
海洋政策研究

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Preface

Dr. Kesavan, Dr. Valencia and Dr. Kullenberg kindly accepted our invitation to become visiting scholars at our foundation to study and discuss current ocean-governance, EEZ, and maritime security issues, particularly regarding regional problems in East Asia.

As it was impossible to completely explore these issues in the time available, each of the visiting scholars agreed to prepare paper/s based on these discussions and their previous work. The foundation is most grateful for this.

Dr. Kuunnavakkam Vinjamur Kesavan is presently a Visiting Professor at Kobe Gakuin University in Kobe and Professor of Japanese Studies at the Jawaharlal Nehru University in New Delhi. He holds a Ph.D. in Japanese studies from the Indian School of International Studies. His most notable work is on international issues between Japan and India, and includes the Philippines and Indonesia.

Dr. Mark J. Valencia is a Maritime Policy Expert based in Hawaii. He received his Ph.D. in Oceanography from the University of Hawaii and was with the East-West Center there for 26 years, focusing on maritime policy and international relations in Asia. Before joining the East-West Center, he was Lecturer at University Sains Malaysia and a Technical Expert with the UNDP Regional Project on Offshore Prospecting based in Bangkok.

After receiving his Ph.D. from Gothenborg University, Dr. Gunnar Erik Boje Kullenberg was a Professor of Gothenborg University and Copenhagen University. He later served as Secretary-General of IOC, UNESCO and then as Director General of the International Ocean Institute from 1998 to 2002. His main areas of work and research include maritime security, EEZ, and regional issues among Asian countries.

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Maritime Security and the Asia-Pacific: Challenges and Prospects

Professor K.V Kesavan

Maritime Security and the Asia-Pacific: Challenges and Prospects

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The issue of maritime security is of critical importance to the countries of the Asia-Pacific region, which are set to play a key role in international politics in the 21st century. The region is already witness to some dramatic economic, scientific, and technological developments. Japan, China, Korea, ASEAN, and India represent models of their own in the realm of economic development. During the long cold war period, countries were divided by ideological differences that created strong psychological barriers to closer relations. The rivalry between the two blocs was not confined only to land and air, but also extended to the oceans. Both blocs understood that their global supremacy would depend upon the degree of dominance that they maintained in the oceans. They not only developed strong navies, but also acquired islands and naval bases to bolster their positions. Though the naval race created grave tensions, the anxiety of the two powers to avoid an open showdown, however, did create a degree of uneasy stability in the maritime situation. Security alliances, both bilateral and multilateral, which were forged during the cold war, provided effective deterrence against any adventurous military action. The end of the cold war was followed by unusual fluidity in international relations and this was also reflected in the maritime situation.

New concept of security:

One of the most important outcomes of the end of the cold war is to be seen not only in the elimination of ideology as a factor in international relations, but also in the broader interpretation of the concept of security itself. Security is no longer defined in mere military terms. Though military strength is still a crucial factor, many non-military components of security, such as resources, technology, trade, environment, and so on, are being increasingly emphasized. In other words, there is a growing realization of the need to evaluate security in a holistic or comprehensive manner. In the same way, maritime security has come to be seen in broader terms. It includes not only the naval strength of countries, but also such other factors as freedom of navigation, marine resources, sea-lanes safety, maritime environment, proper delimitation of exclusive economic zones (EEZ), and so on. In other words, the region has moved from the cold war structure to a new situation underpinned by strong trends towards multilateralism. Secondly, it is also moving away from mere military preoccupations to more comprehensive multilateral economic interactions.

Peculiarities of the region:

One of the most important maritime features of

the region is the dominant presence of several closed and semi-enclosed seas like the Yellow sea, Japan Sea, South and East China Sea, the Bay of Bengal, etc. The region also abounds in narrow straits and channels. Of these, the straits of Malacca, Sunda, and Lombok are very important. The Malacca Strait, which connects the Indian Ocean with South China Sea, is one of the busiest sea lanes of the world and annually more than 50,000 ships pass through the strait carrying vital natural resources such as oil, mineral ores, etc. It is also one of the worst chokepoints, as the sudden seizure or closure of the Strait could paralyze the whole global trade. As we will see later, the security of the Malacca Strait is inextricably bound up with the economies of East Asian countries.

In recent years China, Korea, India, and ASEAN countries have made great economic strides contributing to strong integrating trends within the region. APEC, ASEAN+3, ASEAN+1, etc., are evidence of the emerging trends towards greater economic integration. China, Japan, ASEAN, and India have already started the process of entering into a wide network of free trade and economic partnership agreements and it is hoped that by 2010 the whole area will witness massive flows of trade, technology and investment. All these will culminate

in the formation of what is called an East Asian Economic Community.

While movements towards greater integration are progressing, one cannot ignore certain opposite tendencies encouraged by several issues and one of them is to be seen in the form of territorial questions. Some of these have long historical backgrounds, such as the Senkaku islands dispute between China and Japan or the Takeshima island dispute between Japan and Korea. The dispute between Japan and Russia over the Northern Islands also belongs to this category. China and many ASEAN countries are involved in serious territorial disputes over the Spratly and Paracel islands. In fact, both China and Vietnam even had a military clash over their competing claims. Apart from claims arising from history, these islands and the adjacent sea-beds are believed to be rich in oil and gas resources. During 1992-95, China took a number of measures to assert its claims to these disputed islands. However, in 2002, China and ASEAN decided to reduce tension at least temporarily by signing a code of conduct in the South China Sea. Although there is peace in and around the islands for the time being, the disputes have not been settled and they carry the potential for tension in the future. There is little doubt that any future settlement of the disputes will have great implications for the maritime security of the region.

There are, in addition, other disputes that have arisen out of the new regulations of the 1982 UN Convention on the Law of the Sea (UNCLOS). Under UNCLOS, states enjoy the following claims:

Every state has the right to establish its territorial sea up to a limit not exceeding twelve nautical miles; (Article 1)

Every state can claim a continental shelf which comprises the seabed and subsoil of the submarine areas that extend beyond its territorial seas throughout the natural prolongation of a country's land territory- to a maximum of 350 nautical miles or 200 nautical miles from baseline whichever is farther

Every state can also claim an exclusive Economic Zone (EEZ) extending 200 nautical miles beyond and adjacent to the territorial sea. Under this coastal states enjoy "sovereign rights" for the purpose of

exploring and exploiting, conserving and managing the natural resources, and all related activities, as well as jurisdiction over artificial structures, marine scientific research and protection and preservation of the marine environment. (Articles 55-75)

Article 121 states that rocks where human habitation is not possible cannot have an EEZ or continental shelf.

The coming into effect of UNCLOS in 1994 introduced many new dimensions into maritime security in the sense that countries which had a free hand in their maritime operations are now faced with several restrictions because the claims made by various states for their EEZs are too overlapping. This is so particularly in the case of the South China Sea where claimants have tried to establish some semblance of human habitation in far off islands in order to conform to Article 121 of UNCLOS. In the East China Sea, the controversial claims made by Japan and China over the status of Okinotorishima, as to whether it is an island or a rock, need to be settled. UNCLOS states that in the event of any dispute arising out of overlapping claims, they should be settled by negotiations in good faith. Since one of the paramount reasons for nations to expand their EEZs is to utilize the potential natural resources in these seas, and since harnessing those resources may be fraught with stupendous hazards and costs, joint development of the area could be a way out. Of course, the terms of such joint developments need to be worked out carefully with due consideration to the competing positions. Joint development has taken place successfully in a few cases. Both Malaysia and Thailand took a long time to enter into such joint efforts to exploit the gas resources in the gulf of Thailand. Vietnam and Thailand too had serious differences on their boundary in the Gulf of Thailand, but agreed to conduct joint naval patrols and were willing to promote joint development of gas fields in the Gulf.

Rapid economic development and maritime security:

The Asia-Pacific region has witnessed its highest economic growth in the last several decades and this trend is likely to continue in the coming decades as well. While Japan has been a powerful engine of growth contributing significantly to other

countries with its economic assistance, South Korea and ASEAN countries have also passed through major economic and technological transformation. China and India have now emerged as new centers of economic power. It is estimated that by 2050, both China and India will rank as the second and fourth biggest economies in the world. One of the keys to the on-going economic and technological growth is the prevalence of a secure and stable maritime environment. Massive trade flows carrying manufactured goods, and energy and other raw materials need to have uninterrupted access to the sea lanes passing through the East and South China Sea and the Indian Ocean. The South China Sea, which covers more than 1800 miles, connects both Southeast and Northeast Asia through important sealanes. The Indian Ocean, the third biggest ocean in the world, provides crucial routes to the Middle East, Africa, and East Asia. The Strait of Malacca, which provides a crucial link between the Indian Ocean and South China Sea, is one of the busiest chokepoints in the world. Japan, China, Korea, ASEAN, and India depend upon the Persian Gulf countries for more than 70-75 % of their energy needs. As their demands for energy grow in the coming years, the pressure on the Gulf countries will also correspondingly increase. It is therefore paramount to ensure peace and political stability in the Gulf region and to maintain the security of the sealanes. All major countries like the US, Japan, China, and India are very much concerned about the political situation in the Gulf region.

In Asia it is estimated that 90% of the increase in energy consumption during 2000-20 will be witnessed in the use of coal, oil, and natural gas. Of this, the contribution of oil will be to the tune of 35%, followed by natural gas (30%) and coal (26%). It is also calculated that the world oil consumption will rise from 70 million barrels per day (mbd) in 2000 to 102 mbd in 2020. The share of Asia will increase markedly to account for 50%. The use of oil is expected to have a net 40-45% share in the whole primary energy consumption profile.⁽¹⁾ This increase in the energy consumption of Asia will be due to the economic and industrial progress of countries like China, India, Japan, ASEAN, Korea, etc. Since oil will be a major factor in the energy consumption and given the fact that none of these Asian countries are endowed with it, their dependence on outside sources is inevitable.

Although they are making vigorous efforts to diversify the geographical sources of oil, their dependence on Gulf oil is crucial to their energy strategies. When so many countries from different continents depend upon the Gulf countries, naturally the pressure on them will be tremendous. In this context, one should closely study the energy strategies of China, because its ambitious economic vision rests on its access to the West Asian energy supplies.

China Factor:

The dramatic rise of China as one of the leading economic and military powers of the world has been a subject of great interest in recent years. For a long time, it was believed that China, with all its diversities, huge population, and ideological issues would take a long time to achieve rapid economic take-off. But by adopting highly pragmatic economic strategies, while still sticking to its political faith in the centrality of the communist party, China has been able to demonstrate its dynamism. Since the end of the 1970s, China's political and economic institutions have passed through a major transformation. The rate of economic growth has been consistently high. During the first half of the 1990s, China's economy witnessed a double-digit growth. Later, however it tended to stay between 8-9%.

One can gauge a direct linkage between China's energy endowment and its economic development. Till 1996, China enjoyed a high degree of self-sufficiency in energy consumption. Even in 1994, its energy sufficiency rate was as high as 101.0 %. And this was far above the corresponding rates for the US (81%) and Japan (18.5%).⁽²⁾ But the rapid economic and industrial growth of the country soon changed the whole energy scenario, and in 1996 China became a net importer of energy.

To be sure, even in 1993, for the first time China had imported oil from abroad. Since then the role of oil and coal, two major sources of energy, has drastically altered. While coal has accounted for a substantial percentage of energy production, oil has become a key to the growth of China's economy and its consumption has gone up by leaps and bounds. In 2003, China surpassed Japan as the second biggest user of oil. By 2010, China's oil imports will amount to 4 mbd and by 2030, the figure is supposed to reach 10 mbd.⁽³⁾

Even though coal will continue to be an important source of energy, the Chinese government has been reducing the use of coal in its overall strategy. Its interest has shifted increasingly to oil and gas. In 1996, the government introduced major changes in its energy policy by adopting what it called a 'strategic oil-supply security system' by which it encouraged domestic producers to go in for overseas activities and invited foreigners to come to China to invest.

Until the early 1990s, most of China's imported oil came from Southeast Asia. But very soon it had to look beyond that region, because Southeast Asian countries themselves needed vast quantities of oil for their own national development. From then on, China has depended upon Gulf countries for the bulk of its oil supplies. But China knows that keeping West Asia as its main source entails risks for three reasons. First, the region is in a state of perennial turmoil and any major war or political disturbance could upset China's energy plans. Second, since the US is maintaining its military presence in the region, China will have to play its diplomatic cards skillfully in order to continue to enjoy oil supplies. Thirdly, the Gulf countries face far too many demands for oil from numerous countries. But at the same time, there are also advantages in having close links with the Gulf countries. For one thing, it is more economical to import oil from the region, and qualitatively, gulf oil is superior to anything available elsewhere. Further, China is quite confident that the oil stocks in the Gulf region are likely to last for a fairly long time. Another positive factor is that oil exploration technology has become so advanced that it is relatively easy to exploit new deposits for commercial use.

Two major aspects of China's resource diplomacy need to be noted. First, while keeping the Gulf region as its main energy source, it is also making frantic efforts to find new and long-term geographical alternatives like Central Asia, Siberia, North Africa and Latin America. Second, in an attempt to diversify its energy sources, China is particularly looking for the use of gas.

Deeply concerned about its own future energy security, China spares no efforts to strengthen its relations with oil rich countries of the Gulf as well as other regions. China's links with the Arab coun-

tries are quite old, traceable back to the pre-energy crisis of 1973. But after 1973, relations with the Arab world steadily expanded. During the post-cold war period, China's diplomacy in the Middle East has been sophisticated enough to steer a cautious course of maintaining friendly relations without at the same time offending the US. Beijing had maintained cordial relations with Iraq until the war broke out in 2003. It did not agree with the unilateral military action taken by the US, though it was keen to avoid any confrontation with Washington. Relations with Iran have always been very cordial and Iranian oil supplies to China are substantial. China has made it known that a peaceful solution should be found to the present tangle on Iran's nuclear program and that no unilateral military action should be taken against that country.

Chinese leaders have frequently made official visits to the Arab world in order to strengthen their relations with the Arab countries. In January 2004, President Hu Jintao visited Egypt, Gabon and Algeria with the main objective of promoting mutual cooperation in the energy field.⁽⁴⁾ Soon a Sino-Arab Cooperation Forum was set up and its first meeting was attended by the Chinese foreign minister Li Zhaxing in September 2004. Li stressed the importance of Sino-Arab economic cooperation, particularly in trade, energy, and investment.⁽⁵⁾ Apart from the supplies of oil, China's energy interest is also to be noted in signing long-term agreements for the exploitation of oil and gas. Prior to the outbreak of the Iraq war in 2003, some Gulf countries were even inclined to welcome China's long-term commitments in order to balance the influence of the US. In January 2004, China successfully bid an order for the exploitation of a national gas field in Saudi Arabia. In July 2004, China and the Gulf Cooperation Council (Saudi Arabia, Bahrain, the United Arab Emirates, Qatar, Oman, and Kuwait) signed a Framework of Economic, Trade, and Investment Cooperation. Energy cooperation between the two is steadily expanding and in 2003 trade accounted for \$17 billion.⁽⁶⁾

China's efforts to woo some of the oil-rich African countries like Algeria and Nigeria are noteworthy. In particular, Algeria, though a small country, is rich in oil resources. In October 2002, the China National Petroleum Corporation successfully bid a tender for developing an oil field in Algeria.

In 2003, China signed three joint venture agreements for oil and gas exploration.⁽⁷⁾

China's energy supplies originate predominantly in the Middle East region and this aspect will continue for a fairly long time, though China is also making tremendous efforts to find alternative supply centers in the Russian Far East or within Asia itself if possible. Before we examine China's strategies for finding alternatives, it is important to note that the sea lanes passing through the Indian Ocean and South China Sea via the Malacca Strait will be of critical importance to China for a long time to come. Although China does not see any immediate threat to the security of the sealanes, it certainly worries about the preponderant naval influence of the US in the region. Should relations with the US sour, China cannot count on the smooth flow of its oil supplies. As a possible response to any such challenging situation, China has formulated its strategy at different levels and it needs to be examined closely.

First, China is very much interested in seeking new sources of energy that lie within its close geographical neighborhood. This would give China some advantages. Enormous costs involved in transportation would be reduced. Further, these resources would not face the risk of having to pass through any major choke-point like the Malacca Strait. China has therefore intensified its efforts to explore potential areas, particularly in the East China Sea. But the Chinese quest for resources clashes with similar energy interests of Japan. This conflict of interests will have serious security ramifications that involve Taiwan, the US, and the overall maritime security of the South and East China Seas.

A close look at China's policy in the East China Sea would clearly show its deep interest in establishing its presence there. But the East China Sea is not a Chinese lake and there are complex questions of certain rights and obligations arising out of UNCLOS. It recognizes the right of every country to define waters up to 200 nautical miles from its territorial baseline as its EEZ and recognizes its rights to explore the continental shelf in its EEZ and exploit its natural resources. A heated question has arisen between China and Japan on the rationale that should guide the demarcation of their respec-

tive EEZs in the East China Sea. Both countries vigorously contest the ownership of the Senkaku islands, otherwise known as Daiou Dao in Chinese. Japan, which controls the islands, has complained about China's illegal intrusions into the waters in and around the islands. According to Japan, the EEZ line should be drawn equidistantly between the land territories of the two countries. But China questions this and wants the line to be drawn to the east of the Senkaku islands because its EEZ should include the continental shelf.⁽⁸⁾ In addition, both countries strongly question the status of a small islet called Okinotorishima. While China calls it a 'rock', Japan claims a vast EEZ around Okinotorishima on the ground that it is an island. Article 121 of the UNCLOS states that every island will entitle its owner country to generate an EEZ, continental shelf, and a territorial sea. But Para 3 of the same article points out that islands that "cannot sustain human habitation or economic life of their own" will not be considered under the ambit of the Article. If Okinotorishima is considered an island, Japan will be entitled to declare a vast area surrounding the island as its EEZ or continental shelf. In such a situation, other countries will have to receive the permission of Japan before conducting any surveys in the area. After April 2004, China intensified its survey activities, drawing strong protests from Japan. One of the reasons for China's vigorousness was that Japan had not fulfilled the requirements of Article 75 of UNCLOS, which wants countries to display on charts the outer limits of their EEZs. Even though Japan ratified UNCLOS in 1994, it has still not carried out its obligation. This lukewarm attitude of Japan could be attributed to its anxiety not to provoke China. It is relevant in this context to note that in strict compliance with the provisions of UNCLOS, Japan also refrained from undertaking any surveys or explorations in the East China Sea, even though many Japanese oil development companies like the Japan Petroleum Exploration Company and the Teikoku Oil Co. had been exerting pressure on the government to do so. Now that China has already made its initiatives clear, domestic pressures on the Japanese government are intensifying.⁽⁹⁾ Several official level talks have so far not helped the two countries to find a mutually acceptable settlement.

