CENTER FOR THE STUDY OF DEMOCRATIC INSTITUTION."PACEM IN MARIBUS".

Malta,28/6/70.

Programma e partecipanti.

1) - Paper N°1.

2) - Paper N°2.

3) - Ocean Enterprice.

Pacem in Maribus

MALTA
June 28 — July 3,
1970

An

International Convocation

on

Frontiers of the Seas

to Explore Peaceful Uses of

The Oceans and the Ocean Floor

Conducted

On the Island of Malta

June 28 - July 3

1970

by the

Center for the Study

of Democratic Institutions

. . . I think it is clear that there
can be no doubt that an effective
international regime over
the seabed and the ocean floor beyond a clearly
defined national jurisdiction is the only
alternative by which we can hope to avoid
the escalating tensions that will be
inevitable if the present situation is allowed
to continue. It is the only alternative
by which we can hope to escape the immense
hazards of a permanent impairment
of the marine environment. It is, finally,
the only alternative that gives assurance that
the immense resources on and under
the ocean floor will be exploited with harm
to none and benefit to all.
Finally, a properly established international
regime contains all the necessary
elements which should make it acceptable
to all of us here: rich and poor countries,
strong and weak, coastal and
land-locked States. Through an international
regime all can receive assurance
that at least the deep sea floor will be
used exclusively for peaceful purposes
and that there will be orderly
exploitation of its resources.

ARVID PARDO

The Representative of Malta
U.N. Document A/C.1/PV 1516

The Marine Revolution

THE MARINE REVOLUTION is upon us, and now must take its place on the long list of great disjunctures that have marked human history — the political, industrial, and socio-economic revolutions of the past, the technological and biological revolutions of the present. The Marine Revolution partakes of all of these and adds a new dimension.

The great sea change stems immediately from the rapidly expanding and intensifying industrialization of the oceans. Scientific and technological breakthroughs have opened the hidden depths, and in the process they have raised a host of ecological issues related to the increasingly acute concern for the total human environment. As man moves for the first time to exploit territory traditionally regarded as a no-man's land beyond sovereign claim he poses grave new problems of development and disarmament, and brings new stress to the fragile structure of international relations.

There are already many ominous signs that the Marine Revolution could turn out to be predominantly destructive. In important ways it is without precedent; starting from a far more advanced stage than earlier industrial developments this impending transformation allows no time to adjust to change, and takes place in a medium that magnifies the effects of miscalculation. On the basis of present trends reputable scientists now predict that the oceans may be dead of man-made pollution before the end of the century. Bereft of this essential reservoir of life, the earth might finally become unable to sustain the marauding human race.

Yet, no one can seriously propose that industrializations of the oceans be halted. A "zero-growth economy" for the seas is the most utopian of all utopias — and, worse still, it is a rich man's dream that would become a nightmare for the majority of peoples whose survival requires full development of the world's

resources. Luddism did not work on land. It will not work under water.

The realistic alternative is to harness and rationally direct the forces of the Marine Revolution, minimizing the destructive side effects. The oceans can be bountiful. Food production could be increased fourfold, even sixfold, during the next thirty years. Oil production might well increase at about the same rate, and advancing technology will reclaim an increasing proportion of the mineral treasure trove on the ocean floor: fifteen billion tons of copper, seven thousand billion tons of boron, fifteen billion tons of manganese, twenty billion tons of uranium, five hundred billion tons of silver .... Such resources are not static or given; they are what man and his ongoing technological revolution make of them.

So, for better or worse, we can expect cities to expand over the oceans, and colonies for work and recreation to come into being deep down below. The oceans will provide improved means of weather forecast and control; communications and transport on and below the surface are destined to grow in volume, density and speed. The Marine Revolution has brought to a new focus the basic issues inherent in the technological and biological transformations that characterize our age, and this in turn demands consideration of their impact on democratic institutions and international relations. The oceans have come to pose a problem too serious, and too diverse, to be left to oceanographers. Thus the studies that preceded this conference reached across the disciplines, and outside them.

Two primary considerations encouraged an approach on such a scale. First, the ocean problem can be, and has been, singled out and at least operationally separated from the more complex issues of the deteriorating human environment as a whole. Thanks to the bold and imaginative initiative of the Government of Malta, the problem is now before the United Nations. A Forty-two Nations Sea-bed Committee has been given a mandate to propose to the General Assembly a set of principles to support the legal framework and functional structure of an international ocean regime. Rarely, if ever, have pioneers on the frontiers of evolving political theory addressed themselves to such a ready forum.

On the other hand, any successful approach to

the creation of an ocean regime leads inescapably to consideration of the great, overriding issues of international relations that constitute the ultimate threat to the human environment. We cannot expect to move forward here at Malta without catching some preliminary glimpse of new forms of international cooperation; a system that guarantees peaceful development of ocean resources as the common property of mankind must be based on improved understanding of the relations between the human environment and law; and it would require institutionalizing new forms of participation and communication among transnational science, multinational industry, and international politics. The creation of an international ocean regime could mark the point of passage from one era of international relations to another. The great maritime no-man's land offers a chance for a new beginning.

Pacem in Maribus is a private, unofficial assembly, convened by the Center for the Study of Democratic Institutions on the invitation of the Government of Malta. The Convocation brings together political leaders from all parts of the world, as well as scientists and experts in ocean industries and fisheries. In preparation for the Convocation, the Center sponsored a series of five study conferences, each giving rise to a voluminous publication. The total bulk of these writings and transcripts runs to about 3,000 pages, plus a bibliography of more than 800 titles.

The findings, observations, and conclusions embodied in those papers dwell on broad and general issues, are descriptive of the present state of affairs, and set forth the principal agreements and disagreements on the adequacy of current information, and on its interpretation. The summary that follows is based on the assumption that the endeavor now must proceed from purely theoretical research to a combination of theoretical and operational elements. So, too, the program of the Convocation has been arranged to facilitate consideration of the operational principles that appear to govern development of an ocean regime:

1. The ocean environment is an indivisible whole comprising high seas, territorial waters, contiguous zones, and estuaries; seabed and continental shelf and the atmosphere above it; living and nonliving resources;

channels of communication; bodies of national and international law; traditions, myths, values, passions and fears. He who deals with any aspect of ocean problems, willingly or unwillingly, must deal with the whole.

2. The oceans are a vital part of the earth's life support system, affected by and affecting the atmosphere, and subject to alteration by discharges from land.

3. There is an area of the seabed and ocean floor and the subsoil thereof, which lies beyond the limits of national jurisdiction. The boundary between that area and the area which falls under national jurisdiction must be determined but its location is not a precondition for the establishment of an ocean regime. The rigidity of any territorial political boundary, furthermore, is affected by the impact of functional and ecological boundaries peculiar to the ocean environment.

[*Wednesday Panel:* The Limits of National Jurisdiction.]

4. The littoral zones of the oceans and seabeds contain the principal reservoirs of known resources and are the principal generators of pollution. No matter where the political boundaries are drawn, activities in these areas must be regulated by common accord.

5. Ocean resources are not static but are a function of technology, which is a process of continuous change.

[*Wednesday Panel:* National and International Management of Fishery Resources.]

6. The oceans are the common heritage of mankind. They cannot be expropriated; profits must be shared equitably; management must be based on the participation of all peoples and nations.

[*Monday and Wednesday Panel:* The Common Heritage of Mankind.]

7. The essence of such management must be planning for the conservation and development of the ocean environment and its resources.

8. Such planning must be systemic, interlinking the multiple uses of, and interests in, the marine environment. It must be functionally directed, not territorially directed. It must be conducted in the context of natural ecological units and according to their ecologic-

ally determined boundaries even though these do not correspond to political boundaries. It must be a cooperative effort of nations, industrial enterprises and scientific institutions. It must be voluntary, not enforced by an international bureaucracy, providing incentive through the benefits derived therefrom; the only sanction against non-cooperation would be exclusion from benefits. It must be based on maximal participation of those concerned with management as well as of those interested in the reinvestment and redistribution of profits. It must include both short-range and long-range projections, covering spans ranging from two to 50 years and more.

9. Planning must be based on monitoring to provide a continuing flow of information; it must coordinate the activities of states, intergovernmental agencies, national and international scientific institutions. The input of scientific information into planning and political decision-making must be improved and strengthened.

[*Tuesday and Wednesday Panels:* Planning and Development in Relation to Ocean Resources.]

10. Since data-storage and information can never be exhaustive and complete, planning must be based on imperfect information. It must be flexible enough to adapt to change resulting from new information.

11. Planning for the conservation and development of the ocean environment must deal with the interface between scientific research and military intelligence and between industrial development and military development. It is in the context of such planning that the disarmament of the ocean floor and of the high seas beyond the limits of national jurisdiction can become a reality.

[*Monday Panel:* Arms Control and Disarmament in the Oceans; Interaction Between Military Development and Industrial Development.]

12. Planning for the conservation and development of the ocean environment must be conducted in such a way that it satisfies the needs of the developing nations for economic growth as well as those of the developed nations for stability and conservation, and that it reconciles the profit motivation of industrial enterprises (whether private or public, capitalist or socialist, their interests in the ocean environment are

the same) with their emphasis on efficiency, and the responsibility of the political community for accommodating multiple and conflicting uses, with its emphasis on equity.

[*Thursday Panel:* The Emerging Ocean Regime.]

These operational principles, derived from the proceedings of the five preparatory conferences, leave a number of issues still unresolved.

Global planning must be articulated in a network of regional, national, and local plans. The relations of earth sensing of the sea and of the land must be clarified; the work of existing United Nations and intergovernmental bodies must be implemented and integrated by a new over-all planning body; the attempts to define territorial boundaries by common accord must continue; the question whether an international regime should function as a holding company issuing licenses, or as an operator in the exploration and exploitation of the seas, must be decided one way or the other, although perhaps not once and for all; services to be provided (weather forecasting, sea monitoring) must be determined. Research and study in these areas and others must continue, and there must be recognition that all areas are interconnected.

At best, the establishment of a legal regime and the determination of the boundaries of the ocean area beyond national jurisdiction may require several years and hinge on the outcome of a new general conference on the law of the seas. In the meantime it is essential that interim arrangements be made to provide a bridge between the present, unsatisfactory situation and the establishment of an effective regime.

Some such interim arrangement might result from unofficial initiatives, with the agreement and cooperation of governments and intergovernmental bodies. This would be seen as preceding establishment of an ultimate legal regime, which obviously must be the responsibility of governments, with the nongovernmental sector providing support and cooperation. There is ample precedent for such a development; new forms of integration between the public and the private sector (where it exists as a developed infrastructure), or between the individual citizen and government, are emerging in countries of varying stages of development, and even in the uncertain area of supranational relations.

In this sense the *Pacem in Maribus* initiative might

provide an immediate response, however partial, to the challenge voiced by Secretary-General U Thant on May 15, 1970.

"If effective measures are to be taken in time, we need something new — and we need it speedily — a global authority with the support and agreement of governments and of other powerful interests, which can pull together all the piecemeal efforts now being made and fill the gaps where something needs to be done."

Elisabeth Mann Borgese,
Senior Fellow, Center for the Study of Democratic Institutions
and
Secretary-General of the Pacem in Maribus Convocation

* * * *

THE CENTER for the Study of Democratic Institutions is an independent, non-profit, educational institution devoted to discussion and clarification of basic issues facing the world today. It is an outgrowth of the Fund for the Republic, established in 1952 by the Ford Foundation.

The Center, located in Santa Barbara, California, no longer has any affiliation, financial or otherwise, with the Ford Foundation, or with other major philanthropic organizations, governmental, or tax-supported agencies. The current program depends on contributions from more than 100,000 members scattered around the world.

The core of the Center's work is the dialogue. The deliberately small resident staff of seven Senior Fellows plus distinguished visiting experts meets daily for discussion, aided from time to time by Associates and special consultants. The results of these continuing colloquies are disseminated through the *Center Magazine,* Occasional Papers, special publications, and an audiotape service available to radio broadcasters and discussion groups.

When a particular subject demands a wide range of participants and a more immediate impact on the world community, the Center organizes a major conference with internationally prominent participants.

Thus *Pacem in Maribus* was preceded by *Pacem in Terris* I in New York in 1965, and *Pacem in Terris* II in Geneva in 1967.

Robert M. Hutchins, Chairman of the Center, has summed up the Center's purpose in these words:

"We believe in the power of reason. In spite of the tragedies of two world wars and the nightmare events of recent years, we believe that man is a reasonable creature. We believe the appeal to reason may still be heard. This is the base on which we operate. The Center is an intellectual community dedicated to trying to get things clear so that a reasonable argument can be conducted. The Center does not take positions: it seeks to promote understanding by indicating responsible positions that can be taken and to suggest what the consequences may be; it is concerned with what ought to be done. As a result, the Center operates between the ivory tower and the political arena and believes that through the dialogue we can think, and think together, about how to transform knowledge into wisdom, how to work in common toward the solution of human problems."

In pursuit of that goal the Center sought special contributions to finance *Pacem in Maribus*. This Convocation is made possible by the generous response of the following:

Associated Students
University of California
Santa Barbara, Calif.

Mr. Nils Astrup
Fearnley & Eger
Oslo, Norway

Ente Nazionale Irdocarburici
Rome, Italy

Mr. James H. Douglas, Jr.
Chicago, Illinois

Fiat Corporation
Turin, Italy

Mr. & Mrs. Frank Gilloon
Del Mar, California

Hunt-Wesson Foods
Fullerton, Calif.

I. R. I.
Rome, Italy

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Toledo, Ohio

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New York, New York

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New York, New York

Mr. Lowell Wakefield
Port Wakefield, Alaska

* * * *

The Center acknowledges its special debt to the Government of Malta, His Excellency, the Governor General of Malta, Sir Maurice Dorman, The Honorable Prime Minister of Malta, Dr. Giorgio Borg Olivier, His Excellency, Ambassador Arvid Pardo, Mr. Joseph R. Grima and the entire staff of the Ministry of Commonwealth and Foreign Affairs of Malta. It is most grateful, too, to Professor E.J. Borg Costanzi, Vice Chancellor of the Royal University of Malta, for so generously arranging for the use of the Aula Magna, and for the cooperation of his Faculties and students. It also wishes to thank Dr. Aurelio Peccei, President of Italconsult, M. Christian Monnier of Paris, France, Professor Shigeru Oda of Tohoku University, Sendai, Japan, Mr. Wilbert M. Chapman of Ralston Purina Company in San Diego, California, whose last-minute illness prevented him from attending this Convocation, the United Nations and all its specialized agencies, and the hundreds of others on all the continents who responded when they were needed.

Sunday

June
28
Sunday

10:00 a.m. - 12:00 noon
Corinthia Palace Hotel

Meeting of the Steering Committee

Presiding:
William O. Douglas
of the United States
Associate Justice of the Supreme Court
Member, Board of Directors
Center for the Study of Democratic Institutions
Chairman of the Pacem in Maribus Convocation

6:00 p.m. - 8:00 p.m.
Valletta

Plenary Session at the Aula Magna

Royal University of Malta

Presiding:
Harry S. Ashmore
of the United States
President, Center for the Study of Democratic Institutions

Greeting:
His Excellency the Governor General of Malta,
Sir Maurice Dorman, G.C.M.G., G.C.V.O.

Address:
William O. Douglas
of the United States
Associate Justice of the Supreme Court
Member, Board of Directors
Center for the Study
of Democratic Institutions

Message:
His Excellency, U Thant,
Secretary-General of the United Nations
to be delivered by:
Vittorio Winspeare Guicciardi
Under-Secretary-General and Director General
United Nations

Report:
The Status of the Sea-bed in the United Nations Disarmament Committee
Her Excellency, Mrs. Alva Myrdal
of Sweden
Minister of State, Representative of Sweden
on the United Nations Disarmament Committee

Report:
The Status of the Sea-bed in the United Nations Sea-bed Committee
His Excellency, Arvid Pardo
of Malta
Ambassador to the United States,
the United Nations, and the Union of Soviet Socialist Republics.
Representative of Malta on the United Nations Sea-bed Committee.

To be followed by a reception at the Hilton Hotel

Monday

8:30 a.m. - 9:30 a.m.
Corinthia Palace Hotel

Planning Session for Students and Junior Civil Servants

Election of Chairman

Panel:

S. Arthur-Worrey
of Nigeria

Mansour Farhang
of Iran

Ann L. Hollick
of the United States

Kola Ikusemiju
of Nigeria

Uwe Jenisch
of the German Federal Republic

Peter Kausch
of the German Federal Republic

Max Ivers Kehden
of the German Federal Republic

Nancy C. Price
of the United States

P. Sreenivasa Rao
of India

Jean Pierre Salanic
of France

David P. Stang
of the United States

Jorge A. Vargas Silva
of Mexico

Peter Weingart
of the Federal German Republic

Monday

June
29
Monday

9:30 a.m. -
1:00 p.m.
Corinthia Palace Hotel

Group 1
Election of Chairman

Arms Control and Disarmament in the Oceans

Panel:

(Rapporteur)
Lord Ritchie-Calder of Balmashannar
of Great Britain
Chairman, Metrication Board,
Associate, Center for the
Study of Democratic Institutions

Joab Augusto de Araujo Castro
of Brazil
Ambassador to the United Nations

John Craven
of the United States
Massachusetts Institute of Technology

Mohamed Fakhreddine
of Sudan
Ambassador to the United Nations

John Galtung
of Norway
Director, International Peace
Research Institute

Samar Sen
of India
Ambassador to the United Nations

Seiichi Tagawa
of Japan
Chairman, Subcommittee
for Marine Development,
House of Representatives, The Diet

Anton Vratusa
of the Federal Socialist Republic of Yugoslavia
Deputy Secretary of Foreign Affairs

(to be announced)
of the Union of Soviet Socialist Republics

Monday

9:30 a.m. -
1:00 p.m.
Corinthia Palace Hotel

Group 2
Election of Chairman

The Role of Enterprises in an Ocean Regime

Panel:

(Rapporteur)
Neil Jacoby
of the United States
Former Economic Advisor to
the President of the United States
School of Business Administration, University of California,
Los Angeles,
Associate, Center for the Study of Democratic Institutions

M.C. Basu
of India
Planning Commission, Government of India

David S. Blanchard
of the United States
Chief of Maritime Branch
International Labour Office

Enrico Bonomi
of Italy
Director, International Studies Division, ENI

Frank LaQue
of the United States
Vice President, International Nickel Co. Inc.

Michel Lemaignan
of France
President, Compagnie Francaise
des Petroles

Kenji Okamura
of Japan
Mitsubishi Heavy Steel Company

Antonis Tritsis
of Greece
Illinois Institute of Technology

Edward Wenk Jr.
of the United States
University of Washington

Monday

9:30 a.m. -
1:00 p.m.
Corinthia Palace Hotel

Group 3
Election of Chairman

Fishery and Ocean Ecology

Panel:

(Rapporteur)

Sidney J. Holt
of Great Britain
Secretary, Intergovernmental Oceanographic Commission
UNESCO

H. Kasahara
of Japan
Dean, College of Fisheries, University of Washington

Cyril Lukas
of Great Britain
Intergovernmental Oceanographic Commission
UNESCO

N. K. Panikkar
of India
Director, National Institute of Oceanography

Walter Ranke
of the German Democratic Republic
Vice Director, Institute for Fisheries

Mario Ruivo
of Portugal
Director, Fishery Resources Division,
Food and Agriculture Organization of the United Nations

Oris Russell
of the Bahamas
Permanent Secretary to Ministry of Agriculture
and Fisheries

Lowell Wakefield
of the United States
President, Wakefield Fisheries
Alaska

Monday

9:30 a.m. -
1:00 p.m.
Corinthia Palace Hotel

Group 4
Election of Chairman

The Role of Science and Scientists in the Oceans

(Rapporteur)

Harvey Wheeler
of the United States
Senior Fellow, Center for the Study of Democratic Institutions

A.A. Buzzati-Traverso
of Italy
Assistant Director-General for Science,
UNESCO

Hidetsugu Ishikura
of Japan
Councillor, Science and Technology Agency

Robert Jungk
of the German Federal Republic
Technische Universität, Berlin

C.I.O. Olaniyan
of Nigeria
University of Lagos

Jacques Piccard
of Switzerland
Oceanographer, Explorer

Roger Revelle
of the United States
Center for Population Studies,
Harvard University

Warren S. Wooster
of the United States
Scripps Institution of Oceanography

Renigius Zagorski
of the People's Republic of Poland
Vice Chairman, Academy of Science,
Marine Research Committee

Monday

1:30 p.m. *Luncheon*

4:00 p.m. - 6:00 p.m.
Corinthia Palace Hotel

Groups 1 and 2: Joint Session

Presiding:

William O. Douglas
of the United States
Associate Justice of the Supreme Court
Member, Board of Directors,
Center for the Study of Democratic Institution

Report:

The ILA Committee on Deep Sea Mining

L.J. Bouchez
of the Netherlands
University of Utrecht

Panel:

The Resource Potential of the Seabed

Milner B. Schaefer
of the United States
Director, Institute of Marine Resources
University of California, San Diego

Nonliving Resources as Common Heritage of Mankind Legal Implications

Jovan Djordjevic
of the Federal Socialist Republic of Yugoslavia
Justice, Constitutional Court of Yugoslavia

Interaction between Military Development and Industrial Development

John Craven
of the United States
Massachusetts Institute of Technology

The Role of Enterprises in Planning and Decision-Making

W. Langeraar
of Denmark
Chairman, Intergovernmental Oceanographic Commission,
UNESCO

Criteria for the Allocation of Rights: Registration, Determination of Licenses and Leases, Collection of Royalties, Distribution of Benefits

Thorvald L. Mellingen
of Norway
Continental Shelf Division, Royal Norwegian Council
for Scientific and Industrial Research

Monday

4:00 p.m. - 6:00 p.m.
Corinthia Palace Hotel

Group 3

Fishery and Ocean Ecology

(concluded)

Panel:

H.R. Bardarson
of Iceland
President of the Assembly of the Inter-Governmental Maritime Consultative Organization

Jean E. Carroz
of Switzerland
Fishery Liaison Officer,
Food and Agriculture Organization of the United Nations

Ralph Townley
of Great Britain
Chief, Animal and Fish Resources Programme
United Nations Development Programme

(to be announced)
of the Union of Soviet Socialist Republics

4:00 p.m. - 6:00 p.m.
Corinthia Palace Hotel

Group 4

The Role of Science and Scientists in the Oceans

(concluded)

Panel:

Richard Bellman
of the United States
University of Southern California
Associate, Center for the Study of Democratic Institutions

Alexander Comfort
of Great Britain
Group Director, University College

(to be announced)
of the Union of Soviet Socialist Republics

Carlo Morelli
of Italy
President, Osservatorio Geofisica Sperimentale, Trieste

9:30 p.m.
Corinthia Palace Hotel

Reception by their Excellencies
the Governor General of Malta
and Lady Dorman

Tuesday

June
30
Tuesday

9:00 a.m. -
1:00 p.m.
Corinthia Palace Hotel

Group 1

Arms Control and Disarmament in the Oceans

(concluded)

Panel:

Jens Evensen
of Norway
Royal Ministry of Foreign Affairs

Woyzych Goralzyk
of the People's Republic of Poland
International Law, Warsaw University

Gerhard Hahn
of the German Democratic Republic
Director, Institute of International Relations

David Hall
of Australia
Secretary, Committee on the Peaceful uses of the Sea-bed and the Ocean Floor Beyond the Limits of National Jurisdiction,
Chief, Section for Sea-bed and Ocean Floor Affairs,
Department of Political and Security Council Affairs
United Nations

Said Uddin Khan
of Pakistan
U.N. Peace-keeping Mission, Nigeria

Robin Murray
of Great Britain
London Business School

Robert Neild
of Great Britain
Director, Stockholm International Peace Research Institute

E.R. Richardson
of Jamaica
Ambassador from Jamaica to the United States

Salim Ahmed Salim
of the United Republic of Tanzania
Ambassador to the United Nations

Torgil Wulff
of Sweden
Royal Ministry of Foreign Affairs

Tuesday

9:00 a.m. -
1:00 p.m.
Corinthia Palace Hotel

Group 2

The Role of Enterprises in an Ocean Regime

(concluded)

Panel:

Z. Blazevic
of the Federal Socialist Republic of Yugoslavia
Legal Advisor, INA

J. Devaux-Charbonnel
of France
Legal Adviser, ERAP

Gjert Laading
of Norway
~~Continental Shelf Division~~
Royal ~~Norwegian Council for Scientific~~ and
Industrial Research

Edward Lamb
of the United States
President and Chairman of the Board
Lamb Enterprises, Inc.
Member of the Board of Directors, Center
for the Study of Democratic Institutions

Giulio Pontecorvo
of the United States
Columbia University, Graduate School of Business

Horst Schlimper
of the German Democratic Republic
Vice Minister of Communications

~~Tetsuya Senga~~
of Japan
Federation of Economic Organizations

Vincenzo Soro
of Italy
Director-General of Economic Affairs,
Ministry of Foreign Affairs

Anthony Lovell Smith
of Great Britain
Consultant, Under-Sea Engineering Projects

Jerzy Vohau
of the People's Republic of Poland
Ministry of the Merchant Marine

Tuesday

9:00 a.m. -
1:00 p.m.
Corinthia Palace Hotel

Group 3

Planning and Development in Relation to Ocean Resources

Panel:

(Rapporteur)

Oscar Schachter
of the United States
Research Director, United Nations
Institute for Training and Research

M.C. Basu
of India
Planning Commission, Government of India

Jovan Djordjevic
of the Federal Socialist Republic of Yugoslavia
Justice, Constitutional Court of Yugoslavia

William Ewald
of the United States
Visiting Fellow, Center for the Study of Democratic Institutions

Ruth Orr
of Israel
Legal Adviser
Ministry of Development

F.E. Popper
Food and Agriculture Organization of the United Nations

Raúl Prebisch
of Chile
Director-General, Latin American Institute
for Economic and Social Planning
United Nations

Vincenzo Soro
of Italy
Director-General of Economic Affairs
Ministry of Foreign Affairs

Ralph Townley
of Great Britain
Chief, Animal and Fish Resources Programme
United Nations Development Programme

Tuesday

9:00 a.m. - 1:00 p.m.
Corinthia Palace Hotel

Group 4

Ocean Ecology

Panel:

(Rapporteur)

John Wilkinson
of the United States
Senior Fellow, Center for the Study of Democratic Institutions

H.R. Bardarson
of Iceland
President of the Assembly
Inter-Governmental Maritime Consultative Organization

A.A. Buzzati-Traverso
of Italy
Assistant Director-General for Science, UNESCO

Milner B. Schaefer
of the United States
Director, Institute of Marine Resources, University of California, San Diego

Lars-Goran Engfeldt
of Sweden
Second Secretary, Permanent Mission of Sweden to the United Nations

Arnold Kuenzli
of Switzerland
University of Basel

Bengt Lundholm
of Sweden
Swedish Natural Science Research Council

Kenneth E.F. Watt
of Canada
Institute of Ecology, University of California, Davis

Warren S. Wooster
of the United States
Scripps Institution of Oceanography

1:30 p.m.

Luncheon

3:15 p.m. - 7:00 p.m.
Corinthia Palace Hotel

Excursion Offered by the Malta Government Tourist Board

Places to be visited:
Upper Barracca Gardens
National Museum
St. John's Co-Cathedral and Museum
The Palace

Wednesday

July
1
Wednesday

9:00 a.m. -
1:00 p.m.
Corinthia Palace Hotel

Group 1

The Limits of National Jurisdiction

Panel:

(Rapporteur)

Arvid Pardo
of Malta
Ambassador to the United States, the United Nations,
and the Union of Soviet Socialist Republics.
Representative of Malta on the United Nations Sea-bed Committee

Juraj Andrassy
of the Federal Socialist Republic of Yugoslavia
University of Zagreb

Paul Bamela Engo
of the Federal Republic of Cameroon
Minister-Counsellor
Permanent Mission to the United Nations

Wolfgang Friedmann
of Great Britain
The Law School, Columbia University

Louis Henkin
of the United States
The Law School, Columbia University

Nugroho
of Indonesia
Lawyer, former Ambassador to the
Democratic Republic of Vietnam

Shigeru Oda
of Japan
Tohoku University

Jose M. Ruda
of Argentina
Ambassador to the United Nations

Wednesday

9:00 a.m. - 1:00 p.m.
Corinthia Palace Hotel

Groups 2 and 3: Joint Session

Presiding:

W. Langeraar
of Denmark
Chairman, Intergovernmental Oceanographic Commission, UNESCO

Report:

Participation Potential and Needs of the Developing Nations in the Exploitation of Ocean Resources

Sergio Martins Thompson-Flores
of Brazil
First Secretary, The Brazilian Mission to the United Nations

Panel:

Planning and Development and the Role of Enterprises

Z. Blazevic
of the Federal Socialist Republic of Yugoslavia
Legal Adviser, INA

Jan Van Dauman
of Great Britain
Assistant Director of Public Relations, International Business Machines, Ltd.

Richard Eells
of the United States
Graduate School of Business, Columbia University

Kenji Okamura
of Japan
Mitsubishi Heavy Steel Co.

J. Picard
of France
Compagnie Française des Petroles

Oscar Schachter
of the United States
Research Director, United Nations Institute for Training and Research

Lowell Wakefield
of the United States
President, Wakefield Fisheries
Alaska

Wednesday

9:00 a.m. -
1:00 p.m.
Corinthia Palace Hotel

Group 4

Report:

Scientific Potential and Needs of the Developing Nations in the Exploration of Ocean Resources

(to be announced)

Panel:

International Cooperation in Weather Forecasting, Control and Modification

Arthur Barber
of the United States
Director, Institute for Policy and Planning, Washington, D.C.

Eugene Bollay
of the United States
President, American Meteorological Society

Jens N. Engelstad
of Norway
Continental Shelf Division
Royal Norwegian Council for Scientific and Industrial Research

Wendell Mordy
of the United States
University of Montana

Alf Nyberg
of Sweden
President, World Meteorological Organization

Kenneth Spengler
of the United States
American Meteorological Society

N.L. Veranneman
of Sweden
Secretary of the EC Panel
on Meteorological Aspects of
Ocean Affairs
World Meteorological Society

(to be announced)
of the Union of Soviet Socialist Republics

Wednesday

1:30 p.m. *Luncheon*

4:00 p.m. - 6:00 p.m.
Corinthia Palace Hotel

Groups 1 and 3: Joint Session

Presiding:

H.R. Bardarson
of Iceland
President of the Assembly, Inter-Governmental Maritime Consultative Organization

Report:

National and International Management of Fishery Resources

Shigeru Oda
of Japan
Tohoku University

Panel:

Living Resources as Common Heritage of Mankind: Legal Implications

Francis T. Christy, Jr.
of the United States
President, Resources for the Future, Inc.

Regional Arrangements

Jean E. Carroz
of Switzerland
Fishery Liaison Officer
Food and Agriculture Organization of the United Nations

Conflicting Uses of the Marine Environment

Enoch Dillon
of the United States
National Council on Marine Resources and Engineering Development

Georgette Mariani
of France
Centre National pour l'Exploitation des Oceans

Nugroho
of Indonesia
Lawyer, former Ambassador to the Democratic Republic of Vietnam

Wednesday

4:00 p.m. - 6:00 p.m.
Corinthia Palace Hotel

Groups 2 and 4: Joint Session

Presiding:

A.A. Buzzati-Traverso
of Italy
Assistant Director-General for Science, UNESCO

Report:

Interaction between Scientific and Commercial Exploration and Freedom of Research and Information

Warren S. Wooster
of the United States
Scripps Institution of Oceanography

Panel:

Development and Pollution
Pollution Control

O.A. Amarel Affonso
of Brazil
Diretoria de Hidrografia e Navegacao
Ministerio da Marinha

Thomas Busha
of the United States
Inter-Governmental Maritime Consultative Organization

Jerold M. Lowenstein
of the United States
San Francisco Medical Center, University of California

Bengt Lundholm
of Sweden
Swedish Natural Science Research Council

(to be announced)
of the Union of Soviet Socialist Republics

9:15 p.m.
Mdina

Open Air Concert at Cathedral Square

Thursday

9:00 a.m. - 12:00 noon
Corinthia Palace Hotel

Group 1

The Emerging Ocean Regime: Its Area of Competence and its Legal Framework

Report:

Louis Sohn
of the United States
Counsellor on International Law for the Department of State

Report:

(to be announced)
of the Union of Soviet Socialist Republics

Panel:

(Rapporteur)
Elisabeth Mann Borgese
of the United States
Senior Fellow, Center for the Study of Democratic Institutions
Secretary-General, Pacem in Maribus Convocation

Hamilton S. Amerasinghe
of Ceylon
Ambassador to the United Nations, Chairman of the United Nations Sea-bed Committee

Gaetano Arangio-Ruiz
of Italy
University of Bologna

Silviu Brucan
of the Socialist Republic of Romania
University of Bucharest
Visiting Fellow, Center for the Study of Democratic Institutions

Paul Bamela Engo
of the Federal Republic of Cameroon
Minister-Counsellor, Permanent Mission to the United Nations

Wolfgang Friedmann
of Great Britain
The Law School, Columbia University

Lazar Mojsov
of the Federal Socialist Republic of Yugoslavia
Ambassador to the United Nations

Alva Myrdal
of Sweden
Minister of State,
Representative of Sweden on the United Nations Disarmament Committee

Raul Prebisch
of Chile
Director-General, Latin American Institute for Economic and Social Planning, United Nations

Thursday

July
2
Thursday

9:00 a.m. -
12:00 noon
Corinthia Palace Hotel

Group 2

Pollution, Insurance, and Self-Regulation of Enterprises

Panel:

Joseph Barnea
of
Director, Resources and Transport Division, Department of Economic and Social Affairs, United Nations

Z. Blazevic
of the Federal Socialist Republic of Yugoslavia
Legal Adviser, INA

Hidetsugu Ishikura
of Japan
Councillor, Science and Technology Agency

Ramon Magalef
of Spain
Instituto de Investigaciones, Pesqueras, Barcelona

Oscar Schachter
of the United States
Research Director, United Nations Institute for Training and Research

A. de Spingler
of France
Directeur Adjoint au Domaine Minier, ERAP

Kenneth E.F. Watt
of Canada
Institute of Ecology
University of California, Davis

Thursday

9:00 a.m. - 12:00 noon
Corinthia Palace Hotel

Group 3

Organizational Problems of Fishery Enterprises

Panel:

David Blanchard
of the United States
Chief of Maritime Branch
International Labour Office

Sidney J. Holt
of Great Britain
Secretary, Intergovernmental Oceanographic Commission
UNESCO

H. Kasahara
of Japan
College of Fisheries, University of Washington

N.K. Panikkar
of India
Director, National Institute of Oceanography

Giulio Pontecorvo
of the United States
Graduate School of Business, Columbia University

Milner B. Schaefer
of the United States
Director, Institute of Marine Resources
University of California, San Diego

Lowell Wakefield
of the United States
President, Wakefield Fisheries
Alaska

Thursday

9:00 a.m. -
12:00 noon
Corinthia Palace Hotel

Group 4

Report:

IOC Activities in Ocean Research

Sidney J. Holt
of Great Britain
Secretary, Intergovernmental Oceanographic Commission
UNESCO

Panel:

Systems Analysis and Forecasting in the Ocean Environment

Nicholas Flemming
of Great Britain
National Institute of Oceanography

Robert L. Friedheim
of the United States
Center for Naval Analyses

Robert Jungk
of the German Federal Republic
Technische Universität, Berlin

William Mansfield
of the United States
National Council of Marine Resources and Engineering Development

Carlo Morelli
of Italy
President, Osservatorio Geofisica Sperimentale, Trieste

Jerome Morenoff
of the United States
President, Ocean Data Systems, Inc.

(to be announced)
of the Union of Soviet Socialist Republics

Thursday

12:30 p.m. *Luncheon*

3:00 p.m. - 5:00 p.m. Groups 1 and 4: Joint Session

Corinthia Palace Hotel

Presiding:

E.R. Richardson
of Jamaica
Ambassador to the United States

Report:

Legal Needs of the Scientific Community

Roger Revelle
of the United States
Center for Population Studies,
Harvard University

Panel:

Science as the Common Heritage of Mankind Legal Implications

Arnold Kuenzli
of Switzerland
University of Basel

The Role of Scientists in Decision-Making in an Ocean Regime

Alexander King
of Great Britain
Organization for Economic Cooperation and Development

The Internationalization of Research and Development

Dino Dindo
of Italy
Council of Europe

Scientific Research on and above the Continental Shelf

Thorvald L. Mellingen
of Norway
Continental Shelf Division
Royal Norwegian Council for Scientific and Industrial Research

Thursday

3:00 p.m. - 5:00 p.m
Corinthia Palace Hotel

Groups 2 and 3: Joint Session

Presiding:

O.A. Amarel Affonso
of Brazil
Diretoria de Hidrografia e Navegacao
Ministerio da Marinha

Report:

Special Needs of Latin American Nations and Enterprises

Joao Araujo Castro
of Brazil
Ambassador to the United Nations

Panel:

Consortia and Joint Ventures

Wolfgang Friedmann
of Great Britain
The Law School, Columbia University

J.P. Lacrois
Directeur de l'Exploitation,
EFL — Re

Milenko Milic
of the Federal Socialist Republic of Yugoslavia
Attorney at Law

Tetsuya Senga
of Japan
Federation of Economic Organizations

Manuel Terez-Guerrero
Secretary-General, United Nations Conference on Trade and Development

6:30 p.m
Valletta

Cocktail Reception

by the Hon. Minister
of Commonwealth and Foreign Affairs
Dr. Giorgio Borg Olivier, to be held at
Old Chancellery Hall, Ministry of Commonwealth
and Foreign Affairs

Friday

July
3
Friday

9:00 a.m. - 1:00 p.m.
Valletta

Plenary Session at the Aula Magna

of the Royal University of Malta, Valletta

Presiding:
William O. Douglas
of the United States
Associate Justice of the Supreme Court
of the United States
Member, Board of Directors
Center for the Study of Democratic Institutions

Address:
Dr. Giorgio Borg Olivier
of Malta
The Hon. Prime Minister

Reports:
By the Chairmen of the Working Groups

Summary and Conclusions:
Harry S. Ashmore
of the United States
President, Center for the Study of Democratic Institutions

Appointment of a Continuing Group

1:30 p.m — *Luncheon*

3:15 p.m - 6:30 p.m

Sightseeing Excursion offered by the Malta Government Tourist Board

Places to be Visited:
The Old Capital City, Mdina
Roman Villa and Museum
Buskett Gardens
Mosta Church

8:30 p.m.
Hilton Hotel

Closing Banquet

Presiding:
Arvid Pardo
of Malta
Ambassador to the United States, the United Nations, and the Union of Soviet Socialist Republics

Addresses:
Hamilton S. Amerasinghe
of Ceylon
Ambassador to the United Nations
Chairman of the Sea-bed Committee

(Others to be announced)

Steering Committee

Chairman of the Convocation:
William O. Douglas
Member, Board of Directors,
Center for the Study of Democractic Institutions

Deputy Chairman:
Harry S. Ashmore
President
Center for the Study of Democractic Institutions

Secretary General:
Elisabeth Mann Borgese
Senior Fellow, Center for the Study of Democratic Institutions

Chief S.O. Adebo
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Director, United Nations Institute for Training and Research

Gaetano Arangio-Ruiz
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University of Bucharest,
Visiting Fellow,
Center for the Study of Democratis Instutions

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Ralston Purina Company

Xavier Denieu
of France
Maître des Requêtes
au Conseil d'Etat
Rapporteur of the Foreign Affairs Commission and
Member of the National Assembly

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of the United States
United Nations Development Programme

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of the Union of Soviet Socialist Republics
Director, Institute of World Economics
and International Relations

Edward Lamb
of the United States
President and Chairman of the Board,
Lamb Enterprises, Inc., and Member,
Board of Directors, Center for the Study of
Democratic Institutions

Frank L. LaQue
of the United States
Vice President, The International Nickel Co., Inc.

Clare Boothe Luce
of the United States
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of the United States
Scripps Institution of Oceanography

Shigeru Oda
of Japan
Law School, Tohoku University

Arvid Pardo
of Malta
Ambassador to the United States,
the United Nations, and the Union of Soviet Socialist Republics

Jacques Piccard
of Switzerland
Oceanographer, Explorer

Raul Prebisch
of Chile
Director-General, Latin American Institute
for Economic and Social Planning, United Nations

Roger Revelle
of the United States
Center for Population Studies, Harvard University

The Participants in the Convocation

O.A. Amarel Affonso
of Brazil
Diretoria de Hidrografia e Navegacao,
Ministerio da Marinha

Lewis Alexander
of the United States
Law of the Seas Institute,
University of Rhode Island

George Alexandrowicz
of Canada
Faculty of Law, Queen's University

Nimat Al-Nakib
of Iraq
Iran National Oil Co., Baghdad

Hamilton S. Amerasinghe
of Ceylon
Ambassador to the United Nations

Juraj Andrassy
of the Federal Socialist Republic of Yugoslavia
University of Zagreb

Gaetano Arangio-Ruiz
of Italy
University of Bologna

S. Arthur-Worrey
of Lagos, Nigeria

Jaoa Augusto de Araujo Costro
of Brazil
Ambassador to the United Nations

Harry S. Ashmore
of the United States
President, Center for the Study of Democratic Institutions

Arthur Barber
of the United States
Institute for Policy and Planning

H.R. Bardarson
of Iceland
President of the Assembly of the
Inter-Governmental Martime Consultative Organization

Joseph Barnea
Director, Resources and Transport Division Department of
Economic and Social Affairs, United Nations

M. C. Basu
of India
Planning Commission, Government of India

J. A. Beesley
of Canada
Head of Legal Division
Canadian Department of External Affairs

Richard Bellman
of the United States
University of Southern California,
Associate, Center for the Study of Democratic Institutions

David S. Blanchard
of the United States
Chief of Martime Branch,
International Labour Office

Z. Blazevic
of the Federal Socialist Republic of Yugoslavia
Legal Advisor, INA

Eugene Bollay
of the United States
President, American Meteorological Society

Enrico Bonomi
of Italy
Chief, International Studies Bureau, ENI

Elisabeth Mann Borgese
of the United States
Senior Fellow, Center for the Study of Democratic Institutions
and Secretary-General, Pacem in Maribus Convocation

Leo J. Bouchez
of the Netherlands
Volkenrechtelijk Instituut der Rijksuniversiteit te Utrecht

Michael Bradley
of the United States
University of Michigan, School of Natural Resources

Eugene Brooks
of the United States
Plainview, Long Island

The Participants in the Convocation

David Brower
of the United States
Director , John Muir Institute for Environmental Studies, Inc.

E.D. Brown
of Great Britain
Faculty of Laws, University College

Neville Brown
of Great Britain
Lecturer in International Politics,
University of Birmingham

Silviu Brucan
of the Socialist Republic of Romania
University of Bucharest, Visting Fellow,
Center for the Study of Democratic Institutions

Thomas Busha
of the United States
Inter-Governmental Martime Consultative Organization

A.A. Buzzati-Traverso
of Italy
Assistant Director-General for Science, UNESCO

Lord Ritchie-Calder of Balmashannar
of Great Britain
Chairman, Metrication Board,
Associate, Center for the Study of Democratic Institutions

Jean E. Carroz
of Switzerland
Fishery Liaison Officer, Food and Agriculture
Organization of the United Nations

Wilbert M. Chapman
of the United States
Director of Marine Resources, Ralston Purina Company

J. Devaux-Charbonnel
of France
Legal Advisor, ERAP

Francis T. Christy, Jr.
of the United States
President, Resources for the Future, Inc.

S. von Ciriacy-Wantrup
of the United States
College of Agriculture, University of California, Berkeley

John Cogley
of the United States
Senior Fellow and Editor of *The Center Magazine*
Center for the Study of Democratic Institutions

Alexander Comfort
of Great Britain
Group Director, University College

Joseph Connell
of the United States
University of California, Santa Barbara

John Craven
of the United States
Massachusetts Institute of Technology

Raymond F. Dasmann
of the United States
Director, The Conservation Foundation, Washington, D.C.

Enoch Dillon
of the United States
National Council on Marine Resources and
Engineering Development

Sidney M. Davis
of the United States
New York, New York

T. Joseph Devine
of Canada
Canadian Institute of International Affairs

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of Italy
Council of Europe

Jovan Djordjevic
of the Federal Socialist Republic of Yugoslavia
Justice, Constitutional Court of Yugoslavia

William O. Douglas
of the United States
Associate Justice of the Supreme Court,
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Chairman of the Pacem in Maribus Convocation

Ernest Dubois
of France
Directeur, Bertin et Cie

Rene J. Dupuy
of France
University of Nice

Richard Eells
of the United States
Graduate School of Business, Columbia University

The Participants in the Convocation

Joseph W. Ehrenreich
of the United States
University of Southern California

Asbjorn Eide
of Norway
International Peace Research Institute

Jens N. Engelstad
of Norway
Royal Norwegian Council for Scientific and Industrial Research

Lars-Goran Engfeldt
of Sweden
Second Secretary,
Permanent Mission of Sweden to the United Nations

Paul Bamela Engo
of the Federal Republic of Cameroon
Minister-Counsellor, Permanent Mission to the United Nations

Jens Evensen
of Norway
Royal Ministry of Foreign Affairs

William Ewald
of the United States
Visiting Fellow,
Center for the Study of Democratic Institutions

Mohamed Fakhreddine
of Sudan
Ambassador to the United Nations

Mansour Farhang
of Iran

Nicholas Flemming
of Great Britain
National Institute of Oceanography

Robert L. Friedheim
of the United States
Center for Naval Analyses

Wolfgang Friedmann
of Great Britain
The Law School, Columbia University

John Galtung
of Norway
International Peace Research Institute

Mr. and Mrs. Frank J. Gilloon
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Center for the Study of Democratic Institutions

Norton Ginsburg
of the United States
University of Chicago

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of the Polish People's Republic
International Law, Warsaw University

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of the United States
New York, New York

William A. Gross
of the United States
Director of Research, Ampex Corporation

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United Nations, Geneva

Max Habicht
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Counsellor, International Law

Gerhard Hahn
of the German Democratic Republic
Director, Institute of International Relations

David Hall
of Australia
Secretary, Committee on the Peaceful Uses of the Sea-Bed and the Ocean Floor Beyond the Limits of National Jurisdiction. Chief, Section for Sea-Bed and Ocean Floor Affairs, Department of Political and Security Council Affairs, United Nations

Michael Hardy
of Great Britain
United Nations Legal Department

John Lawrence Hargrove
of the United States
Director of Studies,
The American Society of International Law

Crane Haussamen
of the United States
Member, Board of Directors,
Center for the Study of Democratic Institutions

The Participants in the Convocation

Louis Henkin
of the United States
The Law School, Columbia University

Sven Hirdman
of Sweden
Stockholm International Peace Research Institute

Ann L. Hollick
of the United States
Washington, D.C.

Sidney J. Holt
of Great Britain
Secretary, Intergovernmental Oceanographic Commission, UNESCO

Peter S. Hunt
of the United States
Peter Hunt Associates

C. P. Idyll
of the United States
Division of Fishery Sciences, University of Miami

Kola Ikusemiju
of Nigeria
Western State Fisheries Service, Lagos

Hidetsuga Ishikura
of Japan
Science and Technology Agency, Tokyo

Neil Jacoby
of the United States
School of Business Administration, University of California, Los Angeles, Former Economic Advisor to the President of the United States, Associate, Center for the Study of Democratic Institutions

Uwe Jenisch
of the German Federal Republic

Robert Jungk
of the German Federal Republic
Technische Universität

H. Kasahara
of Japan
College of Fisheries, University of Washington

Peter Kausch
of the German Federal Republic

Max Ivers Kelden
of the German Federal Republic

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of the United States
Vice President and Director of Continuing Education, Center for the Study of Democratic Institutions

General Said Uddin Khan
of Pakistan
United Nations Peace-Keeping Mission, Nigeria

Alexander King
of Great Britain
Organization for Economic Cooperation and Development

H. Gary Knight
of the United States
Louisiana State University

James Knott
of the United States
Washington Center of Foreign Policy Research

Tadeusz Kozluk
of the Polish People's Republic
Second Secretary, Permanent Mission of the Polish People's Republic to the United Nations

Arnold Kuenzli
of Switzerland
University of Basel

Werner Kuhn
of the United States
Lawyer

Gjert Laading
of Norway
Continental Shelf Division, Royal Norwegian Council for Scientific and Industrial Research

J.P. Lacroix
of France
Directeur de l'Exploitation, ELF — Re

Edward Lamb
of the United States
President and Chairman of the Board, Lamb Enterprises, Inc., and Member, Board of Directors, Center for the Study of Democratic Institutions

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Chairman, Intergovernmental Oceanographic Commission, UNESCO

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of the United States
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of France
President, Compagnie Francaise des Petroles

Jean-Pierre Levy
of France
United Nations Secretariat.

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of Great Britain
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of Sweden
Ecological Research Committee,
Swedish Natural Science Research Council

Florence Mahoney
of the United States
Washington, D.C.

Gerard Mangone
of the United States
Woodrow Wilson International Center for Scholars

William H. Mansfield
of the United States
National Council on Marine Resources and
Engineering Development

Madeline Marina
of the United States
Assistant to E.M. Borgese

Ramon Margalef
of Spain
Instituto de Investigaciones Pesqueras, Barcelona

Georgette Mariani
of France
Centre National Pour l'Exploitation des Oceans

Andrew Martin
of Great Britain
International Law, University of Southampton

Ed S. Mathews
of France

Nicholas M. Matte
of Canada
McGill University

Frances McAllister
of the United States
Member, Board of Directors,
Center for the Study of Democratic Institutions

Jack McFarland
of the United States
Consolidated Edison Company of New York, Inc.

Thorvald L. Mellingen
of Norway
Continental Shelf Division, Royal Norwegian Council
for Scientific and Industrial Research

Emile Merlin
of France
Directeur Technique, Compagnie General Transatlantique

Milenko Milic
of the Federal Socialist Republic of Yugoslavia
Attorney at Law

Florence Mischel
of the United States
Director, Audio-Tape Program, Center for the
Study of Democratic Institutions

Lazar Mojsov
of the Federal Socialist Republic of Yugoslavia
Ambassador to the United Nations

Brooke Mordy
of the United States
Editor

Wendell Mordy
of the United States
University of Montana

Carlo Morelli
of Italy
President, Osservatorio Geofisica Sperimentale, Trieste

Jerome Morenoff
of the United States
President, Ocean Data Systems, Inc.

The Participants in the Convocation

Koji Morimoto
of Japan
Secretary to Sciichi Tagawa,
House of Representatives, The Diet

Fritz Munch
of the German Federal Republic
Heidelberg University

Frances Murray
of Great Britain
Educator

Robin Murray
of Great Britain
London Graduate School of Business Studies

Alva Myrdal
of Sweden
Minister of State,
Representative of Sweden to the United Nations
Disarmament Committee

Else S. Nagel
of the United States
Photographer

Fred Warner Neal
of the United States
Claremont Graduate School, Associate, Center for the
Study of Democratic Institutions

Robert Neild
of Great Britain
Director, Stockholm International Peace Research Institute

William A. Nierenberg
of the United States
Scripps Institution of Oceanography

Nugroho
of Indonesia
Lawyer, Former Ambassador to the
Democratic Republic of Vietnam

Alf Nyberg
of Sweden
President, World Meteorological Organization

Dennis M. O'Connor
of the United States
University of Miami

Shigeru Oda
of Japan
Law School, Tohoku University

J.D. Ogundere
of Nigeria
Advisor in International Law, Federal Ministry of Justice

Kenji Okamura
of Japan
Mitsubishi Heavy Steel Co.

C.I.O. Olaniyan
of Nigeria
University of Lagos

Robert E. Osgood
of the United States
National Security Council

Seniel Ostrow
of the United States
Member, Board of Directors, Center for the
Study of Democratic Institutions

Felipe Paolillo
of Uruguay
University of Montevideo

Arvid Pardo
of Malta
Ambassador to the United States, the United Nations,
and the Union of Soviet Socialist Republics,
Representative of Malta on the United Nations
Sea-Bed Committee

Vladimir Pavicevic
of the Federal Socialist Republic of Yugoslavia
Second Secretary, Permanent Mission of the Federal
Socialist Republic of Yugoslavia to the United Nations

Aurelio Peccei
of Italy
President, Italconsult

Mario Pedini
of Italy
Under Secretary of State for Foreign Affairs

A. Perrodon
of France
Chef du Department Geologique Central, ERAP

J. Picard
of France
Compagnie Francaise des Petroles

Jacques Piccard
of Switzerland
Oceanographer, Explorer

The Participants in the Convocation

Giulio Pontecorvo
of the United States
Graduate School of Business, Columbia University

F.E. Popper
Food and Agriculture Organization of the United Nations

Frank Potter
of the United States
Executive Director, Environmental Clearinghouse,
Washington, D.C.

Raul Prebisch
of Chile
Director-General, Latin American Institute
for Economic and Social Planning, United Nations

Nancy C. Price
of the United States
Science Policy Research Division,
Legislative Reference Service, The Library of Congress

Walter Ranke
of the German Democratic Republic
Vice Director, Institute for Deep Sea Fisheries

P. Sreenivasa Rao
of India

Anthony T. Ressa
of the United States
Attorney at Law, Bellevue, Washington

Roger Revelle
of the United States
Center for Population Studies, Harvard University

E.R. Richardson
of Jamaica
Ambassador to the United States

Hans Richter
of the German Democratic Republic
Foreign Ministry

Ondolf Rojahn
of the German Federal Republic
Heildelberg University

Morris Rosoff
of the United States
Attorney at Law, New York, New York

Mr. and Mrs. Robert Rothschild
of the United States
Rhombar Company, Inc., New York, New York,
Founding Members,
Center for the Study of Democratic Institutions

Jose M. Ruda
of Argentina
Ambassador to the United Nations

Larry Ruff
of the United States
University of California, San Diego

Mario Ruivo
of Portugal
Director, Fishery Resources Division,
Food and Agriculture Organization of the United Nations

Jean-Pierre Salanic
of France
Attorney at Law

Salim Ahmed Salim
of the United Republic of Tanzania
Ambassador to the United Nations

Oscar Schachter
of the United States
Research Director, United Nations Institute
for Training and Research

Milner B. Schaefer
of the United States
Director, Institute of Marine Resources,
University of California, San Diego

Stuart A. Scheingold
of the United States
University of Washington

Eric Schindler
of Switzerland
John Muir Institute for Environmental Studies, Inc.

Horst Schlimper
of the German Democratic Republic
Vice Minister of Communications

O. Schloesing
of France
Chef du Service Iuridique, Compagnie Francaise des Petroles

Samar Sen
of India
Ambassador to the United Nations

The Participants in the Convocation

Tetsuya Senga
of Japan
Federation of Economic Organizations

Agha Shahi
of Pakistan
Ambassador to the United Nations

Stanley K. Sheinbaum
of the United States
Associate, Center for the Study
of Democratic Institutions

Rei Shiratori
of Japan
Japan Peace Research Institute

Saul M. Silverstein
of the United States
Rogers Corporation, Founding Member,
Center for the Study of Democratic Institutions

Reginald Simmonds
of Ghana
Faculty of Law, University of Ghana

Norman J. Singer
of the United States
General Counsel, Oceanic Exploration Company

Anthony Lovell Smith
of Great Britain
Consultant, Under-Sea Engineering Projects

Beryl Smith
of the United States
Radio Technician, Center for the
Study of Democratic Institutions

George P. Smith, II.
of the United States
School of Law, University of Arkansas

Louis Sohn
of the United States
Counselor on International Law, Department of State

P. V. J. Solomon
of Trinidad and Tobago
Ambassador to the United Nations

Vincenzo Soro
of Italy
Director-General of Economic Affairs,
Ministry of Foreign Affairs

Kenneth Spengler
of the United States
Executive Director, American Meteorological Society

A. de Spingler
of France
Directeur Adjoint au Domaine Minier, ERAP

David P. Stang
of the United States
Assistant to the Under Secretary,
Department of the Interior

Seiichi Tagawa
of Japan
Chairman; Sub Committee for Marine Development,
House of Representatives, The Diet

Peter Tagger
of the United States
Director of Promotion, Membership and Development,
Center for the Study of Democratic Institutions

Milko Tarabanov
of the People's Republic of Bulgaria
Ambassador to the United Nations

Manuel Terez-Guerrero
Secretary General,
United Nations Conference on Trade and Development

Peter M. Thacher
of the United States
Counsellor for Disarmament and Outer Space Affairs,
United States Mission to the United Nations. Observer

Sergio Martins Thompson-Flores
of Brazil
First Secretary, Brazilian Mission to the United Nations

Arturo M. Tolentino
of the Philippines
Majority Floor Leader, The Senate

Ralph Townley
of Great Britain
Chief, Animal and Fish Resources Programme,
United Nations Development Programme

Antonis Tritsis
of Greece
Illinois Institute of Technology

Remigio Valido
of the United States
San Francisco, California

The Participants in the Convocation

Jan Van Dauman
of Great Britain
Assistant Director of Public Relations,
IBM, United Kingdom, Ltd.

Jorge A. Vargas Silva
of Mexico

John Van Dyke
of the United States
Visiting Fellow, Center for the Study
of Democratic Institutions

Wolfgang Vitzthum
of the German Federal Republic
Freiburg University

Sabine Vollmar
of the German Federal Republic
Legationsrätin, Auswärtiges Amt.

Jerzy Vonau
of the Polish People's Republic
Ministry of the Merchant Marine

Piers von Simson
of Great Britain
Research Assistant,
Center for the Study of Democratic Institutions

Anton Vratusa
of the Federal Socialist Republic of Yugoslavia
Deputy Secretary of Foreign Affairs

Lowell Wakefield
of the United States
President, Wakefield Fisheries, Alaska

Liselotte Waldheim
of Austria
Disarmament Affairs Division, United Nations Secretariat

Mrs. Kenneth E. Walser
of the United States
New Canaan, Connecticut

Kenneth E. F. Watt
of Canada
Institute of Ecology, University of California, Davis

Peter Weingart
of the German Federal Republic

Edward Wenk, Jr.
of the United States
University of Washington

Harvey Wheeler
Senior Fellow, Center for the Study
of Democratic Institutions

John Wilkinson
of the United States
Senior Fellow, Center for the Study
of Democratic Institutions

Warren S. Wooster
of the United States
Scripps Institution of Oceanography

Torgil Wulff
of Sweden
Royal Ministry for Foreign Affairs

Elizabeth Young
of Great Britain
Disarmament Expert

Renigius Zagorski
of the Polish People's Republic
Vice Chairman, Academy of Sciences,
Marine Research Committee

Georges Abi-Saad
of Switzerland
Graduate Institute of International Studies

Joseph Barbara
of Malta
Vocational Training Officer, Fisheries Section
Department of Agriculture and Fisheries

Mihai Bacescu
of the Socialist Republic of Romania

Baltron Bethel
of the Bahamas
Permanent Secretary to the Ministry of Home Affairs

E. Busuttil
of Malta
Head, Department of Public Law,
The Royal University of Malta

S. Busuttil
of Malta
Head, Department of Applied Economics,
The Royal University of Malta

The Participants in the Convocation

F. Cremona
of Malta
Dean, Faculty of Law and Head,
Department of Commercial Law

Xavier Deniau
of France
Maître des Requêtes au Conseil d'Etat
Rapporteur of the Foreign Affairs Commission and
Member of the National Assembly

Arthur D. Hanna
of the Bahamas
Deputy Prime Minister

K. P. Jain
of India
Senior Research Officer
Permanent Mission of India to the United Nations, Geneva

Hal Melvin
of the United States
Rob Houwer Films

H. Micallef
of Malta
Head, Department of Biology,
The Royal University of Malta

M. A. Movahed
of Iran
Senior Legal Advisor, Board of National Iranian Oil Compony

N. K. Panikkar
of India
Director, National Institute of Oceanography

Sidharth Shankar Ray
of India
Member, Legislative Assembly

N. K. Salve
of India
Member of Parliament

G. Schembri
of Malta
Lecturer, Department of Commercial Law (Maritime)

N. L. Veranneman
of Sweden
Secretary of the EC Panel on Meteorological Aspects of
Ocean Affairs, World Meteorological Organization

Participants and Observers are attending the convocation
in their private capacities;
official titles are listed only for identification.
A supplementary list of those accepting
after this program went to press is inserted.
Panel listings are subject to last minute changes.

The Participants in the Convocation

(SUPPLEMENTARY LIST)

Saud Al-Sabah
of Kuwait

Nagamitsu Asano
of Japan
Member, Board of Directors, Japan Fisheries Association

Ahmed Taibi Benhima
of Morocco
Ambassador, Permanent Mission of the Kingdom of Morocco
to the United Nations

Arthur Borne
of Great Britain
Chairman, Ocean Resources Conservation Association

William F. Claire
of the United States
World Federalists, Washington, D.C.

Peter Dorn
of Italy
Oceanographic Museum

Aymar Achille Fould
of France
Assemblee Nationale

Alain du Haut Cilly
of France
Compagnie Francaise des Petroles

Vincent Hill
of Jamaica
Commissioner of Mines, Government of Jamaica

J. Joseph
of Monaco
Director, International Laboratory of Marine Radioactivity,
International Atomic Energy Agency of the United Nations

Narumich Kasuga
of Japan
Japan Petroleum Development Corporation

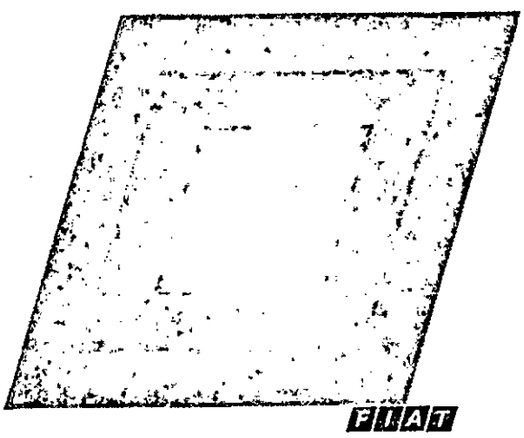
Soubhi J. Khanachet
of Kuwait
Envoy Extraordinary and Minister Plenipotentiary,
Permanent Mission of the State of Kuwait
to the United Nations

John Logue
of the United States
Villanova University

Mme. Martin-Stone
of France

CENTER FOR THE STUDY OF DEMOCRATIC INSTITUTIONS
Box 4068, Santa Barbara, California 93103

New York Office: 136 East 57th Street, New York 10022
Los Angeles Office: 205 South Beverly Drive, Beverly Hills, California 90212



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" . . . As I write, the sea whispers to me and I close my eyes. I am looking into a world unborn and formless, that needs to be ordered and shaped . . . "

1903 *Tonio Kröger*

The Center for the Study of Democratic Institutions / The Fund for the Republic, Inc.

PACEM IN MARIBUS CONVOCATION

MALTA

JUNE 28 - JULY 3, 1970

Box 4068, Santa Barbara, California 93103/Telephone: (805) 969-3281/Cable: CENTER SANTABARBARA (CALIF)

CONTENTS

NOTE TO ALL PARTICIPANTS:

This folder contains introductions to the five volumes derived from the proceedings of the preliminary Pacem in Maribus conferences. The table of contents following each introduction list the papers and authors included in the final collections. Also included are a copy of the tentative agenda, and a list of participants complete as of the last week in May.

Manuscript copies of each of these volumes will be available at Malta in sufficient quantity to permit any participant to consult any paper he may find of special interest. It is expected that the entire series, plus a bibliography, and a summary of the proceedings at Malta, will be published shortly in an English languge trade edition.

One volume in the series, OCEAN ENTERPRISES, is being published in special format as a Center Occasional Paper and will be available in printed form. The others, in manuscript, have been edited separately and there are some duplications and variations in style which will be eliminated in the final published version.

PACEM IN MARIBUS

Introduction to the Series of Volumes

by Elisabeth Mann Borgese

The issue most likely to occupy the forefront of public attention during the seventies is conservation and improvement of the human environment. Issues pertaining to what is loosely termed "ecology" are dominant in local, national, and international politics; this in itself is a matter of moment since passionate public interest is rarely aroused at all three levels simultaneously. The concern embraces the whole of human environment, natural or man-made, physical or social. The new emphasis is on the entirety -- cities and wilderness, oceans and atmosphere -- and on the interdependence of parts.

Yet, in order to understand what is happening to our environment, and what might be done about it, it is necessary to deal with the parts that make up the whole. The address in these volumes is to the oceans; they are particular, they are immense, and they are in crisis. Abruptly we have found ourselves at the end of the era when the vast expanse and great depth of the seas provided immunity from man's exploitative drive and talent. Within the next ten years thirty-five per cent of the world's growing oil requirements will be met from offshore production. Food from the oceans -- including fishmeal and fish-protein concentrates -- may quadruple

by the end of the century. A revolution in the mining industry is in the making; it may be fifteen years away or a hundred and fifty, but it is certain, and when it comes, most of the world's metal supply will be mined under water. Cities may expand over the oceans; colonies for work and recreation may be built deep down below. Weather forecasting and potential control depend on the oceans; communications and transport on the surface and beneath it are growing in volume and density.

Development of ocean resources is coming with a rush. It raises urgent new demands for order, at a minimum for a systematic approach to coördination of increasing, and often conflicting, multiple uses. The alternative is political and economic chaos, environmental pollution, perhaps even the ultimate pollutant, war itself.

The oceans and the ocean floor, covering over seventy per cent of this planet, are no-man's-land, and so, in another sense, they belong to everyman. So far no nation has laid claims of sovereignty to any territory beyond the narrow strip of coastal waters and of the continental shelf. It is here, on this "common property of mankind," that nations from the East, the West, and the underdeveloped continents are now called upon to cooperate in unprecedented ventures made possible by new underwater technology. This is the last global frontier challenging man's creative energy and imagination; the need, and the opportunity, is not merely to

develop physical resources but to devise new forms of international cooperation and organization.

The problems of the oceans are peculiar; yet they are interdependent with the problems that arise on land, in the air, and in outer space. Thus new forms of organization appropriate to this particular no-man's-land are bound to provide spin-offs in other critical areas as well. It was this conviction that led the Center for the Study of Democratic Institutions to consider the seabottoms as a vast, available, and as yet humanly unpopulated laboratory for institutional change. In the winter of 1967 a study project was initiated on the law of the seas. The first phase brought together diplomats, scientists, fishery experts, and industrialists from a number of countries and resulted in publication of a model statute for a possible ocean regime.* The second phase broadened the scope of the project through a series of conferences at the Center and elsewhere.

On June 28, 1970, this protracted undertaking reached climax when the Center convened at Valetta, Malta, an international convocation devoted to clarification of the urgent issues that had been identified in the extended examination of the impending exploitation of the ocean deeps for military and commercial purposes. The convocation was titled Pacem in Maribus (Peace in the Oceans) to establish its continuity with two previous international convocations. These were undertaken initially by the Center in

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* The Ocean Regime, A Center Occasional Paper, October, 1968.

response to the call for a new exploration of means of ending the Cold War contained in the late Pope John XXIII's notable encyclical, Pacem in Terris. The first of the Pacem in Terris convocations was held in New York in 1965 and brought together a unique combination of political leaders and intellectuals from the Eastern and Western blocs. In 1967, under the lengthening shadow of the war in Southeast Asia, a similar gathering, Pacem in Terris II, was convened in Geneva, Switzerland.

The focus of Pacem in Maribus has been somewhat narrower, and the composition of the convocation different. The immediate issues for consideration were those raised by development of a new underseas technology that has ended the historic immunity of the ocean deeps from man's exploitation -- limited until this century to hunting down marine life from the surface of the seas. However, the implications of the Malta conference went far beyond the scientific, technical, military, legal, and political issues raised by man's impending advent into territory to which no nation has a traditional claim of sovereignty. The issues raised there are international on their face, and they are novel; among all the controversies in the course of the studies there was one general agreement -- that solutions must be found in new and unexplored areas of international cooperation that may well exceed the limited reach of existing treaty-based international organizations.

Between 1968 and 1970 an astonishing amount of work has been directed toward the problems involved in the establishment of an ocean regime. The Center's coordinating efforts have paralleled those going forward at the international and national levels, in the public as well as in the private sector, in the areas of both popular literature and scholarly publishing. Much of this research and publication is purely scientific, or is concerned with narrow practical problems such as those encountered by fisheries, restricted to military considerations, treated within the limits of technological-industrial opportunities for exploitation, or confined to the complex legal entanglements that fascinate experts on maritime law.

In the United Nations, military and disarmament problems have been referred to the Geneva Disarmament Committee where attempts to reach consensus on a very limited treaty based on a Soviet-American draft have thus far been a failure. The scientific aspects of the problem are covered by UNESCO's Intergovernmental Oceanic Commission (I.O.C.) and Scientific Commission on Oceanic Research (S.C.O.R.), both operating within a limited frame of reference and with restricted means. (The annual budget of I.O.C. is $200,000.). Meteorology is treated separately by the World's Meteorological Organization (W.M.O.). Fishery development is coordinated by the Food and Agriculture Organization. Pollution is dealt with by IMCO, the Intergovernmental Maritime Consultative

Organization, and F.A.O., the Food and Agriculture Organization, while the World Health Organization and the International Labor Organization are involved with safety standards and labor relations in oceangoing commerce, traffic, and industry.

In addition to all this, the United Nations General Assembly has appointed a permanent Seabed Committee of forty-two nations, which, in turn, has set up a special legal subcommittee and a technological-economic subcommittee. Both have issued reports, based on fact-finding studies provided by the Secretariat as well as by the specialized agencies. Liaison and coordination among all these groups have been vastly improved during the last two years by the establishment of interagency and intersecretariat committees, and it is expected that synthesis of all factors and elements should emerge from the discussions of the Seabed Committee, followed by the debates in the First Committee of the General Assembly and the General Assembly as a whole.

The complexity of this cumbersome intergovernmental machinery makes it certain that tangible results will be slow in coming. Such an operation, by its nature, tends to produce descriptive and statistical rather than prescriptive and creative material. At best, it may tend toward the extension, coordination, and perfection of existing concepts and organizations. Novelty is slow to emerge from old concepts, and unity is hard to forge from the specialized and fragmentary. Modern science, on the other hand, especially systems analysis utilizing cybernetics to discover synergetic effects, suggests a different approach -- not

from the part to the whole but from the whole to the part, from the "system" to the "subsystem" with all their interconnections and feedbacks.

The ocean environment is an indivisible whole comprising high seas, territorial waters, contiguous zones, and estuaries; seabed and continental shelf and the atmosphere above it; living and non-living resources; channels of communication; bodies of national and international law; traditions, myths, values, passions, and fears. A pebble dropped in any one area sends rings of ripples outward. He who deals with any aspect of ocean problems, willingly or unwillingly, must deal with the whole.

Considerations of military uses of the seas, at issue in current negotiations on arms control and disarmament, are inseparably interconnected with the legal issues of the continental shelf and the limits of national jurisdiction. What happens within even the first mile offshore may render any international system of security and control ineffective. A great deal of oceanographic research alsays has been carried on under military auspices, and still is. One of the first requirements of peaceful exploration of the ocean environment is that the role of science and scientists in their relation to the military must be reëxamined and redefined.

With increasing exploitation of oil, gas, and mining resources, private and public enterprises are moving into the

vanguard of technological development. The devices being perfected for commercial exploitation -- new types of submersibles, listening devices or other means of exploration, underwater explosives, submarine habitats, improved storage and transport facilities -- all these are readily convertible into military weapons and vice versa. Thus the military-industrial complex already is manifesting itself under the seas. The provisions of the Soviet-American draft arms-control treaty, prohibiting the installation of weapons of mass destruction on the ocean floor beyond the limit of twelve miles from shore, hardly touches this web of complexities. No matter how amended, such a treaty can be considered only as a first step; the increasingly urgent issues of underseas arms control and disarmament must be dealt with in the context of a legal framework for an ocean regime, within which planning and development for the peaceful uses of the ocean environment and its resources will tend to deemphasize and reduce the military uses of seas and seabed. On the eve of the Malta Convocation this understanding was announced as the basis of official policy by one of the great powers. President Nixon announced willingness to renounce all United States claims beyond a depth of 200 meters in a statement which rejected the demand of American oil interests for a policy of unrestricted competition.*/

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*/ WASHINGTON -- President Nixon Saturday proposed an international treaty remouncing all national claims to ocean resources below a depth of 200 meters and establishing this wealth as "the common heritage of mankind."

Unless nations join to update the law of the sea, he said in a statement released by the White House, "unilateral action and international conflict are inevitable."...

Mr. Nixon said the United States will introduce specific proposals at the next meeting of the U.N. Seabeds Committee to implement the initiatives he outlined Saturday...

"At issue," the President said, "is whether the oceans will be used rationally and equitably and for the benefit of mankind or whether they will become an arena of unrestrained exploitation and conflicting jurisdictional claims in which even the most advanced states will be losers.

"The issue arises now -- and with urgency -- because nations have grown increasingly conscious of the wealth to be explited from the seabeds and throughout the waters above, and because they are also becoming apprehensive about ecological hazards of unregulated use of the oceans and seabeds." -- Los Angeles Times, May 24, 1970.

The Pacem in Maribus project started from this systemic or ecological approach and involved construction of a model regime. Its five subsidiary study projects derive directly from the model and were intended to correct, refine, and complete the preliminary undertaking, and quite possibly to create alternative models. The five projects:

Arms Control and Disarmament.

The Legal Framework for an Ocean Regime; the Continental Shelf and the Limits of National Jurisdiction.

Ecology and the Role of Science and Scientists.

Planning and Development.

The Role of Enterprises.

Preparatory conferences, one for each project, were held at the Center in Santa Barbara, at the University of Rhode Island, and at the United Nations between January and April, 1970. Three

of the study projects proceeded along lines parallel to those followed by other organizations, including the agencies of the United Nations: Arms Control and Disarmament; The Legal Framework for an Ocean Regime; and Ocean Ecology and the Role of Science and Scientists. The other two projects are unique in their concept and development.

Planning and Development, based on the concept that the seas and their beds are the common heritage of mankind, would seem to provide the core of any dynamic working model for an ocean regime. Considering the existence of sovereign nations, such a regime must be based on consensus rather than coercion, and consensus is fostered not by prohibitions and controls but by the prospect that joint policymaking promises expanding opportunities. Creative planning, based on the responsible participation of enterprises and nations, is the positive, dynamic counterpart to trust-busting (of oil monopolies, for example), which is negative and repressive and therefore has proved inefficient, and to such economic devices as the forced unitization of the irrationally splintered and competitive fisheries industry. Planning, in this sense, is directed from the bottom to the top, from the periphery to the center. It is non-enforceable but self-executing, the penalty being exclusion from benefits. To be effective, planning must be such that non-cooperation will be expensive. Its objective must be to increase the capacities of autonomous enterprises and sovereign states through cooperation rather than to curtail

their activities by requiring submission to the restrictive edicts of an international bureaucracy.

In this context consideration of the role of enterprises, begins with an examination of the expanding role of the multinational corporation. Exemplified by the international oil industry, this comparatively recent economic phenomenon has achieved a system of global, large-scale planning and development probably unmatched in the world today. In the words of Robert Engler,* the oil industry has learned that "survival on its terms depends on its ability to plan. Its history is an evolution of experimentation with techniques for creating order, whether the immediate challenge has been waste, competition, scarcity, depression, plenty, technology, war or national boundaries." This necessarily has given rise to new forms of integrating private and public sectors of the economy. Giant corporations now exercise an economic power superior to that of many nation-states; they have developed their own decision-making processes, their own global diplomacy; in economic matters, they deal with sovereigns as sovereigns. Once international relations were relations exclusively among (inter) nations; nations were the only actors in the drama, the only bearers of rights and responsibilities, the only subjects of international law. Today international relations extend over an ever-broadening spectrum of activities, from politics to economics, from social affairs to

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* The Politics of Oil, 1967

science, technology, communications, and culture. Transnational organs are evolving around each of these functions, claiming new rights, shouldering new responsibilities, building new economic empires, molding new loyalties. Non-governmental international organizations and intergovernmental organizations of all types have joined and are joining the nations as actors in the international drama. Slowly but surely, they are acquiring a new status under international law.

In their inescapable role in the decision-making process, industry --as well as science and labor, for which analogous arguments can be made -- might usefully serve as a balancing factor between efficiency and equity in an international regime. Efficiency, in a regime charged with the responsibilities of management, may require a departure from the basic principle of one-nation-one-vote, embodying the concept of the sovereign equality of nations. Considerations of equity, however, may seem to create a contradiction: why should the rich and powerful nations have a bigger voice in international decision-making affecting "the common heritage of mankind" than the numerous and more populous poor nations? The direct and autonomous participation of industry, science and labor in international planning and decision-making could introduce a balancing factor in favor of efficiency without violating the principle of equity. These considerations apply to private as well as to public enterprises, whether they operate under a capitalist or a socialist regime. Their goals and functions under an ocean regime are -- or should be -- the same.

