

# OCEAN YEARBOOK 25



Edited by

Aldo Chircop, Scott Coffen-Smout, and Moira McConnell



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# OCEAN YEARBOOK 25



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MARINE &  
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Sponsored by the Marine &  
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Edited by  
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# *The International Ocean Institute*

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Professor Elisabeth Mann Borgese founded the International Ocean Institute (IOI) in 1972 as an independent, non-profit, non-governmental organization headquartered at the University of Malta. The IOI was created to promote education, capacity building, and research as a means to enhance the peaceful and sustainable use and management of ocean and coastal spaces and their resources, as well as the protection and conservation of the marine environment, guided by the principle of the Common Heritage of Mankind.

For more than 30 years the IOI has stood at the forefront of organizations in addressing these issues with the concern of future generations through an interdisciplinary and comprehensive approach. The IOI has also prepared working papers for the Third United Nations Conference on the Law of the Sea (UNCLOS III: 1973–1982), for the Preparatory Commission for the International Seabed Authority, for the International Tribunal for the Law of the Sea (1982–1994), and for the EU coastal management policy (2006), as well as for various governments. It has provided consultants to UNEP, UNDP, the World Bank, the United Nations Industrial Development Organization (UNIDO), EU, UNESCO/IOC, and the Asian-African Legal Consultative Committee (AALCC). It contributed to the formulation of recommendations of the World Summits in Rio de Janeiro (1992) and Johannesburg (2002), the World Forums on oceans, coasts and islands (2003–2009), as well as to the review of the developments in ocean affairs through the United Nations Open-ended Informal Consultative Process. The IOI was awarded the 2006 South-South Partnership for the special contribution to the tsunami recovery efforts. In 2007, the IOI was granted a special consultative status within the Economic and Social Council (ECOSOC) on the United Nations.

The goals of the IOI are to:

- contribute to the evolving process of ocean governance through its functions and activities;
- monitor the implementation of international conventions and agreements as they relate to the oceans;

- mobilize the political will to implement national and regional plans and international agreements on the management and sustainable use of the ocean, coasts and islands through a global network of operational centres;
- raise awareness of the peaceful uses of the ocean, its protection and conservation, as well as the sustainable development of its resources, and in accordance with the principle of the common heritage of humankind;
- engage in the dissemination, the sharing and transfer of knowledge and experience; and
- respond to the needs of developing countries, particularly coastal communities and the role of women by increasing their abilities to develop and manage the ocean and coastal resources sustainably.

The International Ocean Institute achieves its goals through:

- education and training;
- research and analysis;
- organization of conferences and meetings;
- institution-building and partnership;
- promotion and communication; and
- fundraising in support of the activities of the Institute and its network.

The IOI's activities include training projects, information dissemination, conferences, research and publications:

- Training of hundreds of decision-makers and professionals, mainly from developing countries, through short and long duration interdisciplinary courses in ocean and coastal management;
- Ocean governance advocacy within the United Nations system through participation in and contribution to intergovernmental meetings and conferences;
- Development work among coastal communities with the objective of improving their livelihood while restoring and preserving coastal ecology;
- Information dissemination to international organizations and national institutions through the global IOI Network and the IOI web site;
- Organization of the biennial *Pacem in Maribus* Conference and other seminars and workshops;
- Research on a variety of ocean-related areas such as international and regional agreements and policies on oceans and the coastal zone; on regional and sub-regional co-operation and on scientific and technological approaches to sustainable management of living and non-living marine resources;
- Education and awareness-creation about ocean resources, marine and coastal environments, and the need to care for them;

- Publication of the *Ocean Yearbook* in collaboration with the Marine & Environmental Law Institute, Schulich School of Law, Dalhousie University, Canada;
- Maturing IOI's web site ([www.ioinst.org](http://www.ioinst.org)) and publication of an electronic newsletter *IOInforma* by the IOI HQ. Regional operational centres also publish their own newsletters, research papers and reports; and
- Services include advice, consultancy, and information regarding ocean and coastal environments.

The IOI gained a worldwide respect and reputation through its contribution to the codification and implementation of the Law of the Sea Convention, and to the subsequent development of the concept of sustainable development as it applies to the ocean. Furthermore, through the launching of such projects as the coastal and eco-villages projects, dedicated women and youth programmes, training in ocean governance, risk assessment and others, the IOI has contributed positively to the implementation of ocean governance, with a particular focus on developing nations.

The IOI is now developing an international ocean governance and capacity building education programme, OceanLearn, that will consist of a network of education, training and research centres with expertise in ocean, coastal and marine-related affairs and governance. The Centres will be joined together in a partnership so as to provide for an interdisciplinary and comprehensive coverage of the subject areas. The overall objective will be to enhance the abilities of developing countries to develop and govern their own marine and coastal resources and environment sustainably.