China's unauthorized maritime activities in the East China Sea have not occurred all of a sudden.

In fact, one can trace their beginnings to as early as 1990. In that year, there were as many as sixteen such incidents. There were thirty-three in 1999 and twenty-four in 2000. In the first half of 2004 itself, there were more than thirty. Though the ostensible aim of China in undertaking these missions was to explore the extent of the natural resources available in the sea, a gradual evolution of military objectives was also noticeable, as Chinese naval vessels were actively involved in these missions. For instance, in 1999, twelve naval vessels including a Jianghu I Class frigates were found within 110 km north of the Senkaku Islands. Similarly, in July of the same year, ten Chinese naval vessels, including destroyers, were noticed in Japan's EEZ about 130 km north of the Senkaku Islands.⁽¹⁰⁾ Even though, in 2002, both countries agreed to inform each other two months prior to undertaking any mission, Chinese continued their activities.

According to Article 74 of UNCLOS, until a bilateral EEZ is demarcated on the basis of international law, concerned countries "shall make every effort not to jeopardize or hamper the reaching of the final agreement". But China has already begun not only to conduct surveys close to the median line drawn by Japan, but also to enter into contracts with companies both at home and abroad. In an attempt to find a peaceful solution to the issue, officials of both Japan and China met in Beijing on 25 October 2004 but the talks ended in a stalemate as the Chinese side was not inclined to furnish any data.⁽¹¹⁾

Over a period of time, China has been pursuing a carefully crafted maritime strategy in order to explore and exploit the natural resources available within its close neighboring seas. China, long regarded as a continental country, depended on the erstwhile Soviet Union for a great deal until the ideological schism between the two changed the Chinese policy. From the 1960s, China's attention shifted in the direction of depending on maritime resources for most of its requirements. In 1964 it established the state Maritime Agency.

There are many compelling reasons for China to emphasize the maritime aspect of its foreign policy.⁽¹²⁾ First, China's continental coastline covers about 18,000 km and its inland coastline about 14,000 km. With the coming into force of UNCLOS, China is aware of the new rights it has

acquired and it was also one primary reason why China quickly became a party to it. Second, China's ocean resources are estimated to be bigger than its land resources. While estimates differ sharply, it is believed that China possesses enormous amounts of petroleum and natural gas resources in its seas. This fact assumes greater relevance now when China's expanding economy needs more and more natural resources. Third, the ocean indeed plays a key role in the country's economy. Accounting for 5-10 % of the country's GNP, about twenty administrative bodies are connected with maritime affairs and more than four million people are engaged in ocean related employment. In 2004, China's maritime industries even recorded 9.8 % growth, which was higher than that of the national economy.⁽¹³⁾

China's exploration of ocean resources has a long history, starting from the 1960s. But in the 1980s, when its technological capabilities were fully established, China invited foreign capital and technology, and concentrated on exploring both oil and gas. By the end of the 1990s, China had signed about 130 agreements with about 70 oil-producing countries. China also understood the critical importance of modern infrastructural facilities for the growth of maritime industries. Maritime transportation is one of the major items on its agenda. It is making all out efforts to build new and well-equipped harbors and modernize the existing ones. The number of harbors has not only increased but many of them have come to be counted among the biggest in the world. Shanghai port is next only to Hong Kong and Singapore in terms of handling quantities of cargo. According to a survey conducted by the Ministry of Commerce, China will be the biggest container handling hub in 2010 and Chinese ports will be able to handle about 3 billion tons of cargo. The same source also states that there was a dramatic increase in the number of containers handled by Chinese ports from 165.5 million in 1999 to 478 million in 2003.

China and Central Asia:

One way to reduce its dependence on Middle East oil supplies and the safety of the sea lanes would be to find new sources in Russia and the Central Asian Republics, which are very rich in oil and natural gas. Siberia offers numerous opportunities as a supply source alternative not only for China, but also for Japan, Korea, and ASEAN.

China signed an agreement with Russia to build an oil pipeline connecting Angarsk in Russia and Daqing in China. But following another offer for a different pipeline plan from Japan in 2003, Russia became somewhat cool to China's earlier agreement. In March 2003, Russia preferred a new route from Taishet, about 500 km away from Angarsk to Nakhodaka with a branch line to China. Russia and Japan finalized their agreement on 31 December, 2004. But Japan is still worried about the huge cost as well as the long distance. Another Russian project that has attracted the interest of China, Japan, and Korea is the Sakhalin oil project. The Sakhalin 2 project which produces light and low sulphur quality crude oil is largely supplied to China, Korea, and Taiwan. The Sakhalin I project will also go into production soon and it remains to be seen whether Japan would be interested in it.⁽¹⁴⁾

China is also very much interested in developing the Central Asian Republics as energy partners and in this China uses its Shanghai Group links to promote its interests. China has entered into an agreement with Kazakhstan for the supply of oil through a pipeline. The pipeline will connect with Xinjiang from where it will be taken to Shanghai. There is also another plan to construct a pipeline from Kazakhstan to Iran from where oil will be brought to China by sea. All these mega-projects involve huge financial expenditure, but they show the deep Chinese concerns to ensure the country's future energy security.⁽¹⁵⁾

Security angle:

At a time when the EEZ question tends to escalate into a major controversy with Japan, it is difficult to miss the strategic angle related to the future settlement of Taiwan. China wants as much access to and control over the East China Sea as possible, so that in the event of any military action over Taiwan it could effectively prevent US naval forces from advancing towards the island state. In fact, China has been quite uneasy over what it calls the expanding parameters of the US-Japan security alliance. During the early post-cold war years, it opposed the international peace-keeping bill, the Clinton-Hashimoto joint statement of 1996 and the revision of the defense guidelines of 1997. Later, when the Japanese government passed special bills and dispatched its defense forces to the Indian Ocean and Iraq, China alleged that Japan was using

anti-terrorism as a pretext to expand its military activities. More recently, the new National Defense Policy Outline of 2004, which names China a source of considerable security concern, has been criticized by Beijing as an attempt to revive the old cold war situation in Asia. The joint statement issued in February 2005 by the US and Japan in their 2+2 meeting, which mentions the importance of the security of Taiwan, has also been severely criticized by China.⁽¹⁶⁾ Simultaneously Beijing has clarified that the Senkaku islands is a disputed territory which has to be settled. In response, the US has taken the position that the security of the islands falls very much within the scope of the US-Japan security alliance. There is little doubt that these contentious claims over the EEZ and the future of the Senkaku islands make the region a flashpoint and the situation surrounding the East China Sea could become a major source of tension with serious ramifications for the vital security of the sealanes.

Aware of its dependence on massive oil supplies from the Persian Gulf, China worries about the safety of the sea-lanes, which are by and large under the control of the US and its allies. Maintaining reasonably good relations with the US is one option that China has been practising meticulously. But at the same time, it is exploring alternative strategies to overcome any unexpected difficulties that affect free passage through the Malacca Strait. China's policy of friendship and cooperation with Myanmar shows the extreme caution with which Beijing has sought to promote its economic and strategic interests. Since 1988 China has been the principal supporter of the military regime in Myanmar. Taking advantage of the absence of other countries who boycotted the military regime, China has extended massive economic aid to Yangon, particularly in the infrastructure sector. Beijing has offered favorable terms in its trade with Myanmar. But more importantly, China has extended military hardware assistance in addition to sending its military advisers to Myanmar. In the process, China has set up its naval and communication facilities in some of the important islands off the Myanmar coast in the Bay of Bengal and the Andaman Sea. On Saganthit island, there is a Chinese built radar station which enables the Chinese technicians to monitor the maritime area. The ultimate objective of China is to seek an outlet to the Indian Ocean

through Myanmar and connect it with its southern provinces of Yunnan and Sichuan. If China succeeds in its plan, then it should be possible for oil bearing ships from the Gulf to reach Myanmar from where the oil could be transported to Southern China either by pipeline or rail. This is one way of overcoming the risk of over-dependence on the Southeast Asian straits. The growing influence of China in Myanmar will exert tremendous geo-strategic influence on the maritime security of Asia. Realizing it, the Indian government has now started taking speedy measures to counter China's influence by strengthening its economic and political links with Myanmar. Both India and Myanmar share a long land as well as a maritime boundary. Strong cultural, ethnic and historical ties have always bound the two countries together for centuries. Following the strong sense of alarm raised by the former Indian Defense Minister George Fernandes in 2001 on the expanding influence of China, New Delhi started cementing new economic and security cooperation with Myanmar. Both India and Myanmar are cooperating to strengthen BIM-STEAC along with other countries like Bangladesh, Thailand, Nepal, Sri Lanka, and Bhutan. India is interested in a long-term partnership with Myanmar for utilizing its gas resources. Trade volume between the two has increased though there is still vast scope for it to grow further. India has helped Myanmar in building infra-structural facilities. Under strategic cooperation, India is contributing to the modernization of Myanmar's military. India is also helping the Myanmar government in its fight against insurgency along its border. In 1999, India established a new Far Eastern naval command in the Andaman Sea with a view to balancing China's influence. On many occasions, Chinese were found operating ships and trawlers flying Myanmar flags. The whole area has assumed great strategic significance in view of the presence of the two major Asian powers. The sea adjoining the Andaman and the surrounding islands is highly sensitive, infested with piracy and armed robbery, and a confrontational situation between China and India would only encourage these elements to intensify their illegal activities leading to further complications in the prevailing maritime security.⁽¹⁷⁾

Need for multilateral approaches:

There are too many complex maritime related issues that need to be addressed and many of them

are multilateral in nature. What is therefore needed is a multilateral organization to thoroughly discuss them in order to arrive at possible solutions. In the Asia-Pacific region, the only body dealing with security issues is the ASEAN Regional Forum (ARF) which was established in 1994 with the full support of the ASEAN group, the US, and Japan. Though ASEAN had been in existence since 1967, a variety of reasons had stood in the way of creating a security body. The most important of them was the then prevailing cold war, which sharply divided the region on ideological lines. But the end of the cold war provided a new urgency for such an organization. At the Singapore Summit 1992, the ASEAN countries decided to move to "a higher plane of political and economic cooperation" and to "security, regional peace and prosperity." At the time of its establishment in 1994, ARF consisted of ASEAN members and the seven dialogue partners of the ASEAN group. Today its membership has expanded to include 23 countries: ASEAN 10, the US, Japan, China, two Koreas, Russia, Australia, New Zealand, Canada, India, South Pacific, Mongolia and Pakistan.

ARF started off well in 1994 on an evolutionary road with emphasis placed on confidence-building measures to be followed by efforts to undertake preventive diplomacy and resolution of conflicts. Soon it realized that it was a daunting challenge to deal with complex political and security issues which included territorial questions, undefined EEZs, terrorism, maritime security, and so on. In 1995, ARF issued a concept paper that was realistic enough to understand the challenges that it faced. The paper made three major points:

- a) Though the Asia-Pacific region had witnessed dramatic economic progress, it should be borne in mind that such periods of economic growth were followed by major shifts in power relations;
- b) In view of the extraordinary diversity of the region, ARF should recognize multiple approaches to peace on a consensual basis; and
- c) The unresolved territorial and other issues should be carefully addressed in order to avoid a confrontation among the countries concerned.⁽¹⁸⁾

In the evolution of ARF, one can see certain broad trends. During 1994-97, which was a formative period, it devoted much of its time to undertaking CBMS. It also adopted agreed positions on

many global issues such as the South China Sea, Korea, non-proliferation, etc. During 1998, it spent considerable time on issues such as maritime security, piracy, small arms, etc. Of course, regional questions like Myanmar, East Timor, South Asia, etc, also preoccupied its attention. Since 9/11 incident, ARF has been showing its concern to effectively address different forms of threats posed by terrorism.

Recommendations of the Inter-Sessional Group:

Following an agreement reached among the members of ARF at their ministerial meeting held in July 1997, the Inter-Sessional support group on CBM held wide ranging discussions on two important subjects - CBMs and maritime security. The Group was quite satisfied with the prevailing atmosphere of peace and stability in the Asia Pacific region. But it also noted that since the bulk of trade in the region is sea-borne, it was imperative to ensure the security of the sea lanes which were quite vulnerable. In this context, it noted the serious challenges that maritime security faced from both traditional and non-traditional sources. It was especially concerned about the menace of ocean piracy and terrorism. One way to combat the menace would be to ensure the commitment of ARF as well as other countries to the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation, 1988 (SUA). Yet another way would be through voluntary bilateral and sub-regional cooperation since the crimes committed were transnational in nature. The Group expressed that most of the conflict situations could be easily tackled if member countries ratified UNCLOS and the relevant conventions of the International Maritime Organization (IMO). The group made the following recommendations to the ARF for its consideration and final implementation.

- a) Ratify and implement the 1982 UNCLOS and the relevant IMO conventions;
- b) Extend full support to the work of the Tokyo Memorandum of Understanding on port state control in the Asia-Pacific;
- c) Ratify the SUA Convention; and
- d) Extend support to cooperative surveillance arrangements.⁽¹⁹⁾

The 5th ARF ministerial meeting held in Manila in July 1998 recorded its endorsement of the recom-

mendations and urged the member countries to lend their full support to the existing regional and multi-lateral arrangements and institutions.

In November 1999, ARF convened its Maritime Senior Officials Meeting in Honolulu to consider the question of finding ways and means to ensure maritime security. One of the recommendations made by the meeting was the need to combat piracy. This was subsequently considered by the Inter-session Group on CBM in 1999, which also agreed that ARF should pay special attention to the issue.

ARF and Piracy:

ARF was very much concerned about the threats posed by non-traditional sources to maritime security like piracy, armed robbery and terrorist groups. It recognized that since most of the incidents of piracy occurred within the coastal and archipelagic waters, only collective efforts by the member countries could effectively combat the challenge. It also feared that if this menace was not checked in time, the situation could further deteriorate leading to a nexus between pirates and several terrorist organizations. This possibility loomed quite large in view of the presence of terrorist and religious fundamentalist groups around the critical Malacca Strait. In 2003, ARF at its 10th ministerial meeting, issued a lengthy statement on cooperation against piracy and other threats to maritime security and called upon the member countries to undertake measures such as exchange of information, implementation of the SUA Convention, extension of technical assistance for capacity building and so on. These measures clearly indicated the movement of ARF from the stage of merely exchanging views to that of collective action. But in order to translate these efforts into effective action, member countries need political will, dynamic leadership, and financial and human resources.

ARF and Maritime Transport Security:

On 2 July 2004, ARF, at its meeting held in Jakarta issued a statement on strengthening transport security against international terrorism. It called upon the member countries to:

- a) implement their obligations under IMO's International Ship and Port Security (ISPS);
- b) hold joint exercises for enhancing institutional capacity-building of coastal states to combat piracy and maritime terrorism;

- c) take appropriate measures for strengthening security regimes for container shipping; and
- d) impart training and use of equipment for respective transport security services

ARF and II Track: CSCAP:

ARF has a second track wing consisting of the Council on the Security and Cooperation in the Asia-Pacific (CSCAP) and the International Institute of Strategic Studies. Though both are coordinating their efforts to promote the objectives of ARF, the role of CSCAP has become more prominent in recent years.

Established in 1993, and composed of scholars, officials and others, CSCAP has provided essential inputs to ARF on a wide range of important issues. Its recommendations on maritime security, confidence-building measures, etc., have been found extremely useful. Those recommendations have evolved from numerous workshops and regular conferences conducted by it.

Working Groups:

CSCAP has five working Groups which deal with:

- a) Comprehensive and Cooperative Security;
- b) Confidence and Security Building Measures;
- c) North Pacific Security;
- d) Transnational Crime; and
- e) Maritime Security.

The Maritime Security Group has defined the following main objectives to promote maritime cooperation and dialogue among the countries of the Asia Pacific region;

- a) to develop an understanding of regional maritime issues for cooperation;
- b) to contribute to a stable maritime regime in the Asia Pacific region;
- c) to undertake policy oriented studies on specific problems related to maritime security; and
- d) to provide maritime CBMs and promote adherence to UNCLOS.

With the support of Japan, Australia, and New Zealand, the Group on Maritime Security has expanded its agenda to cover within its purview such issues as transport of hazardous materials, including nuclear fuel shipments, cooperation in disaster management, etc. One of the important

contributions of the Group is to be seen in the compilation of a memorandum on the Guidelines for Regional Maritime Cooperation predicated upon the principles of UNCLOS. Stressing the importance of regional security and stability, the Guidelines cover a wide spectrum of measures, such as maritime security and confidence building measures and preventive diplomacy and these are also the basic objectives of ARF.

The goals of the Guidelines are as follows:

- a. They provide an important confidence-building measure.
- b. They contribute to the process of an ocean governance regime in the Asia Pacific region by a clear recognition of the rights and obligations of countries in matters such as territorial seas, EEZs, continental shelves, etc.
- c. They also recognize the importance of the need for maritime cooperation without which there cannot be any law and order on the seas. They call upon countries to become parties to UNCLOS and develop cooperative approaches to the maintenance of sea-lanes of communication, in particular, the need for such cooperation in the South China Sea and South Pacific regions.
- d. They also believe that maritime security should be considered in a holistic and comprehensive way. Nations should pursue their commercial interests in a sustainable manner without any prejudice to the marine environment and resources, as laid down in UNCLOS.
- e. These guidelines, far from being legally binding, set the general principles for cooperative conduct.⁽²⁰⁾

The 12th meeting of the Group was held in Singapore on 10-11 December, 2002 and discussed in detail the question of how to ensure the implementation of various transportation safety measures without hampering the normal flow of trade. The meeting also drew specific attention to the illegal fishing, arms trafficking, piracy, drugs and narcotics going on rampantly in the Andaman-Nicobar sea. It lamented the total absence of any cooperative efforts among littoral countries to combat these problems. Yet another subject that worried the Group was the growing naval arms acquisitions in the Asia-Pacific region. In particular, proliferation of submarines and cruise missiles in the region could heighten concerns for the maintenance of

maritime security. While the Group was satisfied with the Declaration on the Conduct of Parties in the South China Sea signed by ASEAN and China, it also expressed its anxieties on the non-binding nature of the understanding and the absence of any geographical reference.⁽²¹⁾

The overall assessment of the Group on the maritime security situation was far from encouraging. Despite many significant developments at both bilateral and multilateral levels, the Group noted that the situation "has become more serious." This decline had occurred not only because of the spread of terrorism, but because of the enhanced military spending in the region. The concerns of the Group were succinctly expressed as follows:

"The overall assessment for the latest Working Group meeting is that while there have been some positive developments with bilateral and multilateral cooperation and agreements, the maritime security situation in the region has become more sensitive. This is only partly a consequence of the direct threat of terrorism, but includes the heightened level of military activity in the region and the increased incentive for regional countries to enhance their military spending often with capabilities (submarines and cruise missiles) that are not really related to fighting terrorism. Other adverse developments include the 'spy ship' incident in Northeast Asia and disputes over the right to conduct military activities in the exclusive economic zone of another State. The need for consideration of maritime confidence and security-building measures, including greater focus on cooperative activities, is more important than ever. The overall objective should be a more solid, stable and harmonious maritime regime in the region."⁽²²⁾

Cooperation among navies in the region could be an important contributor and there is scope to pursue the increasing opportunities for such cooperation.