Starting with this systemic approach to ocean problems, projected into a working model, five groups of experts have completed preliminary work on the subprojects. Their work is summarized in these volumes, along with a report on the Pacem in Maribus convocation in Malta, which was charged with reassembling the whole and discussing each issue in the context of all others. To facilitate this task, the participants in the Malta convocation were grouped, not according to subject areas defined in the preliminary study projects, but according to their professional expertise: political-legal groups, industries, fisheries, ocean sciences. Each group consisted of a number of core persons drawn from the ~~study-project panels~~, plus a number of new invitees. Each working group appraised the report or reports in its area of particular competence. This procedure was designed to maintain and enlarge the dialogue which had been carried over from project to project.

Subsequently, the political-legal group, including a number of ambassadors to the United Nations as well as parliamentarians, members of government, and other public opinion leaders, met with each group of technical experts in turn. This confrontation was intended to encourage the emergence of new ideas, in the hope of breaking out of the dichotomies and dilemmas the nineteenth-century tradition of international law tends to impose upon current thinking -- the limits of imagination that so far have

deadlocked negotiations on an ocean regime in the United Nations.

The Center's effort will be deemed worthwhile if the proceedings at Malta are seen to embody even a preliminary glimpse of a new system of international cooperation; a peace system devised for the oceans on the basis of improved understanding of the relationship between human environment and laws; a system institutionalizing new forms of participation and communication among transnational science, multinational industry, and international politics. If this is so, a modest start may have been made toward solving the increasingly urgent problems of the maritime no-man's-land. And the creation of an international ocean regime, founded on the concept of the common heritage of mankind, could mark the point of passage from one era of international relations to another. The lonely seabottoms provide an opportunity for a new beginning.

Volume I

QUIET ENJOYMENT:

ARMS CONTROL AND POLICE FORCES FOR THE OCEAN

Proceedings of the Preparatory Conference

On Arms Control and Disarmament

January, 1970

In Quiet Enjoyment

by Lord Ritchie-Calder of Balmashannar

Seven-tenths of the surface of our planet are covered by the waters we call oceans. The other three-tenths are the continents which, so far, have provided the living-space and the material needs of mankind. On this land-mass, Homo sapiens evolved, migrated and settled. The species differentiated into ethnic groups that carved out territories which became nation-states and which were subdivided into properties, landed estates, homesteads, fields, and urban realty.

The rocks and subterranean strata of the continents were quarried, mined and drilled to extract the solid minerals and the liquid oil to fabricate the material needs and provide motive power. Those resources also represented property to be claimed, exploited and protected against counter-claimants and exprcpriators. To secure the "quiet enjoyment" (to use the lawyers' phrase) of such properties, an elaborate system of laws had to be established and had to be supported by constabularies, by national armies, and, in our day, by the massive, long-range, armaments of global strategy.

The oceans, all 140,000,000 square miles of them, were the waters which separated the continents and the islands, which provided the thoroughfares for trading ships and, in war, the battlegrounds for navies. Periodically, nations, with a sense of naval supremacy, e.g. the Portuguese, the Spaniards or the English, would claim dominion over areas of the open, or high seas. (The Spanish Main was the South and Central American mainland bordering on the Caribbean Sea or vice versa.) The English jurist, John Selden, in

1635, expounded the legal doctrine of Mare clausum in which he asserted that "the sea by the law of nature or nations is not common to all men but capable of private dominion or property as well as the land." This, however, did not prevail against Mare liberum in which Hugo Grotius, the Dutch jurist, in 1609, embodied the doctrine of Freedom of the Seas, qualified only by the practical need of a coastal state to exercise some jurisdiction in the waters adjacent to its shore. In the eighteenth century, this was defined by van Bynkershoek as the actual distance which could be protected by land-based cannon. This range (overambitiously for the weaponry of the time) was defined as three miles.

Beneath the surface of the seas, on which ships had the right of free passage, there were fish. As fishing boats extended their ocean-going capacity and could reach fishing-grounds farther and farther from their own coasts, coastal nations sought to safeguard the livelihoods of their own fishermen by protecting their rights within territorial waters and by seeking to extend the limits of those waters. This took the form of armed protection against foreign competitors as well as a marine constabulary to ensure good fishing practices by their own nationals. Furthermore, the navies of the maritime nations, in common interest, provided a form of collective security against piracy on the high seas.

Naval activity, aggression or defensive, entered a new dimension with the advent of the submarine, which could operate in the concealment of the covering waters.

Without dealing, at this particular point, with the legal claims by coastal states to their territorial waters or to the Continental Shelf as the seaward extension of their national frontiers, it

can scarcely be gainsaid that there is a vast area of our planet, covered by water, which is beyond national jurisdiction, i.e. over which no state can claim dominion. When the British sang lustily "Britannia rules the waves" it was by poetic, and certainly not legal, license. And, indeed, there was little point in making such claims when the wealth of the sea (apart from fish) was in Davy Jones' locker -- the sunken treasure galleons and bullion ships.

The ocean has been described as a "liquid mine." It contains in solution, in suspension, or in deposition, all the Earth's elements. The minerals are disposed in the ocean by various mechanisms. They can come from the mantle through volcanic fissures and vents. They can come from meteorites for which the ocean offers a far bigger target than the land, receiving something like four million tons of cosmic debris per annum. Mainly, however, they come from the crustal rocks of the land surface. The weathering of rocks, the scouring by rains, the action of the winds, and the "open cast mining" by the streams and rivers carving their courses from their watersheds to the seas make their contribution. The waves themselves are a form of hydraulic mining, undercutting cliffs, with their mineral formations and surf-grinding the hardest rocks. On conservative estimates the oceanic waters contain fifteen billion tons of copper; seven thousand billion tons of boron; fifteen billion tons of manganese; twenty billion tons of uranium; five hundred million tons of silver; and ten million tons of gold; and, all other elements in proportions of millions and billions of tons. Diamonds, platinum, placer gold and tin are dredged up from the sea-floor in relatively shallow areas. Ocean rigs drill into submerged Continen-

tal Shelf to get natural gas, oil and molten sulfur. Bromine, common salt and magnesium are extracted from seawater itself. The Germans had the idea of paying off their World War I debt by recovering gold from seawater but were defeated by the cost and magnitude of the operation, which would have meant processing billions of tons of water.

The sea itself, however, by its own alchemy and by the leisurely processes of eons of time, has made substantial conversions. They take the form of "manganese nodules" which is a misleading name because with manganese they incorporate other valuable minerals. These nodules were first brought to the surface a century ago by the British oceanographic vessel "Challenger" which dredged them up from the deep parts of the Atlantic, Pacific and Indian Oceans. From the turn of the century, when the "Albatross" expedition found that the nodules covered an area of the eastern Pacific larger than the United States, little serious attention was paid to nodules until the International Geophysical Year in 1957/58 when the oceanic surveys of that great scientific cooperative enterprise showed that, around the world, the nodules were, in composition and extent, a major source of economic minerals. There may be debate about their extent and global quantities but, however exaggerated some of the optimistic estimates may have been, the amounts are of such orders of magnitude and their geographic distribution so widespread that they constitute a tangible and recoverable resource.

Thus the seabed has become desirable real estate, a property which, beyond the limits of national jurisdiction, belongs to nobody or to everybody. If it belongs to nobody, anybody can claim the right to exploit the resources and somebody else can "muscle-

in." The "anybody" or the "somebody" could be rival corporations or rival nations. In either case, they would have to sustain their "quiet enjoyment" against all-comers. It is difficult to imagine how that enjoyment could be quiet; on the contrary, violent disputes, including resort to armed force and to wars, would seem unavoidable. If, on the other hand, the property belongs to everybody, that means that it is trust for the peoples of the world, i.e. the common property of mankind, in which case some legal system will have to be devised to safeguard it and some machinery will have to be contrived to administer it, to permit the orderly development of the resources and ensure the "quiet enjoyment" of the rights of concessionaires. Neither the law nor the machinery exists. Some sort of Ocean Regime must emerge.

On the initiative of the Government of Malta, through its spokesman Ambassador Pardo, the matter was brought before the United Nations and on October 6, 1967, the General Assembly referred to its First Committee the item:

> "Examination of the question of the reservation exclusively for peaceful purposes of the seabed and the ocean floor and the subsoil thereof, underlying the high seas beyond the limits of present national jurisdiction and the use of their resources in the interests of mankind."

By the time "We, the peoples," in whose name the Charter of the United Nations had been embodied, were thus invoked as possessing a common heritage at the bottom of the sea, a family estate of at least one hundred million square miles, the military were already there. The Maltese resolution had been forestalled by the deep ocean strategies of the great powers. This had become something more than the old-fashioned deployment of submarines or of submerged

mines as a threat to surface navies and to lines of supply. It involved the strategic nuclear missile systems.

With the increased efficiency of aerial and satellite surveillance systems -- the extension of the aerial photography which had revealed in detail the construction of the Cuban missile sites -- and with the target accuracy of nuclear weaponry, fixed land bases had become vulnerable. The answer sought was mobility or concealment. The opaque depths of the sea offered both.

Furthermore this new dimension of strategy intensified the research and technology for operating at great depths. When military services "pick up the tab" and through their appropriations, take care of research and development costs, the time-scale of technological innovation becomes radically different. The "spin-off" from an expense-no-object military program can become the "know-how" of civilian operations. The missile program became the satellite program; the bleeps of Sputnik I became the telecast of Man-on-the-Moon in 1969, twelve years later. With the cut-back of the Outer Space program in 1970, the military-industrial complex of the United States were looking for diversification and were looking for employment of their "know-how" and their manufacturing capacity for purposes of Inner Space, the ocean bed.

Aerospace can become hydrospace in seeking alternatives. This is important in any discussion of the need of an Ocean Bed Regime because there has been a tendency to say "What's the hurry? Deep ocean technology has a long way to go." But has it? It is now quite clear that depths and pressures are no longer regarded as ultimate deterrents. Materials-technology is already far enough advanced to promise manned vehicles even at the greatest depths --

although Man-in-Depth will only be incidental to most of the operations involved in the extraction of the resources of the ocean floor, or its subsoil. Dr. John Craven (at the Center for the Study of Democratic Institutions seminar in January 1970) said, with the assurance of unique experience: "It is technically feasible to put men, material and equipment in the deepest part of the ocean and it will be feasible at low cost in the very near future."

If, therefore, this "know-how" is applied either for military proposes or by some adventurous enterprise which badly wants something of resource-value from the sea-bottom, part of the common heritage of mankind will be preempted; not only will we be wrestling with "squatter's rights" but, in the absence of a regime to require proper safeguards, exploitation may cause serious, perhaps irreversible, ecological damage.

This pollution aspect is critically important. We have had reminders of the kind of hazards from oil blow-outs from drillings on the Continental Shelf, notably the incident in the Santa Barbara Channel starting on January 28, 1969. There the safety measures in the actual drilling process were inadequate and allowed a blow-out from the actual drill-hole, which was blocked after the first escape of oil into the Channel. Ignorance about the nature of the sea-bottom only five miles offshore, however, led to a continuing oil-escape, because the drilling, like the withdrawal of a stiletto from its wound, had produced the equivalent of an internal hemorrhage. The pressure from depth caused the oil from the uncased drill-hole to suffuse the whole system of porous rocks and escape through fissures into the sea, with resulting havoc to wildlife and to recreational beaches. As Dr. V.E. McKelvey, of the U.S.

Geological Survey told the United Nations' Economic and Technical Subcommittee (March 17, 1969): "Subsea mineral exploitation inevitably carries the potential to create hazards to other uses of the sea and damage to other marine resources. The nature of some of those hazards are already known from experience gained in coastal waters but others in respect of the deep sea floor are as yet poorly understood....At this stage it is essential to recognise that some of the problems to be faced are as yet unknown and the dimensions of others are undefined."

He cited some: the use of dynamite for underwater seismic exploration, to determine the nature of geologic structures, with resulting shock destruction of fish; the presence of dumps of millions of tons of ordnance explosives and other military lethal materials in areas of possible mining operations and the ignorance of the effects of dredging for minerals with resultant release of particulate matter into the marine environment. (He rated the latter as unlikely to produce serious effects in the deep sea or beyond national jurisdiction.) The possible risks can be multiplied because we know what we do not know about the ocean and its ecology.

The agencies of national governments can supervise and regulate possible hazardous practices on the Continental Shelf but there is no present body which can lay down rules of behavior and procedure for those who on their own initiative might seek to exploit the deep sea bottom.

While the discussions in the United Nations, now transferred from the ad hoc committee on the seabed to a standing committee continued, the U.S.A. and the U.S.S.R. in October 1969 agreed to a

Joint Draft Treaty within the context of demilitarization. In this they declared themsleves willing not to emplant or emplace....any object with nuclear weapons or any other type of weapons of mass-destruction in or on the ocean floor. It seemed such a nice gesture but it was received with some ungraciousness by many nations. It simply meant that the strategists of the two major powers had already discarded the idea of ocean bottom fortresses in favor of evasive mobility. Strategical submarines of the Polaris type or other forms of submersibles had been accepted as a better proposition.

This underlines the obvious, that the the neutralization of the ocean bed, its floor or its subsoil, cannot be considered apart from the supradjacent waters or from the offensive-defensive uses of the Continental Shelf. The exercise of treating it as a special aspect, however, was invaluable because of the novel issue which it raises and the new frame of reference it provides for security and arms control.

That was why the Center for the Study of Democratic Institutions in preparing the materials for the Malta conference, Pacem In Maribus, made the symposium on demilitarization of the seabed its first in the series. It served both its own and the general purpose, because it raised pretty well all the issues with which one has to deal in considering a possible ocean regime -- even to the point of making the need for such a regime not "possible" but imperative, and urgent.

The examination, with experts available, showed, as has already been stressed, that the time-scale in which development of resources for peaceful purposes and, yes or no, the common good of mankind, is considerably modified by military incentives. If there is a military impetus behind the technology, access to material and non-

material resources may not be deferred as long as some present estimates would suggest. Strategic minerals in short-supply in a nation's inventory could themselves provide a pretext for unilateral exploitation. That would raise the question of how right of access could be acquired, or sustained, in the absence of some regulatory body. It also raises questions of possible damage to the ocean ecology if indiscriminate development should take place, whatever the pretext.

Advances in sea-mining of hard minerals have not so far been as rapid as those of offshore oil-extractin but they are indicative. "The Glomar Challenger," the American scientific survey ship, has already set a record for the deepest penetration into the ocean floor -- drilling 2,759 feet into the subsoil beneath 16,316 feet of water in the North Atlantic. (This was limited by the inability to accomplish reentry-reinsertion of the drill into the hole but this can be overcome within the next few years.) The "boomerang corer" can be used to evaluate seabed mineral deposits. This, dropped from a ship, sinks to the bottom, takes a sample and returns to the surface by float. A sediment analysis device has been developed which sends back signals from the bottom by cable, giving data on acoustic velocity, bearing strength, temperature and bulk density. A radioisotope-powered "pinger," with a five-year life, can send back acoustic signals precisely marking undersea locations. Submersibles, undersea work-vehicles, "habitats" and crawlers are here already.

There are plans for man-made islands, above a seabed site, not on stilts but stabilized on a hygrometer principle, and they can be any size you want. This would be the Space Platform of Inner

Space and could be large enough to provide docking facilities for oil-tankers, or ore-ships or housing an on-the-spot ore-refinery.

As Dr. V.E. McKelvey told the U.N. Economic and Technical Subcommittee (March 13, 1969): "Interest continues in the manganese nodules particularly for their nickel or copper content and research is on the way on mining systems which will make their recovery feasible..."

Dr. Frank L. LaQue, consultant to the International Nickel Corporation, has calculated that to satisfy half the world's present demand for coblat would require only a little over one hundred square miles of nodule-bearing sea-floor and all the nickle demand could be supplied by harvesting 1,500 square miles a year. His idea is for a moving platform which will not occupy the ocean bottom more than transiently -- the equivalent of deep-sea trawling and, according to him, not involving any question of jurisdiction, national or otherwise. This is similar to the view of Mr. J.E. Flipse, President of Deepsea Ventures, a U.S. corporation already set up and ready to go to recover nodules. His reckoning is that for a reasonable pay-out of capital investment and subsequent profit, all that would be needed would be access to an area one thousand square miles or thirty miles by thirty miles, where about half the material would be collectable. He did not see any dangers of claim-jumping. There could be plenty for everybody without muscling-in on each other (Pro. Law of the Sea Institute, University of Rhode Island, Kingston, Rhode Island, 1969).

This "just going fishing" will predictably lead to trouble. Offshore oil-drilling scarcely existed at the end of the Second World War. Since then between nine thousand and ten thousand wells

have been drilled offshore (farthest, seventy miles) and offshore oil now accounts for about 17% of the world's petroleum production. But governments did not leave it to the "just going fishing" people. This wealth made the seaward extension of the coastal states desirable property for which sovereignty is claimed and over which jurisdiction is exercised on a national basis. Governments are prepared to assert and defend their seaward frontiers, and to give flag protection to those to whom they have allocated rights and who expect "quiet enjoyment" of those concessions.

How is that "quiet enjoyment" to be assured in the case of the ocean deeps? In our Center sessions we considered the alternatives (a) of a free-for-all, or (b) of an ocean regime properly constituted.

Assuming that the nationals of a country were to discover and exploit the mineral resources of the seabed with no authority to give them permission to do so and if they were to establish a man-made island, an ocean-platform, above that site, would the state of which they were nations provide flag protection and sustain their claims against all-comers? What would then happen if the "comers" were in turn to invoke flag protection from their states? This would be tantamount to the military expropriation of ocean-property and would more than likely lead to armed conflicts. But we further considered what might be the possible role of multi-national corporations who might combine, with no nationality of origin, in an enterprise of this size and novelty. One of the present characteristics of multinational corporations is that a foreign concern with technological know-how and managerial expertise combines with nationals of a country whose resources or markets they are seeking to develop and, by this incorporation, secure the protection of

their enterprise. But in the deep sea there is no means of doing this. One conceives a consortium of firms combining their capabilities and their technology in a multinational anonymity with neither a flag of state nor a flag of convenience. Through what constabulary would they acquire their "quiet enjoyment?" The answer could be, "their own." They could provide their own security police, as firms now protect their plants against burglary, sabotage or industrial espionage. It is possible to foresee private navies maintaining or extending the claims of the corporations like maritime feudal barons.

At one stage, our discussions in the symposium seemed almost like a script conference for a wild western scenario. We were opening up "The Last Frontier," the oceans, with adventurers going out into the virgin territories staking their claims and repelling interlopers, until the federal marshal came along to represent law and order, followed by the elected sheriff and the appointed constabulary of a regime of law-and-order. The wild western analogy could, comfortably, be extended to the conflict of other interests -- the cattlemen driving out the hunters, the sheepmen in conflict with the ranchers, and both resenting the homesteaders; the competing claims of the railroad "barons" and the primacy of oil. This can be correlated with the conflict of interests between the extraction of material resources and the fishing of living resources and with the freedom of marine transport. When we tempered that melodrama, we still had symptoms worth examining. We looked at present tendencies to see the future challenges. The giant tankers are a case in point: they are not only an ecological hazard but an insurance risk which the tanker companies have now corporately to underwrite. This can only mean an inspectorate to ensure that the conditions are observed and, in the case of pollution, some sort

of self-policing system to see that waste oil is not irresponsibly dumped. There is already the example of TOVALOP, The Tanker Owners Voluntary Agreement Concerning Liability for Oil Pollution. This is a combination of private interests and from it is bound to emerge a new form of supervision and enforcement.

The role likely to be played by large corporations whether nationally incorporated or multinational, in relation to the sea "beyond national jurisdiction" raises issues which do not arise on the Continental Shelf where national jurisdiction applies. Through whom and with whom would they negotiate in the absence of an ocean regime? Or, if an ocean regime existed? How would their "quiet enjoyment" of rights be allocated and, having been allocated, how would they be ensured? It raises new questions of collective insurance and of the inspectorate and constabulary necessary to protect the "common heritage" from expropriation or pollution and how to protect rights once granted in relation to other rights, i.e. fishing, possible fish farming, transport and communications.

As will be seen from the papers which follow an "exercise" which started from the question of demilitarization of the ocean bed, led by an inescapable compulsion to an examination not only of present strategies, of problems of general disarmament and of the spin-off of military technology, but to the questions of a new kind of collective security, of a new custodianship, of a new constabulary and of a new legal regime beyond the definitions of present international law. The fact that most of these were beyond the self-evident types of reference only illustrates the complications, the implications and the opportunities involved in the recog-

nition that seven-tenths of our world is a "property" which has to be defined, developed, defended, policed, inspected and allocated. And if we add, "in the common interest of Mankind," this requires some kind of active trusteeship which at the moment does not exist but must be contrived.

As the moderator of the symposium at the Center for the Study of Democratic Institutions, charged with the preparation of these papers for the Pacem In Maribus Convocation, I am indebted to Elizabeth Young (Lady Kennet) who was convener, participant, and editor, and to the other participants and contributors: Professor E.D. Brown, Mr. Neville Brown, Dr. John Craven, Mr. Sven Hirdman, General Said Uddin Khan, Mr. James E. Knott, Mrs. Frances Murray, Mr. Robin Murray, Professor Rei Shiratori, and Commodore Torgil Wulff.

Introduction: Why & Wherefore?

by Elizabeth Young

Our understanding of the oceans is by now probably adequate for certain rather general judgements to be made, and therefore for certain political decisions to be taken. A sentiment is undoubtedly growing up that some kind of international regime should be devised, but this sentiment remains rather inchoate in part because the various legal limits which are more or less widely recognized do not for the most part coincide with the natural configurations of the seas nor with the uses man and other living matter make of them. The time scale within which decisions about a regime must be taken, if they are to be taken at all and not go by default, is determined by the rate at which certain things happen. On the one hand are the various technical innovations, particularly military and industrial, that we have become capable of, and on the other are the various damaging or unwelcome interferences these innovations result in, either to our environment or to ourselves.

There is no foolproof way of estimating what this period may be, during which decision may be effective. Forecasting the progress and momentum and interactions of technical developments and of their possibly harmful consequences is an inexact science, particularly because political breakthroughs to decisiveness are often the result of accidents: the Torrey Canyon affair, which triggered one such political breakthrough, could not itself have been precisely foreseen. Yet the time had come for governments to realize that they were in no way bound to subsidize the oil industry by paying to clear up its accidents.

Slowly it is becoming self-evident that if adequate cover from the insurance world is not available for a particular activity, this is probably because the activity is not economically viable. (Insurance on a giant tanker may already be reaching about $ 1 million a year.[1]) That the Jumbos of the transportation world may be reenacting the life cycle of the Dinosaurs was for a time disguised by the willingness of governments to allow their use without proper insurance cover. Steps are now being taken in the Intergovernmental Maritime Consultative Organization (IMCO) to rectify a situation that at sea had become intolerable. (See E. D. Brown, below.) How effectively the new arrangments will be enforced and by whom remains to be seen. If, as now seems likely, hydrocarbons are present in some parts of the deep ocean,[2] there will be a positive requirement for governments to reach agreements on controls over their exploitation and on the enforcement of these controls.

A breakthrough to a sense of common interests currently ill-served, is also due in the arrangements of the international fishing industry, where investment at present is going into improving the competitiveness of national fishing fleets, rather than into improving the world's supply of fish,[3] which in many areas is deteriorating sharply. Present controls are inadequate, and enforcement haphazard.

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1. Economist, February 28, 1970, p. 79.

2. See Ocean Informations, Janvier-Fevrier, 1970, for a summary of an article by E. D. Schneider in Undersea Technology and a comment by Professor M. Vigneaux.

3. See for instance: M.B.F. Ranken, "The Multi-Disciplinary Approach to Capital Projects in Oceanology," Proceeding of the Society for Underwater Technology, February 6, 1969.

Recently, environmental pollution has become a matter of universal concern. As far as the seas are concerned, controls hardly exist. Already several acres of the Atlantic off New York are dead, because of the continuous dumping there of sludge from New York's sewage works. The Caspian Sea is dying from pollution and loss of water to irrigation. The deep waters of the Baltic will probably turn into a lifeless "oceanic desert" if their oxygen content continues, because of pollution, to decrease at the present rate. In the Baltic, in the North Sea, and in the Irish Sea, highly toxic wastes -- arsenic, cyanide, phosgene and mustard gas, among others -- have been dumped in containers that will not last as long as the poisons they contain. ~~These are suicidal threats~~, and there are equivalent ones wherever the balance of nature is being insulted, whether out of ignorance, contempt, or avarice. Pollution is inadequately controlled on the national scale, but it is now being recognized as an international as well as a national problem, both economically and physically. The enormous increase in atmospheric carbon dioxide since the spread of industrialization (5% between the 1890's and 1944, 10% between 1944 and 1967) could, by way of a "greenhouse effect," result in an irreversible and damaging rise in the world's temperature. The present burst of public alarm may trigger a political ~~breakthrough~~ here too. A World Conference on Pollution of the Environment is due to be held in Sweden in 1972.

However, whether conservation wins out in the fishing industry, whether pollution is to be controlled, will be determined not only by the quality of our intentions, but also by the state of our knowledge and the length of our technological arm (that combined devil's fork and shepherd's crook).

Technologies

(Note: Almost all the references in this section are to Western sources. Soviet information on these matters is limited.)
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In this general field a large number of theoretical and production breakthroughs are more or less imminent: the fuel cell or some other small, autonomous, and longlasting source of power for small vehicles, including submersibles, is likely to be an economic proposition within the next five or ten years. Basically low cost materials for the construction of submersible vehicles, such as glass, kinds of fiber glass, syntactic foam (hollow glass miscropheres in an epoxy resin matrix) are already available. So, in theory, is free-flooded machinery. The U.S. Navy Deep Submergence Vehicles are themselves designed to be transportable by air, by the Lockheed C141, or on the "back" of an ordinary submarine.[4] A system of navigation satellite stations over each of the oceans, which first allowed missile-launching submarines to pinpoint their location, is now to be available to ordinary shipping too; and, for ship traffic control, including the precise location of shipping by the same satellite, a universal system could be in service by 1975.[5] Weather forecasting is about to become a science, because at last enough information

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4. Samuel Feldman: The U.S. Navy D.S.Vs; paper given at Oceanology '69 Conference, 1969. The first of these, the Deep Submergence Rescue Vehicle, has started sea trials. It has a crew of three and can transport twenty-four men at a time. The vessel is "unclassified" and other navies will be able to install an appropriate fixing tube on their submarines. (Ocean Information Jan.-Feb. 1970, p. 4.)

5. Aviation Week & Space Technology, March 9, 1970, p. 212.

will be available. Surveys by satellite of the earth's resources will also help the fishing industry by allowing schools of fish to be located and followed.[6] Enormous increases in the size and capability and speed of both conventional and unconventional, submarine and surface craft are on the way, including factory ships of various kinds for the fishing and oil industries.[7] The container revolution and the fact that a considerable proportion of the world's tramp fleet built during the second World War is due to be scrapped, are combining to produce an entirely new style in general ship building and management.[8] New methods are being developed for extracting oil offshore -- some of them useable not only far out at sea but at ever increasing depths. The oil can be stored ~~in rage, bottom~~less tanks into which the oil rises, and as from a samover, can be poured directly into tankers or bladders, quite independently of the shore.[9] Submarine tankers are proposed and so presumably are submarine terminals.[10] Techniques for fish and shellfish farming and rearing are progressing,

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6. See e.g. Air Force Space Digest. February, 1970, pp. 34.

7. See e.g. Moscow Radio, February 25, 1970 for details of "the new generation of trawlers which are virtually floating factories." The Polish Press Agency (March 2, 1970) reports a new Soviet method for catching fish without nets: they are "enticed by light and extracted with the aid of a special pump installed on the ship." Speeds of one hundred knots are forecast for air cushion vehicles; tankers with a dead-weight of a million tons are being considered; and one of 420,000 tons will be built in Japan in 1971.

8. See e.g. Report on Marine Science & Technology, H.M. Stationery Office, Cmnd. 3992, p. 17, paragraph 68.

9. One such storage unit is in operation 58 miles offshore from Dubai, in the Persian Gulf. It is in 160 feet of water, 205 feet high, and 270 feet across. Its capacity is 500,000 barrels and it is equipped with foghorns and warning lights. Ocean Industry, September 1969, p. 9.

10. General Dynamics is said to be proposing a 170,000 ton submarine tanker, 270 meters long, 42 meters across and 25.5 meters draught, with a speed of 18 knots. Oceans Information, Jan.-Feb. 1970.

for use both close into shore and at sea; dredging, trawling and mining for minerals on the seabed may for a time be slowed down by the satellite-aided discovery of further mineral resources on land, but the technology for obtaining them from the seabed is growing, either by drilling or trawling.[11] Certainly within the seventies, the construction of platforms and artificial islands will be a common economic proposition, whether on the surface or submerged, for airfields, nuclear and other power stations, and any other noisy, hot, smelly or unpleasant purpose.[12]

Some of these civil developments are in harness with the course of military developments at sea. A cheap fuel cell (or the equivalent) and cheap construction materials and techniques will allow the world's navies progressively to disappear into the vast spaces beneath the surface of the sea (cheap, that is, in comparison with nuclear propulsion). These non-nuclear techniques will probably provide the same kind of country as could achieve a small nuclear weapon capability, with a twenty-day submersible. Advanced navies will certainly go on developing the nuclear-powered submarine, the cost of which Mr. John Craven

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11. It is reported that Messrs. Deepsea Ventures of Houston, Texas, propose to demonstrate a collection system, by way of suction pipes, in summer 1970 (Oceans Information, December 1969, p. 6., and Jan.-Feb. 1970, p. 8.) Television tubes that amplify light by a factor of 30,000 allow the bottom to be inspected in detail - Willard Bascom, Technology & the Ocean. Scientific American September 1969, p. 200.

12. Surveying will start in 1970 in Japan for offshore sites suitable for building floating or submarine nuclear power stations (Kyodo, January 27, 1970). An artificial island is being constructed in the Black Sea as a base for oil prospecting; it is to be capable of withstanding ice and waves fifteen meters high. (Moscow Home Service. November 22 1969.)

for one, believes may come down to about half that now current. The Non-Proliferation Treaty, of course, does not control the transfer of fissile material for military purposes (as opposed to explosive devices - see Article III); and enriched fuel for nuclear submarines is likely to be available from several sources. Military satellite observation systems and improved guidance systems for missiles will hasten the process by making surface ships, particularly large ones like aircraft carriers, increasingly vulnerable. So will the use of lasers against ship-based air defenses:[13] a laser beam will penetrate to a depth of a thousand feet, but not much further. The United States, and perhaps the Soviet Union, are carrying on research into a long-range underwater launched missile system (ULMS). Dr. Craven's view is that a design could now, though at very great expense, be built to fire from twenty thousand feet below the sea. Stable platforms will be used by the military for airfields, docks, both surface and underwater storage, and other traditional naval base functions.[14] They could also be used to carry antiballistic missiles and their related radars, for retrieval facilities for various kinds of information systems,[15] and so on. Sea floor engineering will be costly rather than difficult.

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13. Aviation Week & Space Technology, March 9, 1970, p. 209.
14. Aviation Week & Space Technology, January 5, 1970.
15. Technology Week, June 12, 1967.

On the production side, in the United States the whole process, military and civil, will be pushed by the Administration's decision to limit the space and missile programs. This has resulted in substantial unused capacity in the great aerospace firms, and it is clear that many of them are now making equipment for use in the ocean. Several firms are producing prototypes of submersibles; and opinion on the world's stock exchanges seems to agree with them that navies and industry are indeed about to go submarine, and that this is likely to be a profitable field for investment. Something of the same sort may be going on in the Soviet Union, where the space program also appears to be in eclipse.

Disputes and Conflicts

Many thousands of miles of uncertain new frontiers were created by the 1958 Convention on the Continental Shelf. This is already resulting in trouble, for signatories and non-signatories alike, some of it threatening to explode in violence. One of the few "laws" established by political scientists is that conflict most easily erupts over frontier disputes.

Current disputes range from polite disagreements, as between West Germany and Denmark and the Netherlands over the drawing of boundaries on the bed of the North Sea,[16] to the threats the Egyptian government issued in November 1969 over prospective Israeli-sponsored drilling for oil on the continental shelf some thirty miles offshore in the Gulf of Suez by an American company,

16. Settled, March 1970.

Midbar, registered in London and using Canadian drilling equipment. Some reports suggest that the five gunboats that unexpectedly left Cherbourg last Christmas for Israel were intended "to protect offshore oil-finding operations."[17]

A glance at the map on Page 3 gives an indication of where new frontiers will have to be drawn. That the United States and the Soviet Union now have a common submarine frontier should not lead to trouble. The division of the North Sea has proceeded peaceably enough. However, if there is oil in the Mediterranean, submarine boundary drawing will be very difficult indeed. Already there is disagreement between the United States and Canada about Canadian claims, not only to the islands but also to the waters of the Arctic Archipelago, as well as over mineral rights on the continental shelf between Nova Scotia and Maine. In Southeast Asia and the Far East, where oil has already been found, division of the seas will be an even worse proposition because of the great number of islands and states involved. The "lease map" of this area is now nearly full,[18] and within the next few years exploration will have found out just how valuable this particular bit of continental shelf is. The situation will be exacerbated by the fact that many governments hereabout do not recognize each other. One map now in circulation shows an area on what appears to be the North Korean shelf leased by the Government of South Korea to Messrs. Caltex for exploration.[19] Argentinian claims to the Falkland Islands

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17. International Herald Tribune, March 4, 1970.

18. Financial Times, March 24, 1970.

19. Financial Times, March 5, 1970.

are perhaps partly affected by the great expanse of their continental shelf; and, the British Government is currently examining the possibility of oil there. In the Northern part of the Persian Gulf, disputed boundaries on land result in disputed boundaries on the shelf. Iranian naval craft are said on at least one occasion to have forced an American company to move its gear from a disputed area. The Gulf of Suez dispute mentioned above is further complicated by the existence in the area of an oil field jointly operated by the Egyptian Government and Standard Oil of Indiana.

Disputes arise also about the nature and habits of various kinds of fish: the Brazilians have successfully maintained aginst the French that a particular kind of lobster is sedentary and may therefore not be taken by foreigners. Equally, the Russians are successfully maintaining the king crab to be sedentary, while the Japanese maintain it swims: the crab is not freely available to Japanese fishermen. Britons and Danes are in dispute at the time of writing because the salmon is at some stages of its life a river fish, and at others a sea fish: the British believe the Danes are over-fishing British salmon in the North Atlantic. There are other fishery disputes between Russians and Japanese, some of them consequent upon Russian occupation since 1945 of certain previously Japanese islands. The protection of traditonal fishing rights, particularly in the face of the highly developed and competitive techniques of some fishing fleets, has caused several Latin American states to declare, and enact into their domestic law, territorial waters extending two hundred miles. The United States and

Soviet Union are now jointly proposing a universal maximum of twelve miles.[20] Trouble is likely to ensue if any attempt is made to enforce such a twelve mile limit; for instance, by providing naval protection for fleets fishing within the Latin American limits.

If the owners of jumbo-tankers solve their insurance problems, disputes may arise over the desirability of "improving" certain international narrows. Thus, the Japanese Government wishes to make a full-scale survey of the Straits of Malacca, through which more than 90% of Japan's oil now passes, much of it in tankers for which the Straits are dangerously shallow. The first reaction of the Malaysian Government was to extend its territorial waters from three to twelve miles, thus acquiring a right to block the Japanese proposal. A compromise has now been reached, in which, no doubt, Malaysian interests will be protected.

If a general agreement were reached to universalize territorial waters at twelve miles, a number of international narrows would be affected, at least as far as the seabed is concerned. In some cases, advance permission might be required for the passage of warships.[21] Those which would then be entirely through territorial waters include, among others, the Dardanelles, the

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20. The Times (London) February 28, 1970. On March 25, 1970 it was announced from Brazilia that Brazil's territorial waters had been extended to two hundred miles, from the previous twelve.

21. The Soviet Union, several Eastern European countries, Indonesia, Turkey, and Pakistan require such advance permission. See: A. Kobodkin: Territorial Waters and International Law; International Affairs (Moscow) No. 8, 1969, pp. 78+.

Straits of Malacca, the sound between Sweden and Denmark, the Straits of Dover, the Strait of Bab el Mandeb, the Strait of Gibraltar, the narrows at the entrance to the Persian Gulf and the Bering Strait.

Volume I

QUIET ENJOYMENT:

ARMS CONTROL AND POLICE FORCES FOR THE OCEAN

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(3) Rei Shiratori, Tokkyo University, Japan

(4) John Craven, Massachusetts Institute of Technology

(5) E. D. Brown, University College, London

(6) Commodore Torgil Wulff, Ministry for Foreign Affairs
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(7) Mrs. Elizabeth Young, London

(8) Lord Ritchie-Calder of Balmashannar (conference chairman)

Volume II

LEGAL FOUNDATIONS OF THE OCEAN REGIME

Proceedings of the Preparatory Conference

On the Continental Shelf and Legal Framework

January-February, 1970

by Elisabeth Mann Borgese

INTRODUCTION

The second Pacem in Maribus Preparatory Conference took place at the University of Rhode Island, Providence, Rhode Island, January 30 through February 1, 1970. It dealt with juridical and political questions arising from the definition of the continental shelf, the limits of national jurisdiction, and the establishment of a legal framework for an international ocean regime. A list of the names of the thirty experts from fifteen nations who participated follows this introduction.

We shall not dwell, in these introductory pages, on scholarship, however profound, on information however rich, or on analysis however keen -- for all are amply presented in the essays collected in this volume and speak there for themselves. We shall try instead to focus on novelty, on the rare emergent concept that may conceivably move a debate from one system of thought or paradigm where it may be deadlocked in insoluble dilemmas, to another where such dilemmas may be resolved. The Rhode Island Preparatory Conference had some of that too.

If one were to choose one central theme whose ramifications somehow touched on and affected every legal issue under discussion, this would be The Common Heritage of Mankind.

There can be no doubt that the concept, introduced into United Nations terminology by Ambassador Pardo of Malta in his historic address of November 1, 1967, has found wide acceptance during the intervening two years. The developing nations are of one mind on this matter: any international regime to control, regulate, and administer the peaceful exploration and use of ocean resources must be based on the concept that these resources are the common heritage of mankind. Among the developed nations, Japan endorses the concept, as pointed out by Professor Oda. As far as the United States is concerned, Professor Henkin referred to President Johnson's famous declaration, "We must ensure that the deep seas and the ocean bottom are and remain the legacy of all human beings," which preceded and anticipated the formulation of the Maltese principle and could hardly be opposed to it. Yet both Americans (including some of those present in Rhode Island) and representatives of the Soviet Union have on many occasions, if not opposed the principle, certainly insisted on pointing out that it "lacked legal content." During the debates of the U.N. General Assembly, Mrs. Alva Myrdal of Sweden met this objection with this

statement: "If any delegation still held this view, it would imply opposition not because the concept lacks content, as has sometimes been vindicated, but rather because it has a content which is contrary to certain interests."

The common heritage of mankind is a new principle in international law, and must therefore be defined in terms of lex ferenda (new law) rather than in terms of lex lata (existing law). What sense, then, can there be in the objection? If the concept lacks legal content, it is up to the present generation of international lawyers to give it such content.

I

Before attempting new definitions and probing their legal and structural corollaries, we should follow the course of the debate, and first consider briefly the relations between what is common heritage of mankind and what is not: what is to be subject to peaceful exploration and use for the benefit of mankind as a whole, and what is to be subject to appropriation by nations. In other words, we should consider the question of the territorial boundary of the outer continental shelf and

the limits of national jurisdiction.

In the analysis of this writer, the common heritage of mankind, like the common good or other related concepts, is primarily a qualitative, not a quantitative concept. It regulates relations between people and goods as well as relations among people, no matter where they are. If science is the common heritage of mankind, and if one of the corollaries of this concept is the free circulation of scientific information, then the hoarding of scientific secrets in your basement is a violation of this principle, no matter that your basement is your very own, jus utendi et abutendi (the right to use and misuse) included. If a stock of fish belongs to the common heritage of mankind, with the corollary that it must not be depleted beyond an agreed level, then the catching of such fish beyond that level by subjects of nations parties to the agreement is a violation of the principle no matter whether it occurs in international waters or in a territorial sea. If the marine environment is the common heritage of mankind, with the corollary that it must be preserved from pollution resulting from dumpings or explosions or oil

slicks, then appropriate safety standards must be observed and monitored in international waters as well as in territorial waters or estuaries; on and under the seabed as well as on the continental shelf. A violation of such standards is pollution of the common heritage of mankind, no matter where it takes place, including your very own bailiwick.

If the common heritage of mankind is not primarily a quantitative concept that can be neatly circumscribed by physical boundaries, then the search for such boundaries is bound to meet with great difficulties. That these difficulties indeed result is clear enough in the papers collected in Part I of this volume as well as in the discussion at the University of Rhode Island.

Dubious as it was in itself, making the ocean map into a crazy quilt, the 200-metre depth limit as a synonym for the limit of exploitability is dead. The technological development of this last decade has rendered it obsolete. Commerical exploitation is already taking place at considerably greater depths, leaving us, as far as lex lata is concerned, with exploitability modified by adjacency as the sole criterion

for the delimitation of the legal continental shelf and of national jurisdiction. Professor Henkin's paper elucidates the manifold ambiguities inherent in both exploitability and adjacency. The discussion made it quite clear that

(1) a large number of nations -- 29 of them landlocked and 22 shelf-locked -- would draw no advantage whatsoever from the exploitability criterion;

(2) like the 200-metre depth criterion which must be abandoned, any depth limit would be arbitrary, artificial, and apt to be quickly overthrown by technological change;

(3) "distance is no criterion: distance with depth or without depth" (Alexander). If distance were acceptable as a criterion, there would be no rationale for accepting one distance over another;

(4) to "compensate" nations having steep narrow continental shelves with an extension of jurisdiction over a certain distance from the shore line may turn out to be illusory. "What good would it do a country whose shelf went out for twenty miles to have an additional thirty miles of abyssal plain? They've not nothing."

(Alexander)

(5) Geology is a poor criterion for the delimitation of sovereignty, whether you go to the edge of the shelf or to the point at the foot of the slope. The geological foot of the slope is largely buried under sediments and as a "boundary" is extremely imprecise, difficult to delimit, and what is more it would take a lot of money just to find where these lines of contact are.

(6) Those who have the technology, the economic power, and the military force are supreme ("sovereign") in the oceans, but the poor nations would not progress toward supremacy in any real sense by extending their "sovereignty" over wider areas of ocean floor and high seas. What they are lacking is indeed not territory nor natural resources. They have them galore. What they lack is technology and capital. By adding more territory and more natural resources, they could simply enlarge their area of exploitability by others: their surface of vulnerability.

(7) The "intermediate zone" proposed by Alexander, and with some variations by Henkin, Bouchez and many others, might turn out to be illusory as well. For if each of

the two boundaries delimiting this zone (landward: the 200-metre isobath; seaward: the geological boundary) is irrational, ill-defined, and probably not time-resistant, why should their addition in any system prove acceptable? Apart from the fact that the construct is a logical curiosum. For there may indeed be a buffer zone, an intermediate zone, between the territories of one state and another state. But how can there be an intermediate zone between California and the United States, between the Ukraine and the Soviet Union, between a state and the international community within which that state exists? The European Communities have established "temporal buffer zones," Termini a quo for the abolition of customs duties, and such. This would be the only kind of intermediate zone that logic could establish between the national and the international order.

Thus, if the establishment of a regime must await the delimitation of national sovereignties out in the oceans, it will wait forever. Forever nations would bicker and bargain over distances and depths, grope for pseudo-scientific ad hoc arguments and justifications,

spend time and labor and money in searching the ocean floor for points of contact between landmass and abyssal plain -- past the rise, the edge, the geological foot of the slope -- developing a leisurely Byzantine vocabulary while being overtaken time and again by advancing technology and its attendant expansion of exploration and exploitation which time and again would start anew the process of bickering and bargaining.

Fortunately it does not. There is consensus now that the two problems must and can only be solved together: that indeed the concept of a nonterritorial functional regime may modify the concept of the territorial boundary. While no one interested in the establishment of an international regime would dream of attacking or devaluating the principle of sovereignty and the sovereign equality of nations, the extension of this principle, from its mater terra firma to dimensions for which it was not born, such as outer space or the deep oceans, may turn out illogical and unreal. There may be other boundaries out there -- economic boundaries, ecological boundaries -- impinging on the rigidity of old-fashioned territorial boundaries. No matter where

such territorial boundaries will be drawn, they will turn out unstable in ecological and technological terms. The less they interfere with technological change and ecological stability -- meaning the closer to shore they are drawn -- the more stable they will turn out to be. The concept of the common heritage of mankind does something to the concept of property and sovereignty out there. You can have one or the other: not both.

II

The discussion of the philosophical and juridical content of the concept of the common heritage of mankind, it seems to us, did yield new insights. Let us begin with Ambassador Pardo's unwritten statement of the concept:

Why did he say "common heritage of mankind," and not common property of mankind or common property of states whether members of the U.N. or not? he was asked. Why did he not use some other formulation? The choice was not accidental. Ambassador Pardo had something very precise in his mind. "We did not think it

was advisable to use the word 'property' -- not because I had anything against property, and I don't express any opinion as to the desirability or nondesirability of this ancient institution -- but I thought it was not wise to use the word property .... Property is a form of power. Property as we have it from the ancient Romans implies the ius utendi et abutendi (right to use and misuse). Property implies and gives excessive emphasis to just one aspect: resource exploitation and benefit therefrom."

What is the content of heritage? Ambassador Pardo proposed that it be "determined pragmatically in relation to felt international needs." It is not limited by a complex of real or potential resources. "World resources," he pointed out, "should not be conceived in a static sense. New resources are being constantly created by technology." The common heritage of mankind, however, includes also values. "It includes also scientific research." Thus, if there were a set of ethical and legal rules to be derived from the principle of the common heritage, these would have to be applicable to science and science policy as well.

Pardo suggested three characteristics of the common heritage of mankind. First of all, "the absence of property. Not the denial of property but the absence of property." The common heritage engenders the right to use certain property, but not to own it. "It implies the management of property and the obligation of the international community to transmit this common heritage, including resources and values, in historical terms. Common heritage implies management. Management not in the narrow sense of management of resources, but management of all uses." Third, common heritage implies sharing of benefits. "Resources are very important, benefits are very important. But this is only a part of the total concept."

Mr. Cabral de Mello, the representative from Brazil, who has contributed much to the clarification of the concept during the debates of the U.N. Seabed Committee, sharpened his definition further during the more informal discussions in Rhode Island. "We have tried to define this concept on the basis of two main elements," he said. "To use common-law parlance, we could call them, first, a denial of rights and, second,

an assertion of rights. The first element, the denial of rights, would be based on the concept of res communis. The common heritage of mankind cannot be subject to any form of appropriation whether by states or by private entities. Nonappropriation, although necessary, is not comprehensive enough. And this is where the second positive element comes in. And that is that states shall participate in the management and regulation of the activities in the area as well as in the benefits obtained from exploration, use, and exploitation of the resources."

No matter what the quantity of benefits involved -- and experts disagree widely about what this will be, at least in the first decade of ocean exploration -- it is obvious that this concept of the common heritage of mankind would qualitatively change the conceptual basis of development and foreign aid policies. For, as Mr. Cabral de Mello pointed out, "It is clear to us that the benefits to be derived from the exploration and the exploitation of the seabed should accrue to developing states not on the basis of foreign aid, not as an act of generosity of the wealthy members of

the international community, but as a necessary consequence of the peaceful use of the common heritage of mankind. The sharing of these benefits would have nothing to do with economic aid, which is a very different thing."

Vladimir Pavicevic, the Yugoslav U.N. Mission's expert on seabed problems, had a definition which closely concurred with the Brazilian's. For him, too, the three main aspects of common heritage are, first, that it is nonappropriable or nonproperty, not subject to national appropriation or acquisition in whatever form, or to sovereignty, sovereign rights, property rights, etc. Second, that acquisition of the rights to use the seabed and to exploit its natural resources must be founded upon an international regime established for this purpose. Exploration, use, and exploitation of the seabed and its resources must be conducted in the interest of mankind as a whole, irrespective of location and taking into account the special needs and interests of developing countries. All are entitled to participate on an equitable basis in the sharing of benefits. And, third: All states have the right to participate, through an appropriate international machinery, in

regulating, administering, and managing the common heritage of mankind.

The Yugoslav concept of social property, or social patrimony as it is also called in the Yugoslav Constitution, is little understood abroad. This may be due in part to the novelty of this concept, and perhaps partly to the fact that "social property" is really a misnomer. As defined in Jovan Djordjevic's essay, social property is the absence of property, or non-property. In his definition of common heritage, Pardo refers to Roman law as not applicable. Djordjevic points out that neither Roman Law (Justinian's Code) nor the Napoleonic Civil Code, applicable both to private property and state property, can be applied to the concept of social property. Perhaps the term "property" should have been avoided in the context of the Yugoslav Constitution for the very same reasons Ambassador Pardo adduced with reference to the common heritage of mankind. The content of the common heritage of mankind, Pardo said, "is determined pragmatically in relation to felt international needs." "The rights implicit in social property," Djordjevic said, "are

derivative, relative, functional." As does Pardo's Djordjevic's definition of the content of social property includes not only material resources but spiritual goods. It engenders a new social relationship. It creates new values. Resources are an important part, and equitable sharing of profits is intrinsic in the concept, but the concept is far more comprehensive. "The concept of social ownership is organically tied to the concept of management.... Politically, managing means not only administering, transmitting, and conserving but also planning, development, and distribution." All of this calls for a special socio-legal regime which "must include machinery for management."

It is not the first time that a theory or a discovery has been made simultaneously in the most disparate environments, and the concept of common property, as Francis Christy pointed out, "can appear within a communist state, it can appear in a capitalist state, it can appear in a primitive society as well as in a developed society." It can appear, we might add, in a national as well as in an international

community. We stress the analogy between the Yugoslav and the U.N. concept not merely because of their historical interest but in order to find out what light each one may shed on the other. The common heritage concept, as spelled out here, is a few years younger than the social property concept. If common heritage, like social property, is considered a process, we are still at the very beginning of the first phase of this process. We are still groping for definitions. It has not yet been institutionalized. The social property concept, though struggling against the limitations imposed by underdevelopment and other historical incidents, has been embodied in a constitution and in an institutional framework. The possibility that this framework holds some lessons for the building of a legal framework and machinery for the ocean regime is not to be discarded out of hand. As Professor Scheingold commented, "this is why we are so interested in this notion of social property and are trying to understand the way it is effectively institutionalized in Yugoslavia."

III

The search for institutional models, or rather for institutional features of existing international organizations that could be adapted to the functions and needs of an ocean regime ranged from old organizations such as the International Telecommunication Union through all of the United Nations organizations and agencies -- with special emphasis on the International Atomic Energy Agency and the Development Program -- to the European Communities. The papers are collected in Section III. We shall attempt here to isolate some basic issue areas into which the discussion may have brought new insights.

It is generally held that international organizations are inefficient to the extent that they lack enforcement powers and machinery of the sort national governments can rely on. Thus Ambassador Evensen pointed out that I.T.U., which does not wield any supranational powers, has therefore not been able to solve disputes when real political interests of member states have been at stake. Violations such as the unauthorized use of wavelengths (a common heritage

of mankind), although causing local or regional disturbances and "noise," have not been as disruptive as would be the unauthorized use of ocean resources in an ocean regime where the lack of enforcement machinery might therefore be more crippling. On the other hand, looking for enforcement powers in the machinery of an organization that is largely functional might be as misleading as looking for purely territorial boundaries. The regime need not develop into anything like a supranational state. Just as its territorial boundaries interact with its economic and other functional boundaries, coercion in an international enterprise of this sort must be and can be effectively limited by its interaction with consensus and coöperation.

A new type of international decision-making is in fact evolving, and the European Communities provide a good example. Their executive body, the Commission, is not basically coercive, as Professor Scheingold pointed out. "That is to say, it is a system which is based really in the final analysis on modified national choice." In this pattern of decision-making, agreement precedes formal policy-making. There is no

evidence that such a system reduces decision-making to marginal areas while national egotism triumphs in matters that really matter. "I am not suggesting," Professor Scheingold said, "that nonsalient kinds of concerns are the only ones that can be dealt with, because, as a matter of fact, it is usually the salient concerns of nations which induce them to cooperate. It is only those things which are important to them which will get them to give up a limited amount of discretionary power in given areas." Cooperation, Ambassador Pardo concurred, must be based on "a subordination of nonvital national interests to international interests."

What has emerged in the European Communities is a "commingling of consensus and authority in which the capacities of the nation-states are increased as a result of cooperation rather than a situation where nation-states have committed themselves to obeying a bureaucracy or a set of institutions" (Scheingold). An analogous thought was expressed by Ambassador Pardo: "The maximizing of rights in a shrinking world diminishes opportunity. The freely recognized limitation of legal rights maximizes opportunity." In other words, there

is today more sovereignty in cooperation through international machinery than in self-aggrandizement. The oriental-Christian maxim that only he who loses himself finds himself is now applicable to nations in an interdependent world.

Rocognitions of this sort of course do not do much toward shaping the machinery through which decision-making based on consensus is to be achieved. Here any existing model falls short. Whether the one-nation one-vote principle, as practiced in the General Assembly, the Assembly of the International Atomic Energy Agency, and in a number of other international organizations, would be effective in an organization charged with the responsibilities of management and planning is at least questionable. A system in which voting strength is based on financial contribution, as it is in the World Bank, seemed attractive to some participants, but totally unacceptable to the spokesmen for the developing nations. Ambassador Pardo suggested a new and original scheme for weighting the vote: "One model," he said, "could be the adoption of objective criteria for the evaluation of the totality of the maritime

interests of a state. All states have an interest in the marine environment. Afghanistan has an interest in the sense that the marine environment influences, say, the weather in Afghanistan. But for some states, for instance Iceland, this interest is considerably more important. Iceland literally lives on the sea and its resources. Without the sea, Iceland would be nothing. There are two ways of evaluating the totality of maritime interests. Either through how much a nation depends upon the sea, or on the basis of the magnitude of its interests relative to those of other countries. There are various models possible which would establish objective criteria. This is needed if the essence of the regime is management, and rational management requires that those who know the sea should be able to exercise a greater influence on decision-making than those to whom the sea is less important."

If one wanted to quantify, one should say that voting strength would be weighted on the basis either of the proportion between the marine production of a nation and its gross national product, or of the proportion

between the marine production of a nation and the total international marine production. Since these two ratios may be very different, it might also be based on the ratio of these two ratios. This system of weighting certainly has more to commend it than others proposed in the past. No matter how it may be refined or perfected, however, it is bound to work in favor, not of those who "know the sea," whose gross national product may be based on fishery carried on, conceivably, with very primitive means, but of the wealthy and technologically developed nations. It may turn out to be no more acceptable to the developing nations than is any other system of weighting the vote.

A new approach is needed. This was emphasized again and again during the discussion. "The problems we are facing at this conference," Dr. Martínez Cabañas of Mexico said, "impose on our minds the necessity of looking at the future not with the standards, the prejudices, and the weight of the past, but with the idea of contemplating a new world with new patterns and new sets of values." And Lord Ritchie-Calder concurred: "We've got to lay our barrage, as it were, well ahead of

what we regard as the practical point of this particular moment. Otherwise we'll lose the sight of our aim and we will not achieve it."

A solution to the problem of decision-making and voting strength in a machinery appropriate to the rational management of the marine environment and resources -- a solution which must balance the demands of efficiency with those of equity -- may well be inherent in the concept of the common heritage of mankind.

One corollary of the concept of common heritage, as we have seen, is participation. This is generally understood. One corollary of participation, as spelled out in the constitutionally and institutionally more advanced system of social property in Yugoslavia, is that it "transforms the classical representative political structures" (Djordjevic) and provides for the direct participation of autonomous ("self-managing") functional organizations in planning and decision-making.

The need for participation by private and public, national and multinational organizations in the planning and decision-making processes of an

international ocean regime (as, for that matter, in any national one) was stressed by several participants. Thus Ambassador Evensen of Norway pointed to the participation of "private corporations and organizations" in the decision-making processes of the I.T.U. as a "highly useful" feature "in this highly technical field of international law." For, he said, "it is easier to go into negotiations with technical people, not only of governments but also of private corporations and organizations." And Professor Scheingold called attention to the fact that in the European Communities, "the Economic and Social Council provides at least in theory the systemic representation of interest...of participational democracy. But the trouble is that that Social and Economic Council is really apart from the control of the institutional decision-making process, and the problem is not so much to establish a theory of representation which effectively represents economic interests as it is to integrate that kind of system into the real decision-making axis of the organization."

Such an integration would have a number of advantages, which are analysed in some detail in Pacem

in Maribus volumes III and IV (Development And Planning; The Role of Enterprises). In the present context only one point should be stressed: recognition of the autonomy of industry at the international level would be one way -- there may be others -- to provide a solution to the problem of voting strength. For industry -- as well as science and labor, for which an analogous argument could be made -- would serve as a balancing factor between the demands of efficiency and the commands of equity. Managerial efficiency requires a departure from the basic principle of one-nation one-vote embodying the sovereign equality of nations. Considerations of equity render such a departure impossible. Why should the rich and powerful nations have a bigger voice in international decision-making than the much more numerous and populous poor nations? The direct and autonomous participation of industry and science in international planning and decision-making would introduce a balancing factor in favor of efficiency without violating the principle of equity or that of the sovereign equality of nations.

With these considerations we have passed from

the constitutional-institutional sphere into that of politics and the political problems -- elementary and complex at once -- of the conflicting aspirations and fears of the developed nations on the one hand and the developing on the other.

That it is this division, rather than the old idiological one between East and West, socialism and capitalism, that constitutes the main problem which has been slowing the work of the Seabed Committee, is seen clearly in the papers in Section IV of this volume and in the record of the discussion. To put it in a nutshell: the developing nations take the concept of the common heritage of mankind seriously. They have spelled out its implications of nonappropriation, participation and shared benefits. They do not want beneficence. They want their fair share. The developed nations tend toward wanting to hold fast to what they have. At best they are inclined to beneficence, to "aid." The price of participation, in their view, is inefficiency. Efficiency, in their view, comes before equity. The primary emphasis of the developed nations is on controls, on don'ts, including pollution control. The primary

emphasis of the developing nations is on cooperation, on do's, on development even at the risk of pollution. The primary emphasis of the developed nations is on codes (static), while that of the developing nations is on machinery (process).

So sharp is this division that the discussion considered even the possibility of two conflicting mutually-exclusive regimes. One such regime was projected by Ambassador Pardo. Setting aside the obstreperous majority of the U.N. Assembly, about thirty of the technologically most advanced nations of East and West, who are enabled by existing law to control about two-thirds of the world's oceans, might agree to establish their own regime based on the principle of a narrow shelf, operating exploration and exploitation of the areas beyond its limits under a rather loose code, giving leeway to free enterprise and competition. Those who remained outside -- mostly the developing nations -- would be the losers: their industrial development slowed, their freedom of action limited by the naval power of the regime nations with which they could in no way compete. This is a prospect not pretty

to behold.

In retort, this writer raised a counter-specter during the discussion. Suppose the industrially developed nations could not agree among themselves on the establishment of such a regime. Though united in their desire to maintain and to enjoy the fruits of their technological development, yet they are divided by opposing economic and ideological principles. The acerbated competition between the Soviet Union and American companies for the West European natural-gas market is a clear indication. Mounting tension within the United States over the import-quota system and the offshore oil "outrage" indicates that an international ocean regime, no matter how loose, might indeed bring down oil prices now controlled by the Big Seven. If considerations were restricted to the industrially developed nations, such a regime might therefore never come about. Suppose instead that the developing nations joined to ward off those conditions imposed by the industries of the developed nations that they individually cannot parry. Suppose that -- presumably under Chinese leadership -- they established a regime

"bearing in mind the special needs of developing nations," a regime that imposed on exploiting companies a formula of joint-venture and participation in management something along the lines of the Mattei formula, what would be the consequences for the developed nations? The answer was that the developing nations alone could not pull it off. They also are too deeply divided among themselves. The technological gap is too deep. They could not stand ~~their ground~~ against the highly developed industries ~~and industrial~~ military complexes. The world is fashioned in such a diabolical way, Professor Brucan of Romania commented, that the developed nations cannot do without the developing nations, and vice versa. A state of affairs, he added that "makes strange seabed fellows."

One might raise a third alternative -- perhaps somewhat more carnal than the two political specters: While government squabble, there may be a silent and unobtrusive advance by the private world government of ~~industry~~. ~~If the~~ big oil companies have succeeded in the past, through a series of "treaties," in marking off regions as open, closed, or postponed

for concessions, and in developing patterns of "cooperation in obtaining leases and in drilling -- in Iraq and the Arabian peninsula, in the Persian Gulf and in Venezuela -- why should they not succeed on the seabed as well? If indeed the only purpose of an international ocean regime were the maximizing of production and of the profits therefrom, why not leave it to industry? But the purpose of an ocean regime is not production and it is not profits. It is, among other things, the "coordination of multiple uses in conservation of the ocean environment as the first, the foremost, and the last reservoir of life on this earth of ours: the common heritage of mankind. The management of an enterprise of this sort has dimensions other than the economic. It is a task clearly transcending the capacities of industry. A private world government of industry would be a prelude to chaos. To protect their other interests in the oceans -- be they defense, fisheries, or self-protection against pollution -- nations still would have to create an international regime or extend their own jurisdiction seaward unilaterally, as Canada just did, and create further

complications.

No matter what name we attach to it, the concept of the common heritage of mankind is something that we cannot evade. It is upon us and will be with us, forced on us by the dialectics of history. "The concept of common heritage cannot be stopped," Ambassador Pardo said. "It will eventually be adopted simply because it is a historical necessity and the needs of the world require it and will require it increasingly. The political factor is irrelevant. The political factor may anticipate or delay the acceptance of this concept. The political factor may determine the form in which the concept is accepted by the international community. But the advance of technology is such that at some point in time and in some form we believe the concept must be accepted."

Dr. Martínez Cabañas also stressed the historical necessity of adopting a new concept of property in the common heritage of mankind: "Today, in our civilization, in our modern industrial societies, it is very difficult to defend the old Roman or French

principle of private ownership implying freedom to use and misuse things. Today no one can claim the absolute right to anything. In any discussion of private rights versus social rights in the ocean environment we have to think in terms of social interests instead of private interests. Therefore, I do not see any great difficulties in applying to the new regime we are building the principle of social ownership or social responsibility for management." He also stressed, in this context, the necessity of "the conception of a new mentality and the vision of a new man."

The issue of "improving the quality of life" and establishing adequate controls to conserve the human environment is pressing on us from all sides. The implications are far-reaching. A Universal Declaration on the Human Environment, which may emerge from the United Nations Conference in Stockholm in 1972, implies a new concept of human rights transcending the traditional concepts of individual human rights, whether civic-political or social-economic -- all of which were based on the concept of a conflict between individual and society. The new environmental rights, without

which the old rights can no longer be enjoyed, are based on the concept of man in his environment, including the social environment. This, in turn, implies a new concept of man, as different from our traditional concept of man as Neal Armstrong is from Christopher Columbus. The emphasis today is on integrality, on interdependence, on teamwork, organization, discipline, and cooperation much more than on individuality or improvisation or competition. The new concept we have of man in turn determines our concept of world organization. As our concept of world organization determines our concept of man. The way we see ourselves we see the world, and the converse.

An international organization corresponding to the new concept of man should have the following qualities:

(1) It should be based on cooperation and participation rather than on competition and coercion. This will affect the nature and limits of its jurisdiction.

(2) It should be not merely political nor merely economic but comprise the human environment as a whole. This will affect the character of its membership.

(3) It should be dynamic, not static, with the emphasis on doing, not on prohibiting, on development and planning, not on controlling and inspecting. This will effect disarmament as the corollary of a "peace system," peace being understood as "a process embodied in a structure."

(4) It could not abrogate sovereignty, but it should not be based on sovereignty. It should be based on common interests, on the common good; it should enhance national ~~self-determination~~ through international "cooperation. It could not abolish private property, but it should not be based on private property. It should be based on common property: the common heritage of mankind, the common management of which would enrich all and each.

The creation of a legal framework for an international ocean regime for the peaceful use of ocean resources, the description of machinery apt to carry out its tasks, the determination therein of the limits of national jurisdiction; these give us a chance, for the first time, to move toward this future. The initial steps may be small and beset with compromises

with the past and present. But we would be on the road, "God's Road," to use the ancient Russian epithet for the oceans.

Elisabeth Mann Borgese

Volume II

LEGAL FOUNDATIONS OF THE OCEAN REGIME

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EDITORIAL NOTES:

1. Three contributions -- 5, 12, and 17 -- were written or enlarged after the Preliminary Conference at the University of Rhode Island. Ambassador Amerasinghe's paper was for a closely related but not Pacem In Maribus conference at the Center, as well as for this volume.

2. A report with excerpts from the dialogue of the Preparatory Conference on the Legal Framework and Continental Shelf has been written by Wolfgang Vitzthum and will form the introductions to the four parts of this volume when it is printed as a book.

PACEM IN MARIBUS: Preparatory Conference
on the
Legal Framework and Continental Shelf

University of Rhode Island
January 30, 31, February 1, 1970

PARTICIPANTS

Lewis Alexander, Law of the Sea Institute, University of Rhode Island

Juraj Andrassy, Faculty of Laws, University of Zagreb

R.C. Arora, Permanent Mission of India to the United Nations

Elisabeth Mann Borgese, Center for the Study of Democratic Institutions

Leo J. Bouchez, Reader in International Law, University of Utrecht, and Rapporteur of the Deep Sea Mining Committee of the International Law Association

Silviu Brucan, Former Ambassador of Romania to the United Nations and the United States, and Visiting Fellow, Center for the Study of Democratic Institutions

Evaldo Cabral de Mello, Permanent Mission of Brazil to the United Nations

Lord Ritchie-Calder, Advisor on Science and Conservation to the Labour Party in Great Britain, holder of a Chair at the University of Edinburgh, and Associate of Center for the Study of Democratic Institutions

Jean E. Carroz, Fishery Liaison Officer, Food & Agriculture Organization of the United Nations, Rome

Francis T. Christy, Jr., Resources for the Future

*Jovan Djordjevic, Faculty of Law, University of Belgrade

Robert Dockery, Assistant to Senator Claiborne Pell

*René J. Dupuy, Faculty of Law, University of Nice

Jens Evensen, Ministère Royal des Affaires Estrangères for Norway

Wolfgang Friedmann, School of Law, Columbia University

Margaret Gerstle, Assistant to Senator Claiborne Pell

Michael Hardy, United Nations Legal Office

Louis Henkin, The School of Law, Columbia University

Gustavo Martínez Cabañas, Bufete de Estudios Economicos, Mexico

Nicholas M. Matte, School of Law, McGill University

Fritz Münch, Faculty of Laws, Heidelberg University

Raymond Nelson, Assistant to Senator Claiborne Pell

Shigeru Oda, Law School, Tohoku University

Arvid Pardo, Ambassador to the United Nations, Permanent Mission of Malta

Vladimir Pavicevic, Permanent Mission of Yugoslavia to the United Nations

Claiborne Pell, United States Senator from Rhode Island

Benjamin H. Read, Director of the Woodrow Wilson International Center for Scholars

Stuart A. Scheingold, Department of Political Science, University of Washington

Piers von Simson, Research Assistant to Rexford Guy Tugwell, Center for the Study of Democratic Institutions

Wolfgang Graf Vitzthum, Institute for Public Law, University of Freiburg, and Research Assistant to Elisabeth Mann Borgese

*Professors Djordjevic and Dupuy contributed papers, but were absent because of illness

Volume III

PLANNING AND DEVELOPMENT IN THE OCEANS

Proceedings of the Preparatory Conference

On Planning and Development

February, 1970

Preface

by Oscar Schachter

The participants in the Preparatory Conference on Planning and Development in Relation to Ocean Resources agreed that increased efforts to promote the planned development of ocean resources are needed. Increased international efforts are a major part of what is required in order that ocean resources be efficiently and equitably developed. In the discussion of what kinds of international efforts should be undertaken, a number of ideas and issues emerged. The most important of these ideas and issues are outlined below. This brief outline indicates the breadth of the problems in this area. The report which follows goes into these problems more deeply.

Planning

Limitations on the extent of planning for the use of ocean resources were discussed and the following suggestions were made:

Planning cannot be limited to single uses; multipurpose planning is required.

Planning cannot be limited to the high seas and the ocean floor beyond national jurisdiction.

At least some aspects of planning should be global.

Efficiency and equity were viewed as general goals for the planned development of ocean resources. The problem of priorities among possible planning goals leading to efficiency and equity was discussed, and the folloiwng suggestions were made:

Efficiency would be served by an increase in research and planning efforts.

Maximization of net benefits, elimination of conflicts between uses and minimization of the effects of pollution would lead to greater efficiency.

Equity would be served by preferential participation in the use of ocean resources by developing countries.

Equity would be served by participation in planning for the development of ocean resources by developing countries.

The kind of planning needed and desired in the development of ocean resources was considered. The following criteria for the orientation of planning were suggested:

Planning should be systemic, functionally directed and voluntary.

Planning should be the result of maximum participation.

Planned Development of Fishery Resources

With regard to the present situation in the use of fishery resources, there was considerable controversy:

Some claimed that developing countries benefit from the present free access to fisheries and that conservation measures do not limit free access.

Others claimed that conservation measures now in use are disadvantageous to developing countries.

Some claimed that conservation measures are protecting fish resources adequately.

Others claimed that some fish stocks are over-fished while other stocks are under-fished.

With regard to the prospects for the future use of fishery resources, a number of predictions and suggestions were made:

Unexploited but usable fish resources will become scarce during the next thirty years.

More small fish will be usable than in the past, so that unexploited but usable fish resources will remain abundant during the next thirty years.

Fishing should be limited to the maximum net economic yield rather than to the maximum sustainable physical yield.

Fishing would be more equitable and more efficient if property rights to fish resources were established.

Planned Development of Mineral Resources

With regard to the present situation, the existence of significant quantities of exploitable and usable mineral resources located outside national jurisdiction was questioned.

With regard to the prospects for the future development of mineral resources several comments were made:

In order to establish security of investment, exclusive rights to mineral resources are needed.

How exclusive rights can be equitably and efficiently parcelled out is still undetermined. First come, first served and competitive bidding are two possibilities.

Developing countries should participate, and be offered preferential advantage, in the development of mineral resources.

Because mineral resources are so abundant and because they will be difficult to exploit, neither the question of security of investment nor the question of participation by developing countries is important.

Pollution and the Planned Development of Marine Resources

A number of questions about pollution and pollution control were raised:

How important are present marine pollution problems?

How are pollution control measures to be formulated and who is to enforce them?

Can pollution control be integrated with the planned development of ocean resources?

Some suggestions were made:

More research on the oceans themselves is needed before an evalution of the importance of many marine pollution problems can be made.

Marine pollution and the marine ecosystem should be monitored so that future problems can be predicted. The costs of this proposal need to be evaluated and compared with the benefits.

International Machinery for the Planned Development of Marine Resources

The machinery now in existence was discussed and suggestions for improving it were made:

Better coordination and funding would improve the functioning of the machinery.

Some of the UNDP funds made available last year for pure research of long term significance to the development of food production on a global basis should be used to further fundamental understanding of the oceans.

A voluntary tax of one per cent on the exploitation of all ocean resources, with the revenues going to the planned development of ocean resources, should be levied. It was questioned whether such a tax would raise a significant amount of money and whether it would be unduly burdensome to developing countries.

Present planning efforts are inadequate because the goals are inappropriate.

Multi-purpose planning would be served best by a centralized planning agency.

In general, the participants agreed that a new international ocean agency is needed. Suggestions about what kind of agency this should be were put forth:

A new specialized agency with advisory and coordinative responsibilities in the development of ocean resources should be established. This agency would be in part self-defining; that is, it would accrue new responsibilities and powers in the course of carrying out its original mandate.

A new specialized agency with extensive powers in the area of deep-sea mining, and advisory and coordinative responsibilities in other areas, should be established.

A new kind of international agency with extensive powers over the use and development of all ocean resources should be established. The agency should not be a specialized agency. It should have a clear mandate from the beginning and should have a cooperative, rather than a donor-recipient, approach to development.

Introduction

by Wolfgang Graf Vitzthum

The preparation of the convocation Pacem in Maribus was conducted through five preliminary conferences that discussed the questions concerning new and intensified uses of the marine environment.

The third of these preparatory meetings dealt with Planning and Development in Relation to Ocean Resources, and was organized jointly by the United Nations Institute for Training and Research (UNITAR), an autonomous institution within the framework of the United Nations, and the Center for the Study of Democratic Institutions, an educational non-profit institution. Under the chairmanship of Mr. Oscar Schachter, Deputy Executive Director and Director of Research of UNITAR, this meeting took place at United Nations Headquarters in New York from 25 - 27 February 1970. The participants -- outside experts and Center fellows -- are listed in Appendix I.

The panelists sought to define the problems, to clarify concepts, and to initiate new ideas for the planned, efficient, and equitable development of ocean resources. They were particularly concerned about the impact of the increased use and exploitation of the ocean environment on the development of the southern part of

the globe and on marine ecology. In addition, they discussed the requirements and overall objectives, and the criteria of planning the development of ocean resources. Apart from the political problems involved, the experts were particularly interested in questions of the methodology by which the nations can acquire the means of handling these ocean-related problems and the international machinery for the administration of ocean-related planning.

No attempt was made to obtain a consensus of opinion. Accordingly, this report presents the main views shared by the experts as well as points and areas of disagreement. The report has not been submitted to the participants for approval. Most of the panelists prepared background papers, which are listed in Appendix II. The background papers, the revised report, and excerpts from the discussion will be made available to all participants in the Malta Convocation.

I. The Need for Planning in Relation to Ocean Resources

If humanity as a whole is to benefit from the rising level of ocean-related activities and if additional conflicts resulting from these activities are to be avoided adequate planning on a global scale is called for. Some experts questioned whether international planning could or should be confined to that part of the marine environment constituted by the high seas and by the seabed and

subsoil beyond the limits of national jurisdiction. These panelists felt that the need for some aspects of ocean-related planning is global or at least of dimensions transcending national, geographic, and ecological boundaries.

The panelists agreed that the functions and articulation of international planning would differ depending on the specific zone or resource involved. There was also consensus that, at least in the high seas and on the "non-national" part of the seabed, internationally coordinated planning is inadequate today. Everybody felt that existing planning, which is mostly national, cannot solve the most imminent problems.

Among the overall objectives postulated for such future global planning were a maximization of net benefits derived from ocean exploitation, a rational accommodation of the multiple uses of this area, the diminution of harmful effects to the ocean ecology, and the preferential participation by developing countries in the exploitation of ocean resources.

Despite consensus on the need for international planning, coordination, and cooperation, it was evident that no agreement could easily be reached on its principles, criteria, priorities, and procedures. The view was expressed that such an agreement might be less difficult to reach with regard to those ocean areas and resources that are still relatively free from vested interests. Participants

differed on the question whether an international ocean regime should be under U.N. sponsorship or should be in a separate and independent corporate structure.

II. Planned Development of Fishery Resources

The participants noted that there are at present some stocks that are underfished and other stocks that are overused. It was evident that the need for and the role of planning for these two groups of stocks would have to be different.

As to the apparently underfished stocks, some panelists were of the opinion that -- although there was no need for regulation -- planning is needed in order to obtain some idea of the nature of that stock of fish so that regulatory measures can be introduced when the overfishing point is reached. These experts held that for underused stocks the present system of free access was not only adequate, but preferable. They described these under-utilized stocks as consisting primarily of small sized (under five inches) and previously unfished "trash fish," used for the production of fish meal and protein concentrate.

With regard to the overfished stocks, most experts felt a need for increased planning of conservation measures, for more adequate funds with which to carry out the plans, and for a better disposition on the part of member nations

to carry out the plans. Some panelists suggested -- and were challenged on the point -- that the best measure of conservation would be an increase in the establishment of national quota systems. The suggestion was also made that some kind of property right should be established that could be sold or auctioned in order to obtain maximum economic value from exploitation of both fishery and mineral resources.

Up to now, it was pointed out, the only conservation efforts on an international level -- with the exception of the International Commission on Whaling -- were made by regional arrangements among the nations concerned with the exploitation of a stock. Many of these agreements have been based on the restriction of fishing activities of the parties involved in order to maintain a sustainable yield. There are also national quota systems and other measures. The question was raised whether some of these fishing agreements do not in fact prevent the entry of new fishing nations into the various regional "clubs" of established fishing countries.

It was mentioned that conservation agreements that limited the fishing season increased the cost of the catch. Fishermen endeavoured to obtain as large a catch as possible in the limited time. This is economically wasteful and leads to over-capitalization, which is of questionable value to a nation's economy. The case of Peru, where the capital used to catch the fish has outstripped the yield, is

representative.

Some experts claimed that the present system of free access actually favors the developing nations. These panelists pointed to the remarkable developments the fishing industry has made in the developing nations, particularly in Peru, during the last decade. These experts were of the opinion that the free access system was vital to this process, and that if this free access to underfished resources was cut off, the rate of fishing development in the developing countries would inevitably slow down. According to the most recent statistics, the total fish catch of the developing nations slightly exceeds that of the developed nations, a growth that is related to the substantial UNDP programs in this field.