The IOI scope and presence is truly international with 22 Operational Centres and five Focal Points around the globe, with several new Focal Points in the development stage. IOI Focal Points will be selected from alumni and appropriate qualified and experienced persons associated with the IOI. IOI Focal Points are not expected to receive any financial support from IOI, but will provide their intellectual contribution to the IOI on a voluntary basis. The IOI network provides a flexible mechanism with a governing and coordinating structure that generates synergism and strategic planning of the network of semi-autonomous nodes. This cohesive and comprehensive mechanism is capable of cooperating equally well with other intergovernmental systems and the private sector. The current centres and focal points and their host institutions are:

IOI–Black Sea, National Institute of Marine Geology and Geoecology, Romania; IOI–Canada, Dalhousie University, Canada; IOI–Caspian Sea, Astrakhan State Technical University, Astrakhan, Russia; IOI–China, National Marine Data and Information Service, State Oceanic Administration, P.R. China; IOI–Costa Rica, Universidad Nacional, Costa Rica; IOI–Cuba, Universidad de la Havana, Cuba; IOI–Eastern Africa, Kenya Marine and Fisheries Research Institute, Mombasa, Kenya; IOI–Egypt, National Institute of Oceanography and Fisheries (NIOF), Egypt;



IOI–Germany, Centre for Tropical Marine Ecology, Germany; IOI–India, Auroville Centre for Scientific Research, Tamil Nadu, India; IOI–Indonesia, Centre for Marine Studies, University of Indonesia, Indonesia; IOI–Islamic Republic of Iran, Iranian National Centre for Oceanography (INCO), Tehran, Iran; IOI–Japan, Japan Foundation of Sustainable Development, Japan; IOI–Malta, University of Malta, Malta; IOI–Pacific Islands, University of the South Pacific; IOI–Slovenia, Marine Biology Station at the Institute of Biology, Piran, Slovenia; IOI–South Western Atlantic Centre for Marine Studies, Brazil; IOI–Southern Africa, University of Western Cape, South Africa; IOI–Thailand, Foundation of National Disaster Warning Council, Bangkok, Thailand; IOI–Ukraine, Oceanological Center of National Academy of Sciences of Ukraine, Sevastopol, Ukraine; IOI–United States, University of South Florida, St. Petersburg, U.S.A.; and IOI–Western Africa, Nigerian Institute for Oceanography and Marine Research, Lagos, Nigeria.

Each Operational Centre is autonomous, identifying its own priorities for research, capacity building and development within the broad mission of the IOI, while benefiting from the support of the overall IOI Network. Regional approaches to research and capacity building enable the Institute to draw upon the different strengths of the Operational Centres to cater to the needs identified within each region. A director, generally supported by a small staff with a large number of experts and volunteers on call, runs each Centre.

The current focal points and their institutes are: IOI–Pakistan, National Centre of Maritime Policy Research, Bahria University, Karachi, Pakistan; IOI–Cyprus, Cyprus University of Technology, Limassol, Cyprus; IOI–China, Shanghai Maritime University, Shanghai, P.R. of China; IOI–Australia, Global Coral Reef Monitoring Network, Townsville, Australia; and IOI–Lebanon, Lebanese Union of Professional Divers, Saida, Lebanon.

The IOI is governed by a Board that makes decisions on policy, programme and budget matters. Five regional representatives were elected from operational centre directors in 2009 to replace the IOI Committee of Directors and represent five regions, namely; Africa, The Americas, Asia & Oceania, Eurasia, and Europe. These representatives will participate in meetings of the newly constituted Board (Steering Committee), but will not participate in discussions on financial, budgetary and personnel matters. Growing steadily and responding to global changes, the IOI Network is now aimed to multiply its spectrum of activities. It plans to move from direct training to training the trainers and from direct implementation of projects to offering advisory and consultative services.

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## *Marine & Environmental Law Institute* *Schulich School of Law*

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Established in 1883, the Schulich School of Law at Dalhousie University is the oldest common law school in Canada. As a leading law school, it has traditionally played a critical role in the development of national legal education in Canada, in servicing the needs of the Atlantic region and as a focal point for graduate level education globally. The Law School offers the full breadth of undergraduate and graduate level education and is a partner with the International Ocean Institute in supporting, producing and providing a home for the *Ocean Yearbook* in its Marine & Environmental Law Institute (<http://www.dal.ca/law/MELAW>).

The Schulich School of Law, with its location in the vibrant port city of Halifax, is internationally recognized for excellence in marine and environmental law research and teaching. Since its establishment in 1974 as an area of specialization for Bachelor of Laws (LL.B.) students and subsequently for Master of Laws (LL.M.) students and Doctoral in the Science of Law (J.S.D.) candidates, the Marine & Environmental Law Programme (MELP) has one of the most extensive academic course offerings and supervisory capability in these two fields in the world. With more than 12 full and part-time faculty members currently teaching in the Programme, students have a unique opportunity to learn about public and private law practice in marine (including shipping, fisheries and oil and gas) and environmental law (including land-use planning) taught from domestic, international and comparative perspectives. At the LL.B. level students wishing to specialize in these fields have the option of obtaining a certificate of specialization in either Marine or Environmental Law or both.