However, the Group noted that it should be done carefully, avoiding the potential for "stumbling blocs" rather than "building blocs".

ARF, despite its strong concerns about the need to maintain maritime security, as expressed in its various recommendations and appeals, does not

have the power to implement them. Such power lies in the hands of individual countries which have to adopt appropriate legislative measures for that purpose. The need to suppress piracy in the seas calls for collective efforts on the part of the member countries. To what extent have the countries of the Asia-Pacific region realized the gravity of the problem? Have they chalked out any collective action to effectively address piracy? What are the practical obstacles that stand in the way of such common action?

Piracy in the post-cold war period:

Though piracy is as old as the history of shipping itself, it has grown dramatically in Asian waters, particularly in the post-cold war period. During the cold war years, the powerful naval forces maintained by both the US and the Soviet Union in the Pacific and Indian Ocean exerted a strong deterrent effect on the network of pirates operating in those areas. But the end of the cold war saw the departure of the Russian naval forces as well as a marked reduction in the presence of US naval forces, which in turn encouraged many disgruntled economic and political groups to exploit the situation. Further, with the adoption of new economic strategies based on liberalization and market reforms by a large number of Asian countries, there has been a tremendous increase in foreign trade and maritime traffic. The resultant economic growth has also created sharp disparities in many Asian societies, forcing some sections to indulge in illegal activities like piracy, armed robbery, etc.

It is necessary to note one or two features of the nature of modern piracy. First, pirates in Asian waters are well equipped with some of the most sophisticated weapons and scientific instruments like radar, radio, and satellite communication systems. Using high speed boats when they apprehend their victims, there is also evidence that they work in coordination with many international mafia groups as well as with rebellious political elements like the LTTE. They operate in areas which border on the territorial waters of more than one or two countries, which enables them to flee from one country's territorial jurisdiction to another and escape. This is one of the serious legal gaps which are exploited by the pirates. It is necessary to note the definition of piracy as found in Article 101 of the 1982 UNCLOS. Article 101 states:

Definition of Piracy consists of any of the following acts.

a) any illegal acts of violence or detention or any act of depredation, committed for private ends by the crew or the passengers of a private ship or private aircraft, and directed

(i) on the high seas, against another ship or aircraft, or against persons or property on board such ship or aircraft;

(ii) against a ship, aircraft, persons or property in a place outside the jurisdiction of any state;

b) any act of voluntary participation in the operation of a ship or an aircraft with knowledge of facts making it a pirate ship or aircraft;

c) any act of inciting or intentionally facilitating an act described in subparagraph (a) or (b).

According to UNCLOS III, when an act of piracy takes place on the high seas, all states have the right to arrest the pirates and bring them to justice. But when such incidents occur within the territorial or archipelagic areas of a country, only the concerned coastal state has the jurisdiction to exercise its sovereignty. When a spy boat moves from one country's territorial water to another, it becomes difficult to apprehend it unless there is cooperation and understanding between the coastal states. The formation of EEZs and continental shelves under UNCLOS has further increased the sovereign rights of the coastal states, giving rise to many conflicting claims among them. These contentious claims have further complicated the issue of maritime security. It is therefore all the more necessary for coastal states to coordinate their actions against piracy and armed robbery in the seas. For instance, following several incidents of the movements of suspicious ships in the Japan Sea, the defense authorities of Japan and South Korea set up a hot line to exchange information on maritime security.

Though incidents of piracy and armed robbery in the sea have occurred all over the world, the experience of the Asia-Pacific region has its own peculiar features. The activities of the pirates have multiplied particularly during the post-cold war years. In 1993, the number of actual and attempted attacks on ships all over the world was 103. In 2000, the number reached a high of 469. But in 2001, it slightly declined to 335, but again rose to 370 in 2002 and to 445 in 2003. In 2004, there was a decline, with 325 incidents. From a look at the

regions where these incidents have occurred, one finds that the Asian continent has accounted for more than 50% of them. Within Asia, Indonesia, Malaysia, and the Malacca Strait account for the maximum number of such incidents. In 2004, for instance, 147 incidents occurred in these areas out of a total of 325 for the whole world, even though this was less than 154 for the year 2003. Indonesia continued to experience the highest number with 93 incidents, followed by the Malacca Strait with 37. Other countries like the Philippines, Thailand, Vietnam, Cambodia, etc., have had a lesser number of attacks. It is remarkable to note that the East China Sea has consistently witnessed a decrease in the number of incidents whereas in the case of the South China Sea, the number, though small, has been fluctuating. In 2004, Bangladesh faced 17 incidents, compared to 58 in the previous year. In India, the eastern coast off Chennai and the Andaman Sea has always had several incidents, but in 2004, the number came down to 15 from 27 in 2003.⁽²³⁾

According to the International Maritime Bureau (IMB), hijackers of vessels, tugs, and barges, who abound in Indonesian waters, in the Northern Malacca Straits and off North Sumatra may not hail totally from the Aceh rebel groups as was widely believed earlier, but may include criminal gangs. Within the course of twelve days from June 2004, eight serious incidents occurred in the area. On 6 June, a Singapore tug was attacked by pirates in the North Malacca Straits and the members of the crew were kidnapped. On 8 June, an Indonesian bulk carrier was attacked and the crew members were forced to jump off board. IMB at once communicated its concerns to the Indonesian government, which in turn ordered its navy to take immediate measures to deal with the incidents effectively. This was also discussed in IMB's Tri-annual Conference on Piracy and Maritime Security held in Kuala Lumpur in the last week of June 2004. Attended by delegates from thirty-four countries, representing law enforcement officials, commercial shipping interests, maritime policy makers, etc., the conference examined the present challenges posed by piracy and other issues and the possible solutions for them.⁽²⁴⁾

IMO convened a high-level conference in July 2005 to consider the various possibilities for

enhancing maritime security and the environment in the Strait of Malacca and Singapore. The conference was intended to provide opportunities to littoral states to spell out their action plans in addition to developing a global approach to the protection of sea-lanes, including the Malacca Strait. In a resolution on the Ocean and Law of the Sea adopted on 10 November 2004, the UN General Assembly had strongly supported IMO's effort to organize the conference.

What has been the response of Malaysia, Indonesia, and Singapore to the rising piracy threat? Several positive developments have taken place indicating the deep concerns of these countries to maintain maritime security in the Malacca Strait and the adjacent areas. In May 2004, at a meeting of the Malaysian-Indonesian Joint commission, both countries promised to enhance bilateral naval cooperation. In July, the two countries were joined by Singapore and they decided to start their coordinated patrols along the strait. The trilateral operations are all through the year intended to provide safety to the 50,000 ships that pass through the Malacca Strait annually. Each country has pledged to commit between 5 and 7 ships for this exercise. They have also pledged to start a naval hotline to maintain close communication.⁽²⁵⁾

It is to be noted that the trilateral patrols between the three countries are somewhat limited in the sense that they conduct patrolling within their own respective territorial seas. Ships will be permitted to enter each other's waters only in the event of chasing a pirate ship. The three countries welcome assistance from outside countries only in the form of "skills and equipment."

The position taken by Singapore deserves to be noted, because, being one of the busiest international ports and depending on foreign trade for its very existence, it has attached utmost importance to maritime security. Since the 9/11 incident, its concerns for the safety of the sea-lanes as well as its own port and other installations have grown. In 2002, it preempted the attempts made by some of the militant religious groups to attack American ships entering the Singapore port. Singapore fears that if some terrorist groups succeed in blocking the Malacca Strait, it could badly disrupt world trade, causing incalculable damage to the economies of

numerous countries. With a view to preempting such a disaster, Singapore formed an inter-agency navy-led Maritime and Port Security Working Group to monitor measures to meet the needs of maritime security. Even as early as 1992, Singapore had coordinated bilateral patrolling with Indonesia. The Deputy Prime Minister and Defense Minister of Singapore, Tony Tan, while addressing the Asian Security Conference in June 2003, made three important suggestions for strengthening regional cooperation in ensuring maritime security. First, all countries need a firm commitment to international cooperation on maritime security by enhancing joint efforts in subjects like exchange of information and capacity building. Second, there is need to build on the existing anti-piracy frameworks. Third, it is necessary to develop an integrated multi-dimensional approach to maritime security. It should involve a whole array of institutions like security agencies, port authorities, industries, etc.⁽²⁶⁾

At a time when the maritime security situation in and around the Malacca Strait appeared to be better, a serious attack on a Japanese tugboat occurred on 14 March 2005 in the strait between Malaysia and Indonesia. It was an incident in which a group of pirates opened fire on the tugboat which had arrived in Penang port in the evening. The pirates then boarded the vessel, seized properties, and abducted the captain and two crew men before speeding towards Indonesian waters.⁽²⁷⁾ The incident once again highlighted three points. First, it is believed that pirates normally attack vessels and capture crew men for monetary gains. But there is also a strong suspicion that some of the terrorist groups in the region, such as Jemaah Islamiya, could be behind such incidents. It is therefore necessary to understand the origin and motives of these incidents. Second, with each incident, it is becoming increasingly clear that the pirates are as well equipped with weapons and fast moving boats as some of the navies and coast guards of the South-east Asian countries. Third, any counter measures taken to suppress piracy should be based on the collective will of the countries concerned. The trilateral agreement between Indonesia, Malaysia, and Singapore on coordinated patrolling has obviously not responded adequately to the prevailing uncertainties in the maritime situation. In this context, the suggestion made by the Japanese Prime Minister Junichiro Koizumi in 2001 for a regional coopera-

tion agreement on anti-piracy in Asia is very relevant. After the March 14 Penang incident, the Japanese government is making vigorous efforts to speed up the process of its early implementation. The agreement proposes to set up in Singapore an information sharing center through which the signatory countries share information on piracy and related incidents. As many as sixteen countries, including China, India, South Korea, and ASEAN have adopted the agreement and are poised to implement it soon.⁽²⁸⁾

The most serious impediment to any effective action against piracy should be seen in the fact that since the Malacca Strait lies within the territorial waters of Malaysia and Indonesia and Singapore, when an attack takes place, the flag state of the ship cannot initiate any police action without the consent of the coastal states. As has been noted earlier, the provisions of UNCLOS (Article 101) need to be reviewed in order to have a pragmatic approach to address the issue. The latest incident of March 14 amply demonstrated the inadequacy of the capacity of the coastal states to handle the problem despite their coordinated patrolling in the Strait. In this context, the International Maritime Bureau's definition of piracy is much broader and it can perhaps be useful in overcoming many legal hurdles pertaining to the sovereign rights of the coastal states. IMB defines piracy as an "act of boarding or attempting to board any ship with the apparent intent to commit theft or any other crime and with the apparent intent or capability to use force in the furtherance of that act". This definition would cover any act whether the ship is on the high seas or in territorial waters.

IMO has been seized of the serious threats arising from maritime transport insecurity. Even as early as December 1985, IMO studied the question of terrorism at the instance of the UN General Assembly with a view to making recommendations for formulating appropriate measures to combat terrorism and piracy. As a result of its efforts, in March 1988, the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation (SUA Convention) was adopted in Rome along with a protocol to safeguard off-shore platforms. Basically, the SUA convention is directed against a) unlawful acts against ships, such as the violent seizure of vessels; b) acts of violence target-

ing persons on board ships; and c) use of devices on ships in order to destroy or damage them. By July 2004, only 107 countries had ratified the Convention and only 96 had ratified the protocol. The fact that Malaysia and Indonesia are not parties to the Convention constitutes a major weakness in the whole anti-piracy response structure.

Following the 9/11 terrorist attack, there was a strong apprehension that terrorists might also use maritime transport to target some of the crucial channels and choke-points with a view to crippling world trade. IMO has been preoccupied with the necessity to broaden the scope of the SUA Convention to include many more types of crimes such as transport of weapons of mass destruction. In this context, IMO is also strongly inclined to modify the prevailing rules pertaining to the right of states to board and inspect a suspected ship even if it is outside the territorial waters of that state. Ultimately, much would depend upon how best the member countries are able to strike a balance between the common interests of maritime security and their own sovereign rights in the seas. This is not a question that affects the Malacca Strait alone. There are seriously contested territorial disputes and controversial and overlapping EEZs and continental shelves in the South and East China Sea areas. To what extent the countries concerned are willing to work out compromises to ensure larger maritime security interests will be a challenging task.

US proposal on maritime security: RMSI

If Malaysia, Indonesia and Singapore are not able to effectively deal with piracy, will they support any initiative coming from outside the region? Their attitude towards the Regional Maritime Security Initiative (RMSI) put forward by the US clearly highlights their serious reservations on any outside intervention. RMSI, which emanated from Admiral Thomas Fargo, Commander, US Pacific Command, is a proposal that would enable the US forces to make "effective interdiction" in these sea lines of communications where "terrorists are known to move about and transmit throughout the region."

Fargo explained that far from posing any threat to the sovereignty of any country, RMSI "will be a partnership of regional nations who are willing to contribute their resources to enhance maritime security. It is not a treaty or an alliance."⁽²⁹⁾

RMSI was strongly opposed by Malaysia and Indonesia as constituting an affront to their sovereignty. Malaysian leaders pointed out that there was no need for any foreign intervention for ensuring the security of the straits and that they would take all possible measures on their own for that purpose. Datul Abdul Aziz, Malaysian Foreign Minister, assured that the new Malaysian Maritime Enforcement Agency would start operating from 2005 with well equipped modern vessels and advanced devices. Indonesia's reaction was still sharper in that it considered RMSI a national humiliation. Only Singapore extended support to RMSI on the grounds that in view of the various complexities involved in maritime security, it would be necessary to have multilateral cooperation to effectively address the problem.⁽³⁰⁾

These states then tried to broaden their joint patrol plan by seeking the support of some of the neighboring countries. Thailand shared their basic concerns and expressed its willingness to participate. India, one of the major regional naval powers which had played a notable role in rescuing a Japanese vessel *Alondra Rainbow* from pirates in 1999, is equally interested in a regional initiative to safeguard the straits. India has extended its cooperation to Malaysia and Sri Lanka in establishing their coast guards.

Having seen the resentment of Malaysia and Indonesia, the US retracted from its earlier position and Fargo himself visited those countries in June/July 2004 to clarify that the US had the utmost respect for their sovereignty and that there was no question of stationing American military forces in the straits. In June, during a visit to Singapore, Defense Secretary Donald Rumsfeld himself admitted that while the US attached utmost strategic significance to the Malacca strait, it had no plans to patrol the waterways without first securing the approval of the littoral countries. The whole debate on RMSI has driven home the point that the littoral countries are keen to enhance the security of the straits on the basis of their own capabilities while seeking to keep out the US. The latest case of the tsunami has also demonstrated the keenness of Indonesia to terminate the presence of foreigners as quickly as possible even though it accepted a great deal of relief aid.

The case of Proliferation Security Initiative (PSI):

Most Asian countries have expressed similar reservations on the initiative taken by the US to prevent the proliferation of nuclear weapons through maritime transportation. The Proliferation Security Initiative (PSI) was announced by President Bush in May 2003 as an effort to consider possible collective measures to interdict the proliferation of weapons of mass destruction, missiles, and their related materials that threaten the peace and stability of the world. The states from where such transfers can occur are North Korea, Iran, Libya, Syria, and the Sudan. Japan has supported the principle of interdiction and participated in the activities of PSI. Japan and Singapore are the only Asian countries that figure among the fifteen core group members of PSI. Twelve PSI interdiction exercises have been conducted so far and Japan hosted the last one off the coast of Sagami Bay in October 2004.

Apart from several technical problems that are involved in the principle of interdiction, such as its use on the high seas, the legal status of the non-signatories of NPT, or Missile Technology Control Regime (MCTR) vis-a-vis interdiction, etc., many countries like China and North Korea suspect that it may increase tension and encourage the US to contemplate preemptive military action against certain countries. South Korea, an ally of the US, has not joined it largely because it does not want to provoke North Korea. The same North Korea factor made Japan somewhat hesitant about its joining the PSI in the initial stage and this was clearly indicated in its delay in hosting the 12th PSI exercise. India, another important country, has decided to stay out of PSI even though it could derive some benefits if shipments between North Korea and Pakistan could be examined to see if they carried objectionable materials. India's basic position is that interdiction amounts to infringement one's sovereignty and that PSI would legitimize preemptive wars.

India and maritime security:

It has been noted how some of the ASEAN countries welcome India to play a role in the maintenance of maritime security in view of its long historical ties with the region and its relatively non-controversial image. They tend to believe that India could play the role of 'a balancer' in the increasing-

ly complicated geo-strategic Asia-Pacific region.

India has a long coastline of about 7.5 thousand km, including the long 1,760 km coastlines of the Andaman and Nicobar islands. These islands are closer to Sumatra and Myanmar than to mainland India. Even though India had a rich historical maritime tradition, the long foreign colonial rule neglected maritime security and it is only since independence that India has developed a maritime framework in its foreign policy. India has now one of the strongest and most sophisticated navies in the Asia-Pacific region. It is well-equipped with warships, aircraft carriers, submarines, minesweepers, etc. The Indian navy has four major commands and one of them is located in the strategic Andaman Islands.

India has a strong Coast Guard, which was set up in 1978 as an independent Armed Force of the Indian government. The main functions of the coast guard are: 1) safety and protection of offshore installations; 2) protection of fishermen in distress; 3) protection of the maritime environment; 4) action against piracy and terrorism, and 5) safety of life and property at sea. Its responsibilities have multiplied with the demarcation of vast EEZs and continental shelves. It is a strong force well equipped with modern patrol vessels, aircraft, helicopters, and so on.