This position was challenged on two counts. The attempted exclusion of foreign fishermen from zones of a width of 200 miles by some developing coastal nations -- eight in Latin America -- seemed to indicate the dissatisfaction of these developing nations with the freedom-of-access system. Some experts pointed out, however, that a broadening of the area of exclusive fisheries jurisdiction would favor, above all, the United States flag fishermen and would be extremely damaging to the majority of the small developing countries that had relatively narrow access to the sea. Thus, these nations would damage their interests by decisions taken on this basis. Furthermore, the overall benefit to the

developing nation by expansion of fishing activities alone was questioned. It was contended that catching and marketing as such is of minor economic value to the fishing nation. Only the combination of fishing with processing and exporting by the developing nation itself could make the expansion of fishing activities a major instrument of economic development. This view was contested by most experts. They pointed out that the bulk of the increased catches by developing countries are processed to the stage of final consumption -- and generally also consumed -- within the territory of the nation where they are landed.

Panelists favoring the present system of management of high seas fisheries were of the opinion that global planning should be concerned primarily with conservation measures, i.e., should call the attention of the world to places where overfishing is taking place and recommend measures for ending it. In their view, a general shift from the present -- admittedly imperfect -- system to an entirely new and at the present stage amorphous system did not seem warranted. These experts urged instead a rapid modification and a thorough improvement of the present system and its institutional arrangements.

Other participants felt that the present institutional framework allowed neither for effective conservation of over-used stocks, and the prevention of overfishing, nor for a preferential advantage for the developing countries. Fishery,

furthermore, was not an industry that can be looked upon in isolation. The potential damage from pollution of the minerals and living resources made a systematic integrated approach to the entire range of problems mandatory.

Therefore the question was raised whether a new international institution is needed, one with the power to deal with all interrelated problems and objectives simultaneously.

III. Planned Development of Marine Mineral Resources

In discussing the non-living resources on and under the sea floor, the point was made that too little is known about their existence, their extent, and their economic exploitability within and beyond the 200-metre depth line. The fact that there are some two to three million individual entrepreneurs involved in fishing and only some two to three dozen currently involved in mineral exploitation indicates a difference in dimension in the planning problems to be faced in dealing with these two types of resources.

No attempt was made to elaborate on the question of the limits of national jurisdiction. The experts were aware that the seaward extent of the continental shelf and the function -- embracing, inter alia, the planning and development of deep sea mining -- and structure of an ocean regime were discussed at the second preparatory conference for the

Malta Convocation. They noted that these questions have been under much closer scrutiny on the international and national level since 1967 than have the various aspects of international ocean-related planning and developing.

The deliberations on the mineral resources began with the observation that some problems of their planned development in the area beyond national jurisdiction probably are similar to those discussed in relation to living resources. Assuming that there are mineral deposits beyond the shelf which will become eonomically exploitable and, because of the different value of different sites, subject to competing demands for access in one to three decades, the important fishery question of freedom of access versus exclusive rights must also be faced in some parts of the mineral field. Without exclusive rights to limited areas and their primary resources, it seems a sound development of most deposits would be jeopardised. Therefore, one goal for the promotion of deep-sea mining is the establishment of exclusive rights, i.e., of security of investment.

Among the planning decisions to be made are the following: whether we seek a maximum production of raw materials or a maximum amount of revenues; whether the proposed international regime would be responsible for carrying out research to find out more precisely what mineral resources are to be found on the ocean floor, and

whether there should be a sharing of the wealth of the ocean floor between the advanced and the developing nations.

Some panelists stressed that a system of granting title to valuable sites was primarily a technical question, the solution of which could easily be reached under any kind of international regime. They pointed to the danger that in the absence of such a regime the few competing technologically advanced nations or their few deep-sea enterprises would solve this question of exclusivity of access among themselves. This "club-like" solution would be even more difficult for "newcomers" -- i.e., the less advanced nations -- to challenge than that in the field of fishery conservation and quota arrangements.

It was felt that if rights and licenses were granted to states rather than to enterprises, all states -- regardless of their economic system -- could participate.

There was no agreement on the goals and criteria for the allotment of these rights. The systems of first-come first-served and of competitive bidding were discussed. It was felt that any system would have to be adapted to the additional, specific, and perhaps overriding consideration of equity.

It was agreed that the controversial issues are in fact the questions of who should get the exclusive rights under what conditions. Here again -- as in the prior discussion of the planning of fishery development -- the

questions of economic efficiency and of preferential advantage for the developing nations were raised.

The actual "physical" participation of developing nations in the exploitation of deep-sea resources was held by some to be essential. Others felt that the developing nations should benefit primarily from the revenues flowing from the granting of exclusive rights to the technologically advanced nations, that is, the role of the developing nations should be of a receiving rather than a contributing nature.

Some participants feared that international practice is already moving away from the goal of establishing an international deep-seas authority with important jurisdiction. Developing coastal nations might prefer to continue the present trend of enlarging their areas of national jurisdiction. The remaining unclaimed area might be neither accessible nor valuable enough to merit any international machinery.

In considering this partly-witnessed, partly-predicated expansionist practice of coastal states, it was stressed that in the long run a broad definition of the continental shelves would be detrimental to most of the less developed parts of the world. It is technology, training, and financing rather than territory and natural resources that are lacking in the southern part of the globe. Furthermore, expansion of the continental shelf is of benefit only to the few developing nations that have open ocean off their coasts.

The inequity would be even more aggravated by the fact that -- because of the unequal distribution of resource sites -- only a few coastal nations would find an additional source of income and influence in their newly-claimed offshore areas.

IV. Pollution and the Planned Development of Marine Resources

The need for more research on the individual kinds and effects of pollution was stressed, as was the need for basic research on such presently unknown factors as the chemical composition of the oceans.

We must become better able to predict the circulation of the sea and the atmosphere and to understand the relation between them. Research efforts should concentrate on disposal of waste from shore, particularly in shallow seas; dangerous cargoes; disposal of radio-active and chemical wastes; pollution stemming from the exploitation of mineral resources; and atmospheric pollution.

It was also suggested that we should investigate how pollution might be limited, how liability can be established, and what measures should be taken when pollution occurs. One participant proposed that a distinction be made between kinds of pollutants. Containerized radioactive wastes might, for instance, be considered less damaging than certain

other types of pollution and less priority might therefore be given to such less-significant pollutants. Perhaps developing corporations should be required to monitor pollutants on a day to day basis.

In considering the growing sources of pollution, and assuming that the consequences of some environmental damage are already irreversible, the need for a better understanding, for more rules, and for better enforcement was stressed. It was recalled that a number of international governmental and non-governmental institutions are actively concerned with some aspects of this problem and that these activities have led to the stipulation and adoption of some international conventions regarding pollution prevention and damage liability. However, these agreements still seem far short of the detailed, enforceable, and enforced rules desirable for pollution control. It was not discussed in detail, however, what the best regulations and rules were, and it was pointed out that it is quite likely that at this early juncture we do not yet have sufficient knowledge on which to base them.

It was suggested that an intergovernmental authority should monitor the ecology of the ocean as a system -- using satellites for the identification of oil slicks for instance -- and that this institution should also lay down anti-pollution standards. The enforcement of these rules, however, should be left to the states.

Liability for pollution is, of course, frequently difficult to establish. Although pollution caused by oil tankers is at first easily identifiable, the oil may drift around the Gulf Stream and eventually cause destruction in some distant area. Furthermore, anti-pollution tactics present problems, because their ecological results are still mysterious. It was unknown, for instance, that methods used to sink oil and thus to prevent damage to birds caused untold additional damage to fish.

Although there were numerous participants in favor of establishing a new international authority to deal with pollution, other participants pointed out that there are already international organizations operating in this field and that the costs of preventing pollution might be greater than the costs caused by pollutants. Those in favor of a new international authority rebutted by saying that the social costs of pollution are enormous and unmeasurable and hence that the cost-benefit approach is worthless.

It was pointed out that there is an apparent absence of political will and therefore of funding so far as internationally organized anti-pollution research is concerned. For instance, in 1968 the Secretary-General of the United Nations in E/4487 set out broad recommendations for all aspects of improved marine activities in the international field, and asked for increased financial assistance to

international basic research on the biochemical consequences of marine pollution. There has been no attempt made by the nation-states to provide these funds or to carry out this body of recommendations. The FAO Technical Conference on Marine Pollution to be held in Rome in December of 1970, which is the culmination of a series of cooperative activities among the specialized agencies of the United Nations, and the U.N. conference on questions of the Human Environment which will take place in Stockholm in 1972 were mentioned. The UNDP Administrator had said in an important statement last year that 6 per cent of the UNDP funds would be made available for pure research on the development of new sources of food production and it was suggested that this source might be tapped.

It was stressed that developing nations are generally and understandably less concerned about marine pollution than are highly industrialized nations. Some experts feared that the enforcement of rigid safety and anti-pollution standards against countries of the southern half of the world could in fact cripple their industrial development. It was suggested that the question of the prevention of pollution -- like so many other questions arising out of the new and increasing activities in the marine environment -- is constructively approached within the broader context of planning and development. Thus some experts proposed that the

developed nations, the prime beneficiaries of pollution control measures, should provide funds for the initiation of such measures in the developing countries, and that these funds could perhaps be administered by UNDP. It was also suggested that an attempt be made to improve the perceptions of the developing countries with regard to the long-term costs of pollution.

V. International Machinery for the Planned Development of Marine Resources

Most participants agreed that international planning of fishery and mineral resource development, of conservation, and of more comprehensive anti-pollution measures should be encompassed by one single, all-embracing, non-national new institution. With such an overall organization as a kind of general system, it was envisaged that the various uses of the sea and the different exploitation activities could be effectively treated as integrated sub-systems.

There was an understanding that the role of such an international authority in the planning and development of each of these sub-systems would vary from case to case. It was also agreed that the same flexibility and differentiation should apply with respect to the new body's relation to or partial incorporation of existing international organs.

The new international organization within the United Nations family, while it would exclude navigational matters, would have planning and operational responsibilities. It would have the job of monitoring the sea (including the weather), keeping under continual review matters such as pollution control, fisheries conventions, mineral exploitation and scientific research, and generally subjecting the oceans and their resources to continuous professional

scrutiny. It would be expected that new responsibilities and new powers would accrue to the organization over a period of time.

Three different opinions were advanced as to the area of competence of this new machinery. Most participants felt that, for the time being and given the present system of international relations, a new ocean institution should primarily coordinate those functions already vested in similar governmental institutions. Thus, the new authority would be a loose combination of several departments, including committees of FAO, IOC, IHB, IMCO, WMO, WHO, IAEA and others. Added to these merged functions might be a single new one, the coordination of deep-sea mining. The new institution's authority would, however, through its coordination and cooperating functions be only of an "advisory" nature, wielding considerable factual powers to influence activities in all subsystems.

The second category of critics proposed that the new ocean institution should have -- apart from the traditional powers of FAO's Committee on Fisheries, etc. -- a much stronger role to play in the important new field of ocean activity, deep-sea mining. They thought that a fresh start in international relations would be made if one single, new, all-embracing institution were

created, and in it were vested an unprecedentedly large power for the planning and development of deep-sea mining.

Some of the Center staff stated that a combination of existing functions plus deep-sea mining coordination -- strong or weak -- in an administrative arrangement conceived of as within the present system of international organizations and following the same pattern could not constitute a decisive step ahead. They called the other approaches "first-class funerals" for the ocean regime. They asked for a departure from what they called impotent and ineffective international organizational patterns. They felt that only an international authority with new and strong responsibilities for all oceanic subsystems could establish a breakthrough and, if such an authority should work out successfully, it could later be regarded as a model for the United Nations at large.

In substantiation of their call for a new model, this group put forward their assumption that the next decades will be increasingly shaped by the global conflicts between the developed and the underdeveloped countries. They urged, therefore, that all planning of research, use, conservation, development, exploitation and non-pollution of the ocean be tied to development. To enforce the compelling necessity of developing the Southern part of the globe, the new ocean authority must

-- in the view of these panelists -- represent the first institutional response to this challenge. It should, therefore, be a new type of international organization, with the authority to plan, to distribute, and to enforce.

This far-reaching proposal, challenged as being unrealistic and undesirable by many, was defended by others. The latter pointed out that the ocean environment, being partly free from vested interests, could provide a better testing ground for a new approach than any other part of the world. Furthermore, they said, the developing nations, which are not the beneficiaries of the "realities" of the present system, will increasingly advocate its change into a new, more development-oriented system. This point was challenged by those who said that the present system benefits the developing nations at least in fisheries and that it is fisheries that now produce most of the revenue from resources in the ocean beyond national jurisdiction.

The question was raised whether the Twenty-Fifth General Assembly should encourage all nations and enterprises to pay a voluntary development tax of one percent on all ocean produce living or non-living during the second development decade, which coincides with the first International Decade of Ocean Exploration. The revenues might be turned over to a planning commission consisting

of the Inter-Agency Consultative Board of the UNDP, the intersecretariat of IOC and -- to be sure the developing nations are duly represented -- to a committee of UNCTAD. This tax would be a way of establishing the principle of the common heritage of mankind: the benefits to be derived from the exploitation of the oceans would accrue to the developing nations not on the basis of foreign aid, but as a logical consequence of the peaceful use of the common heritage of mankind. At least in one area the odious distinction between donor nations and recipient nations would be abolished. A new beginning would be made.

Although most participants gave rather negative responses to this idea, some Center participants justified a moderate tax on the ground that the new institution's planning and development activities would actually broaden the opportunities of the use of this area by all states and enterprises. The international tax would be used to finance cooperative planning and equitable development of ocean resources. Compared to the moratorium resolution of the last General Assembly -- which was intended as an emergency measure, a temporary prohibition -- the tax proposal would be a positive constructive measure.

The procedure -- the temporary levying of a one percent development tax -- and the mechanism -- the

international machinery as described above -- should not be mistaken for "The Regime." Inevitably, an international ocean regime will have to be far more complex, but this would be a concrete beginning. Action would be initiated. A General Assembly Resolution of the kind suggested might be considered point 0 of a dynamic model for an international ocean regime, a point that is bound to move in its set of coordinates, variable factors permitting.

It was pointed out in opposition, that an international tax would require elaborate machinery and would raise only a relatively insignificant amount of money. The FAO considered levying a restaurant tax in connection with its "Freedom from Hungar" campaign but abandoned the idea when it became convinced the tax ram counter to all accepted concepts of taxation. A tax on ocean resources, if passed on to the consumer, might have widespread repercussions on the cost of living and spending patterns.

CONCLUSION

In summing up the objectives, procedures, and instruments of planned development of ocean activities, four general criteria for the orientation of planning in such a context were proposed by the Center for further consideration.

First, planning must be systemic, interlinking the multiple uses of and interests in the marine environment.

Second, planning must be functionally directed, not territorially. Thus, as far as the exploitation and conservation of fishery stocks are concerned, one should keep in mind Dr. Schaefer's point that "there's a need to provide for management of the living resources by natural species population, in the context of natural ecological units, and according to the ecologically determined geographical boundaries even though these do not correspond to political boundaries." With regard to non-living resources, pollution problems, inter alia, dictate a similar functionally-directed planning policy, determined by ecological rather than by political boundaries.

This non-territorial approach to planning suggests the third basic consideration. Plans are not laws. They move on another plane from that of national sovereignty.

They cannot be enforced -- not even at the national level, for that matter. They must be arrived at freely, the only incentive being the benefits derived therefrom, the only sanction against non-cooperation being exclusion from benefits. If planning is successful, it must become increasingly expensive not to cooperate.

Fourth, planning must be based on maximal participation of those concerned with management as well as of those interested in the reinvestment and/or redistribution of profits. A separation of these planning functions would be fatal. Here, again, planning must be systemic.

Volume III

PLANNING AND DEVELOPMENT IN THE OCEANS

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Pacem In Maribus Preparatory Conference
On Planning and Development in the Oceans

LIST OF PARTICIPANTS

Professor Juraj Andrassy, University of Zagreb, Yugoslavia

Mr. M.C. Basu, Indian Planning Commission, New Delhi

Mrs. Elisabeth Mann Borgese, The Center for the Study of Democratic Institutions (Project Director, Pacem in Maribus)

Ambassador Silviu Brucan, The Center for the Study of Democratic Institutions

Mr. Wilbert M. Chapman, Director of Marine Resources of Ralston Purina Company, San Diego, California

Mr. Francis T. Christy, Jr., Resources for the Future, Inc., Washington, D.C.

Miss Margaret M. Croke, Research Officer, UNITAR

Dr. Joseph W. Ehrenreich, Director, Graduate School of Business Administration Research Institute for Business and Economics, University of Southern California, Los Angeles

Dr. William Ewald, The Center for the Study of Democratic Institutions

Dr. Robert L. Friedheim, Center for Naval Analyses, Arlington, Virginia

Professor L.F.E. Goldie, Visiting Professor at Columbia University, New York City

Mr. Michael Hardy, United Nations Office of Legal Affairs

Dr. Hiroshi Kasahara, Associate Dean, College of Fisheries, University of Washington, Seattle, Washington

Mr. Jean-Pierre Levy, Ad Hoc Unit for Marine Science and Technology, United Nations Department of ESA, (Technical Secretary)

Sir Arthur Lewis, Professor of Political Economy, Woodrow Wilson School of Public and International Affairs, Princeton, New Jersey

Dr. Jerome Morenoff, President, Ocean Data Systems, Inc., Bethesda, Maryland

Mr. Oscar Schachter, Deputy Executive Director and Director of Research, UNITAR, (Conference Chairman)

Dr. Milner B. Schaefer, Director, Institute of Marine Resources, University of California, San Diego (absent because of illness)

Mr. Reginald Smith, Assistant Director-in-Charge of Economic Surveys and Policies Branch, United Nations ESA Department

Mr. Ralph Townley, Chief of Animal and Fish Resources Programme, UNDP

Dr. Wolfgang Vitzthum, The Center for the Study of Democratic Institutions (Rapporteur)

Volume IV

OCEAN ENTERPRISES:

A SUMMARY OF THE PROSPECTS, AND HAZARDS, OF MAN'S IMPENDING COMMERCIAL EXPLOITATION OF THE UNDERSEAS

Proceedings of the Preparatory Conference

On the Role of Enterprises in an Ocean Regime

April, 1970

by Elisabeth Mann Borgese

PREFACE

The issue most likely to occupy the forefront of public attention during the seventies is conservation and improvement of the human environment. Issues pertaining to what is loosely termed "ecology" are dominant in local, national, and international politics; this in itself is a matter of moment since passionate public interest is rarely aroused at all three levels simultaneously. The concern embraces the whole of the human environment, natural or man-made, physical or social. The new emphasis is on the entirety -- cities and wilderness, oceans and atmosphere -- and on the interdependence of parts.

Yet, in order to understand what is happening to our environment, and what might be done about it, it is necessary to deal with the parts that make up the whole. The address here is to the oceans; they are particular, they are immense, and they are in crisis. Abruptly we have found ourselves at the end of the era when the vast expanse and great depth of the seas provided immunity from man's exploitative drive and talent. Within the next ten years thirty-five per cent of the world's growing oil requirements will be met from offshore production. Food from the oceans -- including fishmeal and fish-protein concentrates -- may quadruple

by the end of the century. A revolution in the mining industry is in the making; it may be fifteen years away or a hundred and fifty, but it is certain, and when it comes, most of the world's metal supply will be mined under water. Cities may expand over the oceans; colonies for work and recreation may be built deep down below. Weather forecasting and potential control depend on the oceans; communications and transport on the surface and beneath it are growing in volume and density.

Development of ocean resources is coming with a rush. It raises urgent new demands for order, at a minimum for a systematic approach to coördination of increasing, and often conflicting, multiple uses. The alternative is political and economic chaos, environmental pollution, perhaps even the ultimate pollutant, war itself.

The oceans and the ocean floor, covering over seventy per cent of this planet, are no-man's-land, and so, in another sense, they belong to everyman. So far no nation has laid claims of sovereignty to any territory beyond the narrow strip of coastal waters and of the continental shelf. It is here, on this "common property of mankind," that nations from the East, the West, and the underdeveloped continents are now called upon to coöperate in unprecedented ventures made possible by new underwater technology. This is the last global frontier challenging man's creative energy and imagination; the need, and the opportunity, is not merely to

develop physical resources but to devise new forms of international cooperation and organization.

The problems of the oceans are peculiar; yet they are interdependent with the problems that arise on land, in the air, and in outer space. Thus new forms of international cooperation and organization appropriate to this particular no-man's-land, this available and as yet humanly unpopulated laboratory, are bound to provide spin-offs in other critical areas as well. It was in this conviction that the Center for the Study of Democratic Institutions initiated, during the winter of 1967, a study project on the law of the seas. The first phase brought together diplomats, scientists, fishery experts, and industrialists from a number of countries and resulted in publication of a model statute for a possible ocean regime.* The second phase broadened the scope of the project through a series of conferences at the Center and elsewhere. These will culminate in an international convocation in Malta in June, 1970: Pacem In Maribus (Peace in the Oceans).

Between 1968 and 1970 an astonishing amount of work has been directed toward the problems involved in the establishment of an ocean regime. The Center's coordinating efforts have paralleled those going forward at the international and national levels, in the public as well as in the private sector, in the areas of both popular literature and scholarly publishing. Much of this research and

* The Ocean Regime, A Center Occasional Paper, October, 1968.

publication is purely scientific, or concerned with narrow practical problems such as those encountered by fisheries; restricted to military considerations, treated within the limits of technological-industrial opportunities for exploitation, or confined to the complex legal entanglements that fascinate experts on maritime law.

In the United Nations, military and disarmament problems have been referred to the Geneva Disarmament Committee where attempts to reach consensus on a very limited treaty based on a Soviet-American draft have thus far been a failure. The scientific aspects of the problem are covered by UNESCO's Intergovernmental Oceanic Commission (I.O.C.) and Scientific Commission for Oceanographic Research (S.C.O.R.), both operating within a rather limited frame of reference and with restricted means. (The annual budget of I.O.C. is $200,000.) Meteorology is treated separately by the World's Meteorological Organization (W.M.O.). Fishery development is coordinated by the Food and Agriculture Organization. Pollution is dealt with by IMCO, the Intergovernmental Maritime Consultative Organization, and F.A.O., the Food and Agriculture Organization, while the World Health Organization and the International Labor Organization are involved with various aspects of safety standards and labor relations in oceangoing commerce, traffic, and industry.

In addition to all this, the United Nations General Assembly has appointed a permanent Seabed Committee of forty-two nations, which, in turn, has set up a special legal subcommittee and a technological-economic subcommittee. Both have issued reports,

based on fact-finding studies provided by the Secretariat as well as by the specialized agencies. Liaison and coordination among all these groups have been vastly improved during the last two years by the establishment of interagency and intersecretariat committees, and it is expected that synthesis of all factors and elements should emerge from the discussions of the Seabed Committee, followed by the debates in the First Committee of the General Assembly and the General Assembly as a whole.

The cumbersome complexity of this intergovernmental machinery makes it certain that tangible results will be slow in coming. Such an operation, by its very nature, tends to produce descriptive and statistical rather than prescriptive and creative material. At best, it may tend toward the extension, coordination, and perfection of existing concepts and organizations. Novelty is slow to emerge from old concepts, and unity is hard to forge from the specialized and fragmentary. Modern science, on the other hand, especially systems analysis utilizing cybernetics to discover synergetic effects, suggests a different approach -- not from the part to the whole but from the whole to the part, from the "system" to the "subsystem" with all their interconnections and feedbacks.

The ocean environment is an indivisible whole comprising high seas, territorial waters, contiguous zones, and estuaries; seabed and continental shelf and the atmosphere above it; living and non-living resources; channels of communication; bodies of national and international law; traditions, myths, values, passions,

and fears. A pebble dropped in any one area sends rings of ripples across the whole. He who deals with any aspect of ocean problems, willingly or unwillingly, must deal with the whole.

Considerations of military uses of the seas, at issue in current negotiations on arms control and disarmament, are inseparably interconnected with the legal issues of the continental shelf and the limits of national jurisdiction. What happens within the limits of national jurisdiction, furthermore, even within one mile offshore, may render any international system of security and control ineffective. A great deal of oceanographic research has always been carried on under military auspices, and still is. One of the first requirements of peaceful exploration of the ocean environment is that the role of science and scientists in their relation to the military must be reexamined and redefined.

With increasing exploitation of oil, gas, and mining resources, private and public enterprises are moving into the vanguard of technological development. The devices being perfected for commercial exploitation -- new types of submersibles, listening devices or other means of exploration, underwater explosives, submarine habitats, improved storage and transport facilities -- all these are readily convertible into military weapons and vice versa. Thus the military-industrial complex already is manifesting itself under the seas. The provisions of the Soviet-American draft arms-control treaty, prohibiting the installation

of weapons of mass destruction on the ocean floor beyond the limit of twelve miles from shore, hardly touches this web of complexities. No matter how amended, such a treaty can be considered only as a first step; the increasingly urgent issues of underseas arms control and disarmament can be dealt with only in the context of a legal framework for an ocean regime, within which planning and development for the peaceful uses of the ocean environment and its resources will automatically tend to deemphasize and reduce the military uses of seas and seabed. In such a framework, and only in such a framework, does the technological-economic imperative effect disarmament.

The Pacem In Maribus project started from this systemic or ecological approach and involved construction of a model regime. Its five subsidiary study projects derive directly from the model and will serve to correct, refine, and complete the preliminary undertaking, and quite possibly to create alternative models. The five projects are:

Arms Control and Disarmament.

The Legal Framework for an Ocean Regime; the Continental Shelf and the Limits of National Jurisdiction.

Planning and Development.

The Role of Enterprises.

Ecology and the Role of Science and Scientists.

Preparatory conferences, one for each project, were held at the Center in Santa Barbara, at the University of Rhode Island, and at the United Nations between January and April, 1970. Three of the

study projects proceeded along lines parallel to those followed by other organizations, including the agencies of the United Nations: Arms Control and Disarmement; The Legal Framework for an Ocean Regime; and Ocean Ecology and the Role of Science and Scientists. The other two projects are unique in their concept and development.

Planning and Development, based on the concept that the seas and their beds are the common heritage of mankind, would seem to be the core of any dynamic working model for an ocean regime. Considering the existence of sovereign nations, any regime must be based on consensus rather than coercion, and consensus is fostered not by prohibitions and controls but by the prospect that joint policymaking promises expanding opportunities. Creative planning, based on the responsible participation of enterprises and nations, is the positive, dynamic counterpart to trust-busting (of oil monopolies, for example), which is negative and repressive and therefore has proved inefficient, and to such economic devices as the forced unitization of irrationally splintered and competitive industries like the fisheries. Planning, in this sense, is directed from the bottom to the top, from the periphery to the center. It is non-enforceable but self-executing, the penalty being exclusion from benefits. To be effective, planning must be such that non-cooperation will be expensive. It must contemplate the participation of autonomous enterprises and sovereign states whose capacities are increased as a result of cooperation rather than curtailed by submission to some international bureaucracy.

The role of enterprises, in this context, has been considered from four different angles:

1) The multinational corporation, which is exemplified by the international oil industry, has achieved a system of global, large-scale planning and development probably unmatched in the world today. In the words of Robert Engler,* the oil industry has learned that "survival on its terms depends on its ability to plan. Its history is an evolution of experimentation with techniques for creating order, whether the immediate challenge has been waste, competition, scarcity, depression, plenty, technology, war, or national boundaries." This sort of planning would of necessity be an integral part of the functioning of an ocean regime, and industry would have a powerful and responsible role. The impetus industry has given to technological progress in ocean exploitation can be beneficial to the world community as a whole under an ocean regime that balances the drive for private profits with mankind's proper concern over pollution, conservation, the multiple uses of ocean space, equity, and development.

2) New forms of integrating the private and public sectors of the economy are in the cards, and they now manifest themselves from the community level, through the national level, to the international level. Giant corporations, for example, now exercise an economic power superior to that of many nation-states; they have

* The Politics of Oil, 1967

developed their own decision-making processes, their own global diplomacy; in economic matters, they deal with sovereigns as sovereigns. Why not formally recognize this obvious fact of international life? The current trend in international law is in that direction, and the maritime specialists now find themselves in the vanguard. Once upon a time international relations were relations exclusively among (inter) nations; nations were the only actors in the drama, the only bearers of rights and responsibilities, the only subjects of international law. Today international relations extend over an ever broadening spectrum of activities, from politics to economics, from social affairs to science, technology, communications, and culture. Transnational organs are evolving around each of these functions, claiming new rights, shouldering new responsibilities, building new economic empires, molding new loyalties. Non-governmental international organizations and intergovernmental organizations of all types have joined and are joining the nations as actors in the international drama. They are acquiring a new status under international law, slowly but surely. The role of enterprises must be studied from this angle.

3) The private power of industry weighs heavily on the decision-making processes of government. The oil companies especially have wielded a notorious backstage influence on the making of foreign policy. Would it not be preferable if, in an international

regime for the peaceful uses of ocean resources, the oil industry, in accordance with its worldwide commitments and needs, could openly express its own viewpoint and participate actively in planning for resource development under its own responsibility? It would appear to be a healthy separation, removing the oil industry from involvement in government's concern with the multiple needs of political communities.

4) Recognition of the autonomy of industrial interests at the international level would have one further advantage. Industry -- as well as science and labor, for which analogous arguments can be made -- could serve as a balancing factor between efficiency and equity in an international regime. Efficiency, in a regime charged with the responsibilities of management, may require a departure from the basic principle of one-nation-one-vote, embodying the concept of the sovereign equality of nations. Considerations of equity, however, make any such departure impossible: why should the rich and powerful nations have a bigger voice in international decision-making affecting "the common heritage of mankind" than the numerous and more populous poor nations? The direct and autonomous participation of industry and science and labor in international planning and decision-making could introduce a balancing factor in favor of efficiency without violating the principle of equity and of sovereign equality of nations.

These are the considerations that underlie the special study project on the role of enterprises undertaken in the context of

the Pacem In Maribus project. In various measure, they apply to private as well as to public enterprises, whether operating under a capitalist or a socialist regime. Their goals and functions in an ocean regime are -- or should be -- the same. Starting with a unitary or systemic approach to ocean problems, projected into a working model, five groups of experts have completed preliminary work on the subprojects. It will be the task of the Pacem In Maribus convocation in Malta to reassemble the whole and to discuss each problem in the context of all others. To facilitate this task, the participants in the Malta convocation are being grouped not according to subject areas defined in the preliminary study projects but according to professional expertise: political-legal groups, industries, fisheries, ocean sciences. Each group will consist of a number of core persons drawn from the study-project panels, plus a number of new invitees. Each working group will appraise the report or reports in its area of particular competence. This procedure is designed to enlarge the dialogue.

Subsequently, the political-legal group, which will include a number of ambassadors to the United Nations as well as parliamentarians, members of government, and other public opinion leaders, will meet with each group of technical experts in turn. This confrontation should encourage the emergence of new ideas, aimed at breaking out of at least some of the dichotomies and dilemmas that the nineteenth-century tradition of international law tends to impose upon current thinking -- the limits of imagination that

so far have deadlocked negotiations on an ocean regime in the United Nations.

If at Malta we can catch even a preliminary glimpse of a new system of international cooperation, a peace system devised for the oceans on the basis of improved understanding of the relationship between human environment and law, a system institutionalizing new forms of participation and communication among transnational science, multinational industry, and international politics, then we would have made more than a modest start at solving the increasingly urgent problems of the maritime no-man's-land. The creation of an international ocean regime, founded on the concept of the common heritage of mankind, could mark the point of passage from one era of international relations to another. Here is a chance for a new beginning.

Elisabeth Mann Borgese

Santa Barbara, California
May, 1970

Basic Issues in Ocean Enterprises

by Neil Jacoby

The role of enterprises in the oceans should be viewed as part of the broader problem of the relationship of human society to the deep seas. The oceans that cover seventy percent of the world's surface are the ultimate source of life on earth. The stability of their ecology is indispensible to the existence of mankind. They determine man's physical environment, provide his sustenance, and enable his survival. Yet the forces of nationalistic competition, burgeoning population, and rampant industrialization have begun to threaten the ocean environment and thereby the future welfare of man. The ocean waters and the seabeds can be dangerously misused for military purposes. They are being polluted and degraded by the effluences of commerce and industry. Their economic resources can be impaired by myopic exploitation.

Because the oceans constitute a global system, ocean problems cannot be resolved by national actions. Only a supranational authority, regulating ocean usage equitably in the long-run interests of all mankind, can stop the dissipation of irreparable ocean values. Only a supranational authority can devise and enforce arrangements under which stable relationships can be reestablished between human society and the oceans. It is within this framework that the role of enterprises in exploring for an producing ocean resources should be considered.

In defining the role of ocean enterprises, numerous basic issues must be confronted. These issues are legal, political, biological and ecological as well as economic and administrative in character, and they are closely interrelated. They concern the jurisdiction, constitution and functions of an ocean regime; the conservation, technology and probable economic value of ocean resources; the terms, conditions and fees to be established by an ocean regime for exploration and production activities of enterprises; and the types of enterprises and priorities to be assigned each type in ocean activities. Herein, we briefly explore these issues, noting alternative policies and courses of action proposed or discussed by the authors of papers in this volume.

1. Territorial Jurisdiction of an Ocean Regime

Basic to all other problems is how to define the territorial jurisdiction of a supranational ocean regime. This is, of course, the converse of the question of defining the jurisdiction of nation-states over the ocean waters and seabeds adjacent to their shores. Generally, nations bordering the oceans seek a broad definition of national jurisdiction, while landlocked countries support a restricted definition. The great powers, like the United States and the Soviet Union, find themselves in an ambiguous position. On the one hand, they favor a narrow concept of national jurisdiction in order to preserve maximum freedom of the seas for their commerce and their navies.

On the other hand, they covet possession of the resources in and under the oceans along their lengthy coastlines. As a result of these conflicting interests, a bewildering variety of national claims of exclusive fishing, mineral, navigational and other rights over "adjacent waters", "territorial seas", and "continental shelves" has proliferated. Peru, Chile and Brazil claim exclusive fishing rights in the oceans up to 200 miles from their shores. Bordering nations have already carved up among themselves exclusive mineral rights to the Adriatic, Baltic and North Seas. In its 1968 Statement of Policy on Jurisdiction over the Natural Resources of the Ocean, The American Petroleum Institute proposed that United States jurisdiction extend over the seabed of the submerged North American continent out to where it meets the abyssal ocean floor - which can be several hundred miles from land in ocean waters 12,000 feet deep!

Whether a wide=band or narrow-band concept of national jurisdiction ultimately prevails will make an enormous difference in the potential economic value of ocean resources coming under the control of an ocean regime. Although man's knowledge is lamentably meager, what little is known about marine biology and geology suggests that the preponderance of resources with potential economic value exists in the seabeds or superjacent waters of the continental shelves rather than in and under the deep oceans. If an ocean regime controlled the disposition of

all resources beyond the traditional "three-mile limit", it would possess billions of dollars of assets even under existing technologies of recovery. If, on the other hand, its authority began 200 miles or more from every coastline, the present economic value of its resources would be negligible. Under the first condition, the relations between an ocean regime and ocean enterprises would immediately be matters of great importance. Under the second condition, most of those issues would vanish or be reduced to small proportions.

Given its complexity, resolution of the jurisdictional problem will require many years. However, the establishment of an ocean regime need not await a final solution. The suggestion has been made that an ocean regime be established with provisional boundaries, so defined as to meet the acceptance of most nations, leaving its final territorial jurisdiction to be negotiated later on. For example, the regime might immediately take provisional jurisdiction over oceans and seabeds at depths of more than 200 meters and at distances from land of more than 200 miles, whichever were the greater.

2. Constitution and Functions of an Ocean Regime

How should the functions of an ocean regime be defined, and how should the agency be structured to discharge those functions? Should an all-purpose general authority be established? Or would a series of specialized supranational agencies be more feasible, at least initially? Specialization

might be on a basis of functions, such as research, licensing, or enforcement. It might be upon a basis of industry, such as shipping, fisheries, petroleum or hard minerals. It might involve a series of regional agencies, respectively concerned with ocean affairs in the Atlantic, Pacific, Mediterranean, or Indian regions.

Certain specialized agencies of the United Nations are already involved in aspects of ocean activity. The Food and Agricultural Organization studies fisheries. The World Meteorological Organization collects data, coordinates national research and performs research on weather. Once the oceans were recognized as an integrated system, in which each activity impinges on every other activity, these separate programs might be drawn together under a single ocean authority of the United Nations.

The superiority of a systemic approach to policies for the world's oceans is a powerful argument for a general-purpose ocean agency. A general-purpose agency would, of course, be expected to organize separate divisions to carry out particular functions, deal with separate industries, or provide on-the-ground supervision of particular regions. Its overall strategy and policy would, however, take interdependencies into account. It would recognize that oil pollution cannot be confined to one area; that oil slicks from ocean shipping damage fisheries and the recreational values of adjacent shores; that over-fishing can deplete a species of fish and deprive future generations of

its utility. Above all, it could launch and coordinate large-scale research projects designed to enlarge man's slender knowledge of the oceans, and to guide his activities so as to preserve the ocean environment whilst assuring optimum utilization of marine resources.

Mrs. E. M. Borgese has proposed that an ocean regime be established as an agency of the United Nations to regulate, supervise and control all activities on the high seas and on or under the seabed. (See her The Ocean Regime, an Occasional Paper published by the Center for the Study of Democratic Institutuions, October, 1968.) Its policies would be formulated by a Maritime Commission of seventeen members, elected by a Maritime Assembly composed of representatives of the UN, extractive industries, fisheries and oceanographers. Policies would be executed by a Maritime Secretariat and interpreted by a Maritime Court. Separate Secretariats would be established for mining, petroleum, fishing and aquaculture. (None was proposed for ocean transportation.) The Regime would have broad powers to license governments or corporations tc explore and produce ocean resources, to regulate fisheries, aquaculture and pollution, to promulgate safety standards, to conduct research, to inspect ocean installations, and to impose penalties upon violators of its rules.

Professor Richard Eells has proposed that the ocean regime take the form of a multinational corporate authority, whose stock would be allocated among members of the United Nations in proportion to the value of their national products, subject to adequate

representation of less developed countries. The corporation would need the moral support of the United Nations. Stock could ultimately be held by governments, foundations or corporations involved in the oceans, and they would elect a board of directors to prescribe its policies. The corporation would license public or commercial organizations to use resources of the sea. It would pay dividents to its shareholders after meeting its costs.

A corporate format for an ocean regime might facilitate its establishment. A task-and-action oriented corporation might well produce more efficient action than a political organization. On the other hand, there is the problem of insuring that its action would be in the general public interest. As the present writer has shown, the multinational corporation has demonstrated great ability to assemble resources and to organize production on a worldwide scale. It tends to reconcile and to reduce the political, social and economic differences among nations. Its potentialities in ocean enterprise are surely no less than on land.

In structuring an ocean regime, consideration should also be given to possible combinations of political and corporate forms. For example, it would be feasible for the Ocean Regime proposed by Mrs. Borgese to have one or more multinational corporations operating under its general control. Arthur Barber has proposed the establishment of a multinational Weather-Ocean Corporation, which would enter into ten-year contracts with national governments to observe, report and forecast the weather.

He plausibly contends that such a global corporation, capable of systematic correlation of weather data, would not only improve weather forecasting but would perform the task at less cost than the present combined outlays of national governments for this purpose, and would produce substantial net revenue tc its sponsor. Because a global weather system would mainly involve the oceans, a Weather-Ocean Corporation could well be the first in a series of corporate subsidiaries operating under the aegis of an ocean regime.

3. Conservation Activities of an Ocean Regime

Issues of ocean conservation appear to be of more urgency than issues of commercial exploitation of marine resources, and they involve enterprises in manifold ways. The wreckage of the oil tanker Torrey Canyon off the British coast in 1968 and recent oil well blowouts in the Santa Barbara Channel and the Gulf of Mexico are dramatic examples of the rising volume of marine pollution resulting from the booming production and transportation of petroleum in the oceans. As more drilling is done in deeper waters, and as tankers become more numerous and gargantuan, the massive pollution episodes will become more frequent. Well blow-outs, ruptures of pipelines, and collisions and runnings aground by tankers will multiply. Although maritime insurance companies exert a salutory influence by inducing their clients to take preventive and protective measures, their regulatory powers are limited. As James Dawson has pointed out, man

national governments and corporations engaged in risky ocean activities are self-insured. They operate tanker fleets or offshore drilling or mining ventures, and are answerable to no one for discharging pollutants into the oceans or leaving junk and discarded equipment as hazards to navigation.

Less spectacular but equally pernicious is the pollution resulting from the common practice of flushing the sludge and debris of oil tankers into the oceans, with incalculable effects upon marine life. Efforts by national governments to curb this degrading practice have proved ineffective, and it is spreading. A supranational authority with policing capabilities is needed.

Another kind of conservation issue is raised by fishing enterprises. It is in the obvious long run interest of mankind to maintain appropriate stocks of such reproducible resources as fish in the oceans, and to limit annual catches of each species to the "maximum sustainable yield." This problem has so far been met partially by international agreements between major fishing nations. An example is the Soviet-American agreement on lobsters. As the ocean fisheries expand under world population pressure, and as the enterprises of more nations become more extensively engaged, international agreements will become more difficult to reach. Only a supranational ocean regime offers an effective solution.

The point should be stressed that conservation of marine resources poses problems beyond the competence of nations to solve. The seas are an indivisible whole, ignoring man's

political boundaries. Pollution originating in national waters may move into international waters, and vice-versa. Because every nation has an equitable interest in the marine activities of every other, all should join in the protection of their common heritage.

4. Technological and Economic Aspects of Marine Resources

The economic value of the resources under control of an ocean regime will depend upon its territorial jurisdiction and upon world supply-demand conditions for resources yielded by the oceans and seabeds. Having explored the first determinant, we now briefly consider the second.

Ocean resources having present or potential economic value include services for transportation, communication and recreation, extracted commodities, living and non-living, and real estate that might be created on seamounts for living space, power generation, or other purposes. Non-living commodities capable of extraction from ocean waters or seabeds include water, minerals, chemicals, liquid petroleum and natural gas. Living commodities include, of course, fish, marine animals and plants useful for food or drugs.

The principal conclusion reached by students of maritime economics is that, apart from fisheries, the present economic value of ocean resources in the seabeds and superjacent waters more than 200 meters in depth (which under the 1958 Geneva Convention lie beyond national jurisdiction) is not large. Biological and geological factors place the preponderance of

valuable liquid and hard minerals, as well as fish, within national jurisdictions. The value of hard minerals being currently recovered from the oceans is miniscule, apart from the extraction of magnesium from sea water. Although offshore production of petroleum now accounts for about 17 percent of world output, all of it is being produced in waters less than 100 meters in depth. In his assessment of prospects for deep ocean mining, F. L. Laque finds that manganese nodules found in abundance over the deep ocean floor are the hard mineral of most imminent economic value, and that their production probably will not become commercially profitable in competition with land-based minerals for another decade or two.

More effective techniques of exploration and production can, of course, reduce the costs of ocean resources and can give value to hitherto worthless materials. Ocean technologies are improving dramatically. Professor Pontecorvo notes that it took the petroleum industry nearly twenty years to move from 50 to 640 feet of maximum water depth of wells drilled; only one additional year to reach 1,200 feet; and some believe wells will be drilled in 6,000 feet of water by the late 1970's. Yet rising technological capability does not necessarily mean lower costs. In fact, the costs of petroleum per barrel rise exponentially with water depth. Deep-water oil must compete with shallow-water oil and with oil produced on the land, as well as with vast amounts of oil potentially available at somewhat higher costs from oil shales, tar sands and the hydrogenation of coal.

One must conclude with T. F. Gaskell that it is unrealistic to expect that an ocean regime will become rich by controlling oil and gas beyond the continental shelves.

Sea fishing has increased rapidly since World War II, the annual catch having risen from 22-million tons in 1952 to 57-million tons in 1968, an average annual growth of 6.2 percent. A major part of this harvest is taken near the margins of the continents. In contrast to minerals, which are a non-reproducible stock, fish constitute a reproducible flow of resources whose long-run benefits to man are greatest when the annual catch is limited to the "maximum sustainable yield." The consensus of experts is that the sustainable annual harvest of world fisheries in the aggregate is probably two or three times as large as the current yield. However, certain species are being over-produced, and excessive fishing occurs in certain areas of the oceans with under-fishing in others. As the world fishing industry grows, more species will require conservation rather than development, and greater efforts will be necessary to guide fishing activities into the most productive channels. Fisheries research and management programs, now generally directed at a single species or region, will need to be correlated. Equitable allocations of fish catches among nations, as more species reach their maximum sustainable yields, will also present problems for multinational solution.

Anthony Ressa's "Project Taluga", a plan to construct islands on a submarine seamount in the Cortez Bank of Mexico and

to organize a new national government to have sovereignty over them, raises the startling prospect of developing a new resource in the oceans,--land! It also dramatically reveals the need for an authority to take jurisdiction over the oceans and seabeds beyond national control as the common property of mankind. As matters now stand, they are res nullius, open to any government or private entity who takes possession of them. As population pressures rise on the land, and the mitigation of environmental pollution becomes urgent, islands and marine living environments for the generation of power, submarine mining, research, or simply recreation will be created. Such enterprise activities should be controlled to prevent disturbance of the ocean ecology.

5. Financial and Administrative Aspects of Marine Enterprise

Because substantially different geological, biological and technological conditions are confronted by the ocean fishing, petroleum, and hard minerals industries, the terms of exploration and production licenses issued to enterprises in these industries should also differ. As Dr. Laque has noted, the wide distribution of magnesium nodules on the ocean floor, with an absence of concentrated deposits in limited areas and a recovery technique employing no fixed equipment, makes their production resemble fishing more than mining. Licensing of such activity by an ocean authority would therefore be more appropriate than the designation of exclusive concession areas. Petroleum deposits, on the other hand, are concentrated in specific areas

and require heavy investment in fixed equipment, so that enterprises would require the protection of exclusive concession areas over an extended time.

It is premature to be specific about the revenue goals of an ocean regime or the amount of royalties or license fees to be charged enterprises. In general, a regime should establish terms that are considerably more liberal than those prevailing on land, because the risk-level of ocean operations is much higher. Given man's meager knowledge of the seas and the pioneering efforts needed during the early years, the regime should emphasize promotion of ocean enterprises rather than realization of immediate revenues. Although this policy will disappoint those leaders of less developed countries who have been led to hold exaggerated hopes of vast incomes from the oceans, it will pay off most highly in the end.

6. Enterprise Types and Priorities

A final set of issues concerns the types of enterprises to be permitted or encouraged to operate in the oceans, and the priorities or preferences that should be assigned to each. Ocean enterprises might be private, public, or mixed in ownership; they might operate either individually or in national or multinational consortia. An "open" policy should probably be followed by an ocean regime during the initial period, under which public or private or mixed enterprises would be freely authorized to explore for and develop ocean resources, under appropriate safety and anti-pollution regulations and restrictions on production. At a

later stage, competition among enterprises for licenses and concessons might become severe. The regime would then face problems of allocating rights among enterprises of different types or nationalities. Manifestly, all nations should be entitled to have their enterprises participate in ocean activities on a scale proportionate to their national incomes, populations, locations or some appropriate criterion or combination of criteria. Under these circumstances a case could also be made for giving priorities to multinational enterprises or consortia of enterprises.

Professor Wolfgang Friedmann has made a strong case for giving priority to joint ventures in the oceans between governments and private enterprises as a means of diffusing technological and managerial knowledge among the less developed countries. They could be a means whereby the twenty-three landlocked countries, many of which are poor economically, could participate in ocean enterprises.

Should an ocean regime itself undertake entrepeneurial activities or confine itself to research and regulatory functions? If the petroleum industry offers a prototype, the former policy will prevail. Nearly all of the important oil-producing countries offer exploration and production concessions to enterprises and simultaneously operate their own national oil company for these purposes. To the argument that international organizations lack experience in operating enterprises, there is the answer that they are already carrying on successful banking and financing operations through the

World Bank and International Monetary Fund. Why should not a corporate subsidiary of an ocean regime become equally successful in industrial operations?

7. Next Steps for Action

Herein, the salient issues of ocean enterprise have been raised, and observations have been offered about alternative solutions. Definite policy choices require more discussion--official and unofficial--among citizens of all nations having special knowledge of the subject. The holding of such discussions, and the generation of consensus on the basic issues of jurisdiction and organization of an ocean regime, is an obvious first step. Hopefully, this will be followed by multinational action to establish such a regime. There are many positive and negative reasons for a determined move forward on this path. An ocean regime offers the most promising area for international cooperation, and the most powerful means of rejuvenating the United Nations. Viewed from the other side, it is essential to provide the political and institutional machinery that alone can save mankind from the disasters of exploding population and onrushing technology.

Volume IV

OCEAN ENTERPRISES:

A SUMMARY OF THE PROSPECTS, AND HAZARDS, OF MAN'S IMPENDING COMMERCIAL EXPLOITATION OF THE UNDERSEAS

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List of Participants

Pacem In Maribus Preparatory Conference
On the Role of Enterprises in an Ocean Regime
Santa Barbara, California
April 1-3, 1970

(1) Arthur Barber - Institute for Policy and Planning, Washington, DC

(2) Adolph A. Berle - New York

(3) Enrico Bonomi - ENI, Rome, Italy

(4) James W. Dawson - Alexander Howden & Swann, Ltd., London

(5) Richard Eells - Columbia University, New York

(6) Neil Jacoby - University of California, Los Angeles (conference chairman)

(7) Frank L. LaQue - The International Nickel Company, Inc. New York

(8) Jack McFarland - Consolidated Edison Company of New York, Inc.

(9) Aurelio Peccei - Italconsult, Rome, Italy

(10) Giulio Pontecorvo - Columbia University, New York

(11) Anthony T. Ressa - Bellevue, Washington

(12) Edward Wenk, Jr. - University of Washington, Seattle

Volume V

THE OCEAN ENVIRONMENT

Proceedings of the Preparatory Conference

On Ecology and the Role of Science

April, 1970

Introduction

by John Wilkinson

The fourth preparatory conference for the Pacem in Maribus convocation was held at the Center for the Study of Democratic Institutions April 20 - 26, 1970. Initially, the subject was "Ecology"; but, for obvious reasons, it was decided to widen it into a conference on "Ecology and Related Science Policy." This extension was feasible for the reason that all contributed papers that had to do with ecology contained, either explicitly or implicitly, indications of possible science policies for the ocean regime. Thirty-two representatives from ten different countries participated. All of them were either professional ecologists or experts in disciplines (e.g., areas of political science) that had been strongly influenced in their work by ecological considerations. It is an essential characteristic of ecology that the most diverse subject matters are drawn together into one; and it is not uncommon these days, for example, to hear of persons who call themselves "bio-geo-ecologists," or something of the sort.

The names of the participants, exclusive of Center personnel, are listed in an appendix to this paper. Perhaps of more importance is a second appendix which was the agenda outline for the conference. This outline, with seven principal headings and twenty-five or so sub-headings, was used both as a schema for commissioning papers in advance, and as a program of subjects to be taken up seriatim during the six days of the conference. Such a procedure could only be followed roughly in both these enterprises since it is of the very nature of ecology for "everything to be connected with everything else." The outline begins with ecology considered in the most abstract way, i.e., as general systems theory; and proceeds through more familiar meanings of the term to very concrete considerations of politics and policy. It will be noted that there is a considerable overlap with the results of the proceeding conferences, both in contributed essays and the ensuing dialogue. This overlap, however, is not mere duplication. It rather represents the consideration of the same kinds of materials and problems from a very different point of view. And, in any case, such overlap lies in the very nature of ecology.

It must be emphasized that a conference on a "telluric" ecology was planned and carried out. It is manifestly impossible to consider the ocean regime in abstraction from the land regime. Everyone is familiar by now with the way in which "pollution," whatever its source, tends to go through global

distribution chains, nutritionally or otherwise. This does not mean that it is impossible to distinguish the ocean from the land as two fundamentally different kinds of regions with "interfaces," most often narrow coastal belts, that lie between them. (These interfaces are not always coastal belts; if they were, it would be relatively easy to settle the difficult problem of "regions" and regional regimes.) Much discussion during the symposium was devoted to the seemingly intractable problem of the definitions of regions, a problem which has both theoretical and practical significance. The theoretical significance is clear; the practical significance of the problems arises as soon as one attempts to set up institutions, either of a scientific or political nature, to consider policy research, and implementation of this involved in any rational ocean regime.

Ecology, like meteorology, may be said to be just coming of age. In fact, only after World War II was any substantial advance made on ecology considered as the "web of nature," so well described by Darwin and his followers. The developments after World War II were due to the elaboration of ecological systems analyses. Norbert Weiner and those who followed him, showed how systems of entities interacting through communication channels possessing a certain band-width, and signal-to-noise ratios, could in general be described by systems of differential equations, so that, for example, the

general conditions of stability resulting from the existence of "feed-back" mechanisms could be described. This kind of ecology clearly comes under the headings of cybernetic-information system theory. Such theories complement rather than supplant the older type of ecology. The formal theory has been pretty well elaborated, but the data that must be "switched" into the theory in order to make predictions are very exiguous. There was a general recognition on the part of the symposiasts, that, if "hard" data relating to the variables of land ecology are inadequate, the situation in this respect is, and probably will long continue to be, even more difficult with respect to the ocean. It nevertheless seems to be clear that the "modern" ways of describing the web of nature are valid, at least, in so far as they give it a dimension of clarity and distinctiveness that was previously lacking. Nonetheless, it seemed to be the consensus of the group that there is, even under the present restrictions, enough evidence to suggest a strong possibility of severe damage to the global ecosystem consequent upon the adoption of certain policies. On the very reasonable premise that with all its limitations ecology is able to discern certain policies and practices that may be excessively destructive, or even fatal, to the whole human race, it is necessary to make important political decisions on the basis of our limited and admittedly insufficient information. In this sense ecology

lays down certain boundary conditions, like the rules of chess inside of which, and only inside of which, rational action is possible. The notion of a "boundary condition," it was noted, can be easily clarified from the cybernetic information-theoretic approach to the problems of ecology. The advantage of this approach besides the introduction of clarity, is that much expensive and time consuming data-gathering could be avoided, for example, on the part of oceanographers, who, in any case, are in severe financial straits, along with the rest of the scientific community. It was remarked during the discussion that a rational man need not know the principles of ballistics to be convinced that he ought not to play Russian roulette. There was almost total agreement on this conception of ecology as a set of limiting conditions with only a small minority in disagreement.

There was also a consensus (already emphasized in previous preparatory conferences) that ecology could do in the sea whatever it could do on the land. There was further agreement, dissented from by only a few participants, that considering the recent history of technology, it seemed very probable that whatever could be done would be done; and that if political sagacity more impressive than what we have been accustomed to is not soon brought to bear, a kind of technological determinism must result. There was some dissent

from this thesis (of the universal availability of ocean technological ability) on economic grounds, since it is clear that most technological enterprises are much more costly when carried out in the ocean. On the other hand, nearly all the participants were aware (or allowed themselves to be persuaded) that technological applications usually become, economically speaking, cheaper by a factor of 10 to 100 as they are utilized, so that economic costs become a very fragile guide in the matter of developing the ocean regime for well or ill.

The first day's discussions were concerned with ecology in its most general mathematical sense. Richard Bellman contributed a paper which evoked a lively discussion on the relation between mathematics and ecology. He recommended in it the extensive use of mathematical techniques of the same sort that have been developed to analyse military, economic and engineering systems over the last 30 years. The role of computers and their inherent limitations and advantages in these matters was discussed. The discussion seemed to issue in an agreement that, although these methods may clarify certain issues, they involve implicit assumptions, seldom made explicit, of measures of "good." It is Bellman's conviction that "simulation methods" are the best means available for the necessary combination of mathematical techniques and human wisdom. The notion of "irreversible effects" palyed a rather large role in this sort of discussion.

Probably the best definition of a boundary condition imposed by ecological considerations, it was agreed, is that major (and even minor) bio-geo-physical manipulations may be irreversible and contribute to ecological instability.

One of the effects of irreversible manipulation might be the so-called "species extinction," with an almost certain concomitant disappearance of invaluable genetic information accumulated over many millenia.

The discussion proceeded on the second and third days with the recognition of factors of differences in cultural values, societal goals, and those matters which belong to the study of "human ecology," in which man as an entity connected by multitudinous feedback mechanisms, either adaptive or non-adaptive, in character, with all other elements of the eco-system, is the key notion. These differences obviously must be taken into account in a global ecology, particularly one which seeks to issue in research and other sorts of global planning institutions. For example, these differences ususally imply great difficulties in communication and set limits to finding a "common purpose." Thus, the underdeveloped world is interested more in development and hardly at all in pollution. (The logarithm of the ratio of cost to benefit is one important measure of ecological information, as contrasted, for example, with ecological data). It can easily be observed

that for the Third World, and indeed for disadvantaged minorities within affluent societies, the "poor" are interested in the cost whereas the "rich" are interested in the benefits.

Problems of political jurisdiction were noted, in relation to a telluric ecology. The importance of coastal zones was, for the second time, a subject of long debate. In these zones use is heavy and pollution problems greatest, but it is precisely here that we find the locus of maximum concentration of marine life and spawning. Moreover, littoral jurisdiction is fragmented even within nations, a fact that vastly complicates the problem of control, and also makes it difficult for a national government to relinquish authority to an international body, even if it wished to. Nevertheless, in these interfacial zones ocean-ecological problems are greatest. Exploration for oil very likely promises to be an on-going problem. Almost every nation with an ocean littoral is, or will be, affected. Kuweit, for example, has no desire to interfere with the present rather slack oceanic oil-regimes that resulted from the Geneva Conventions with regard to coastal zones. (This nation has, in fact, withdrawn from the coming Maltese deliberations, presumably because of its total dependence on oil.)

Likewise, it made little sense to the symposiasts to divide jurisdiction over the atmosphere. It was suggested that the atmosphere as a whole be subjected to recommendations by some central planning and regulating body just as is suggested

for coastal areas.

By implication only, most of the group (there was no conclusive discussion of this point) would probably favor some kind of regulation of ecological policies presently confused by political boundaries, by some kind of supranational institution.

Questions of institutional size, centralization vs decentralization, and if the latter, on what basis, were discussed; and there was no evident disagreement from Mrs. Borgese's key notion that planning has to be centralized, but that operations can be decentralized.

In view of the difficulty of defining ecological regions, there was an inconclusive debate on the value of regional organizations. It was nevertheless insisted upon by many that, regardless of the nature of possible regional organizations, there was a great importance to be attached to lateral information flow, and avoidance of secrecy. In this and other connections, it might be noted that several of the speakers insisted time and again that most so-called ecological "data" does not represent ecological "information." It was felt that the real value of the "new" ecology lay in the conversion of crude and often whimsically collected data into relevant information. There was a very broad spectrum of opinion on problems of ecological data and data handling. For example; How much data really is needed and might be made relevant as information? It was strongly suggested by many that there was already too

much mere data-gathering as far as ocean ecology is concerned. This insistence on the part of some that there is already too much data-gathering does not contradict the general agreement that there is too little oceanic ecological information available. Oceanic data-gathering, it was felt by many, was and is often dictated by supposed needs that have no relevance to any conceivable theory that could use them. It was pointed out the "censuses" of whatever sort rarely contain any data that can become informative, i.e., the basis of concrete decision making.

No consensus was reached in judgments of the severity of the ecological problems facing the world. As always appears in technological debates in general, certain ecologists seem to be incorrigible optimists and others determined pessimists. A preponderance of opinion seemed to indicate, however, that problems are sufficiently severe, both with respect to the ocean and the land, so that crises (eco-catastrophes) are possible and perhaps even imminent; so that policies must be structured with the time factor in mind, and immediate institutional provision made for science to be directed toward averting catastrophe. All through the week's discussion the importance of the time element came up again and again. It was repeatedly stressed that we have no adequate definition of social time, and that crises may already have been passed so that the world is, in some respects, in the "crash" stage of the downward process. A small minority of the participants recognized no

unusual problems with respect to the ocean. Of those who thought that unusual and perhaps irreversible change is actually occurring and that institutional adjustment or invention is an urgent necessity, some thought existing international agencies and scientific international organizations, with perhaps a greater or lesser degree of emphases or possible extensions of functions, could do the job; and that it would not be desirable, even if it were feasible, to try to invent something entirely new. Other participants thought that something new would be desirable in the long run, but not feasible now, so that we should "make do" with improving what we have. Still others felt that new institutions were a pressing necessity, along the lines proposed in the coastal regime model for planning and coordination and for the comprehensive and long-term field of view.

Considerable interest was expressed in developing an almost non-existent capacity to look ahead, forecast, and warn of dangers; and to develop ways of monitoring in order to obtain information relevant to the above purposes.

Robert Jungk was of the opinion that many oceanic problems have no real reference to the future, except as an end point, but are concerned with trends already long since begun and exceedingly difficult to reverse.

Terms used in the above connection were: "lookout institutions," "early warning systems," "assessment and exploratory centers," "detecting anomalies," "forecasting, predicting

and screening," and the possible role of an "oceanic Ombudsman."

However, exactly how such ecologic functions are to be articulated with existing political and research structures (or possible future structures) was not discussed in any very conclusive way. It was agreed by most that further consideration of these points is needed both at Malta and in the framework of whatever future "policy-research" Organization that deliberations on Malta give rise to.

It was generally assumed that scientists (physical, biological, and social) could make important positive contributions to planning and decision-making. However, no conclusions at all were reached on how to institutionalize these contributions, i.e., what the nature of the relationship between ecological science and politics could or should be. This, of course, was a recurrent theme of previous preparatory conferences, and reflections on of/the scientific-political interface in general. Ecologists do not understand politics and politicians have, if possible, even less comprehension of the way to interact with scientists. There seemed to be general agreement on this point, as well as a strong conviction that completely new methods of information feedback and decisional liaison must be found or invented de novo.

There was a general strong feeling, however, against the creation of a "scientific bureaucracy." There was an emphasis in the discussion on "flexibility" of organization

of a type not presently existent anywhere that would allow for a constant flow of new ideas, the protection of critics against unorthodox ideas, etc.

A specific recommendation was made by Alexander King that the proposed political chamber could work only if scientists were involved who are independently minded and not already involved in national policy-making decisions.

There was a difference of opinion, amounting almost to a difference of temperament, as to the meaning of science policy, the minority maintaining that this means making provisions for "scientists to do science;" and the majority holding that the problem has to do, under present circumstances, more with how to provide for scientists to do science that is relevant to ecological and social problems, and how to get their results (or them) effectively into the decision-making procedures. It was recognized that such problems are universal to all discussions, under any rubric, of an ocean regime. Apart from the very shakily "scientific" theory of decision-making, it was recognized that ecologists and scientists as such could have very little to contribute to political decision-making except in the matter of setting down very plausible limits to the successful use of political power.

There was, at one time or another during the week, a very considerable but inconclusive discussion of the so-called "internationalization of social costs", that were agreed to be

particularly ecologic in character. The role of the market, or of a "quasi-market" such as is used in the Soviet Union, was much analyzed. Certain theorists present demanded as a condition of stability the so-called "zero growth economy." This would require, however, that some estimation had to be made of the price of ecological necessities, and it was in this connection that some equivalent of the market economy must be sought. It seems clear that most ecological systems and sub-systems generate a price, whatever may be their value, with very great difficulty. Nobody, for example, owns the condors or the blue whales, and as a result, they cannot generate a number expressive of value unless some new version of what is supposed to be done by the market system is introduced. An international body might be commissioned to set, conventionally but not arbitrarily, a price on those features of the global ecology that are thought to be invaluable. But, again, differences in priorities would have to be investigated. Apart from logical difficulties, it was felt that "cultural relativity" would be very difficult to manage. "Pollution," for example, is relevant here. Almost everyone in the western world, it was felt, knew most of the scare items about pollution, seen ecologically as generalized "noise" in the ecological communication channels. But, what if the Third World were to insist, as it does, that the developed countries mean by pollution, "people," and especially "colored people?" Such a difficult question refers again back to the statement that

the estimates of costs and benefits are very likely to pose intractable problems. That "population" is a kind of pollution was rejected by some like Professor Revelle, on the ground that an automatic feedback mechanism will take care, as, for example, in the United States, of excessive population growth in affluent societies. Against this it was argued plausibly that the operation of innocent sounding phrases like "feedback mechanisms" in fact represent eco-catastrophes, for example, "population crashes." Further, the optimist's notion that the affluent societies would find it in their interest to do away with the use of DDT runs up against the interest of the lesser developed countries who prefer, or are said to prefer, the absence of malaria to the uncertain meaning of DDT accumulation in fatty tissues. Another example of dubious "automatic" mechanism that does away with pollution is apparently a universal tendency to go from chemicals like DDT to more specialized (and therefore ecologically destabilizing) compounds, that are also progressively more poisonous. It was pointed out that one perhaps ought to bear in mind that the so-called "nerve gasses" were developed in looking about for a substitute for ecologically objectionable insecticides. A clearer paradigm of the destabilizing effects of such compounds on many ecologic subsystems could scarcely be adduced.

The role of "false ecological ideologies" was brought out in this connection by Kenneth Watt who contested the view

that pesticides do accomplish the things they are supposed to accomplish. The really big problem, according to him and others, is that there is little evidence that they do at all what they are supposed to do. He indicated four mechanisms by means of which the use of pesticides had made, for example, house flies and other insects, not only resistent to pesticides but even longer lived. It was pointed out by some that our awareness of the kinds of problems that we have lost out to in the past have consumed our big efforts. So, the agreement ran, we have built up elaborate structures to cope with "what we are," and it is the unexpected, the unfamiliar that always "end-runs" us. What implications of ecology can combat false notions of what we should advocate in the long range point of view? Can ecology, better than most other sciences, really give a view of emergent novelty? The interdisciplinary nature of ecology is perhaps better geared to the imperfectly predictable novum, in monitoring eco-catastrop

False ideologies concerning ecology make it necessary, in the minds of many, that independently-minded scientists, and not merely government nominees, be recruited for any organization that might result from the conference on Malta. Alexander King repeated, as a result of his experience in OECD, that government nominees were "not bad people," but suffered from becoming in time "members of the establishment." By taking well-known names, he said, you have the

innovators of 10 years ago, well enough motivated but, in fact, protecting what they have established. "You need scientists," he declared, "who are professionally more detached from the politically minded policy making process. This probably means a floating population of scientists in oceanic lookout organizations rather than a permanent population of exceptional people." It was pointed out to Dr. King that his own OECD did have some permanent people. It seemed to be agreed that in the ocean regime it would be extremely difficult to maintain any objective critical function along with any control functions of the sort that involve matters of government responsibility and sovereignty.

The discussions ended on an inconclusive agreement about control of the seas through governments and not through corporations. It was pointed out, however, that governments, at least in this respect, are public corporations and that some very general principles apply to both. At this stage our discussions seemed remarkably to overlap and agree with what had been the results of the preparatory conference on the role of the corporation in the ocean regime.

NOTE OF EDITOR:

I have omitted from the above account most of the innumerable specific examples of ecological management and mismanagement that are the usual stock-in-trade of discussions among ecologists. Most of these examples, like the details of epidemics of liver cancer in many species of fish, presumably due to certain types of pollution flowing from the land into the sea, have appeared in dramatic accounts in the news media and are easily accessible to all.

J.W.

Volume V

THE OCEAN ENVIRONMENT

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List of Participants

Pacem In Maribus Preparatory Conference
On Ecology and the Role of Science
Santa Barbara, California
April 21-25, 1970

(1) Richard Bellman, University of Southern California, Los Angeles

(2) David Brower, John Muir Institute for Environmental Studies, San Francisco

(3) Oliver Bryk, Exotech, Washington, D.C.

(4) Dr. Wilbert M. Chapman, Ralston Purina Company, San Diego, Cal.

(5) S. von Ciriacy-Wantrup, University of California, Berkeley

(6) Joseph Connell, University of California, Santa Barbara

(7) Raymond F. Dasmann, The Conservation Foundation, Washington, D.C.

(8) Jean Dorst, Museum National d'Histoire Naturelle, Paris

(9) Lars-Goran Engfeldt, Swedish Mission to the U.N., New York

(10) Dennis Gabor, C.B.S. Laboratories, Stamford, Connecticut

(11) Norton Ginsburg, University of Chicago

(12) S. J. Holt, Food and Agriculture Organization, Rome

(13) Peter Hunt, Peter Hunt Associates, Bronxville, New York

(14) Robert Jungk, Technische Universitaet, Berlin

(15) Alexander King, Organization for Economic Cooperation and Development, Paris

(16) Arnold Kuenzli, Switzerland

(17) William K. Lindvill, Stanford University, Palo Alto, Calif.

(18) Bengt Lundholm, Swedish Natural Science Research Council, Stockholm

(19) Wendell Mordy, University of Montana, Missoula

(20) W. W. Murdoch, Imperial College, Ascot, Berkshire, England

(21) Frank Potter, Environmental Clearinghouse, Washington, S.C.

(22) Larry Ruff, University of California, San Diego

(23) Milner Schaefer, University of California, San Diego

Participants (continued)

(24) Kenneth E. F. Watt, University of California, Davis

(25) Warren S. Wooster, University of Kiel, Germany

Tentative Agenda for the Proceedings

PACEM IN MARIBUS

Malta

June 28 - July 3, 1970

PACEM IN MARIBUS CONVOCATION

MALTA

June 28 - July 3, 1970

I. Composition

It is anticipated that there will be a total attendance of 250-300 persons. Invitations are extended to two groups:

1) Members of the Steering Committee,
Members of the Preparatory Conferences,
Members of the Center staff.

This group, of 90 persons from 21 countries, will constitute the core of the Convocation. (see Appendix A)

2) Representatives of public and private, national and international enterprises engaged in the extraction of living and nonliving resources,
Diplomats and other government officials, including the Ambassadors of the 42 Member-States of the U.N. Seabed Committee,
Representatives of intergovernmental organizations and agencies.

Whether they are government officials or private citizens, all will be invited to take part in an individual, personal capacity.

II. Schedule

1) The Steering Committee will meet on Sunday, June 28, at 10 a.m., at the Corinthia Palace Hotel. Among other things, it will adopt an agenda.

2) There will be an inaugural plenary session at 6 p.m. at the Governor's Palace. Addresses will be delivered by representatives of the Government of Malta, the United Nations, and the Center for the Study of Democratic Institutions. There will be an up-to-date report on the activities of the United Nations Seabed Committee by Ambassador Hamilton S. Amerasinghe of the Permanent Mission of Ceylon to the United Nations, in his capacity as Chairman of the U.N. Seabed Committee. Mrs. Alva Myrdal of the Royal Ministry of Foreign Affairs of Sweden will report on the activities of the Geneva Committee on Disarmament. The session will be followed by a cocktail reception and informal buffet at the Hilton Hotel.

3) The working sessions, all to take place at the University of Malta, will be arranged as follows:

Monday, June 29	Tuesday, June 30
9:30 a.m. - 1:00 p.m. 4:00 p.m. - 6:00 p.m.	9:00 a.m. - 1:00 p.m. 4:00 p.m. - 6:00 p.m.

Wednesday, July 1	Thursday, July 2
9:00 a.m. - 1:00 p.m. Afternoon free for sightseeing Open air concert at Mdina Cocktail Reception by the Government of Malta	9:00 a.m. - 1:00 p.m. 4:00 p.m. - 6:00 p.m.

Friday, July 3

9:00 a.m. - 1:00 p.m. - Plenary Session at the Governor's Palace
Afternoon free for sight-seeing
A closing banquet will be held in the evening at 8:00 p.m.

III. Procedure

Participants will be divided into four working groups:

1) Legal-political and arms control - GROUP ONE

2) Extraction of nonliving resources (oil, gas, and mining enterprises) - GROUP TWO

3) Development of living resources (fishery enterprises) - GROUP THREE

4) Ocean sciences and science policy - GROUP FOUR

Each group will consist of core persons and new participants. To achieve the maximum, most systematic and constructive coverage of the voluminous prepared material (see Appendix B), and to provide for interaction between all groups, these working groups will meet first separately, to discuss, each one, the report or reports of its particular competence. Thus, Group One will deal with volumes 1 and 2, Group Two with volumes 3 and 4, Group Three with volumes 3, 4, and 5, and Group Four with volume 5.

Appropriate briefs to the volumes, responding to the interests and requirements of each group, will be prepared in advance.

Each group of specialists will meet as a separate entity. In addition, each group will then meet with the political-legal group for a further exchange of ideas. There will also be joint sessions of the non-legal-political groups with each other. This procedure is to reflect the ecological and systemic approach to the law of the seas and the multiple uses and interests it must govern. It is anticipated that there will be a report summarizing the outcome of the meetings, reflecting whatever new ideas may be expressed. This report would not necessarily present a consensus of the views expressed, as these views might be conflicting in themselves.

IV. Provisional Agenda of Working Sessions

Monday , June 29

9:30 a.m. - 1:00 p.m.

Group 1: Election of Chairman;
Report on Arms Control and Disarmament in the Oceans;
Discussion.

Group 2: Election of Chairman;
Report on the Role of Enterprises in an Ocean Regime;
Discussion.

Group 3: Election of Chairman;
Report on Fishery and Ocean Ecology;
Discussion.

Group 4: Election of Chairman;
Report on the Role of Science and Scientists in the Ocean
Discussion.

4:00 p.m. - 6:00 p.m.

Groups 1 and 2: Joint Session.

Report on the ILA Committee on Deep Sea Mining;

Discussion of Issues Common to Both Groups:

The resource potential of the seabed;

Nonliving resources as Common Heritage of Mankind--Legal Implications;

Interaction between military development and industrial development;

The role of enterprises in planning and decision-making;

Criteria for the allocation of rights-registration, the determination of licenses and leases, the collection of royalties, the distribution of benefits.

Group 3: Discussion on Fishery and Ocean Ecology; Concluded.

Group 4: Discussion on the Role of Science and Scientists in Oceans; Concluded.

Tuesday, June 30

9:00 a.m. - 1:00 p.m.

Group 1: Discussion on Disarmament; Concluded

Group 2: Discussion on the Role of Enterprises; Concluded

Group 3: Report on Planning and Development in Relation to Ocean Resources;

Discussion

Group 4: Report on Ocean Ecology:

Discussion.

Wednesday, July 1

9:00 a.m. - 1:00 p.m.

Group 1: Report on the Limits of National Jurisdiction;

Discussion.

Groups 2 and 3: Joint Session.

Report on Participation Potential and Needs of the Developing Nations in the Exploitation of Ocean Resources;

Discussion on Issues Common to Both Groups: Planning and Development and the Role of Enterprises.

Group 4: Report on Scientific Potential and Needs of the Developing Nations in the Exploration of Ocean Resources

Discussion on Ocean Ecology; Concluded.

4:00 p.m. - 6:00 p.m.

Groups 1 and 3: Joint Session.

Report on National and International Management of Fishery Resources;

Discussion of Issues Common to Both Groups: Fishery Management and the Freedom of the Seas;

Living Resources as Common Heritage of Mankind --Legal Implications;

Regional Arrangements;

Conflicts between Traditional and New Uses of the Marine Environment.

Wednesday, July 1 - 4:00 p.m. - 6:00 p.m. (con't)

Groups 2 and 4: Joint Session

Report on Planning and Development;

Discussion of Issues Common to Both Groups: Management of Ocean Programs;

Interaction between Scientific and Commercial Exploration;

Multiple Use of Ocean Space;

Freedom of Research and Information;

Pollution and Pollution Control;

Coordination Between Research Activities of States, Intergovernmental Organizations, Enterprises, and Scientific Institutions.

Thursday, July 2

9:00 a.m. - 1:00 p.m.

Group 1: Report on the emerging Ocean Regime: Its Area of Competence and Its Legal Framework;

Discussion.

Group 2: Discussion on Pollution, Pollution Control and Self-regulation of Enterprises; Concluded.

Group 3: Report on the Role of Enterprises;

Discussion.

Group 4: Report of IOC Activities in Ocean Research;

Discussion.

4:00 p.m. - 6:00 p.m.

Groups 1 and 4: Joint Session.

Report on the Legal Needs of the Scientific Community;

Discussion of Issues Common to Both Groups: Science as the Common Heritage of Mankind -- Legal Implications;

The Role of Scientists in Decision-Making in an Ocean Regime;

The Internationalization of R & D;

Scientific Research on and above the Continental Shel

Thursday , July 2 - 4:00 p.m. to 6:00 p.m. (con't)

Groups 2 and 3: Joint Session

Report on Special Needs of Latin American Nations and Enterprises;

Discussion of Issues Common to Both Groups: The Multiple Use of Ocean Space and Its Regulation;

Potential Role of International Consortia;

Joint Ventures and Mixed Private-Public Enterprise Groups in Ocean Exploitation.

Friday , July 3

9:00 a.m. - 1:00 p.m.

Plenary Session of All Groups

Address by the Prime Minister of Malta;

Reports by the Chairmen of the Working Groups;

Summary and Conclusions: Report by Robert M. Hutchins

Discussion;

Appointment of Continuing Committee.