The Schulich School of Law also hosts two other research institutes, the Health Law Institute and the Law & Technology Institute, and has additional concentrations in the fields of international law, business law, criminal law and public law. In addition to the required courses in the MELP specialization students are also encouraged to undertake research/courses in those and other fields in the LL.B. curriculum. This allows students to engage in the interdisciplinary study of emerging and cross-cutting topics such as biotechnology, environment and health, ethics, indigenous rights, animal rights, international trade law and human rights.

The 30 years of research excellence of the Schulich School of Law MELP faculty was formally recognized by the Dalhousie University Board of Governors in 2004 with the creation of the Marine & Environmental Law Institute. The Institute, which is housed in the Law School, carries out research and consultancy activities and also directs the MELP academic specialization. In addition to their scholarly research and publication activities, faculty, staff and others associated with the Institute carry out research projects and provide advisory services to agencies of the United Nations and other inter-governmental organizations, international non-governmental organizations, and regional organizations as well as assisting government departments and non-governmental organizations in Canada and overseas. Recently, the Institute has advised the Governments of the federal Republic of Nigeria and the Islamic Republic of Pakistan on international law of the sea and marine law matters and provided the governance input into the Arctic Council's seminal report on the Arctic Marine Shipping Assessment.

The Institute provides law students with the opportunity to gain experience working as research assistants through its research projects, workshops and editing the *Ocean Yearbook*. The Institute supports student collaboration in addressing environmental issues through the Environmental Law Students' Society and the East Coast Environmental Law Association, a non-governmental organization dedicated to environmental law education and advocacy. The Institute encourages interdisciplinary collaborations within the Dalhousie University community including the School for Resource and Environmental Studies, the Marine Affairs Program, the International Development Studies Program, the Centre for Foreign Policy Studies, and the Ocean Tracking Network (OTN) led by the Department of Oceanography. The Institute's numerous national and international linkages include the Ocean Management Research Network, the Global Forum on Oceans, Coasts and Islands and the IUCN Academy of Environmental Law.

## *Acknowledgements*

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The editors are grateful for the ongoing administrative and substantive support provided by the Marine & Environmental Law Institute and the Sir James Dunn Law Library at the Schulich School of Law, Dalhousie University. The financial support for the editorial office provided by the Schulich School of Law and by the International Ocean Institute's headquarters in Malta is gratefully acknowledged. We wish to extend thanks to Julie-Ann Sobowale for research and editing assistance, to Susan Rolston for compiling the volume index, and to Lauri MacDougall for administrative support. Warm thanks go to members of the Board of Editors for their continuing support. Special thanks are extended to staff at Brill for editorial and infrastructural support.

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## **Marine Farming: Perspectives on Its Inevitability and Sustainability**

Menakhem Ben-Yami

*Fisheries Adviser, Tel Aviv, Israel*

As a primary goal, aquaculture development should conserve genetic diversity and minimize negative effects of farmed fish on wild fish populations, while increasing supplies of fish for human consumption.<sup>1</sup>

### **INTRODUCTION**

Fish farming or aquaculture is defined by the Food and Agriculture Organization of the United Nations (FAO) as “the farming of aquatic organisms, including fish, crustaceans, mollusks, and aquatic plants.” Marine farming, marine aquaculture, or mariculture can be defined as the “farming of marine organisms.” It also implies some sort of ownership of the cultivated stock, although not necessarily over the area where the marine farm is anchored or staked.<sup>2</sup> Sea or ocean ranching, therefore, does not fall under this definition since the “seed” fish grown in hatcheries once released are not owned until captured. Aquaculture, including marine farming, has become a mass provider of animal protein, an employment option for poor farmers and displaced capture fishermen, a solution for marginal lands and water resources, and an export opportunity to earn foreign currency. With marine fisheries unable to satisfy a growing demand for such popular fish species as salmon, cod and shrimp, and inland capture fisheries for trout, tilapia and carps, the markets have turned to marine farming as a complementary source of seafood. Aquatic foods have high nutritional quality, contributing, on average, 20 percent or more per capita in animal protein intake for almost 3 billion people, mostly in developing countries. Fish is also the world’s most widely traded foodstuff and a key source of export earnings for many countries, particularly for small island states. Fish farming is also significant for countries in South and Southeast Asia.

1. FAO Code of Conduct for Responsible Fisheries, 1995.

2. C. Bailey, S. Jentoft and P. Sinclair, eds., *Aquacultural Development: Social Dimensions of an Emerging Industry* (Boulder, CO: Westview Press, 1996).