After 1947, India took quite some time to develop an appropriate perspective on its maritime diplomacy. During most of the cold war period, because of its close relations with Moscow, many suspected that India did not have an independent maritime strategy. But since the end of the cold war, India's approach has dramatically changed and its maritime policy has become more comprehensive, taking into account several non-military factors such as the need for developing modern ports and harbors, exploitation of marine resources, preservation of the environment, development of commercial shipping, modernizing fishing industries, etc. India's participation in the UNCLOS deliberations was quite prominent and, later, it took legal measures to implement the changes that followed the UNCLOS conference. Setting up its own EEZs, India went on to vigorously broaden the parameters of its maritime policy. One compelling reason for this shift is to be seen in India's increasing dependence on the

security of the sea-lanes. For one thing, the growing energy needs of the economy have placed a new emphasis on the security of the sea lanes. During 2001-02, India's total consumption of oil was about 107 million tons out of which only about 32 million tons were produced indigenously, including the offshore wells. The remaining 75 million tons had to be imported. Following the adoption of the economic liberalization program of the government, which has given a new thrust to external trade and foreign direct investment, India's trade volume has been continuously growing. It should also be noted that, at present, more than 90 percent of India's overall external trade is sea-borne.⁽³¹⁾

Indeed the whole complexion of India's foreign policy has changed in the post-cold war period. Far from being hamstrung by ideology, India has pursued a pragmatic multi-dimensional diplomacy so as to build new bridges of understanding with the US. The US is now India's biggest trading partner and investor. Both countries have also instituted several mechanisms for carrying on a defense dialogue and technological cooperation. The fact that the then US Secretary of State Colin Powell in one of his earliest Congressional testimonies sought New Delhi's maritime cooperation in combating terrorism showed the importance that the US attached to India's role. During the war in Afghanistan, India extended its assistance to the security of American vessels in the Malacca Straits. Both the US and India have been regularly conducting joint naval and air exercises. In fact, a full-scale security dialogue encompassing all aspects of mutual cooperation constitutes a major aspect of Indo-US relations.

India's diplomacy in the Asia-Pacific region has made still more impressive strides. Its pursuit of a 'Look East' policy since 1991 has highlighted the convergence of security and economic interests between India and the East and Southeast Asian countries. The interests of India's rapidly expanding economy, with an annual growth rate of over 6 per cent, naturally go beyond the narrow confines of South Asia. India's links with East and Southeast Asia are historical and the presence of a large Indian population in the region provides an additional reason for its renewed interest. In 1994, India became a full-fledged dialogue partner of the ASEAN group followed by its admission to the ARF in 1996. India is also holding annual summit

meetings with the group in what is known as ASEAN+1. Like Japan and China, India has also signed the treaty of amity and cooperation with the ASEAN group as well as the Framework Agreement on Comprehensive Economic Cooperation. Now efforts are under way for eliminating or reducing tariffs between the two sides. It is expected that within the next ten years, ASEAN will be able to work out free trade agreements with India, Japan and China. In the meantime, trade and investment relations between India and ASEAN have made significant strides. India and Japan have also initiated steps to arrange a similar free trade agreement between themselves. With such tremendous economic prospects looming large, their interests in maritime security have also increasingly tended to converge. For instance, Singapore, Indonesia, and Malaysia expressed their keenness in August 2004 to have India provide maritime security to the Malacca strait. This was in contrast to their negative reaction to the US offer for joint patrolling of the straits. India's Foreign Minister Natwar Singh had earlier stated in July 2004, at the time of the ARF meeting, that it would be in India's interest to ensure that the Malacca Strait remained free from the dangers of piracy and terrorism. Southeast Asian countries do not entertain any fear of domination from India nor do they carry any historical legacy of suspicion and distrust. India has extended assistance to Malaysia in organizing its coast guard. Both Malaysia and Singapore have regularly held their joint naval exercises with India.

It is necessary to take note that India is seized of the importance of the security of the Malacca strait and contributes to the strategic stability of the Bay of Bengal area. It also understands that the channels leading to the Malacca straits, such as the 10 Degree Channel and the Six Degree Channel, should not be endangered under any circumstances. India also worries about the increasing influence of the Chinese navy off the coast of Myanmar. In order to exercise effective surveillance over the Chinese activities, India has established a new naval and air base in the Andaman and Nicobar Islands.

The 'Look East' policy has also witnessed both India and Japan broadening the parameters of their bilateral relations. For too long a time, Indo-Japanese relations remained predominantly economic in

nature. But after India's nuclear tests in 1998, followed by the suspension of Japan's ODA for well over three years, both countries understood the necessity for adding non-economic components to their bilateral relations. The initiative for a security dialogue was taken by India when its Defense Minister George Fernandes visited Japan in January 2000. Prime Minister Mori Yoshiro gave further impetus to the initiative when in August 2000 he called upon both countries to build a new global partnership that would address a wide spectrum of international issues, including nuclear disarmament, terrorism, maritime security, structural reform of the UN, a fair global financial system, and so on. This idea of a global partnership was further articulated by the Koizumi-Vajpayee joint statement in December 2001. Both prime ministers in particular stressed the importance of bilateral cooperation in maintaining the security of international sea lanes and advocated a regional cooperation agreement for eradicating piracy.

It is against this background of widening maritime perspectives and interests that the prospects of Indo-Japanese cooperation have to be examined. Since piracy has been one of the most serious threats to the safety of the sea-lanes in recent years, both countries could think of joint action along with Southeast Asian countries. IMB has been warning that the incidence of piracy may increase in the coming years unless prompt countermeasures are designed and implemented. As has been noted earlier, the well-known incident of Alondra Rainbow convinced both India and Japan in October 1999 of the urgency to take collective action to get rid of piracy.

Subsequently, the Japanese Prime Minister Keizo Obuchi put forward a proposal in November whereby he wanted the Japanese coast guard to conduct joint patrols with their counterparts in Indonesia, Malaysia, Singapore, South Korea, and China. In April 2000, Japan convened an international conference on anti-piracy in Tokyo. The conference examined in detail the threats posed by piracy in each country and the measures to be adopted. At the end of the conference, the participants issued an appeal called the Tokyo Appeal which reiterated their determination "to cooperate, devise, and implement all possible measures to combat piracy and armed robbery against ships."

Since then Japan has been dispatching its coast guard missions to various countries in South and Southeast Asia. Both India and Japan have held joint coast guard exercises several times off the Chennai and Mumbai coasts. In particular, the sea near Chennai was infested with pirates and militants of the Sri Lankan LTTE. In the northern part of the Bay of Bengal, trawlers and boats of Bangladesh, Burmese and Thai origin regularly visited the Sunderbans and attacked the vessels of the Indian Coast Guard and damaged marine resources. There were reports that they were supplying arms to many groups of insurgents in Northeast Indian states.

Conclusion:

Many of the issues related to maritime peace and security should be addressed multilaterally since most of them have a bearing on the whole region. For instance, as we have noted, the energy requirements of the Asia-Pacific countries can be met if there is cooperation among them. A multilateral Asian energy institution could facilitate the flow of energy supplies and avoid the kind of competition that is seen now. Such an institution could also enable the recipient countries to work out the maintenance of emergency energy stocks to overcome any crisis and foster mutual cooperation. Further, such cooperation is indispensable for the exploitation of new regions like Siberia and the Central Asian Republics. Any efforts to harness their

resources have to be multilateral, requiring huge capital and technologies of even Western countries.

Secondly, differences over territories and EEZs could have a serious bearing on maritime security. Ocean resources form the common heritage of mankind and UNCLOS provides adequate mechanisms for peacefully settling any dispute arising out of contested EEZs or continental shelves. It is essential for countries to be fully committed to the letter and spirit of UNCLOS.

Thirdly, there is no disagreement among countries on the need to eradicate non-traditional security threats such as piracy, terrorism, armed robbery, etc. But these challenges can be successfully faced only by mutual cooperation and concerted efforts. We have noted how a narrow definition of piracy could negate the efforts of individual countries to combat it.

Lastly, ARF is the only multilateral security forum in the region and unfortunately, despite its best efforts in confidence-building measures, it has not moved forward to the stage of resolving disputes. Its real effectiveness will, of course, depend upon the member countries. For instance, the territorial questions in the South China Sea area are directly linked to sea lane security, and amicable settlements among the countries concerned will be indispensable for regional peace and stability.

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APPENDIX-I

Locations of ACTUAL and ATTEMPTED attacks, Jan. to Dec. 1993-2004

Source: IMB Annual Report 1 January-December 2004 on Piracy and Armed Robbery Against Ships

	Locations	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
SE ASIA	Cambodia	1	1	1	1	1							
	Indonesia	10	22	33	57	47	60	115	119	91	103	121	93
	Malacca Straits	5	3	2	3		1	2	75	17	16	28	37
	Malaysia		4	5	5	4	10	18	21	19	14	5	9
	Myanmar (Burma)				1	2		1	5	3			1
	Philippines		5	24	39	16	15	6	9	8	10	12	4
	Singapore Straits		3	2	2	5	1	14	5	7	5	2	8
	Thailand			4	16	17	2	5	8	8	5	2	4
FAR.	China/Hkong/Macau	1	6	31	9	5	2		2			1	3
EAST	East China Sea	10	6		1	1			1	2	1		
	Hong Kong/Luzon/Hainan(HLH)Area	27	12	7	4	1							
	Papua New Guinea				1	1	3			1	1		
	Solomon islands					1		1	2		2		
	South China Sea	31	6	3	2	6	5	3	9	4		2	8
	Taiwan			2						2	1	1	
	Vietnam		2	4		4		2	6	8	12	15	4
INDIAN	Bangladesh		2	2	4	9	9	25	55	25	32	58	17
	India	1		8	11	15	12	14	35	27	18	27	15
SUB CONTINENT	Sri Lanka	2	1	6	9	13	1	6	3	1	2	2	
AMERICAS	Brazil	4	7	17	16	15	10	8	8	3	6	7	7
	Caribbean		1									4	
	Colombia	1		1	3		4	4	1	1	7	10	5
	Costa Rica										1		
	Cuba											4	
	Dominican republic				1	3	4	2	4	5	7	6	2
	Ecuador		3		3	10	10	2	13	8	12	2	1
	Guatemala								1				
	Guvana	1			2		2		1		12	6	2
	Haiti							1	1		1	1	6
	Honduras								1			1	1
	Jamaica				1	3	2	2			2	5	7
	Martinique											1	
	Mexico							1		1			
	Nicaragua			1	1								
	Panama			1					1		2	2	
	Peru			1	2	1	1	2	4	1	6	7	5
	Salvador				1	1							
	Trinidad & Tobago									1		2	1
	Uruguay			1									
	USA				1	1		1		1	1		
	Venezuela				1	3	1	6	3	1	8	13	7
AFRICA	Algeria		1							1			
	Angola	3				1	1	1	3	1		3	
	Benin											1	
	Cameroon					3	5	3	2	7	5	2	4

Locations	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Congo								1	1			
Egypt		1				2	1	1	2			
Eritrea												1
Equatorial Guinea								1				
Gabon			1			2	3	2	3	7		
Gambia										1		
Ghana			1	2	2	4	2	2	5	5	3	5
Guinea		1	1	2	3	2	6	6	3	2	4	4
Guinea Bissau							1		1	2		
Ivory Coast		1		4	4	1	5	5	9	5	2	4
Kenya						7		5		2	1	1
Liberia											1	2
Mauritania								1				2
Madagascar					1				1	3		1
Morocco							1	1	1			
Mozambique								2		1	1	
Nigeria	2		1	4	9	3	12	9	19	14	39	28
Oman										1		
Red Sea/Gulf of Aden								13	11	11	18	8
Senegal				2	6	2	1		1	3	8	5
Sierra Leone				3	3				3	1		3
Somalia/Djibouti		1	14	4	5	9	14	9	8	6	3	2
South Africa								1	1		1	
Tanzania	2	1	2	3	4	3	3	2	7	3	5	2
Togo								1		1	1	
Yemen				1	5			1	1	5		
Zaire							2					
REST OF WORLD					5	1						
Albania												
Arabian Sea								2				2
Arabian Gulf											1	
Australia								1				
Bulgaria										1	1	
Denmark			1		1							
France						1						
Georgia										1		
Greece				1	2			1				
Indian Ocean								1	1			
Iran			8	2	3	1	3	1	1		2	
Iraq									2			1
Italy			1	2		1	2			1		
Malta					1							
Netherlands					1							
Pacific Ocean												1
Portugal					1							
Russia			1		1							
Turkey			1	1	2							
UAE								1				2
United Kingdom										2		
Location Not Available	2		1			1			1			
Total for the year	103	90	188	228	248	202	300	469	335	370	445	325

海上セキュリティとアジア太平洋：挑戦と見通し

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要約

海上セキュリティは、21世紀の国際政治において重要な役割を果たし始めたアジア太平洋地域の諸国にとって、極めて重要である。この地域では、既にいくらかの劇的な経済的、科学的及び技術的な発展を目の当たりにしている。日本、中国、韓国、ASEAN諸国及びインドは、経済発展の分野において独自のモデルを体現している。長い冷戦期には、諸国は関係強化に対して強力な心理的障壁をつくり出した思想的な相違によって分断された。両陣営の敵対関係は、陸や空に限定されず、海にも広がっていた。両陣営は共に、世界的な支配権が、海洋において維持される支配の程度に左右されるということを理解していた。両陣営は強力な海軍を発展させるだけでなく、その地位を高めるために島や海軍基地を手に入れた。海軍の増強競争は深刻な緊張を生み出しはしたが、両大国があからさまに対決することを避けねばならないという懸念が、ぎこちなくではあるが海上にある程度の安定を生み出した。冷戦期に形作られた二国間や多数国間のセキュリティのための同盟は、無謀な軍事行動を効果的に抑止した。冷戦が終焉した後に国際関係が異常なほどに流動化した、このことが海上にも反映されたのである。

Maritime Confidence and Security Building in East Asia
Recent Progress and Problems

Mark J. Valencia

Maritime Confidence and Security Building in East Asia Recent Progress and Problems

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Abstract

In East Asia, progress in maritime confidence building is signified by fisheries agreements, prior notification regimes, co-operative anti-piracy initiatives, and naval exercises. But disputes regarding fisheries, intelligence collection expeditions, and boundaries have eroded confidence. Moreover, the extension of maritime jurisdiction has been overlain on a pre-existing structural pattern of distrust, making the maritime frontier dangerous for international relations.

KEY WORDS: ASIA; MARITIME; CONFIDENCE; SECURITY; PROGRESS; PROBLEMS

Much of East Asia is essentially maritime, encompassing a maze of islands, archipelagos, strategic straits, and sealanes. For many years East Asian nations attempted to avoid escalating tension with their neighbors by either refraining from extending their maritime jurisdiction or foregoing provocative activities in maritime frontier areas. However, in the last decade all East Asian coastal countries have claimed 200 nautical miles (nm) Exclusive Economic Zones (EEZ). This has resulted in a sea change in the maritime arena where disputes between unfriendly nations can seriously exacerbate relations between them. For example, in 1996, in a 'tit-for-tat' sequence, China, Japan and South Korea formally claimed overlapping 200 nm EEZs.¹ These conflicting claims to ocean space and resources were superimposed on already troubled relations and conflicting territorial claims to islands (Tokdo/Takeshima: Japan/South Korea; Diaoyu/Senkaku: Japan/China). As fisheries and other incidents increased, nationalism rose in each country, pressuring policymakers to address the issues.

Thus, given its geography and the plethora of maritime boundary and territorial disputes stimulated by this wave of extended maritime jurisdiction, it is not surprising that maritime issues have risen to the forefront of regional security concerns.² Moreover, the increasing prominence of issues like environmental pollution and resource ownership, as well as illegal activities, now including piracy and 'terrorism,' dictates broader responsibilities and changing priorities for military force structure, operations, and training. Together with the require-

ments of self-reliance and force modernization, these concerns are reflected in the significant maritime dimension of current arms acquisition programs in the region. This includes maritime surveillance and intelligence collection systems, multi-role fighter aircraft with maritime attack capabilities, modern surface combatants, submarines, anti-ship missiles, naval electronic warfare systems, and mine warfare capabilities. Because some of these new systems have offensive capabilities, they can be seen as provocative and thus destabilizing, by those countries that do not have them and lack the means to acquire them. Moreover, possession of these systems undoubtedly increases the risk of inadvertent escalation in time of conflict. In short, maritime East Asia has become an increasingly dangerous frontier where the building of trust and confidence is sorely needed.

The first step toward the peaceful settlement of conflict is the creation of a sense of community.³ The creation of such a community presupposes at least the mitigation and minimization of conflict, so that shared interests and common needs outweigh the factors that separate the parties. A functional approach can help the growth of positive and constructive common work and of common habits and interests, decreasing the significance of artificial boundaries and barriers by overlaying them with a natural growth of common activities and administrative agencies. The challenge then for Asia is to develop a variety of bilateral arrangements that will demonstrate that a habit of dialogue and working together can build common - and eventually - co-operative security. Tactical learning - in which

behavior towards co-operation is changed - must give way to complex learning in which values and beliefs about reaching goals through co-operation are changed. In this context, co-operation in the maritime sphere can be a means of building confidence, reducing tension, and eliminating points of conflict, and it can have spillover effects in other fields. Unfortunately, confrontation and conflict in the maritime sphere can have the opposite effect. As a means of assessing the current situation, this paper provides an update on significant progress and problems of building confidence and security in the maritime sphere of East Asia.

Pre-Existing Maritime Co-operation

There is a pre-existing foundation in East Asia upon which robust maritime regimes and confidence can be built.⁴ In Southeast Asia, permanent Association of Southeast Asian Nations (ASEAN) committees of marine importance include Fisheries, Meteorology, Science and Technology, and Shipping. There is also a 1975 ASEAN agreement for the Facilitation of Search for Ships in Distress and Rescue of Survivors of Ship Accidents. In the area of environmental protection, there is an ASEAN Sub-regional Environment Programme, and an ASEAN Committee on Petroleum, which has developed contingency plans for oil spills. And the United Nations Environment Programme for East Asian Seas has helped enhance marine environmental awareness and capabilities. However, the most concrete example of indigenous Southeast Asian maritime regime building is the Strait of Malacca Safe Navigation Scheme between Malaysia, Singapore, and Indonesia. Also a web of bilateral military co-operation has emerged, particularly focused on patrolling common maritime borders.

There are also several marine-relevant international organizations operating in the region, such as the Indo-Pacific Fisheries Commission, the Southeast Asia Fisheries Development Centre, the International Center for Living Aquatic Resources Management, The Committee for Co-Ordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas, and the Working Group for the Eastern Pacific of the Intergovernmental Oceanographic Commission. These organizations are not indigenously derived or funded and include among their membership both extra-ASEAN and Southeast Asian states. Nevertheless, they may serve as mod-

els, platforms, or stimuli for indigenously initiated marine regional arrangements.