Provisional List of Participants

PACEM IN MARIBUS

Malta

June 28 - July 3, 1970

PACEM IN MARIBUS

June 28 - July 3, 1970

Participants and Observers

By Nationality

ARGENTINA

Jose M. Ruda, Ambassador

BAHAMAS

Baltron Bethel, Permanent Secretary to Ministry of Home Affairs

Oris Russell, Permanent Secretary to Ministry of Agriculture & Fisheries

BRAZIL

Joao Augusto de Araujo Castro, Ambassador

Sergio M. Thompson-Flores, First Secretary

BULGARIA

Milko Tarabanov, Ambassador

BURUNDI

Nsanze Terence, Ambassador

CANADA

Gordon R. S. Hawkins, Executive Director, Canadian Institute of International Affairs

Nicholas M. Matte, Professor, McGill University

CEYLON

Hamilton S. Amerasinghe, Ambassador

FRANCE

Delegation of 6, organized by Xavier Deniau, Deputy for Loiret

Bertrand de Jouvenel

Rene J. Dupuy, Professor, University of Nice

FEDERAL GERMAN REPUBLIC

Official delegation, to be determined

Fritz Munch, Professor, Heidelberg University

Robert Jungk, Professor Technische Universitaet

S. von Ciriacy-Wantrup, Professor, College of Agriculture, Berkeley

Wolfgang Vitzthum, Freiburg University

Helmut Krauch, Studiengruppe fur Systemforschung

Horst Rittel, Studiengruppe fur Systemforschung

Dr. Kunz, Studiengruppe fur Systemforschung

DEMOCRATIC GERMAN REPUBLIC

Delegation organized by Heinz Joswig

GREECE

Antonis Tritsis, Illinois Institute of Technology

GUYANA

Delegation of 2 organized by the Hon. Attorney General & Minister of State

INDIA

Samar Sen, Ambassador

R. C. Arora, Counsellor

M. C. Basu, Planning Commission, Government of India

INDONESIA

ITALY

Representative of the Foreign Ministry, to be determined

Gaetano Arangio-Ruiz, Professor, Universita degli Studi Bologna

Aurelio Peccei, ITALCONSULT

Enrico Bonomi, International Studies Bureau, ENI

JAMAICA

E. R. Richardson, Ambassador to the United States

JAPAN

Shigeru Oda, Professor, Tohoku University

Seiichi Tagawa, House of Representatives, The Diet

Hidetsugu Ishikura, Councillor, Science and Technology Agency

H. Kasahara, Dean, College of Fisheries, University of Washington

Rei Shiratori, Japan Peace Institute

MALTA

Arvid Pardo, Ambassador

MEXICO

Gustavo Martinez-Cabanas, Economist, Mexico City

NETHERLANDS

L. J. Bouchez, Professor, University of Utrecht

NIGERIA

J. D. Ogundere, Federal Ministry of Justice

C. I. O. Olaniyan, University of Lagos

NORWAY

Jens Evensen, Royal Ministry of Foreign Affairs

Thorvald L. Mellingen, Continental Shelf Div., Royal Norwegian Council for Scientific & Industrial Research

Gjert Laading, Continental Shelf Div., Royal Norwegian Council for Scientific & Industrial Research

Jens N. Engelstad, Continental Shelf Div., Royal Norwegian Council for Scientific & Industrial Research

Asbjorn Eide, Director, International Peace Research Institute

John Galtung, International Peace Research Institute

REPUBLIC OF THE PHILIPPINES

Arturo M. Tolentino, Senator

POLISH PEOPLE'S REPUBLIC

Representative of Foreign Ministry, to be determined

Tadeusz Kozluk, Second ~~Secretary~~

SOCIALIST REPUBLIC OF ROMANIA

Representative of the Foreign Ministry, to be determined

Silviu Brucan, Professor, University of Bucharest

SUDAN

Mohamed Fakhreddine, Ambassador

SWEDEN

Alva Myrdal, Royal Ministry for Foreign Affairs

Torgil Wulff, Royal Ministry for Foreign Affairs

Robert Neild, Director, Stockholm International Peace Research Institute

Sven Hirdman, Stockholm International Peace Research Institute

Bengt Lundholm, Swedish Natural Science Research Council

Lars-Goran Engfeldt, Second Secretary

SWITZERLAND

Jacques Piccard, Oceanographer

Arnold Kuenzli

UNITED REPUBLIC OF TANZANIA

Salim Ahmed Salim, Ambassador

TRINIDAD AND TOBAGO

P. V. J. Solomon, Ambassador

UNION OF SOVIET SOCIALIST REPUBLICS

Delegation of 5, headed by Academician Vinogradov

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND

Ritchie-Calder

Representative of government, to be determined

E. D. Brown, Professor, University College

Neville Brown, Lecturer, University of Birmingham

Alexander Comfort, Professor, University College

Wolfgang Friedmann, Professor, Law School, Columbia University

Robin Murray, London Business School

Frances Murray, Social Studies Teacher

Anthony Lovell Smith, Consultant, Under-Sea Engineering Projects

Jan Van Dauman, IBM United Kingdom, Ltd.

Elizabeth Young, Writer on Disarmament and Arms Control

UNITED STATES OF AMERICA

Lewis Alexander, Law of the Sea Institute, University of Rhode Island

Arthur Barber, Director, Institute for Policy and Planning, Washington, D.

Richard Bellman, Professor, University of Southern California

Eugene Bollay, President, American Meteorological Society

David Brower, Director, John Muir Institute for Environmental Studies

Wilbert M. Chapman, Director, Marine Resources, Ralston Purina Co.

Francis T. Christy, Jr., Resources for the Future

Joseph Connell, Professor, University of California, Santa Barbara

John Craven, Professor, Massachusetts Institute of Technology

Raymond Dasmann, The Conservation Foundation, Washington, D. C.

Enoch Dillon, National Council on Marine Resources & Engineering Developme

William O. Douglas, Justice, The Supreme Court of the United States

Richard Eells, Professor, Columbia University

Joseph W. Ehrenreich, University of Southern California

Robert Friedheim, Center for Naval Analyses

J. William Fulbright, United States Senator

Norton Ginsberg, University of Chicago

William Gross, Director of Research, Ampex Corp.

Louis Henkin, Professor, Law School, Columbia University

Peter Hunt, Peter Hunt, Associates

James Knott, Washington Center for Foreign Policy Research

Frank LaQue, International Nickel Company

William Lindvill, Stanford University

William Mansfield, Nat'l Council on Marine Resources & Engineering Develop

Jack McFarland, Consolidated Edison Company of New York

William Mordy, University of Montana

Jerome Morenoff, President, Ocean Data Systems, Inc.

UNITED STATES OF AMERICA (continued)

William A. Nierenberg, Scripps Institution of Oceanography, La Jolla

Claiborne Pell, United States Senator

Giulio Pontecorvo, Professor, Columbia University

Frank Potter, Director, Environmental Clearinghouse

Anthony T. Ressa, Attorney, Bellevue, Washington

Roger Revelle, Professor, Harvard University

Milner B. Schaefer, Director, Institute of Marine Resources

Stuart Scheingold, Professor, University of Washington

Kenneth Spengler, American Meteorological Society

Peter Thacher, Counsellor, United States Mission

Lowell Wakefield, President, Wakefield Fisheries

Kenneth E. F. Watt, Professor, University of California, Davis

Edward Wenk, Jr., Professor, University of Washington

Warren S. Wooster, Scripps Institution of Oceanography

SOCIALIST FEDERAL REPUBLIC OF YUGOSLAVIA

Anton Vratusa, Deputy Secretary of Foreign Affairs

Lazar Mojsov, Ambassador

Jovan Djordjevic, Supreme Court

Juraj Andrassy, Professor, Faculty of Law, University of Zagreb

Vladimir Pavicevic, Second Secretary

Milenko Milic, Yugoslav Association for Maritime Law

UNITED NATIONS AND SPECIALIZED AGENCIES

Alf Nyberg, President, World Meteorological Organization

W. Langeraar, Chairman, Intergovernmental Oceanographic Commission

A. A. Buzzati-Traverso, Assistant Director-General for Science, UNESCO

David S. Blanchard, International Labor Office

Joseph Barnea, Food and Agriculture Organization

Jean E. Carroz, Food and Agriculture Organization

Mario Ruivo, Food and Agriculture Organization

Mr. Potter, Food and Agriculture Organization

Michael Hardy, United Nations Legal Department

Sidney Holt, Intergovernmental Oceanographic Commission

Alexander King, Organization for Economic Cooperation & Development

Jean Pierre Levy, United Nations Secretariat

Raul Prebisch, Director-General, Latin American Institute for Economic & Social Planning

David Hall, Political and Security Council Affairs

Said Uddin Khan, United Nations Forces

Oscar Schachter, United Nations Institute for Training & Research

Ralph Townley, United Nations Development Program

NORTH ATLANTIC TREATY ORGANIZATION

A. G. Kuhn, Head, Disarmament & Arms Control Section

STUDENTS

N. Kawashima, Japan

Japan (one student to be determined)

P. Sreenivasa Rao, India

Italy (two students to be determined)

Mansour Farhang, Iran

Jorge A. Vargas Silva, Mexico

Ann L. Hollick, United States

David P. Stang, United States

Nancy C. Price, United States

Jean Pierre Salanic, France

Peter Weingart, Federal German Republic

Max Ivers Kehden, Federal German Republic

Uwe Jenisch, Federal German Republic

Peter Kausch, Federal German Republic

Liselotte Waldheim, Austria

Africa (two students to be determined)

OBSERVERS

Seniel Ostrow (Mr. & Mrs.)

Frank Gilloon (Mr. & Mrs.)

Mrs. Irving Graef

H. Gary Knight

Frances McAllister

OBSERVERS (continued)

Dennis M. O'Connor

Morris Rosoff

Robert Rothschild

Saul Silverstein

George P. Smith, II

Remigio Valido

Mrs. Kenneth E. Walser

Sidney M. Davis

Michael D. Bradley

Florence Mahoney

Ondolf Rojahn

Norman J. Singer

CENTER FOR THE STUDY OF DEMOCRATIC INSTITUTIONS

Harry S. Ashmore

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John Cogley

William Ewald

Crane Haussamen

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Neil Jacoby

Frank K. Kelly

CENTER FOR THE STUDY OF DEMOCRATIC INSTITUTIONS (continued)

Edward Lamb

Madeline Marina

Florence Mischel

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Fred Warner Neal

Stanley K. Sheinbaum

Beryl Smith

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John Wilkinson

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Box 4068, Santa Barbara, California 93103

(2)

Selected Bibliography

for the use of

PACEM IN MARIBUS

A Proposed International Convocation

To Explore Peaceful Uses of the Oceans and the Ocean Floor

30 June 1969

New York office:
136 East 57 Street
New York, N.Y. 10022
(212) 753-1340

Table of Contents

Introduction

1. This selected bibliography has been prepared as a background paper for PACEM IN MARIBUS, a proposed International Convocation which will explore peaceful uses of the oceans and the ocean floor. The Convocation will be conducted by the Center for the Study of Democratic Institutions, Santa Barbara, California, and is due to open in Valetta on the Island of Malta on 22 June 1970.

2. Because of this special purpose, the bibliography is by no means aimed at completeness or highly technical works. It includes only those works which are likely to assist the Convocation in its task and enable informed decisions. It is aimed at helping experts of different backgrounds to engage in an interdisciplinary dialogue on ocean matters.

3. In its form the guide follows the ecological and systemic approach to the ocean environment all preparatory work for the Convocation is taking. Thus the bibliography lists works on general oceanography, on marine geology, biology, meteorology and technology, on marine ecology and pollution, on living and non-living resources of the seas as well as works on the legal, political, economic and disarmament aspects of the sea. These various subjects are overlapping and inter-related. A discussion of a more adequate governance of the use of the oceans and the ocean floor will have to consider these disciplines and activities inter-connected and, often, interdependent as they are.

4. The bibliography has several weaknesses and every effort will be made to eliminate them in a second draft. Thus the information on some works is still incomplete and the Japanese, Latin American and European -- especially the Soviet -- literature is underrepresented. However, even if a better balance is finally reached, the present American dominance in the writing on ocean science and maritime law will still be apparent. This is particularly the case with works published after the Maltese initiative in the United Nations in August 1967 -- the period of time on which this guide is primarily focussed. For earlier legal references see the Bibliographical Guides prepared by the Secretariat of the United Nations for the 1958/60 Conferences on the Law of the Sea (A/CONF. 13/17, 21 Nov. 1957; A/CONF. 19/6, 16 Feb. 1960). As far as possible these bibliographies have been used as models for style in an attempt to avoid the different styles generally used in the U.S.A. for citing legal and scientific publications.

5. For the preparation of this bibliography, the following bibliographies have been especially useful:

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6. This selected bibliography has been prepared by Wolfgang Vitzthum, research assistant at the Center for the Study of Democratic Institutions.

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Foreword

On June 28, 1970, the Center for the Study of Democratic Institutions will convene at Valletta, Malta, an international convocation devoted to clarification of the urgent issues raised by the impending exploitation of the ocean deeps for military and commercial purposes.

The site was chosen in response to a formal invitation from the Government of Malta. This joint sponsorship recognizes the creative contribution to the formulation of deep-seas issues in the United Nations by Malta's Ambassador Arvid Pardo.

The Center has titled the convocation Pacem in Maribus *(Peace in the Oceans) to establish its continuity with two previous international convocations. These were undertaken initially in response to the call for a new exploration of means of ending the Cold War contained in the late Pope John XXIII's notable encyclical,* Pacem in Terris.

The first of the Pacem in Terris *convocations was held in New York in 1965 and brought together a unique combination of political leaders and intellectuals from the Eastern and Western blocs. In 1967, under the lengthening shadow of the war in Southeast Asia, a similar gathering,* Pacem in Terris II, *was convened in Geneva, Switzerland.*

The focus of Pacem in Maribus *is somewhat narrower, and the composition of the convocation different. The immediate issues for consideration are those raised by development of a new underseas technology that has ended the historic immunity of the ocean deeps from man's exploitation — limited until this century to hunting down marine life from the surface of the seas. As a result, the existing body of treaties and maritime law is already gravely challenged in all parts of the world. National claims to territorial waters now extend far beyond the traditional three-mile limit set by international convention when such a span provided adequate protection against seaborne cannon.*

However, the implications of the Malta conference go far beyond the scientific, technical, military, legal, and political issues raised by man's impending advent into territory to which no nation has a traditional claim of sovereignty. The issues raised here are international on their face, and they are novel; Pacem in Maribus *anticipates that solutions must be found in new and unexplored areas of international coöperation that may well exceed the limited reach of existing treaty-based international organizations.*

Experts in the various fields have been assembled in five preparatory conferences, each yielding a detailed report to serve as background for the Pacem in Maribus *discussions at Malta. The organization and rationale of these meetings are described in the preface to this volume on* Ocean Enterprises *by Elisabeth Mann Borgese, senior fellow of the Center, who originated the idea for the convocation and has served as project director. Participants in the preliminary conferences are listed in Appendix III.*

This volume brings together papers prepared for the fourth of the preparatory conferences and includes edited excerpts from exchanges among the experts who gathered at the Center in Santa Barbara from April 1 through April 3, 1970. Neil H. Jacoby,

an associate of the Center, chaired the meeting. Elaine H. Burnell, associate editor of the Center's publication program, and Piers von Simson, a member of the Center staff, edited this version of the proceedings as an OCCASIONAL PAPER *to be distributed to the Center's members. The following senior fellows, associates, and staff members participated in the discussions, and their remarks appear in the commentary sections: Harry S. Ashmore, Rexford G. Tugwell, Harvey Wheeler, and John Wilkinson, senior fellows; William R. Ewald and Kenneth S. Tollett, visiting fellows; Stanley K. Sheinbaum, associate; Frank K. Kelly, vice-president; Wolfgang Graf Vitzthum, special assistant to Elisabeth Mann Borgese; and A. M. W. Hathaway, acting secretary to the senior fellows.*

The following are the participating experts represented in this volume:

ARTHUR BARBER: *A former physicist with the Air Force Cambridge Research Center, Mr. Barber later became deputy assistant secretary of International Security Affairs, Department of Defense, Washington, D.C. He is at present the president of the Institute for Policy and Planning in Washington, D.C.*

ADOLPH A. BERLE: *A consultant of the Center since the inception of its basic-issues program, Mr. Berle is emeritus professor of law at Columbia University, a former ambassador to Brazil, chairman of President Kennedy's task force on Latin America, and consultant to the Secretary of State. He is the author of numerous volumes on the role of the corporation in contemporary society.*

ENRICO BONOMI: *A native of Milan, Mr. Bonomi took his degrees in law and political science. He is at present chief of the International Studies Bureau of* Ente Nazionale Idrocarburi.

ELISABETH MANN BORGESE: *A Center senior fellow, Mrs. Borgese, the daughter of Thomas Mann, started work as a research associate of the Committee to Frame a World Constitution and as an editor of* Common Cause. *Later, she worked for Intercultural Publications, Inc. as editor of the English edition of* Diogenes *and the Italian edition of* Perspectives USA *and served as executive secretary of the board of editors of the* Encyclopaedia Britannica. *She is the author of several books and has written a number of stories and essays for American and Italian magazines and anthologies. She is a member of the American Society of Arts and Sciences, the American Society of International Law, and the Academy of Political Science.*

JAMES W. DAWSON: *A graduate of Canford College in England, Mr. Dawson joined Lloyds of London in 1940 and became a member of that organization in 1948. He began specializing in oceanological problems related to the insurance industry in 1962. He is presently the managing director of Ocean Industry Insurers Ltd. of London, England, a member of the Alexander Howden (Holdings) Group of companies. He is the author of a number of articles concerning oceanographers as well as articles in* Oceanographic *concerning the London insurance market.*

RICHARD EELLS: *A professor in the Graduate School of Business, Columbia University, Mr. Eells is also founder and president of the Foundation for the Study of Human Origins and executive editor of the Program for Studies of Modern Corporations. He is also currently a business consultant to the General Electric Company. The author of a number of publications on business and the corporation, among them* Conceptual Foundations of Business *(1961) and* The Government of Corporations *(1962), Mr. Eells was chief of the AEROS Division of the Legislative Reference Service of the Library of Congress from 1945-1950 and has twice held the Guggenheim Chair of Aeronautics.*

WOLFGANG FRIEDMANN: *A professor of international law and director of international legal research at Columbia Law School, Mr. Friedmann has also been a professor of public law at the University of Melbourne and a professor of law at the University of Toronto. He is the author of many books in the legal field and a member of the American Academy of Arts and Sciences and the American Society of International Law. He is also a member of the board of the* Modern Law Review.

NEIL JACOBY: *A Center associate, he was for twenty-one years dean of the School of Business Administration, U.C.L.A., and is currently a professor at U.C.L.A. Mr. Jacoby was recently chairman of President Nixon's Task Force on U.S. Economic Growth. In his career as an economist, Mr. Jacoby has served as a consultant to the board of governors of the Federal Reserve System, the U.S. Treasury Department, the Director of Finance of California, the RAND Corporation, du Pont de Nemours and Com-*

pany, General Motors Corporation, U.S. Gypsum Company, and Bank of America. He also was U.S. representative to the Economic and Social Council of the United Nations in 1957, a member of President Eisenhower's Council of Economic Advisors from 1953 to 1955, head of the Fiscal Mission to Laos in 1960, and head of the U.S. Aid Evaluation Mission to Taiwan, Republic of China, in 1965. He is currently director of a petroleum corporation.

FRANK LAQUE: *A metallurgist and vice-president (retired) of International Nickel Company, Inc. of New York, Mr. LaQue is also a senior lecturer at the Scripps Institute of Oceanography, University of California, San Diego. A past president of the Electrochemical Society, the American Society for Testing Materials, and the National Association of Corrosion Engineers, he is also a member of the American Chemical Society, the Society of Naval Architects and Marine Engineers, the British Iron and Steel Institute, and many other organizations. Mr. LaQue is the recipient of a number of awards in his field, among them the F.N. Speller award in corrosion engineering and the Howard Coonley medal of the American Standards Association.*

JACK R. MCFARLAND: *Design coördinator for Consolidated Edison Company of New York, Inc., Mr. McFarland's field is industrial planning and design. He is a graduate of Whitman College and took a degree in architecture from the University of Oregon. He is author of* The Planning Report for the Bonneville Power Administration, *Portland, Oregon.*

AURELIO PECCEI: *An Italian business executive, Mr. Peccei is the divisional manager and a member of the steering committee of Fiat Company. He is the founder of Fiat Industries in Argentina, is chairman of the board of Fiat Concord in Buenos Aires, is managing director of Italconsult in Rome, and vice-president of Ing. C. Olivetti Company in Ivrea, Italy. Mr. Peccei is also chairman of the Committee for Atlantic Economic Coöperation, headquartered in Paris.*

GUILIO PONTECORVO: *A professor at the Graduate School of Business at Columbia University, Mr. Pontecorvo graduated from Dartmouth College and received his doctorate from the University of California at Berkeley. An economist, he is co-author, with James A. Crutchfield, of* Pacific Salmon: A Study in Irrational Conservation *(1969). He is an adviser to the economic branch of both the Bureau of Commercial Fisheries and the Fisheries Division of F.A.O. He is a member of the executive committee of the Law of the Sea Institute, University of Rhode Island, and a member of the International Marine Science Affairs Panel of the National Academy of Science.*

ANTHONY T. RESSA: *An attorney in private practice in Bellevue, Washington, Mr. Ressa received his law degrees from Gonzaga University in Spokane, Washington. A member of the American Bar Association, the Washington State Bar Association, and the King County Bar Association, he is also a member of the American Society of International Law and a nominee to the World Organization of International Law.*

CHARLES S. STEWART: *A graduate of the University of California, Berkeley, where he also earned his doctorate, Mr. Stewart has been a professor at the Graduate School of Business at Columbia University for the past ten years. Prior to that, he taught at the University of Indiana and the University of Beirut, Lebanon. The author of* The Economy of Morocco: 1912-1962 *(1964) and* The Global Businessman *(1966), he has contributed a number of articles to economic publications, including the* Journal of Marketing. *He is a member of the American Economic Association, the Academy of Political Science, and the Middle East Institute.*

EDWARD WENK, JR.: *Appointed professor of engineering and public affairs at the University of Washington in February, 1970, Mr. Wenk was for four years prior to that the executive secretary of the National Council on Marine Resources and Engineering Development. He began his career as a research engineer and administrator at the David Taylor Model Basin, later developed criteria used in hull design of the nuclear and Polaris vessels, and served as chairman of the Department of Engineering Mechanics, Southwest Institute, San Antonio, Texas, from 1956 to 1959. Mr. Wenk was the first adviser on science and technology in the Legislative Reference Service of the Library of Congress and subsequently established the Science Policy Research Division there. He is a member of the American Society of Mechanical Engineers, the Pressure Vessel Research Committee, and the National Society of Professional Engineers as well as a fellow of the American Association for the Advancement of Science, and chairman of ASCE Research Committee.*

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"THE ULTIMATE POLLUTANT"

CONTRIBUTED BY THE HERBERT AND NANNETTE ROTHSCHILD FUND, INC.

Preface

The issue most likely to occupy the forefront of public attention during the seventies is conservation and improvement of the human environment. Issues pertaining to what is loosely termed "ecology" are dominant in local, national, and international politics; this in itself is a matter of moment since passionate public interest is rarely aroused at all three levels simultaneously. The concern embraces the whole of the human environment, natural or man-made, physical or social. The new emphasis is on the entirety — cities and wilderness, oceans and atmosphere — and on the interdependence of parts.

Yet, in order to understand what is happening to our environment, and what might be done about it, it is necessary to deal with the parts that make up the whole. The address here is to the oceans; they are particular, they are immense, and they are in crisis. Abruptly we have found ourselves at the end of the era when the vast expanse and great depth of the seas provided immunity from man's exploitative drive and talent. Within the next ten years thirty-five per cent of the world's growing oil requirements will be met from offshore production. Food from the oceans — including fishmeal and fish-protein concentrates — may quadruple by the end of the century. A revolution in the mining industry is in the making; it may be fifteen years away or a hundred and fifty, but it is certain, and when it comes, most of the world's supply of metals will be mined under water. Cities may expand over the oceans; colonies for work and recreation may be built deep down below. Weather forecasting and potential control depend on the oceans; communications and transport on the surface and beneath it are growing in volume and density.

Development of ocean resources is coming with a rush. It raises urgent new demands for order, at a minimum for a systematic approach to coördination of increasing, and often conflicting, multiple uses. The alternative is political and economic chaos, environmental pollution, perhaps even the ultimate pollutant, war itself.

The oceans and the ocean floor, covering over seventy per cent of this planet, are no-man's-land, and so, in another sense, they belong to everyman. So far no nation has laid claims of sovereignty to any territory beyond the narrow strip of coastal waters and of the continental shelf. It is here, on this "common property of mankind," that nations from the East, the West, and the underdeveloped continents are now called upon to coöperate in unprecedented ventures made possible by new underwater technology. This is the last global frontier challenging man's creative energy and imagination; the need, and the opportunity, is not merely to develop physical resources but to devise new forms of international coöperation and organization.

The problems of the oceans are peculiar; yet they are interdependent with the problems that arise on land, in the air, and in outer space. Thus new forms of international coöperation and organization appropriate to this particular no-man's-land, this available and as yet humanly unpopulated laboratory, are bound to provide spin-offs in other critical areas as well. It was in this conviction that the Center for the Study of Democratic Institutions initiated, during the winter of 1967, a study project on the law of the seas. The first phase brought together diplomats, scientists, fishery experts, and industrialists from a number of countries and resulted in publication of a model statute for a possible ocean regime. The second phase broadened the scope of the project through a series of conferences at the Center and elsewhere. These will culminate in an*

*The Ocean Regime, *A Center Occasional Paper, October, 1968.*

international convocation in Malta in June, 1970: Pacem in Maribus *(Peace in the Oceans).*

Between 1968 and 1970 an astonishing amount of work has been directed toward the problems involved in the establishment of an ocean regime. The Center's coördinating efforts have paralleled those going forward at the international and national levels, in the public as well as in the private sector, in the areas of both popular literature and scholarly publishing. Much of this research and publication is purely scientific or concerned with narrow practical problems such as those encountered by fisheries; restricted to military considerations; treated within the limits of technological-industrial opportunities for exploitation; or confined to the complex legal entanglements that fascinate experts on maritime law.

In the United Nations, military and disarmament problems have been referred to the Geneva Disarmament Committee where attempts to reach consensus on a very limited treaty based on a Soviet-American draft have thus far been a failure. The scientific aspects of the problem are covered by UNESCO's Intergovernmental Oceanic Commission (I.O.C.) and Scientific Commission on Oceanic Research (S.C.O.R.), both operating within a rather limited frame of reference and with restricted means. (The annual budget of I.O.C. is $200,000.) Meteorology is treated separately by the World Meteorological Organization (W.M.O.). Fishery development is coordinated by F.A.O., the Food and Agriculture Organization. Pollution is dealt with by I.M.C.O., the Intergovernmental Maritime Consultative Organization, and the Food and Agriculture Organization, while the World Health Organization and the International Labor Organization are involved with various aspects of safety standards and labor relations in ocean-going commerce, traffic, and industry.

In addition to all this, the United Nations General Assembly has appointed a permanent Seabed Committee of forty-two nations, which, in turn, has set up a special legal subcommittee and a technological-economic subcommittee. Both have issued reports, based on fact-finding studies provided by the Secretariat as well as by the specialized agencies. Liaison and coördination among all these groups have been vastly improved during the last two years by the establishment of interagency and intersecretariat committees, and it is expected that synthesis of all factors and elements should emerge from the discussions of the Seabed Committee, followed by the debates in the First Committee of the General Assembly and the General Assembly as a whole.

The cumbersome complexity of this intergovernmental machinery makes it certain that tangible results will be slow in coming. Such an operation, by its very nature, tends to produce descriptive and statistical rather than prescriptive and creative material. At best, it may tend toward the extension, coördination, and perfection of existing concepts and organizations. Novelty is slow to emerge from old concepts, and unity is hard to forge from the specialized and fragmentary. Modern science, on the other hand, especially systems analysis utilizing cybernetics to discover synergetic effects, suggests a different approach — not from the part to the whole but from the whole to the part, from the "system" to the "subsystem" with all their interconnections and feedbacks.

The ocean environment is an indivisible whole comprising high seas, territorial waters, contiguous zones, and estuaries; seabed and continental shelf and the atmosphere above it; living and non-living resources; channels of communication; bodies of national and international law; traditions, myths, values, passions, and fears. A pebble dropped in any one area sends rings of ripples across the whole. He who deals with any aspect of ocean problems, willingly or unwillingly, must deal with the whole.

Considerations of military uses of the seas, at issue in current negotiations on arms control and disarmament, are inseparably interconnected with the legal issues of the continental shelf and the limits of national jurisdiction. What happens within the limits of national jurisdiction, furthermore, even within one mile offshore, may render any international system of security and control ineffective. A great deal of oceanographic research has always been carried on under military auspices, and still is. One of the first requirements of peaceful exploration of the ocean environment is that the role of science and scientists in their relation to the military must be reëxamined and redefined.

With increasing exploitation of oil, gas, and mining resources, private and public enterprises are moving into the vanguard of technological development. The devices being perfected for commercial exploitation — new types of submersibles, listening devices or other means of exploration, underwater explosives, submarine habitats, improved storage and transport facilities — all these are readily convertible into military weapons and vice versa. Thus the military-industrial complex already is manifesting itself under the seas. The provisions of the Soviet-American draft arms-control treaty, prohibiting the installation of weapons of mass destruction on the

ocean floor beyond the limit of twelve miles from shore, hardly touches this web of complexities. No matter how amended, such a treaty can be considered only as a first step; the increasingly urgent issues of underseas arms control and disarmament can be dealt with only in the context of a legal framework for an ocean regime, within which planning and development for the peaceful uses of the ocean environment and its resources will automatically tend to deëmphasize and reduce the military uses of seas and seabed. In such a framework, and only in such a framework, does the technological-economic imperative effect disarmament.

The Pacem in Maribus *project started from this systemic or ecological approach and involved construction of a model regime. Its five subsidiary study projects derive directly from the model and will serve to correct, refine, and complete the preliminary undertaking and quite possibly to create alternative models. The five projects are:*

- ☐ Arms Control and Disarmament.
- ☐ The Legal Framework for an Ocean Regime; the Continental Shelf and the Limits of National Jurisdiction.
- ☐ Planning and Development.
- ☐ The Role of Enterprises.
- ☐ Ecology and the Role of Science and Scientists.

Preparatory conferences, one for each project, were held at the Center in Santa Barbara, at the University of Rhode Island, and at the United Nations between January and April, 1970. Three of the study projects proceeded along lines parallel to those followed by other organizations, including the agencies of the United Nations: Arms Control and Disarmament; The Legal Framework for an Ocean Regime; and Ocean Ecology and the Role of Science and Scientists. *The other two projects are unique in their concept and development.*

Planning and Development, *based on the concept that the seas and their beds are the common heritage of mankind, would seem to be the core of any dynamic working model for an ocean regime. Considering the existence of sovereign nations, any regime must be based on consensus rather than coercion, and consensus is fostered not by prohibitions and controls but by the prospect that joint policymaking promises expanding opportunities. Creative planning, based on the responsible participation of enterprises and nations, is the positive, dynamic counterpart to trust-busting (of oil monopolies, for example), which is negative and repressive and therefore has proved inefficient, and to such economic devices as the forced unitization of irrationally splintered and competitive industries like the fisheries. Planning, in this sense, is directed from the bottom to the top, from the periphery to the center. It is nonenforceable but self-executing, the penalty being exclusion from benefits. To be effective, planning must be such that noncoöperation will be expensive. It must contemplate the participation of autonomous enterprises and sovereign states whose capacities are increased as a result of coöperation rather than curtailed by submission to some international bureaucracy.*

The Role of Enterprises, *in this context, has been considered from four different angles:*

1) The multinational corporation, which is exemplified by the international oil industry, has achieved a system of global, large-scale planning and development probably unmatched in the world today. In the words of Robert Engler, the oil industry has learned that "survival on its terms depends on its ability to plan. Its history is an evolution of experimentation with techniques for creating order, whether the immediate challenge has been waste, competition, scarcity, depression, plenty, technology, war, or national boundaries." This sort of planning would of necessity be an integral part of the functioning of an ocean regime, and industry would have a powerful and responsible role. The impetus industry has given to technological progress in ocean exploitation can be beneficial to the world community as a whole under an ocean regime that balances the drive for private profits with mankind's proper concern over pollution, conservation, the multiple uses of ocean space, equity, and development.*

2) New forms of integrating the private and public sectors of the economy are in the cards, and they now manifest themselves from the community level, through the national level, to the international level. Giant corporations, for example, now exercise an economic power superior to that of many nation-states; they have developed their own decision-making processes, their own global diplomacy; in economic matters, they deal with sovereigns as sovereigns. Why not formally recognize this obvious fact of international life? The current trend in international law is in that direction, and the maritime specialists now find themselves in the vanguard. Once upon a time international relations were relations exclusively

*The Politics of Oil, *1967.*

among *(inter) nations; nations were the only actors in the drama, the only bearers of rights and responsibilities, the only subjects of international law. Today international relations extend over an ever broadening spectrum of activities, from politics to economics, from social affairs to science, technology, communications, and culture. Transnational organs are evolving around each of these functions, claiming new rights, shouldering new responsibilities, building new economic empires, molding new loyalties. Nongovernmental international organizations and intergovernmental organizations of all types have joined and are joining the nations as actors in the international drama. They are acquiring a new status under international law, slowly but surely. The role of enterprises must be studied from this angle.*

3) The private power of industry weighs heavily on the decision-making processes of government. The oil companies especially have wielded a notorious backstage influence on the making of foreign policy. Would it not be preferable if, in an international regime for the peaceful uses of ocean resources, the oil industry, in accordance with its worldwide commitments and needs, could openly express its own viewpoint and participate actively in planning for resource development under its own responsibility? It would appear to be a healthy separation, removing the oil industry from involvement in government's concern with the multiple needs of the political community.

4) Recognition of the autonomy of industrial interests at the international level would have one further advantage. Industry — as well as science and labor, for which analogous arguments can be made — could serve as a balancing factor between efficiency and equity in an international regime. Efficiency, in a regime charged with the responsibilities of management, may require a departure from the basic principle of one-nation-one-vote, embodying the concept of the sovereign equality of nations. Considerations of equity, however, make any such departure impossible: Why should rich and powerful nations have a bigger voice in international decision-making affecting "the common heritage of mankind" than the numerous and more populous poor nations? The direct and autonomous participation of industry and science and labor in international planning and decision-making could introduce a balancing factor in favor of efficiency without violating the principle of equity and of sovereign equality of nations.

These are the considerations that underlie the special study project on the role of enterprises undertaken in the context of the Pacem in Maribus *project. In various measure, they apply to private as well as to public enterprises, whether operating under a capitalist or a socialist regime. Their goals and functions in an ocean regime are — or should be — the same. Starting with a unitary or systemic approach to ocean problems, projected into a working model, five groups of experts have completed preliminary work on the subprojects. It will be the task of the* Pacem in Maribus *convocation in Malta to reassemble the whole and to discuss each problem in the context of all others. To facilitate this task, the participants in the Malta convocation are being grouped not according to subject areas defined in the preliminary study projects but according to professional expertise: political-legal groups, industries, fisheries, ocean sciences. Each group will consist of a number of core persons drawn from the study-project panels, plus a number of new invitees. Each working group will appraise the report or reports in its area of particular competence. This procedure is designed to enlarge the dialogue.*

Subsequently, the political-legal group, which will include a number of ambassadors to the United Nations as well as parliamentarians, members of government, and other public-opinion leaders, will meet with each group of technical experts in turn. This confrontation should encourage the emergence of new ideas, aimed at breaking out of at least some of the dichotomies and dilemmas that the nineteenth-century tradition of international law tends to impose upon current thinking — the limits of imagination that so far have deadlocked negotiations on an ocean regime in the United Nations.

If at Malta we can catch even a preliminary glimpse of a new system of international coöperation, a peace system devised for the oceans on the basis of improved understanding of the relationship between human environment and law, a system institutionalizing new forms of participation and communication among transnational science, multinational industry, and international politics, then we will have made more than a modest start at solving the increasingly urgent problems of the maritime no-man's-land. The creation of an international ocean regime, founded on the concept of the common heritage of mankind, could mark the point of passage from one era of international relations to another. Here is a chance for a new beginning.

ELISABETH MANN BORGESE

Santa Barbara, California
May, 1970

Introduction

The role of enterprises in the oceans should be viewed as part of the broader problem of the relationship of human society to the deep seas. The oceans that cover seventy per cent of the world's surface are the ultimate source of life on earth. The stability of their ecology is indispensible to the existence of mankind. They determine man's physical environment, provide his sustenance, and enable his survival. Yet, the forces of nationalistic competition, burgeoning population, and rampant industrialization have begun to threaten the ocean environment and thereby the future welfare of man. The ocean waters and the seabeds can be misused for military purposes; they are being polluted and degraded by the effluents of commerce and industry; and their economic resources can be impaired by myopic exploitation.

Because the oceans constitute a global system, ocean problems cannot be resolved by national actions. Only a supranational authority, regulating ocean usage equitably in the long-run interests of all mankind, can stop the dissipation of irreplaceable ocean resources and devise and enforce arrangements under which stable relationships can be reëstablished between human society and the oceans. The role of enterprises in exploring for and producing ocean resources should be considered within this framework.

In defining the role of ocean enterprises, we must confront numerous basic issues. These issues are legal, political, biological, and ecological as well as economic and administrative in character, and they are closely interrelated. They concern the jurisdiction, constitution, and functions of an ocean regime; the conservation, technology, and probable economic value of ocean resources; the terms, conditions, and fees to be established by an ocean regime for the exploration and production activities of enterprises; the types of enterprises and the priorities to be assigned each type in ocean activities.

1. Territorial Jurisdiction of an Ocean Regime

Basic to all other problems is the question of a definition of the territorial jurisdiction of a supranational ocean regime, and conversely, the question of defining the jurisdiction of nation-states over the ocean waters and seabeds adjacent to their shores. In general, nations bordering the oceans seek a broad definition of national jurisdiction, while landlocked countries support a restricted definition. The great powers, like the United States and the Soviet Union, find themselves in an ambiguous position. On the one hand, they favor a narrow concept of national jurisdiction in order to preserve maximum freedom of the seas for their commerce and their navies. On the other hand, they covet possession of the resources in and under the oceans along their lengthy coastlines. As a result of these conflicting interests, a bewildering variety of national claims of exclusive fishing, mineral, navigational, and other rights over "adjacent waters," "territorial seas," and "continental shelves" has proliferated. Peru, Chile, and Brazil claim exclusive fishing rights in the oceans up to two hundred miles from their shores. Bordering nations have already claimed for themselves exclusive mineral rights to the Adriatic, Baltic, and North Seas. In its *Statement of Policy on Jurisdiction over the Natural Resources of the Ocean,* released in 1969, the American Petroleum Institute proposed that United States jurisdiction extend over the seabed of the submerged North American continent out to where the continental slope meets the abyssal ocean floor — a point that can be several hundred miles from land in ocean waters twelve thousand feet deep!

Whether a wide-band or a narrow-band concept of national jurisdiction ultimately prevails will make an enormous difference in the potential economic value of ocean resources coming under the control of an

ocean regime. Although man's knowledge is lamentably meager, what little is known about marine biology and geology suggests that the preponderance of resources with potential economic value exists in the seabeds or superjacent waters of the continental shelf rather than in and under the deep oceans. If an ocean regime controlled the disposition of all resources beyond the traditional three-mile limit, it would possess billions of dollars of assets even under existing technologies of recovery. If, on the other hand, its authority began two hundred miles or more from every coastline, the present economic value of its resources would be negligible. Under the first condition, the relations between an ocean regime and ocean enterprises would immediately be matters of great importance. Under the second condition, most of those issues would vanish or be reduced to small proportions.

Given its complexity, resolution of the jurisdictional problem will require many years. However, the establishment of an ocean regime need not await a final solution. The suggestion has been made that an ocean regime be established *with provisional boundaries,* so defined as to receive the acceptance of most nations, leaving its *final* territorial jurisdiction to be negotiated later on. For example, the regime might immediately take provisional jurisdiction over oceans and seabeds at depths of more than two hundred metres or at distances from land of more than two hundred miles, whichever is the greater.

2. Conservation Activities of an Ocean Regime

Issues of ocean conservation appear to be of more urgency than issues of commercial exploitation of marine resources, and they involve enterprises in manifold ways. The wreckage of the oil tanker Torrey Canyon off the British coast and recent oil well blowouts in the Santa Barbara Channel and the Gulf of Mexico are dramatic examples of the rising volume of marine pollution resulting from the booming production and transportation of petroleum in the oceans. As more drilling is done in deeper waters, and as tankers become more numerous and gargantuan, the massive pollution episodes will become more frequent. Well blowouts, ruptures of pipelines, and collisions and runnings aground by tankers will multiply. Although maritime insurance companies exert a salutory influence by inducing their clients to take preventive and protective measures, their regulatory powers are limited. As James Dawson has pointed out, many national governments and corporations engaged in risky ocean activities are self-insured. They operate tanker fleets or offshore drilling or mining ventures and are answerable to no one for discharging pollutants into the oceans or leaving junk and discarded equipment as hazards to navigation.

Less spectacular but equally pernicious is the pollution resulting from the common practice of flushing the sludge and debris of oil tankers into the oceans, with incalculable effects upon marine life. Efforts by national governments to curb this degrading practice have proved ineffective, and it is spreading. A supranational authority with policing capabilities is needed.

Another kind of conservation issue is raised by fishing enterprises. It is in the obvious long-run interest of mankind to maintain appropriate stocks of such reproducible resources as fish in the oceans and to limit annual catches of each species to the maximum sustainable yield. This problem has so far been met partially by international agreements among major fishing nations. An example is the Soviet-American agreement on lobsters. As the ocean fisheries expand under world-population pressure, and as the enterprises of more nations become more extensively engaged, international agreements will become more difficult to reach. Only a supranational ocean regime offers an effective solution.

The point should be stressed that conservation of marine resources poses problems beyond the competence of nations to solve. The seas are an indivisible whole, ignoring man's political boundaries. Pollution originating in national waters may move into international waters, and vice versa. Because every nation has an equitable interest in the marine activities of every other, all should join in the protection of their common heritage.

3. Technological and Economic Aspects of Marine Resources

The economic value of the resources under control of an ocean regime will depend upon its territorial jurisdiction and upon world supply-demand conditions for resources yielded by the oceans and seabeds. Having explored the first determinant, we now briefly consider the second.

Ocean resources having present or potential economic value include *services* for transportation, communication, and recreation, *extracted commodities,* living and non-living, and *real estate* that might be created on seamounts for living space, power generation, or other purposes. Non-living commodities capable of extraction from ocean waters or seabeds

include water, minerals, chemicals, liquid petroleum, and natural gas. Living commodities include, of course, fish, marine animals, and plants useful for food or drugs.

The principal conclusion reached by students of maritime economics is that, apart from fisheries, the *present* economic value of ocean resources in the seabeds and superjacent waters more than two hundred metres in depth (which, under the 1958 Geneva Convention, lie beyond national jurisdiction) is *not large*. Biological and geological factors place the preponderance of valuable liquid and hard minerals, as well as fish, within national jurisdictions. The value of hard minerals being currently recovered from the oceans is miniscule, apart from the extraction of magnesium from sea water. Although offshore production of petroleum now accounts for about seventeen per cent of world output, all of it is being produced in relatively shallow waters. In his assessment of prospects for deep-ocean mining, F. L. LaQue finds that manganese nodules found in abundance over the deep-ocean floor are the hard minerals of most imminent economic value and that their production probably will not become commercially profitable in competition with land-based minerals for another decade or two.

More effective techniques of exploration and production can, of course, reduce the costs of ocean resources and can give value to hitherto worthless materials. Ocean technologies are improving dramatically. Professor Charles S. Stewart notes that it took the petroleum industry nearly twenty years to move from fifty to 640 feet of maximum water depth of wells drilled and only one additional year to reach twelve hundred feet. Some believe wells will be drilled in six thousand feet of water by the late nineteen-seventies. Yet, rising technological capability does not necessarily mean lower costs. In fact, the costs of petroleum per barrel rise exponentially with water depth. Deep-water oil must compete with shallow-water oil and with oil produced on the land, as well as with vast amounts of oil potentially available at somewhat higher costs from oil shales, tar sands, and the hydrogenation of coal. One must conclude with T. F. Gaskell that it is unrealistic to expect that an ocean regime will become rich by controlling oil and gas beyond the continental shelf.

Sea fishing has increased rapidly since World War II, the annual catch having risen from twenty-two million tons in 1952 to fifty-seven million tons in 1968, an average annual growth of 6.2 per cent. A major part of this harvest is taken near the margins of the continents. In contrast to minerals, which are a nonrenewable stock, fish constitute a reproducible flow of resources whose long-run benefits to man are greatest when the annual catch is limited to the maximum sustainable yield. The consensus of experts is that the sustainable annual harvest of world fisheries *in the aggregate* is probably two or three times as large as the current yield. However, certain species are being overfished, with excessive fishing occurring in certain areas of the oceans and underfishing in others. As the world fishing industry grows, more species will require conservation rather than development, and greater efforts will be necessary to guide fishing activities into the most productive channels. Fisheries research and management programs, now generally directed at a single species or region, will need to be correlated. Equitable allocations of fish catches among nations, as more species reach their maximum sustainable yields, will also present problems for multinational solution.

Anthony Ressa's "Project Taluga," a plan to construct islands on a submarine seamount on the Cortes Bank off Mexico and to organize a new national government to have sovereignty over them, raises the startling prospect of developing a new resource in the oceans — land! It also dramatically reveals the need for an authority to take jurisdiction over the oceans and seabeds beyond national control as the common property of mankind. As matters now stand, they are *res nullius*, open to any government or private entity who takes possession of them. As population pressures rise on the land, and the mitigation of environmental pollution becomes urgent, islands and marine living environments for the generation of power, submarine mining, research, or simply recreation will be created. Such enterprise activities should be controlled to prevent disturbance of the ocean ecology.

4. Financial and Administrative Aspects of Marine Enterprise

Because substantially different geological, biological, and technological conditions are confronted by the ocean-fishing, petroleum, and hard-mineral industries, the terms of exploration and production licenses issued to enterprises in these industries should also differ. As Dr. LaQue has noted, the wide distribution of magnesium nodules on the ocean floor, with an absence of concentrated deposits in limited areas and a recovery technique employing no fixed equipment, makes their production resemble fishing more

than mining. Licensing of such activity by an ocean authority would therefore be more appropriate than the designation of exclusive concession areas. Petroleum deposits, on the other hand, are concentrated in specific areas and require heavy investment in fixed equipment, so that enterprises would require the protection of exclusive concession areas over an extended time.

It is premature to be specific about the revenue goals of an ocean regime or the amount of royalties or license fees to be charged enterprises. In general, a regime should establish terms that are considerably more liberal than those prevailing on land because the risk level of ocean operations is much higher. Given man's meager knowledge of the seas and the pioneering efforts needed during the early years, the regime should emphasize promotion of ocean enterprises rather than realization of immediate revenues. Although this policy will disappoint those leaders of less developed countries who have been led to hold exaggerated hopes of vast incomes from the oceans, it will be to their benefit in the end.

5. Constitution and Functions of an Ocean Regime

How should the functions of an ocean regime be defined and how should the agency be structured to discharge these functions? Should an all-purpose general authority be established? Or would a series of specialized supranational agencies be more feasible, at least initially? Specialization might be on the basis of functions, such as research, licensing, or enforcement. It might be on the basis of industry, such as shipping, fisheries, petroleum, or hard minerals. It might involve a series of regional agencies, respectively concerned with ocean affairs in the Atlantic, Pacific, Mediterranean, or Indian regions.

Certain specialized agencies of the United Nations are already involved in aspects of ocean activity. The Food and Agricultural Organization studies fisheries. The World Meteorological Organization collects data, coördinates national research, and performs research on weather. If the oceans were recognized as an integrated system, in which each activity impinges on every other activity, these separate programs might be drawn together under a single ocean authority of the United Nations.

The superiority of a systemic approach to policies for the world's oceans is a powerful argument for a general-purpose ocean agency. A general-purpose agency would, of course, be expected to organize separate divisions to carry out particular functions, deal with separate industries, or provide on-the-ground supervision of particular regions. Its overall strategy and policy would, however, take interdependencies into account. It would recognize that oil pollution cannot be confined to one area; that oil slicks from ocean shipping damage fisheries and affect the recreational values of adjacent shores; that overfishing can deplete a species of fish and deprive future generations of its utility. Above all, it could launch and coördinate large-scale research projects designed to enhance man's slender knowledge of the oceans and to guide his activities so as to preserve the ocean environment while assuring optimum utilization of marine resources.

Elisabeth Mann Borgese has proposed that an ocean regime be established as an agency of the United Nations to regulate, supervise, and control all activities on the high seas and on or under the seabed. Its policies would be formulated by a maritime commission of seventeen members, elected by a maritime assembly composed of oceanographers and representatives of the United Nations, the extractive industries, and the fisheries. Policies would be executed by a maritime secretariat and interpreted by a maritime court. Separate secretariats would be established for mining, petroleum, fishing, and aquaculture. (None was proposed for ocean transportation.) The regime would have broad powers to license governments or corporations for the exploration and exploitation of ocean resources, for regulating fisheries, aquaculture, and pollution, for promulgating safety standards, for conducting research, for inspecting ocean installations, and for imposing penalties upon violators of its rules.

Professor Richard Eells has proposed that the ocean regime take the form of a multinational corporate authority whose stock would be allocated among members of the United Nations according to some formula that would assure adequate representation to less developed countries. The corporation would need the moral support of the United Nations. Stock could ultimately be held by governments, foundations, or corporations involved in the oceans, and these stockholders would elect a board of directors to prescribe policies. The corporation would license public or commercial organizations to use resources of the sea, and it would pay dividends to its shareholders after meeting its costs.

A corporate format might facilitate the establishment of an ocean regime. A task-and-action oriented corporation might well produce more efficient action than a political organization. On the other hand, there

is the problem of insuring that its action would be in the general public interest. The multinational corporation has demonstrated great ability to assemble resources and to organize production on a worldwide scale. It tends to reconcile and to reduce the political, social, and economic differences among nations. Its potentialities in ocean enterprise are surely no less than on land.

In structuring an ocean regime, consideration should also be given to possible combinations of political and corporate forms. It would be feasible for the ocean regime proposed by Mrs. Borgese, for example, to have one or more multinational corporations operating under its general control. Arthur Barber has proposed the establishment of a multinational weather corporation, which would enter into ten-year contracts with national governments to observe, report, and forecast the weather. He plausibly contends that such a global corporation, capable of systematic correlation of weather data, would not only improve weather forecasting but would perform the task at less cost than the present combined outlays of national governments for this purpose and would produce substantial net revenue to its sponsor. Because a global weather system would mainly involve the oceans, a world weather corporation could well be the first in a series of corporate subsidiaries operating under the aegis of an ocean regime.

6. Enterprise Types and Priorities

A final set of issues concerns the types of enterprises to be permitted or encouraged to operate in the oceans and the priorities or preferences that should be assigned to each. Ocean enterprises might be private, public, or mixed in ownership; they might operate either individually or in national or multinational consortia. An "open" policy should probably be followed by an ocean regime during the initial period, under which public or private or mixed enterprises would be freely authorized to explore for and develop ocean resources, under appropriate safety and anti-pollution regulations and restrictions on production. At a later stage, competition among enterprises for licenses and concessions might become severe. The regime would then face problems of allocating rights among enterprises of different types or nationalities. Manifestly, all nations should be entitled to have their enterprises participate in ocean activities on a scale proportionate to their national incomes, populations, locations, or some appropriate criterion or combination of criteria. Under these circumstances a case could also be made for giving priorities to multinational enterprises or consortia of enterprises.

Professor Wolfgang Friedmann has made a strong case for giving priority to joint ventures in the oceans between governments and private enterprises as a means of diffusing technological and managerial knowledge among the less developed countries. They could be a means whereby the twenty-nine landlocked countries, many of which are poor economically, could participate in ocean enterprises.

Should an ocean regime itself undertake entrepreneurial activities or confine itself to research and regulatory functions? If the petroleum industry offers a prototype, the former policy will prevail. Nearly all of the important oil-producing countries offer exploration and production concessions to enterprises and simultaneously operate their own national oil company for these purposes. To the argument that international organizations lack experience in operating enterprises, there is the answer that they are already carrying on successful banking and financing operations through the International Bank for Reconstruction and Development (World Bank) and the International Monetary Fund. Why should not a corporate subsidiary of an ocean regime become equally successful in industrial operations?

7. Next Steps for Action

Herein, the salient issues of ocean enterprise have been raised, and observations have been offered about alternative solutions. Definite policy choices require more discussion — official and unofficial — among citizens of all nations having special knowledge of the subject. The holding of such discussions, and the generation of consensus on the basic issues of jurisdiction and organization of an ocean regime, is an obvious first step. Hopefully, this will be followed by multinational action to establish such a regime. There are many positive and negative reasons for a determined move forward on this path. On the one hand, an ocean regime offers the most promising area for international coöperation and the most powerful means of rejuvenating the United Nations. On the other hand, it is essential to provide the political and institutional machinery that alone can save mankind from the disasters of exploding population and onrushing technology.

NEIL H. JACOBY

Santa Barbara, California
May, 1970

PART ONE

PRESENT ENTERPRISE ACTIVITIES

The exploitation of ocean resources is dominated by two industries at the present time — oil and fisheries. Although the fisheries industry is the more important in purely monetary terms, the activities of the oil industry have particular significance with respect to an ocean regime. The oil industry is a relative newcomer to the oceans; it is responsible for and dependent on great advances in technology; and it requires fixed installations and huge investments for its extraction activities.

Given the technological possibilities and the opinion of some experts that at least half of all oil extraction will be from offshore wells by 1988, we may expect claims to an ever expanding continental shelf. While such claims are often based on nationalism, the overriding consideration may be the desire of the oil industry to protect its investment. It is hardly surprising that an industry required to invest many millions of dollars in every well should be extremely sensitive to legal uncertainties. This sensitivity usually manifests itself in great resistance to any change in the status quo. An interesting parallel can be drawn between the industry's present lack of enthusiasm for an ocean regime and its hostile attitude toward the shift from state to federal control over offshore oil production in the early forties. At that time the industry vigorously insisted on the extension of states rights over submerged lands and on the protection of "historic boundaries." The federal takeover was attacked as an inroad on "the sanctity of private property" and the "life blood of democracy." Then, as now, the primary concern seems to have been the protection of a heavy investment.

While the oil industry presents a challenge to an international regime by virtue of the novelty of its technology, the fisheries industry presents a challenge by virtue of its antiquity. The historical notion of the freedom of the seas has contributed to the present fragmentation of the fisheries industry. The high seas have always been open to all to fish, and the fishing industry is thus characterized by open access, both literally, in the sense that the seas are open to all, and economically, in the sense that entry into the market requires relatively little capital investment and equipment. The result has been an atomistic and predatory industry, with low profit margins and, more seriously, unscientific depletion of stocks.

The arguments for some kind of international control are persuasive. Hunger is still a way of life for many millions of human beings. Despite great advances in agricultural production and food distribution, the U.N. Food and Agricultural Organization states categorically that food output per person in poor countries in 1968 was only two per cent above 1934-38 levels. With meat and milk, the costly foods, comprising a growing share of that output, the average villager in poor countries is probably worse fed now than before the Second World War. More rational management of fish stocks and greater emphasis on aquaculture could contribute to higher protein levels in much of the world's diet, and the seas thus offer the hope of a new source of protein-rich foods.

Advancing technology may well have its greatest impact on marine mining of hard minerals, although at present they have less importance than either oil or fish. In some cases the cost of extraction, processing, and transportation compares unfavorably with the cost of exploiting minerals on land, but there have also been some promising discoveries. The Dillingham Corporation of Honolulu has, for example, begun exploitation of an exceptionally pure form of calcium carbonate called aragonite on the seabed off the Bahamas. Potential damage to the fragile ocean environment from strip mining of this sort makes the need for some international control system all the more apparent if mining activities are not to work the same depredations on the seabed as they have on land.

The owner of the Bahamas mining concession, Dr. Thomas D. Nicholson, is reported by *The New York Times* to have justified his sale to the Dillingham Corporation on the grounds that "we thought we had something marketable and we went ahead and sold it. Maybe some fish might be disturbed, but they could probably find someplace else." To approach the world's last great resource with this attitude or to plead ignorance of the consequences of our actions is to repeat the mistakes of the past and to jeopardize the future.

CHARLES S. STEWART and GIULIO PONTECORVO

PROBLEMS OF RESOURCE EXPLOITATION: THE OIL AND FISHING INDUSTRIES

Underlying much of the discussion about the role of enterprises in the ocean is the half-truth that organizing capital and labor to exploit the marine environment presents unique problems. At the highest level of abstraction this is not so. The basic difficulties connected with organizing productive activity and making decisions under uncertainty are similar on land and in the oceans, regardless of whether the enterprise is publicly or privately owned.

As one moves away from the most general management problems, however, differences between enterprises operating in the ocean and those carrying on similar activities on land become more apparent. These differences are found both in production functions — the way in which inputs are organized to create output — and in the institutional framework within which enterprises must operate. The marine environment generally requires enterprises to use a different technology and face a different set of hazards than they would on land. Thus far, however, the most important distinctions between exploiting the resources of the ocean and those on land have been in the human institutions for organization and control. Exploiting ocean resources involves such questions as the common-property (open-access) status of fish stocks, the extent of a coastal state's seaward jurisdiction, and the limits of liability for damage to the environment. These problems may be expected to continue to arise in the foreseeable future. It is appropriate, therefore, to consider the range of issues presented by both different technology and different institutions.

The variety of marine resources, the special production functions required to exploit them, and the institutional constraints under which they are exploited force us to consider a system of classification (see Table I) that will be useful for economic analysis and will provide a basis for policy discussion as well. For purposes of discussion, marine resources may be divided into three broad categories: Resource Type #1, primarily offshore minerals, including oil; Resource Type #2, fish and other freely moving organisms that have economic value; Resource Type #3, oysters and the like whose extraction depends on a type of agricultural processing. While this last category is not overly important at the moment, the imminence of technological change and the increasing physical control over the marine environment that will come with it could increase the significance of these resources in the future. The three categories of resources present different problems, and it is possible to distinguish among them in broad economic and political terms.

On the assumption that permission to exploit mineral deposits on the continental shelf is an exclusive right granted by a government — or some approximation thereof — mineral-resource exploitation may be considered as a set of problems in the regulation and control of monopoly, similar to those that arise in communications, power generation, and so forth. Because the resources are offshore and their exploitation may impinge upon national-defense objectives or affect international relations, however, some policy consideration must be given to the geographical aspects of these grants. As mineral exploitation moves farther offshore to the limits of the continental shelf, the question of national jurisdiction becomes a problem. Thus far the issue has not been forced, but the techniques for the exploitation of oil resources are advancing so rapidly, along with a corresponding drop in relative costs, that an international law-of-the-sea convention will be forced to deal with the question in the foreseeable future.[1]

Fish stocks, which are open-access or common-property resources, present more complex problems. In those cases where a large measure of national control over the resource is possible, as is the case with inshore lobster populations, the objective is to achieve an optimum allocation of inputs for a set of industries that automatically tend to poor economic and biological performance, to chronic excess capacity and instability, and to a proclivity for overfishing. These circumstances suggest the necessity for controls that would modify the open-access condition to enable the present structures to yield results comparable to those that obtain in healthy agricultural situations.

Where national control is weak or nonexistent and open access permits all nations to exploit the fish stocks, economic solutions will depend on international negotiation. No matter how difficult the institutional problems connected with such negotiation, the objective of rational resource use remains. This is an area where there is room for experimentation and flexibility of approach. To suggest just one possibility, an international fishing corporation might be established to exploit certain resources, enabling small nations to realize returns from a joint venture considerably greater than the level of return they could achieve individually.

The third category is aquaculture. Specified areas are owned by individual entrepreneurs producing relatively small shares of a homogenous product. In this type of enterprise, legal claims to given areas may be freely transferred, as is true in the case of other real estate. Within this category there will undoubtedly be cases where the environment will dictate monopoly solutions similar to those applicable under the first category.

A fourth category of importance is recreation. Except in a few circumstances, recreation uses do not compete with other uses and have therefore been excluded from this discussion.

OFFSHORE OIL AND GAS

The oceans are the last earthbound frontier. The ocean surface has, of course, provided trade routes for merchants since antiquity, and men have long used the water column for fishing and the seabed for crustaceans and mollusks. As has been true of the frontier on land, ordinary rules of law and order have operated weakly, if at all, on the high seas. Free movement over the ocean's surface and license to capture its living creatures have been inhibited only by a three-mile limit — the range of a cannon shot — or a twelve-mile limit — the distance a man can see with the naked eye. The merchant's or the fisherman's freedom to roam and to take has been a manifestation of laissez-faire doctrine in its most perfect form. Private enterprise has flourished in response, without regard for the consequences from a welfare point of view.

Technological developments, changes in supply and demand, defense needs, and, perhaps above all, man's curiosity have now focused attention on the ocean floor and its subsurface. The ancient trades of transport and fishing are now supplemented by the search for oil and gas, the production of Frasch sulfur, and the dredging for tin, diamonds, oyster shell, sand, and gravel. As yet, these activities take place in the relatively shallow waters of the continental shelf. Mining of hard minerals on the deep-ocean floor awaits a technology that will make exploitation competitive with mining operations on land, and industry hesitates to proceed, many would say, without a body of law to protect its deep-ocean undertakings.[2] At the same time, hydrocarbon traces in cores brought up from the deep ocean by the Glomar Challenger have not gone unnoticed among oilmen.

Pushing the ocean frontier deeper and deeper requires knowledge and hardware, both of which are being provided by governments and private enterprises. It has been estimated that more than fifty American companies, the government itself, and a number of universities are working on oceanographic projects of various kinds.[3] On occasion, natural-

resource companies combine with other types of corporations, as have Mobil and North American Rockwell in the development of a subsea production system that will be serviced by a submersible work boat. While hard-mineral exploitation has considerable potential in the deep ocean and excellent research and development are being carried out, oil and gas extraction is by far the most developed private mineral activity offshore. It has been estimated that in 1966 about six per cent of total U.S. mineral production was offshore, and the proportion is rising. Offshore oil and gas accounted for more than eighty-four per cent of the total offshore mineral production and ten per cent (321 million barrels) of all U.S. oil and gas production, up from one per cent (27.5 million barrels) ten years earlier.[4] By 1969, the figure had risen to fifteen per cent.[5]

All signs point to an increase in the share of world oil and gas production that will come from offshore drilling, and the trend is toward exploitation farther and farther from shorelines. Many think that the two-hundred-metre isobath and the "rubber boundary" provisions of the Geneva Convention of 1958, which defined the continental shelf, have been overtaken by technology. Without offering alternative legal arrangements, a swift review of offshore hydrocarbon developments over the last twenty years or more will perhaps suggest the urgency of amendment.[6]

A great deal has happened since 1948 when the first real offshore well was spudded in off the Louisiana coast in fifty feet of water. By one count, hydrocarbon exploration and development is now taking place off the shores of seventy countries; twenty-one either have reported finds or are already producing. Not surprisingly, the best success has often been in areas adjacent to land where oil had earlier been found. In the United States, the waters off Louisiana and California have shown the best results and the most promise, although Alaska's Cook Inlet should not be overlooked, despite problems with ice and thirty-foot tides. Relatively little exploratory drilling has been carried out on the Atlantic shelf thus far.

Elsewhere, there is little surprise at the developments in Lake Maracaibo and in the oil-rich Arabian Gulf area, among them finds off Dubai, Abu Dhabi, the Neutral Zone, and Iran. Good results have been obtained off Nigeria and Portuguese Angola as well. Gas discoveries in the North Sea, particularly in the British area, will certainly change drastically the logistics of the United Kingdom's energy supply.

There have also been disappointments. Results in the French, German, and Danish zones of the North Sea have been largely negative thus far, and the same holds true for the Pacific coast off Canada and the northwestern United States.

We have already noted that by the mid-sixties ten per cent of daily U.S. output was offshore. Worldwide, offshore oil production in 1966 was six million barrels per day, or roughly sixteen per cent of total production. The share of natural gas was even greater. Proven offshore oil reserves have been estimated at eighty-five million barrels, or twenty per cent of the world's total reserves.[7]

To exploit this oil has not been cheap. According to one source, the cost of drilling 12,500 holes in U.S. waters and bringing into production those that were commercial was about thirteen billion dollars, including almost six billion in rental and royalty payments; costs, not the least of them bonuses, are going up.[8] Leases off Louisiana, Texas, and California cost thirteen leading bidders 1.4 billion dollars in 1967-1968, or eighty-one per cent of the total industry outlay for the three sales. The average of $658 per acre for the Louisiana leases was almost three times the $234-per-acre average paid in the previous record tidelands auction in 1962, and the average of $1,137 per acre paid for the tracts in the Santa Barbara Channel dwarfs them both. As one oilman noted, the companies must be prepared to accept low returns on investment or be outbid by someone who is. "Despite the difficulties of accurate financial prediction, industry continues to go offshore because it must. That is where the large potential reserves are to be found."[9] Finally, it should be noted that oil-import quotas are an important factor; Middle East crude can be set down on the Atlantic Coast in some cases at one-half the price per barrel of the domestic variety.

Unlimited imports of cheap foreign crude would certainly reduce the value of offshore leases, to say nothing of those held by marginal producers on land. As it is now, prorationing of domestic production and quotas on imports keep prices up (see Table I). In the case of offshore operations, at least, the resulting rent is apparently being captured by government, at least in part, initially through bonus payments and later through royalties.

The huge capital requirements needed just to find oil offshore, quite aside from the further investment in downstream facilities necessary when it is found, have precluded the legendary independent wildcatter. Most companies are very big indeed and have extended-time horizons. In addition, as far as conservation is concerned, experience has shown that optimum

exploitation of a wasting asset like oil can be more closely approximated if it is carried out by a few big companies, not by many small ones.

National control over subsurface assets has one great virtue: it partly eliminates "the rule of capture" that has led to disastrous results on land in the form of over-investment in production facilities and sub-optimum recovery.

The national policy of the biggest producer and consumer of oil and gas, the United States, inevitably affects other nations. While record totals were being paid for leases on the U.S. continental shelf, foreign governments were paid only three hundred million dollars. While other factors certainly have some influence, the artificially wide spread between U.S. domestic prices and world prices, resulting from import quotas, is a major cause of this disparity. Stiff international competition and abundant crude supplies abroad have made the quiet days of "Red-Line" and "As-Is" agreements obsolete. The big-seven oil companies now find competition from many independents and government-owned companies, all seeking a share of the world market.[10]

The biggest barrier to expansion outward from the relatively shallow areas that have been explored and exploited to date has been water depth.[11] It required nearly twenty years for oil companies to move from the fifty-foot level to the 640-foot level, but in only one additional year, operations reached twelve hundred feet. Some believe that there will be drilling at six thousand feet by the late seventies. The costs of a quantum jump in depth, however, seem to rise almost geometrically, especially in production systems. Fixed platforms that have been built in a hundred to a hundred and fifty feet of water cost about six million dollars; at six hundred feet the cost is estimated at sixteen million while at one thousand feet the estimated cost is thirty to forty million and at least an additional five million dollars more must be added for topside equipment. Beyond that depth, many observers feel that submerged platforms or subsea completion systems will be the only practical technologies.

The question remains of how to get the oil ashore. Pipelines have been laid as deep as 340 feet and even deeper on an experimental basis. Here oil logistics plays a crucial role and may eliminate the need for any system at all. The experience of the Dubai Petroleum Company is a case in point. This company avoided the construction of a pipeline, tank farm, and loading terminal by developing an underwater storage facility located at the offshore site in the Arabian Gulf. With a capacity of five hundred thousand barrels and in water deep enough for supertankers, the storage tank stays submerged on the oil-water principle. As oil is pumped out, seawater comes in; the converse occurs when oil is pumped in.

Exploration has always been the most hazardous operation in the oil business. (At the present time the uncertainty with respect to spills is also increasing.) Although seismographic techniques for identifying promising structures have been highly developed and are readily adaptable to offshore work, as yet no instrument exists that can find oil directly. The only instrument is still the drill, as it was a hundred and eleven years ago, and it must have a platform.

The most common type of platform so far is the self-elevated one, a rig with huge adjustable legs resting on the bottom. Costing roughly ten million dollars apiece, some of these rigs can drill in water up to 250 feet, and there are about ninety in use around the world. For deeper water, semi-submersible units have been developed. They are anchored over the drilling site and stabilized by pontoons lying thirty to forty feet below the surface. The latest development is the drill ship that, as the Glomar Challenger demonstrated, can be designed to work effectively in the deep ocean. The secret of its success is a technique called dynamic positioning, which maintains the vessel's position over the hole. A sonar beacon lies on the ocean floor and four hydroplanes below the ship's hull home in on this beacon, feeding information into a computer. The computer, in turn, automatically controls fore and aft lateral thrusters that keep the ship over the beacon.

The technological developments allowing the oil and gas industries to move into deeper and deeper waters, and the risks and costs involved, are matters of history; they suggest answers to questions of where, how far, and how much. A much more difficult question is, "How fast?" The answer lies in the future and we can only speculate.

According to one authority, the rate of development depends on the capricious geological processes of the past, the ability and efficiency of operating companies, the demand for petroleum and its products, and governmental policies and actions.[12] More specifically, a distinction must be made once more between American and foreign crude. There is apparently little prospect of a major find on land in the continental United States, a positive factor in encouraging more and more offshore efforts; the continental shelf — 850,000 square miles — seems at-

tractive to the industry, given our present technology. Nor are there signs of any significant relaxation of the oil-import quotas, and the price umbrella they provide will encourage uncertain ventures to meet demand, while allowances for depletion and certain drilling costs will encourage efforts to increase the supply. Whether the prolific North Slope discoveries will slow offshore exploration and development depends on many factors, not the least of which are the methods and costs of bringing the oil to consumer markets.

On the negative side, from the industrial point of view, is the obvious necessity of improving techniques for cleaning up after inevitable spills and the need for clarification of the whole question of the associated liability for damage to the environment.[13] It can also be foreseen that, since ocean resources are layered, eventually a serious traffic problem might arise, with production platforms hindering navigation and trawler operations.

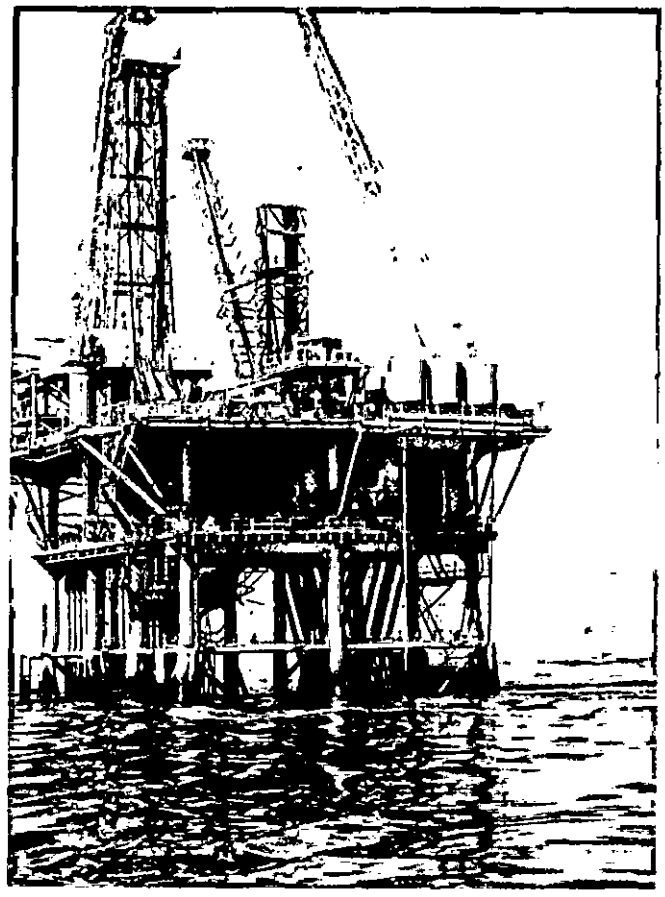
Abroad, companies are caught in a squeeze between falling prices and demands from producing countries for increased revenues. Even so, the long-run demand for fossil fuels suggests that the search for new supplies must and will go on — the only safe prediction to be made concerning an industry deeply affected by the uncertainties of the marketplace and the accidents of nature.

FISHERIES

The oceans are often envisioned as a cornucopia, and a first glance at the statistics on the world's fisheries sustains that rosy view. Not only is the world's output of protein from the oceans increasing but the increase is being shared in significant proportion by nations in the southern hemisphere. A closer look, however, reveals the image to be, in part at least, a mirage. (See Tables II, III, IV, and V.) The fisheries on the average make little contribution to economic development, and they tend to chronic instability and the misuse of resources in both developed and underdeveloped countries.[14] This trend will continue in the absence of a major change in the legal and institutional framework in which they operate. The crucial institutional problem is, of course, the common-property status of fish stocks. Even in the best of circumstances (assuming sufficient biological knowledge on which to base regulation aimed at preventing overfishing and also assuming the much less likely proposition that biological protection of stocks can be sustained in the face of economic pressure from a troubled industry), the economic problems associated with exploiting resources no one owns — or controls the rate of use of — tend always to escalate.

One of the problems in convincing fishermen and the administrators of fisheries of the pervasive and pernicious character of the common-property status of the resource lies in the difficulty of making a practical rather than a theoretical distinction between the long and the short run. At any point in time it is possible for a fishery to be profitable. This short-run profit may occur despite a long prior period of low earnings. An increase in natural abundance or a rise in price or both will serve to transform a moribund fishery into a bonanza. (A technological change that reduces costs and increases gear effectiveness is similar in effect to a price increase.) In time, natural abundance will be reduced or excessive entry will divide the rents created by the price rise among the increased number of fishermen until the individual share of the benefits again approaches zero and the fishery is back in its initial equilibrium.[15]

As an example, let us examine the history of the Alaskan salmon fishery to see if it is consistent with these hypotheses. Today in Alaska we find twice as many fishermen catching forty per cent as many fish as in the nineteen-thirties — the fish are no harder to catch — while the ratcheting effect of intermingled



good and bad years serves to perpetuate the process.

As a crude first approximation, we may focus these remarks by saying that fishing and processing enterprises are, and have been, oriented to the short run. Profits can be made in the early stages of a fishery's development or in the intermediate periods in its life when product prices, costs, and supply conditions are in favorable conjunction.[16]

Let us emphasize, however, that if the condition of common property could be alleviated, the possibilities for adequate earnings are very good. If the Alaskan salmon fishery were operated efficiently, a conservative estimate is that over twenty million dollars per year in rents would be available to strengthen the firms, increase factor earnings, carry on research and restoration programs, and so forth.[17] Clearly, therefore, eliminating the common-property status of fish stocks has great advantages.[18]

The common-property status of the resource is, however, only one of the constraints on the rational exploitation of the world's fisheries. As is true of all industries, fisheries must adjust continuously to changes in demand as well as to variations in supply conditions. While analysis of demand is obviously a central consideration in any particular situation, certain long-run considerations make it possible to concentrate on the problems of supply. To bring out certain relationships, the following discussion will largely ignore price considerations in order to emphasize the problems connected with the rate of natural abundance of the resource and its availability to fishermen and processors.

Imagine the ocean having a number of fish populations, each with its own population dynamics, yield functions, and so on. Fishermen will, given free choice and the common-property status of the stocks, exploit the populations in descending order, beginning with those guaranteed to bring the most profit. In the absence of any biological regulation, each stock will be exploited to a limit beyond both the net economic and the maximum sustainable yield, particularly in the case of more valuable species. Because of the existing interrelationship of abundance, operational cost, and the end price of fish products, fishermen will move from population to population, exploiting and reducing each in turn. Throughout this process, however, aggregate output will be rising.[19] Gross output will cease to rise when the opportunity to expand into new populations is balanced by the decline, or stability in supply, of the older or already exploited stocks. This process is suggested in the tables where the slow growth or actual decline in heavily exploited species is partially concealed by extension of the fisheries, particularly into those populations that today provide the bulk of the raw material for the fishmeal industry. This is not the place to go into the bio-economic implications or to explore the expanding literature on the ultimate limits to productivity of protein material in the oceans.[20] The point of concern here is that for most fishery enterprises, both primary producers and processors, a crucial question is the continuity of flow and the adequacy of the fish supply.[21] Not only has the supply problem been critical from the point of view of the entrepreneur but it has played a key role in shaping the enterprises that have emerged in the process of exploiting fishery resources.

In summary, the net economic yield from fish stocks exploited under common-property status will tend toward zero in the long run. Even under these circumstances, certain firms will make a profit, as the differential skills of individual entrepreneurs, either fishermen or processors, permit them to earn quasi-rents. The industry will be characterized by chronic instability, excess capacity, and, in many cases, individual hardship, especially if the labor and capital employed are for various sociological and economic reasons particularly immobile. During the period of their development, however, and for recurring short periods thereafter, fisheries may be very profitable.

Supply conditions have played a major role within this framework in determining the form and size of enterprises engaged in catching and processing fishery resources. The scattering of the supply of fish over wide geographical areas and the variability in this supply, together with the problems associated with holding and transporting the catch, have tended to limit the advantages of large-scale operations and therefore the size of economic units engaged in both catching and processing. In primary markets, we find in most cases atomistic sellers (fishermen) facing oligopsonistic buyers (processors). Even though buyer-concentration is in many instances relatively high, these structures still tend to be unstable. This instability has been sufficiently pervasive to prevent the rationalization of the fisheries that would have taken place had there been monopoly or an effective collusive oligopoly on the buying side.[22]

With this set of hypotheses for background, let us look briefly at certain aspects of three specific situations: certain Norwegian fisheries, the Peruvian *anchoveta* fishery, and a multinational corporation that has a strong interest in many of the world's fisheries.

Historically fishermen-farmers have been central

figures in the Norwegian fisheries. These individuals have operated seasonal small-boat inshore fisheries. The handlining for cod off Lofoten and the winter-herring fishery are typical. Entry into these fisheries has been restricted in a *de facto* sense by the natural rigors of life along the coast of western Norway and by the high level of seamanship skill required. *De jure* conditions, such as the prohibition against trawling on the Lofoten banks, have also served to reserve the stocks for local fishermen. Despite these barriers, entry has taken place, and today there is evidence that the Norwegian small-boat fisheries are overcapitalized, require heavy subsidies, and in general exhibit the usual characteristics suggested by our hypothesis on the condition of mature fisheries.[23]

This situation in Norway has been alleviated or exacerbated, depending on the viewpoint, by national policy, one objective of which has been to sustain the density of the coastal population, particularly in the north. The fisheries have played a role in this policy by having the national marketing agency (Frianor) encourage the operation of small processing plants in scattered harbors, by having fish prices negotiated by a powerful national union, and by obtaining direct governmental subsidies and such social services as rural education.

In distant-water fisheries, Norway has been reasonably successful. These fisheries have been exploited by medium-size firms, many of them family-owned businesses, with perhaps a fleet of several vessels. The skill of the fishermen, the ability to maintain product quality, and the capacity to fill the needs of certain markets have brought a profit.[24] The increasing pressure on the North Atlantic stocks and the additional effort by various nations competing for those stocks suggest, however, that it will take the utmost in entrepreneurship to sustain earnings in the long run.

The increase in catch by the Peruvian *anchoveta* fishery — from several hundred thousand tons to over ten million tons in approximately a decade — is in some ways the most important development in the world's fisheries in this century.[25] The size of the fishery and the nature of the end product have created problems that are different in scale and kind from those found in most other fisheries.[26]

Relatively speaking, the Peruvians have achieved spectacular results. On the biological side, population-dynamics studies have been carried out, and a considerable body of knowledge dealing with the problem of potential sustainable yield is now available. Biological regulation has been institutionalized by the establishment of an ocean institute *(Instituto Del Mar)* that works directly on these problems and by the creation of a department of fisheries at the agricultural university.

The industry consists of individual firms owning one or more processing plants strung along the coast. Roughly eighty per cent of the fishing vessels belong to these processing firms, with the remaining vessels independently operated by syndicates or owner-captains. While these vessels are technically independent, they are in most cases bound by contract to specific processors. These contractual arrangements are the price the independent owner pays for the financial assistance he receives from the processor to acquire his vessels. There is some fleet mobility along the coast among those vessels operated or tied to processors who operate plants in different locations.

A number of firms in the fishery are foreign-owned, but many of the most efficient fleets and processing plants are Peruvian.[27] Some of the Peruvian firms have also involved themselves in boat building and in the manufacture of other fishery supplies. Some of the successes of the fishery from the Peruvian point of view are obvious: a wide range of entrepreneurial activities associated with the introduction of a capital-intensive technology have been developed, and a potentially sound biological control system has accompanied the intensive exploitation of the resource from the beginning.

These gains are endangered by a failure to come to grips with the efficiency problem. Already the fishery has excess processing capacity, and the fleet size has forced the industry to cut back fishing time to approximately eight months.[28] When the problems created by this mounting capacity are combined with natural variation in supply, with the complex marketing difficulties faced by the industry, with the inherent obstacles to obtaining adequate financing for local firms, and with the politically touchy question of the role of foreign firms, a state of instability results. Stabilization can be achieved only by rationalizing the existing structure, including the imposition of entry limitations that are geared to both catching and processing.[29]

Our final illustration is the fisheries activities of one large multinational corporation. The firm in question now is important in the world's tuna market, is moving to increase its impact on the shrimp business, and is active in the production of fishmeal.

As a general rule, this firm engages in all phases of these three fisheries: it is a primary producer (catching), a processor of the primary production, a

marketer of the processed product, and, in certain instances, a large consumer of the end product. While it engages in the full range of fisheries activity, its role in certain areas is quite limited. It prefers to operate in marketing and in distributing already processed products and attempts to minimize its catching and processing activities. From time to time, however, it becomes heavily engaged in catching and processing. It may play a direct role through the outright ownership of vessels and plants, or it may prefer to participate indirectly by advancing loan capital to stimulate the development of a fishery by others. Whatever the form, the objective is the same—to increase the supply of the raw material available for marketing. As a fishery develops, the firm withdraws when possible from primary production and shifts its resources to provide seed money in different areas of the world. This practice tends to build up the aggregate supply available for the world market, to increase the firm's share of that supply, and to stabilize the flow of the resource. It also permits the firm to limit its participation in primary production to those periods in the life of a fishery when it is most apt to be profitable. In this way, the large multinational organization can avoid most of the economic pressures generated by the common-property status of the resources while it concentrates on the crucial long-run supply problem.

In general, however, all the fisheries of the world suffer from the same malaise. As we have argued, as long as fish stocks remain common property and no limitation on entry is imposed, the aggregate net economic yield from these stocks will in the long run tend toward zero. Rational exploitation of these resources depends therefore on settlement of the common-property and entry problems. Clearly this is a primary task for an ocean regime, for unless the long-run value of fish stocks can be protected by an institutional framework, we cannot expect the industry to spend money on research, exploratory fishing, or conservation measures.

TABLE I: Ocean Resources

	Category #1 Mineral Resources, Including Oil	**Category #2** Stocks of Fish and Other Organisms	**Category #3** Resources Developed for Use in Aquaculture
Entry Conditions	License — grant of monopoly in oil, possibly equivalent to field unitization.	Common property — open access. National and international fisheries pose different problems.	Purchase of title "licenses," as in existing real estate markets.
Industrial Structure	Large-scale, efficient producers with extended-term time horizons due to monopoly positions. Importance of the monopoly positions partially dependent on the nature of the markets for the end product (competitive, noncompetitive).	Excessive number of small producers, unstable structure, employment considerations historically very important, low level of research activity, and basic financial weakness in firms.	An agricultural situation. Structure may resemble monopoly position in the case of certain resources and certain product markets.
Economic Policy Objectives	a) To keep a balance dependent on relative profitability in the several sectors.	a) Same as Category #1	a) Same as Category #1
	b) To capture the rent from the resource.	b) To limit entry, to turn potential rent into realized net yield, and to rationalize the structure of the industry. To avoid excessive losses from dislocation of labor and capital by policies directed toward creating greater factor mobility, ultimately to capture a portion of the rent created by barriers to entry and to utilize it to strengthen the workability of the structure.	b) To sustain a workably competitive structure.

TABLE II: Catch of Sea Fish, by Groups of Species

Species Group*	Yearly Totals (millions of metric tons) 1958	1967	1968	Rates of Change % change 1958-68	% change 1967-68
Flounders, Halibuts, Soles, etc.	0.8	1.2	1.2	+ 46	− 4
Cods, Hakes, Haddocks, etc.	4.5	8.2	9.5	+111	+15
Redfishes, Basses, Congers, etc.	2.2	3.2	3.2	+ 42	+ 1
Jacks, Mullets, etc.	1.8	2.1	2.0	+ 11	− 5
Herrings, Sardines, Anchovies, etc.	7.3	19.6	20.5	+182	+ 4
Tunas, Bonitos, Skipjacks	1.0	1.4	1.4	+ 41	+ 3
Mackerels, Billfishes, Cutlassfishes	1.0	2.7	3.1	+209	+15
Sharks, Rays, Chimaeras	0.3	0.4	0.5	+ 35	+ 7
Unsorted and Unclassified	5.2	8.2	8.5	+ 64	+ 4
Crustaceans	0.9	1.4	1.4	+ 63	+ 3
Mollusks	2.1	3.1	3.4	+ 63	+ 8
Total Catch of Sea Fish**	27.0	51.4	54.5	+102	+ 6

*Excluding freshwater and diadromous fishes; sea cucumbers, sea urchins, and ascidians; whales; seals and miscellaneous aquatic mammals; and aquatic plants.

**Column may not add to total due to rounding.

Source: Food and Agricultural Organization of the United Nations *Yearbook of Fishery Statistics* (Vol. 26), Catches and Landings, 1968.

TABLE III: Total Catch of Aquatic Animals and Plants, by Country, for Countries with Catches in Excess of One Million Metric Tons in 1968

Country	Yearly Totals (millions of metric tons) 1958	1967	1968	Rates of Change % change 1958-68	% change 1967-68
1. Peru	1.0	10.1	10.5	+995	+ 4
2. Japan	5.5	7.9	8.7	+ 57	+ 10
3. U.S.S.R.	2.6	5.8	6.1	+132	+ 5
4. Mainland China (1958 & 1963 only)	4.1	5.8	—	—	—
5. Norway	1.4	3.3	2.8	+ 94	− 14
6. United States	2.7	2.4	2.4	− 10	+ 0.4
7. South and Southwest Africa	0.7	1.6	2.1	+223	+ 29
8. India	1.1	1.4	1.5	+ 43	+ 9
9. Spain	0.8	1.4	1.5	+ 78	+ 5
10. Canada	1.0	1.3	1.5	+ 48	+ 14
11. Denmark	0.6	1.1	1.5	+145	+ 37
12. Chile	0.2	1.1	1.4	+509	+ 31
13. Indonesia	0.7	1.2	1.2	+ 70	− 0.3
14. Thailand	0.2	0.8	1.1	+456	+ 29
15. United Kingdom	1.0	1.0	1.0	+ 4	+ 1
16. Philippines	0.4	0.8	0.9	+111	+ 23
17. South Korea	0.4	0.7	0.8	+108	+ 12
18. France	0.6	0.8	0.8	+ 30	− 3
19. Germany	0.7	0.7	0.7	− 6	+ 3
20. Iceland	0.6	0.9	0.6	+ 4	− 33
Total Catch*	22.3	44.3	47.2	+112	+ 6

*Column may not add to total due to rounding. Excludes Mainland China.

Source: Food and Agricultural Organizations of the United Nations, *Yearbook of Fishery Statistics* (Vol. 26), Catches and Landings, 1968.

TABLE IV: Percentage of Total Catch of Sea Fish, by Groups of Species

Species Group*	1958	1967	1968
Flounders, halibuts, soles, etc.	2.9 (%)	2.3 (%)	2.1 (%)
Cods, hakes, haddocks, etc.	16.6	16.0	17.4
Redfishes, basses, congers, etc.	8.3	6.1	5.9
Jacks, mullets, etc.	6.5	4.0	3.6
Herrings, sardines, anchovies, etc.	26.9	38.2	37.6
Tunas, bonitos, skipjacks	3.7	2.6	2.7
Mackerels, billfishes, cutlassfishes, etc.	3.7	5.2	5.6
Sharks, rays, chimaeras	1.3	0.8	0.8
Unsorted and unclassified	19.3	15.9	15.7
Crustaceans	3.2	2.6	2.6
Mollusks	7.7	6.1	6.2
Total**	100.0	100.0	100.0

*Excluding freshwater and diadromous fishes; sea cucumbers, sea urchins, and ascidians; whales; seals and miscellaneous aquatic mammals; and aquatic plants.

**Column may not add to total due to rounding.

Source: Computed from data obtained from Food and Agricultural Organization of the United Nations, *Yearbook of Fishery Statistics* (Vol. 26), Catches and Landings, 1968.

TABLE V: Percentage of Total Catch of Aquatic Animals and Plants, by Country, for Countries with Catches in Excess of One Million Metric Tons in 1968*

Country	1958	1967	1968
1. Peru	4.3 (%)	22.9 (%)	22.3 (%)
2. Japan	24.7	17.7	18.4
3. U.S.S.R.	—	—	—
4. Mainland China	11.8	13.0	12.9
5. Norway	6.5	7.4	5.9
6. United States	12.1	5.5	5.2
7. South and Southwest Africa	2.9	3.7	4.5
8. India	4.8	3.2	3.2
9. Spain	3.8	3.2	3.2
10. Canada	4.5	2.9	3.2
11. Denmark	2.7	2.4	3.1
12. Chile	1.0	2.4	2.9
13. Indonesia	3.1	2.7	2.5
14. Thailand	0.9	1.9	2.3
15. United Kingdom	4.5	2.3	2.2
16. Philippines	2.0	1.7	2.0
17. South Korea	1.8	1.7	1.8
18. France	2.7	1.9	1.7
19. Germany	3.3	1.5	1.4
20. Iceland	2.6	2.0	1.3
Total**	100.0	100.0	100.0

*Excluding Mainland China. Total catch for these countries constituted the following percentages of the total catch reported for all countries in the respective years: 1958-67.1%; 1967-73.0%; 1968-73.7%.

**Column may not add to total due to rounding.

Source: Computed from data obtained from Food and Agricultural Organization of the United Nations, *Yearbook of Fishery Statistics* (Vol. 26), Catches and Landings, 1968.

F. L. LAQUE

DEEP-OCEAN MINING: PROSPECTS AND ANTICIPATED SHORT-TERM BENEFITS

The expectation of considerable revenue from the exploitation of ocean mineral resources has generated a great deal of discussion during the past few years. Until now these discussions have concentrated heavily on how exploration and exploitation of the anticipated resources should be made subject to some form of international regulation and on how the revenues from such exploitation should be applied for the benefit of mankind. Underlying this discourse is the concept that deep-ocean mineral resources represent "a common heritage" and that, therefore, the wealth derived from their exploitation should be held in trust by the international community and applied for the common good. There are some, also, who feel that the anticipated riches from ocean exploitation should go toward redressing the imbalance between the developed and the developing nations of the world.

Those holding these views envision two prospects for the future. One suggested possibility is that a wild international scramble will take place among the highly developed nations to dominate the exploitation of undersea resources. International tensions would consequently be aggravated and the advanced nations would become even more prosperous in relation to the developing ones. The other suggestion is that an enlightened international social conscience will result in a general recognition that the substantial (often called tremendous) new resources in the ocean can provide mankind with a splendid opportunity. Imbued with a generous new spirit, men may seize the chance to organize exploitation so as to eliminate any possibility of increased international tension and may then distribute the derived wealth for the maximum benefit of mankind, with special concern for developing nations.

The purpose of this paper is to evaluate the prospects for exploiting deep-ocean metals and to examine the possibility of achieving the proposed international goals as a result of this exploitation. This study will deal only with metals — those that are sometimes called "hard minerals," as distinguished from such other minerals as petroleum, natural gas, sulfur, and phosphorites. Sand, gravel, diamonds, precious coral, and the like, will be excluded.

DEEP-OCEAN VS. COASTAL DEPOSITS

Since the ocean mineral resources of present concern are those that may become subject to some sort of international regime, the probable boundaries of this international regime will determine the nature and location of the resources involved. Presumably the Geneva Convention on the Continental Shelf of 1958 defined the limits of jurisdiction of coastal nations over the resources of the seabed. The limit established by a water depth of two hundred metres was made

much more imprecise by extending that limit to any depth capable of exploitation, subject to further limitation by a criterion of adjacency to the coastal state claiming jurisdiction. Experience has shown that each country is likely to have its own interpretation of the provisions of the Convention in extending its limits of jurisdiction beyond the two-hundred-metre depth line, and the technology for drilling oil wells has already advanced well beyond the two-hundred-metre isobath.

We may realistically assume that nations will continue to assert and defend claims to national jurisdiction over seabed resources beyond the two-hundred-metre depth limit. Indeed, both geology and the record of discussions leading up to the Convention of 1958 have been claimed to provide a substantial basis for interpreting "adjacency" as extending to the outer margin of the submerged continental land mass — to the area where this submerged land mass meets the different geological structure of the abyssal ocean bottom at the edge of the continental slope.[30, 31]

Any offshore mining operation undertaken beyond the present depth limits but covered by the adjacency criterion of the Geneva Convention would, therefore, be regulated under national jurisdiction. For all practical purposes, exploitation amenable to international control would thus take place in relatively deep water, at depths probably in excess of twenty-five hundred metres. The first task, therefore, must be to determine what minerals exist at this depth and which ones are possibly recoverable.

Mining operations resembling those on shore and involving the sinking of underground shafts for the excavation of mineralized veins or zones would be difficult and expensive even in the relatively shallow waters of the continental shelf. Although Carl F. Austin asserted in a recent paper the eventual technical feasibility of such operations,[32] they are quite unlikely to be attempted in the deep ocean in the foreseeable future. Furthermore, as Preston Cloud has pointed out, "Modern theory of sea-floor spreading implies that beneath a thin veneer of later sediments the ocean basins are generally floored with relatively young and sparsely mineralized basaltic rock,"[33] and Harold James has reached a similar conclusion. [34] It would be safe to say, therefore, that underground mining in deep international waters is such a remote possibility that it need not concern us at present.

Placer-like deposits of gold, silver, platinum, tin, and diamonds eroded from onshore mineral deposits and carried into the ocean by streams cannot be expected to extend beyond the limits of national jurisdiction, which will encompass the lowest sea level in geologic times when a large fraction of the earth's water was tied up in ice on land.[31] Many areas near shore now covered by water were then exposed, and river beds, possibly containing placer deposits of metals, were then on land. The same is true of mineral-rich beach sands containing valuable concentrations of titanium, zirconium, and iron.

With regard to elements dissolved in seawater, commercial exploitation has been limited to magnesium, bromine, and common salt. Since these are readily available from coastal waters, they are of little interest in terms of the exploitation of deep-sea minerals. The concentration of other metals dissolved in seawater is so low that there is practically no chance of their profitable exploitation; tremendous volumes of water would have to be processed to recover any significant amount. For example, the treatment of five hundred million gallons would yield only about ten pounds of nickel, and concentrations of other metals of interest are of the same order of magnitude.[35]

Metal-enriched muds associated with hydrothermal activities, like those that have been explored in the Red Sea,[36, 37] cannot be expected to be extensive enough, sufficiently rich, or widespread enough to warrant our considering them of immediate significance in the total exploitation of metals from the deep ocean. The same applies to consolidated-vein or lode deposits that might occur at relatively shallow depths on ocean ridges.[31, 34]

Since the effect on deep-sea exploitation in the near future of some of the metals and operations mentioned above is as yet uncertain, this paper will be confined to a discussion of the primary hard mineral resources in the deep oceans. These are manganese and the associated metals found in nodules lying on the ocean floor. As V. E. McKelvey, J. I. Tracy, G. E. Stoertz, and J. G. Vedder have pointed out, "The manganese nodules, in fact, are the only likely potential resource over much of the large ocean basins. . . ."[31]

The existence of manganese nodules on the deep-ocean floor has been known since the famous Challenger Expedition of 1873-1876.[38] Since then numerous other explorations have provided evidence of a wide distribution of manganese nodules of varying composition and potential value. V. E. McKelvey and F. Wang of the U.S. Geological Survey[37] have recently published maps showing locations from which nodules have been recovered in exploratory surveys. So far, only a very small fraction of the total ocean-

bottom area has been surveyed, but explorations to date have shown that nodules of attractive metal content are most likely to be found at depths in excess of twelve thousand feet (thirty-six hundred metres).

Despite the limited extent of current exploration, considerable evidence[37] indicates the presence of manganese nodules over broad ocean areas. This conclusion would be borne out by the general uniformity of ocean-water sources of the nodule constituents above large areas of the ocean bottoms.

As yet, exploration has been insufficient to establish firmly the existence of specific areas covered with nodules of exceptionally high, valuable metal content or to delineate the boundaries of any such areas. Such "hot spots," if found, would constitute unusually desirable concentrations for exploitation and would spark a demand for exclusive concessions in contrast to a generally recognized right of anyone to exploit the nodules of common value distributed over broad areas of the ocean floor, all equally attractive.

Should "hot spots" be discovered, especially if they prove to be relatively rare, international mechanisms would be needed for granting and policing concessions. Beyond the rarity and richness of possible concentrations, other factors would tend to make some locations more attractive than others. Desire for tenure of defined areas would be influenced by such features as: their proximity to potential markets for the metals recovered; their nearness to land bases for refining plants, as a consideration of costs; meteorological and sea conditions; the depth of water in which recovery operations would have to be undertaken; the topography and the soil mechanics of the bottom; and the political stability, overall business climate, and other conditions in adjacent coastal nations where supplementary land-based operations would take place.

The commercial value of nodules will amount to the difference between the market value of the extractable metals and the cost of finding and recovering the nodules, transporting them to refining plants, extracting the metals in marketable forms, and marketing them.

The total income from all nodule-exploitation operations and the total area of the ocean bottom involved will be determined primarily by the composition of the nodules and their concentration in terms of pounds per square foot of ocean bottom. Concentrations as high as seven pounds per square foot have been estimated from photographs. A more reasonable and more conservative estimate for purposes of discussion would be two pounds per square foot, equivalent to 27,878 tons per square mile.

The composition of nodules can be expected to vary through wide limits. The principal constituents will be manganese and iron and the most valuable nickel, copper, and cobalt, always in much smaller concentrations. On the basis of the limited number of samples available for analysis, we could define a representative composition of Pacific Ocean nodules of possible commercial interest:

Manganese:	25	per cent
Nickel:	1	per cent
Copper:	.75	per cent
Cobalt:	.25	per cent

A typical Atlantic Ocean nodule contains these elements in a different ratio:

Manganese:	16	per cent
Nickel:	.42	per cent
Copper:	.20	per cent
Cobalt:	.31	per cent

Because of the inadequate number of available analyses, calculations showing the average metal content of nodules would have limited significance. Furthermore, the iron content of nodules is too low — generally under twenty per cent — for it to be assigned any value in an appraisal of the potential market value of the metals in nodules.

Although the metal content of nodules varies over different areas of the ocean bottom and predictions can be made only in broad, general terms, sampling to date indicates that the greatest concentration of valuable metals is in the Pacific Ocean rather than in the Atlantic and that the most extensive nodule-recovery operations will therefore probably take place there. Unfortunately, nodules of potentially attractive commercial value seem most likely to be found at very great depths of water, from about twelve thousand to eighteen thousand feet (thirty-six hundred to fifty-four hundred metres).

The content of associated metals in some nodules will be high enough to make the manganese unsuitable for its major fields of application unless the associated metals are removed. At the same time, the amount of these metals may be so small and their value so much less than the cost of refining the manganese for their removal that the nodules will be economically unattractive.

As Table I indicates, there is a disparity between

the ratio of metals in nodules and the ratio of world demand for them. We can appreciate the dramatic implications of this disparity by noting that if the world's current need for copper were to be supplied completely from the exploitation of nodules, there would be made available at the same time nearly twenty-five times as much manganese, fifteen times as much nickel, and a hundred and thirteen times as much cobalt as the market could absorb. Probably the most important conclusion to be drawn from Table I is that expected revenue from the exploitation of nodules cannot be calculated simply by adding up the value of the individual metals per ton of nodules. The assumption that there will be a market at current prices for all the metals in the nodules is unwarranted.

Some discussions on the effect of recovering metals from nodules have concentrated on the impact that metals thus derived might have in lowering market prices. Such calculations and predictions have failed to take into account the more important question stemming from the data in Table I — the extent to which the metals might be able to find a market at any price. In the light of present knowledge, there is no reason to expect that individual metals can be recovered from nodules at a cost less than that of mining land-based deposits. From this it follows that the exploitation of nodules will be economically attractive only if a market can be found for more than one of the metals present, and it seems unlikely that the recovery of manganese from nodules will be economically attractive.[31, 40]

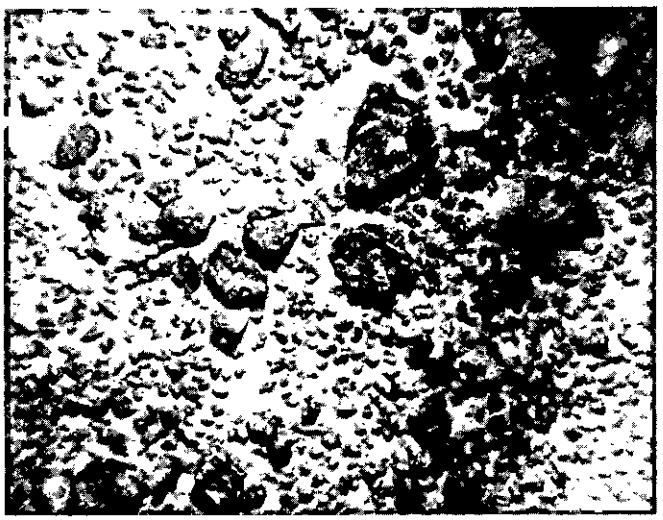
Depending on the process used, the form in which the manganese is made available, and the cost of shipping it to market, manganese nodules might have some value, but the price of manganese would probably drop as a result of adding nodules to existing sources of supply. On the other hand, the manganese might be discarded in the refining process as "rock." In that case, no realizable value would attach to the manganese content of nodules.

The economic attractiveness of manganese in nodules could be increased by a successful effort to develop large new uses for this metal. If the goal is to increase the total value of nodules, however, such new uses should not compete with those of the other metals associated with manganese in nodules. Efforts to develop a market for manganese that is independent of steel production have been unimpressive in the past, to say the least. If the exploitation of nodules for manganese is to be made commercially attractive, more research in this area is required.

The same considerations apply to cobalt. Although the effort to develop new uses for cobalt has already been considerable, more is needed to improve the future of nodule exploitation.

Table II shows the tonnage of nodules of the composition chosen as a model that would have to be harvested, the areas of ocean bottom that would have to be exploited on the basis of two pounds of nodules per square foot, and the fraction of the total ocean bottom that would have to be worked to produce metals from nodules to equal world production from land sources in 1967.

From the data in Table I, we could expect that a nodule-exploitation operation would encounter the least difficulty if it were aimed at satisfying a major share of the world demand for cobalt and that the early stages of nodule exploitation might well be geared therefore to the world's need for cobalt. Based



on the data in Table II, the maximum limit of exploitation would be about 6,500,000 tons of nodules per year. Exploitation at this level would yield approximately thirty-three million pounds of cobalt, four million tons of manganese ore, a hundred and thirty-two million pounds of nickel, and a hundred million pounds of copper.

It would not be realistic to assume that over twenty per cent of the world market for manganese could be displaced immediately to accommodate manganese from nodules, and it remains questionable that the treatment of nodules for recovery of manganese can be made economically attractive. We can reasonably assume, therefore, that the real metal value of nodules would lie in their nickel, copper, and cobalt content. An estimated gross revenue of about $285 million would result from meeting the 1967 world

production of cobalt. This gross would be reduced by the costs of recovery, refining, and so forth, and a net revenue before taxes of sixty million dollars would be an optimistic figure. An assumed international tax rate of fifty per cent would yield thirty million dollars for possible distribution to developing nations. Giving value to the manganese would increase the tax revenue only by about ten million dollars.

As Table II indicates, satisfying all the world's need for cobalt in 1967 would have required harvesting nodules from an area of ocean bottom measuring only 236 square miles, which would comprise only 1.7 ten-thousandths of one per cent of the total ocean area. Even if we went to the unlikely extreme of abandoning all land-based sources of the metals involved and supplied the world's needs for all these metals exclusively from ocean nodules, only about .02 per cent of the ocean bottom would require harvesting each year. In other words, one per cent of the ocean bottom could be expected to satisfy the world's needs for manganese, nickel, copper, and cobalt for about fifty years, in terms of the demand in 1967.

From the data already available and on the assumption that as much as 1.7 trillion tons of nodules distributed broadly over large areas of ocean bottom may be found in the Pacific alone,[38] it would therefore be reasonable to expect that a minute fraction of the ocean bottom will yield the total world need for the metals involved. If this is the case, an international regime would have to deal with only relatively small areas being exploited simultaneously. The few individual operations necessary to meet the demand need not and would not be likely to interfere with one another.

Several factors will influence the extent of nodule exploitation in the future. First and foremost will be the availability of land-based ores of equal or superior commercial attractiveness. Tables III, IV, V, and VI show the known reserves of manganese, copper, nickel, and cobalt respectively. The data in Tables III to VI also show the extent to which the various ores constitute important resources for developing countries. The number of years of supply represented by these reserves, taking the 1967 rates of production as the standard, are summarized in Table VII, but these estimates are sure to be extended by the discovery of new ore bodies on land and by the development of techniques for recovering and treating lower grade ores. It can be concluded from these tabulations and from the studies of V. E. McKelvey[36] that the exploitation of deep-sea nodules will not amount to a desperate attempt to compensate for the exhaustion of land-based sources of metal at any time in the near future.

If the cost of recovering metals from deep-sea nodules were found to be less than the cost of exploiting from land-based ores, there would naturally be a strong incentive to abandon land-based sources. There is no present evidence, however, that recovery of metals from nodules will be more profitable than land-based exploitation. P. E. Sorensen and W. J. Mead[40] concluded, on the contrary, that at the present time the exploitation of nodules for their metal content cannot be expected to be profitable even if credit is allowed for the manganese content. They based their conclusion on estimates of the capital cost of recovery equipment (dredges) and transportation, together with refining costs. While this conclusion might be unduly pessimistic, the commercial advantage of exploiting deep-sea nodules remains to be demonstrated.[39]

If and when the exploitation of metals from nodules becomes commercially attractive, a limitation on the scale of operations may need to be imposed by some international agency. Regulations may restrict the volume of production to conserve resources or to minimize interference with profitable markets for metals mined on land.

Restraint may also result from the unwillingness of land-based producers to abandon mines and processing facilities in which they have a large capital investment. We can expect some recalcitrance from these producers since they would be faced with the simultaneous necessity of raising new capital for the exploitation of ocean nodules. The capital requirements for handling the very large tonnages of nodules involved could easily approach fifty billion dollars for the total shown in Table II.

Restrictions may also result from national and international restraints on potential exploiters for the purpose of protecting national sources of tax revenue and preventing unemployment in land-based mining industries. Countries currently depending for their prosperity on the exploitation of land-based ores might be expected to exert pressure on international control agencies to restrain deep-sea exploitation.

In some instances the exploitation of metals from nodules may be encouraged or expedited for strategic reasons by nations wishing to end their dependence on remote sources under the control of possibly unfriendly nations or to eliminate the hazards of long-distance transport. Their inclination to do so will diminish, however, if the cost of metals recovered

from the sea is substantially higher than that of metals obtainable on land.

THE ANTICIPATED BENEFITS FROM DEEP-OCEAN MINING

In the light of the uncertain future of deep-ocean mineral exploitation and its yet-to-be-established commercial value, the prospects for using revenue from this source to help developing nations seem poor.

In terms of prosperity, the nations of the world range from affluence to poverty on a sliding scale. Because the variations are gradual, an agency charged with distributing tax revenue from deep-ocean mining, even if it were substantial, would have difficulty deciding which developing nations were entitled to a share and how the total should be allocated among them.

The gross national product of a country is a reasonable measure of its prosperity. For purposes of this discussion, it is assumed that developing countries, as candidates for revenues from deep-ocean mining, would be found in Latin America, South Asia, the Near East, the Far East (except Japan), Africa (except South Africa), and Oceania (except Australia and New Zealand). The total gross national product for these areas in 1967 amounted to 12.6 per cent of the world G.N.P., or $291,254,000,000. The worldwide distribution of gross national product in 1967 is shown in Table VIII.

Figures for the proportion of the world gross national product represented by the value in 1967 of manganese, copper, nickel, and cobalt, the valuable constituents of nodules, are given in Table IX.

It can be calculated that the value of world production of manganese, copper, nickel, and cobalt in 1967 represented only .28 per cent of the total gross national product. The distributable revenue from taxation, ten per cent of the total value, would be about .028 per cent of the world G.N.P. (see Tables VIII and IX). It may be noted that the total world production of these metals in 1967 had only about one-half the value of the world catch of fish in that year.

In addition, a substantial portion of the world's production of manganese, copper, and cobalt comes from developing countries (see Tables X, XI, and XII). While most of the world's nickel now comes from Canada (see Table XIII), New Caledonia stands second in nickel production, and new nickel projects are in various stages of exploration and development in New Caledonia, Guatemala, the Dominican Republic, Indonesia, the Philippines, and the Solomon Islands.

If, as would be the case, only the revenue from taxes on the profits deriving from the exploitation of deep-ocean metals is available for adjusting the relative prosperity of developed and developing nations, this amount would be about ten per cent of the total market value of the metals and would represent only a little more than .025 per cent of the world gross national product and only about .2 per cent of the G.N.P. in 1967 of the developing nations. On a per-capita basis, this would come to forty-one cents a head if it were divided equally among the 1,594.9 million people in the developing countries.

It should be evident, therefore, that even in the unlikely event that the deep-ocean bottom replaced all land sources of manganese, copper, nickel, and cobalt, the assignable revenue from the exploitation of these deep-ocean metals could have little impact on efforts to close the current gap between developed and developing nations. Furthermore, substituting ocean for land sources of these metals would tend to detract from, rather than to advance, the prosperity of those developing nations with large deposits of metal-bearing ores.

CONCLUSIONS

Most of the current activity in the recovery of metals from deep-ocean nodules can be characterized as an examination of the technical and economic feasibility of various conceptual approaches. Some of these may lead to preliminary or pilot-scale projects that will precede full-scale commercial operations. No such operations are taking place at present,[89] and the aim now is to provide a basis for future decisions whenever new sources of ore may be needed. Such an eventuality may occur when per-capita consumption of metals in developing countries approaches the present level in the advanced nations.

While the future of deep-ocean mining cannot be predicted with precision, it is safe to draw a few general conclusions:

(1) There will be no commercial-scale exploitation of deep-ocean nodules for several years — probably not before 1985.

(2) There is a need for an international program of ocean exploration that could be part of the International Decade of Ocean Exploration proposed in 1968 by the former American President Lyndon B. Johnson to confirm the extent, the distribution, and

the possible value of metals in deep-ocean nodules.
(3) Since exploitation operations in the foreseeable future will probably be few in number and conducted on a small scale, any international control agency or mechanism should place emphasis on providing a regulatory environment, either national or international, that will provide incentives for risky exploitation and will not place the operations under undue restraint. Unnecessary restrictions can result from efforts to deal with unknown situations and circumstances that may never be encountered.
(4) While appropriate international regulations will be needed in the future, details should not be worked out before the facts are in hand. International laws or regulations aimed at a codification of practice should logically await reasonably precise knowledge of the practice that is to be codified.
(5) Since we currently do not know how much revenue for "the benefit of mankind" can be expected from the exploitation of nodules and since the amount will probably be small for the foreseeable future, the prime international emphasis should be on encouraging exploration and preliminary exploitation rather than on the disposition of revenue. Whatever revenue does accrue from deep-ocean mining will probably have no significant effect on the absolute or relative prosperity of the recipients and may well have a greater effect on the distribution of prosperity among developing nations than on the comparative position of the developing and developed countries.
(6) Developing nations should not be encouraged to expect that the exploitation of deep-ocean metals will provide a major component of the funds they need for future development.

TABLE I: Primary metal to be recovered from nodules to extent of total world* production in 1967

Metal	1967 world production	Pounds per ton of nodules[1]	Percentage of 1967 world production of associated metals that would be made available simultaneously			
			Manganese	Copper	Nickel	Cobalt
Manganese	18,650,000 short tons ore	—	100(%)	4(%)	59(%)	453(%)
Copper	11,184,377,000 pounds	15	2,502	100	1,479	11,335
Nickel	1,007,943,000 pounds	20	169	8	100	766
Cobalt	32,890,000 pounds	5	22	.9	13	100

*Mainland China not included.

[1]Based on nodules containing 25 per cent manganese, 1 per cent nickel, .75 per cent copper, and .25 per cent cobalt.

TABLE II: Tons of nodules and bottom areas to be harvested each year to yield metals at the 1967 level of production from land sources

Metal	1967 world production	Pounds per ton of nodules[1]	Short tons of nodules required[2]	Area to be harvested sq. miles	Fraction of total deep ocean bottom area[4]
Manganese	18,650,000 short tons ore	—	29,800,000[3]	1,069	0.0008(%)
Copper	11,184,377,000 pounds	15	745,625,100	26,746	0.0192
Nickel	1,007,943,000 pounds	20	50,397,150	1,808	0.0013
Cobalt	32,890,000 pounds	5	6,578,000	236	0.00017

[1]Based on nodules containing 25 per cent manganese, 1 per cent nickel, .75 per cent copper, and .25 per cent cobalt.

[2]Based on nodule density of 2 lbs. per sq. ft. of ocean bottom or 27,878 tons per sq. mile.

[3]Increase due to lower manganese content of nodules (25 per cent) as compared with 40 per cent in land-based ores.

[4]Estimated to be 139.5 million sq. mi. (361 x 10^6 sq. km.).

TABLE III

Principal World Ore Reserves of Manganese 1967*

Country	Manganese content of ore reserves thousands of short tons
Australia	44,000
Brazil	46,000
Mainland China	20,000
Gabon	96,000
India	22,500
South Africa	300,000
U.S.S.R.	200,000
Ghana	not available
Total	728,500

Equivalent tons of ore of assumed 40 per-cent grade — 1,821,250,000 tons at 1967 rate of production from land sources (Table 2). This would indicate a supply good for ninety-eight years without any additions to reserves from new discoveries or otherwise.

*Source — U.S. Bureau of Mines Commodity Statements.

TABLE IV

Principal World Ore Reserves of Copper 1967*

Country	Copper content of ore reserves millions of short tons
Canada	9.9
Chile	59.3
Congo	20.0
Peru	24.6
United States	85.5
U.S.S.R.	38.5
Zambia	30.0
Others	40.0
Total	307.8

At 1967 rate of production from land sources (Table 2) this would indicate a supply good for fifty-five years without any additions to reserves from new discoveries or otherwise.

*Source — U.S. Bureau of Mines Commodity Statements.

TABLE V

Principal World Ore Reserves of Nickel 1967*

Country	Nickel content of ore reserves millions of pounds
Australia	2,000
Canada	20,000
Cuba	36,000
Dominican Republic	1,600
Guatemala	2,000
Indonesia	16,000
New Caledonia	33,000
Philippines	9,000
Puerto Rico	1,600
U.S.S.R.	20,000
United States	425
Others	7,000
Total	148,625

At 1967 rate of production from land sources (Table 2) this would indicate a supply good for 148 years without any additions to reserves from new discoveries or otherwise.

*Source — U.S. Bureau of Mines Commodity Statements.

TABLE VI

Principal World Ore Reserves of Cobalt 1967*

County	Cobalt content of ore reserves millions of pounds
Canada	386
Congo	1,500
Cuba	744
New Caledonia	880
U.S.S.R.	450 (estimate)
United States	56
Zambia	766
Morocco	28
Total	4,810

At 1967 rate of production from land sources (Table 2) this would indicate a supply good for 146 years without any additions to reserves from new discoveries or otherwise.

*Source — U.S. Bureau of Mines Commodity Statements.

TABLE VII

Apparent years supply of metals in known land ore reserves at 1967 rate of production*

Metal	Indicated years supply**
Manganese	98
Copper	55
Nickel	148
Cobalt	146

*From Tables 3, 4, 5, and 6.

**Assuming no additions to reserves from new discoveries or otherwise.

TABLE VIII

Worldwide Gross National Product—1967*

Gross National Product in U.S. Dollars

Area	Millions	Dollars per Capita
Western Hemisphere (except Latin America)	850,930	3,824
Western Europe	581,778	1,636
U.S.S.R. Sphere	419,711	1,377
Japan	115,660	1,158
Latin America	105,783	426
South Asia	61,389	91
Near East	45,940	345
Far East (except Japan)	43,012	147
Africa (except South Africa)	34,240	132
Australia & New Zealand	32,304	2,213
South Africa	13,080	617
Oceania (except Australia and New Zealand)	910	250
Total	2,304,737	

*Source — Statistics and Reports, Division U.S. Agency for International Development and for U.S.S.R. Sphere Monthly Bulletin of Statistics, United Nations.

TABLE IX

Value of World Production of Nodule Metals in 1967

Metal	Total Production	Market Price	Value
Manganese	18,650,000 short tons[1] ore	$25.68 per ton[2] ore	$ 478,932,000
Copper	11,184,377,000 pounds[3]	.45 per pound[4]	5,032,970,000
Nickel	1,007,943,000 pounds[3]	.90 per pound[5]	907,149,000
Cobalt	32,890,000 pounds[1]	$ 1.85 per pound[1]	60,846,000
Total Value			$6,479,897,000

[1]U.S. Bureau of Mines.

[2]Based on 40 per cent Mn content ore @ 72¢ per unit or $25.68 per ton.

[3]*Metallgesellschaft* Statistics.

[4]Estimated composite price.

[5]Average price per year.

TABLE X

World Mine Production of Manganese Ore from Developing Countries* in 1967

Country	Production Short tons	$ Value	Total per Capita	Per Cent of World Mine Production**
Mexico	122,000	3,133,000	$ .07	0.6
Brazil	1,248,000	32,049,000	.37	6.7
India	1,762,594	45,263,000	.09	9.4
Ghana	580,000	14,894,000	1.84	3.1
Morocco	315,413	8,100,000	.57	1.7
Congo Republic	307,813	7,905,000	.45	1.6
Gabon	not available	—	—	
	4,335,820	111,344,000		23.1
U.S.S.R.	7,940,000	203,899,000		42.6

*From *American Metal Market* Metal Statistics.

**Total 18,650,000 short tons.

TABLE XI

World Mine Production of Copper from Developing Countries* in 1967

Country	Production Metric Tons	$ Value	Total per Capita	Per Cent of World Mine Production**
Bolivia	6,300	6,250,000	$ 1.45	0.1
Chile	660,200	654,965,000	72.77	13.0
Congo	321,500	318,950,000	18.12	6.3
Cyprus	21,500	21,330,000	35.55	0.4
Finland	28,800	28,572,000	6.08	0.6
India	9,200	9,127,000	.02	0.2
Mexico	56,000	55,556,000	1.22	1.1
Peru	192,000	190,477,000	15.36	3.8
Philippines	86,200	85,516,000	2.46	1.7
Rhodesia	18,000	17,857,000	3.97	0.4
Southwest Africa	33,800	33,532,000		0.7
Uganda	15,000	14,881,000	1.88	0.3
Zambia	663,000	657,742,000	168.65	13.1
	2,111,500	2,094,755,000		41.7

*From *Metallgesellschaft* Statistics.

**5,073,200 metric tons.

TABLE XII

World Mine Production of Cobalt from Developing Countries* in 1967

Country	Production Pounds	$ Value	Total per Capita	Per Cent of World Mine Production**
Congo	21,424,000	39,634,000	$2.25	65.1
Morocco	4,254,000	7,870,000	.56	12.9
Zambia	3,608,000	6,675,000	1.71	11.0
	29,286,000	54,179,000		89.0

*From *American Bureau of Metal Statistics Year Book.*

**32,890,000 pounds.

TABLE XIII

World Mine Production of Nickel from Developing Countries* in 1967

Country	Production Metric Tons	$ Value	Total per Capita	Per Cent of World Mine Production**
Finland	3,400	6,746,000	$ 1.44	0.7
Greece	2,500	4,960,000	.57	0.6
Africa (other than Republic of South Africa)	1,200	2,381,000		.3
Cuba	23,600	46,826,000	6.89	5.2
New Caledonia	72,000	142,858,000	2,197.82	15.8
	102,700	203,771,000		22.6
Canada	224,000	444,447,000		49.0

*From *Metallgesellschaft* Statistics.

**457,200 metric tons.

ENRICO BONOMI

ENTE NAZIONALE IDROCARBURI: A STATE-OWNED HOLDING COMPANY

ENTE NAZIONALE IDROCARBURI — National Hydrocarbons Agency — is an Italian oil corporation created in 1953 by an act of Parliament to carry out activities of national interest in the petroleum industry. In 1967 the company's Charter of Incorporation was amended to include the chemical and nuclear industries.

Today ENI operates through some hundred and sixty subsidiaries and associated companies formally incorporated in eighty-nine countries. These companies are grouped under nine main subsidiary corporations of ENI. AGIP is head of the group of companies interested in petroleum exploration and production and petroleum-product marketing. ANIC heads the ENI group interests in petroleum refining and petrochemicals. SNAM's field covers hydrocarbons transportation and distribution and the sale of natural gas. AGIP NUCLEARE coördinates activities in the nuclear sector. The other five main companies are affiliates of the four significant subsidiaries mentioned. NUOVO PIGNONE is head of the mechanical industry division, which manufactures electronic and other industrial control equipment; SNAM PROGETTI is an engineering and construction firm (petroleum, petrochemical, and nuclear plants) and operates research and development laboratories; SAIPEM drills oil and gas wells and constructs plants and pipelines; LANEROSSI is the head company for textiles, and SOFID takes care of financing ENI group activities.

The ENI group has become one of the world's largest centrally controlled, fully integrated oil companies, showing an increase in gross sales from $304 million in 1954 to $2,240 million in 1969. During the same period, employment by the group rose from about 15,800 to nearly 63,000 persons.

ENI's primary function is to provide low-cost fuel energy for Italy. Italy must import eighty per cent of its oil; like Japan, it is a country practically without energy resources. From the beginning ENI has contributed decisively to Italian economic growth in two major ways: first, by providing Italian industry with an increasing amount of natural gas and petroleum products at moderate prices; second, by making substantial industrial investments in the less developed areas of Italy and thus creating, in effect, true nuclei of industrialization, such as Gela in Sicily and Pisticci in Lucania. Furthermore, ENI has given important impetus to the large, modern Italian petro-

chemical industry through its acquisition of a block of Montecatini-Edison stock and thus has contributed substantially to this industry's ability to develop.

ENI has stimulated healthy competition in many domestic fields and thus has made a strong indirect contribution to the Italian economy. For example, reduced fertilizer costs have aided the farmer, and similar reductions in fuel costs have resulted in remarkable savings for Italian motorists.

Direct contributions, on the other hand, have been and continue to be made by ENI's investments in industrial plants, mainly in southern Italy. Among various plans designed to help economic growth in the southern regions of Italy is a recently approved project for constructing a large seawater desalination plant in Sicily. This project is being undertaken in coöperation with companies outside the ENI group. Another example of ENI's contribution is its direct investment in the Mezzogiorno area of southern Italy; ENI has provided a total of more than a million dollars to date.

ENI management has always realized that the problems of national economic development must also be considered from the broad viewpoint of the international economy. The economies of individual countries depend on a number of complex factors of increasing dimension, and the development of each country is related to the development of others. ENI's role in the international oil market initially was greatly influenced by the philosophy of its early director, Enrico Mattei. Recognizing the desire of underdeveloped countries emerging from colonial status to participate in profits from their own natural resources, Mattei saw the opportunity to establish a relationship with oil-producing nations that would satisfy their needs and still prove favorable for Italy. ENI's corporate strategy was to view the problems of Italian economic development in terms of a world economy conditioned by the increasingly important part being played by the Afro-Asian countries. Mattei conceived a formula that resulted in the oil-producing countries sharing the risks and profits of the extraction process in addition to receiving royalties, thus breaking away from the traditional fifty-fifty profit split between oil companies and the governments of oil-producing nations. By providing attractive profit-sharing deals with the governments of host countries, Mattei sought to obtain foreign crude oil for Italy. At the same time, he made arrangements with the Soviet Union to purchase crude oil at a relatively low price, and he established ENI affiliates as oil distributors in oil-importing countries.

In pursuit of its own needs and its statutory purposes in the petroleum and nuclear-energy industries, ENI has expanded its multinational activities to more than fifty countries in Africa and Asia. This multinational expansion has been based upon a strategy that recognized the legitimate aspirations of the countries in which ENI wanted to set up operations. ENI's policy has been to help the host country accelerate its own economic development. As a consequence, ENI has collaborated with host countries by associating the country itself in the selected ENI enterprise, whether the enterprise was engaged in exploration and production, product distribution, or refining of petroleum. In other words, the host country has been made a principal in the development of an activity taking place in its territory.

ENI gives priority to the search for sources of gas and oil; all the integrated structure of the group is tied to this primary aim. At the time that ENI was formed, large reserves of natural gas had been discovered in the Po Valley. ENI was successful in exploiting the Po Valley resources, and ENI's exploration and production efforts were later extended to the central-southern sections of continental Italy and to the island of Sicily. A new mining law in 1967 gave ENI an option on twenty-five per cent of the continental shelf within the limit of the two-hundred-metre isobath, and the search for oil and gas has been extended to all the Italian continental shelf.

Prior to 1969 the ENI group had discovered gas reserves in Italy totalling 9.2 million cubic feet, and further discoveries of natural gas, both onshore and offshore, were announced by AGIP in 1969. Meanwhile, the search in Italy continues. Abroad, exploration has been extended over larger and larger areas and now encompasses Saudi Arabia, Abu Dhabi, Qatar, Egypt, Tunisia, Libya, Iran, the Congo (Brazzaville), Nigeria, Thailand, Indonesia, Madagascar, Tanzania, Argentina, Colombia, and the British, Norwegian, and Dutch North Sea areas. Altogether, by the middle of 1969 the areas of the world covered by exploration and production permits and concessions in which the ENI group of companies had interests, either solely or in partnership with others, totaled over 270 million acres. The average net share of ENI interest in this acreage was about forty per cent.

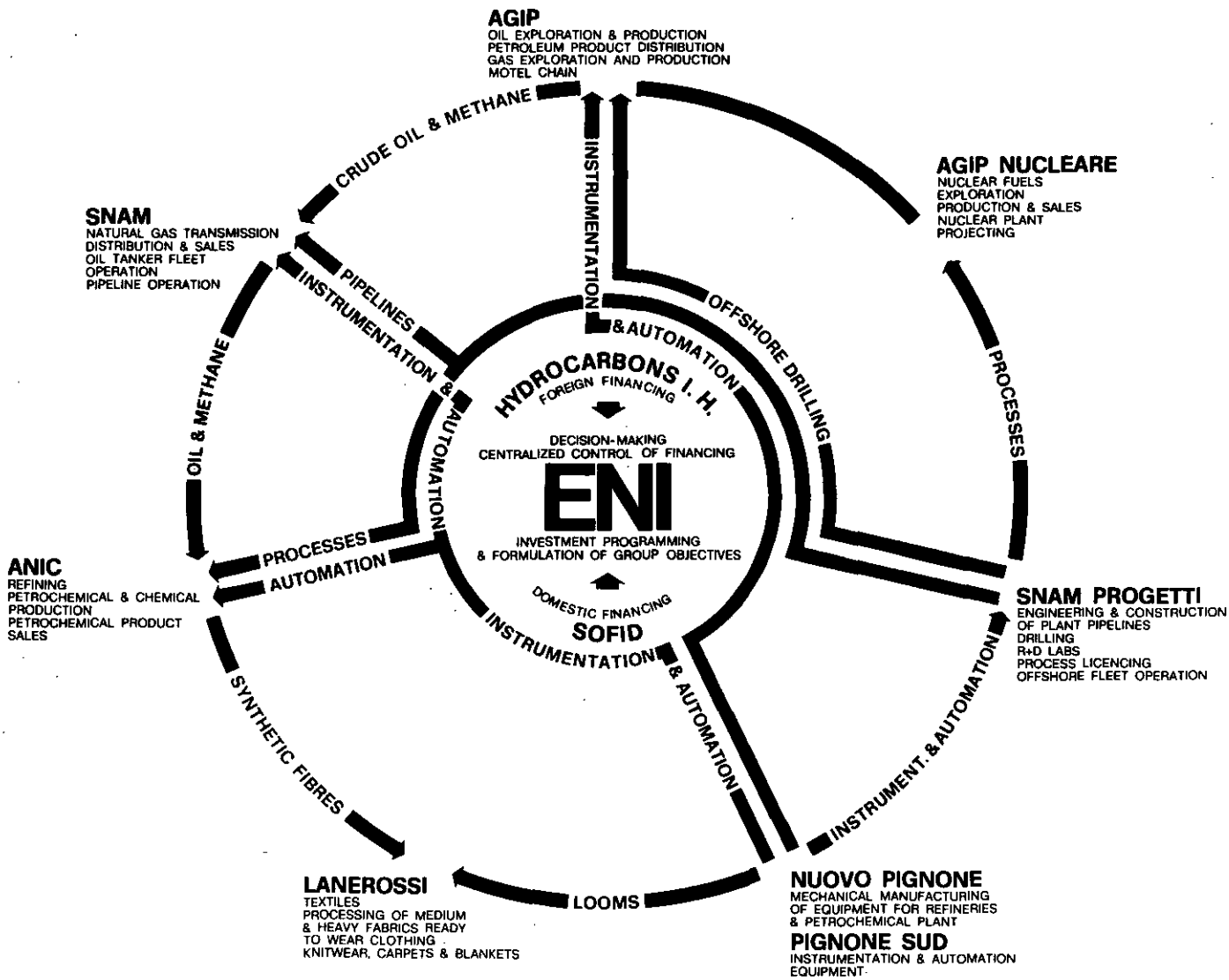
In addition to exploration, ENI has long been producing oil not only in Italy but also in Egypt, Tunisia, Iran, and recently in Qatar, and it is producing gas in the British North Sea. The group also has discoveries of commercial value in Nigeria. In Iran, the Rostam field has now gone into production and the

Nowrouz and Hendijan fields are being prepared for production, while a new discovery, Rakhsh, was announced in mid-1969 by an AGIP associate. When the four Iranian fields are all in production in 1970-71, it is contemplated that total production by AGIP interests in that country will be around 100,000 to 120,000 barrels a day.

Despite conditions making the productive fields on the Sinai Peninsula and in Nigeria temporarily unavailable to the group, ENI's world production of oil at the end of 1969 topped six and a half million tons and is steadily rising. During the next year ENI is expected to be able to satisfy its oil requirements from its own wells.

Among the many problems that SNAM and its affiliates had to overcome in the early days was that of transportation, first of natural gas and then of oil. At the beginning of 1970 the natural-gas transmission network of SNAM in Italy extended over the country for a total length of about forty-seven hundred miles. This rapidly growing network, covering both the north and the south, as well as a good portion of Sicily, and now linked together in one integrated system, was and is a necessity for making available

INTERCONNECTIONS IN ENI GROUP INTEGRATION



this convenient source of energy to industry and to other users. A liquid natural-gas reception terminal is being planned for Sicily to supply local consumers with natural gas imported from Libya.

Although ENI now has reserves of gas judged sufficient for sixteen years of consumption at the present rate, the group will begin importing this fuel in liquid form from Libya and in gaseous form from Russia in 1972-73. Thus ENI will be in a position to supply economically the future needs of the country for natural gas.

The transportation of crude oil and liquid products is another task entrusted to SNAM, which heads not only the group of companies distributing natural gas but also those that operate various oil pipelines. The ENI group constructed one of the important international pipelines, the 621-mile Central European pipeline that carries oil from Genoa to Ingolstadt in Germany and to Aigle in Switzerland, giving Middle East oil a short, direct route to the central part of Western Europe. The ENI group also has a ten per cent participation in the Trans-Alpine pipeline and a four per cent participation in the Adriatic-Vienna pipeline. SNAM operates the ENI fleet of ocean tankers whose total capacity has risen in recent years from a hundred thousand tons to five hundred thousand tons. In addition, SNAM now has on order two 253,000-ton supertankers.

ENI has interests in eleven large refineries, five of which are in Italy and six abroad. The group's foreign refineries have been built with the intention that they will be able to supply products directly and autonomously to the various foreign distribution networks of ENI. In other words, they are a part of group integration, typical of oil-company operations. Abroad ENI does not dictate where the oil must come from, and foreign refineries are free to obtain supplies from any source able to supply their needs.

In Italy, AGIP has for many years been the foremost distributor of refinery products and at the present time has a network of about six thousand retail-sales outlets, of which more than thirteen hundred are complete service stations. Because of the broad line of high-quality products that AGIP offers the motorist through this network, AGIP has consistently held the major share of the Italian petroleum market. The company also operates a number of agricultural centers for supplying products to and servicing farm vehicles and equipment.

Through affiliates, AGIP distributes petroleum products in Austria, Switzerland, Germany, Spain, and France in Western Europe and in some twenty countries in Africa. Distribution of AGIP products has also been started in Hungary and Czechoslovakia.

Following the directive from Parliament in 1967 giving to ENI the statutory purpose of exploration, production, regeneration, and sale of nuclear fuels, the group has obtained a number of uranium exploration permits in Kenya, Somalia, the United States, Guyana, and Canada. In addition to these efforts, ENI has taken a significant holding in the SOMAIR company of Arlette, Niger, which will begin production in 1970 from a proven uranium deposit capable of an output of fifteen hundred tons a year of U_3O_8.

AGIP NUCLEARE, which coördinates ENI activities in the nuclear field, has a plant at Rotondella in southern Italy for producing reactor fuel elements for the National Electricity Authority nuclear-power plant at Latina near Rome — a plant originally built by ENI. In addition to fuel elements of this type, ENI is studying the feasibility of fabricating other types of elements in order to be in a position to supply fuel for all kinds of reactors now being studied or planned for Italy.

In collaboration with another company outside the ENI group, ENI is presently working on plans to build a plant for the reprocessing of irradiated reactor-fuel elements that will be large enough to take care of all Italian reprocessing needs. In addition to these various projects, SNAM PROGETTI, together with an English group, has made a bid to build a new 650-megawatt advanced, gas-cooled nuclear-power reactor for the National Electricity Authority. CNEN, the Italian Committee for Nuclear Energy, has awarded SNAM PROGETTI a contract to design and construct a 140-megawatt PEC experimental, fast-breeder reactor.

ENI's position as a large producer of natural gas and a refiner of great quantities of oil made the petrochemical industry a natural field into which integrated group operations could be expanded. The group's first large-scale operation of this nature was the chemical complex at Ravenna, followed by large plants at Gela and Pisticci. A new petrochemical works is now being built at a location near Foggia; it will utilize natural gas from ENI fields in that part of the country. In coöperation with SNIA VISCOSA, ENI is now planning to build a plant in the same location to produce caprolactam. Engineering work is now underway for a 300,000-ton-per-year aromatics plant to be built in Sardinia. In the Tirso Valley, also in Sardinia, a fully integrated ENI petrochemical-manufacturing plant is being built to produce synthetic fibers and to manufacture textiles. The princi-

pal chemical products produced by ENI group plants are fertilizers, synthetic rubbers, plastics, synthetic resins, synthetic textiles, bitumens, and cement.

Although SNAM PROGETTI and SAIPEM are responsible for design, engineering, and construction, SAIPEM also does well-drilling on contract and owns a large, modern offshore operations fleet, which includes floating platforms and pipe-laying and crane barges. SNAM PROGETTI, in addition to its engineering and construction capabilities, owns and operates the group's largest research and development laboratory, which not only performs routine and special scientific work for group companies but develops and patents petrochemical and other processes that SNAM PROGETTI licenses either to group companies or to outsiders.

Textiles became part of ENI's vertically integrated operations some years ago when LANEROSSI was taken over. Since then, LANEROSSI production has been steadily increasing. LANEROSSI uses synthetic fibers of various types manufactured in ANIC petrochemical plants, which in turn are produced from gas discovered by AGIP and delivered by SNAM or from petrochemical stocks coming from ANIC refineries. Recently ENI has also purchased the plants and equipment of the Maratea woolen mills and created a new company, MARLANE, as a subsidiary of LANEROSSI.

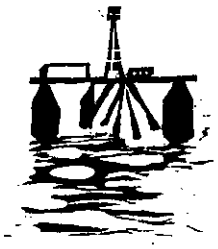
In budgeting for the five-year period from 1969 to 1973, ENI has earmarked approximately half of its outlay for investment abroad. These funds will be used almost entirely for developments in hydrocarbons and nuclear fuels, an allocation reflecting ENI's primary concern with procuring diversified, low-cost, and secure sources of fuel energy for Italy. Also reflected in this foreign-investment policy is a continuation of ENI's management concept that future world enterprise is inevitably tending toward a global economy where the multinational company must coöperate with developing nations in expanding all world markets. The objective of ENI's multinational strategy will therefore bring more and more benefits to host countries while it also brings increasing benefits to Italy.

The fulfillment of ENI's fundamental purpose would not conflict with the underlying objectives of an ocean regime. From ENI's point of view, however, the first task for an international ocean regime should be to define the limits of national jurisdiction. As long as there is confusion over the question of national jurisdiction, no clear idea can emerge of the scope of an international ocean regime or of the role of enterprises within it. If the functions of this international authority were to be limited to the control of franchises for exploitation or were it merely to act as a central registry for claims, it could not begin to resolve our current problems.

The United Nations has so far been unable to solve the jurisdictional problem, although its recent resolutions do offer hope of a new international convention on the continental shelf. Either the United Nations or an international conference on the law of the seas might find it advisable to distinguish between large oceans and marginal seas — inland seas, narrow seas, and closed seas. The Italian government, like nearly all other governments, is taking a position of wait-and-see. It would presumably have no objection to an international regime, per se, but it would vigorously oppose any encroachment on its legitimate interests in the continental shelf.

JAMES W. DAWSON

INSURANCE AS A REGULATOR



Marine insurance was born when an outraged Phoenician watched his goods being cast into the Mediterranean in order to save his storm-tossed ship, its crew, and its cargo. He was later gratified to receive contributions from all concerned in the venture and thus to find his losses equitably shared. From this early experience the term "average" arose, and it is a concept closely bound to marine insurance today.

Insurance is an industry that all too frequently carries upon its protesting shoulders the predictable results of human stupidity and cupidity, as well as "acts of God" and totally unexpected disasters. It anticipates (some would say naively) that its clients will behave in a high-minded way, "as if uninsured," but frequently the reverse is the case. It is not, as is popularly supposed, a caucus of faceless, rapacious, and unapproachable mandarins, hiding behind banks of computers and weaving plots to plunder the world's commerce. Computers, in fact, are regarded in enlightened insurance quarters as tools for specific jobs but not as substitutes for the finest computer of all, the human brain.

The position of Lloyd's of London as an international insurance market is well-known. It started in 1688 as a coffee house run by Edward Lloyd, who evidently had a rare and un-English gift—he made good coffee. Lloyd's Coffee House was situated on Tower Street near the River Thames. Its customers consisted mainly of ships' masters and merchants and others with a maritime interest. In those early days insurance on ships and their cargoes was accepted by individual merchants as a sideline, and each of them took a share of any particular risk. They became known as "underwriters" since they wrote their signatures and their percentage share of the risk, one beneath the other, on the insurance contract. Edward Lloyd encouraged businessmen to meet at his Coffee House to transact insurance, and he provided quill pens, ink, paper, and shipping intelligence.

Lloyd himself died in 1713, but when Lloyd's became a corporation by an act of Parliament in 1871, it retained much of the character of his popular meeting place by the busy river. Lloyd's owns the premises where underwriting is carried on by individuals, and, without accepting insurance itself, it still provides services for others to do so. There the likeness ends. As sail gave way to steam, coal to diesel oil, and piston to jet, many new areas were pioneered. Ships

grew and cargoes became more valuable. Insurance companies opened underwriting offices conveniently near to Lloyd's, and today the market carries immense loads — giant tankers, jumbo jets, and vast land complexes. Other markets were being created in parallel in the United States, in the European countries, and subsequently all over the world. The term "insurance market" is somewhat baffling to those outside the industry. In terms of anti-trust practices, it expresses the characteristic of individuality among underwriters. Insurance brokers "shop" for the best terms on behalf of commercial concerns the world over, and policies are arranged for objects in both outer and inner space as well as at the interface.

The London market is the most comprehensive and the one with the largest capacity, but a great deal of interchange and coöperation obtains among insurers in all parts of the world for the purpose of spreading the load. When a major catastrophe occurs, no single insurer of consequence escapes, and the ripples of claims may lap the shores of the London market for months and years after the event. To be a successful underwriter requires more than a quick brain, a vivid imagination, and a dash of cynicism spiced with humor. Today it also demands rapid appreciation of new technologies, the most difficult requirement of all. Beyond all this, underwriters often need a sixth sense. Few who operate on a worldwide scale, for example, recognized the strength of the inflation pulling them under during the past five years, and, as a result, underwriting losses have been widespread. The lesson has been learned the hard way, and insofar as any man can judge such matters as the rising cost of repairs to giant tankers, some stability is being achieved. Even so, insurers are still pondering the cause of three possibly mortal explosions on these big ships, all of them quite new, within a period of a few days while all were gas-freeing at sea.

Insurance is a regulator in many different fields. Although industries and individuals that lack an insurance program often proclaim their good housekeeping habits, seldom is this the case. Insurers inhibit dangerous or potentially dangerous situations by insisting in advance on protective or preventive measures to avoid accidents induced by omission and to forestall the disasters that follow corrosion and decay.

We have one interesting example of this process in reverse. In the late forties and early fifties oil-drilling rigs spread rapidly over the waters of the Gulf of Mexico. Their multiplication was followed by catastrophic losses, particularly during the hurricanes that cut like a scythe around the Gulf. As a natural result, insurance premiums rose to levels that some oil companies considered intolerable, and some of the larger ones decided on self-insurance.

Experienced underwater engineers paint a fascinating picture of this vast land-oriented industry advised by land engineers leaping into the sea as if the seabed were a flat prairie where skies are always blue and the seaweed's as high as a sea elephant's eye. Many of the supposedly unexpected disasters were preventable in the considered view of oceanographers familiar with the medium, whose advice went unsought or unheeded. To quote a spokesman for a major oil company, "The oilman pretends the sea is not there."

As the offshore oil industry expanded in wealth and strength, different views emerged as to the design of oil rigs, the merits of insuring them, the construction of oil tankers of ever increasing dimension, and so forth. Before that time ships and ironmongery associated with undersea oil fields had been policed, so to speak, by the classification societies, by well-known naval architects, and by risk-management experts acting on behalf of insurers. Now the larger consortia and companies created their own insurance funds and insured only against macro-disasters. Classification societies consequently starved for lack of requests for independent certification. As the concept of self-insurance gained acceptance, classification rules were perhaps eased so that the classification societies could continue making trading profits, and insurance ceased to be a regulator and to perform its vital function of asking awkward questions. Recently a Chief Ship Surveyor from Lloyd's Register of Shipping, which commands universal respect in insurance markets, said, "Giant tankers, unlike aircraft, where both the fuselage and engines can be tested under all operating conditions, are expected to function properly on their maiden voyages, although they may be prototypes." This statement makes a recent forecast of a once-a-year major spillage disaster, related to giant tankers and primitive nautical charts, seem quite conservative.

Large consortia or governments that now operate big mining complexes, oilfields, and tanker fleets are answerable to no one, although they do adhere to minimum safety standards, both national and international. The law by its very deliberative nature must lag far behind technological advances, whether these be bland or potentially lethal. Large operators stand outside the influence that inspection by unbiased,

non-political experts engaged by underwriters can bring. Nor are they prevented from leaving all manner of unlovely and dangerous junk on the seabed to trap our unwary descendants. Variations in standards of ship and oil-rig classification cannot easily be attacked or defended, but the simple mathematics of disasters resulting in spillages tells us that the desire for oil and other minerals is far ahead of the technological knowledge within these industries.

The concept that the world's insurers might actually police both inner and outer space is an interesting proposition. Insurers, however, take the view that the system they have evolved, protected as it is by well-tried laws and more than two centuries of experience, is preferable because it assumes the integrity, honesty, and good intentions of known operators who insure. Those who do not insure for one reason or another would, without doubt, resent the intrusion of private police into their affairs, however dangerous or nefarious these affairs might be. There are instances on record, moreover, of governments instructing insurers to withdraw insurance coverage when the insured was acting in a fashion hostile to the government concerned, although such political interference is happily very rare. Police forces operated by different groups of insurers are another matter; they could all too easily be used for political ends and sink into disrepute as mere tools of government. Individuality is jealously guarded by the industry as a whole, and it is recognized by insurers that a free market is basic to thriving commerce. As Lloyd's puts it, "Each for himself and not one for the other."

The pressing necessity today is the prevention of a free-for-all on a global scale beneath the surface of the seas, such as the one recently observed in Alaska. The intense debate in many quarters as to who should own what in relation to the continental shelf, slope, and rise, vis-à-vis mining, fishing, and mariculture, serves as a warning. To divide up the international waters of this small planet, even if we had the haziest notion of what lies beneath them in terms of exploitation, is an affront to the dignity of thinking men. To parcel out such hostile, permanently dark regions in the form of concessions, without knowledge of either seabed topography or the environment in relation to supporting life, would promote conflict rather than inhibit it.

Talking to pilots of submersible research vehicles and work boats is revealing. Many charts in use today are inadequate and inaccurate, oriented to eighteenth- and nineteenth-century wooden ships of shallow draft. A recent international survey of the Malacca Straits under the auspices of the Intergovernmental Maritime Consultative Organization (IMCO) revealed shoals that were hitherto unsuspected. The significance of this discovery in its relation to giant tankers with full bellies, planned soon to enter the Straits, boggles the mind.

Wide-ranging discussions took place at the Summer School in Malta last year, but to my mind the most important and urgent concerned the question of charting the ocean bed in advance of legal boundary definitions. A World Charting Decade was suggested, involving the coöperation of ocean liners, cargo vessels, and inshore fishing vessels using inexpensive but effective bottom-profiling systems. This operation is not as simple as it first appears. According to an experienced underwater pilot, a seamount was discovered not long ago by a surface ship between Nova Scotia and Greenland, was named after the ship, and was marked on charts. Since then, it has been discovered that there is no such seamount. A sudden difference of salinity or thermal layers resulted in a return by the ship's sonar equipment to simulate a seamount. Off the northwest coast of Scotland, another pilot observed an area marked on the chart as sandy bottom; in reality this was a small area of sand leading to stones and then to house-sized rocks and boulders, although these three give different returns on sonar.

Charts of the Sea of Japan and the China Sea, where rival prospectors are very active, are known to have inaccuracies. Areas marked as two hundred fathoms are in reality one thousand; seamounts appear that do not exist; and flats are indicated where seamounts are. Even with bottom surveys of sufficiently fine grain to be useful, navigation remains the problem and, even for ocean liners, is comparatively crude. In short, a fine-grain ocean-bottom survey is of no value unless it can be related and oriented to clearly defined geographical positions on a chart.

Accurate navigation is also one of the main problems in operating manned submersible vehicles. It is my belief that as soon as this problem can be overcome in an economically viable way, undersea work boats will give a great boost to visual, photographic, and electrical surveys of the seabed along the continental shelf. Although in many areas of the globe water below two hundred feet is as black as pitch, this method, considered in terms of the economic viability of present techniques, seems superior to surface ships operating alone, mapping shoals of fish, the deep scattering layer (which plays havoc

with depth-finding apparatus), and thermal or saline layers. Other phenomena bedevil accurate seabed mapping, but it seems logical that a submersible vehicle near the seabed can be more accurate than a surface vessel pinging from remote points above it.

Topographical problems are not the only ones delaying the formulation of the peace-keeping guidelines so urgently needed. The ocean floor has been a dumping ground for centuries during both war and peace — millions upon millions of tons of explosives and ordnance litter the sea bottoms, as well as snarled cables, anti-submarine nets, and numerous other unnatural hazards dropped from ships, aircraft, and drilling platforms. The National Research Council Mine Advisory Committee in Washington, D.C., has taken the lead by pursuing a program of charting and clearing arms dumps, mines, and other destructive ordnance in United States waters. Every nation's legal obligation is to sweep explosive devices from its waters. The problem grows worse rather than better, however, since many nations have pushed their seaward boundary claims beyond where they were at the end of the Second World War. As recently as the Korean war, four thousand mines were planted by the North Koreans alone, in addition to aerial bombs, hedgehogs, and depth charges. International coöperation in raising or destroying arsenals of arms and other man-made hazards would demonstrate very well the futility of undersea warfare. The after-effects of generations of careless and wanton aggression would be disclosed for all to see.

The monsters of long ago are supposedly extinct on land, although there is strong evidence of the survival of some of them in the deep waters of the world. Some people feel that the prehistoric remains being pumped in the form of oil from what were once fecund, steaming jungles, populated by huge and savage creatures, have far more terrible powers and a breath more foul than the monsters of millions of years ago. Others find a recent Delphic pronouncement that "three-hundred-thousand-ton tankers are here to stay whether we like it or not" to be as overconfident as Philip II's faith in the ponderous great galleons he sent to destruction in 1588.

It is safe to say that there are no accurate charts of over ninety-five per cent of the ocean, and meandering currents, shifting sand banks, vertical one-dimensional surface surveys, and other factors affect the accuracy of charts of coastal waters. Large tankers require fourteen miles to stop at normal speeds.

Maneuverability in confined spaces has long been known to be a prerequisite to survival on the sea. We may dare hope that at least in some measure this ancient knowledge is being acted upon since the British and Dutch governments are planning a hydrographic survey of the English Channel this autumn to find out how much water there is available to big ships. This progress, while it deserves applause, might also be termed glacial. People are said to visit the cliffs of Dover and the Delaware River to watch collisions.

The history of mankind may one day be recorded on some other planet or, more hopefully, by a superman or woman on earth. Man's epitaph may well be that the species never acknowledged the lessons learned by its predecessors. The words "exploit" and "develop" have replaced the expression "to plunder with indecent haste." If one substitutes these more expressive and pungent words for our legalized piracy, it becomes obvious that we, the peoples of the earth, are unsystematically destroying our birthright in the name of progress.

The meaning of "exploit" has changed from "to prosper, to achieve" into "making capital out of something in an unfavorable sense." I would like to offer the new word "imploit" for use in the hydrospace. Imploit would generate thoughts of conservation, of debris removal, and of dedication to ecological sanctity. If we were to imploit, drilling, mining, and farming sites would be left in a better state after operations than before. If only Alaska could be imploited so that when mineral claims are staked, the fate of one of the last great unspoiled ecological marvels in the world might not be at risk!

A glowing and exciting example of enlightened imploitation comes from Frankfurt Zoo. It has not only bred many endangered species but reintroduced them to their countries of origin. Imploitation would imply that those who drill for, pump, and gather minerals from the sea would set aside a portion of their profits for the conservation of wild life in and on the sea. Imploiters would, unlike the exploiters of today, do well to consult those who understand the finely balanced ecological systems beneath the ocean's surface in both deep and shallow waters.

A closer dialogue between mineral producers and marine technologists, biologists and scientists, is long overdue. The insurance industry has had a close interest in these great mineral industries for many years. Latterly this interest has flagged and, in some areas, disappeared in the face of arrogance and haughty indifference to technological advance. With some notable exceptions, mutual confidence and respect have given way to anger and frustration and heavy financial loss.

Technology related to oceanography has been aptly defined by Willard Bascom, famous for the Mohole Project and for unlocking many secrets of the sea and its behavior. He puts it thus: "It is knowledge fortified by machinery and tools, without which men would be ineffective against the sea." Last year two hundred thousand tons — forty-nine ships — were lost by stranding, exceeding losses from any other single cause. What is more, offshore structures collapsed for want of easily obtainable, low-cost photographic evidence of corrosion, tidal erosion, and buckling and for lack of visual bottom surveys, among other causes.

Conventional divers, whose heavy boots stir up black sediment, often make grossly inaccurate "touch-and-feel" surveys that may be worse than none at all. Gullibility and cynicism frequently rule on the surface, while below it the one desire is to return to warm, bright sunshine as quickly as possible.

Many accusations, varying in accuracy and weight, have been leveled at the oil industry in the recent past. The commodity, when pumped, transported, and stored with more than half an eye to spillage, blowout fire, and explosion, is a modern necessity without which industry and medicine would suffer immeasurably. The real enemy is indifference to modern technological aids for the prevention and cure of accidents. The insurance industry is, in practical terms, powerless to withdraw coverage pending production of photographic evidence of damaged undersea equipment, and the worst offenders may not insure or are charterers remote from ownership of the equipment. Insurance brokers, in addition, may allow the prospect of a commission to drive them to well-meant but uninformed technical cajolery in order to convince underwriters of the power and expertise of their client and his equipment.

Legislation aimed at the oil industry and designed to inhibit pollution by imposing unlimited liability merely passes an intolerable burden onto insurers, who may be led to grant cover beyond the limits of sane trading and eventually go bankrupt. A most stern, efficient, and unbiased police force was formed millions of years ago and formed so well that it is as potent today as ever. More effective than discriminatory legislation, it is the dark, cold, and hostile environment of the ocean depths whose lieutenants are tsunami waves, submerged volcanoes, and undersea waves of immense power.