Several specialized United Nations agencies whose terms of reference include marine problems also have offices in the region, such as the UNESCO Regional Office for Science and Technology for Southeast Asia in Jakarta, the United Nations Environment Programme Regional Office in Bangkok, and divisions of the Economic and Social Commission for Asia and the Pacific concerned with transportation and natural resources. The many U.N.-sponsored or supported national projects and bilateral assistance programs in the marine sphere also have helped to stimulate and support national marine awareness in the region. And the non-governmental Southeast Asian Program on Ocean Law and Policy has helped to build capacity and understanding regarding Law of the Sea matters in Southeast Asia.

In Southeast Asia, there are already several multilateral regimes with maritime relevance. These include the 1995 ASEAN Nuclear Weapons Free-Zone Treaty, the 1976 ASEAN Treaty of Amity and Co-operation, and ASEAN 1971 declared goal of a Zone of Peace, Freedom and Neutrality. More fundamental to a specific management regime for the South China Sea are the 1992 ASEAN Declaration on the South China Sea, and the repeated Indonesian South China Sea Workshop Statements signaling agreement by the claimants to resolve any territorial or maritime disputes through peaceful means. And the Committee for Security Co-operation in the Asia-Pacific, a track-Two confidence building exercise, has a working Group on Maritime Co-operation. This working group's efforts, particularly its Guidelines for Regional Maritime Co-operation, may provide the foundation for a process of comprehensive maritime security regime building.

Despite these beginnings, nation building has primacy in Southeast Asia. With the exception of Thailand, all nations in and around the region have achieved independence or have experienced society-transforming movements within the past quarter-century. Many are still struggling with the basic problems of nationhood, thus inserting a nationalistic fervor into regional and maritime affairs. Within ASEAN itself, relations are cordial but competitive and perhaps unstable in the long-term. The

ASEAN nations produce many of the same raw materials, and the resulting direct competition for credit, investment markets, and development assistance may increase with advancing economic development. Southeast Asian nations only now are beginning to perceive clearly their own national marine interests and how these differ from those of neighboring states or outside maritime powers. At this juncture, commonalities are neglected and differences tend to be emphasized. The maintenance of newly acquired national sovereignty over ocean resources and jurisdiction over ocean space has underlying national security connotations, and thus any proposed coordination or co-operation might be perceived in some quarters as impinging on national security.

Moreover, extension of maritime jurisdiction has imposed inequities and imbalances in marine endowments upon an already economically and politically competitive milieu. The marine area and attendant resource base of Singapore, Cambodia, Laos, and Brunei are negligible compared with the great gains of Indonesia, the Philippines, and Vietnam. Thailand perceives that it has lost access to important fishery resources that made its large fleet profitable. Ironically, the windfall increases in the area and resources for Vietnam and Indonesia raise the possibility of competition and conflict between these new maritime neighbors. This redistribution of area and potential wealth, as well as the concomitant potential for conflict, could endanger ASEAN's progress in co-operation.

In Northeast Asia, regional co-operation is in a much earlier stage of development and there are serious obstacles to maritime regime building. In political terms, there are four countries with six governments, with little history or experience in multilateral co-operation. In this context, a primary obstacle to truly regional co-operation is the difficulty of involving both China and Taiwan in a multilateral marine policy regime covering areas claimed by both, particularly given the increasing tension in their relationship.

Another difficulty for Northeast Asia is the isolation and pugnacious, non-participatory stance of North Korea. Since North Korea borders and claims continental shelf, "security zones," and EEZs in the Japan (East) and Yellow (West) Seas, its eventual

participation in functional marine policy regimes is important. And it is not clear who speaks for Russian Far East maritime policy and how stable and steadfast that policy is or will be. Although the participation of the major powers, China and Japan, is critical to a successful regime in Northeast Asia, both may be reluctant to participate unless they can dominate.

For more than a decade the United Nations Environment Programme has sponsored a North-West Pacific Region Action Plan (NOWPAP) to forge concrete co-operation in marine environmental protection. However, NOWPAP continues to face many problems including disagreement regarding the specific geographic definition of the region for co-operation, the priorities for projects, the means of their implementation, and the all-important allocation of costs. Thus NOWPAP's progress has been severely retarded.

Other than boundary and island sovereignty issues, which stimulate nationalism, there is a rather low marine "awareness" in Northeast Asia.⁵ Despite growing interest and obvious need, Northeast Asian states continue to ignore most of the opportunities currently available in the marine sphere. They have seemed incapable of resolving the growing multiple use conflicts in their own EEZs, let alone those conflicts that are truly transnational in character. Furthermore, the ocean as a whole continues to play a role in the national and regional development process far below its potential for most of the coastal states of Northeast Asia.

Maritime issues are generally only a ripple in the great ebb and flow of economic and political relations in Northeast Asia. But many national frontiers are now maritime in nature and nationalism can elevate these issues into symbols of national pride and integrity. Indeed, some maritime issues may be so crucially situated in time or substance vis-à-vis the balance of much greater issues that they could act like a rogue wave or surge that significantly disturbs political relations in Northeast Asia. Disputes over islands or boundaries in areas of great petroleum potential could belong to this category. Considering the tenuous or even hostile relations between most of the states in the region and the likelihood of petroleum in disputed conti-

mental shelf areas, maritime issues could become the “tail that wags the dog” of international relations in Northeast Asia.

Progress Fisheries

There has been remarkable recent progress in fisheries agreements that contribute to maritime confidence and security building (MCSB) in North-east Asia.

The China-Japan Fisheries Agreement of November 11, 1997, which entered into force in June 2000

Faced with overlapping EEZ (and continental shelf) claims in the East China Sea and burgeoning fisheries disputes, China and Japan agreed to establish three different zones where different fisheries regimes apply:

Exclusive fishing zones in their EEZs up to 52 nm from their respective baselines in the area between 27 °N and 30 °40' N;

Joint regulation in the area beyond 52 nm from each state's baselines and between 27 °N and 30 °40' N; and

Exclusion of the application of the fisheries agreement to the area south of 27 °N.

To summarize, each country will manage its fisheries within 52 nm of its baselines; beyond 52 nm and between 27 °N and 30 °40' N, boats of the two countries may fish without prior approval of the other's government.⁶ The area south of 27 °N, including the area around the disputed Diaoyu/Senkaku islets, remains unregulated high seas.

The Agreement mandates the establishment of a China-Japan joint fisheries commission that will make recommendations on matters relating to catch quotas and other terms and conditions of fishing operations for the nationals and fishing vessels of each signatory state in the other's EEZ, on matters regarding the maintenance of the ‘fisheries order,’ and on matters relating to fisheries co-operation between the two states.

Although this bilateral agreement is a step in the right direction, there remain several fundamental problems with potential negative implications for both fisheries and international relations in the East

China Sea. For example, the EEZ and continental shelf boundaries have not been agreed. Moreover, the relevance of Taiwan's and South Korea's claims and roles remains an open question. And there is no effective dispute settlement mechanism built into the Agreement. Specific quotas and conditions of operations must be negotiated every year and may be held hostage to the quality of political relations between the parties. Nevertheless, this Agreement is a remarkable step towards the building of at least a bilateral regime governing maritime activities in areas of overlapping or unclear jurisdiction.

The Japan-South Korea Fisheries Agreement

Also faced with overlapping EEZ and territorial claims and increasingly frequent and bitter fisheries incidents in the Sea of Japan (East Sea), Japan and South Korea established a joint fishing area there and in a small area south of Cheju Island. They also agreed on the establishment of a South Korea-Japan joint fisheries commission to implement their co-operation for the conservation and management of the living resources in their joint fishing areas. The commission will make recommendations to the states on matters relating to the conditions of fishing operations, the maintenance of the ‘fisheries order,’ the condition of the marine living resources, co-operation between the two states in the fisheries field, the conservation and management of the marine living resources in the joint fishing area, and other matters relating to the implementation of the Agreement. The signatory states are supposed to respect the recommendations of the commission in their determination of the terms and conditions for allowing the fishing vessels of other states in their EEZ.

This Agreement was very unpopular in both countries, particularly in South Korea where it became a hot political issue. It is also complicated by the inclusion of a small area south of Cheju, which overlaps China's claimed EEZ. Indeed, the commission will be exercising prescriptive jurisdiction for the conservation and rational management of living resources in an area covered by the Japan-China agreement. Presumably South Korea and Japan agreed to establish the small joint fishing area there to preserve their legal position with regard to their respective claims with China.

The South Korea - China Fisheries Agreement

On November 11, 1998, after five years and 19 rounds of negotiations, South Korea and China reached an agreement on fisheries in the Yellow Sea. The Agreement established three different zones between the two countries: EEZs, joint, and transitional. In the EEZ, the coastal state exercises its sovereign rights over resources. The transitional areas are zones of about 20 nautical miles in width on both sides of a joint fishing area, where the nationals and fishing vessels of the two states are allowed to fish. The zones extend northward to 29 °45' latitude. These zones were to be incorporated into the countries' respective EEZs after four years of joint management. The two countries also agreed to gradually reduce their fishing so as to maintain balanced fishing in the transitional areas, to take measures for the conservation and management of the living resources in accordance with the decisions of the joint fisheries commission, to jointly conduct surveillance to ensure that the conditions for fishing are observed, and to exchange a list of fishing vessels for effectively carrying out these obligations.

Problems remain. South Korea felt it could not wait for four years until the transitional area is incorporated into each EEZ because of the rapidly increasing number of Chinese fishing vessels engaged in indiscriminate over-exploitation of the living resources in the transitional area. Thus South Korea tried to incorporate the area into its EEZ ahead of the four-year time schedule through negotiations. Moreover, transgressions continue to be reported by both sides. Most important, the Agreement is provisional in that it can be finalized only when the boundary delimitation is settled, and incomplete in that it will need many more negotiations on the terms and conditions for fishing and catch quotas in each other's EEZ.

Commonalities

The core aspect of these fisheries agreement is their establishment of joint fishing areas as a provisional arrangement for dealing with overlapping prescriptive and enforcement jurisdictions of the coastal states in their overlapping EEZs. On the one hand, this is the result of the inability of the states to agree on the delimitation of their EEZ boundaries. In fact, if they could have clearly

delimited their boundaries, these contrived arrangements for joint fishing areas would not be necessary. However, the joint fishing area may also be regarded as a useful device to allow the nationals of coastal states to fish in an area of overlapping EEZs that is to be treated as part of the "the high seas," subject to conservation requirements. Eventually, however, the continuity of the ecosystem of the Yellow and East China Seas and the migration of the fish stocks through all three countries' claimed zones dictate that a tri-lateral unified management system will be necessary.⁷

Scientific Research

The Japan-China Agreement on mutual prior notification of February 13, 2001

"Illegal" scientific research in another country's EEZ is not usually considered a security issue. But when the countries in question are rivals for power and leadership in Northeast Asia, such activities can become national issues and the progenitor of potential conflict. Chinese marine scientific research and navy ships have been frequenting the area claimed by both China and Japan since 1998, causing great concern and consternation in Japan. Indeed, Japan claims that activities carried out by Chinese ships in Japan's claimed EEZ over the past five years include a collection of data for military purposes as well as exploration of natural resources - both in violation of the 1982 Convention on the Law of the Sea.⁸ China argued that it was conducting research in its claimed EEZ and on its claimed continental shelf which is allowed by the 1982 Convention.

Chinese research vessels were sighted on 16 occasions in 1998, 30 times in 1999, and 24 times in 2000 operating within Japan's claimed EEZ in the East China Sea.⁹ In 1999, four sightings occurred within the 12 nm territorial waters of the disputed Diaoyu/Senkaku islands. Although Japan's Maritime Safety Agency asked the vessels to leave the area and to cease the research, they refused. The Chinese activities were concentrated near the Amami islands and some involved magnetic and seismic exploration for hydrocarbons, while others may have been focused on collecting oceanographic data important for naval operations.

Japan suspects that the increasing activities of Chinese marine research vessels on the Japanese side of the Japan-China equidistant line are

designed to make such activities a *fait accompli* that China can use to its advantage in negotiating the boundary of its EEZ and its continental shelf.¹⁰ It is also concerned because the major sealane for tankers importing its vital oil runs through the East China Sea. In mid 2000 these intrusions raised domestic political hackles in Japan and forced then Japanese Foreign Minister Yohei Kono to urge China to curb its ship operations in Japan's claimed EEZ.¹¹ Moreover, Japanese lawmakers threatened to postpone a U.S. \$161 million loan to China because of concern among ruling party lawmakers with Chinese "spy" ships. In talks with Chinese Foreign Minister Tang Jiaxuan, the two nations agreed on August 31, 2000 to negotiate an agreement for advance notification of such "surveys" by either party.¹²

On February 13, 2001, Japan and China agreed on a mutual prior notification system.¹³ The Agreement cleverly avoids specifying any line beyond which advance notification is required. It simply says that China is to give Japan at least two months notice when its research ships plan to enter waters "near Japan and in which Japan takes interest" and that similarly, Japan is to inform China before its vessels enter waters "near" China. The notification must include the name of the organization conducting the research, the name and type of vessels involved, the responsible individual, the details of the research, such as its purpose and equipment to be used, the planned length of the survey, and the areas to be surveyed.

Anti-Piracy Initiatives

U.S./Indian co-operative anti-piracy air and naval patrols in the Malacca Strait

On April 21, 2002, Malaysia's Defense Minister Datuk Seri Najib Abdul Razak declared that India and the United States are 'free to conduct joint patrols in international waters within the Malacca Strait.'¹⁴ The decision to deploy the ships was part of India's involvement in "Operation Enduring Freedom" against terrorism. Escort duties of high value ships were divided between ships of the Indian and American navies for six months each.¹⁵ Such co-operation between the U.S. and Indian Navies followed the lifting in September 2001 of U.S. military sanctions on India imposed after its nuclear testing in May 1998. In May 2002 their forces conducted joint military exercises, including their

navies, for the first time in nearly 40 years. U.S. naval ships are also docking regularly in Indian ports. However, on the downside, China is somewhat suspicious of this renewed U.S./Indian military co-operation.¹⁶

The continued efforts of Japan to lead a co-operative anti-piracy effort in Southeast Asia

On March 12, 2002, at Japan's initiative, maritime authorities and experts from 14 other Asian countries convened in Tokyo to discuss ways of combating piracy in the region.¹⁷ Also in August 2002, the Japanese Coast Guard and the Royal Brunei Marine Police conducted a joint anti-piracy exercise in waters offshore Brunei.¹⁸ On October 23, Japan dispatched a Coast Guard patrol boat (the Yashima) for training in the South China Sea and joint training with the Indian Coast Guard. The Yashima made port calls in India and Singapore and patrol nearby waters.¹⁹ In March 2003, after an anti-piracy conference of the region's coast guards in Manila, Japan and Philippine Coast Guards led an anti-piracy training exercise.²⁰

Miscellaneous bilateral and multilateral arrangements, exercises and dialogue, e.g.

Shipping and Resources Exploration

'Experimental' direct shipping between the People's Republic of China (PRC) mainland (Xiamen) and Taiwan (Kaohsiung).²¹

China (CNOOC) - Taiwan (CPC) agreement to jointly explore for oil and gas in the Taiwan Strait.²²

Japan (JNOC) - South Korea (KNOC) resumption of joint exploration for oil and gas in their Joint Development Area.²³

China-South Korea discussion of the possibility of joint development in the Yellow Sea.²⁴

Military Exercises and Arrangements

Resumption of South Korea-Japan joint maritime search and rescue drills off Cheju in the East China Sea.

The August 2002 Joint Russian-Japanese Coast Guard exercises in Aneva Bay.²⁵

The May 2002 exchange of warship visits between China and South Korea and joint search and rescue exercises.²⁶

Russia-China joint naval maneuvers.

The March 10, 2003, visit to Malaysia of three

Japanese warships.²⁷

The June 2001 joint naval exercise of 16 nations hosted by Singapore including Chinese, Japanese, Russian, Indian, and U.S. forces.²⁸

An April 2002 five-nation submarine rescue drill in Japanese waters involving Australia, Japan, Singapore, South Korea, and the United States.²⁹

The May 2002 Cobra Gold exercise involving the U.S., Thai, and Singaporean forces and Team Challenge adding Philippine and Australian forces as well as aircraft from South Korea and Japan.³⁰

The April 2003 first ever joint Brunei-Philippines Navy exercises.³¹

The annual U.S. hosted RIMPAC exercises including from Asia this year Australia, Japan, and South Korea.³²

U.S./China talks on military maritime safety under their Military Maritime Consultative Agreement and the agreement by Beijing to allow a U.S. Navy ship to visit one of its ports in November 2002.³³

The April 2002 APEC marine affairs ministerial meeting hosted by South Korea focusing on maritime business, ocean science and technology, and the marine environment.³⁴

Close But No Cigar

There are two multilateral efforts that could give MCSB measures in Asia a major boost. But they have not reached fruition, and because of high and perhaps misplaced expectations, their lack of success may actually undermine MCSB.

*A code of conduct for the South China Sea.*³⁵

Differences between key ASEAN claimants and between them and China continue to prevent agreement on a legally binding, detailed code of conduct in the South China Sea.³⁶ In November 1999, the Philippines proposed a specific code of conduct covering the entire South China Sea and including no further occupations of the features. But ASEAN claimants could not agree among themselves regarding the geographic coverage of the code. Vietnam wanted it to include the Paracels, which have been occupied by China since it took them by force from South Vietnam in 1974. This definition of the code's coverage was of course unacceptable to China. Malaysia also wanted it restricted to the area of overlapping claims. Moreover, China wanted a general declaration of principles rather than

specific prohibitions.

Malaysia, in a bid to break the impasse and get China to accept the proposal, suggested at the ASEAN annual meeting in Brunei in August 2002 that the "code" be replaced by a political "declaration" and that the coverage be non-specific as well. But China returned the draft for "further discussions." Differences over its wording remained.

On November 4, 2002, ASEAN and China signed a ten point Declaration on the Conduct of Parties in the South China Sea.³⁷ It is hoped that this will reduce tension and improve the general political climate in the South China Sea. As background, two bilateral codes of conduct (Vietnam/Philippines; China/Philippines) already exist as do numerous platitudes in statements issued by the Track-Two South China Sea Workshops. However, violations of these undertakings by most parties have been numerous and frequent. The new points of the declaration include a statement that the parties will refrain from "action of inhabiting on the presently uninhabited islands, reefs, shoals, cays and other features." Actually, this was watered down from a ban on erecting new structures such as those China has built in spurts on Mischief Reef from 1995 to present.