Recently man has shown pride in his ability to swim freely at depths of one thousand feet. Physiologists believe that twice this depth is the tolerable limit, beyond which the nervous system will be damaged. Submersibles can provide a shirt-sleeve environment for men to operate sophisticated tools at many times this depth, and wet submersibles manned by skin divers can extend working times by making possible powered descents, maneuvering, and ascents far beyond the capabilities of free swimmers.

Safety under the sea has been and will hopefully continue to be regulated by insurance, working hand-in-hand with the oceanographic industry's own rigorous, self-imposed safety guidelines. Insurers as well as oil men and aquanauts hope for sensible, workable legislation from international lawyers who have a clear knowledge of who they are protecting and from what. Deep-sea prospecting and subsequent mining must be understood as operations that will take place on the slopes of mountain ranges of Himalayan proportions in remote regions like the Canadian Northwest Territories. To share such regions among nations by granting concessions would be like parceling out the Andes with the aid of three-hundred-year-old maps in candle-lit darkness.

A short time ago a distinguished naval officer, addressing an audience of nonmilitary oceanographers, asked a fanciful and somewhat cynical question: "How many of you have been below one thousand feet?" He was surprised to be greeted by a forest of hands. He asked the same question successive times, each time increasing the depth, but still many of the raised hands remained. These underwater engineers and scientists, and those who support them from the surface, are the men we must look to for reducing pollution and for preventing the rape of the oceans. Their knowledge of currents and tidal phenomena can provide us with accurate maps, and their acquaintance with the appearance of an oil rig about to collapse or a corroded ship's bottom can forewarn and forearm insurers. Only they can tell whether salvage is possible, and only they can know whether pipelines have corroded in their concrete sleeves to burst out and lie suspended several feet above the sea floor waiting for an anchor to fracture them.

Their capabilities at present are largely ignored. Some of the largest oil companies stand accused of brushing aside the engineers whose eyes can probe the murky, plankton-laden depths to give them, and their insurers, indisputable photographic evidence of scouring, corrosion, damage by marine predators, and drilling rigs made unsafe by lack of proper support following scouring.

The words of a seventh-century Chinese poet unfortunately still apply today: "Businessmen boast of their skill and cunning/but in philosophy they are like little children/bragging to each other of successful depredations./They neglect to consider the ultimate fate of the body./What would they know of the Master of Dark Truth/who saw the wide world in a Jade Cup?"

The insurance industry may not see the world in a jade cup, but neither is it helpless to improve the present state of affairs. The device above the entrance of Lloyd's of London is surmounted by the word *"Fidentia."* To good faith must be added good sense if the aim is fewer losses, less pollution, and lower premiums. Insurers cannot regulate hurricanes, prevent earthquakes, or change men's bigoted notions of what is or is not to be done for the benefit of our small planet and all who sail on her. They *can* be more ready for events that only ostriches could consider unpredictable, and they can come to depend on the men who combine vision, idealism, and knowledge with practical skills beyond the ordinary. In addition, a little more modesty from the mineral industries and less from oceanographers would help to cleanse the world's circulatory system and enrich us all.

Commentary

MR. JACOBY: Since our concern is the role of enterprises in an international ocean regime, perhaps we should discuss what might be the most important function of this regime with regard to fisheries, deep-ocean mining, and other industrial activities.

MR. PONTECORVO: Well, clearly the simple solution for the fisheries is to unitize them, to set up a corporation that will fish any given stock rationally — in fact, fish all stocks rationally — and divide the rents from the fishery operations among the participants. But —

MR. JACOBY: You would have to limit entry.

MR. PONTECORVO: Of course, that's the basic assumption of any fisheries activity.

MR. VITZTHUM: Isn't it a long jump from the present system of free entry to the establishment of a single corporation and the complete abolition of the free-entry system? Wouldn't it be more practical to start on a smaller scale, say, by establishing quotas for various stocks or by keeping certain stocks under control only until they had a chance to restore themselves?

MR. PONTECORVO: A single corporation is one possibility, but there are other solutions. Another might be to put a freeze on entry, with a grandfather clause to protect those currently in the industry. There are any number of approaches. It is possible to take action at the state level, for example, and at one point we had almost persuaded the state of Washington to limit entry into the salmon fishery. Another possibility is international quotas. In all probability, the international conference on the Atlantic cod stocks will establish quotas. Each nation would determine how to handle its quota internally, but all countries would then be able to rationalize their fishing efforts within this quota structure.

Actually, the whole proposition of limiting fishing efforts is more complicated than it appears. In most fisheries where limitations have been imposed, biological factors have been the primary consideration. Even when biological control mechanisms have worked quite well and the restoration of stocks has been hailed by conservationists, economists have considered the results disastrous. The cost of biological control mechanisms often far exceeds the economic benefits. From an economic point of view, the purpose of limiting entry is to improve methods of fishing and to increase efficiency. So, it's more complex than —

MR. WENK: You know, we really don't have an accurate estimate of stocks at sea. All we know is what has been successfully hunted, and the main source of information on which we base present techniques of regulation is the data on fish caught. This information may not be incorrect, but it is incomplete. It is known, for example, that if we weed out some of the predatory fish we can increase stocks of other species, but no one has gone about that process systematically.

Contrary to widespread belief, fish are not uniformly distributed in the oceans. Most of the ocean is a biological desert. The fish are usually concentrated in narrow regions close to coastlines because the food is there. Many species of fish spend part of their life cycle in the deep ocean and part of it near the coastal areas; many actually live in marshlands during the early stages of their lives. Most fish are therefore caught almost within sight of land — not all the high value species but a substantial fraction of them. What we know about the fish population is largely empirical and therefore not only is the question of limiting entry somewhat complicated but so also is the question of the function and the scope of an international regime.

MR. TUGWELL: Did you say that the deep seas are not likely to have great bodies of fish?

MR. WENK: I don't want to give the impression that they don't have great bodies. We do not know for certain. According to our present information, the heaviest concentrations are near the coastlines. The productivity of the sea has been estimated over a very wide range, and I think the latest figures from F.A.O. are inclined to be conservative — somewhere between three and six times the present world catch. Probably the total is considerably higher. The important point is, however, that we do not even know what information we need in order to limit entry. Intelligent decision-making can take place only in the presence of fact. Where do we stand today?

MR. WHEELER: If fish populations are concentrated near the coastlines, wouldn't a massive program for increased productivity, by necessity, take place in close proximity to the shore?

MR. WENK: On the basis of today's knowledge, that would be right.

MR. DAWSON: The Russians are fishing at two-thousand-foot depths very successfully, aren't they?

MR. WENK: There is no question about successful fishing in international waters. Tuna, a high-value species of significance in the marketplace, is caught far out to sea. The point is simply that most of the intensively developed fisheries are relatively near the land. I don't think the vital questions can be answered on a simple national versus international basis, however, because unfortunately there is still a good deal of debate on where international waters begin and end.

MR. LA QUE: The Stratton Commission* treated the territorial sea as distinct from the continental shelf, and its recommendations for dealing with territorial seas were separate from those concerned with seabed resources. Conceivably, therefore, the two can be dealt with as independent entities.

MR. JACOBY: I think this is a most important matter to which we should devote some attention. We know that the nations adjoining the North Sea have carved it up by treaty. I understand that Italy and Yugoslavia have carved up the Adriatic for purposes of oil exploration. How extensive is the concept that territorial seas can be removed from international jurisdiction? What is a territorial sea? Could the whole Mediterranean, for instance, conceivably be a territorial sea?

MR. WENK: Everyone of the nations bordering the Mediterranean has already taken a position on the territorial sea, and my recollection is that none of them so far has gone beyond twelve miles.

MR. VITZTHUM: We are missing a distinction here. The problem is whether the floor of the Mediterranean can be considered part of the continental shelf — not of the territorial sea — should the bordering countries decide to carve it up. Parts of the Mediterranean are very deep, even some portions of the Adriatic divided between Italy and Yugoslavia. The question is, "Do bordering nations have the right under the shelf convention or under any present definition of the shelf to split up even the deep portions of seas like the Mediterranean?"

MR. LA QUE: It might expedite things if the nations of a particular region, like the Mediterranean, could come to an agreement on objectives similar to those we visualize for a future international regime. Regional regimes might be interim devices, models for a more extensive international regime to come later. Fewer people would have to agree, and some degree of control could be achieved.

MR. VITZTHUM: With whom would jurisdiction lie? The coastal nations?

MR. LA QUE: With some regime established by the coastal nations.

MR. BONOMI: I think that it would probably be interesting to look at the trend in American policy. I was much impressed by an official statement by President Nixon that American security will depend in part on an integrated hemispheric economy. He went beyond the old concept of resources under direct sovereignty to suggest a prospective organization that would make the Western hemisphere independent of the rest of the world for oil and gas. I wonder whether this principle may not eventually be applied in the Eastern hemisphere as well. If it were to be, the relationship between advanced consuming countries and underdeveloped producing countries would certainly change. I don't know what will come from the new

*The Presidential advisory commission established by Public Law 89-454 to study the long-term needs and opportunities of the oceans and to suggest possible major changes in U.S. governmental machinery. Its report was submitted in January, 1969. Chairman was Julius Stratton, former president of Massachusetts Institute of Technology, who is chairman of the board of the Ford Foundation.

oil committee set up by President Nixon or what will result from United States negotiations on a change in import restrictions, but these American developments could have a bearing on the problems connected with establishing an ocean regime.

MR. VITZTHUM: Why should Europeans always look to the United States for leadership? The interests of the United States are very much tied to the whole question of extending jurisdiction over the continental shelf to include the slope, but many other nations have less to gain from such an extension — for example, Italy, Germany, and Japan.

MR. BONOMI: That's questionable.

MR. VITZTHUM: Well, there is no slope whatsoever in the North Sea and the Baltic, for instance. The interests of the adjacent countries there would not be furthered directly by extending national jurisdiction to the slope. Why couldn't Europeans assume a role of leadership and say, "We stop with the shelf principle at two hundred metres. That's our regional international law, and — "

MR. BONOMI: And who would get the resources in the remaining part?

MR. VITZTHUM: In the remaining part of the world?

MR. BONOMI: In the remaining part of the seabed.

MR. VITZTHUM: On the slopes and even farther down?

MR. BONOMI: Yes. Beyond the two-hundred-metre limit.

MR. VITZTHUM: These resources would ultimately be placed under regional or global control. What I am saying is that Europe should influence decision-making instead of sitting tight and waiting for the United States to make the first move. The United States has special interests of its own, but European interests are not necessarily identical. I can visualize a united Western European community of the seabed, perhaps as an extension of the Common Market, a maritime community of states.

MR. BONOMI: Before your idea could be accepted, we would need a clear definition of the international ocean regime because, for some European countries, a rather wide definition of national jurisdiction may have some advantages. In the case of Italy, we reserve twenty-five per cent of continental-shelf areas to ENI, and the size of those areas makes a difference.

MR. BARBER: I would like to supplement Mr. Bonomi's view. We have not talked about the nature of an international ocean regime. In particular, I think we need to consider what the checks and balances would be in such a regime. We can be sure that if an international regime is established, it will face questions and issues that we cannot now imagine. The geographical boundary of the regime is not the only open question. Equally important, it seems to me, is how this entity should set up an appropriate series of checks and balances to insure that it does not become, in effect, an autocrat of the seas.

MR. PECCEI: I think that probably we are facing a problem with so many variables that we cannot solve all of them. In a situation like this, it is often better to strike a bargain now than to avoid discussion for long periods of time. Through the ingenuity of lawyers and oceanographers, a compromise somewhat short of a clear-cut definition may emerge. That would be better than waiting nine or ten years for a broad consensus.

MR. WENK: To that I would add that the absence of any well-defined, responsible regime leaves the way open to those who wish to promote the idea of extending national sovereignty for their own advantage.

MRS. BORGESE: I would like to return to Mr. Jacoby's original question — the function of an ocean regime with regard to industrial activity. Mr. LaQue's discussion of the quantity and distribution of manganese nodules in the ocean leads me to believe that we are heading for a revolution in the mining industry. He says that he does not expect deep-ocean mining of nodules for fifteen years, but fifteen years is nothing. It is practically upon us. If, by 1985, a few companies plowing a few square miles of the ocean floor can bring up as many metal-bearing nodules as he says, we are faced with a need for worldwide planning. Because of the impact on the price structure and on the economies of metal-exporting underdeveloped nations, deep-ocean mining may pose a problem of the first magnitude in a very short time. I think it is not too early to think of planning mechanisms.

MR. LAQUE: Fifteen years can be interpreted in two ways. Your assumption is that mining will be undertaken on a broad scale in fifteen years. I meant it the

other way — that deep-ocean mining cannot be expected to start on any scale for at least fifteen years. I am not arguing against future planning. Whether it's fifteen years or a hundred and fifty years, I am sure that these ocean metals will be exploited. I do feel that we should study this matter so that when we need to choose between exploiting low-grade ore on land and nodules on the ocean bottom, we will have a basis for an intelligent decision.

MR. HATHAWAY: Your pessimism about the commercial value of manganese nodules seems to be based on the assumption that no new uses will be found for the metals they contain. These manganese nodules grow by accretion, over millenia. Their growth rate bears a direct relation to the nodule's increasing surface area where the growth takes place. The relation is an exponential one but so slight that any planning for extensive exploitation must consider nodules to be a nonrenewable resource. Nodules are, in effect, no less exhaustible than any other mineral resource.

MR. LA QUE: If we can believe what we are told — that there are trillions of tons of these nodules — the rate of depletion of them to accommodate the world need for manganese, nickel, copper, and cobalt would be infinitesimal, if that need remains even close to present demand.

MR. WILKINSON: It seems unbelievable to me that we could not find an enormous number of uses for manganese. After all, there was a time when no one used iron either. I can't imagine that it would tax the ingenuity of an industrial chemist to find many more uses for manganese than we now have.

MR. PONTECORVO: That raises an intriguing question. What you have suggested, Mr. LaQue, is that we have an infinite supply of certain minerals. That point by itself is worthy of greater emphasis. If we assume, for now at least, that there is such a thing as diminishing returns, then clearly the relative price of these minerals should decline in the long run. It seems to me that the possibility of making a profit from exploiting these minerals will depend on our being able to substitute them for others as their relative price falls in the future. In other words, the substitution possibilities will really determine the revenues that these minerals will yield in the long run. If they are really in lasting supply and if the fixed cost of production declines, as it may with improved technology, the metals in these nodules will become relatively cheap. In that case, the return from their exploitation will depend on how rapidly they are substituted for other metals, on how great a demand is generated. Maybe no such substitution will be possible, but I think chemists would argue that point. I submit, therefore, that there will perhaps be more to nodule exploitation than meets the eye and that the generation of returns may be more open-ended than your conclusion suggests.

MR. LA QUE: No one can argue that substitution may not eventually occur, but our freedom to substitute is not as great in present-day metallurgy as is commonly supposed. The composition of metals is becoming increasingly complex, and the choice of certain combinations to produce specific properties is deliberate. The more sophisticated the alloys — for use in jet engines and the like — the less the opportunity for substitution. On the other hand, with an unlimited supply of nickel, for example, the metallurgy of the world could be changed from iron-based to nickel-based, but this is something that may happen in a hundred years, not in the near future.

MR. VITZTHUM: I think we are missing one element in this discussion. A La Jolla marine scientist told me recently that if the United States ever runs out of cobalt for strategic weapons, and developing nations can't be counted on to supply it, America will go after cobalt from nodules. His point was that the United States would secure the metals it felt were strategically necessary at any cost. When national defense is at stake, the profit motive is not the overriding one, and the same can be said with respect to national prestige. Some European nations, for example, have little economic reason to try to catch up with the United States in computer technology. They are doing it just the same because they feel left out and because they reason that unless they catch up in this large technological field there will be no chance for them to compete in other fields. Therefore, for strategic or technological reasons, governments might provide industry with money or tax benefits in order to stimulate deep-ocean mining well before 1985, and economic gain might not be a primary consideration.

MR. BARBER: I am troubled by the lack of any open discussion about the assumptions underlying the need for an ocean regime. So far, I have detected at least two quite different assumptions, and I think there is yet a third. Implicit in Mr. Vitzthum's remarks is the assumption that we need an ocean regime to control

the military-industrial complex. To say that governments will seek out cobalt for strategic weapons regardless of economic considerations is to imply that governments are fundamentally irrational and must be controlled. This argument itself is by no means irrational, but do we want to consider this element a major political factor in planning an ocean regime? A second viewpoint that seems to me to predominate in this discussion is the conviction that an ocean regime is needed to assure the rational exploitation of resources like oil and gas, manganese, and fish. Actually, that is a traditional point of view. A third consideration, which has been largely ignored, is that the oceans may not be viable entities for *anything* within ten or fifteen years. We may need an ocean regime to assure that we will have oceans, at least as we now think of them. What strikes me is how little we know about the oceans. We don't know the effects of pollution or what will happen if whales disappear from the face of the earth. Humanitarian considerations aside, would the extinction of whales shake up the life cycle and fatally disturb the ecology of the oceans? It seems to me we are proposing to draw up a rational policy for handling phenomena about which we have literally no knowledge. We ought to know what we are talking about before we make any policy. Perhaps we ought to discuss what I would call a survival strategy — to develop some sense of priorities and to decide what the dominant issues are.

MR. PECCEI: That is the point exactly. We know too little of what happens on our planet to have logical policies, regimes, or structures. Of course, we have to do the best we can with the knowledge that we have as we go along, but we must try for greater insight in order to have better foresight with regard to the ocean as well as the land.

MR. ASHMORE: We have all heard extrapolations from Paul Ehrlich, the biologist, that the seas will be dead within a reasonably short time. Is there any data available on the effect of pollution on the fish stocks? Do we know what's happening?

MR. PONTECORVO: The biologists with whom I associate occasionally — I usually fight with them — are not of the opinion that the seas are about to die. However, I think the pollution question is very serious, as is the whole question of control mechanisms. The global processes of energy transformation in the ocean are so enormous and the environment so complex and difficult that as far as I know we have no control mechanisms capable of increasing fish productivity in the open ocean. I feel that there is a lot more work to be done before we can think seriously about control mechanisms for the ocean. Aquaculture, of course, is a different story because the environment can be controlled. Aquaculture makes mainland China one of the primary fish producers in the world, and even in the southern United States we have seen a recent upsurge in output from what are essentially fish ponds.

MR. WENK: There are some recent indications that in bays and estuaries, under proper control conditions, we could produce protein probably a hundred times more efficiently than we can on land. Natural sources of food are systematically flushed in and out of these estuaries, and it is not hard to raise fish there if the stocks are controlled and predators eliminated. Thousands of miles of coastline, all within national jurisdiction, could be used for aquaculture, and I would guess that we will see an intensification of this kind of activity within the next ten years. Pollution will have all the more importance, however, because today pollutants are the most concentrated in bays and estuaries.

The main effect of pollutants so far has been to force withdrawal of shellfish beds from exploitation. Roughly ten per cent of the area within the United States now is prohibited from shellfish exploitation because of pollution. Salmon artificially introduced into the Great Lakes mainly for sport fishing fared so well that they became of commercial value, but within two years the catch had to be prohibited from the marketplace because of the concentrations of DDT. Recently the Canadian government was obliged to ban the sale of eighteen thousand pounds of pike from one of its lakes as a result of mercury compounds introduced by Dow Chemical Company. All species of fish seem to have a unique chemical factory that makes them concentrate heavy metals that are poisonous to man but not to the fish. As far as I know, all species concentrate one or more of these poisons, in varying amounts. Some concentrate mercury, some concentrate arsenic, and so on. Most fish, at least the fatty varieties, seem to concentrate DDT.

MR. PONTECORVO: Some biologists claim that the North Sea is productive because it *is* so heavily polluted.

MR. KELLY: Do they give any reason for that?

MR. PONTECORVO: Enrichment by organic matter that provides more food.

MR. ASHMORE: Is pollution considered a serious problem by those who are concerned with the economic side only?

MR. PONTECORVO: Well, I simply cannot say because I do not know the long-run implications of the concentration of DDT in fish. We know something about what DDT does to robins, but we don't yet know what it does to fish.

MR. ASHMORE: Even if you have close inshore development of aquaculture, aren't there still international implications from pollution? Can even closely controlled territorial waters escape?

MR. WENK: It isn't true quite yet that one fellow's pollution is another fellow's nutrient, although this is by now the case in the North Sea. The circulation of sea water is such, however, that pollutants do not dilute and disperse immediately. There was an old-fashioned belief that the oceans, by virtue of their very size, had an infinite capacity to absorb pollutants. Actually strands of pollutants injected into the ocean from river mouths remain concentrated for hundreds of miles. Fresh water from the Amazon, as you know, is found far out from land. Concentrations of pollutants penetrate the ocean in a similar fashion, and they usually swing along the coastlines, often someone else's coastline. Another problem is that fish migrate in and out of coastal areas at some time during their life cycle, so that even deep-water fish may concentrate pollutants.

MR. DAWSON: What about the built-in pollution of our international waters that we are heading toward? I think that sooner or later we must have some legislation to correlate the accurate charting of the oceans and the building of bigger and bigger tankers. As things stand now, we know practically nothing about what really is under the sea and yet the plans are that five-hundred-thousand-ton macrotankers will navigate waters where confusions between two hundred fathoms and a thousand fathoms are quite common. Put the two together, and you have instant pollution all over the world. Not just polluted coastal waters.

There is another aspect to pollution from oil. The oil companies have been in too much of a hurry. The industry simply flung itself at the Gulf of Mexico when very few people knew the ins and outs of the problems involved. Oceanographers can tell which rig will collapse next and why, but the oil companies and the oceanographers do not get together. In many instances, the oil companies just don't want to know; they do not want to see the picture.

MR. VITZTHUM: Your thesis is that insurance is a regulator. Considering the amount of oil floating in the water today, I am not too impressed by this regulatory power. I wonder whether the present insurance companies are not economically too weak vis-à-vis the big oil-producing and oil-shipping companies to act as regulators. Might there not be a case for a stronger organization of insurance companies, for their coöperating like the Arabian oil-producing countries to improve their bargaining position? Couldn't they establish an international or regional insurance body or something similar?

MR. DAWSON: It's like trying to catch a butterfly in a hurricane. At the moment insurance is in a rather weak position because it has been through a phase of some five years of stiff underwriting losses. I think if you try to give insurance some regulatory role and try to make it a cohesive total force instead of a group of trading competitors, you will create a situation where insurance can dictate, just as the oil industry now dictates. This is not healthy. I also think it would be very bad to cut off dialogue with the oil companies. Without dialogue, hostility is certain to develop and hostility can be fatal.

MRS. BORGESE: If safety standards were to be drawn up by a group of scientists and oceanographers, on the one hand, and enterprises, including insurance companies, on the other, would that improve the situation?

MR. DAWSON: The only experience I have had with safety standards is with the Marine Technology Society safety guidelines. The Society published a book of highly intelligent strictures that are being implanted onto insurance contracts. It is now becoming the rule that anyone virtually anywhere in the world who wishes to insure an object under the sea must comply with these strictures.

MR. LAQUE: I think you need a technical basis for international safety standards.

MR. JACOBY: It strikes me also that there must be a technological basis for the propagation of safety

standards. My impression is that the evolution of offshore drilling is at such an early stage and technology in such a state of flux that we really do not yet know how to write safety standards. Am I correct in this?

MR. LA QUE: There are in existence now some recently promulgated standards regulating longshoring operations that have substantially reduced the number of accidents in the loading and unloading of ships. These standards have a sound technological basis and are recognized and used. I don't see why international safety standards for undersea operations could not be developed.

MR. DAWSON: Or fit into something like the International Standards Organization.

MR. LA QUE: Yes, I think I.S.O. does provide an existing mechanism that might be of use. It is made up of all the standards bodies of all the countries of the world.

MR. BARBER: I believe it is important to make a distinction between law and standards. It has been my experience that governments and the international polity should write the law but not the standards. Private groups should establish standards to insure compliance with the law. The big disaster comes when governments write standards and then get involved in technology, which goes out of date.

MR. LA QUE: The practice that is generally followed is that private bodies develop the standards because they have the competence. Subsequently these standards are given the force of law when they are incorporated into some national or international code. I think this is the proper course.

MR. BONOMI: Safety standards are difficult to set up, as the experience of the European Economic Community has shown. We have been debating standards for pipelines over land — much less hazardous than similar lines at sea — and we are completely unable to reach agreement on a common security code. The European Economic Commission of the United Nations tried to establish a safety code for gas pipelines, but the code it has developed has no legal significance because it has not been embodied in any legal international or national instrument.

MR. VITZTHUM: In the final analysis, the decision must be a political one. Standards will affect different nations differently. Obviously a nation trying to industrialize will not be as interested in safety or anti-pollution standards as nations with established technology.

MR. LA QUE: There are many occasions when the *need* for safety regulations is recognized by all, even though there is lack of agreement among the people affected on what the standards should be. It is not uncommon, therefore, for a regulative body or a legislative body to impose a safety standard by edict without waiting for complete agreement. It is highly desirable to have good standards before they are imposed, but it is not mandatory. There is nothing to keep an international body, given the authority, from imposing safety regulations without a consensus of all concerned.

MRS. BORGESE: Could the United Nations or an international ocean regime use insurance companies as safety advisers?

MR. DAWSON: Yes, but it might not work too well in practice. One regulatory body in England sent out two hundred letters to industry and did not receive a single reply. What happens is that if companies receive floods of paper from a regulatory body, they just do not respond.

MR. PECCEI: May I say that while I compliment those who are searching for solutions, even in these specific matters, I think that we are missing the real gist of the importance of the ocean. We should not consider it chiefly as a place where we can recover minerals or extract oil. The ocean is of much greater importance than that. What is in jeopardy now is life — both the quality of life and survival itself. The greatest reservoir of life in this embattled world is the ocean. The oxygen cycle is based on the ocean, for there, among the plankton, ninety per cent of the photosynthesis takes place. The ocean sustains our life capabilities; it has life potential for the species within it, for all animals, and for mankind. We must ask ourselves how we can survive and survive decently. There will always be nodules on the ocean bottom and always oil, profitable or not, but what are these riches without life on earth? So that life may continue and mankind survive, we need a systemic approach not only to the ocean itself but to all the related environment and to the institutions that affect it. Life must be our true concern.

PART TWO

PROJECTED ENTERPRISES

"They thought I was crazy when I bought the island. I said it was a bargain. . . . They thought it was anarchy to fly my own personal flag."

Judge Fulton of the Federal District Court opened his judgment in *U.S. v. Ray* with this quotation from J. P. Donleavy's *Meet My Maker the Mad Molecule*. Today, however, exploitation is not limited to existing islands, for the very advances in marine technology that make possible the exploration and exploitation of ocean resources at ever greater depths bring with them the potential for building new "land masses" or artificial islands.

Traditional international law did not anticipate the creation of an island by means of engineering but confined itself to title derived from effective occupation of uninhabited *natural* land masses. Moreover, this body of international law, which evolved during centuries of conquest by colonial powers, did not contemplate occupation by private individuals on their own behalf but only occupation on behalf of states. When it comes to private construction in international waters, the law is thus deficient in two respects: it covers only the occupation of an existing land mass not the creation of a new land mass; and it treats nation-states rather than private individuals as the traditional subjects of international law.

It is in this legal vacuum that private island-building must be seen. Two factors will probably determine the fate of such activities in the ocean: first, the number of sites available for private construction, and, second, the objectives of private enterpreneurs. Since construction must take place on a seamount in relatively shallow water and yet not on the continental shelf of a coastal state, it would seem probable that the number of potential sites, and hence the potential artificial islands, is relatively small. The motives of private entrepreneurs in building artificial islands will be an important consideration since nation-states frequently feel compelled to fill any lacunae in international law by unilateral action. In the case of purely scientific ventures, the islands may well come under the jurisdiction and control of the states whose nationals create them, just as ships are subject to the jurisdiction of the state whose flag they fly. Purely commercial ventures, on the other hand, will create new problems for the international community.

In the past such commercial ventures have usually received short shrift from coastal states because the express purpose of the ventures has been to undertake activities not permitted in those coastal states. The most obvious example is the proliferation in recent years of "pirate" radio stations on abandoned World War II seaforts in the North Sea. These radio stations were used to broadcast commercial programs into Britain and Holland where they are illegal. It was perhaps this attempt to circumvent the laws of the coastal state that provoked the hostile reaction. Many of the stations, furthermore, were broadcasting on unauthorized frequencies, interfering both with legitimate stations and with Coast Guard and Navy emergency communications. Britain countered by passing legislation making it illegal for British companies to supply such offshore facilities, for British nationals to work on them, and for British firms to place advertising contracts with them. Holland, on the other hand, went so far on one occasion as to send its Navy to occupy the structure by force and close down the radio station.

Coastal states will, however, be provoked to such extreme reaction only if they consider their national interests to be threatened. When, as seems probable in the near future, artificial islands are created for scientific or commercial purposes, the reaction may well be different. Where there is respect for the systemic international order that prevails even on the high seas, where safety of navigation is guaranteed, where rules of navigation and the right of innocent passage are protected, and where there is no interference with established allocation of communications frequencies, these new land masses in the oceans may well be welcomed into the international community.

JACK R. McFARLAND

AN OCEANOGRAPHIC AND SUBOCEANIC PROBE: ISLAND POWER STATIONS

The task that will confront man, if he is to succeed in the challenge he faces on the ocean frontier, will be to structure an attainable plan for the development and management of the ocean realm. The almost scaleless undertaking will require great virtuosity to create a new perspective that will bring into proper balance his dreams, his ego, and his best wit. The task of making the initial step will be the most difficult. To survey the groundwork and program the new establishment, one strongly supported and backed internationally, will be that first step. Only then, with the abstract of a great joint venture established and the coöperative and creative climate synthesized, could real plans be made. The emerging continuity, having brought men of the world together, would nourish and strengthen their communal efforts in the accomplishment of a tour de force.

While it requires little vision to be aware of the need coöperatively to pursue the sensitive and systematic development of this world's greatest volume, it will take clear and great vision as well as herculean efforts and devotion on the part of a broad spectrum of disciplines if the urgent need and the goals established to meet that need are to be met with a response of any significance. It must involve men of many talents and men of great general knowledge; it will require as well the guidance of truly universal men, for only with the balance and unity of broad intelligence can a truly elegant synthesis be realized. One need not look far to see what national and international fragmentation has been wrought societally during our intrigue with intellectual and technical specialization. Shortsighted and selfish pursuits must be replaced by new long-range plans that are firmly rooted in a philosophy of environmental and ecological clemency. What man has wasted he must replace, and the destruction he has wrought must now be paid for. The future of his last, and perhaps his richest, frontier is at stake.

We are all aware of the compromising and awkward position of the industrial sector today. Industry, directly and indirectly, is regarded as one of the major threats to marine and terrestrial ecology and environment. Today all industry is suspect as a near and visible neighbor. While the demand for its products continues to grow in an incredible spiral, the problem of industrial expansion that must meet this demand is often hamstrung when it comes to the siting of new

facilities. It is becoming an increasingly difficult problem to solve, for critics abound and the picture is clouded by hysteria and emotion and quite often poor or distorted information. This is not to say that certain alarm is unfounded but that the resulting potpourri makes rational analysis difficult if not impossible.

However man and industry have erred in their enthusiastic and sometimes misguided conquests, there is evidence of an awakening to the fact that necessary new expansion and growth cannot be uncontrolled and must be undertaken with all hands on deck. Corporations large and small now employ talents never before associated with their operations. They are broadening their outlooks and expanding their capabilities so that they may meet the creative challenges and responsibilities they have in the past overlooked. The electric utility, with all its demerits, is very much a part of this new vanguard.

Consider an electric utility serving a large metropolitan area, one of the most highly concentrated areas in the world. This utility is faced with the monumental task of providing, in the next ten years, new capabilities for the generation and distribution of electricity equal to all those it amassed in the first fifty-eight years of the twentieth century. In addition to assessing the bare facts, which were the only facts that were considered in the past, it now must be and is dedicated to meeting this challenge with finesse.

The new generating facilities dictated by load demand and economics, be they fossil- or nuclear-fired, will be large and will require large sites and large quantities of water for cooling. To eliminate the need of perhaps highly desirable land being devoted to unsightly transmission corridors, they should be as close to the load centers as possible. Yet, few in the city will consent to being their neighbor.

The electrically greedy metropolis is a world port and is adjacent to large bodies of water, both open and protected. With the lack of large publicly acceptable industrial sites within the city, the utility begins to explore the possibility of sites offshore that will satisfy the close-coupled relationship so essential to its operation. Possible sites include existing islands, man-made islands, platforms on piling, and caverns below the ocean floor. Each could provide the required space, necessary cooling water, and the sense of privacy the public critics would have them enjoy.

With land in short supply and excessively dear for all industries that must retain a close physical relationship with the city, sites offshore offer the possibility of mutually beneficial as well as highly logical multi-use solutions. To mention only one, consider the air-transport industry with its need for new jetports. This industry is about as welcome in or near the metropolitan area as an electric utility. They both transport a commodity, provide an increasingly popular service, and have for the most part the same detractors, "polluticians."

Although neither the air-transport industry nor electric utilities can be regarded as contenders for sites in international waters, industrial intrigue with offshore exploration is by no means new. While there has as yet been no large-scale deployment, we have some unpleasant evidence of what can happen. Vast claims have been made and a rush can be expected. Indeed, the rush may be imminent and, because of this, the effort to save existing international waters and seabeds from the massive mismanagement and destruction that has been inflicted on land, and is beginning to infect the oceans, should be the urgent and major goal of the Malta Convocation. The oceans should first and with dispatch be established as an international preserve with all the ecological connotations of such a concept. Then and only then would it be safe or would we be mature enough to pursue its rational management and exploitation.

While certain industries today are showing interest in the possible advantages of sites immediately offshore to provide various mainland services, in the long run the major focus should be on the protection and management of international resources. The exploration and exploitation of these resources will depend essentially on a highly mobile force, one that will utilize space, surface, and submarine vehicles. Permanent access to submarine and suboceanic regions and the establishment of new internationally sanctioned industrial spaces, on the other hand, may well require stationary habitats rooted in and giving direct access to the geological foundations of the ocean floor.

While strategically located islands might be considered as sites for the new establishment, the concept that follows depicts the form and anatomy of a shallow marine entry utilizing a seamount site. It suggests a prototype seat for the international colonization of the seas. This seat or group of seats would be used where needed around the globe and would become part of the structural backbone, the fixed community, of the established international ocean-management organization.

The autonomous and environmentally philanthropic nature of the organization would of necessity be reflected in the basic concept used to structure and energize the new undertaking. This model is suggested as a habitat for the organization's essential functions: social, organic, and inorganic research and management; the production, harvesting, and distribution of marine food; and the extraction and marketing of needed minerals and petroleum. To fulfill its purpose, the marine seat must be a thoroughly responsible and ecologically acceptable entity; it must, in a sense, be a complete and self-contained utility.

Generally, the prototype considered here is attainable by means of existing technology. In the future whatever advanced technology is needed should be sought and developed under the direction of the international joint venture. The appalling redundancy characteristic of national man's separate and secret competitions for new conquests and techniques is a waste and a luxury not to be tolerated in this undertaking. The only redundancies that could be justified would be those that provide for the integrity of a safe, clean system. The ocean can no longer be considered a great blotter for the mistakes or failures of man. If he is to pursue his daring conquests, he must devise methods that will properly contain his failures.

Access into the submarine and suboceanic depths will be provided by groups of circular caissons anchored in the geology of the sea floor. Their number, grouping, and structural interconnections will be dictated by the number of functions to be served at any one site and the safety requirements peculiar to the installation and its operation. The caissons will provide the means for all vertical communications and transport and will act as ventilating shafts for the compartmentized suboceanic complex below.

Beginning at sea level, the organization of the complex is initially vertical until the third, or suboceanic area, is attained. At this point the proportions will be both vertical and horizontal. The three zones and the activities to be accommodated are:

1. Sea Level
(a) Living and administrative spaces.
(b) Surface and air-docking facilities.
(c) Meteorological and communications stations.
(d) Limited daylight farming.

2. Submarine
(a) Underwater observatories.
(b) Underwater laboratories.
(c) Underwater docking and entry locks for submersible research and work vessels.

3. Suboceanic (four compartment possibilities)
Compartment A
(1) Electric generation.
(2) Fresh-air and ventilation system.
(3) Fresh-water system.
(4) Waste-processing and disposal system.
Compartment B
Mineral exploration, extraction, and processing.
Compartment C
Petroleum and gas exploration and extraction, with release control system.
Compartment D
(1) Food processing.
(2) Light manufacturing.
(3) Repair shops.
(4) General warehousing.

While the spatial and functional organizations described here might be thought of as typical, the requirements for the exploration and exploitation of a specific site can be expected to vary considerably, just as the location, climate, ocean currents, and resources sought will vary. For this reason the most important feature of the basic caisson module would be the ease with which it might be adapted to the needs of a particular site. The habitat has been referred to as an organism because of the ecological integrity and efficiency it must establish and because of its cellular structure, which enables it to be responsive to the mechanics of any situation. If the habitat would seem to emulate life, a continuity, it is not a coincidence.

ANTHONY T. RESSA

A PLAN FOR AN ISLAND STATE

How does the present state of national and international law affect the plan of an entrepreneur to develop a land mass in the ocean beyond the present limits of national jurisdiction? What effect would any future extension of the limits of national jurisdiction have on such a project? Project Taluga is a planned development to which these questions will apply, but the answers to them will depend on the applicability of any law or treaty that would permit or prohibit the undertaking. Consideration of the project in some detail must, therefore, precede any specific conclusions.

In 1959 Edward M. deSarro, an American engineer, conceived a plan for the construction of a land mass at Cortes Bank, a seamount in the Pacific Ocean. Since that time, Mr. deSarro has expended more than a quarter of a million dollars of his personal funds on exploration, research, and engineering toward the construction of this land mass, which he has called Project Taluga. On March 8, 1968, the Cortez Development Corporation was formed for the purpose of succeeding to all rights, title, and interest, and to all technology and research, developed by Mr. deSarro in connection with this project. The corporation, located in Bellevue, Washington, will provide a perpetual entity to direct administration and supervise architectural and engineering activity for Project Taluga and other seamount projects.

The Cortes Bank is a submarine seamount rising from the abyssal ocean floor; it is located a hundred miles seaward from an extension of the maritime boundary separating the United States and Mexico. Measured from the westward terminal point of this boundary, the Cortes Bank is nine miles south of the boundary and one hundred miles west of the Republic of Mexico. The bank is beyond the continental rise, where the continental slope meets the seabed, in an area that would be within the jurisdiction of the contemplated international ocean regime and beyond the present recognized national jurisdiction of the United States or the Republic of Mexico. Cortes Bank extends from a latitude of 32°25′30″N. to 32°27′40″N. and from a longitude of 119°5′W. to 119°8′W.

LEGAL CONSIDERATIONS

The Cortez Development Corporation takes the position that the area it seeks to develop is beyond the present limits of national jurisdiction of either the United States or the Republic of Mexico. The corporation maintains that its position is valid simply on the basis of location. It asserts that national jurisdiction cannot be claimed under the doctrines of adjacency or exploitability or on the basis of any other method for fixing a legal or geological boun-

dary for the continental shelf. It maintains further that the Cortes Bank is not a natural promulgation of either nation's territory into and under the sea. Rising from the abyssal ocean floor, a seamount is by its very nature not part of the seabed, and its geological presence therefore requires special consideration.

Any plan for a development beyond a state's territorial sea requires a review of applicable state, national, and international law as recognized by political subdivisions within the state as well as by the state itself and by other sovereign states. Since the United States has indicated an interest in the area of Cortes Bank, the following references are to applicable United States law, as it presently exists, and to U.S. court decisions. No interpretation of the law and court decisions of the Republic of Mexico will be cited.

What rights does a person or a state have beyond the limits of the territorial sea? The United States first claimed jurisdiction over the continental shelf by the Truman Proclamation of 1945:

"The Government of the United States regards the natural resources of the subsoil and seabed of the continental shelf beneath the high seas but contiguous to the coasts of the United States as appertaining to the United States, subject to its jurisdiction and control."[41]

The Truman Proclamation failed to define the continental shelf. A definition did emerge in the United States Outer Continental Shelf Act of 1953:

"All submerged lands lying seaward and outside the areas of lands beneath navigable waters as defined in Section 2 of the Submerged Lands Act."[42]

The term "lands beneath navigable waters," as used in the Act, is defined as:

"(1) all lands within the boundaries of each of the respective states that are covered by nontidal waters that were navigable under the laws of the United States at the time such state became a member of the Union, or acquired sovereignty over such lands and water thereafter, up to the ordinary high water-mark as heretofore or hereafter modified by accretion, erosion, and reliction;

"(2) all lands permanently or periodically covered by tidal waters up to but not above the line of mean high tide and seaward to a line three geographical miles distant from the coastline of each such state and to the boundary line of each such state where in any case such boundary as it existed at the time such state became a member of the Union or as heretofore approved by Congress, extends seaward (or into the Gulf of Mexico) beyond three geographical miles; and

"(3) all filled in, made, or reclaimed lands that formerly were lands beneath navigable waters as hereinabove defined."[42]

Following passage of the Outer Continental Shelf Act, numerous states commenced boundary suits that will inevitably continue until all federal-state continental-shelf boundary lines are finally settled.

The Geneva Convention on the Continental Shelf, drawn up in 1958, gave what amounts to a disputed definition. Article 1 provided:
"For the purpose of these articles, the term 'continental shelf' is used as referring (a) to the seabed and subsoil of the submarine areas adjacent to the coast but outside the area of the territorial sea, to a depth of two hundred metres or, beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources of the said areas; (b) to the seabed and subsoil of similar submarine areas adjacent to the coasts of islands."[43]

This definition, although generally accepted, has been subjected to different interpretations by various states, the United Nations, the American Bar Association, the National Petroleum Council, and other organizations. As a consequence, there have been recent suggestions that a new convention be held to redefine the outer continental shelf.

Article 2 of the convention provided:

"(1) The coastal state exercises over the continental shelf sovereign rights for the purpose of exploring it and exploiting its natural resources.

"(2) The rights referred to in paragraph 1 of this article are exclusive in the sense that if the coastal state does not explore the continental shelf or exploit its natural resources, no one may undertake these activities, or make a claim to the continental shelf, without the express consent of the coastal state.

"(3) The rights of the coastal state over the continental shelf do not depend on occupation, effective or notional, or on any express proclamation.

"(4) The natural resources referred to in these articles consist of the mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to sedentary species, that is to say, organisms that, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil."[43]

The recent North Sea case decided by the International Court of Justice significantly limited the definition of "adjacency" by dictum declaring:

". . . by no stretch of the imagination can a point on the continental shelf situated, say, a hundred miles, or even much less, from a given coast, be regarded as 'adjacent' to it, or to any coast at all, in the normal sense of adjacency."[44]

Of particular interest to any state or citizen of a state is the recent case of *U.S. v. Ray* decided by the Federal District Court, Southern District, in Miami, Florida, which ruled on the question of whether the United States had possession of or claimed title to the continental shelf seaward from the territorial sea. In that case, the Court stated:

"The United States, acting through the legislative power of the Congress or the treaty-making power of the President, has never claimed title to the shelf or asserted sovereign ownership over it. All it has claimed is the right to explore and exploit the shelf and formulate regulations to insure an orderly enjoyment of that right, in a manner consistent with the safety of navigation."[45]

The Court went on to a determination of the issue of submarine trespass.

"The gist of the common law action for trespass *quare clausum fregit* is the unwarranted entry upon the land of another. Such a claim can be constructive. If an owner is not in actual possession of the property but does have *title* thereto, the title will draw constructive possession to itself, and trespass will lie. However, since the United States is not in actual

possession of these reefs, and since it apparently has not claimed their title, it cannot recover under its first count the trespass claim."[45]

This decision must be recognized as the precedent-setting case in the state of Florida limiting the seaward extent of title and possession of the shelf by the United States.*

As recently as February 26, 1970, a dispatch from Washington, D.C., carried by the United Press International, stated that the United States will continue to recognize three miles as the limit a country may claim as its territorial waters, although it favors extending the limit to twelve miles.

In an American Bar Association joint report by the Section of International and Comparative Law, the Section of Natural Resources Law, and (with qualification) the Standing Committee on World Order under Law, following the annual meeting in Dallas, Texas, August 10-11, 1969, there appeared a summary and critique of Chapter 4, Part 3, of the report of the Marine Science Commission. The following were conclusions regarding the limits of the continental shelf:

"(1) We reaffirm our opinion that the concept of adjacency contained in the present shelf Convention should properly be interpreted to include the submerged continental land mass. In the view widely held among our members, all of the submerged continental land mass is subject to national jurisdiction over its natural resources. In the view of a significant number of our members any part of this land mass will come within natural jurisdiction as soon as it becomes accessible to exploitation.

"(2) We reaffirm our opinion that it would not be desirable, in terms of overall United States interests, to seek a formal international conference for the purpose of fixing a precise boundary for the legal shelf. We believe it both preferable and proper to achieve this aim through parallel declarations by interested states announcing a uniform interpretation of the criteria embodied in the 1958 Convention.

"(3) We reaffirm our opinion that the United States should assert to the full the rights over adjacent submarine areas now vested in it by the shelf Convention and by general international law.

"(4) We reaffirm our opinion that claims to rights in excess of those recognized in the shelf Convention (such as rights over the superjacent waters, nonsedentary fisheries, or airspace) are invalid extensions of the continental-shelf doctrine and should be so regarded by the United States."[47]

The foregoing report recognized that any consideration of a deep-sea regime would be entangled with the question of the continental-shelf limits.

The United Nations, in its continuing effort to define the limits of the continental shelf and to solve other problems relating to the ocean, adopted a resolution on December 15, 1969, by a vote of sixty-two to twenty-eight with twenty-eight abstentions, declaring a moratorium on all exploitation of the resources of the deep seabed. The pertinent provisions of the resolution are as follows:

"*Declares* that, pending the establishment of the aforementioned international regime:

"(a) States and persons, physical or juridical, are bound to refrain from all activities of exploitation of the resources of the area of the seabed and ocean floor, and the subsoil thereof, beyond the limits of national jurisdiction;

"(b) No claim to any part of that area or its resources shall be recognized."[48]

The position of the United States delegate was that the prohibition in the draft resolution would be without binding legal effect. The delegate from Ceylon, one of the co-sponsors of the resolution, is reported to have said, "It will have no legally binding effect whatsoever." The chairman of the American Bar Association's Section on International and Comparative Law stated, "The General Assembly may only recommend to states how they and their nationals should comport themselves."

Since the Geneva Convention on the Continental Shelf, the numerous articles and papers that have been published on the subject have almost universally overlooked references to the doctrine of discovery and occupation. A separate ocean regime with jurisdiction over the entire ocean floor and the subsoil beneath and located beyond the seaward boundary of a state's recognized jurisdiction would automati-

*EDITOR'S NOTE: The Federal District Court ruled on two points of law: 1) whether there were grounds for a common-law action in trespass; 2) whether the United States could halt construction activities because they had been undertaken without a statutory permit. Ray lost the case on the latter issue. For a fuller review of the case, see Appendix I.

cally preclude a state from acts of discovery and occupation that have been recognized since the early nineteenth century. Acquisition of territory takes place under what is legally known as "original" or "nonderivative" acquisitions. In all instances, the claimant has attempted to establish a series of acts that amount to his taking and maintaining possession of land that was previously *res nullius* (belonging to no one). Discovery is merely one of the possible starting points in the series. If the claimant succeeds, he establishes title by occupation.[49]

The original or nonderivative modes would include: (a) discovery, (b) occupation, (c) prescription, (d) accretion, (e) erosion, and (f) avulsion.

How would the modes of original or nonderivative acquisition of territory be applied to submarine areas? In the words of L. C. Green:

"It has been suggested . . . that title to the continental shelf and its resources depends upon effective occupation, in the same way as does title to land or guano islands, although it is true that the requirements for effective occupation depend on the nature of the terrain, the difficulty of settlement, and the like. What is necessary for land, therefore, may be more than the minimum required for the seabed. Nevertheless, mere proclamations and unilateral declaration can amount to no more than inchoate titles requiring some measure of occupation or exploitation to perfect them."[50]

Article 2 of the Geneva Convention on the Continental Shelf changed what has been customary international law. Sir Humphrey Waldock declared in a paper published in 1951:

"What, in the absence of a legislative convention, is the alternative? The alternative presumably is that we should recognize an entirely new doctrine of customary law under which the continental shelf vests *ipso jure* in the coastal state on the analogy of territorial waters or territorial airspace. . . . The analogy is not exact because the concepts of the territorial sea and airspace, unlike the suggested concept of the continental shelf, were not adopted in the face of a contrary rule of established customary law. . . . Let it be conceded that the advent of new methods of submarine exploration and engineering constitute a new factor comparable with the development of aircraft. But the new factor is not to operate in a field of law that is virgin. It is to operate in a field where under the established law a state has no exclusive rights unless it can show an exceptional title by specific acts of occupation. The suggested new doctrine of the continental shelf, therefore, is not merely novel but involves a reversal of existing customary law."[51]

Article 2 of the Convention also gave the United Nations inherent title to the continental shelf beyond the two-hundred-metre isobath, and the U.N. moratorium resolution was based on this inherent authority. The United Nations proposes that it administer an ocean regime, leaving exploration and exploitation to a licensee.

THE TALUGAN COMPLEX

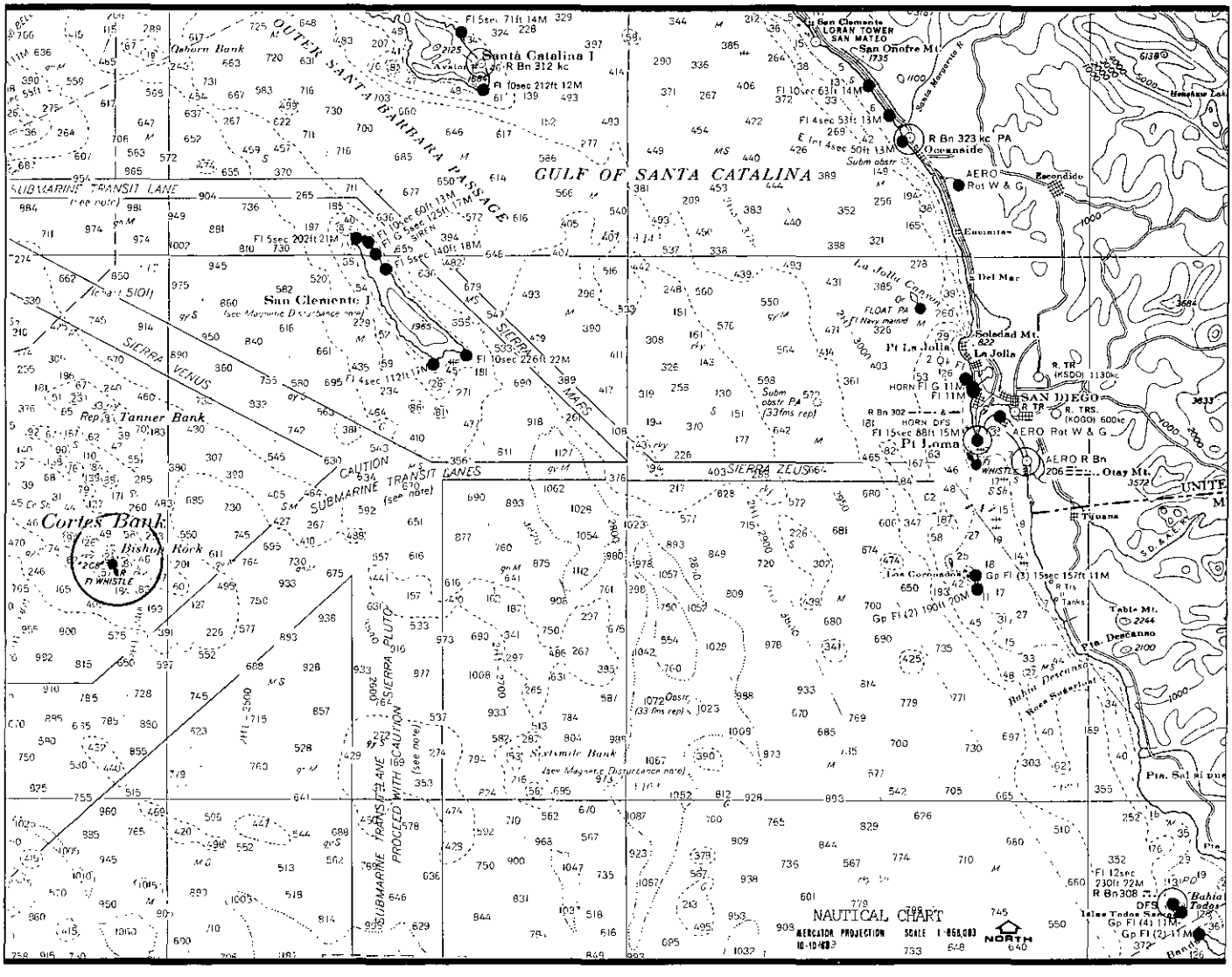
The area surrounding the Cortes Bank is characterized by a series of deep basins and intervening ridges. These basins have a maximum depth of 1,080 fathoms and are primarily areas of sediment accumulation. The sides of the banks are steep, with an average slope of six degrees. The steep slopes rise 850 to 1,080 fathoms above the floor of the basins that flank the bank on three sides. The Cortes Bank is a hundred and twenty square miles in area, with a minimum depth of two fathoms. The most striking physiographic feature of the bank is its extensive terrace at a depth of forty to sixty fathoms. On this terraced surface are two major topographic highs. Samples show that the highs consist of basaltic rock, whereas the terrace is of sedimentary rock. Rock samples were taken at twenty-seven locations. Only igneous and sedimentary rocks were found in the bank area. Of the rock specimens, 67.1 per cent were igneous, primarily of volcanic origin.[52] Cortes Bank is uniquely formed in a natural manner to provide a base for construction of a land mass above water.

The Talugan complex will consist of four distinct island land masses — the capital island, consisting of 2.3 acres; Aurora, 26.12 acres; the large island of Triana, 102.3 acres; and the second-phase island of Bonaventura, 48.35 acres. A maximum depth of eight fathoms (forty-eight feet) is maintained as the outer boundary for each of the land masses. Surrounding the entire complex will be a protective rock seawall. This seawall will maintain an average depth of ten fathoms, or sixty feet. There is a minimum of a hundred and fifty feet planned between this rock seawall and the land mass, allowing ample channel width for marine traffic circulation. The protective seawall is designed to minimize erosion and to act as a deflector for the land mass. Openings are planned

in the seawall to allow boat traffic to enter and exit the complex.

The first actual construction fill will begin with the seawall. Rocks are classified by size and weight. Class "C" rock, from six inches to one foot in diameter, will form the base. Layers of Class "B" rock, up to one ton maximum, will be placed upon this base. The outside portion of the seawall will contain Class "A" rock, weighing a maximum of three tons. There are several possible quarry sites with suitable rock within a one-hundred-mile radius of the Cortes Bank. Currently under primary consideration are the Coronado Islands, located in Mexican waters. Here the rock could be blasted to the correct size and barged to the Talugan site where it would then become the major fill material used for Taluga.

The fill material is designed to support a large reinforced concrete superstructure. This superstructure is to be approximately fifty feet wide by thirty-five feet high. The structure will be approximately three miles in length and will not only offer additional protection against possible storms but will contain retail shops to serve the island complex. The area enclosed by the seawall is almost two square miles. There is also to be a six-thousand-foot runway similar in design to the seawall superstructure. The runway will be a hundred and fifty feet wide, with a separate air-taxi area. On the lower level of the runway, fuel storage compartments and warehouse facilities are planned. There will be docking facilities, located at the southwest end of the air strip, for ten passenger and three cargo planes, as well as for four helicopters. Directly beneath the docking facilities will be the air terminal, which connects to a rapid-transit system located under the taxiway for service to the islands of Triana and Aurora. The rapid-transit system will move tourists, baggage, and service personnel and cargo to the hotel complexes on Triana.



From an economic point of view, the location of the Cortes Bank prohibits massive on-site construction and therefore a building system had to be designed that could be prefabricated on the mainland and barged to the site, with a minimum of on-site construction. All major structures are to be built over the water for easy boat access and also so that the land mass can be maintained as a park area for the islands' inhabitants. With the building separation, land-fill operations and building construction can occur simultaneously. All the important supporting columns go down to bedrock, and construction can therefore begin without waiting for the land to settle. It is planned that living units will also be prefabricated. A free modular construction system, to allow a great variety of spaces with a minimum of architectural and structural alteration, will be the primary building method used in the Talugan complex.

A Los Angeles accounting firm was engaged early in 1969 to make periodic reviews of the proposed plans for Taluga, basing their findings on numerous conferences with and reports provided by the Cortez Development Corporation.

The following outline prepared by this firm summarizes the estimated construction costs for completing the island of Taluga and some of its facilities (Phase I construction). These costs reflect current prices on construction services and supplies.[53] This estimate does not include costs for hotels, apartments, business structures, and recreation buildings that are to be built on land leased to private enterprises.

ITEM	ESTIMATED COSTS (Thousands of Dollars)
1. Land Mass and Breakwaters Rock class A, B, and C: *dredging material, sand, and topsoil.*	$135,870
2. Concrete Hydrowall and Bazaar Structure.	43,200
3. Airstrip Structure and Air Terminal (including some piers).	82,500
4. Electric Power and Service Distribution: *electrical generators; electrical distribution system; street lighting; and lagoon lighting.*	5,130
5. Water Desalinization and Distribution: *water desalinization equipment and water distribution system.*	4,400
6. Sanitary Sewage and Garbage Disposal: *sanitary sewer collection system; sewage treatment plant; and garbage disposal.*	5,600
7. Elevated Transit System.	8,000
8. Park and Recreational Facilities: *landscaping; garden sculptures; tennis courts; handball courts; swimming pools; putting greens; marine life park; support equipment; and safety equipment.*	13,000
9. Docks, Marinas, and Piers.	3,000
10. Communications: *radio and TV station and electronic and navigational aids.*	11,800
11. Public Structures and Social Facilities: *primary school; high school; marine academy; hospital; yacht club; and amphitheater.*	15,800
12. Government Buildings.	19,500
13. Construction and Operations Planning.	2,200
Total:	$350,000

Phase I of the Talugan complex will serve a total population of approximately ninety thousand. It is estimated that ten thousand tourists will stay for a period of more than one day, while eight thousand will visit for one day only. It is anticipated that the complex will attract approximately three thousand retired residents. The remainder of the population will be government and private employees.

The accounting firm has been commissioned to study operating plans and estimated future revenues from all sources, including the tourist trade, and to prepare from them projections of the economic outlook for the Talugan project. On November 28, 1969, a special team of consultants, consisting of an economist, an engineer, a tourism consultant, a hotel consultant, a franchise consultant, and several general business consultants, submitted to the board of directors of the Cortez Development Corporation a projected economic outlook for the Talugan project, together with an economic pilot study.

Part I of the estimated annual economic outlook dealt with the four basic sectors of the economy — the tourist sector, the support and labor force, the industry sector, and the government sector — and summarized the projected annual gross income and product from these sectors in substantial, though painstakingly conservative, figures.

Part II of the report covers the economic outlook for the Talugan Project, including a refinement of estimated costs of the preliminary economic feasibility study; project cost estimates for the technical feasibility study; and estimated construction costs for the completion of the island of Taluga and its basic support facilities.[54]

Part III is a brief summary of the phases of Project Taluga, and the projected costs and returns are handled in four sections: Phase I — Pilot Study, completed; Phase II — Complete Feasibility Study, in preparation; Phase III — Construction (reported above); Phase IV — Operation, providing investors a return based on all operations.

CONCLUSIONS

The foregoing outline of the contemplated development of this land mass beyond the limits of national jurisdiction, considered in terms of present and future national and international law (or the absence of such law), would suggest the following conclusions:

(1) Project Taluga as conceived by its founder and currently directed by Cortez Development Corporation is located in international waters beyond the limits of national jurisdiction of either the United States or the Republic of Mexico.
(2) The projected development is to be on a submarine seamount located above the abyssal ocean floor beyond the limits of the legal and the geological definitions of the continental shelf.
(3) The Geneva Convention of 1958 has not established a universally accepted definition of the term "continental shelf."
(4) Neither national nor international law is directly or indirectly applicable with respect to location, purpose, or operation.
(5) Article 2 of the 1958 Geneva Convention is limited to the natural resources of the seabed and subsoil of the continental shelf.
(6) Neither Article 1 nor Article 2 of the Convention contemplates a submarine seamount as a natural resource subject to exploration and exploitation by persons or states.
(7) The North Sea case defined and limited the term "adjacency," as it may be applied to a state's jurisdiction over the shelf.
(8) The Presidential Proclamation of 1945, asserting jurisdiction, is limited to the geological shelf.
(9) The U.S. Outer Continental Shelf Act is limited by definition to the shelf itself.
(10) Recognized jurisdictional differences exist between the navigable ocean and the seabed and ocean floor. The U.S. Department of State has repeatedly withheld recognition of territorial seas beyond the three-mile limit, while the U.S. Department of the Interior permits drilling on the ocean floor eighty miles from shore.
(11) *U.S. v. Ray* declares that the United States has never been in possession of or claimed title to the continental shelf.
(12) A seaward extension of the provisional maritime boundary between the United States and Mexico would place the Cortes Bank west of the coast of Mexico.
(13) At the present time there is no recognized and enforceable national or international law that prohibits the construction of a land mass at Cortes Bank. Conversely there is no present law that establishes jurisdiction, guidelines, or licenses for such a project.

From ancient times to the present, man has shown concern about new islands that arise from the sea. As Alfonso the Wise of Castille wrote in 1265:
"It seldom occurs that new islands arise out of the sea. But if it should happen that a new island arise, we state that it must belong, *as property,* to whomever inhabit it first. But he or they who colonize it *owe obedience* to the lord within whose dominion the new island arose."[55]

With reference to Cortes Bank, the question can now be asked: Who is the lord within whose dominion the new island arose?

PART THREE

POSSIBLE INTERNATIONAL OR TRANSNATIONAL ENTERPRISES

An unfortunate principle may be said to govern the workings of all international organizations: the willingness of member states to agree on a common course is in inverse proportion to the utility of that course. The more complex and pressing the problem, the greater the difficulty of reaching a consensus, and, as a consequence, many despair of the effectiveness of international bodies. Such pessimism is unjustified, for these bodies must represent widely diverging viewpoints on all but the simplest of problems. The aim, therefore, must be to find solutions that lie between those proposals that are acceptable to all but ineffective and those that are effective but not universally acceptable.

Establishing an international ocean regime will clearly tax to the utmost the capacity of an international organization to reach agreement. There are, nevertheless, a number of encouraging precedents for a new approach to areas or resources common to mankind. The treaty on the Antarctic, the treaty on Outer Space, the Moon, and Other Celestial Bodies, and the conventions on the use of airspace demonstrate the capacity of states to approach new areas and resources in a spirit free from nationalism and to agree not to make claims of sovereignty. A further example, especially significant in that it concerns resources yet to be discovered, is the treaty establishing EURATOM, the atomic energy agency of the European Economic Community. That treaty contains a striking advance in the legal notion of common property, for it provides that any fissionable material discovered in any one of the six member countries automatically belongs to EURATOM and thus to all the nations in common.

While they originally involved only a few states, these agreements clearly demonstrate the feasibility of an international ocean regime. More striking, perhaps, are the commercial agreements that make possible the highly developed world trade of the late twentieth century. Commercial enterprises have emerged to transcend national frontiers, and "world peace through world trade" is no longer an empty slogan. East-West trade continues to grow exponentially, despite national and ideological differences, and several Western corporations are involved in the key automotive, computer, petrochemical, and textile industries of the Soviet Union in a way that would have been unthinkable ten years ago. An ever growing list of United States corporations have a greater stake in foreign than in domestic operations. Standard Oil of New Jersey, Pfizer, Colgate-Palmolive, H. J. Heinz, Singer, United Shoe Machinery, International Telephone and Telegraph, and Anaconda all have at least half their assets abroad, or do more than half their selling abroad, or earn more than half their net income abroad. This dramatic overreaching of national frontiers by the corporate sector may in a very real sense be as important as the creation of international organizations. It reveals unmistakably that where mutual advantage and common interests are perceived, nation-states will work together for the common good. The challenge facing an ocean regime, whether based on an international political organization or on an international commercial venture, will be to foster that perception and to encourage nation-states to cooperate rather than compete and thus to solve their problems through agreement rather than through conflict.

ADOLPH A. BERLE

ANALOGIES BETWEEN ENTERPRISE ACTIVITIES IN AIRSPACE AND IN THE OCEANS

In some respects, the problems connected with seabed development, including pertinent questions of international law, are similar to the difficulties we faced thirty years ago with regard to the use of airspace. Many of these issues were resolved by the Chicago Conference on Civil Aviation in 1944. It may be asked whether lessons can be drawn from our relative success in the field of aviation that will be of help in meeting the growing difficulties connected with the use of the oceans. Some analogies unquestionably exist, and they may provide us with guidelines.

By the time the world attempted to come to grips with the problem of civilian air use, the whole question had already been complicated by a series of nationalistic legal claims, similar to the claims now being advanced in connection with the seabed. In 1944 we had to start with an accepted doctrine of international law: each nation had sovereign rights to the air column above its own territory, "up to the sky." Legally any nation could prohibit over-flying by anyone else; permission was required before the planes of one country could fly over another. Thus our task in 1944 was to find ways to prevent the airspace and the airways of the world from being chopped into arbitrary national sectors and to make the air a common medium for transport and other civilian use.

Somewhat similar conditions prevail today with respect to the seabed. As long ago as 1945 President Truman proposed a law of the continental shelf, suggesting that every state with a seacoast be accorded the exclusive right to develop its adjacent continental shelf to the two-hundred-metre isobath. It was then thought that seabeds could not be exploited at water depths greater than two hundred metres.

Guided by the same general philosophy advanced in the Truman Proclamation, an international conference held at Geneva in 1958 enunciated the famous continental-shelf Convention, which was later ratified by a large number of countries. This Convention came into force on June 10, 1964, and adopted as a general doctrine of international law the right of coastal states to exploit the seabed on the continental shelf adjacent to their territories.

In an interpretation of this Convention, the International Court of Justice[56] accepted the continental-shelf doctrine in general, but the Court also observed: ". . . by no stretch of imagination can a point on the

continental shelf situated, say, a hundred miles, or even much less, from a given coast, be regarded as 'adjacent' to it, or to any coast at all, in the normal sense of adjacency, even if the point concerned is nearer to some one coast than to any other."[57]

Today exploitation of the seabed at almost any depth is a practical possibility, and the older theory of the continental shelf is becoming obsolete. A lively controversy is developing over the propriety of extending the continental-shelf doctrine to apply beyond the shelf itself to the deeper seabed.[58] The American Petroleum Institute is urging such an extension,* and on February 2, 1968, the Soviet Union promulgated an edict[59] proclaiming the seabed adjacent to the Soviet Union, irrespective of depth, as part of the Soviet continental shelf and declaring the natural resources thereunder to be owned by the U.S.S.R. Furthermore, on October 23, 1968, the Soviet Union, Poland, and the German Democratic Republic signed a declaration stating that the entire continental shelf of the Baltic Sea was continuous and subject to delimitation among the corresponding Baltic states, with a side agreement that participants were not to give over any part of the Baltic shelf to non-Baltic exploitation or use.

Meanwhile Latin American countries have been staking out their claims, some of them asserting limited sovereignty over the sea and its beds to a line two hundred miles offshore parallel to their adjacent coastlines. Recently Brazil, with a vast Atlantic shoreline, has joined this group. The extent of these claims differs, but they include claims to the seabed and to its mineral resources, to fishery rights, and to control of surface vessels fishing in the superjacent waters. Since international law recognizes freedom of the seas, no country has yet asserted that these claims impair the right of free navigation of surface waters.

All these claims, and the emergence of a degree of conventional international law supporting some of them, are similar to the claims and the law supporting the doctrine of national sovereignty over airspace that we faced at Chicago in 1944. Furthermore, the large oil companies that are now resisting any limitation on their freedom to exploit the seabed had their counterparts in the struggle for control of the air in the forties. Although the complete history of the fight for air supremacy has never been written, three large corporations at that time set up combinations designed to give them exclusive navigation rights across the Atlantic and the Pacific, as well as on certain North-South routes. Had the scheme succeeded, all of the air in the rest of the world would have been tributary to these main streams, and the corporate plunder would have been great indeed. The Chicago Conference was able to halt the plan, proving that corporate claims do not necessarily succeed in the absence of adequate political interest.

Unfortunately, the analogy between the oceans and the air is far from complete. Common interest was then a factor of far greater weight in the air than it now is in the sea. When individual nations uncompromisingly asserted their sovereign right to control their own columns of air, they also ran the risk that they would be confined within them and would thus be prevented from using the air as an international carrier. Common interest in access to the airways was in 1944 the means of breaking through the claims to undisputed national sovereignty over the air columns, with the result that the Chicago Conference was able to arrive at a formula for defining four freedoms of the air: the right to over-fly in innocent passage; the right to land in case of emergency; the right to land to discharge cargo; and the right to take on cargo in international matters. Absolute sovereignty was thus restricted to the right of cabotage and the right to determine where the landing points should be.

In addition, when the Conference set down rules for navigation and general air practices, it could rely on national coöperation. Force was unnecessary and sovereignty irrelevant. Obeying the rules was simply a matter of expediency. Those who wished to use the international airways could be counted on to comply with regulations in their own self-interest. This is not to say that air channels have always been inviolate — the law has been broken from time to time during one big war and a whole series of little wars. The establishment of international rules to cover air practice has meant, however, that a stop signal in New York is also a stop signal in Cairo or Delhi. Planes depend on these signals to enable them to take off from one airport and land safely at another. Anyone can opt out of this system of international law if he so chooses, but, if he does, his airplanes are unlikely to arrive at their destinations.

In the case of the seabed, common interest in international control seems much less of a positive factor, and the ocean floor at present appears to be up for grabs. What is more, claims to the seabed appear more tenacious than were the claims to the columns of air overlying the territory of sovereign

*For a statement of the American Petroleum Institute position, see Appendix II.

states. Any given area can be physically occupied, the seabed can be developed, and ocean surfaces can be controlled by naval power. Fishing vessels venturing within claimed areas have already been seized on a number of occasions, and few nations have cared to resist and face the naval war that such direct confrontation on the sea might bring. To some extent, also, occupation of the seabed itself has already taken place, chiefly by governments or private corporations interested in drilling for oil. It will, therefore, be more difficult to bring the seabed under universal control and to devise a generalized system of recognized international law and practice for its use than it was to work out methods for international control of the air twenty-five years ago.

On the other hand, international machinery does exist for the discussion of ocean problems, with the possibility of at least a measure of agreement. There is, for example, a United Nations Permanent Committee on the Peaceful Use of the Seabed and the Ocean Floor Beyond the Limits of National Jurisdiction. No similar forum existed in 1944 with respect to airspace, and a specific international conference had to be called.

The continental-shelf doctrine has been attacked both because it has offered a basis for extravagant claims and because it has failed to deal adequately with the problem of fishing rights. Experienced international lawyers — Professor L. F. E. Goldie of Loyola University in Los Angeles, for example — believe the continental-shelf doctrine has frozen so that the choice is no longer open between accepting the exclusive jurisdiction of coastal states over the shelf and seeking community freedom from such claims. The United Nations General Assembly's resolutions on national sovereignty over natural resources tend to support that conclusion.

Every land-bound state will have an interest in some kind of limitation on the claims of coastal states to their adjacent seabeds. In addition, every coastal country will have an interest in the resources of the deep ocean. On the basis of even this small amount of common concern, therefore, it should be possible to work out an agreement within which there could be competition.

Although the right of peaceful passage through the subsurface of the sea has attracted little attention so far, it is entirely possible that oceanographic tech-

niques will advance to the point that free access to the subsurface for submarine commerce or for scientific research will become of universal concern. One small dispute has already occurred. In 1962 a lively "lobster war" was carried on between Brazil and France. Brazil asserted the exclusive right to take crustaceans from areas that France insisted were open sea. In the future, as nations begin to develop resources other than oil, freedom of access to the undersea belt may well become a universal issue of major importance.

The state of affairs as it stands is not reassuring. All the conditions are present for a series of grabs not only for continental-shelf areas but for the deep seabeds beyond. Current claims under the Geneva Convention already go far beyond the limits of adjacency thought conceivable by the International Court of Justice. Like the United States National Petroleum Council, international oil interests are already advocating enlarging the continental-shelf doctrine, for, as Professor Louis Henkin has observed, they "feel confident of their ability to deal with national governments, their own and others," but consider dangerous any international regime. Finally, there is the distinct possibility that other countries may follow the Soviet lead and claim exclusive right to large areas of the seabed.

Can we resolve the international question before, not after, confrontation between nations using force or its equivalent to establish their pretensions? I think we can — but I think it will require another meeting like the one held at Geneva in 1958. With the existing state of international law, nothing less than an international treaty agreed to by a large number of nations will change or even limit the current national claims to the adjacent continental shelf, without defined outer limits. In the absence of such a treaty, it will be difficult to settle the question of the extension of the continental-shelf concept to the deep-ocean bed. Just as the Chicago Conference had to work out a new solution for use of airspace, an international forum will need to search for a long-term remedy for the present indefinite status of the ocean beds.

Conceivably the General Assembly of the United Nations might accomplish the task. Before the General Assembly now is a report, and a draft declaration of general principles, submitted by the Ad Hoc Committee to Study the Peaceful Use of the Seabed and Ocean Floor Beyond the Limits of National Jurisdiction. When this Committee agreed on a report on August 30, 1968, it expressed the hope that the United Nations General Assembly might at its twenty-second session agree on methods of action. The Committee emphasized, however, that the principles elaborated needed "further consideration and study,"[60] and probably, therefore, a new conference is needed.

The fundamental problems requiring resolution will come under four headings:

First, what limit shall be set to the doctrine of adjacency? Proximity, or adjacency, can be defined and limited and the areas of permissible national exploitation restricted in turn.

Second, what regime can be worked out for the exploitation of the seabed beyond any agreed limit? In the case of air, the International Civil Aviation Organization was brought into existence, and it has worked smoothly ever since. Similar provision could be made for an international undersea-resources administration, set up as a specialized branch of the United Nations. It should have jurisdiction over all undersea resources outside the boundaries of the continental-shelf area as further defined.

Third, what are the requirements to assure free access? The principle of "freedom of the underseas" might be established by treaty and embodied in international law. This principle should recognize the right of any peaceful vessel to navigate not only the ocean surface but also the underseas, up to the conventional limits of national sovereignty — the three-mile limit if the American doctrine is adopted or the twelve-mile limit if the view of some other countries prevails. Freedom of the underseas should be as clear-cut a right as the currently accepted right of any vessel to navigate the ocean surface.

In establishing this principle, the word "peaceful" should be stressed. At the Chicago Convention we adopted the concept of the four freedoms of the air. In like manner, freedom of undersea movement could and should be given to submarines on peaceful missions but not to vessels of war.

Fourth, what administrative or regulatory authority should an international ocean regime have? The international regime here contemplated could be assigned the task of licensing the exploitation of seabed resources and of drawing up applicable rules. It seems unlikely that governments will engage heavily in seabed exploitation; it is far more probable that international oil and mineral companies will venture their capital in such enterprises. It would not be beneath the dignity even of governments, however, to seek license from an international authority for this type of exploitation. Appropriate charges on the profits of such enterprises could be made; the money thus derived could be channeled into the

United Nations Development Fund for use in assisting the less developed nations for whom capital-building seems essential.

Presently we face the danger that undersea exploration and exploitation may take one of two extreme courses. Vast nationalist grabs analogous to the colonial grabs of the nineteenth century may result in the colonization of undersea resources. Alternatively, sheer anarchy may prevail beneath the surface waters, bringing with it the twin perils of conflict and paralysis in the development of ocean resources.

If an international ocean regime is to come into being, it must be in response to a universally recognized need. What are the common interests with sufficient worldwide appeal to provide the necessary base?

Probably the foremost consequence of unlimited national appropriation will be that sooner or later national interests will collide. The United States will eventually confront the Soviet Union in the Bering Straits, and Canadian interests might impinge on those of Denmark or even on American claims. In the Baltic Sea, disputes will unquestionably arise. As overlapping claims bring about more frequent conflicts, the common interest will favor a machinery for settling these disputes.

Ecology is a second matter of general interest. It is difficult to believe that anyone in the world is now entirely unaware of ecological problems, with the possible exception of the most underdeveloped states. The nations having the greatest interest in the deep oceans are also those with the most concern for ecology. Countries having large fishing industries, for example, are becoming aware that misuse of ocean resources could result in a smaller catch.

A third area of common interest is the issue of freedom of undersea navigation, mentioned above.

Finally, all nations have a common interest in profit, be they capitalist or socialist regimes. Whether for idealistic reasons, for economic reasons, for financial reasons, or for international-power reasons, every nation and every instrumentality wants all the profit possible. Arguments between capitalist nations and socialist nations over the respective wickedness of private and public exploitation concern not the profits themselves but the use of these profits.