It also commits the parties, albeit voluntarily, to holding dialogues and exchanging views and information between their defense and military officials, and to prior notification to the other parties of impending joint/combined military exercises (probably aimed at U.S.-led multilateral exercises). And it reaffirms the parties' commitment to freedom of navigation in and over-flight above the South China Sea, a matter of great interest to maritime powers.

The downside to the Declaration is that:

1. It is a political declaration, not a legally binding detailed code of conduct.
2. It makes no mention of the geographic scope or even of the 'Spratlys' or 'Paracels.'
3. It repeats worn and ineffective platitudes from previous bilateral codes of conduct and the South China Sea Workshops, such as 'the parties will undertake to exercise self-restraint in the conduct of any activities that would complicate or escalate the disputes, and affect peace and 'stability.' The parties concerned undertake to

resolve their territorial and jurisdictional disputes by peaceful means, without resorting to the threat or use of force.’ These principles were agreed to some time ago and have been violated by several claimants.

4. Most important, the parties themselves publicly acknowledged that a binding code of conduct is important for peace and stability in the region and agreed to continue to work towards it.³⁸

In the months preceding and following the agreement the Philippines moved civilians onto Pag-asa in the Spratlys,³⁹ Vietnam rescued Chinese fishermen whose boats sank in the Spratlys but then delayed releasing them;⁴⁰ Vietnamese soldiers fired at two Philippine bombers flying reconnaissance at about 1000 feet over Vietnamese-occupied but Philippine-claimed Pugad;⁴¹ Vietnamese forces were alleged to have occupied Parola after Philippine forces abandoned it;⁴² China continued to beef up its military presence in the area;⁴³ and the destruction of coral reefs in the area increased.⁴⁴ Thus the South China Sea remains a politically dangerous place and a more specific legally binding code of conduct is necessary to avoid further violent incidents.

Council for Security Co-operation in Asia and the Pacific (CSCAP) Maritime Co-operation Working Group

CSCAP’s efforts have to be included in the “close but no cigar yet” category. Despite great timing in topic selection, prodigious effort and productivity, including the Guidelines for Maritime Co-operation (December 1997) and Co-operation for Law and Order at Sea (February 2001), none of its guidelines and recommendations have been officially adopted by the target governments.⁴⁵ Moreover, some of its work is being duplicated without any apparent linkage in official forums such as the ARF. Nevertheless, CSCAP remains a ready resource if and when governments decide to avail themselves of its expertise.⁴⁶

Mixed Bag

The U.S. maritime anti-terror initiatives

Recent efforts by the Bush Administration to seek agreements for the U.S. Navy to arrest ships on the high seas, in foreign EEZs, and even in others’ territorial seas is a ‘mixed bag.’⁴⁷ U.S. leadership in maritime anti-terrorism initiatives is certain-

ly forging new military co-operation and strengthening existing arrangements throughout Asia.

But it also has a potential downside. Such activities, unilateral or agreed, could run counter to the 1982 U.N. Convention on the Law of the Sea. This Treaty was a ‘grand bargain’ between developing states and the maritime powers and is seen by most countries as a “package deal.” A major bone of contention during the nearly two decades of acrimonious negotiations was the desire of developing coastal states to limit the “freedom” of navigation of the maritime powers which were then as now led by the United States. The contending groups finally agreed to a compromise which established three major zones:

A 12-nm-territorial sea where coastal states retain sovereignty over most activities and where only innocent passage is allowed, that is, passage which is not ‘prejudicial to the peace, good order or security of the coastal state;’

A 200 nm Exclusive Economic Zone where coastal states retain sovereign rights over resources and related activities but maritime powers retain most of their navigational “freedoms”; and

The high seas where navigational freedoms remain unencumbered.

Transit passage through straits used for international navigation and archipelagic sealanes passage were also part of the bargain. Thus the concept of coastal state sovereignty in the 12-nm-territorial sea was enshrined in the Treaty and the long-term practice of all states, including the United States, as part of a package compromise regarding navigational freedoms.

The Treaty came into force in November 1994 upon its 60th ratification. The United States Congress has yet to ratify the Treaty. However, there is a question regarding the rights of countries like the United States that have not ratified the 1982 Convention to invoke the Convention’s careful balance of rights and duties to justify their military activities in the EEZs of other coastal countries. Nevertheless, the United States argues that the navigational freedoms codified by the Convention - like other provisions it agrees with - are customary international law.

Although the new U.S. actions would be consensual and for specific ‘war time’ purposes, such ‘exceptions’ can over time create new law and practice. Indeed, some fear it could be the thin edge of a wedge further eroding the sovereignty of nations. It could also undermine the existing Law of the Sea. Indeed, if the U.S. can arrange for such ‘exceptions,’ so can other countries.

Specifically, the United States is proposing that coastal states “allow” the U.S. Navy to search their ships on the high seas and in their territorial waters as part of counter-terrorism operations. They want to be able to chase down and board vessels in foreign waters when pursuing ships believed to be carrying al-Qaeda or other ‘terrorists’ whose organizations have ‘global reach.’ The definition of ‘terrorists’ and ‘global reach’ would presumably be determined solely by the United States. The Proliferation Security Initiative is a more recent expansion of this doctrine.⁴⁸ It focuses on intercepting weapons of mass destruction including shipments headed by sea to ‘rogue’ nations. Although the full list of states being asked to agree to this new regime is secret, such states probably include Australia and Canada; in East Asia, Japan, South Korea and the Philippines; and in West Asia, India and Pakistan.

What is more troubling to some countries is that the United States may proceed with or without the concurrence or even the knowledge of the coastal state. U.S. Defense Secretary Donald Rumsfeld has said that “the United States would mount a maritime interdiction effort anywhere the benefits outweighed the costs.” He added that “if we had information that there was someone moving from the Philippines for example to Indonesia, we might very well try to intervene. . . .”⁴⁹

For some time now, the United States and its coalition allies, Australia, Britain, Canada, France, Germany, and Spain, have been interdicting ships on the high seas in the Persian Gulf and Arabian Sea.⁵⁰ This action is supposedly backed by a U.N. Security Council Resolution aimed at preventing war material from reaching the Taliban and al-Qaeda, and capturing their leaders. But taking this a step further, under a U.S. proposal by the Chief of U.S. Special Operations Command, U.S. Navy Seals would regularly board and search suspicious vessels on the high seas anywhere in the world even

when permission of the flag state is not granted. This practice is in itself highly questionable under current international law. Indeed, one can argue it violates the 1982 Law of the Sea Convention that specifies the limited occasions when a warship may board and inspect another vessel on the high seas. Basically these are only when the other vessel is flying no flag or is suspected of being of the same nationality as the warship.

Eroding Confidence at Sea

Unfortunately, there have also been several major incidents in the region in the last few years that have heightened tension and detracted from any confidence that may have been built.

Fisheries Conflict

*The South Korea-Japan-Russia fisheries imbroglio*⁵¹

The three-way disputes over South Korean saury fishing around the Russian-controlled southern Kurile Islands/Northern Territories brought South Korea-Japan relations to a boiling point. On December 10, 2000, South Korea reached an agreement with Russia to allow 26 South Korean fishing boats to fish for 15,000 tons of saury around the southern Kuriles from July 15 to November 15, 2001, for the fee of \$850,000. Both South Korea and Russia explained that the agreement was purely based on commercial considerations. Nevertheless, Japan feared that such an agreement would undermine its claim to the islands (Northern Territories/Southern Kuriles) which it disputes with Russia, and pressured South Korea to abrogate the agreement. When South Korea refused, Japan revoked from June 19, 2001, South Korean saury boat fishing in its EEZ off northeastern Japan- the Sanriku area. In a tit-for-tat exchange, South Korea froze its fishing contract with Japan as well as planned bilateral fisheries talks, posing a threat to Japanese crab fishing.

Domestic politics then reared its ugly head. Seoul maintained that it could not drop the plan to fish around the disputed islands because of pressure from its fishing industry. Also mixed in was Seoul’s outrage at Japan’s newest high school history text books, which it alleged whitewashed Japan’s wartime brutality, and Japanese Prime Minister Junichiro Koizumi’s paying homage at the Yasuku-

ni shrine, a memorial to Japanese war dead including war criminals. Meanwhile, Tokyo had to consider its own fishing industry's interest as well as elections of its upper house in late July.

Confrontation became possible, either between fishermen from both countries or even between their patrol vessels. Japan indicated that such South Korean fishing around the "Northern Territories" would be "illegal" and that the "capture of such vessels by Japanese patrol boats was a possibility. South Korea said it would respond 'sternly' if Japanese maritime authorities tried to block or interfere with South Korean fishing boats entering the area. For its part, Japan's Prime Minister Koizumi said: "I am concerned that if we leave the current state as it is, it will have serious negative effects not only on the peace treaty negotiations, but the overall Japan-Russia relations." And South Korean Foreign Minister Han Seung-soo also expressed concern to Japanese Foreign Minister Tanaka that relations with Japan would deteriorate further if Russia formally agreed with Japan not to allow third countries to fish in the Southern Kuriles area.

Finally, on December 28, 2001, there was a breakthrough between Japan and South Korea in which Japan granted South Korea permission to catch 9000 tons of saury off Sanriku (off its Pacific coast), the same amount as originally allotted in 2001. However, Japan will also allow South Korean boats to fish within 35 miles off the coast if they do not achieve their quota outside that limit. Nevertheless, this quota may well be unattainable in the Sanriku area - outside or inside 35 nm. In return, South Korea announced it would forego fishing in the disputed Kurile area in 2002.

Thus a simple fisheries dispute became a front-burner, three-sided diplomatic "wrangle." Although there were many high- and working-level discussions and even summit meetings to settle the dispute, it remained a 'hot button' diplomatic issue, especially between South Korea and Japan. Although cooler heads prevailed this time, confidence was certainly damaged. The overall lesson learned is that given the difficult relations in North-east Asia, relatively low level disputes over fish can damage relations between the states involved. This possibility - even probability - should temper

decisions by national fisheries policy makers. In sum, such decisions should be made only after serious consideration of the ramifications for political relations with neighbors.

Overlapping claims to islands and maritime space

There are many of these and they lurk just beneath the surface, occasionally boiling over, both disturbing relations between rival claimants and destroying confidence in each other's positive intentions.⁵² As an example, the Senkakus/Diaoyutai controversy surfaced again just in October 2002 when former Taiwan President Lee Deng Hui stated that the Diaoyutai belong to Japan, not China.⁵³ This statement sparked a furor in Taiwan and certainly displeased China. The problem surfaced again in January 2003 when the Japanese government leased three of the five features from private owners⁵⁴ and then again in February when Taiwan announced it was considering including the features in its claimed EEZ.⁵⁵

Intelligence-gathering Incidents

Chinese intelligence ships in Japanese waters

In May through June 2000, Haibing-723, a Chinese icebreaker/intelligence gathering ship, circumnavigated Japan on a suspected intelligence-gathering mission.⁵⁶ The ship, after carrying out a series of activities in the sea area near the Tsushima Strait, sailed north through the Sea of Japan, crossed the Tsugaru Strait three times back and forth, sailed south along the seashore of Japan bordering on the Pacific, past the Boso Peninsular, Shikoku and Amami Oshima. It was also verified that Dongtiao-232, a Chinese missile range instrumentation ship, had engaged in intelligence gathering activities in July in sea areas off Irako-misaki, Aichi Prefecture, and in sea areas south of the Kii Peninsula. For Japan the April 2005 incursion of a Chinese submarine into Japanese territorial water's was the last straw.⁵⁷

In addition to gathering intelligence by electronic means about the activities of the Japan Self-Defense Forces (JSDF) and the U.S. Forces in Japan (USFJ), the purposes of the presence of China's intelligence gathering vessels in Japanese waters appear to be (1) training of its crews in intelligence gathering, and (2) surveying (depth, water temperature, currents, and sea-bottom topography)

for military purposes such as submarine operations. It is also possible that their activities in these waters are designed to restrain the JSDF and the USFJ and test the reaction of the Japanese government, public opinion, and the JSDF.

Japan believes that China has increased its vigilance against the Japan-U.S. security alliance because of the strengthening of the alliance since 1996, including, in particular, the enactment of the Law Ensuring Peace and Security in Situations in Areas Surrounding Japan.⁵⁸ Japan considers the deployment of China's naval vessels in the East China Sea a demonstration of China's opposition to Japan and the United States including Taiwan in the scope of "situations surrounding Japan." Moreover, Japan thinks the deployment of China's naval vessels may be designed to restrain Japan and Taiwan from introducing a Theater Missile Defense system, or Taiwan from moving towards independence.

Indeed China has said that Japan and the United States are trying to include Taiwan in the scope of "situations in areas surrounding Japan." Chinese analysts point to then Japanese Foreign Minister Kono's statement that the Senkakus in particular fall within the security treaty's application.⁵⁹ And Chinese media have repeatedly charged that (1) Japan has changed the focus of its defense policy to one aimed at dealing with plural sources of threats occurring in areas surrounding Japan, (2) Japan has been completely transformed into an 'accomplice' of the United States in military operations undertaken by the latter in the Asian region, (3) Japan's military co-operation with the United States, including joint military operations, intelligence and logistical support, and the re-siting of US Army 1st Corps Headquarters from Washington state to Camp Zama near Yokohama⁶⁰ - represents a change in its status from a recipient of U.S. protection to a participant in military actions of the United States, and (4) the United States has strengthened its alliance with Japan to maintain its 'hegemony', and Japan is using the clout it gains from its military alliance with the United States to accelerate its transformation to a military power. As these charges suggest, China fears the possibility of Japan and the United States actively undertaking joint military action against it in future. Indeed the alteration of the US-Japan security alliance to designate security in the Taiwan Strait as a 'common strategic objective'

seemingly confirms China's worst fears.⁶¹ Meanwhile, Japan has begun planning for the worst, for the first time publicly declaring China a potential threat.⁶²

The April 1, 2001, EP-3 reconnaissance plane incident over China's EEZ 63 (and the March 24, 2001, Bowditch incident)

The April 1, 2001, collision between a U.S. surveillance plane and a Chinese fighter jet raised several questions regarding the legality of military activities in EEZs. China and the U.S. have held several meetings under the auspices of their Military Maritime Consultative Agreement to try to avoid a recurrence of this politically dangerous incident. The negotiators have discussed their countries' different legal positions regarding such military activities in China's EEZ and perhaps the political concerns that drive them.

The collision took place about 62 nm southeast of Hainan in the South China Sea. China said that the U.S. 'spy' plane was flying over its EEZ, and that it was endangering its security. Further, China demanded that the United States halt its spy flights off its coast. But the United States said that its plane was flying over 'international' waters that for navigation purposes are under the regime of 'freedom of the high seas,' and was thus enjoying the freedom of over-flight. And on May 7, 2001, the United States resumed surveillance flights over China's EEZ. Indeed, the United States flies more than 400 reconnaissance missions a year around China, an average of more than one per day.

Military activities in the EEZ were a controversial issue in the negotiations of the text of the U.N. Convention on the Law of the Sea and continue to be so in state practice. Indeed, some coastal states, such as Bangladesh, Brazil, Cape Verde, India, Malaysia, Pakistan, and Uruguay hold that other states cannot carry out military exercises or maneuvers in or over their EEZ without their consent. Their concern is that such uninvited military activities could threaten their national security or undermine their resource sovereignty. However, maritime powers like the U.S. insist on freedom of military activities in the EEZ out of concern that their naval and air access and mobility could be severely restricted by the global EEZ 'enclosure' movement.

The Convention does not address this issue directly. One view is that what is not explicitly prohibited by the Convention is permitted. Because the Convention expressly prohibits intelligence-gathering activities in the territorial sea in Article 19(2) but not in the EEZ, such activities are arguably legal. However, it could be also argued that what is not specified is not authorized.

In judging the issue, two principles need to be kept in mind. One is the Convention's basic principle of maintaining the use of the sea for peaceful purposes. Its Article 301 states that: "In exercising their rights and performing their duties under this Convention, State Parties shall refrain from any threat or use of force against the territorial integrity or political independence of any State, or in any other manner inconsistent with principles of international law embodied in the Charter of the United Nations." And Article 88 states specifically that "the high seas shall be reserved for peaceful purposes."

The other principle is contained in Article 58(3) which states that: "In exercising their rights and performing their duties under this Convention in the exclusive economic zone, States shall have due regard to the rights and duties of the coastal state and shall comply with the laws and regulations adopted by the coastal State in accordance with the provisions of this Convention and other rules of international law *in so far as they are not incompatible with this Part.*" While the latter qualification may be a loophole allowing freedom of navigation and overflight, Article 87 states that such freedoms apply in the EEZ *provided* they are exercised with 'due regard for the interests of other states in their exercise of the freedom of the high seas.'

Although the U.S. has not ratified the Convention, it maintains that the navigational freedoms codified by it are customary international law. And even China's own law on the EEZ and the continental shelf, promulgated on June 26, 1998, says that all countries enjoy the freedom of navigation in and flying over its EEZ, provided they observe international law and China's laws and regulations.

It is clear from the Convention and customary international law that U.S. aircraft enjoy the freedom to fly over China's EEZ. But it is not clear

that such freedom is absolute. The question is whether the spy flights are a peaceful act and give due regard to the 'interests' of China in its exercise of freedom of navigation and overflight, and in its management of its EEZ, including surveillance and enforcement of its regulations. The Convention prohibits intelligence operations in or over the territorial sea because they are not considered 'innocent.' What is not 'innocent' in the territorial sea may not be considered 'peaceful' in the EEZ. China certainly considers the spy missions unfriendly and perhaps even hostile acts.

There is also a question regarding the specific activities undertaken by the U.S. EP-3E plane involved in the incident. EP-3Es are outfitted with high-tech eavesdropping equipment to intercept radio transmissions and other communications signals. The plane in question may have been searching for signs of Chinese submarine activities by monitoring military communications traffic in the area, as part of a larger U.S. effort to keep tabs on what the Chinese military is up to in the region, including advances in submarine warfare, intelligence-gathering, and space launch activities. The plane may even have been interfering with and/or altering communications between elements of China's armed forces. If so, this would certainly not be a 'peaceful' use of China's EEZ.

Obviously one of the purposes of the flights is to gather military intelligence that could be used to delineate specific targets in a future armed conflict. Are such activities a 'peaceful' use of the ocean and of China's EEZ? Do they threaten force against the territorial integrity or political independence of China? And does a flight that results in a collision between a U.S. plane and a Chinese plane over China's EEZ give due regard to China's interests in its own exercise of freedom of navigation and overflight in its own jurisdictional zone?

On March 24, 2001, a week before the EP-3 incident, a Chinese frigate closed to within 100 meters of the Bowditch, a U.S. Navy survey vessel collecting data in the Yellow Sea, and warned it not to operate in China's EEZ. Apparently, China believes such activities are a threat to its security and will not permit them to continue. A related issue is whether any of the activities carried out by such U.S. naval vessels or airplanes can be consid-

ered ‘scientific research’? If so, according to the Convention, such activities can be carried out in another country’s EEZ only for peaceful purposes and then only with the consent of the coastal state.

This uncertainty and debate is not confined to China and the United States. Burma, Japan, Thailand, Indonesia, South Korea and Taiwan have extensive air-defense zones. Also, Burma, India and Vietnam have established military warning zones 24 nm wide, while Cambodia and Indonesia have declared such zones 12 nm wide. Alien warships and military aircraft are prohibited from these waters; in the Vietnamese zone other vessels also must secure permission to transit these waters.

These ‘excessive’ claims are constantly being tested by the United States. Indeed, on any given day the U.S. Navy is exercising its maritime freedoms against an “excessive” maritime claim somewhere in the world. Ironically, and as precedents dangerous to the U.S. interests, the United States itself has on occasion enforced restrictions on the freedom of navigation on the high seas. For example, the U.S. Navy, Coast Guard, and Customs and Drug Enforcement Agency once blockaded two major shipping lanes off the coast of Colombia to prevent marijuana from reaching the United States.

These uncertainties will persist until resolved between the parties concerned. Needed now is objective, neutral dialogue and research to find common ground and to establish a *modus operandi* for China, the United States, and other involved countries. This is what the East-West Center and the Ocean Policy Research Foundation of Japan have established, beginning in Bali in June 2002 and convening again in Tokyo in February 2003.⁶⁴

The April 2001 stand-off between Chinese and Australian warships in the Taiwan Strait⁶⁵

China insists on prior notification for foreign warships to enter its territorial seas, while Australia and other maritime nations claim the right of innocent passage in foreign territorial seas. In April 2001, three Australian warships enroute from South Korea to Hong Kong apparently weaved in and out of China’s territorial waters. China, believing that such passage was not ‘innocent,’ demanded that the warships leave China’s territorial waters. Analysts speculated that the incident was in part a reaction

by China to Australian Prime Minister Howard’s support for U.S. President George W. Bush’s position on Taiwan. The incident also occurred only a few weeks after the EP-3 incident.

The December 2001 Japanese Coast Guard attack on and the sinking of a North Korean spy vessel in its and China’s EEZ⁶⁶

In this spy-boat incident, North Korea, though denying any link with the ship, called Japan’s actions “piracy” and “terrorism” Tokyo said it acted in “self-defense.” China expressed concern with Japan’s use of force.

The Japanese Government subsequently introduced a law allowing suspect foreign ships in its EEZ to be arrested, and if they resist, to be fired on with impunity from domestic liability. The 1982 Convention on the Law of the Sea, ratified by Japan and China, already allows a nation to board, inspect, and arrest a foreign ship in its EEZ to ensure compliance with its laws and regulations. And under the Convention, Japan also has the right of hot pursuit if it suspects a vessel has violated its EEZ laws. But in proposing a new law sanctioning the use of force, Japan may be moving beyond the 1982 Convention and international norms.

North Korean spy vessels have freedom of navigation in the EEZ. But at the time of their pursuit of what they suspected was a spy ship, the Japanese Coast Guard vessels used the rationale of illegal fishing. According to a 1999 decision by the International Tribunal on the Law of the Sea, in such situations “the use of force must be avoided as far as possible, and where it is unavoidable, it must not go beyond what is reasonable and necessary under the circumstances . . . consideration of humanity must apply and all efforts must be made to ensure life is not endangered.” The official Japanese government position is that the use of force during the pursuit was proportional to the alleged offense and not excessive. Others disagree. In any case, the liberal use of force could lead to serious incidents between Japan and its maritime neighbors, whose vessels frequently fish illegally in its EEZ. Moreover maritime powers like the United States should be wary of any interpretation that diminishes freedom of navigation in EEZs.

Military Conflict

*The June 29, 2002, North Korea - South Korea clash in the Yellow Sea*⁶⁷

On June 29, 2002, a major naval clash broke out between the Republic of Korea (ROK) and the Democratic People's Republic of Korea (DPRK) naval patrol boats. The clash occurred when two South Korean navy vessels tried to block two North Korean navy warships and some North Korean fishing boats which had ventured 4.8 km south of the Northern Limit Line (NLL). According to South Korea, the North Korean boats fired first. A North Korean navy boat with heavy caliber weapons sank a South Korean patrol boat, killing five South Korean sailors and wounding 22.⁶⁸ A DPRK warship was seen aflame and being towed north across the sea border.

North Korea argued that it had never recognized the NLL, that it had no fishing boats in the area at the time, that it had not fired first, and that the South Korean boats 'intruded' into its claimed waters.⁶⁹ It further maintained that South Korea precipitated the clash by amassing twice as many warships in the area to mount a 'surprise' attack. North Korea also alleged that the South Korean military did this in order to undermine any chance of reconciliation and then to blame the North for the impasse. The DPRK rejected the U.S.-led U.N. command's proposal for military talks, stating that it would only hold talks to discuss the maritime border which it declared to lie considerably to the south of the NLL.⁷⁰

South Korea maintained that North Korea had recognized the NLL implicitly several times and when it signed the 1992 Basic Agreement which stipulated that "areas for non-aggression shall be identical with those over which each side has exercised jurisdiction until the present time." South Korea insisted that it will maintain and defend the NLL as the *de facto* maritime border between the two Koreas, with force if necessary.

The incident had political repercussions throughout the Korean Peninsula and Northeast Asia. On July 10, South Korean domestic critics charged that the ROK military had covered up a serious incident on June 13, for fear of a negative impact on the outcome of local elections.⁷¹ Eventually the ROK Navy essentially admitted that it mis-

handled the encounter because of incorrect field command reports and fear of North Korea's anti-ship Styx missiles, and the Defense Minister was replaced.⁷² The June 29 incident caused both South Korea and the United States to back away from contact with Pyongyang.⁷³

Although the DPRK expressed its regret that the incident occurred and offered to restart talks with the ROK,⁷⁴ this is not the first nor will it be the last incident in this area. The valuable blue crab (*Portunus trituberculatus*) is the only resource that both the North and South are interested in and the fishing season is very short, extending only from May 1 to July 15. Thus competition for the lucrative crab catch might well have been a trigger for this clash. The North Korean gunboats were escorting fishing boats that compete with South Korean fishermen for these crabs along the sea boundary, which North Korea does not recognize. During the winter all is relatively quiet on the West Sea front. But when the blue crab season rolls around each spring, more clashes can be expected unless at least a temporary solution can be found. Indeed, in early June 2003, tensions and gunfire flared again along the NLL.⁷⁵

Analysis and Conclusions

The last few years have witnessed both significant positive and negative developments in maritime confidence and security building in Asia. There seem to be several common factors encouraging the positive developments. The fisheries and prior notification agreements in Northeast Asia are clearly conflict avoidance mechanisms. They were a result of a past practice of maritime conflict avoidance, the introduction of the EEZ regime, conflicting claims, an increasing frequency and intensity of incidents, and, above all, domestic political pressure in Japan and South Korea. In sum, leaders considered the political relationships between China, Japan and South Korea too important to be undermined by the rising nationalism accompanying these disputes. These decision makers concluded that it was in these countries' common interest to compromise and reach at least interim solutions. However, the South Korea-Japan-Russia imbroglio was allowed to fester much too long before cooler and wiser heads eventually prevailed. By not short-circuiting this seemingly innocuous fisheries dispute, more fundamental differences were allowed to surface. These included the question of sovereignty

over the southern Kuriles and lingering suspicion and animosities left over from World War II.

The U.S./Indian anti-terrorism patrols in the Malacca Strait and Japan's anti-piracy initiatives derive from a common security interest in keeping the sealanes open and safe for commercial traffic. The myriad miscellaneous bilateral and multilateral maritime arrangements, exercises, and dialogues primarily reflect the reinvigorated U.S. naval interest and presence in the region as well as China's tentative foreign policy initiatives. Ironically, one may be in response to the other, and therefore not necessarily positive in the long-run. Drawing from regime theory,⁷⁶ the major factors contributing to regime formation in these examples are national leadership, clearly defined benefits, the necessity to avoid conflict, and, to some extent, public awareness and concern.

Just as commonalities of interest account for progress, fundamental diversity and even conflicts of interests explain the obstacles to and erosion of confidence in the maritime sphere. Whereas it was in the common interest of ASEAN and China to reach at least a political agreement on the South China Sea, China and Vietnam's refusal to compromise on the specific inclusion of the Paracels in the geographic scope of the Declaration, and China's refusal to accept specific prohibitions, prevented agreement on a robust code of conduct. Moreover, it led to a thinly papered-over split within ASEAN on this issue.

The "leadership" of an outside maritime power, the United States, has led to maritime co-operation in the 'war against terrorism.' But it is not clear how long-lasting and robust this co-operation will be. And unilateral actions by the same "leader" have created concern regarding the role and rule of international law and what may be expected of "co-operators." Moreover, there is growing concern regarding military and intelligence gathering activities in the EEZ, such as U.S. reconnaissance flights around China. Also China's increased intelligence activities around Japan may also be linked to U.S. leadership, such as the enhanced U.S.-Japan security alliance and the heightened suspicion this created in China. The North Korea spy boat incident in Japanese waters and the North/South clash in the Yellow Sea stem from the unresolved and now dete-

riorating situation on the Korean Peninsula. The use of force in these incidents was particularly alarming. Finally, the increased acquisition of maritime power, and the festering disputes over islands and maritime space continue as an integral part of the security mosaic in East Asia. According to regime theory, the obstacles to maritime regime formation in East Asia include diverse fundamental national interests and high politics. It is clear that where relations are poor and colonial era or Cold War disputes linger, e.g., North-South Korea, China-Taiwan and the Northern Territories/Southern Kuriles, maritime incidents can easily and rapidly escalate tension and even result in conflict.

Track-Two dialogues have not made much of a direct contribution to maritime confidence building in East Asia. While it can be argued that the South China Sea Workshops and the CSCAP Maritime Co-operation Working Group have at least kept the relevant countries engaged and talking, they have resulted in little, if any, concrete advances. When necessary, and it has been necessary several times, Track-One negotiators have addressed the "hot" issues and found temporary solutions, often above or beyond those discussed in Track-Two forums. Moreover, these Track-Two dialogues have not been able to prevent the erosion of confidence in the maritime sphere.

There are thus two trends regarding the building of maritime confidence and security, one positive and one negative. The positive trend is the construction of a diverse web of bilateral understandings and exchanges which can expand and have a spillover effect on relations in general. Given this network of arrangements, a multilateral agreement on a "code of conduct," for both Southeast Asian and Northeast Asian seas would be a natural next step. Initially, multilateral arrangements should address common maritime problems like search and rescue, environmental protection, drug trafficking, and smuggling. Also successful co-operation in ocean management could spill over into trust-building among coast guards and navies. A pure multilateral military agreement would be more appropriate when all regional navies have blue-water fleets. Further out to sea, in time and space an international naval or "self-defense" force might ensure ocean peacekeeping, including safety of navigation. This joint force could focus on areas outside national

jurisdiction and emphasize protection of fisheries, air-sea rescue and environmental monitoring.

However, there are hidden constraints even in these positive trends.⁷⁷ There is no one comprehensive institution or initiative and while the multiple parallel dialogues overlap in participants, objectives, and focus, some critical issues are neglected. Nevertheless this structure of multiple communities--communities within communities seems to work because there are linkages between them.⁷⁸ However, existing navy to navy contacts and cooperation seem to be more tactical than strategic. Therefore, the convergence of proposals by China, South Korea, and Russia for a multilateral security forum for Northeast Asia is very significant.

Nevertheless, the positive trend is overlain on a larger security dilemma - a pre-existing pattern of suspicion and distrust based on fundamental political and ideological differences which extend like sensitive tentacles into the maritime sphere. Thus the extension of jurisdiction and the nationalism that accompanies it, combined with enhanced armament and technology, have made the maritime frontier more dangerous for political relations. And now we must consider a further ingredient - the U.S.-led "war on terrorism," and the potential confrontation with, or embargo of, North Korea. These developments will have a profound effect on maritime confidence building - enhancing it between allies, and deepening suspicion among the excluded or opposed. But these clouds will eventually pass, leaving the region with the deeper security construct and the conflicting trends in maritime confidence and security building that arise from it.

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東アジアにおける海上の信頼醸成とセキュリティの構築：最近の進歩と諸問題

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要約

東アジアでは、海上における信頼醸成は漁業協定、事前通報制度、海賊対策イニシアチブの協力そして海軍演習において見られる。しかしながら、漁業、諜報活動そして境界をめぐる紛争が、その信頼を損なっている。海上管轄権の拡大は、不信感に関する既存の構造的パターンの上に覆い被さるものであるため、海の境界が国際関係を危ういものになっている。

キーワード： アジア、海上、信頼、セキュリティ、進歩、問題

Ocean Governance Implementation
Part I: Underlying Principles and Theoretical Basis

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Ocean Governance Implementation Part I: Underlying Principles and Theoretical Basis

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Abstract

This paper aims at exploring ways and means of achieving ocean governance implementation, including the role of the linkage between the sciences (natural, social, economic) and the development and implementation of ocean governance, and management. The need for, basis for, and role of ocean governance are briefly discussed in the paper, with reference to the Common Heritage of Mankind, the economy, and security. It is widely acknowledged that the ocean is a necessary part of our life support system. However, the very large role the ocean plays in supporting our economy and society at large is only gradually becoming generally acknowledged. The ocean is also the Common Heritage of Mankind. Ocean governance or ocean management, however, is not in place, except locally in several places and some nationally. It is increasingly realized that this must be achieved. The sciences should play an active role in this process. Thus the WSSD 2002 reached agreement on the need urgently to take actions to achieve sustainable development of oceans and coasts, including small islands. Activities are also pursued or being initiated in several leading nations, e.g., on the need to reform existing legislation, to study links between ocean conditions and human health. The G8 leaders in 2002/2003 called for measures to prevent marine pollution. There is no doubt about the central role of the ocean and coasts in the global economy, in the climate system, as regards environmental pollution and coastal disturbances, as a sector in international law, international relations, and peace and war.

The need for society to have a vision for and consensus about the medium to long-term development of the marine environment and its resources within the framework of sustainable development is considered in this paper. The need for the involvement of the sciences is demonstrated with reference to the global issues of climate change, freshwater availability, as well as regional issues such as provision of food, safe transportation, human health, and security. As one example, it is noted that science is playing a leading role in coral reef management.

Introduction and background

The international legal framework for Ocean Governance exists through the United Nations Convention on the Law of the Sea, UNCLOS, of 1982 (1994). This is supplemented by some previous and several subsequent conventions and agreements, mainly resulting from the UNCED 92 process. It can be shown that these all have certain connections and overlaps (Mann Borgese 2000). These are related to the interdependence of their scopes and purposes: UNCLOS provides the legal framework for all of them. However, the implementation has turned out to be very complex and difficult. This review aims at presenting an overview of the problems of and approaches to Ocean Governance implementation.

The need for a comprehensive approach to ocean affairs is emphasized in UNCLOS. The globalization process likewise requires a comprehensive approach to governance and human security. In this paper it is also argued that the linkage between ocean research and scientific understanding on one hand, and governance, human security, and management directions, including the economic importance of the ocean services, on the other hand, provides a basis for achieving the goal, which has not been sufficiently advocated or pursued.

Concepts of security are no longer limited to the military form but include other factors such as economic, ecology-based, food, and other socio-economic ones. Human health, the environment, and people's means of livelihoods are of central govern-

mental concern. Threats to stability and security are increasingly the result of national and international terrorism, triggered by social and economic inequity, racial and religious differences. Illegal trafficking of arms, drugs, and people is increasing as well as crimes at sea, including piracy, and armed robberies. There are also the problems of smuggling harmful or hazardous wastes, illegal fishing, insurance frauds, and use of sub-standard vessels. Natural disasters affect a growing number of people, especially in crowded and highly vulnerable coastal areas. Such trends have broadened our concept of security, as well as governance, and enhanced the need for comprehensive governance, international cooperation and specification or dedication of related government mechanisms and institutions. Globalization has increased our vulnerability with containment of regional problems being more difficult than before, and through increasing rather than decreasing inequities.

Knowledge about and understanding of the environment has always played a large role for successful implementation of human endeavours, from geographical discoveries to farming and mariculture. Ocean research was founded on basis of the needs of navigation and sailing. This also contributed to knowledge about weather. The navies of the maritime powers were and are significant contributors to and users of ocean research. Fisheries, living and non-living resources exploitation and exploration, and coastal zone protection requirements were and are major sectors supporting and using ocean research, observations, and technology. The concern for climate variability and change, and the possibilities of using ocean observations to obtain long-range forecasting of climate variability and climate change scenarios is also a driving force for ocean studies.

The need for ocean governance stimulated international cooperation and establishment of agreements and legal instruments. The United Nations Convention on the Law of the Sea provides for a "constitution of the ocean", together with additional agreements resulting from UNCED 92. The comprehensive approach is a fundamental element of UNCLOS. This was the seminal contribution of Arvid Pardo, vigorously pursued by the Founder of IOI, Elisabeth Mann Borgese.

Several regional conventions and related institutions have been created since the early 1970's, following the Stockholm Conference. Some of these are relatively closely related to the research community and rely on scientific results, while others are not. The implementation of the agreements and protocols of these conventions are generally very weak. This is mostly coupled to lack of sufficient financial resources. This is ironic since most sectors of our present service-oriented economy are strongly dependent upon and affected by ocean-based services.

Ocean research has a tradition of international cooperation, made necessary by the nature of the ocean. It is only through the advances of our understanding of how the ocean and its ecosystems work that we can build an adequate ocean observing system, as well as specify and implement in an economic way adequate governance and management schemes. The knowledge base underwrites it all. However, the ocean community has not managed to communicate sufficiently clearly to all parts of society its achievements so far, nor the benefits or potential for further advances to help cope with the issues at hand or anticipated. There is a need to adopt a more integrated system-oriented approach in the dialogue, as well as to strengthen it considerably. The initiatives to create various types of inter-sectoral partnerships taken in conjunction with the WSSD 2002 can be steps in the right direction.