As an aside, all nations might well have a common interest in having oil separated from other seabed resources and treated as a special problem. The need for a resource capable of supplying energy is common to all countries seeking modern development, and oil is the standard source of energy that can be imported. Just as a common authority was constituted in Europe to regulate the coal and steel industries, so an international authority for oil might be formed. The basic assumption of such an authority would be that all countries needing oil should get it, either from exploitation of their own resources or from an international pool. If oil were treated as separate from other seabed resources, one area of controversy might be eliminated, leaving the rest amenable to agreement.

In many respects, the specialized agencies of the United Nations have scored greater successes than the parent body itself, perhaps because they have dealt with defined and manageable problems. Regulation of seabed use is such a problem, and the United Nations is already seized of it. Competent diplomacy could profitably move in before the problem gets beyond solution or control. Regulation will not be easy, but neither was it easy to turn back the claim by those who had pioneered the airways that they were entitled to a monopoly of the air.

RICHARD EELLS

THE EMERGENCE OF A CORPORATE SOVEREIGNTY FOR THE OCEAN SEAS

Today, when man's technological capacity has made him so much at home on the surface of the sea that he can effectively explore even its depths, he is confronted by uncertainties. Unlike his experience in the past, when his primary encounter was with the immeasurable forces of nature, man now faces, as his determining limitation, not nature but himself. The ocean is becoming yet another symbol of mankind's inability to use the bounty of nature for common advantage.

Man's clear and present need is for a stable society of the seas, a society sturdy enough to insure the development of ocean resources and to avoid the dangers of ocean conflict and pollution. And yet, when man attempts to form such a society, his scientific and technological capabilities confront his legal and political inadequacies.

It is widely recognized among students of the sea that the concept of the nation-state and the realities of its existence since the medieval period lie behind these legal and political inadequacies. It is clear that an extension of the nation-state system to the realm of the ocean would lead to a division of marine resources that would be less than equitable, to a use of those resources that would be less than optimal, and to a type of sovereignty over them that would be less than favorable for the well-being and peace of the world. Nationalistic encroachment on the ocean bed, acts of piracy against ocean farms and mines, fortification of ocean areas (now a lessened but still a potential threat), senseless pollution of ocean waters, and selfish squandering of ocean resources — these are dangers recognized throughout the world as inherent in the application of the concept of the nation-state to the ocean.

While it is impractical to expect nation-states, acting individually, to distribute the wealth of the ocean in an equitable and effective manner, it is also by no means clear that a stable society of the seas can be established through traditional international means. The parochial interests of member states limit the effectiveness of all our existing international institutions. International treaties, for example, are clear evidence that there are interests common to various countries, but the clash of interests peculiar to the states leads to the framing of treaties on the basis of the least, not the most, that is possible. International law, furthermore, represents a cogent effort to find areas of agreement among the conflicting interests of nation-states, but its own form and its own method are based on the clear fact of conflict, not on mutuality. The United Nations is an assembly of sovereign nation-states, any one or all of which may and do obstruct attempts by the United Nations to undertake a specific job.

We must ask whether there is any device other than the existing international instrumentalities that

should be explored as a possible tool for forming a stable society of the seas. I am persuaded that there may be such a device. I propose consideration of a corporate sovereignty for the ocean — a corporate institution to take responsibility for exploration, development, and protection of the ocean as a resource that is the common heritage of all men.

The multinational corporation has in the last twenty years become a truly transnational force that cuts across the boundaries and barriers of the nation-states. As it manifests itself throughout the world today, it is rationally planned; it aims at increasingly higher production of goods at increasingly lower costs; it is alert to scientific and technological discovery; and it is responsive to human needs and demands, whether expressed by the inhabitants of a country or by members of a consuming public. Strongly oriented to the future, its major decisions are usually reached on the basis of twenty-year or longer projections. These take into account conservation of raw-material sources, encouragement of technological development, and the maintenance of financial and economic viability.

The pursuit of power as a primary goal is characteristic of the nation-state. Not so long ago, nations pursued power to the end of protecting their citizens from foreign violence or threats of violence. The existence of atomic arsenals makes such protection impossible today. The recent spread of violence among and within the less developed nations, together with the increase in domestic violence within almost all states, may be the consequence of the now universal realization that there are no longer effective institutions for protection and that there is, indeed, no place to hide.

The corporation does not pursue power as a primary goal. It is an entity that is organized for specific purposes to meet tangible needs, and it is production-oriented.

As the actualities of national power decrease, the trappings of power do not, and ceremony and ritual prevail as aspects of the pursuit of power as a primary goal. These aspects show themselves in the preoccupation of diplomatic gatherings with matters of precedence and in the clamor, frequent in international organizations, that attends the efforts of nation-states to improve their rank by an increasing volume of nuisance and noise. More important, the fulfillment of ritualistic rules and the performance of ritualistic tasks by national and international bureaucracies often assumes an importance greater than the accomplishment of specific productive work. Filling posts, following procedures, and proliferating paperwork are values often more highly regarded than achieving results. The nation-state is procedure-oriented to somewhat the same degree that the corporation is job-oriented.

The suggestion that a corporate authority can develop a stable society of the seas arises from the following basic considerations of the nature of the corporation: first, its focus is on accomplishment; second, it is not tied to the static aspects of the nation-state; third, it is itself a dynamic and emerging social force with a demonstrated capacity to change and to grow in response to the challenge of its specific tasks. The corporation, to be sure, is many other things, among them a singularly effective device for raising capital.

The authority proposed in this paper would be, in fact, a corporate sovereignty of the ocean; it would not be sovereign either in traditional theory or in traditional law, neither of which has yet defined the status of the ocean. Possibly the ocean is common property; possibly it is no one's property.[61] Law and theory cannot now envisage sovereignty over either sort of property, and the ocean consequently maintains a status sufficiently vague to make establishment of a corporate authority possible.

PART I:
MULTIPLE USES OF THE CORPORATION

The basic question that we must answer is whether or not the corporation can be a suitable vehicle for the exercise of sovereign power over the oceans and for the performance of quasi-governmental functions. Part of the answer to this question will be found in the history of corporations since they came into being in the thirteenth century.

The first man to use the phrase *personna ficta* was Sinabald Fieschi, who in 1234 became Pope Innocent IV. He saw his corporate innovation as a device for protecting church property from the depredations of local rulers, particularly during the interim between the death of an old bishop and the investiture of a new one.[62] The characteristics of his device were the familiar ones that the corporation has had ever since: a life of its own distinct from any individual in it; the rights and privileges of a real person; the capacity to combine the assets of many groups and individuals; and the ability to justify its existence by the performance of special public services. The corporation could outlast governments, enjoy perpetual life, build up traditions, stabilize and routinize work, and provide order when that commodity was scarce.

This form of organization spread from the church to the guilds and the towns; groups of people banded together for an economic or social purpose came to enjoy a special, non-feudal relationship with civil authority, and the unique character of each organization was recognized in a charter that defined the respective duties of prince and people.[63] The idea of public service was inherent in these organizations; they came into being essentially as mutual-aid societies.

With the beginning of the age of discovery and the return of commerce, the corporation began to take the place of the partnership that up to that time had been the only means of economic coöperation outside the guilds. The weaknesses of this limited form of coöperation was particularly apparent when partners died, left the business, or mismanaged it; the new merchants therefore turned their attention to the corporation. Precisely at that time, moreover, the rising monarchies of Western Europe began taking interest in the commerce of their nations and in schemes for the exploration and colonization of the newly discovered lands in America and Asia. Ready money was generally short, and the corporation made it easier to raise capital.[64] Encounters with ships of other nations were frequent, and the corporation took the onus of such engagements away from the monarch. The hundred years following 1590 was the period in which the great trading corporations were founded.

During the seventeenth and eighteenth centuries, these corporations were in their heyday, functioning in at least quasi-sovereign style.[65] When they granted charters for trade and colonization, the civil authorities were forced to recognize that the new companies would be operating in distant areas far from home supervision. Governments had no choice but to grant legislative and sometimes military power to company officials, in addition to their regular powers of general administration.[66] Corporation officials acquired such broad authority that abuse soon followed, and as a result the early form of the trading and colonizing companies became outmoded. While the early trading companies lasted, they were used even to set up governments. The Massachusetts Bay Company, for instance, secured a royal charter in 1629 and utilized it deliberately to found a quasi-independent government only distantly related to England. Its charter became the basis for establishing a mint and providing a limited representative government whose decisions could not be effectively questioned even by the charter-granting authority.[67]

The corporations of this period often found themselves treading sovereign ground at home as well as abroad. In the sixteen-nineties, for instance, the Bank of England was formed to float the national debt and to provide a fresh flow of loans.[68] Other banks of issue were chartered in Scotland. During this period, corporations could be chartered only by a special act of sovereign authority, and quid pro quos were common. The Manhattan Corporation, for example, was granted banking privileges in exchange for providing New York with a public water works.[69] The private corporation was to become, of course, the dominant form of business activity in the latter part of the nineteenth century, but until then public corporations of a non-political character were common. During the first eighty years of American independence, economic development depended heavily on state support. State governments floated bond issues in Europe and participated in joint public and private development schemes, channeling funds into banks, canals, roads, and railroad lines.[70] The Pennsylvania Railroad had its beginnings as a wholly owned state railroad.[71]

Generally speaking, this type of mixed corporation worked effectively to develop the country. The public interest gave financial strength to the corporation; the private interest gave it sound administration. (A few examples of this interchange still survive; the state of Delaware has a majority holding in the Farmer's Bank of the State of Delaware,[72] and the state of Virginia participates in the Richmond, Fredericksburg, and Potomac Railroad.[73]) Once more, however, power was followed by its abuse. As with the early trading companies, so with the mutually advantageous agreements and the other manifestations of intermingled public and private interests. Some of the publicly owned state banks became victims of nepotism and then of fraud. The Bank of the State of Alabama collapsed under these burdens in 1837, leaving the state itself indebted for a sum equal to half the budget of the federal government[74] and inspiring the contemporary observation: ". . . a mass and mess of confusion — such a bundle of heterogeneous botches; in which blundering stupidity, reckless inattention, and both intelligent and ignorant rascality had made their tracks and figures. . . ."[75] It was not rascality, however, that brought about the end of the mixed corporation in the United States; it was the attainment of the goal that the mixed corporation had helped to achieve.

Once the country had accomplished economic development, incorporation was no longer considered a special act requiring a special relationship with civil

authority but an ordinary act needing only general supervision under legal statutes. From this change of attitude and from the impact of the industrial revolution came the modern form of private corporate activity that has been the agent of that revolution in most countries. The basic preoccupations of this modern corporate form have been technological and economic, but its widest influence has been social. Although its ownership is entirely private in most countries, public responsibilities have become inherent in its economic acts. The general public is, in effect, the customer of the large corporation. By reason of the economic vote he casts when making market choices, this customer affects the future of the corporation immediately and directly.

The corporation has discovered that its existence depends on the dynamic relationship of production, price, and consumer choice; an increasing volume of goods can be sold at decreasing cost only if the consumer chooses to buy them. Moreover, the corporation has discovered that it can survive only if it sees itself as a coöperative instrument bringing together the intelligence, the labor, and the capital of very great numbers of men. As a consequence, it is no longer simply a device for doing business. It is a new system of social organization based not on the combative individualism of the past but on a coöperative effort on the part of all persons and all groups connected with it. It is, at the same time, a new method for meeting social responsibilities in areas as separate from business as education and the arts.

Descriptions of it as a monster spawned by the operations of finance capitalism miss the mark because they view an emerging social force of the twentieth century in nineteenth-century terms. Private corporations and the public-enterprise complexes of socialist countries are functionally similar, both in their economic pursuits and in their social effects. Both types of organization plan their activities far ahead; both are subject to economic penalties for failure; and the healthy survival of both is the basic concern of the managers as they frame plans and reach decisions. In practice, healthy survival is synonymous with sound growth. A dynamic interrelationship of production, prices, wages, and consumer choices results in growth; growth itself makes the interrelationship increasingly dynamic. It is this process that makes the corporation ready to respond to change. That single fact gives reason for optimism in today's world.

During the past twenty years, as government restrictions on trade, payments, and capital movements have been relaxed, the new corporate force has become multinational. The value of the international output associated with direct investment and with portfolio ownership of assets by multinational companies in the private enterprise sector alone has been estimated at $240 billion, a figure that is almost twice as high as the total of $130 billion for all export-import trade.[76] The trend is away from economic sovereignty toward an international pattern of coordination, consultation, and commitment. The multinational corporation has suddenly become a major social institution in the world at large. Other than the national state it is the one force, for example, that is capable of coping with the poverty plaguing two-thirds of the human race today. It can undertake tasks as great as the industrialization of Asia and Africa. In many countries on these continents, it is making substantial and unannounced contributions to developing infrastructures; in many it is already the principal educational force. It can provide cultural interchange on a worldwide scale through the cumulative effects of its economic-centered activities in thousands of communities throughout the world.

The medieval city had a logic all its own that in due time overcame the reluctance of those who felt they could tolerate no change in the traditional feudal life. From that city came the commercial and industrial revolutions. The multinational corporation, the final heir to these revolutions, has now established itself in most of the countries of the world, and it looks ahead. The late Frank Tannenbaum wrote, "The state system is not capable of building an effective international order and is not capable of endowing the United Nations with the needed power to maintain the peace between nations. An organization made up of sovereign states is not a satisfactory base for maintaining international stability. . . . If we are going to have an international order, then it will have to rest upon some other base, preferably upon one that is extranational by its very nature. . . . This proposed base is the international corporation. It is by nature supranational. . . ."[77]

The proposal for a corporate sovereignty for the oceans does not envision a private corporation but a mixed one in which governments, research organizations, universities, conservation groups, and private firms could all invest. A mixed corporation would make it possible for countries whose resources are too limited for direct participation on their own account to be a part of the development of the oceans. Such a corporation, moreover, would remove any stigma that might attach to a private operation. There


MAREOCEANUM
AFRIC
ASIA
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would be strong pressure, on the one hand, for concrete projects that would produce effective results rather than political display and, on the other, for an image that would project corporate dedication to public service. Finally, there would be private sources for the funds necessary to launch an ocean society. In the United States alone, where more than seven hundred million dollars a year is being spent for underwater research, fifty or more large companies are working on oceanographic projects. More than a dozen of these companies have underwater research craft.[78] Some 725 others are offering products and services in ocean science and technology. One-third of the five hundred largest companies are active in undersea technology.[79] The petroleum industry has spent over $250 million in underwater research during the last fifteen years since more than sixteen per cent of the oil produced in the world already comes from beneath the sea.[80] The partnership of public and private elements has proved successful before; it can be successful again.

PART II: THE ACTIONS NEEDED AND THE LEGAL CONSTRAINTS

When international law confronts the problem of creating an ocean society, it finds little to go on. Lawyers and statesmen continue to differ on the legal status of the seabed. To be sure, the Geneva Convention of 1958 gave some legal definition to the continental shelf, but the status of the remaining seabed areas is subject to debate. While some have called the seabed *res communis*, that is to say, the joint property of all nations and peoples, others hold it to be *res nullius*, land belonging to no one. Neither of these views settles the important question of whether a nation, a corporation, or an individual may assert title or claim property rights in any area of the ocean floor not now clearly subject to some form of national jurisdiction.[81] No one, in fact, knows what the law is, and this uncertainty generates a suspicion that there is presently no law at all governing these questions.

Since the questions and issues are still purely hypothetical, it is, of course, understandable that neither a body of law nor even a series of rules has arisen to cover them. International law, building upon treaties and other acts of consent among nation-states, is a valuable compendium of past agreement, but it cannot be expected to depart from precedent and serve as the creative basis for such a thing as a new oceanic society. International laws require many years of global consensus before they can develop and gain binding force. If country A takes oil from the ocean floor, and if country B drills alongside A for the same oil, how shall the dispute be adjudicated on the basis of precedent?

Although the law with respect to the seabed is unsettled or, more accurately, nonexistent, a variety of laws, rules, and regulations govern other aspects of the ocean and its resources. The Geneva Convention has sought to add legal certainty to the rights of nation-states in the continental-shelf areas bordering their territories, although it would appear that more controversies have arisen as a result of this treaty than were quitted by its adoption. In addition, "freedom of the seas" has been an accepted and fundamental principle of ocean law for an extended period. This basic precept, which applies to all nations and all peoples, has been held to govern not only movement upon the ocean's surface but also the extraction of living resources from the ocean body. Exceptions to the principle of freedom of the seas have arisen, principally involving exclusive or special nation-state rights in sedentary fisheries, but such exceptions have come about only through long, continued, and effective exclusive usage, recognized and respected by other nations. There is no reason to expect that the international community will recognize similar demands for exclusive rights by a particular nation, corporation, or individual to explore and exploit the deep-ocean floor. A chorus of protests would probably greet any such claims since recent attempts to appropriate fishery areas and rights have met with similar opposition.

If we treat portions of the oceans as if they were national lakes, the coastal states will, in effect, appropriate the oceans of the world. Under this rule, claimed by some already to be in effect, coastal states could extend their jurisdiction over the ocean bottom as advancing technology permitted exploitation over widening areas. Such division among coastal states would make use of the median-line concept of the continental-shelf Convention, and a boundary would be established between whatever states share water at a line ". . . every point of which is equidistant from the baseline from which the breadth of the territorial sea is measured."[82] Actually, the national-lake concept goes far beyond the geological or scientific boundaries of the continental shelf to include all of the world's open-sea areas. Some nations have already concluded agreements for the division of open-sea areas. The North Sea has been split among Norway, Britain, France, Germany, Denmark, and the Netherlands.[83] A similar arrangement has been negotiated between

Italy and Yugoslavia concerning the seabed of the Adriatic.[84] Unilateral action of this kind should not be accorded internationally binding force, but it is highly unlikely that any country, corporation, or individual will test these divisions and allocations in the near future unless one of the superpowers chooses to do so. These developments, initiated by prominent, wealthy nation-states, suggest the difficulty that an international ocean society may encounter as it tries to negotiate with them.

In the United States, the National Petroleum Council, adopting an expansionist stance, has urged that the government interpret the Geneva Convention of 1958 as allowing the extension of American rights and interests in the continental shelf beyond what is commonly considered the geological shelf ". . . to the full limit of the continental land mass; specifically to where the submerged portion of that land mass meets the abyssal ocean floor."[85] The implication is that other nations should do likewise, thus thrusting the boundaries of national jurisdiction far out into the oceans. The National Petroleum Council's stand is an effort to minimize the uncertainty that the petroleum industry feels as oil and gas exploration and exploitation extend to deeper and deeper waters. The industry's search for a nation-state solution is instructive inasmuch as oil companies are expert at negotiating concession agreements; they know how nations think, function, and react, and they have no assurance that an international ocean order, especially one that is tied to the United Nations and influenced by the Third World, will give them fair or even customary treatment.

The Petroleum Council's position is not, however, representative of the rest of the private sector, and it is not even an irreversible position of the petroleum industry itself. Other ocean-resource industries do not have the oil man's vested experience in dealing with nation-states.[86] Most private economic groups concerned with the exploration and exploitation of the open seas would prefer to minimize the influence of nation-states, per se, on the development of an ocean institution and an ocean code.

Those nations that possess the greatest capability for exploring and exploiting the ocean now appear opposed to internationalizing it under the United Nations or an organization like the United Nations. They argue that they are the most heavily involved and are assuming the most substantial financial risks and cannot, therefore, forego their profits. What appears to concern them most — and this is particularly true of the United States and the Soviet Union — is the possibility of U.N. favoritism to the Third World without due consideration of the long-run interests of all mankind in the ocean and its resources. Indeed, on December 15, 1969, both the United States and the U.S.S.R. voted against a proposal in the United Nations General Assembly based on the initiative put forward by Ambassador Pardo of Malta.[87] The United States then accepted adoption of the proposal as a mere "recommendation." At present, therefore, we are faced with the serious possibility of a negative political attitude toward an ocean regime under U.N. auspices since the active participation and support of both the United States and the Soviet Union would be required for success.

On the other hand, there is some modest support within the various branches of the United States government for an international approach to the ocean and ocean bottoms. For instance, a recent proposal from a commission of the U.S. House of Representatives calls for: (1) redefinition of the continental shelf to fix the seaward limits at fifty nautical miles from the baseline for measuring the breadth of the territorial sea; (2) the creation of an international registry authority to record claims by nations to explore and exploit the mineral resources of the seabed and its subsoil; and (3) the creation of an international fund to receive payments from registering nations to be expended for such purposes as marine science and resource development.[88]

There are a number of proposals of a similar nature, and they share two major weaknesses. In the first place, they require a general agreement among nations, within or without the United Nations framework, and the possibility of such an agreement is doubtful. In any case, its consideration would certainly involve lengthy delays — foreign offices are notoriously slow to reach policy decisions that will affect future national interests — and eventually any and all proposals might well clash with the doctrine that everyone is better off the less the boat is rocked. The need is to hasten the development of ocean science, technology, and industry, and it seems unreasonable to ask all the occupants of this planet to deny themselves the full resources of the sea over a period of many years or even decades, during which the hope of eventual agreement slowly dims.

In the second place, it is questionable whether nation-states because of their very nature are capable of reaching an agreement reflecting the long-term interests of the entire international community. Nations, for better or for worse, are committed not only to the interests of their citizens but also to the concept

of the nation-state itself. Neither of these commitments is consonant with the idea of the ocean as the common heritage of all mankind. Proponents of the international-treaty approach to ocean problems sometimes cite the recent Space Treaty as an example of a common-heritage approach, but they forget that only two countries had the potential to reach the celestial bodies. Typical results do not follow from atypical situations. The sea is omnipresent and the nations that touch upon it numerous. Theoretically, the corporate-sovereignty approach to the legal and political problems of the ocean may not be as all-encompassing as the treaty approach, but it can come closer in practice to realizing the interests of all mankind through sensible and coherent exploration, exploitation, and conservation of ocean resources.

Those economic units directly concerned with the ocean and its resources, moreover, possess the most intimate and complete knowledge of sea science and sea technology. Coöperation among the corporations in capitalist states and the economic agencies in socialist states seems much more probable than cooperation between them and politicians. The marine-resource industries, wherever located, have a common interest in the clarification of legal and political questions, including knotty problems of boundaries and jurisdictions such as those posed by the Geneva Convention. While its imprecise language has given rise even to the extreme notion, now discarded, that the ocean bottom can be divided up by the coastline states, neither a majority nor even a large number of ocean-resource companies and economic units should be presumed to favor purely nationalistic allocations. The frustration of legal uncertainty lies behind much current advocacy of the nationalist approach.

The corporate sectors in both the private and the socialist economies have acquired experience and skill in developing rational and efficient organizational structures whose performance can be judged by reasonably objective standards. Political bureaucracies in even the most advanced nations lack these qualifications because they are essentially procedure-oriented rather than job-oriented. Whenever it has been possible to introduce corporate methods into political situations, achievement has been found to increase markedly, not only in the Western states but also in socialist and Third World countries. Indeed, many Third World governments have invited corporate entities to undertake major quasi-governmental development tasks, thus recognizing the efficiency and responsiveness of economically oriented organizations. In both the developed and the less developed nations, the line between the public and private sectors has become blurred as governments and corporations have come to work toward the same goals. In socialist countries, where this trend has theoretical sanction, it has been institutionalized, so to speak, by the apparent absorption of the private into the public sector. Functionally speaking, however, socialism has retained a corporate structure because efficiency is essential for social and economic welfare. Thus we see a repetition of the historical practice — corporations exercising quasi-sovereign powers under modern conditions. This merging of public and private interests in an increasingly complex and interrelated world would suggest that there is no theoretical objection to corporate entities bearing primary responsibility for the ocean and the ocean floor.

In all probability, the initial capital investment required for successful exploitation of the ocean floor will be high. Furthermore, the indications are that public commitments to ocean development will continue to be relatively small. Even the wealthiest countries are under serious budgetary pressures, and Washington, for instance, is indicating continued but reduced support for marine programs.[89] In recent years it has been funding less than one-fourth of the basic and applied ocean research in the United States.[90]

High investment costs will be balanced by low operating costs — lower probably than the cost of surface operations. Large-scale production is the key to low-cost operation, and it is generally agreed that suitable concentrations of resources exist on the ocean floor to permit such production.[91] While there may be no more than fifty large economic units in the corporate and socialist worlds capable of large-scale production, these fifty will be obvious sources of capital whenever investment in the ocean is attended by some measure of security.[92]

Few if any corporations are as yet willing to explore or try to exploit the ocean bottom except offshore. More than expense is involved in this reluctance to venture into deeper water. Legal and political considerations have favored shallow-water technology while they have militated against the development of deep-water technology. The present law of the seas does not provide corporations with the security they need, and a technological gap is artificially created. Ordinary business risks are one thing, imponderable political risks another. Only within a multinational legal framework can investments in non-territorial waters be guaranteed.

Far more than the simple safety of capital is in-

volved. A corporate sovereignty for the ocean would have as its goal three major accomplishments:

(1) To promote the coherent, nonrepetitive exploration of the ocean and the ocean floor for peaceful purposes;
(2) To ensure the rational, nondestructive, exploitation of ocean resources, both living and non-living, for the mutual benefit of all men and all nations;
(3) To protect and conserve the ocean and its resources in terms of the ecological balance of nature and the desire of men everywhere to live in a pleasant, pollution-free environment.

In realizing these goals, a sovereign ocean corporation would be faced with a diversity of immediate and long-range tasks:

(1) To coördinate existing oceanic research and exploration with a view to eliminating duplication and inefficiency;
(2) To provide for the widest and freëst dissemination of oceanic information, knowledge, and technology consistent with the development of proprietary rights in technical processes, with special emphasis on the development of oceanic economic enterprises, either private or semi-governmental, in all nations for the benefit of all peoples;
(3) To play a substantial role in initiating basic and operational oceanic research, with special emphasis on research of an essentially international nature;
(4) To determine the equitable allocation of the rights of exploration and exploitation of all those oceanic resources, both living and non-living, that presently lie in the public domain, to protect and enhance the interests of all mankind rather than any particular segment thereof;
(5) To grant licenses to public and commercial organizations for the use of any of the resources or territory of the ocean seas, to establish standards of proper use, and to pay royalties to its stockholders after meeting its own costs;
(6) To patrol the seas in the course of its regular activities, to have the right to deny licenses and royalties on a national basis whenever the corporation's standards were contravened, but to possess no military or coercive powers, leaving the onus of enforcement with the nation-states.

The initial capital of the corporation would be raised by subscription, which would be limited to education, conservation, industrial, and public bodies actively involved in work in or study of the ocean. The corporation would be responsible to its stockholders through a stockholder-elected board of directors. A stock quota would be assigned to each nation defined by the United Nations as a sovereign entity on the basis of its gross national product, with provisions for variations in quota to permit adequate representation from developing countries and to avoid undue dominance by large and developed countries.

The authority of the corporation would extend only to the ocean itself. That is, it would cease at whatever points on the continental shelf that national sovereignty began. Definition of such points would not be the responsibility of the corporation but of the nation-states themselves. The corporation would provide a consultative service, available on request, on matters involving national waters, leaving to the future the question of whether the various nations might wish eventually to put increasing areas of such waters under the direction of the corporate authority.

Even under the auspices of a corporate sovereignty, economic entities in the more developed countries could continue to have a substantial edge in the exploration and exploitation of marine resources. The technology of undersea exploitation makes such intensive use of capital that the less developed nations, capable of effective competition in labor-intensive industries, are at a disadvantage in maritime technology. Some maritime extractive activities use little capital, however, and could yield benefits to Third World nations far exceeding those from comparable land investments. India, for example, with one-sixth of the world population and a shortage of arable land, could improve its standard of living by a considerable margin if it were to develop aquaculture techniques and commercial fisheries. Compared to space technology, maritime technology is relatively divisible, and individual economic units or individual countries of the Third World could successfully specialize in a single area of marine technology without too great a drain on capital resources. This specialization, like that in more developed countries, cannot be achieved until a way has been found to make the ocean the property of all mankind.

PART III: THE NATION-STATE VS. TRANSNATIONAL ECONOMIC SOLUTIONS

Man can choose one of only two realistic approaches to the development of ocean resources if he hopes to rise above the legal and technological problems that

now beset him. His first choice is to support an ocean society created by and responsive to international political bodies. His second alternative is an ocean society created by and responsive to transnational economic and other bodies. The belief that there is yet a third approach based on the national interests of the various states is illusory. National interests have created the present problems, and a continued resort to the nationalistic approach cannot fail to make them steadily worse. Indeed, the doctrine of might-makes-right disposes toward claims whereby nation-states preëmpt increasingly large portions of the ocean as exclusive preserves. Such actions as the nationalistic division of the North Sea and the claim to exclusive fishing rights by Iceland and a number of Latin American nations can be expected to set the pattern for the future unless, of course, stronger nations intervene.[93]

The solution lies not merely in making sure that economic enterprises have a voice in decisions bearing on ocean development but in creating a wholly new form of ocean governance. The narrow interests of economic units could easily be guaranteed by providing corporate access to the highest decision-making levels of the governing authority, by establishing a system of corporate participation in the institutional structure of the authority, and by creating a corporate bureaucracy. Representation of this sort, however, would accomplish no more than making economic enterprises special entities entitled to political appeasement through proper procedures, rituals, and recognition.

If some form of viable international governance should be achieved, it will matter little whether economic institutions are formally represented or not. The fact of a governing order is far more important than the formalities by which economic units make contact with it. Indeed, the issue between an international regime and a transnational economic order must not be clouded by ritualistic preconceptions. It does not matter who gets the credit for initiating such a governing order or who gets the credit for running it. It matters only that the operation start and that it run. It is the premise of this paper that a transnational corporate authority can start such an operation and run it. If an international political authority can start and run it, the interests — if such they can be called — of the corporate sector will be served satisfactorily. That possibility, however, is dubious.

In evaluating the possibility of an international political regime for the society of the seas, it is well to center attention on the United Nations as the instrumentality crucial to its establishment. In the ocean regime suggested by Elisabeth Mann Borgese, the broadest and most rigorous proposal yet advanced, the United Nations is held to be clearly preferable as an instrumentality to other international bodies, special international conventions, or established organs of international law.[94] Mankind possesses no institution more valuable to the well-being of all men than the United Nations, and any ocean regime must look to it for support. The question is how closely any ocean regime should be tied to it.

This question involves the willingness of nation-states to comply with a United Nations ocean regime. Most nations have formally signed numerous international conventions pertaining both to the land and to the sea — whaling, copyright, and sea-boundary agreements — that they have, in large measure, informally ignored. While the Borgese plan wisely leaves enforcement of the rules of the ocean regime to each state, it reserves to its proposed maritime commission one important judicial penalty — the expulsion of nations in clear violation of its rules from the regime. Membership in the regime would not be automatic under the Borgese proposal. Countries would have to agree to deposit a formal instrument of acceptance with a marine secretariat. With the clear penalty for violating membership requirements that she prescribes, nations might well see an advantage in avoiding this disability by abstaining from membership and thus preventing the regime from becoming a universal body. The difficulty with the Borgese plan, therefore, is that the investiture of the regime depends on the ritualistic proclivities of nation-states and on their notions of what constitutes their interests.

Insurmountable problems, in fact, exist in the very nature of any international body that, by definition, reflects the attitudes of separate nation-states. The remarkable achievement of the United Nations is its capacity to rise above parochialism from time to time and to give expression to moral convictions common to mankind. Although it has been described as little more than an international congress of ambassadors for the discussion of problems and the passing of ineffectual resolutions, the existence of such a congress is important to the world and the ineffectiveness of its resolutions is basic to its existence. Effective resolutions would probably rob it of the support of its constituent governments.

The operational effectiveness of the United Nations has not declined, but the public confidence in an effec-

tiveness that never existed has. Its financial problems are constant, and the steps to better them have been no less nationalistic than the steps to worsen them. Without adequate funds, the United Nations is bound to lack men, arms, influence, and peacekeeping ability.

The moral support of the United Nations would be invaluable to an ocean society. Its practical guidance in the establishment and operation of the regime could be fatal.

To the list of minimal characteristics needed by a transnational authority for the oceans and the minimal steps required to institute it, there must be added one ultimate consideration — the precise nature of the sovereignty to be granted to such a corporate authority. What is needed is a pilot project to test the feasibility of corporate sovereignty and to frame detailed plans for its inauguration.

Perhaps the Malta conference can be the instrument for instituting such a project. The conference could, if it wished, decline to adjourn, invite additional experts, request interim financing from prospective stockholders, and function, in effect, as a study commission in charge of the pilot project. Although it would draw experts from almost all of the world, it would issue no invitations to representatives of nations or of international bodies. It would issue no call for an international convention.

As a study group it could undertake the following activities:

(1) Preparation of a detailed corporate charter.
(2) Negotiation with potential stockholders.
(3) Negotiation with the United Nations for its approval in the form of a moral charter.
(4) Investigation of the scientific, technological, and administrative work to be done by the corporate authority, together with computation of costs.
(5) Investigation of the revenue potential of the authority and computation of income derived from it.
(6) Investigation of the initial capital outlay required and creation of a plan for apportioning stock-subscription rights country-by-country according to a formula that would be equitable and attractive to developed and developing countries alike.
(7) Development of lists of private corporations and public devices through which stock could be channeled to investors.
(8) Designation of a suitable headquarters.
(9) Arrangement for the simultaneous launching of all activities of the corporate authority. (Should such activities be launched in a piecemeal fashion, a coherent whole might be difficult to achieve at a later date. If different work groups were to start out separately with fisheries or food farms or exploration of minerals, they might well begin to compete among themselves. The authority should therefore be integrated from the very beginning. Organizations, once established, acquire power, resources, and interests of their own and, in the process, become living entities that grow if handled well or decay if mismanaged. This particular phenomenon of corporate existence should be used to contribute strength to the corporate sovereignty.)

Functional sovereignty is no problem for a corporate authority, but formal sovereignty is hardly in keeping with the exercise of authority for practical and definable ends. Although the sovereignty of the nation-state is at the root of both national and international problems, the world as it is may be unable to attribute authority to any institution unless it is endowed with the familiar negative attributes.

A corporate authority could negotiate with some sovereign nation to acquire an island complete with its own sovereignty, or it could create a technological island and assume sovereignty over it. To elect either of these options would be to conclude that a corporate sovereignty would be ineffective without an issue of currency, a printing of stamps, a floating of public debt, and a dispatching of ambassadors to every country and to the United Nations. In other words, such a corporate authority would become a nation in itself.

A sovereignty thus defined would be an open admission that ancient and static institutions can prevent the appearance of any dynamic new force in international relations and would probably indicate that the world is not yet ready for a trans-economic society of the ocean. The world, indeed, may not be ready. It may become clear that rule of the oceans through international coöperation or by an international organ is impossible. The possibility of corporate rule is also by no means clear. Two facts, however, suggest that the future of the oceans may be linked to the future of the corporation. The ocean is an entity so undefined and uncertain that it can still be claimed for mankind. The corporation is a dynamic institution with a flexibility and strength that can be put to use for mankind.

ARTHUR BARBER

AN INTERNATIONAL WEATHER CORPORATION: A PROJECTED WORLD UTILITY

This is the earth, our home. The waters of the ocean cover seventy per cent of the surface. Three and a half billion human beings live on the remaining thirty per cent of the surface, some in the frozen arctic and some in the equatorial jungle, but nearly half in the urban areas of the temperate zone. The earth is surrounded by an atmosphere and a water-circulation system about which surprisingly little is known.

— Despite a yearly worldwide expenditure of close to a billion dollars for weather systems and research and development on weather systems, there has been negligible improvement in the accuracy of weather forecasting.

— Men have been attempting to control and influence the weather, but their successes and failures are still largely a matter of debate. Meanwhile, man-made pollution and the heat emanating from our large cities is significantly altering the weather; the amount of carbon dioxide in the atmosphere is growing, and in our own lifetimes we have seen an increase in the number of cloudy days in the northeastern part of the United States and in Western Europe.

— While the weather influences much of our daily lives — transportation, agriculture, recreation — no one has yet calculated in any precise way the savings that more accurate weather forecasting might bring. But our DDT has fallen with the rain all over the planet, has run with the rivers into all our oceans, and has entered living organisms on land and sea. As a consequence, DDT spread on Indian farms may end up in the breast milk of American and European mothers.

Why are we so uninformed and so ignorantly destructive in this era of modern technology? Why, in this time of increasing demand for better weather information, have we so little? The principal answer is that our institutions are unresponsive to our needs.

WORLD WEATHER PROGRAMS

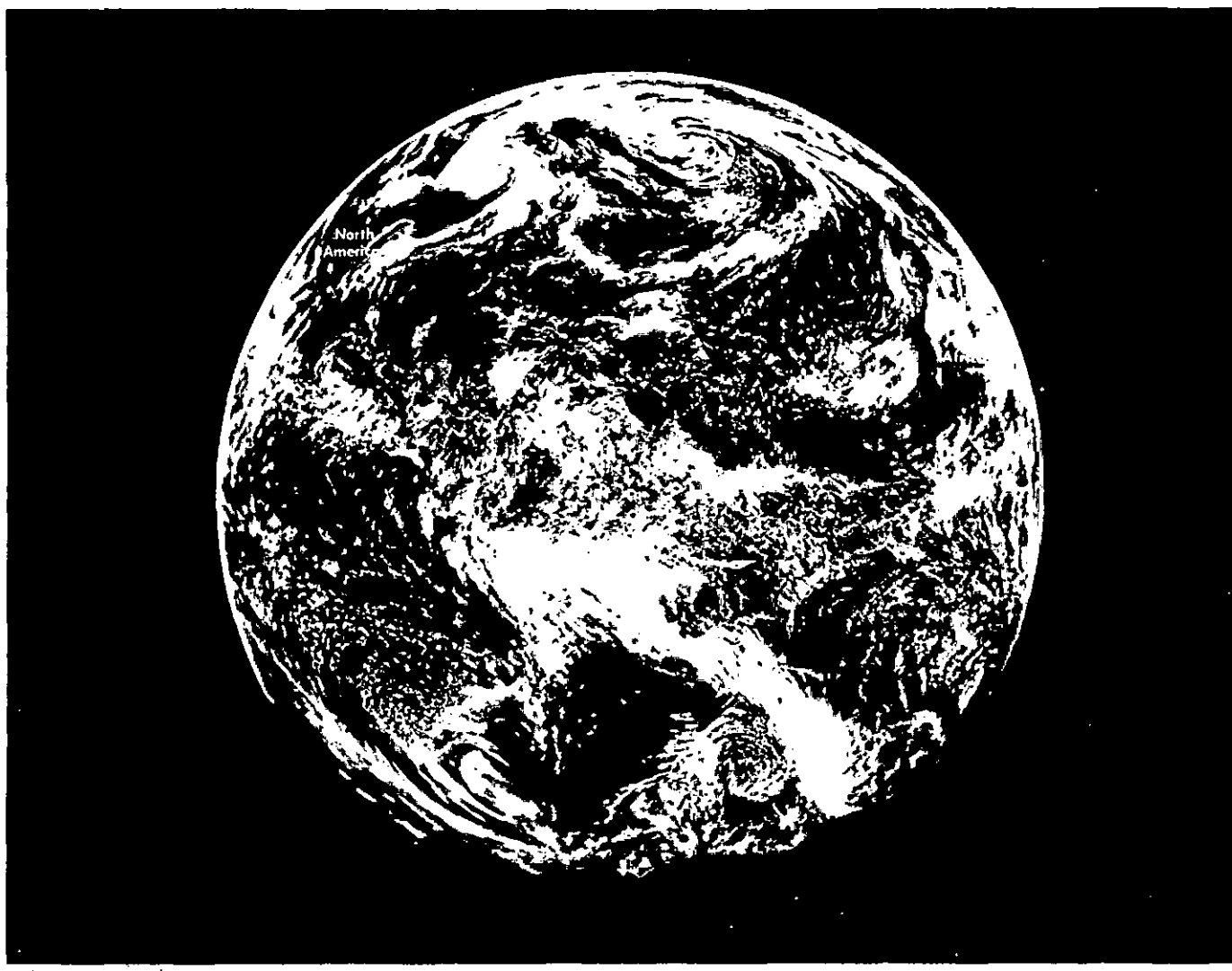
The average citizen throughout the world gives little thought to the weather bureau except to curse it when he gets caught in unexpected rain or snow.

From primitive times man has recognized both the necessity for weathermen and their mysterious character. Rainmakers and witch doctors plied their trade in ancient days in return for food or garments. While the price of weather forecasting has gone up, the mystery remains.

The United States Weather Bureau is typical of weather bureaus throughout the world. It was formed in 1921 and was basically a network of human observers who reported barometric pressure, wind velocity, temperature, and weather conditions on a regular basis. Central reporting bureaus coördinated and analyzed the diverse data they received in order to make a prediction for the next twenty-four to forty-eight hours. Despite the modern technology now available, the same process is still used for most daily weather forecasting.

Demand by the military services for weathermen during the Second World War resulted in a supply of trained weather personnel, and that demand has not substantially slackened since. Because it has become an article of faith of the Defense Department, the Congress, and other branches of the government to support science and technology, weather research has benefited. Budgets for weather research and development have climbed from a few million dollars in 1946 to more than a hundred and seventy million in fiscal year 1971.

Both national and international weather programs suffer from a lack of clear-cut executive responsibility. No less than ten agencies conduct weather programs in the United States, and world programs are run by committees. This diffusion of responsibility is possible because no one has ever seriously questioned the performance of the world's weather systems or, more precisely, weather non-systems. No one has postulated a reasonable performance level that could be expected for a given level of investment. On the contrary, weather reports that used to be clear and definite — "rain predicted at noontime" — have



been changed during the past decade to imprecise predictions like "the probability of precipitation is sixty per cent in the morning, seventy-five per cent in the afternoon, declining to fifty per cent in the evening."

Frank Howard, the batting star of the Washington Senators, once remarked with candor: "I'm a lucky guy. I have one of the few jobs where I can fail seven times out of ten and still be considered a success." Until the Weather Bureau adopts the philosophy of a Frank Howard and accepts responsibility for both its successes and its failures, no one will be able to judge its performance.

While the performance level of various American weather programs remains in doubt, their cost does not (see Table II). In addition to the money spent by the United States, Russia and Japan have allocated considerable sums to weather programs. The world weather budget is estimated at eight hundred million dollars a year, with the United States contributing about five hundred million of the total amount.

WEATHER TECHNOLOGY

Although we have developed powerful tools for weather forecasting, in general they have not been applied, and standards of performance are as lacking abroad as they are in the United States. Today's numerical weather-prediction research, while it is impressively complex and varied, can be considered merely a primitive first step toward understanding the subtle and highly interdependent workings of the atmosphere, the ocean, and the earth. Although the United States Weather Bureau has conducted research on numerical prediction for over fifteen years, daily forecasts still depend primarily on traditional weather charts and the informed judgment of experienced weather analysts. Specific plans for the adoption of numerical weather analysis are notably lacking, except for a few concerned with long-range statistical temperature-precipitation forecasts. The United States Navy Analysis Center does an excellent job of numerical forecasting, but the effect of its high performance is minimal because responsibility for numerical weather analysis and research lies with the Weather Bureau, not the Navy. The Air Force has the largest weather budget of any organization in the world — $167 million per year — some twenty-seven million more than the Weather Bureau itself.

With the creation of the space agency and the subsequent development of satellite technology in the United States, the appearance of weather satellites was merely a matter of time. By now, the Soviet Union, Britain, and France also have weather-satellite programs. Unfortunately, satellite programs have been designed and developed by space and missile engineers, not by men concerned with the prediction of weather. As a result, interesting pictures of cloud formations taken from outer space have for many years passed for improved weather forecasting. In reality, weather forecasts in the United States and Europe have been affected hardly at all by the advent of weather satellites. Pictures of clouds over the eastern United States tell little about the forecasting of weather patterns. Most weathermen continue to use traditional weather maps.

The oceans, and the air above the oceans, are major factors in the creation of weather. While knowledge of the atmosphere over developed countries is adequate, we remain relatively uninformed about the atmospheric conditions over the oceans and developing countries. Little is known about the interaction between the ocean and the atmosphere, or about the transport mechanisms, the mixing, and the moisture in the air. An indication of the importance of the ocean to world weather is the fact that approximately seventy-five per cent of the water that falls in the Mississippi basin is estimated to come from the Pacific Ocean. Similarly, Soviet weathermen have deduced that eighty per cent of the rain falling in the Soviet Union has come from the Atlantic and other oceans to the west. In spite of its importance, relatively little research and measurement of the atmosphere over the ocean has been undertaken until quite recently. Today Japan, Russia, France, Norway, and the United States are independently building buoys for taking such measurements, but none of these countries takes part in a unified buoy program.

The United States has two buoy programs. One is conducted by the Office of Naval Research and the other by the Coast Guard. The Coast Guard has proposed a government-supported program involving hundreds of buoys in the Atlantic and the Pacific, maintained and supported by Coast Guard buoy tenders. The Congress refused to fund such a program in 1968 and 1969, except on a study basis, because of the lack of an organizational framework to justify the cost. In 1970 a thirty-five-buoy experimental program was authorized, and, in addition, Coast Guard cutters, with more soon to be built, maintain stations in the Atlantic Ocean to report weather and guide aircraft.

The World Meteorological Organization was created in 1960 to provide a United Nations framework for coöperation among the weathermen of the world. W.M.O. headquarters is in a lovely modern building in Geneva where international conferences take place, weather information and reports are exchanged, and programs of bilateral assistance from the developed countries to developing nations are initiated. The annual budget of the World Meteorological Organization is between three and three and a half million dollars and has been increasing. This budget supports some eight thousand meteorological stations on merchant ships at sea and at other points throughout the world. The regular observations taken by each of these are passed on promptly to all participating weather stations.

The World Weather Watch, a program arranged by the W.M.O., provides for an international exchange of weather information from data supplied by many national weather programs. The W.M.O. also coördinates international weather research, but it is without the authority to organize, plan, or conduct weather programs. While it is a useful agency of the United Nations, the W.M.O. has no operational responsibility and could not legally take on such responsibility at present. Furthermore, neither U.N. committees nor even competent scientists has a record of good weather-system management.

THE WORLD WEATHER CORPORATION

What, then, is the solution to the present need for greater knowledge of the atmosphere of our earth and for more accurate forecasting? It would be possible within the next four years to plan, finance, and implement a world weather-observation system consisting of four observation satellites, a hundred ocean buoys in the Atlantic and the Pacific, and a network of communications and computers to provide effective, up-to-date weather information to the world. Such a system would take a capital investment of approximately one billion dollars, which could be handled by the nations of the developed world if they were to make annual payments of approximately $190 million.

A multinational consortium composed of companies from the Soviet Union, Japan, Western Europe, Canada, and the United States could propose to the governments concerned a ten-year service contract for accurate, hourly weather measurements, together with a general weather forecast. The fee for this service could be based on the gross national product in each country, and forecasting of this nature would cost developed countries only a minor fraction of the money they currently spend on weather programs.

Although this is an economically and politically sound proposal, businessmen believe that governments will not agree to a coöperative venture of this type and diplomats believe that businessmen will never propose such a system. Both prophecies tend to be self-fulfilling. The time has come to promote mutual education for the benefit of the people of the world.

The present world weather programs are managed as if the world were a composite of countries colored green, blue, and red rather than a planet moving through space. Each national weather program manages itself as if the weather began and ended at the nation's borders, and no one feels responsible for the seventy per cent of the earth's weather that is over the oceans.

The technology of weather observation and prediction has surpassed the ability of existing national organizations to use it for the benefit of man. No world organization is authorized or equipped to plan, manage, and finance the establishment of equipment in the oceans and outer space to provide weather information. Each nation now operates its own program and coöperates with other nations by exchanging information, but nationally managed programs in outer space and the ocean cannot be as effective as those operated by a world organization, authorized and funded to work toward commonly agreed-upon objectives.

To be effective, a world organization should meet the following criteria:

(a) The organization must be sanctioned by enough national governments to give the program political legitimacy, a goal best accomplished through association with or endorsement by the United Nations.
(b) The interests of client states must be reflected at all times in the operation of the organization. Each nation should have representation on a board of directors for this purpose.
(c) Adequate funds to establish and to operate the system must be assured through sound financial planning.
(d) The organization must be impervious to direction from any one state, and it must be isolated from such political issues as Vietnam, Czechoslovakia, and the Middle East in order that it may operate on an efficient basis for the benefit of all its customers.

These requirements could be met in one of three ways, or by some combination thereof:

(a) The creation of a United Nations corporation for this purpose. While the United Nations has never yet chartered a corporation, Professor L. B. Sohn of Harvard Law School and other authorities believe that it has the power to do so if the creation of such a corporation would serve the U.N.'s fundamental purposes. The distribution of power within the corporation and the composition of its board of directors could assure the fulfillment of these purposes. As a lesser alternative, the United Nations could pass a resolution endorsing such a corporation.
(b) The creation of a world corporation in some location such as Geneva, Vienna, or Tokyo that would involve participants from many states who, in turn, would propose agreements among member countries.
(c) The modification of the W.M.O. to authorize it to raise funds and operate such a system as a specialized agency of the United Nations.

THE WEATHER AND POLLUTION

Consciously and unconsciously we are altering the atmosphere in which we live; we do not know specifically how we are doing it and we do not know the consequences. As a report of the National Academy of Science has stated: "Weather modification today is a reality. Men can and do interfere with the atmosphere in a number of different ways. Their ability to produce deliberate changes is still limited and uncertain, but it is no longer either economically or politically trivial."

As an example of man's inadvertent effect on the weather, the total carbon dioxide level in the atmosphere has increased by ten to fifteen per cent in this century. This increase is a consequence of the burning of fossil fuels, such as coal and oil. The resulting layer of carbon dioxide over the earth creates a "greenhouse effect," holding in heat and reflecting it back to the earth. The surface temperature of the planet may therefore have risen about .2° centigrade in the past fifty years, but the stratosphere has probably cooled ten times that amount.

Carbon dioxide is only one factor affecting the temperature balance of the earth. The effect of an increase in carbon dioxide from 300 to 330 parts per million can be compensated for by a change in water vapor of three per cent or by a change in the average cloudiness of one per cent.

The increase in the number of cloudy days over the northeastern part of the United States, amounting to an added five to ten days per year during the past fifteen years, is primarily the result of industrial pollution. Even jet aircraft have made a significant contribution to the increased cloudiness.

The issue is not carbon dioxide or water vapor or clouds, but the determination on a worldwide basis of the heat exchange of the planet on which we live. Is our planet slowly growing warmer because of our actions? What are the consequences of such an increase? What can be done to halt or modify this trend? We are woefully ignorant of the fundamental information on which to base decisions that may affect all mankind.

We need a coöperative world venture involving men of many lands not merely to obtain better weather information, although that is possible and desirable; not merely to learn more about man's effect on his atmosphere and his oceans; not merely to demonstrate that men of different political beliefs can coöperate for a common purpose; but to reinforce the belief that we must act together if we are to preserve and protect the environment of this globe for all people.

The greatest obstacle to the creation of a coöperative international weather venture is the barrier that customs, patterns, and traditions have erected in the minds of men. Such a program would benefit all mankind. It would damage no one. It would save all governments and taxpayers considerable money, and it could represent one small step on the road to world coöperation and peace. We can and should embark on such a program. If we do, at some point in the decade ahead the men, the women, and the children of this planet will know that satellites in the sky and buoys beyond the rim of the ocean are predicting a better tomorrow.

THE PROJECTED EVOLUTION OF THE WORLD WEATHER CORPORATION

The success of the enterprise will depend upon three factors: political agreement and support from key governments, financial support, and sound planning.

The following are working assumptions:

(1) If one major government actively advocates such a program, private financing for planning and preliminary negotiation will be available.
(2) A technically and economically sound plan can be evolved. A preliminary plan will be available by the fall of 1970, a definitive plan in 1971.

(3) Financial support for major capital expenditures will be available from international financial sources if long-term contracts with major governments are achieved.

If these assumptions are valid, the most difficult question will be the financing of the initial steps. A second critical problem will be securing the support of various governments. It is easy to attract interest but difficult to gain a commitment. It is our hope that governments will play a role of friendly interest in the early stages and possibly provide limited funds to national industries in support of technical and planning studies.

As for the political strategy, this will be conducted at three levels.

First, open discussion at the United Nations, both to inform governments and to insure that the program formulated will serve the interests of all peoples.

Second, open discussion with those governments whose financial support is essential. These would include the major European nations, Japan, the United States, and the Soviet Union. The project could proceed if political approval from these nations were obtained and a guaranteed income of a hundred eighty million dollars a year achieved.

Third, tentative arrangements could be made with manufacturing and operating organizations in each of the countries to develop a multinational consortium capable of planning, building, and operating such a system. These organizations would provide information and advice to their governments.

Two or three years of joint planning would be required for carrying out the following:

(1) Agreements among governments, authorizing the organization and making conditional plans to include operating weather groups.
(2) Development of a single plan acceptable to all parties.
(3) Negotiation of the capital financing for long-term (ten-year) commitments.

If the projected enterprise is to meet such a schedule, these activities must take place concurrently rather than sequentially. The plans will depend upon governments; governments will depend upon the soundness of plans; and financial sources will depend both upon agreement among governments and the soundness of the financial plan. Therefore, government negotiation, planning, and financial negotiation must be pursued in parallel and to some degree on a mutual-contingency basis. This concurrent planning, negotiating, and financing would be carried out during the two- to three-year planning period.

Table I is an estimate of the cash flow involved and a tentative schedule for achieving a world weather corporation.

TABLE I:

Income	1971	1972	1973	1974	1975	1976
United States	* .5		55	110	110	110
Russia	.2	.5 **	27	48	48	48
Japan	.2	.5	18	12	12	12
Germany	.2	.3	15	20	20	20
Britain	.2	.3	10	18	18	18
Others	—	—	2	—	—	—
	1.3	1.6	127	208 ***	208	208
Expenses						
Planning and Management	1.0	1.0				30
Capital Plant	—	—	600	450	—	—
Operating	—	—	20	40	40	40

*Figures are in millions of dollars.

**Changes in this rate structure are inevitable. For example, the figure for Japan should probably be increased and that for Britain decreased. A basis for renegotiation based on economy growth should be included.

***An actual budget of approximately two hundred million is more than adequate. These fees are established on the assumption that the program can proceed without agreement and with funds from all the listed countries.

TABLE II: Fiscal Summary

The United States has planned activities in Fiscal Year 1970 in all three major areas of the World Weather Program — the World Weather Watch, Global Atmospheric Research Program, and System Design and Development. The activities by agency in the three major areas are summarized below.

World Weather Watch Implementation (new obligation authority)

Department of Commerce	$ 210,000	($ 980,000)
Department of State	$ 500,000	

Global Atmospheric Research Program (total planned effort)

Department of Commerce	$1,313,000	($ 1,828,000)
National Science Foundation	$1,637,000	($ 2,379,000)
Atomic Energy Commission		($ 290,000)
Department of Interior		($ 30,000)

System and Technology Development (total planned effort)

Department of Commerce	$ 450,000	($ 892,000)
National Science Foundation	$ 536,000	
Department of Transportation	$ 32,000	($ 9,900,000)
National Aeronautics and Space Agency		($51,015,000)

TABLE III: Agency Operational Costs, by Function

	Observations		Analyses and Forecasts		Communications		Dissemination to Users		General Agency Support		Total	
	FY-70	FY-71	FY-70	FY-71	FY-70	FY-71	FY-70	FY-71	FY-70	FY-71	FY-70	FY-71
AEC	790	942			19	19	109	109	701	809	1,619	1,879
Commerce	45,146	53,131	27,374	30,720	9,446	10,510	13,478	16,070	18,663	19,639	114,107	130,070
Defense:												
Air Force	50,432	59,301	18,484	18,934	19,866	22,089	31,180	30,514	37,378	36,941	157,340	167,779
Army	7,218	9,268							1,100	1,307	8,318	10,575
Navy	16,538	13,541	7,534	6,889	4,391	3,833	2,755	2,586	12,988	12,190	44,206	39,039
HEW	55		200						710	770	965	770
ICSC			199								199	
NASA	317	332	454	600	54	74	36	37	221	257	1,082	1,300
Transportation:												
Coast	1,000*	1,500*	35	38	214	487	45	49	112	184	1,000*	1,500*
Guard*	9,475	9,792									9,881	10,550
FAA	3,886	3,395			19,512	20,315	3,517	4,029	8,343	8,352	35,258	36,091
Total	134,857	151,202	54,280	57,181	53,502	57,327	51,120	53,394	80,216	80,449	373,975	399,553

*Cost to Coast Guard for special weather ship off East Coast of U.S. The operation of this ship is charged 100 per cent to meteorological services whereas the other C.G. vessels are charged 40 per cent to meteorological services.

TABLE III (cont'd): Agency Supporting Research Costs, by Function

	Observation		Description		Prediction		Dissemination		Systems		Support		Total	
	FY-70	FY-71	FY-70	FY-71	FY-70	FY-71	FY-70	FY-71	FY-70	FY-71	FY-70	FY-71	FY-70	FY-71
Agriculture	258	285	509	543	27	27							794	855
AEC	575	608	460	486	115	121							1,150	1,215
Commerce	2,895	3,027	2,162	2,315	1,532	1,675	100	100	718	1,043			7,407	8,160
Defense:														
Air Force	3,513	3,586			1,367	1,306					80	80	4,960	4,972
Army	2,700	2,800	500	500	100	100	100	400	2,000	1,000	4,468	5,100	9,868	9,900
Navy	1,250	1,715			1,055	800							2,305	2,515
HEW	640	600	1,059	1,200	250	200							1,949	2,000
NASA	46,207	65,064	450	660					1,890	3,140			48,547	68,864
Transportation:														
FAA	321	445			268	120	93	100	537		353	185	1,572	850
Total	58,359	78,130	5,140	5,704	4,714	4,349	293	600	5,145	5,183	4,901	5,365	78,552	99,331

TABLE IV: Tentative Outline of Fees for Improved World Weather Service

Country	1965 Domestic G.N.P.	Per cent of Total Fees	Annual Fee
United States	$ 624	45	$110
Canada	42	2.5	6
Japan	79	5	12
European Economic Community	259	20	50
European Free Trade Association	142	14	34
Communist Countries	43	2.5	6
U.S.S.R.	260	20	48
Totals	$1,449		$266

European Economic Community — $50 million	
Belgium	$ 2.8
France	14.8
Germany	19.6
Italy	9.6
Netherlands	3.2
Total	$50.0

European Free Trade Association — $34 million	
Austria	$ 2.0
United Kingdom	18.0
Switzerland	3.6
Sweden	10.0
Portugal	1.0
Norway	1.8
Denmark	2.4
Total	$33.8

Communist Countries — $6 million	
Poland	$1.6
Czechoslovakia	1.6
Romania	1.0
Hungary	1.2
Total	$5.4

The purpose of this schedule is to provide a crude estimate of national costs.
All figures are for millions of dollars.

FIGURE I: Current Availability of Upper Air Data

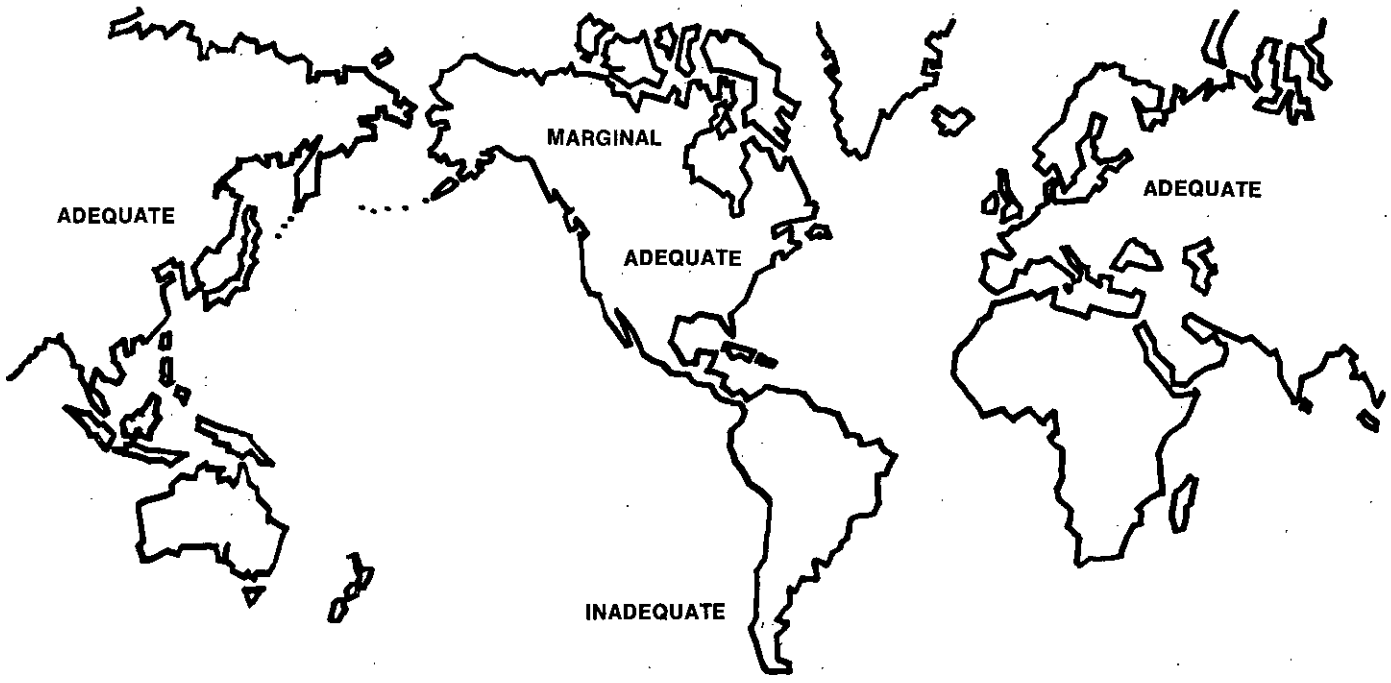
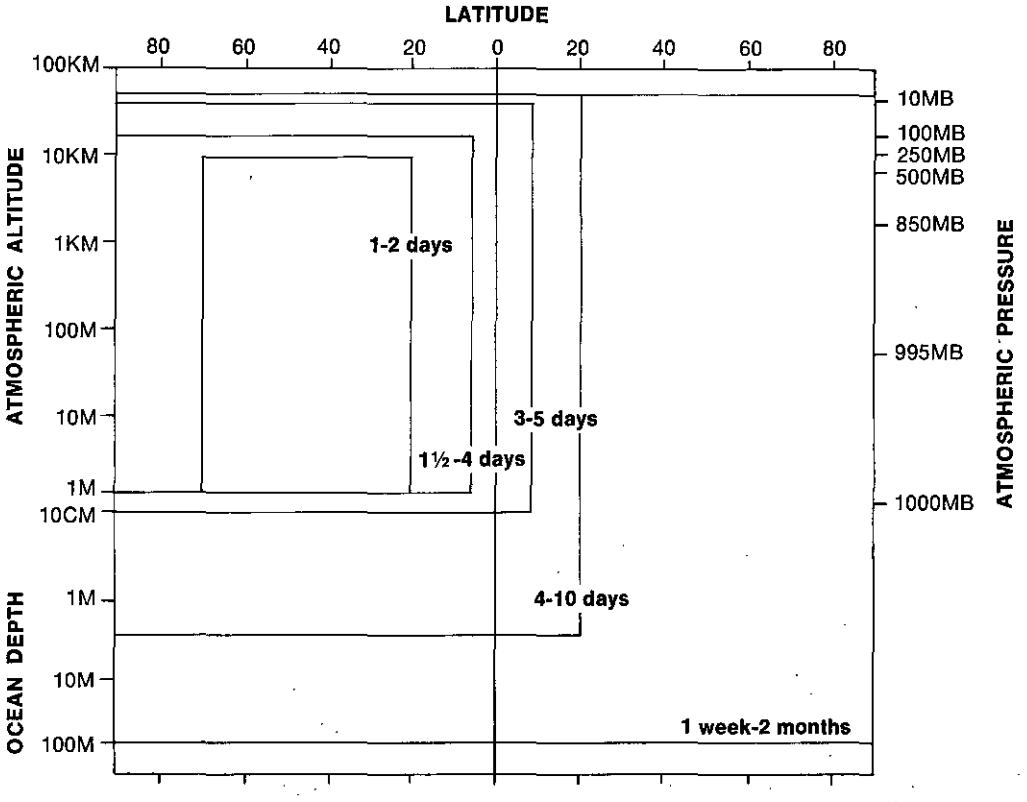


FIGURE II: Schematic of the Data Required for Forecasts in the Mid-Latitudes for Different Forecast Periods



Commentary

MR. JACOBY: I think at the outset it would be appropriate to consider what relation a world weather corporation might have to an ocean regime. Why would it not be feasible and probably desirable to have this corporation operate as a wholly owned subsidiary of an ocean regime? Do you see any difficulty?

MR. BARBER: No, except that I feel that the plan for the world weather corporation is already far more specific than plans for an ocean regime. As far as the weather corporation is concerned, we have been actively discussing more or less detailed matters like budget levels with governments and world corporations for over two years, and therefore planning is rather far along, comparatively speaking. In policy terms, I see no objection to the weather corporation being a part of an ocean regime, but in practice I wouldn't want to wait for the establishment of this ocean regime.

MR. PECCEI: I do not believe that the one would detract from the other. We have a parallel case in Europe. The coal and steel community was formed as part of a larger design, but only at a later date did the European Economic Community come into being.

MR. EELLS: Mr. Barber, I gather that you would not sell weather information. Would it be available to everyone? Would you constantly transmit the information on international wavelengths?

MR. BARBER: In general, yes. The heart of the problem is the necessity for generating enough cash flow per year in terms of long-term, stable contracts to meet costs and insure a reasonable profit. Roughly, we would need contracts up to two hundred million dollars a year.

MR. EELLS: These would be contracts for the service?

MR. BARBER: That's correct.

MR. EELLS: Then the people who are putting up the money would not have a proprietary interest in the information produced by the corporation?

MR. BARBER: No, they would not.

MR. EELLS: That will not be too easy to sell all people. Unless a lot of governments participate, a few governments would be putting up money for all governments.

MR. PECCEI: Again, I think we have an interesting parallel in discussions that are underway right now. The United States, the Soviet Union, and the European states are talking together about a plan to create an institute for applied systems methodology. This would provide a service in the same sense that a weather corporation would provide a service; the results would be available to all, but the cost of running the institute would be shared among six or eight nations. True, the sums involved do not amount to two hundred million dollars a year, but they are quite sizable.

This type of international effort seems to be part of a future trend. Nations would rather participate than stay away and have no hand in what is going on.

MR. EELLS: I agree with the desirability of the goals, but I am concerned about public reaction. I am sure all people will not share the view that a few nations should underwrite the cost of a service to all nations, just as many do not now support foreign aid.

MR. WILKINSON: In a sense, there is nothing altruistic about Mr. Barber's proposal. The people who pay the money will be the ones most likely to derive a great deal of profit. Micro-nations would not be asked to pay because what they would derive would be nearly zero. Maybe some country with a few ships under foreign registry might profit without paying, but the United States and Russia have an overriding interest in this kind of coöperation. It surprises me that they would get so much for so little.

MR. PECCEI: From an economic point of view, Mr. Barber's proposal is very interesting. I am becoming more and more suspicious of anything called international that is really national plus national plus national. We must find new approaches to problems like the oceans and the weather where solutions will

not depend on intergovernmental negotiation or on the International Court. Any proposal for a world authority that is based on sound, scientific planning should be taken seriously because it may bring us closer to the kind of supranational framework for action that we need.

MR. VITZTHUM: My main problem with Mr. Barber's proposal is that he tries in a way to circumvent political problems related to weather and weather information by setting up a corporate weather venture. I believe it was Mr. Wenk who said that information is power. It's no surprise, therefore, that the Air Force has the biggest slice of the weather budget.

This aspect of power will soon be underscored by the possibility of modifying weather. In about two years I will not be surprised to see the first thesis on the international legal implications, and complications, of weather modification. If the Arab countries could, for instance, influence the weather of Israel, they would have no need to attack the Golan Heights; they could simply dry out the country to achieve their purpose. Knowledge about how to influence weather will be a fantastic power that nation-states will not readily deprive themselves of by handing control to a corporation directly responsible to many national governments. Mr. Peccei's approach is the long-range ideal, but I am afraid it will not work as a method for tackling the problems we have today.

MR. BARBER: Obviously the weather corporation could not exist in a political vacuum. We have talked with governments about the idea of having national representatives on the board not simply to direct operations but to insure an open channel to any government. I agree with the proposition that information is power, but I do not feel that this precludes a world-weather organization. The utility we have in mind would be a "corporate goldfish bowl," its operations open for all to see and its staff so selected that it would be impossible for information to be used irresponsibly.

I think it is demonstrable that the idea is not utopian. For example, one of the largest current weather operations is an intelligence operation. Throughout the Cold War, United States Air Force weathermen have daily exchanged data with their counterparts in the Soviet Union. This operation was undertaken for pragmatic reasons — both nations needed information on the weather over potential bombing sites, and a mutual exchange was cheaper than individual efforts.

MR. WILKINSON: Essentially I agree with what Mr. Barber wants to do, but I think that the rhetoric might be improved a little bit. I think it can be granted that we do not have better predictions now that we did fifteen or twenty years ago; they may, in fact, be worse. I sometimes suspect my grandmother's toe is better than anything I can find in meteorology. At the same time, we cannot say that predictions can't be made successfully. We don't know. It is a scientific axiom that until predictions are made, it is never clear that they *can* be made. We may not have a theory that is capable of making better predictions. I have the strong impression from the literature on meteorology that we have a deficient theory at the moment. I am all for a world weather corporation, but I think it is wrong to expect better weather predictions, particularly in the immediate future. The chances are that in the beginning we will have much worse predicitions and that they will tend to get even worse until we can evolve a good theory. If you sell people the idea that spending such and such an amount of money will bring predictions for the better, you may be giving them a false notion. Almost certainly predictions will not get better right away. If we can judge from our experience in some of the other sciences, we must be willing to stick to the effort for twenty-five years, I think, before we can expect good results.

MR. JACOBY: If I may break into this discussion for a moment, I would like to hear some comment on the rather unusual proposal Professor Eells has advanced for a multinational private corporation to function, in effect, as an ocean authority, one having the moral sanction of the United Nations but perhaps chartered by Liechtenstein or Malta or some other small neutral state.

MRS. BORGESE: I agree with Professor Eells' notion that we must go beyond any separation between the political and the economic — the two are inseparable now — and that we must go further than a simple distinction between governmental and non-governmental, between public and private. I have one serious reservation about his proposal, however. It is clear from the discussions in the United Nations Seabed Committee and equally clear from the statements of representatives of developing nations — in and out of government — that the countries of the Third World want the right to participate in the decision-making of any international ocean regime. Any proposal suggesting that this right be based on

wealth or on investment simply would not get the approval of the developing nations. If that qualification for participation is implicit in Professor Eells' proposal, his corporate sovereignty would turn into another project of the Western developed nations or it would not come into being at all.

MR. TUGWELL: You didn't propose to exclude the underdeveloped countries, did you?

MR. EELLS: I said that a stock quota would be assigned to each nation defined by the United Nations as a sovereign entity, with provision for variations in quota to permit adequate representation from the developing countries and to avoid undue dominance by large and already developed countries.

MRS. BORGESE: But what is "adequate?" Third World countries would want participation based on some principle that would give them *equal* rights. They would not take concessions, sops, or gifts. They want to join on an equal basis.

MR. EELLS: Personally, I think that is unrealistic. Let me put it this way. Usually when people discuss some type of instrumentality for solving problems like those presented by the oceans, they do not consider all the options that are open. In this case, the general options are the nation-states, international organizations, and the United Nations. I think there is still another option — a corporate sovereignty for the oceans. I have offered a general description of this option, together with what I thought to be some valid objections to the other three. Perhaps, in the end, the choice will be for one of the three general options, despite the objections to them, but I think it is highly irrational not to discuss all the possibilities. And it certainly —

MR. SHEINBAUM: If there is a mutual interest, the developing nations' share in decision-making is a matter that can ultimately be settled by negotiation, it seems to me. Something can be worked out. I think, however, that we don't want to start with a quota assigned, for example, according to G.N.P.

MR. EELLS: I am not bound to that. We might assign it on population. Very often G.N.P. *is* used as a yardstick, but I am perfectly —

MR. JACOBY: Another alternative would be capital contribution, which was the criterion on which the World Bank and the International Monetary Fund were established.

MR. SHEINBAUM: Why use *any* yardstick that will immediately get the Third World's back up?

MR. EELLS: It's all right with me if we use protein deficiency as our yardstick!

MR. PONTECORVO: Mrs. Borgese raised the important question of how far the major powers will allow themselves to be pushed by the larger number of smaller states and of how the various bargaining positions can be reconciled within the U.N. framework. It's reasonably clear at present that the General Assembly can adopt positions that are not in accordance with the spoken positions of either the Soviet Union or the United States. The reconciliation of the viewpoints of the large powers with those of the developing nations, it seems to me, is one of the major problems we face with regard to the whole question of the law of the seas.

MR. BERLE: In all the other corporations of this kind that I have dealt with, there was some specific function that a quasi-commercial corporation could perform. It is that limited function that made it possible to organize the Development Bank and the World Bank. Could you assign specific functions to this corporation?

MR. EELLS: I would plan to. Without specific functions, the corporation would be a fact-finding and information-gathering body, and some other instrumentality could perform these services just as well. I want to emphasize that my vision of this is not in absolute detail. I have not tried to see all the leaves on the tree, but rather just to see the tree. But I —

MR. BERLE: I'm a little unclear whether your corporation will distribute franchises to someone who will drill for gas in the North Sea bed, for example, or whether it will gather together a pot of capital and then undertake to fish in the Grand Banks, drill for—

MR. EELLS: The former, the former.

MR. BERLE: Only franchises?

MR. PECCEI: It is an authority constituted as a corporation, with the freedom of a corporation, and the flexibility of a corporation — is that not so?

MR. EELLS: That's right. I had in mind the corporate structure of certain types of authority in the United States, applied on a transnational basis.

MR. BERLE: But *they* carry on direct operations, don't they?

MR. EELLS: They do, indeed, but I would think that, in the case of an authority for the oceans, enforcement would have to be left to the nation-states.

MR. PECCEI: May I ask a question of Mrs. Borgese? Do you think if a formula could be found to satisfy both the developed and the underdeveloped nations, East and West, that Professor Eells' idea could provide a solution to many of the present impasses we face?

MRS. BORGESE: Aside from the concrete problem of the relations between developed and developing nations, I see too little public responsibility in a corporation like this. I am afraid it would develop into a technocracy.

MR. SHEINBAUM: I think it may be a mistake to think of this authority as we ordinarily think of a corporation. In this case, the stockholders will be of a different kind. They will be public bodies for the most part, not private individuals in the usual sense, and the influence that they will exert will consequently be of quite a different nature.

MR. EELLS: I felt that it was important to involve the enterprises of the socialist countries and to include public as well as private enterprises.

I gave this paper to a distinguished banker, and he had some objections that have not been mentioned. He thought that the concept should be more pluralistic, that there should be a series of authorities for various functional areas.

MR. JACOBY: You mean a research authority, a licensing authority, and so forth?

MR. TOLLETT: Could you answer that objection by making this a holding corporation?

MR. JACOBY: I think that would be a very logical answer — one corporation with a group of subsidiaries, each performing a specific function.

MR. EELLS: I was given the further objection that this corporation must be made appealing enough to induce nations to subscribe to it. Perhaps making the level of protein deficiency the yardstick for allocating stock quotas would be one way of adding appeal. People are brought together if they have a common anxiety, but also they will join together if they see the prospect of a common profit.

MR. EWALD: One other question: don't corporations have difficulty maintaining a long-range viewpoint — one that looks twenty to fifty years ahead and even beyond? It seems to me that corporations might have some trouble suddenly acquiring a different perspective.

MR. EELLS: Yes, and that is a weakness of this concept.

MR. EWALD: That kind of perspective does not pay off for the people normally involved in corporations. I think, with respect to a corporate sovereignty for the oceans, we would have to build in some motivation for having a long-range view. Ecology might provide the necessary incentive.

MR. EELLS: I have just thought of another answer to Mrs. Borgese's complaint: we could have a board of directors or a board of commissioners, where various groups can be represented.

MR. BONOMI: I wonder whether this corporation will not need an international framework in which to operate. That is, I can't conceive of such a corporation making decisions on matters of principle. I would think that the corporation could engage in policymaking only to the extent that it would operate within a framework of basic principles established by an international conference or by the United Nations.

MR. EELLS: I agree that such an authority could not operate in a vacuum. We would need widespread agreement on principles.

MR. BONOMI: May I say that I was impressed by Mr. Berle's idea of setting oil apart from other ocean problems. If I understood him correctly, he suggested that we consider oil as a whole instead of just the oil in the oceans. Twenty-five or thirty years ago the idea of a world council of oil was put forward as an element in two Anglo-American oil treaties negotiated to settle conflicting British and American oil claims. Some attempt was made to follow through on this

suggestion, but the proposition ran into difficulties in the international oil market.

MR. BERLE: The greatest treaties have not been governmental treaties, and they have not been called treaties. They have been commercial agreements concerned with private profits, but if businessmen can work out enlightened agreements, governments should be able to do the same.

MR. WENK: Businessmen are not always enlightened, nor are governments always unenlightened. I think it is fair to say that if the limits of national sovereignty are extended to include the continental rise and slope, and the oil industry's position implies that they should be, an international regime will have very little promise. This is a fundamental point, and once it is understood, we can see how important the oil industry's position is.

Unfortunately, the industry arrived at its position under stress in the summer of 1968 just when the petroleum interests were reacting sharply to the debate taking place at the United Nations. At that time, a number of emotionally charged nationalistic views were being expressed in the United States as if the national interest coincided with profit-making in the oil business. The oil industry took its position in this atmosphere, and it is now digging in its heels. If the petroleum interests had a chance to start over again, I am not sure the position would be the same today. From a strategic point of view, this position makes for a very unfortunate situation. The oil interests are obviously lobbying for their position, but no one is lobbying for any other position.

MR. BERLE: Is the position taken by the American oil industry any different from that taken by the Soviet Union? The Soviet Union, of course, has been for an unlimited jurisdiction over the continental shelf. It has only partly reduced it to writing in the one case that I know of — the Baltic Sea case — but my impression is their claims are analogous to the American oil claims.

MR. WENK: The Soviet Union is faced with a split personality, just as our government is, and for the same reasons. There are at least two positions in the United States federal government — probably three would be more accurate. From a military point of view, the United States Navy, and the Soviet Navy as well, wants the concept of freedom of the seas extended as far as possible. In other words, the Navy wants to minimize national claims over territorial seas. The Navy believes that if nations have sovereignty over wide expanses of shelf, they will not stop at two hundred miles but will extend the boundary vertically and make whatever claims they wish in relation to this new genesis of sovereignty. Such claims would be exceedingly serious from the point of view of United States national security. It's no wonder, then, that the military would prefer a narrow shelf, and I have a feeling that the Soviet Navy takes the same view, although there is no way to know from public pronouncements.

MR. TUGWELL: You would expect this of a country with long shorelines.

MR. WENK: Yes, but there is also a need to operate internationally through narrow passages. If the sovereignty of those nations bordering those passages is extended far enough to close them, the Soviets would be denied access to the open seas just as we would be. The Soviets are worried about this possibility.

MR. BARBER: I think that both the oil industry and the Navy privately believe and support the view that the United States Navy will defend — literally defend — the property of U.S. oil companies anywhere in the world under any circumstances. This isn't explicit in discussions, but I think it's an important factor behind the oil companies' position. I sat in on one debate and asked, "Do you believe that if the Indonesian government decided to abrogate Standard Oil's contract in Indonesia and seize its property, the United States would do anything about it?" People immediately said, "Yes," almost as if they were stating an article of faith rather than a practical judgment.

MR. TUGWELL: Are you saying that there is a quarrel or a difference of opinion on this between —

MR. BARBER: No. I know the Navy has this view, and so do some oil company executives. It's an underlying assumption that welds a power bloc.

MR. WENK: I think Mr. Barber is right, but the clear fracture between the oil industry and the military is a relatively recent development. At one time, it was believed that national security depended upon access to oil reserves completely under U.S. national sovereignty; this was the argument the oil industry initially

used in developing the National Petroleum Council's position for extending national claims. The military is now saying, "That's not true." The military's position now is that it's not necessary from the point of view of national security to have oil reserves under our sovereignty. I think this is an enormously significant break in the wall. How this conflict is resolved will have a great deal of importance in the whole question of the influence of an ocean regime.

MR. LA QUE: I can confirm Mr. Wenk's assertion that there is a distinct cleavage between the Navy and the petroleum industry. They are as far apart as they can be.

MR. JACOBY: Where was the Navy when Peru took I.P.C.'s property? We didn't even shut off foreign aid.

MR. PONTECORVO: One factor in this argument is the increasing recognition that in today's political climate it is unlikely that we will be able to define one regime for the seabeds, another for the water, and still another for the air column above. The State Department has operated for a long time on the implicit assumption that you could define regimes separately, and it is currently asking for separate conferences. Some people regard this request as naive; others think that it may be realistic. Whatever it is, there is a greatly increased realization within the government that we had better be careful about what we give away. The rights of access through straits — the Straits of Malacca, for example — are probably more important to national security than the oil industry's interest in Indonesia.

MR. ASHMORE: About two or two and a half months ago the United States filed a formal statement of policy on this with the United Nations. Did that have any significance? Did it represent any change in policy? Or was it just a restatement?

MR. WENK: That was a statement of principle and the best the United States government could produce in the absence of a position.

MR. ASHMORE: It did accept, didn't it, the proposition of the common heritage of mankind?

MR. WENK: Yes. I think the principles all fit the idea of looking at the world as a community, but what the United States did not do was take a key position on the limits of national sovereignty.

MR. ASHMORE: Did it have military reservations?

MR. WENK: Yes, and this is reflected also in the draft treaty for disarmament of the seabeds.

MR. BONOMI: May I say that Ambassador Phillips' statement in the United Nations committee was not a statement of principle; it was a shift of objectives. That is quite different.

MR. WENK: I am bothered by a question that arose in both Professor Berle's paper and Professor Eells' paper — the question, essentially, of what it is all for.

I think we have to come back to the matter of where the common interests lie. People are brought together by a common threat. We, in the United States, can visualize a common threat to the environment, as Professor Eells mentioned, but I have a feeling that this is a view reflecting our affluent society and is not necessarily a view that would be expressed among developing nations. We have to ask if there might not be an even more fundamental common threat that would interest developing nations too. I believe the most cohesive common problem is the problem of world hunger. Hunger is not only a problem for those nations suffering from it. The effects of the imbalance between population and food supply may well have a serious long-term impact on the developed nations as well.

I wonder what would happen if we were to weld together some universal threats, on the one hand, and some opportunities from the ocean on the other. What can we *use* enterprises for, what can motivate people to agree, and what will be the disposition of whatever income can be derived from an international regime?

MR. BERLE: You've added a dimension to my list of common interests — humanitarian considerations.

MR. WENK: There is, indeed, a humanitarian element, a strong one, but I am also thinking in pragmatic political terms. Perhaps nations must be encouraged to subscribe to an international convention purely on the basis of narrow self-interest. I am wondering if we must not offer a menu of opportunities that will match the concerns of most nations today. They are not, I believe, primarily concerned with legal abstractions. I think we must think through what the purposes of an ocean enterprise will, or should, be. What do we want an ocean regime for?

PART FOUR

OPTIONS, CONSIDERATIONS, AND GOALS FOR AN OCEAN REGIME

Although a great deal of continuing debate exists as to the best response to the challenge of the oceans, there is almost universal agreement that *something* must be done. The outcome of this debate will put to the test the pious pronouncements of both East and West about coexistence and global harmony. As yet the oceans are not the subject of entrenched vested interests, and consequently the nation-states are left with room to maneuver. They still have time to adopt a solution that will reflect the interests of mankind as a whole rather than one that will serve only national political convenience.

In this context it is significant that the precedents frequently cited for an international ocean regime — the Outer Space and the Antarctica Treaties — deal with areas similarly unexplored and unexploited. As a consequence, the great powers could reach agreement. A cynic might argue that the United States and the Soviet Union could concur on the Outer Space Treaty because neither could be sure who would get there first and that the treaty was an insurance policy for each against colonization by the other. Even if this is so, it increases rather than diminishes the importance of establishing a similar regime in the oceans before they become colonized.

Most major international agreements in the past have been the handiwork of a few powerful countries; smaller or poorer countries, many of which did not even exist as separate entities at the time of the agreements, subsequently acceded to them with varying degrees of enthusiasm. A significant aspect of the challenge presented by the oceans is the part to be played by those countries characterized collectively as the Third World, who will participate in any agreement as full (and perhaps even obstructive) bargaining partners. It is to these countries that advanced nations will have to demonstrate two relatively new attitudes: first, their recognition that Third World states are full members of the international community, with all the rights and the obligations that such membership entails; second, their commitment to do everything in their power to redress the imbalance between the developed and the underdeveloped countries of the world.

Acceptance by the advanced powers of an ever greater responsibility for assisting the progress of underdeveloped countries should not be merely on moral or ethical grounds. It is in the practical interests of every human being on the planet to eliminate hunger, sickness, and ignorance because each of these will eventually have global repercussions. For example, it is now a medically proven fact that protein deficiency in the first five years of a child's life permanently impairs his mental capacity; by allowing a child to starve now, we virtually guarantee that in twenty years' time he will be physically and mentally inferior to his well-fed counterpart. To ignore such starvation and protein deficiency now is to compound the problems the world must face in the future. The oceans present a unique opportunity to close the gap between developed and underdeveloped nations on two fronts: an agreement on an ocean regime could close the political gap by bringing Third World countries into the international arena as full and equal partners; the rational exploitation of ocean resources, potentially capable of supplying a large part of the world's protein needs, could close the gap in human development, of which malnutrition is both a symptom and a cause.

WOLFGANG FRIEDMANN

JOINT EXPLORATION OF OCEAN-BED RESOURCES: SOME ORGANIZATIONAL ASPECTS

It is apparent from the recent intensive, worldwide discussion on the development of ocean-bed resources that the international community will have to choose among three general approaches to future exploitation. The first possibility is a continuation of the present twilight state of affairs; the second, a compromise plan to limit national encroachments upon the ocean bed; and the third, a radical change to international control.

Without any kind of international agreement defining the limits of national jurisdiction, nations may be expected, if the choice is for a continuation of present policies, to compete for ocean-bed resources on an increasing scale and to explore and appropriate ever larger areas of the deep-sea bottoms. Present practices result from the disastrous provision of Article 1 of the Geneva Convention on the Continental Shelf, which extends national jurisdiction over continental-shelf resources beyond a depth of two hundred metres "to where the depth of the superjacent waters admits of the exploitation of the natural resources of the said areas." The rapid progress of technology, permitting or promising drilling and exploitation at greater and greater depths, permanent submarine stations, and transportation along the ocean bed, has been accompanied by increasingly frequent and more vociferous demands for either an open-ended definition of the continental shelf or the establishment of limits up to five thousand metres. The former would, in effect, divide up the ocean, and the latter would mean the potential national appropriation of large portions of the ocean bed.

The second possible choice is an international agreement — possibly under the auspices of the United Nations — on an absolute depth limit, combined perhaps with a horizontal limit but without any international institutional control. In the event of such an understanding, a major portion of the ocean bed would be free from national appropriation, but enforcement of the agreement would be limited to the weak sanctions of customary international law. It is likely, moreover, that an international agreement of this type would leave open the controversial question of whether any limited sector of the ocean bed, like a sea shallow or a seamount, would be subject to national appropriation or occupation.

The third possibility is the establishment of an international control authority for the exploitation of ocean-bed resources, removing the deep seas from

national jurisdiction. According to Ambassador Pardo's plan, Senator Pell's draft treaty, and other proposals, control would rest with an international licensing authority, although the extent of its policing power and operational function remains a matter of debate.

Whatever the choice, the actual exploration and exploitation will be in the hands of large, usually multinational, corporations equipped with advanced technology. They may be private companies, semi-public enterprises, or state corporations, depending upon their national political and economic organization. Of the seven leading Western oil corporations, known as the "seven sisters," all four American companies — Standard Oil of New Jersey, Mobil, Gulf, and Texaco — and the British-Dutch Shell Company are privately owned. The British government has the controlling interest in British Petroleum, formerly Anglo-Iranian, but British Petroleum has traditionally been conducted like a private enterprise without government interference. The French government likewise has a controlling interest in *Compagnie Française des Petroles*. In addition to the big seven, the increasingly important Italian *Ente Nazionale Idrocarburi* is state-owned, as are all communist enterprises, such as the Soviet and Romanian oil trusts.

Whether ownership of organizations for the exploitation of natural resources like oil, natural gas, metals, or other minerals is public, mixed, or private has only minor importance from an international perspective. In method of operation, these various types of corporations do not greatly differ from one another. All are big-scale enterprises, often multinational in character, and all have massive capital and technological resources, whether from the state or from private owners. Only in respect to matters of responsibility and immunity might state-owned corporations pose a problem in international law. The question of whether or not government enterprises should be shielded by the jurisdictional immunities accorded to governments is still highly controversial, but there is more and more support for the opinion that separately constituted government enterprises should not participate in government immunities.[104]

What is more important, for the purposes of this inquiry, is on whose behalf and in whose interest corporations will be operating, and, in this respect, the ultimate approach to the exploitation of ocean-bed resources will be of decisive importance. If the extreme nationalist approach should prevail, with an open-ended, competitive extension of national claims for the exclusive benefit of the coastal states, individual countries will, insofar as possible, license their own enterprises. American corporations will have first claim on whatever the United States may consider its continental shelf, and the same is likely to be true of other industrial nations with seacoasts. Whenever financial and industrial organization and technological know-how permit, the adjacent seabed will be exploited both for the national benefit of the coastal state and by national public and private instrumentalities. Even an industrially developed nation may, however, prefer a competitive multinational operation, provided that an appropriate share of the revenue and the product itself — so far mainly natural gas — is utilized for the national benefit. Some years ago Great Britain subdivided its North Sea continental-shelf area into lots and granted concessions to companies and consortia of other nations.

Whenever a state is financially and technologically insufficiently developed to have its own industrial establishment, it will almost inevitably grant licenses by contract to foreign corporations to develop its continental shelf. The majority of Latin American, Asian, and African nations would in all likelihood enter into concession agreements with one or several of the major multinational corporations. Since some of the communist states — the U.S.S.R., Romania, East Germany, and, in the future, Communist China — have or soon will have the scientific and technological resources to undertake large-scale drilling and other mining operations, the granting of concessions by smaller states for the exploitation of ocean-bed resources will have political as well as economic importance. Depending on their ideological orientation and their diplomatic relations, these states will tend to contract with the corporations of the Western world, with Japan, or with the more advanced communist countries. Business and technological links will often lead to wider ties, as has happened in the cases of Indian steel mills constructed by British, West German, and Soviet engineering firms, with financial assistance from their respective governments. Ocean-bed resources often have an added strategic importance by virtue of their location. In all probability, joint international business ventures, in which the equities of the enterprise are shared between the concession-granting government and the contractors, will be the preferred arrangement.

One of the less fortunate consequences of the continental-shelf concept is that it confers an enormous economic potential on states with a seacoast and therefore, in most cases, a continental shelf. Those

like Argentina, Chile, and Peru that have a steeply descending coastline in place of a continental shelf are seeking to compensate for this disadvantage by claiming a two-hundred-mile zone of territorial waters. Twenty-nine nations at present are totally landlocked. Many of them, especially those in Africa, are also among the poorest countries of the world. Their landlocked condition thus tends to widen still further the gap between developed and underdeveloped nations. Participation in the development of ocean resources is therefore of great political as well as economic importance to landlocked countries. One method of giving them a share of ocean resources might be to grant continental-shelf concessions on a regional, rather than on a national, basis. All members of the Organization of American States or the Organization of African Unity, for example, might participate in the benefits accruing to the coastal nations among them. Such a group of states might use hitherto underemployed regional banks, such as the African or Asian Development Banks, for both the necessary capital investment and the distribution of revenues.

Another less desirable possibility is the appropriation by a landlocked state of a sector of the open seas, like a sea shallow or a seamount, provided that such appropriation is admissible by international law. This question, which until recently has been treated somewhat casually in the literature of international law, may acquire greater significance in the near future, especially for landlocked nations.[105] The prospect of landlocked countries or those with an inadequate continental shelf appropriating sectors of the seabed subsoil is alarming from the point of view of maintaining what remains of the freedom of the seas. It is an illusion to believe that such appropriations or occupations would not in practice increasingly interfere with freedom of navigation and fisheries, even though such freedom would in theory be preserved. Disadvantaged countries cannot be expected to refrain from exploiting whatever possibilities might, without violation of international law, be offered them by the progress of ocean technology. They will be the more prone to seek what advantages they can if nations with a continental shelf, especially those with highly developed technological and financial resources, continue to extend their national claims and to resist not only international control over the exploitation of seabed resources but also any form of international sharing.

Ambassador Pardo's plan and the various other proposals favoring an international rather than a national approach agree broadly on the desirability of establishing an international authority for the supervision of the exploitation of seabed resources. The question arises whether such an authority should be operational, that is to say, directly responsible for the various operations by which the mineral resources of sedentary fisheries or other assets are extracted from the seabed.

There can be little doubt that the question must be answered in the negative. The only worldwide operational — as distinct from supervisory or regulatory — authorities are the International Bank for Reconstruction and Development and the International Monetary Fund. The World Bank and its subsidiaries — the International Finance Corporation and the International Development Association — as well as the International Monetary Fund are essentially financial agencies even though they are as independent in their financial and administrative structures as shareholders' companies. They make loans, allocate funds, hold currencies, and give technical advice, but they do not conduct industrial operations in the manner of the larger enterprises that mine and refine minerals or manufacture products. All the other specialized agencies or branches of the United Nations, including those dealing with communications, transport, and development aid, are administrative and regulatory in character, as exemplified by the U. N. Development Fund, the International Civil Aviation Organization (ICAO), and INTELSAT, the International Television Satellite Consortium, which is managed by the American Comsat Corporation.

An international ocean-bed control authority must be organized on a nearly universal scale if it is to be effective. It must be responsible for the allocation of licenses and for the activities carried out by licensees. Under the Pardo plan and some other proposals, it would also receive some license revenues and be responsible for allocating them to development aid.

It would therefore seem clear that such an international authority would necessarily be supervisory and regulatory rather than operative in character. Its administrative and supervisory responsibilities might well include the direction of international control and police forces as well as the management of financial and development-aid departments. This international authority might conceivably engage in certain judicial or quasi-judicial activities concerned with the fair allocation of concessions and the impartial adjudication of disputes between competing claimants.

Both individual governments and a future international licensing authority would have no choice but to rely on the existing structure of public, mixed, or private industrial enterprises for the actual operations involved in exploiting seabed resources. Ample room would remain, nevertheless, for coöperative arrangements, and the type and scope of joint operations will depend on basic political decisions on the future of the ocean bed.

During the last fifteen years, coöperative international business ventures have, to a steadily increasing extent, become favorite devices for carrying out joint operations where the interests of more than one country are involved. The great advantage of joint ventures over mere concession agreements is that they permit joint-equity participation and that they are flexible. Risks, responsibilities, and profits are shared among the participants, and the interests of all can be reflected in a great variety of modalities.[106]

Joint ventures have long been familiar devices used by the industrial enterprises of technologically advanced countries to pool their resources and operations. Hundreds of bilateral joint ventures exist in fields that require large capital investments as well as complex technological operations, such as electronics, petrochemicals, textiles, and pharmaceuticals. Joint ventures have gained significance in the postwar period as many new and technologically underdeveloped countries have emerged. Since these new nations have found themselves with a wealth of unexploited or foreign-owned natural resources, they have sought a compromise between their desire to control and participate directly in the development of their national resources and their continuing dependence on foreign capital, machinery, and technological know-how. Increasingly, therefore, concession-granting governments have entered into joint ventures with foreign, private entrepreneurs. Since the governments of the developing countries are generally short of liquid capital — at least of transferable currency — they have often formed joint ventures with foreign enterprises in order to solve their dilemma by substituting the sovereign right of exploitation in their territory for cash. A prominent example is the giant LAMCO iron-ore operation in Liberia. There, the Liberian Government has a fifty-per-cent share in a joint venture with an international consortium, in consideration of its granting to the joint venture the concession to exploit the iron ore of the Nimba Mountain.[107]

When it comes to the extraction of mineral resources, there is an increasing tendency for governments that have natural resources to demand a majority share of the joint operation, usually fifty-one per cent. Significant recent developments in this direction are the transformation of formerly foreign-owned copper enterprises in Chile and Zambia into joint-ownership operations in which the government holds fifty-one per cent of the stock and the foreign enterprises, which continues to work the mines, forty-nine per cent. The Chilean Government has concluded such agreements, first, in 1964 with the Kennecott Corporation and, more recently, with the Anaconda Corporation. The Zambian Government has substantially concluded negotiations with the two major British- and American-owned companies that operate the Zambian copper deposits. In all these cases the government does not contribute cash but regards the forty-nine-per-cent share granted to the foreign operator as consideration for his investment and operation. Fortunately, the difficult problem of compensating for this partial expropriation will not arise in the case of ocean-bed operations, which are new ventures.

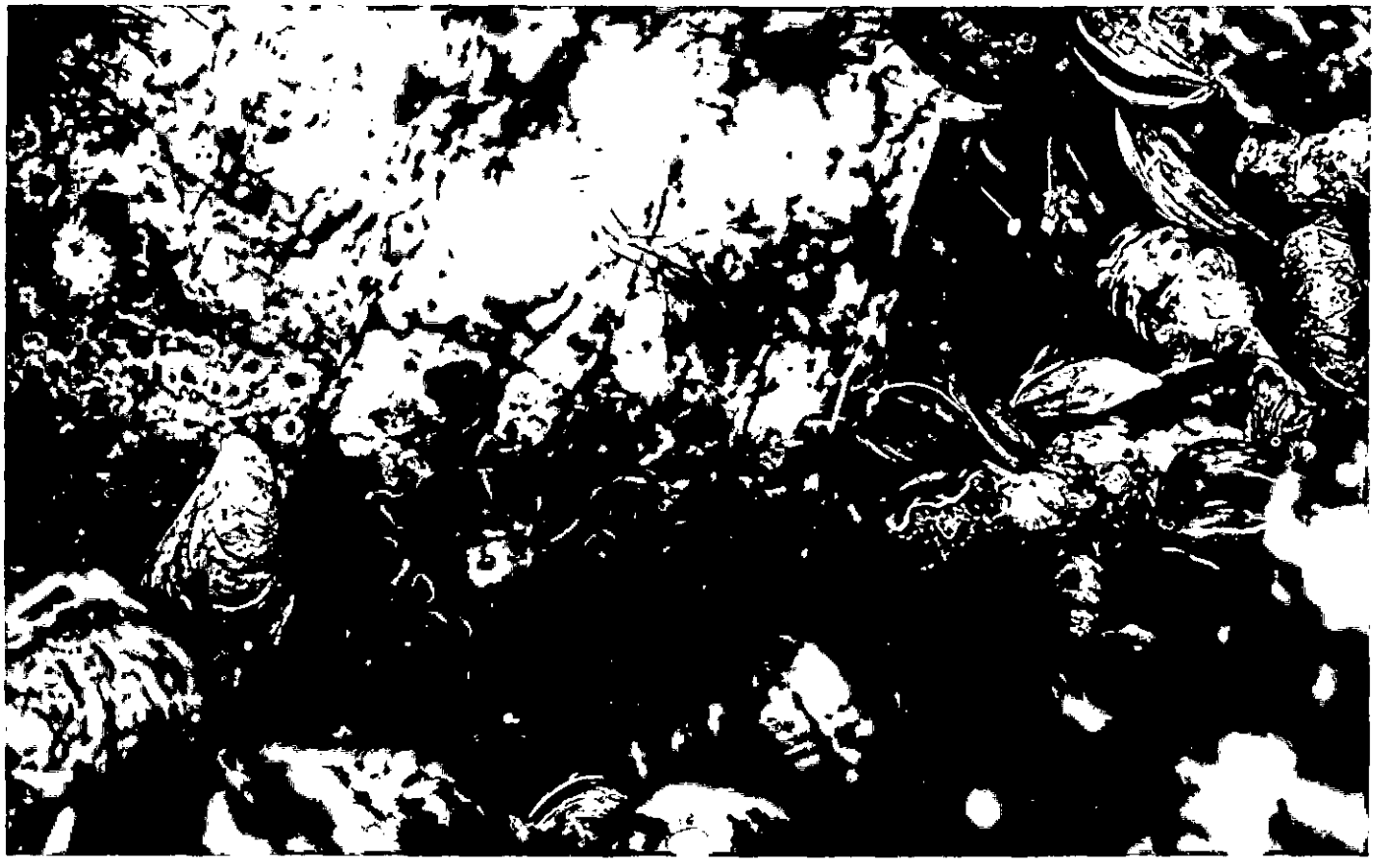
Another important model for joint operations between a country that disposes of, or acquires an interest in, natural resources and a foreign entrepreneur responsible for the technological and managerial aspects of the operation is offered by the various arrangements made between the government of Iran and foreign companies for the exploration and exploitation of its oil resources. These are of particular interest for possible coöperative arrangements to be made with respect to seabed resources.

In 1957 the National Iranian Oil Corporation (NIOC) entered into an arrangement with AGIP, *Agenzia Generale Italiana Petroli,* the Italian state-owned corporation engaged in the exploration, production, and marketing of oil, gas, and other petroleum products. Under this arrangement, a mixed Iranian-Italian company called SIRIP *(Societé Irano-Italienne de Petrole)* was established. Its capital was subscribed in equal parts by AGIP and NIOC. The object of the company is to explore and produce liquid and gaseous hydrocarbons in certain specified areas of Iran. Apart from being a joint-equity venture — at that time a novel form of enterprise in the field of oil production and refining — the arrangement made history by increasing the revenue share of the concession-granting government from the then customary fifty to seventy-five per cent.[108] The arrangement also provided for a joint conciliation committee and for arbitration by a tribunal of three in case of legal disputes.

Equally interesting, although different in structure, is a more recent arrangement made in 1965 between NIOC on the one hand and three foreign parties on the other. According to this arrangement, a "joint structure" was established for offshore exploration and operational activities in certain parts of the Persian Gulf. In contrast to the NIOC-AGIP agreement, this is not an equity joint venture but a contractual joint venture in which NIOC participates with fifty per cent and the other fifty per cent is shared in equal parts among AGIP, the state-owned Indian Oil and Natural Gas Commission (ONGC), and the private American oil corporation, Phillips. The foreign parties may not transfer their interests to any other party without the consent of their Iranian partner. The parties to the agreement have formed a non-profit Iranian joint-stock company called IMINOCO to which they contribute in proportion to their participation in the contractual joint venture. Essentially IMINOCO is a management company entrusted with budget preparation, accounting, and other managerial tasks of concern to all the parties to the agreement. The position of managing director of IMINOCO rotates among the parties. Thus, for operational and management purposes, the participants, who represent four different nations, have established an Iranian company subject to Iranian law.

It is now an almost universal feature of joint international business ventures that the foreign participant no longer operates through a branch as he did in former times but establishes a subsidiary company either wholly owned or jointly owned with local interests in the host country. The local company is subject both to the company law and other relevant laws of the host country in all matters connected with organization. Thus, SIRIP, the Iranian subsidiary of AGIP, is an Iranian company.

This apparent nationalization of the modern multinational corporation conceals certain conflicts and tensions between the worldwide interests of the advanced country and the national interests of the host state where the subsidiary is incorporated. As the experience of hundreds of concession agreements and joint ventures has shown, there is no general theoretical solution for this conflict. The oil companies with worldwide interests, therefore, have engaged in a continuous struggle in recent years with the petroleum producers, now organized into the Organization of Petroleum Exporting Countries (OPEC), over the level of oil prices on which profit-sharing and royalties are calculated. Producing



countries have an interest in basing calculations on an artificially high "posted price," while the companies push for a lower level that corresponds to the actual world-market prices, and managerial personnel have often been torn by conflicting loyalties. To some extent this problem is being solved by a nationalization of the staffs as scientific, technological, and managerial training gains momentum. At the top level, where the managing or technical director is often still a foreigner, conflicts continue to arise.

Financially, the enterprise is foreign, and it still forms part of the worldwide operational network of a company based in an industrially developed country. At the same time, it is a part of the system and policy of the host country, administratively, legally, and economically. How it is viewed will depend on whether foreign or local interests own the majority of the stock. Thus, those countries that forbid majority foreign ownership by law in the case of natural resources clearly disregard the formal aspects of incorporation and make nationality of the stockholders the criterion for determining ownership. The same kind of thinking predominates when existing enterprises are nationalized, and hence the tendency in such countries as Chile and Zambia to acquire a majority interest for the government. Most foreign entrepreneurs concede such majority control reluctantly, but at a time when rising nationalism in Latin America, Africa, and Asia rejects the concept of foreign economic control, local control is likely to be an increasingly frequent phenomenon.

LAMCO is a prominent example of the growing number of multinational enterprises in which private interests, public development corporations, and national or international aid agencies participate in a joint operation. Another form of binational or multinational collaboration is exemplified by EUROFIMA, established in 1956. This company, incorporated in Switzerland, is a consortium through which sixteen European governments pool their railway rolling stock for joint operations. The company is governed in all formal aspects by Swiss law but for other purposes is controlled by the terms of agreement among the participating governments. EUROCHEMIC, established some years later in Brussels, is a joint enterprise for research on nuclear reaction processes involving various European governments and a few private companies. By its articles of agreement, it is governed primarily by the terms of the agreement and subsidiarily by Belgian law.

Among other joint enterprises is the Franco-Italian Mont Blanc Tunnel Corporation, a joint effort of the French and Italian governments for the construction of a Mont Blanc tunnel; the governments participate equally without the establishment of a joint company. The international Moselle Corporation is a joint enterprise among France, Germany, and Luxembourg for the construction of the Moselle Canal. It is incorporated in Germany, but the three governments concerned participate equally in managerial and financial operations. Other organizations of a multinational character are the Scandinavian Airlines System, owned and managed by the governments of Sweden, Norway, and Denmark, with the participation of some private capital, and the Kariba Dam, which generates electricity for Rhodesia and Zambia despite the absence of political and legal links between some of the participants.

As we have already indicated, one strong possibility is that the coastal states will exploit their respective continental-shelf resources on a purely national basis. They may either license public or private national enterprises having the necessary equipment or parcel out the areas to a number of different licensees on the basis of competitive bids, as the British did in the North Sea. Obviously, this approach will lead to ever widening national definitions of the continental shelf and to compensating claims from those states without economically and geographically significant shelf areas.

The bilateral joint venture is likely to be the favorite device of technologically backward countries — both those with a continental shelf and those that are landlocked — in granting concessions to foreign entrepreneurs. They may well adopt the increasingly frequent pattern of recent mining developments on land, the fifty-one-forty-nine-per-cent venture, with the majority interest held by the concession-granting government. The governments concerned would in most cases prefer straight concession agreements so that they could retain full ownership and receive all the profits in return for a contractual fee. Foreign entrepreneurs will often insist, however, on an appropriate equity share not only because of the prospect of corresponding participation in the profits of the enterprise but also because of the need to retain some control over policy and management. While such bilateral arrangements will in many cases ensure a fair share to less privileged countries, they will not represent a significant departure from the nationalistic pattern. The various states that cannot adequately exploit their own resources will simply use foreign entrepreneurs as contractors or partners.

A more promising alternative would be multi-

national arrangements for the joint exploration of certain areas. This exploration could be carried out either by multinational corporate enterprises or by transnational organizations like EUROFIMA and EUROCHEMIC. Such arrangements would be particularly suited to the exploration of relatively small seabed areas, the jurisdiction over which is divided among a number of contiguous states.

The possibility for multinational agreements, however, was adumbrated by the judgment of the International Court of Justice in the North Sea continental-shelf case on January 20, 1969. The Court was asked by West Germany, on the one side, and by Denmark and the Netherlands, on the other, to determine the delimitation of their respective continental shelves. Except that they were willing to submit the matter to judicial decisions, the countries involved took, of course, a purely nationalistic approach. West Germany demanded an adjustment in its favor of the "equidistance" line that, because of the strong inward curving of its coastline, would have given it a smaller continental-shelf area than deemed equitable or demanded by "special circumstances." The Court, by a majority judgment, decided in favor of such a readjustment. Judge Jessup, in a concurring opinion, pointed to the desirability of coöperative arrangements — exemplified by the West German-Dutch agreement on the River Ems. The majority judgment repeatedly referred to the centuries-long community of interests among North Sea coastal states, but the decision did not — and probably could not — do more than divide the contentious area among the contestants. In his dissenting judgment, Judge Lachs observed that a genuine coöperative and equitable solution might have demanded a pooling of the resources of the entire area, with equities distributed in accordance with some criterion like the economic productivity or the population density of the countries concerned.[109]

For the coöperative exploitation of seabed resources, a joint multinational company could be formed that, like EUROCHEMIC, would be incorporated in one of the participating countries and governed by the law of that country for formal and procedural purposes. For all else, however, it would be governed by provisions of the international agreement itself, with interpretations presumably subject to the general principles of law recognized by civilized nations.[110] Participating countries would hold shares in the joint enterprise in proportion to the degree of their involvement or according to some other criterion agreed upon among the parties. Such an agreement would be compatible with the establishment of an international licensing authority since it would concern operational and extractive arrangements. As in other regional institutions, coöperation in undersea exploration would offer the obvious advantage of pooling the resources of countries linked by common interests, contiguity, and other ties.

Legal instrumentalities are not lacking for the establishment of multinational coöperative ventures although eventually a truly international corporate organization might have to be formed, based on a corporate register established under United Nations auspices. The political will to find alternatives to the menacing competitive race between conflicting national interests is the missing ingredient. Without it, mankind cannot acquire the wisdom to move beyond the passions of nationalism and the divisive interests of national sovereignty.

EDWARD WENK, JR.

TOWARD ENHANCED MANAGEMENT OF MARITIME TECHNOLOGY

While marine charts and terrestrial maps representing global geography are inherently complementary, they have had one characteristic difference. Navigational charts delineate primarily the irregular boundary between water and land, together with details of submarine topography, tides, currents, and prevailing winds. Terrestrial maps portray similar topographic detail, with emphasis on rivers, mountains, and cultural features such as roads and cities. They differ from marine charts, however, in that they contain additional cartographic information on the boundaries of private property and demark areas of political sovereignty. This distinction between the two types of maps reflects their historically different uses. Nautical charts facilitated safe and speedy transit between ports but were never intended to convey legal subdivisions; recording proprietorship, cultural settlement, and economic development on ocean charts was considered not only irrelevant but unthinkable.

This attitude has persisted until recently. Today, however, the sea has assumed significance beyond its former primary role as a medium for transport. Reflecting this extension in values after years of congressional probing, a new national policy was adopted in the United States in June, 1966. The aim of this policy is to intensify study and use of the sea to enhance human life through economic and social betterment and to promote world peace and understanding. With the world population outpacing its food supply, with industrial requirements for energy and minerals growing faster than population, and with increasing concentrations of waste being unwittingly injected into the marine environment, it had become clear that neither the problems ahead nor the solutions proposed for them could terminate at the water's edge. The policy enunciated in the Marine Resources and Engineering Development Act of 1966,[111] reinforced by subsequent Presidential statements and elaborated in private conferences, communicated both a new determination to relate the sea to the affairs of man and a desire by the United States not to "go it alone."

The international community was encouraged to collaborate in employing the seas for the benefit of all mankind. Corresponding U.S. initiatives at the United Nations General Assembly in the fall of 1966 led to a resolution[112] reflecting the realization that a multinational approach to peaceful uses of the sea

was not only desirable but necessary: scientific study of the sea is inherently international in character; deep-ocean resources are the common property of all nations; and the need now is to minimize potential conflict as more and more nations project their interests seaward. Ambassador Pardo of Malta aroused interest at the United Nations with his dramatic proposals for using seabed resources to alleviate the economic peril of the less developed lands and of the United Nations itself.

Many nations began their own inquiry into their stake in the oceans; by now virtually all of the hundred and twelve states bordering the sea, and the twenty-nine that do not, are considering their national interests at a policy level, not just at a scientific level. Whetted by projections, based on enthusiasm as well as on fact, that vast wealth was to be derived from the sea, many responded to the stimulus by mapping the marine equivalent of a terrestrial frontier. They drafted boundaries for possible seabed territorial claims. The cautions expressed by President Johnson in July, 1966, not to "allow prospects of rich harvest and mineral wealth to create a new form of colonial competition — and a race to grab and to hold lands under the high seas" initially went unheeded by nations and special interests alike.

Collectively, the countries of the world have thus begun a debate on three major issues concerning seventy per cent of the earth's surface: Who owns the seabed? Beyond boundaries of natural sovereignty, how will exploitation be controlled? How will benefits be distributed?

A NEW APPROACH

It is my thesis that to extract the sought-for benefits from the sea we need a fresh approach flowing from concepts of use and from the relationships among the institutions involved as well as from legal principles and ideology. To aid this mode of analysis, a second category of maritime charts will be needed. Instead of hypothetical boundaries of national sovereignty, these charts would follow the principles used in maps delineating the economic geography of occupied land areas. They would be concerned with the present and future use of the seas.

Two questions arise: First, what intelligence should be portrayed on these maps? And to answer that question, the second — what is their ultimate purpose? I would propose, as an orientation for such charts, a rationale leading to the enhanced management of maritime technology.

To emphasize maritime technology is to reflect the significance of the recently acquired engineering knowledge that is making these resources accessible and exploitable. Our heightened interest in marine resources is a direct consequence of that new knowledge. We now have the technical muscle to accomplish those feats on, in, or under the sea we have long wished for but have always been denied because of the strenuous maritime environment. Maritime technology has generated the use of new and sophisticated tools for exploration — spacecraft, buoy networks, and submarines — as well as tools for the exploitation of marine resources. Technology is properly thought of as concerned with means, but its management involves the notion of ends as well.

The concept of managing technology is a relatively new abstraction and has entered public discussion only recently. This concept has taken hold as technology, managed ineffectively by human institutions, has been seen to inflict damage on our environment. The application of a concept such as this even to familiar enterprises on land is tentative and untried. Application to the marine environment is all the more novel. The object of this paper is to open discussion on the validity and implications of the concept in meeting the conflicts emerging over use of the sea and the seabed and in illuminating opportunities to lay a sound, if unprecedented, basis for future international development. The paper also establishes functions for proposed new supranational machinery in order to assure enchanced management of maritime technology.

First, a definition. The word "technology" is meant to convey the complex process by which a technique is successfully applied to achieve a selected purpose. This definition implies that the technique itself is specialized and refined for the intended purpose — a maritime one, in the context of this discussion. In contemporary terms, techniques are based more on scientific and engineering research than on empirical experience or craftsmanship.

If it is to translate specialized knowledge into effective accomplishment, the technique must be afforded an appropriate institutional vehicle. This vehicle — or enterprise — must have the capacity for decision-making, especially with regard to risk, and the means for raising capital, mobilizing specialized manpower, and articulating with both the marketplace and other enterprises that surround and affect it. It must provide a platform for leadership.

Technology requires that such an institution have the capacity to cope with change and to innovate.

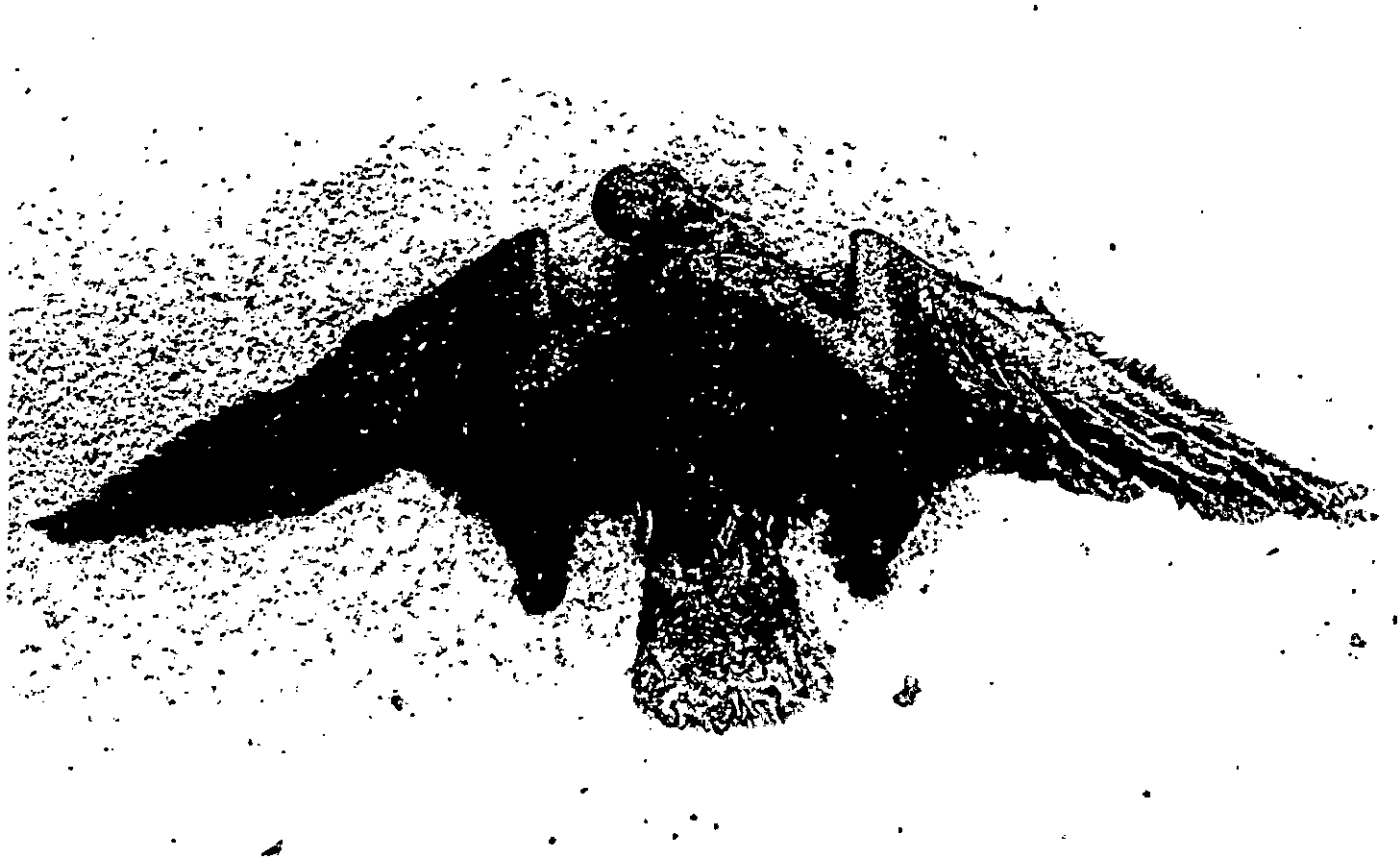
This requirement, in turn, implies the ability to collect and analyze information and to undertake "pre-crisis" as well as "post-crisis" studies. The enterprise must be able to generate new knowledge, that is to say, to perform the research necessary to extend and refine the techniques on which the enterprise was initially founded. It may even spawn subsidiary enterprises whose only goals would be to extend knowledge through scientific research, geographical exploration, or engineering development.

Increasingly significant to contemporary technologies is development of an harmonious relationship among institutional components drawn from four familiar groupings: national governments; international organizations; corporate enterprises; and academic institutions. Historically, the requirements for technology have been generated by both public bodies and private entrepreneurs. Military weaponry, space exploration, and nuclear energy are examples of areas where technology was initially government-sponsored and where the other groups came to be involved later. The production of consumer goods is an obvious example of the second.

The international institution may well play a special role in attempts to deal with maritime technology.

The management of maritime technology, or any other technology for that matter, involves stimulation, control, administration, coördination, and regulation of all components of the technology, so optimized that the aggregate activity may best serve a particular purpose. It has recently been recognized, however, that such management requires an "early warning system" and a corresponding discipline if the newly generated technology is not to induce unwanted side effects inadvertently, through narrow application. It is urgent to recognize this precept of management in the present era of transition from a time when man utilized technology to protect himself from the environment to one in which technology is needed to protect the environment from man.

Major elements of maritime technology may be directed toward exploitation of marine resources so that the management of maritime technology may be considered to subsume the management of resources. Thus, technology management goes beyond resource management in its concern for the techniques and



tools of exploration and exploitation, as well as for the development and conservation of the raw materials themselves. In particular, the concept requires a systems approach that takes into account the interactions that occur during exploitation among the ostensibly separate maritime resources, their different uses, and the activities of the various institutional groups involved in technological development. All potential uses of the sea must be considered rather than merely the exploitation of fish and non-living resources: waste disposal, mercantile commerce; peacekeeping; recreational development; scientific research; and conservation. To seek harmony among these uses would be the object of planning, so that no single-purpose use may unwittingly preëmpt options for the future.

The concept also reflects the premise that sources of capital and instruments of research, discovery, extraction, exploitation, and marketing are as important in developing and distributing benefits from the sea as ownership of the undeveloped resources themselves. In this approach, questions regarding the richness and the distribution of living and non-living marine resources have only subordinate interest; the major concern is to identify and resolve collectively the more fundamental question of what we want these resources for.

FUNDAMENTAL GOALS FOR THE SEAS TO SERVE MANKIND

To manage means to manage with a purpose. If maritime technology had to satisfy only one purpose, the selection of the best management alternative would be much simpler than it is. Discussions at the United Nations have revealed, in the main, three broad purposes that are widely although not universally accepted: preserving world order; maintaining the quality of the environment; and accelerating nutritional and economic health among less developed nations in order to reduce the continuing disparity between them and the technologically advanced nations.[113] These broad goals are not mutually exclusive but they can be both implicitly and explicitly in conflict. Moreover, short-run objectives may not easily be reconciled with long-term goals.

The first step toward enhanced maritime management thus must be the quest for a common purpose, including an effort to discover what is socially desirable, so that we will not simply yield to the seduction of what is technically feasible. The implementation of that step raises questions about the adequacy of our present machinery for universal balloting on an issue like the management of worldwide technology since the constituency includes both national governments and institutions concerned with the use of the sea.

ANALYTICAL CAPABILITIES FOR MARITIME PLANNING

To penetrate this management concept further, it will be necessary to draft the new charts proposed earlier that would portray the economic geography of the oceans. Such charts would, of course, delineate resources, indicating both their presence and their accessibility. Gaps and uncertainties in these charts would immediately suggest targets for geographical exploration. To provide further clues to exploration priorities, another set of charts would be based on the economics of resource recovery, especially in its relation to the exploitation of corresponding terrestrial resources, showing the proximity of marine resources to processing capabilities, energy sources, points of transshipment, and markets. To these resource maps must be added still others not related directly to resources but showing trade routes, recreational sites, tourist traffic, sources of pollution, and ocean circulation patterns that carry pollutants far from their original source. Finally, maps should delineate natural areas of special beauty or sensitive ecology deserving of special protection.

Composite maps of this type should tell us who is involved in what use, in terms of capital investment and profit sharing. Portraying national jurisdictions is a dimension that will lend both complexity and fragmentation to such maps. In addition, if we are to comprehend the full picture, the dynamics of power and influence reflecting the relationships between individual governments and users must be clear, that we may go beyond a simple taxonomy of participants to understand the actual dialogue. It is naive, for example, to equate power with national entities alone. Governments should be identified in terms of their respective roles in providing low-interest capital or subsidies to their nationals, sharing risks, limiting liability, sponsoring exploration and research, regulating pollution, and so forth.

With such charts, it would become evident that the tapestry of use and the nature of the environment — including circulation of sea water, pollutants, and fish — in no way corresponds to projected political boundaries. The actual or potential conflict among the various uses would also be manifest. Shipping lanes simply cannot pass through concentrations of oil platforms, and industrial waste cannot be dumped

on oyster beds. Conflicts will naturally be intensified in the relatively shallow water near coastlines, but engineering potential can extend the locus of activity farther to sea. In the light of the conflict between oil extraction and conservation, industrial enterprises may well be forced out to sea.

THE RATIONALE FOR GLOBAL PLANNING

It may be argued that a similar complexity exists on land and that no such detailed land maps have been constructed to deal with issues there. The term "maps" as used here is a rhetorical device referring to the analytical tools necessary for dealing with the ocean.

The sea is, first of all, a vast homogenous area beyond the reach of national sovereignty (wherever national boundaries may eventually be drawn) and thus is fundamentally a simpler problem than the heterogeneous land masses.

Second, the oceans are now at a sufficiently low relative level of activity and rivalry that many more options are available for its future development than exist for terrestrial activities. Land development has historically been dominated by the concept of private ownership and political subdivision.

Third, we still have the option of keeping the management of ocean technology simple. Many problems in modern society arise from the sheer complexity of its institutions, and, as with biological systems, excessive complexity may be a threat to survival. Coordinating so many different elements with conflicting purposes may fatally overstress the system. Keeping institutional relationships simple could itself be a goal in managing maritime technology.

Society has increasingly failed to manage technology successfully on land. Many of the problems we now face are second- or third-order consequences of a technology adopted for a particular goal. Whereas that goal may have been successfully met, its realization has often been accompanied by serious and unwanted effects that now require emergency correction. More deliberate advance assessment of technological side-effects and better management could have headed off the costs we now face in cleaning up polluted air, water, and land.

Perceptive management becomes all the more imperative in the face of the projected demands that will be made on the ocean during the three short decades left in this century. The anticipated three- to six-fold increase in fishing, oil recovery, ocean transport, waste disposal, and recreational demand, to name but a few activities, makes conflict increasingly probable. The portending conflicts may arise not only between nations but also between users and between institutional groups.

Technology management now has unprecedented means to illuminate the possibly unwanted consequences of any preëmptive development that might conflict with others or impart injury to the natural environment. The advance analysis of which we are now capable can make it possible for us to improve techniques before applying them and thus to minimize the need for subsequent costly or politically difficult corrective measures. The number of oil spills projected for the next thirty years on the basis of recent experience suggests that no coastline will remain unstained. The accuracy with which fish concentrations may be spotted by spacecraft or other devices in the foreseeable future could quickly lead to extermination of species. Setting boundaries will not solve these critical problems.

The advance analysis required will depend on a new form of planning capability whose purpose will be to examine the long-term consequences of the impact of man and his technology on his environment. Concern for the quality of the environment must go well beyond simple control of pollution; quality is not measured only by absence of pollution; it involves also the achievement of harmony among potentially conflicting uses.

A frequent rhetorical question generated by such problems is, "What would you do if you could start over?" In the case of the oceans, it is still possible to ask this question.

What would we do?

In the first instance, I would suggest that attention be directed as much to the question of collective technology management as to the question of ownership, for the means of exploitation may be more profoundly significant than ownership. Unlimited exploitation of resources solely for economic gain, without improved technology, could be a critical threat to the marine environment.

THE ROLE OF LAW

This discussion leads naturally to the role that international law will play. New or amended conventions to define sovereignty will undoubtedly be warranted since the necessarily large capital investments in ocean exploration and exploitation will be made only under the security of a stable legal regime, and the status of relevant conventions is highly con-

troversial. Discussions of sovereignty have been dominated largely by the issue of narrow versus wide seaward extension of national jurisdiction, with the consequence that goals and the barriers to their achievement have received little attention.

Although the concept of technology management set forth in this paper has many legal ramifications, suffice it to say here that international conventions will comprise only a small part of the "rules of the game" required in the future. If we are to govern the relationships among enterprises now involved at sea, and not just relationships among nations, international regulation should provide for the orderly development of resources, for conditions favorable to investment, for the dedication of returns from common resources to world community purposes, and for an harmonious accommodation of all uses, commercial and otherwise, including the preservation of environmental quality.

INSTITUTIONAL INNOVATION

Assuming that large areas of the ocean and seabed will eventually be regarded as common property subject to universal sovereignty, will the various existing enterprises capable of operating in these areas have the vitality to realize the necessary goals? If not, what evolution in institutions is necessary? Numerous proposals have been made for the creation of an international authority to register claims and distribute proceeds. These suggestions are reminiscent of nineteenth-century practices in developing the land frontier. Are they applicable to the twenty-first century? What lessons have we learned about unmanaged technology? In the absence of any new enterprise, what will be the outcome?

Institutions involved in the management of maritime technology must, if they are to be effective, provide for a great variety of functions. First among these is the development of an international consensus on the social and economic goals. Beyond that initial requirement, enhanced management of technology will demand greater knowledge of the environment and improved techniques for transforming scientific discoveries into practical applications. Evaluations of the unwanted consequences of technology will be essential. Capital must be raised, goals and resources matched, exploitation undertaken, products distributed, and benefits disbursed.

Among the existing international, national, private entrepreneurial, and scientific institutions, a number can meet these functional requirements, to a partial extent at least. The United Nations can establish goals. Perhaps twenty-five nations have the oceanographic capabilities to explore the environment. UNESCO's Intergovernmental Oceanographic Commission, the Food and Agricultural Organization, and the World Meteorological Organization are all capable of coördinating explorational research. Perhaps six nations and an unknown, but probably small, number of private enterprises have the capacity for ocean engineering. Some few national and private sources have capital available for investment, as do some international sources, such as the World Bank, and the World Bank can act as an agent for disbursing benefits.

Even on the unwarranted assumption that each of these organizations or groups fulfills a specific function completely, several elements are conspicuously missing. Nowhere does there exist an international planning body capable of collecting, analyzing, and transferring the information needed for decision-making by many individual nations as well as by groups of nations. Similarly lacking is an instrument for coördinating and integrating the various international components of a maritime technology. Nor is there an entrepreneurial enterprise actively seeking use of the sea for the benefit of all mankind; all seem dedicated, rather, to a piecemeal, narrowly opportunistic approach.

The need for additional international machinery has been recognized almost from the genesis of United Nations discussions on the seabed. A wide range of proposals has included suggestions for a modest territorial registration office, for a body to distribute fiscal return from exploitation, and for regulatory and policing machinery. That further study is essential is reflected in the recent resolution[114] calling on the Secretary-General to prepare a study and submit his report to the Committee on Peaceful Uses of the Seabed, which would then report to the General Assembly during the forthcoming twenty-fifth session. The terms of reference of that resolution are limited to "jurisdiction over peaceful uses of the seabed and ocean floor, and the subsoil thereof, beyond limits of natural jurisdiction," but its scope with regard to the seabed encompasses "power to regulate, coördinate, supervise, and control all activities relating to the exploration and exploitation of their resources for the benefit of mankind as a whole, irrespective of the geographical location of states, taking into account the special interests and needs of the developing countries, whether landlocked or coastal." It is hard to imagine any potential powers omitted; the policy-

planning instrumentality proposed in this paper, however, is not intended to be limited to the seabed. From this resolution, it is only a small additional step to devise institutional ways and means of achieving implementation.

Discussion of institutional innovation almost inevitably stirs up resistance among existing bureaucracies whose instinct is to be suspicious of change — always deemed a potential threat to survival. Considering the difficulties that beset any international operation, it would be advantageous to minimize violence to present structures, limiting it to those changes necessary to achieve the stated purposes.

From the preceding discussion, it is clear that some international authority is required to manage the technology for use of the marine environment. The functions of such an authority would include the control of franchises for exploitation but would go beyond the mere registration of claims. The authority would function as a planning and coördinating body and would depend on coöperative effort from a wide variety of individual commercial, national, and international enterprises to meet its objectives. It would, however, have the option of taking initiatives to meet internationally agreed-upon goals if random initiatives by users leave critical gaps. The authority must be equipped to collect and disseminate information about the marine environment and resources that are beyond national sovereignty and that it would be empowered to manage. It would provide information to all nations individually, thus materially assisting those having limited scientific capabilities of their own. It should also undertake long-range studies of resource potential and make management-oriented analyses to predict the consequences of projected uses. By supplementing national capabilities, it should assure the operation of such data-collection, monitoring, and prediction systems as are needed to understand the marine environment and to predict the impact of man's activities on it. The authority would look to some ongoing body, such as the United Nations Development Programme or the World Bank, to dispense proceeds.

What is proposed here initially is a steering mechanism with independent analytical facilities to aid in international decision-making. Its analyses should be based upon, but should not be dependent upon, facts developed by member nations.

It would assess unmet needs and opportunities that cross the jurisdictional lines of international organizations; recommend priorities for exploration; and advocate the development of new techniques necessary for optimal use of the sea, specifying means of control, in such areas as finding and catching fish, drilling for oil, preventing or containing spills, and disposing of harmful wastes. It would coördinate planning for all maritime-oriented international bodies; encourage investments to meet maritime goals, including the reinvestment of proceeds available to it for research, exploration, and engineering development; and develop legal, economic, and technological studies for identifying alternative policies and criteria for the use by those international maritime bodies that have been established by treaty.

The last decade has seen our attitudes toward the sea begin to mature. Our scientific knowledge of the marine environment is increasing as is our ability to put our information to practical use through engineering. A clearer understanding of the benefits to be derived by individual nations has also emerged, but the fragmentation of use, sovereignty, and even of study may still lead to abuse of the marine environment. What seems necessary now is a unifying concept of the sea and a strengthening of our institutions, both national and international, so that we may realize the potential of the oceans. A new international planning and coördinating body dedicated to enhanced management of maritime technology would be a step in that direction.

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15. This description covers the situation of a new fishery. The period of profitability is determined by the size of the stock, the amount of the rent, the demand for the end product, and so on. The development of the Peruvian *anchoveta* fishery in recent years is a good illustration of this hypothesis.

16. There are, of course, always exceptions to the general condition — profitability of enterprise falls in a frequency distribution, and in almost any situation, firms in the upper portion of the distribution may be profitable while the average firm is not.

17. The estimate for the West Coast salmon fishery is over fifty million.

18. There are indications that movement in this direction is getting underway. Both the Canadian Department of Fisheries and the Bureau of Commercial Fisheries are cognizant of this problem and interested in the possibility of moving toward limited entry.

19. This is the basis, in part, for our assertion that the observed increase in output in Tables II-V is a mirage. For a detailed exposition of this process within a fishery see J. A. Crutchfield and G. Pontecorvo, *The Pacific Salmon Fisheries*. Baltimore, Maryland: Johns Hopkins Press, 1969, p. 60 ff.

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21. "In the past the location of processing units has been based on the local availability of fish. The canneries could reach out only a very limited distance for raw materials of acceptable quality. Time is vital in transporting, holding, and processing any type of fish, and salmon are very vulnerable to deterioration after capture. In southeast Alaska, where the supply comes from many small and widely scattered sources, the perishability problem encouraged the growth of smaller processing units. In other places, such as Bristol Bay, where the sources of supply are more concentrated geographically, a different structure of processing firms emerged, with larger units and more frequent opportunities for consolidation of operations." J. A. Crutchfield and Giulio Pontecorvo, *The Pacific Salmon Fisheries*. Baltimore, Maryland: Johns Hopkins Press, 1969, p. 54.

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27. Foreign interests are Scandinavian, Northern European, British, Canadian, and Japanese.

28. Some observers suggest that the existing fleet could land the ten million tons in considerably less than six months.

29. For example, it is important to ascertain whether or not the costs of catching and processing would be lowered significantly if the scale of plants and vessels were increased, that is to say, whether a small number of large plants and large vessels are more efficient than a larger number of smaller boats and plants.

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Also in distribution is an official court "Communique" or brief summary of the decision. Therein is stated: "The waters of the North Sea were shallow, the whole seabed, except for the Norwegian Trough, consisted of continental shelf at a depth of less than two hundred metres. Most of it had already been delimited between the coastal states concerned" (p. 2).

See also: Elisabeth Mann Borgese, *The Ocean Regime*. Santa Barbara: Fund for the Republic, Inc., A Center Occasional Paper, Vol. 1, No. 5, pp. 36-37, wherein it is noted that Norway, with the agreement and concurrence of the other North Sea coastal states involved, claims that its seabed rights include and extend beyond the Norwegian Trough to the mutually agreed median line, despite the Trough's considerable depth and lack of continental-shelf characteristics.

It is also pertinent to note that, in the *North Sea Continental Shelf Case,* the International Court of Justice felt that ". . . the rights of the coastal state in respect of the area of the continental shelf constituted a natural prolongation of its land territory under the sea and existed *ipso facto* and *ab initio,* by virtue of its sovereignty over the land" (p. 4). Where this doctrine leaves the 1958 Geneva Convention and whether it gives a coastal state more extensive continental-shelf rights than it would have under the Convention itself are questions to which the answers are unclear.

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"As regards the [seabed], the better opinion appears to be that it is incapable of occupation by any state and that its legal status is the same as that of the waters of the open sea above it." p. 63.

"On the other hand, the subsoil under the bed of the sea may be considered capable of occupation . . ." but subject to qualification that occupation is by tunnel from the shore of territorial waters. pp. 64, 65.

The leading textbook of L. Oppenheim (5th ed. by Lauterpacht, 1937, §§ 287 C) — written at a time before the continental shelf became an international concept — says, "It would not be rational to consider the subsoil beneath the bed of the open sea as an inseparable appurtenance of the open sea, just as the subsoil beneath the territorial land and water is an appurtenance of such territory.... There is no reason whatever for extending this freedom of the open sea to the subsoil beneath its bed. On the contrary, there are practical reasons — taking into consideration the building of mines, tunnels, and the like — which compel recognition of the fact that this subsoil can be acquired by occupation...." Sir Humphrey Waldock, after a discussion of the views of G. Gidel, Constantine J. Colombos, and others, concludes: "Almost all writers, whichever view they took of the status of the seabed itself, regarded the subsoil as capable of 'effective occupation,' subject to no unreasonable interference with the free use of the high seas above." (Sir Humphrey Waldock, "The Legal Basis of Claims to the Continental Shelf," paper read before the Grotius Society, April 5, 1950, *36 The Grotius Society, Transactions for the Year 1950,* 1951.)

Most writers thus seem to draw a distinction between the seabed, which according to some, though not all, is part of the sea and the subsoil, which may be capable of appropriation of occupation. But some writers limit this to tunnels or mines. All these subtle distinctions seem increasingly unreal since any prospecting, drilling, or mining operation in the subsoil would obviously affect the sea and the surface around it. As such installations increase, the free use of the seas for fishing and navigation would become more and more theoretical.

106. For more detailed analyses and case studies of joint ventures, see Wolfgang Friedmann and G. Kalmanoff, *Joint International Business Ventures,* (1961) and Wolfgang Friedmann and J. P. Bégiun, *Recent Trends in Joint International Business: Cases and Analysis* (to be published in 1970).

107. It should be added that capitalization of this giant operation, which is near $300,000,000, is to a large extent effected by loans from national and international public-aid agencies, as well as by private investors. The equity joint venture constitutes only the nucleus of the operation.

108. This was done by giving a half share of the net profits to the government of Iran and the other half in equal parts to the partners of the joint venture, AGIP and NIOC. Since the former is a wholly owned government corporation, however, the government of Iran receives, in effect, seventy-five per cent of the net proceeds.

109. For an elaboration of this approach, see Wolfgang Friedmann, "The North Sea Continental Shelf Case: A Critique," *American Journal of International Law,* April, 1970.

110. These principles have been used increasingly in arriving at international arbitration agreements, such as the Iranian Oil Agreement of 1954.

CHAPTER 11

111. Public Law 89-454.

112. United Nations General Assembly Resolution 2172 (XXI) of 6 December, 1966.

113. See United Nations General Assembly Resolutions previously referred to, as well as 2413 (XXIII) of 17 December, 1968, on Living Resources; 2574A-D (XXIV) of 15 December, 1969; 2566 (XXIV) of 13 December, 1969, on Marine Pollution; and 2606F (XXIV) of 16 December, 1969, on Seabed Disarmament.

114. United Nations General Assembly Resolution 2574C (XXIV) of 15 December, 1969.

Appendices

APPENDIX I: The Case *of U.S. v. Ray*

[294 Fed. Supp. 532 (1969)]

The parties were: the United States Government, Ray, and the Atlantis Development Corporation, Bahamas, intervenors.
The development concerned consisted of a land fill over a coral reef, located at 25° 27″ N. and 80° 07″ W., outside the U.S. territorial sea, in international waters off the coast of Florida.

The government's case consisted of two complaints: first, that the development constituted an actionable trespass on government property; second, that the development was illegal because it had been undertaken without the necessary statutory permit.

In the first count, the government claimed that the defendant's construction activities constituted a trespass since the coral reef was part of the U.S. outer continental shelf and thus the property of the United States. The court held that this point turned on the nature of the property interest of the United States and that no actionable trespass had been committed since, although the reef did belong to the United States, its proprietary interest was not such as to ground an action in trespass.

In the second count, the government claimed that the construction activities of the defendant involved placing fixed structures on the shelf without the permission of the Secretary of the Army required by Section 10 of the Rivers and Harbors Act 1899 33 USC Para 403 in the case of coastal waters and extended to the continental shelf by the Outer Continental Shelf Lands Act 43 USC 1333 (f).

The court held that both defendant's and intervenor's activities on the reef and those contemplated by both were unlawful in the absence of a statutory permit.

The court held that the proprietary claims of the defendant were inconsistent with the provisions of both the Outer Continental Shelf Lands Act and the 1958 Convention on the Continental Shelf:

The latter provided that ". . . if the coastal state does not explore the continental shelf or exploit its natural resources, no one may undertake these activities, or make a claim to the continental shelf, without the express consent of the coastal state. The rights of the coastal state over the continental shelf do not depend on occupation, effective or notional, or any express proclamation."

The court concluded:
"Whatever proprietary interest exists with respect to these reefs belongs to the United States both under national (Shelf Lands Act) and international (Shelf Convention) law. Although this interest may be limited, it is nevertheless the only interest recognised by law, and such interest in the United States precludes the claims of the defendant and intervenor."

". . . all private proprietary claims to the reef are without merit."

In summary, Ray lost the case because the court ruled that the reef belonged to the United States and that the government could halt construction in the absence of a statutory permit. The proprietary interest of the United States was held not to be such as to ground a common-law action in trespass.

APPENDIX II: Statement of Policy — American Petroleum Institute

Jurisdiction Over the Natural Resources of the Ocean Floor

Preamble

Low-cost domestic energy resources have been the cornerstone of this nation's unprecedented growth. Energy, in ample supply and reasonably priced, is vital to economic progress, industrial expansion, and national security.

Three-quarters of America's energy requirements are supplied by petroleum — oil and natural gas. They provide the fuels for the nation's transportation network and its armed forces and for most of the country's industrial power and residential heat. They are the raw materials for countless other products that have become essential to the national well-being.

Because energy from oil and natural gas plays such a critical role in the nation's overall security and strength, our national policy has had as one of its prime objectives the fostering of a healthy and expanding domestic petroleum-producing industry. America's future growth and security dictate that this goal continue to be a fundamental tenet of U.S. policy.

Demand for oil and natural gas in the years ahead, according to both industry and government estimates, will far outstrip the current level of consumption. If these ever increasing needs are to be met, the nation must look to all domestic sources of petroleum, both onshore and offshore to the full limit of U.S. national jurisdiction over seabed resources. The seabed resources over which the United States, as a coastal nation, has national jurisdiction, are particularly vital to the nation's future, for they may well spell the difference between continued adequacy of domestic petroleum supplies and excessive dependence on potentially interruptible foreign oil supplies.

For this reason, the American Petroleum Institute has been prompted to adopt the following policy.

Policy

Exclusive jurisdiction over the natural resources of the seabed adjacent to the U.S. coasts, including the entirety of the submerged continent out to where it meets the abyssal ocean floor, is this nation's right as confirmed by the 1958 Geneva Convention on the Continental Shelf. The importance of these ocean-floor resources to the nation's future economic growth and security is such that the United States should unequivocally assert, in concert with other like-minded nations, its full rights as confirmed by that Convention.

As for the ocean floor beyond national jurisdiction, much more needs to be known about the deep-sea environment before intelligent consideration can be given to the formulation of a definitive system to govern the exploration of the natural resources of these areas. Until that knowledge is at hand, decision on the precise arrangements to govern deep-sea exploitation beyond national jurisdiction should be deferred.

EXPLANATORY COMMENTS

(1) Oil and natural gas are the nation's prime energy fuels. By the turn of this century, U.S. demand for petroleum energy is expected to double. Even with the recent important developments in Alaska, the best available estimates are that domestic onshore petroleum discoveries and production will be unable to keep pace with such a growth in demand. Increasing dependence will, therefore, have to be placed on U.S. offshore petroleum areas. Although only a small fraction of the seabed under U.S. jurisdiction has been explored, experts view this area as offering one of the most promising provinces for the discovery of oil and natural gas to supply the nation's rising petroleum requirements.

(2) Within three to five years, it is expected that the petroleum industry will have available the technological capability to drill and produce in water depths of 1,500 feet and within ten years to depths of up to 6,000 feet. But offshore operations are extremely expensive, and costs will rise considerably as water depths increase. Offshore platforms now run as high as $15 million apiece, and ocean-floor drilling costs in present water depths average $450,000 per well. Offshore leases also represent a sizable outlay — oil companies have paid the federal government $1.9 billion in offshore lease bonuses since 1967. Companies risking funds of this magnitude must have the economic incentive and security of lease tenure that can best be assured by continuation of the U.S. seabed-resource jurisdiction confirmed under the terms of the 1958 Geneva Convention on the Continental Shelf.

(3) On the basic question of the seaward extent of the national jurisdiction of the coastal nations, the 1958 Geneva Convention on the Continental Shelf, which has been ratified by the United States and thirty-nine other nations, is generally acknowledged to be declaratory of the exclusive sovereign rights of the coastal nations under general principles of international law to the natural resources of the "continental shelf," which is defined in the Convention as:

". . . the seabed and subsoil of the submarine areas adjacent to the coast but outside the area of the territorial sea, to a depth of two hundred metres or, beyond that limit, to where the depth of superjacent waters admits of the exploitation of the natural resources of the said areas . . . ."

(4) The sovereign rights of the coastal nations pertain solely to the resources of the seabed and in no way affect the legal status of freedom of the seas overlying the ocean floor and of the airspace above those waters.

(5) Under the terms of the 1958 Geneva Convention on the Continental Shelf, these rights are exclusive in the sense that if the coastal nation does not explore the Continental Shelf or exploit its natural resources, no one may undertake these activities or make a claim to the Continental Shelf without the express consent of the coastal nation. This means that only the coastal nation or its designees may take advantage of advances in technology to explore and exploit the area covered by the Convention. Given the rapid advances that are taking place in deep-water technology and the outlook for an eventual capability to ex-

plore and exploit at any depth, it also means that it is the test of adjacency, as that test is laid down in the 1958 Geneva Convention on the Continental Shelf, that will determine the outer limit of coastal-nation rights under the Convention. Applying this test in the light of the preparatory works that led to the Convention, the National Petroleum Council, the Committee on Deep-Sea Mineral Resources of the American Branch of the International Law Association, and the American Bar Association's Sections of Natural Resources Law and International and Comparative Law and its Standing Committee on Peace and Law through the United Nations have all concluded that the area within which the coastal nation has a protected right to exercise exclusive jurisdiction and control for purposes of exploration and exploitation of seabed resources includes the entire submerged portion of the continent.

(6) America's chief delegate to the 1958 Geneva Conference on the Law of the Sea, Ambassador Arthur H. Dean, supported this interpretation in presenting the Convention for the Senate's advice and consent to ratification, when he stated to the Senate Committee on Foreign Relations that the Convention was in accord with the inter-American conclusions reached at a specialized conference of the Organization of American States, held in Ciudad Trujillo in March, 1956. The twenty delegations attending that conference had unanimously agreed that the utilization of the resources of the continental shelf could not be technically limited and that the seabed and subsoil areas appertaining exclusively to the coastal state and subject to its jurisdiction and control should include: ". . . the continental shelf, continental and insular terrace [which the conference report defined as the continental shelf and the continental slope 'to the greatest depths'], or other submarine areas, adjacent to the coastal state, outside the area of the territorial sea, and to a depth of two hundred metres or, beyond that limit to where the depth of the superjacent waters admits of the exploitation of the natural resources of the seabed and subsoil . . . ."

(7) The United States can ill afford to relinquish any portion of its jurisdictional rights as confirmed by the 1958 Geneva Convention on the Continental Shelf. The seabed resources confirmed to the United States by this Convention represent a vital petroleum energy potential not only for the nation's normal future requirements but for those that may arise in the event of a serious international emergency. The nation's ability to avert what might have been a serious fuel shortage during the 1967 Middle East crisis was a prime demonstration of the priceless value of adequate domestic petroleum resources, including a degree of excess productive capacity, to national security.

(8) At the present time, entirely too little is known of the deep-ocean environment beyond national jurisdiction and the optimum conditions for its development to the general benefit of mankind for a definitive set of principles governing the exploitation of deep-ocean mineral resources to be formulated with any degree of confidence. Primary activity for some years to come will be focused on the areas clearly within the national jurisdiction of the coastal states. Technological and economic factors will sufficiently deter intensive mineral-resources exploitation of the ocean floor beyond national jurisdiction to permit the orderly collection of data on the deep-ocean environment needed to develop a sound and durable set of international rules for the exploitation of these resources.

(9) There is such a level of international interest in the problem that the initiation of studies of possible solutions is obviously in order, but the matter should be approached with the caution that its importance and the irrevocability of an international commitment once taken both dictate. As suggested by the National Petroleum Council, initial efforts to develop legal arrangements for deep-ocean areas beyond national jurisdiction should be directed toward the formulation of standards of conduct for individual nations and persons engaging in activity pursuant to national license. A move toward the establishment of an international agency with licensing authority would seem premature, but agreement among concerned nations on appropriate standards of conduct and on the establishment of an international registry of claims along the lines proposed by the National Petroleum Council could provide a useful measure of certainty to encourage any feasible mineral exploitation of deep-ocean areas beyond the limits of national jurisdiction during the interim period. The agreed standards would also provide a useful guidepost for the formulation of any long-term arrangements that may eventually be found to be desirable.

NOVEMBER, 1969

APPENDIX III: Preliminary Conferences and Proposed Publications

This volume represents Volume IV of the five-volume series, *Pacem in Maribus*. The complete set is the outcome of the five *Pacem in Maribus* preparatory conferences on the Center's international convocation to explore peaceful uses of the oceans and the ocean floor. Following will be the tables of contents of the other volumes.

NOTE:

In addition to those listed in the tables of contents, the following persons actively participated in the preparatory conferences and contributed much to the discussions: Sven Hirdman, General Said Uddin Khan, Rei Shiratori, R. C. Arora, Silviu Brucan, Evaldo Cabral de Mello, Michael Hardy, Nicholas M. Matte, Shigeru Oda, Joseph Barnea, L. F. E. Goldie, Jean-Pierre Levy, Sir Arthur Lewis, Oscar Schachter, Reginald Smith, Ralph Townley, David Brower, Raymond F. Dasmann, Jean Dorst, Sidney J. Holt, Robert Jungk, Arnold Kuenzli, William K. Lindvill, Frank Potter, Kenneth E. F. Watt.

Volume I

QUIET ENJOYMENT: ARMS AND POLICE FORCES FOR THE OCEAN

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Volume II

THE EMERGING OCEAN REGIME: AREA OF COMPETENCE AND LEGAL FRAMEWORK

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Volume III

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ECOLOGY AND THE ROLE OF SCIENCE AND SCIENTISTS IN AN OCEAN REGIME

CONTENTS

MESSAGE FROM *INDUSTRIA NASTA*

[Oil Industry, Zagreb, Yugoslavia]

For some time *Industria Nasta* — INA — has been active in international oil exploration, and it has succeeded in establishing coöperative relationships between Yugoslavia and many foreign capitals of the world. INA has a special service for operations abroad, which has been set up for the particular purpose of making cooperative arrangements with foreign partners. That service, together with INA's legal service, has for a number of years studied the economic and technical as well as the legal aspects of the problem of foreign investment in oil production both within Yugoslavia and offshore on the continental shelf. For this reason, INA is cognizant of the international problems connected with oil exploration and exploitation and is directly interested in the results of the research for and the conclusions of the Malta Convocation.

INA has been coöperating closely with large multinational enterprises in terms of both trade and credit relations and joint investment in Yugoslavia and abroad. In this respect, INA has followed principles more or less generally adopted in international practice. In its relations with the governments of underdeveloped countries, INA has endeavored to ensure as much local participation as possible in its enterprises and has undertaken to train domestic personnel rather than to keep to the classical concession arrangement where all operations are in foreign hands.

INA considers that the "joint-venture" type of coöperation, because of its flexibility, will be increasingly applied in the world. The Yugoslav economic system provides economic organizations with the broadest possibilities for establishing direct business relationships with foreign enterprises on the world market, and the method of working exclusively through government institutions is entirely unacceptable.

If some system of international coöperation in the exploitation of the resources of the seabed and the ocean floor is accepted within the framework of the United Nations, it would be extremely desirable for public and private capitalist enterprises to work harmoniously with socially-owned (socialist) enterprises. Such a mutual effort for the common good would contribute greatly to the development of a spirit of equitable coöperation, regardless of differences in the respective socio-political systems.

The principles of work and organization undoubtedly call for meticulous study. Experience has shown that foreign enterprises in direct contractual relationship with governments or national companies prefer to settle disputes through arbitration, with the proviso, however, that contracts can be concluded freely by applying the material law. In the case of the Adriatic Sea, national jurisdiction is preferable in the sense that it respects the Yugoslav system and gives broad autonomy to the parties concerned, but as regards a regime for the ocean floor, INA considers international jurisdiction a good and appropriate solution.

If, as a matter of principle, concessions were to be awarded on the basis of international competition, it would be useful from the standpoint of efficiency of operation, especially if a portion of the proceeds accrued from the exploitation of the seabed and the ocean floor were to be used within the United Nations framework for the benefit of the underdeveloped countries.

International oil production is operating increasingly on the principle that various national companies work together on a single project, and this principle of shared risk will no doubt be generally applied in undertaking exploration of the seabed and ocean floor. Perhaps, also, the principle could be adopted that in the case of each particular concession the company or consortium concerned would have a definite percentage share while the project in question would be managed and operated on a contractual basis.

INA is keenly interested and ready to take part in the *Pacem in Maribus* Convocation in Malta.