Ocean governance cannot be instituted for the sake of the ocean alone, but rather for the sake of society and the global environment as a whole. Thus the linkages to and results of ocean research that are relevant for society as a whole must be transmitted much more consistently to all parts of society in an understandable way. All the major issues facing us can partly or wholly be related to the marine environment, the ocean, and the coastal zone: freshwater availability, food security, many major natural hazards, impacts of pollution, transportation problems, climate variability and change, human security, health, poverty, and sustainable livelihoods. Visions on how to address these issues need to be created, so that the public at large can become involved and make informed judgments. This paper aims at highlighting some examples of the linkage between scientific knowledge and governance actions, and how scientific results and

assessments can help create the visions required to change policies and take governance actions.

The ocean is a necessary part of our life-support system. Its role for our life on earth and its values for our economy are, however, only gradually becoming fully recognized and acknowledged. The ocean is our joint heritage, also referred to as our common heritage. "Ecological sustainability, economic efficiency, and social fairness are among the joint objectives required in a governance system to adequately maintain the ocean as our common heritage. The ocean is too important to our survival to allow its continued exploitation as if it was infinite" (Costanza 1998). An adequate governance system for the ocean, or including the ocean, must be put in place and truly implemented. How can this be helped by natural and social sciences and socio-economic considerations?

There is a linkage between management of ocean resources and scientific information about these resources, but how can this linkage be better utilized in a governance system? Science and observations have a large role to play in environmental management; this is shown in many assessments and reviews, for instance by the Scientific Committee on Problems of the Environment, SCOPE, of ICSU. Knowledge and understanding of the ocean coupled with ocean observations and modeling (forecasting) can be used to address many of the key issues our society is facing on land, such as freshwater and food availability, climate change, waste management, transportation, renewable energy provision, security for human beings and resources, employment, and poverty.

In order to achieve such benefits there is, however, a need for enhanced dialogue and exchange between the different communities working in the sectors concerned, utilizing the related resources and developing them further. An example is the emerging dialogue between the ocean and freshwater communities, seen in the WSSD 2002 and the Third World Water Forum 2003.

Furthermore, an essentially natural science approach in relation to the ocean and atmosphere, observations, modeling, and forecasting must be coupled with the results and approaches of the social sciences. This is required to clarify how var-

ious cultures, societies, and communities use the environment and natural resources and react to change, and how they formulate their visions for the future.

There is also a need to explore more how the results of ocean research, observations and technological developments can be used to stimulate ocean governance implementation on local- national, regional and global scales. Examples of such stimulation are found in the clauses of UNCLOS and in agreements of UNCED 1992, as well as in many regional agreements and conventions. However, much more could be achieved as regards the implementation of these agreements with a continued strong involvement of the natural and social sciences communities as partners. The WSSD partnership ideas come to mind. This relates also to why there is a need for ocean governance.

A System-oriented approach

Governance or management is considered here from a system-oriented approach. Such an approach forms the basis for UNCLOS of 1982 (1994) and the realizations of Arvid Pardo about the need to treat the ocean as a whole. The developments over the last five decades have, however, implied that we need to go beyond the ocean as a whole and consider the global environment as a whole, including human society as part of this. The improved and enhanced use of ocean information therefore becomes a major asset with respect to addressing some of the key issues facing the whole globe, as those indicated in section 2.1. Natural and social sciences must play a role together as part of a governance system, together with adequate observations. One scientific paradigm that has emerged partly for this purpose is referred to as ecological economics. The main problem addressed in this approach is "the sustainability of interactions between economic and ecological systems," according to Costanza et al (1998). Economics is here regarded as a life science. The focus of the analysis has been shifted from marketed resources in the economic system to the biophysical basis of interdependent ecological and economic systems. The need for co-existence is explicit. The system-oriented approach is in line with the ecosystem management philosophy now being pursued in fisheries and freshwater management, as well as with the comprehensive approach adopted in the Law of the

Sea. Problems of scale can also be taken into account, in that there should be a correspondence between the scales of the systems. The scales of the economic and ecological systems should match. In most applications they do not, one being political and the other environmental.

The Earth life-support system is dynamic, with non-linear processes and interactions between various scales, particularly in the marine environment, but also over large ranges through teleconnections. The geographical, geochemical and bio-geochemical processes and cycles should also be taken into account in any governance scheme. However, the scheme will not work without attention to the social realities, processes and cycles. This is the contribution of social sciences explaining how we design or develop and maintain the communities we live and work in, and clarifying how the communities at various scales utilize the natural capital and react to change.

There is thus a need to adapt the governance system to the appropriate scales in time and space at local-national, regional and global levels. No single governance system can handle it all; a nested system approach is required. The underlying principles should preferably be the same for the interacting systems. This is in line with the Oceanic Circle model of Mann Borgese (1998). In this context or framework governance may perhaps best be expressed in terms of co-existence between man and the ocean: there is a need to find the proper form of co-existence between our human society and the ocean on all scales.

The need for a common vision

The conceptual model of the oceanic circle may be used to formulate a vision of ocean governance or co-existence in order to translate the philosophical concepts into the language of daily life. The public is part of the system and must be able to form a considered judgment regarding the need for ocean governance, in order for the governance to be implemented successfully. The gradual spreading and attenuation of rings of waves on the surface of the ocean can illustrate the situation. A stone thrown by an individual human being generates a wave on a calm surface which will have limited impacts when hitting the shore, for example on the beach crab or a structure built by a child; the waves

generated by a passing speed boat will have similar but stronger impacts and can even wash a small boat ashore; a subsurface earthquake in the ocean will generate a wave which spreads across the ocean basin and can impact heavily when reaching the coast, a tsunami.

The climate change problem demonstrates that individual “rings”, in this case sustained inputs of greenhouse gases from many and various sources of societies, can together have effects that impact the global life-support system, when of sufficient strength, numbers, and persistency.

Population and demographic developments are key factors and are closely related to the governance system. It appears that regardless of societal constraints, populations have a tendency to increase, possibly until some catastrophic event occurs limiting and decreasing the population. Presently the human population is putting much pressure on the global ecosystem, possibly beyond its carrying capacity. Estimates suggest that we cannot use more than one percent of the biospheric resources if we wish to maintain a stable biosphere. Presently this figure is close to 10 percent in our global society. Similar results are found with respect to the biogeochemical cycles. The natural carbon cycle was balanced to an accuracy of about 0.01 percent. Due to our disturbances, the carbon cycle is presently balanced only to an accuracy of about 0.1 percent. Our carbon, fossil fuel-driven society is posing a threat to the global ecological system. The biosphere must not be seen only as a resource, but as the fundament for our life-support system. This should be taken into account in any global governance system, together with economic and other social factors.

The globalization of the market economy likewise shows that the global scale must be taken into account. The impacts of dedicated economic policies, such as the agricultural and fisheries subsidiaries policies of the dominating economic blocks, have global consequences. The impacts are gradually emerging.

The climate system and climate variability as well as the economy have impacts on individual human beings and communities. Thus the vision or conceptual model of spreading rings should appeal

to individuals. However, this does not provide a vision for how we would like to see the environment and ecosystem in the future. Since individual acts can have negative consequences they should also have positive consequences when changed and adjusted so as to match the needs of a sustainable ecosystem and development. Thus, if we can agree on a vision for the future environment we can all help achieve the vision.

The sensitivity of the market and service-oriented economic system to event-like disturbances is well demonstrated by the impacts on tourism and recreation industries at the global level by individual acts of terrorism. Impacts at regional and global scales of local acts of terrorism on major sectors of the economy and society are conceivable. For instance, the disruption of sea transportation through the Strait of Malacca by piracy would have enormous consequences; this was demonstrated decades ago by the impacts of the closure of the Suez Canal. The possibilities of such acts are good reasons for an internationally implemented ocean governance system, just as are the impacts of various natural events on coastal populations and freshwater availability. The emerging vision is that of sustainable development, which also requires a functioning ecosystem. See further discussion of requirements of sustainable development below.

The need for ocean governance and co-existence with the Ocean

It was Arvid Pardo who formulated the seminal idea by stating in his speech to the UN General Assembly in 1967 that “all aspects of ocean space are inter-related and should be treated as a whole.”

How to achieve this was also injected by Arvid Pardo through his other seminal idea that “the resources of the deep sea-bed constitute the common heritage of mankind,” to be protected and developed for the benefit of all, and in particular developing countries.

This should not be confused with “the tragedy of the commons.” The idea was that the common heritage should be governed, developed, protected, and managed through a suitable international mechanism, possibly under the United Nations.

This led to the basis for the legal framework, the

United Nations Convention on the Law of the Sea. The Convention includes a number of innovations:

replacing often conflicting claims by coastal States with universally agreed limits on the territorial sea of 12 nautical miles; on the contiguous zone of 24 n.m.; on the exclusive economic zone extending up to 200 n.m.; and on the legal continental shelf, extending to the end of the continental margin up to a depth of 2,500 m or even beyond

an elaborate system for mandatory peaceful settlements of disputes, the most advanced ever designed and accepted by the international community

the introduction of the principle of the Common Heritage of Mankind as a new principle of international law

the establishment of a framework for the development of international environmental law in Part XII of the Convention: Protection and Preservation of the Marine Environment; this has had a profound influence, especially for the UNCED process;

the creation of a new regime for the conduct of marine scientific research in Part XIII: Marine Scientific Research; this strikes an equitable balance between interests of the research States and the coastal States.

The Law of the Sea Convention should be seen as a “process”, capable of interacting with changing conditions. It can provide for integration. The Convention provides for regulation of economic activities, and thus can make a contribution to economic security and food security. Part XII of the Convention is the most comprehensive and binding instrument to protect the ocean ecosystems and their services, thus providing a great contribution to environmental security. Part XII also provides the legal framework for the ocean-related parts of all subsequent treaties, agreements, and programmes resulting from the UNCED process. This framework includes enforcement of rules, regulations, and standards, and the Convention includes enforcement also in other parts.

The basic premise of consensus underlying

UNCLOS is that in the future the ocean must be used for the benefit of all and not merely the interests of a few great maritime powers (Anand 2002). The freedom of the seas principle was modified and adapted to meet new needs. The ocean is no longer only a navigation route. Science and technological developments have made it possible to explore and exploit the resources of the ocean as never before. During the UNCLOS negotiations the group of developing countries showed that they were determined that the ocean must benefit all and serve the interests of the international world-wide community of States.

Implementation, however, is another process. It requires capacity and institutions in harmony with the integrated approach.

The basis for the Institutional Framework is found in the Law of the Sea and in results of the UNCED 92 process, in particular Agenda 21.

UNCLOS established four institutions:

- The International Sea-bed Authority
- The Commission on the Limits of the Continental Shelf
- The International Tribunal for the Law of the Sea, with associated arrangements
- The Meeting of States Parties

The Convention also mandated the establishment of regional Centres for the advancement of science and technology. These have not yet been implemented, whereas the four institutions have been established. Each of these institutions functions and is also gradually adjusting to changing situations.

The Commission on the Limits of the Continental Shelf has encountered two major difficulties, both related to the complexity of the definition of the limits of the continental shelf in Article 76 of the Convention. The first is that it is very costly and difficult to prepare the required declaration; the second is that a number of States have already advanced claims exceeding the boundaries, as defined in Article 76. More such claims may well emerge. If boundaries cannot be agreed upon, this threatens to destabilize the convention and the efficiency of Ocean Governance.

The System for Peaceful Settlements of Disputes is a fundamentally important part of the governance, with the International Tribunal for the Law of the Sea, and the International Court of Justice, arbitration and special arbitration tribunals, and conciliation commissions. The Tribunal has had a number of cases and has delivered judgments swiftly and competently.

The legal framework for Ocean Governance developed through the UNCED 92 process includes essentially seven other Conventions, agreements, programmes, e.g., Agenda 21, the Straddling Stocks Agreement; the Convention on Biological Diversity; the United Nations Framework Convention on climate change, the FAO Code of Conduct for Responsible Fisheries, the Global Programme of Action for the Protection of the marine Environment from Land-based Activities, the Programme of Action for the Sustainable Development of Small Island Developing States. All these provide essential elements towards achieving sustainable development; all have strong association or interfaces with the ocean and coasts as well as freshwater; all are part of a comprehensive governance and building blocks for achieving integration of sustainable development and comprehensive security; and they have certain overlaps as demonstrated through the analyses of Mann Borgese, 2000.

The impact of the UNCED 92 Process on the UNCLOS process is large. It extends the scope of the "Constitution for the Ocean" to the coastal land areas where the majority of humankind lives. This is extremely important. For one thing, 80-90% of marine pollution originates from our activities on land. Secondly, the problems of the densely populated coastal zone, including conflicts between various users of the space and of the resources, the sustainability of living resources, human health, food and water security, all require an integrated approach. This is now referred to as integrated coastal zone or area management. This reflects the seminal idea of Arvid Pardo that "the problems of ocean space are closely inter-related and need to be considered as a whole." It was also realized that the management must be done in conditions of uncertainty and risk. The precautionary principle became a substantial element for sustainable development in conditions of uncertainty.

The establishment of regional Centres for the advancement of science and technology is also a vital part of Agenda 21, Chapter 17, and is linked to the UNEP Regional Seas programme. For the Pacific, this has been advocated strongly by the IOI and others. It is gradually happening in an ad hoc manner through the University of the South Pacific.

Integrated coastal management cannot be applied without proper linkages between institutions at all levels: the community, the state, the region, and global developments must work together and in harmony at all levels of ocean management. In order to achieve governance there is also need for some sort of Government.

At the global level the newly created United Nations Informal Consultative Process on Oceans and the Law of the Sea is an integrating institution at the highest level. It has addressed such problems as Illegal, Unregulated and Unreported Fishing; the economic and social impact of pollution from land-based activities; marine science, development and transfer of marine technology; and piracy and armed robbery at sea. At the regional level a similar all-embracing mechanism is required. The Pacific Island nations have developed a regional response mechanism through the Forum Secretariats Marine Sector Working Group.

The legal and institutional frameworks will not function or at best ineffective if there is a lack of material tools for implementation. These tools include:

- educational means
- scientific and technological means
- financial means
- means for monitoring, surveillance and enforcement

We will consider elements of these in subsequent sections.

All sectors of our present service-oriented economy are influenced by the ocean: transport, food production, climatic conditions and freshwater availability, tourism and recreation, waste management, coastal area development and construction, poverty, and employment. This situation should stimulate actions towards achieving adequate ocean governance, establishing relevant institutions, and

implementing the required capacity building. Such ocean governance ought to be established for the sake of human society, survival, and security at large. However, this is only being done in an ad hoc fashion, depending upon individual sectors and pressures, and not in the necessary comprehensive fashion. It should be noted that implementation of ocean governance, including integrated coastal area management, is difficult and complex. There are 3 major reasons: (i) the interaction of uses: various uses may interfere with each other, leading to conflicts in the strong sectoral structure of the governments and between related strong sectorally oriented economic interests; (ii) the interaction between and of ocean spaces: as long as freedom of the seas reigns it is impossible to manage and protect areas under national jurisdiction since the processes in the ocean do not feel any political boundaries; (iii) the uncertainties and lack of understanding as regards the non-linear interactive natural processes in the ocean. Furthermore, there is the question of our social reactions to the ocean as terrestrial beings. Society still essentially regards the ocean as a threatening environment, as a very vast space not suitable to live in. This despite that the fact that approximately 45-50% of the global population inhabits the coastal regions (GESAMP 2001). There is a need to establish another vision of the ocean, and especially as regards its role in relation to our life-support system. Perhaps this is gradually being achieved, but the process is slow. More proactive public information is needed, as is more communication between the ocean community and all other sectors. People generally do not have sufficient knowledge about the ocean; they know much more about the atmosphere and the land. The ocean community has not sufficiently communicated the overall role of the ocean. The need for strengthened exchange between the ocean and freshwater communities is but one example. Shipping managers do not know much about the ocean either, and such knowledge would certainly enhance ocean transport security, as well as help protect the ocean environment.

The evaluation of the ecosystem services carried out by Costanza et. al (1997) and reiterated by Mann Borgese (1998) suggests that about 63% of the total value is contributed by ocean and coastal systems. This alone exceeds the world GNP based on conventional economics. This and the view of

the ocean and its resources as the Common Heritage of Mankind, together with the important role of the ocean in our present service-oriented economy, should provide enough reason for implementation of effective Ocean Governance, quite apart from the fact that the ocean is a necessary part of our life support system.

The economic role of the ocean demonstrates how enhanced knowledge about the ocean within the various economic sectors can help in achieving more efficiency, less waste, enhanced security, and socio-economic profit. The weak involvement of the scientific community, social, natural and other sciences, in the active management seems to hinder the required information exchange and communication and the related development towards ocean government. The situation shows that ocean governance cannot be seen in isolation from other governance schemes; in most applications the governance has to deal with the behaviour and attitudes of the human part of the system. This is seen, for example, by fisheries management, pollution control, and shipping. Ocean governance should not be argued for the sake of the ocean only. The co-existence between man and the ocean must be brought out. There is a strong need for surveillance, control, and enforcement mechanisms as part of the governance but also the need for governance systems not to rely too much on these aspects.

The need for science

It was the enormous development of science and technology after World War II, including in the marine sphere, which pushed the extension of national jurisdictions that also necessitated the revision of the freedom of the seas principle. The president of the USA proclaimed in 1945 that developments in technology necessitated the extension of US coastal jurisdiction to establish conservation zones in the contiguous high seas areas to protect fisheries and the right of exclusive exploitation of the mineral resources of the continental shelf. Science confirmed that huge quantities of oil and gas resources lay buried under the sea bed; development of technology gradually made these resources accessible on an economic basis. Development of technology also revolutionized fisheries. This all benefited the few most technologically advanced countries. It required adjustments of international agreements and law; it also required sharing of sci-

ence and technology for development. This has been well demonstrated in the subsequent decades through the increasing environmental problems and the related need to shift to sustainable development. In the meantime the scientific paradigm has also been transformed from specialized and sectoral one to an interdisciplinary and integrative one; from certainty to uncertainty (Mann Borgese 2002). It is the recognition of uncertainty that forces us to adopt the precautionary principle; it is the complexity of interdisciplinarity that necessitates integrated ocean and coastal management at all levels---local, national, regional, and global in order to achieve sustainability.

Biogeochemical cycles, sediment fluxes, and ecosystem dynamics will set the scene for a new realism in research on both interdisciplinary processes and regional dynamics in the coming decades. Priority areas of application include eutrophication, functionality, and stability of ecosystems, harmful algal blooms, habitat modification, and regime shifts. New observational techniques, both remote and in situ, and coastal interdisciplinary numerical modeling with data assimilation are rapidly evolving. Emerging novel concepts, contemporary scientific results and research, a new generation of observational platforms and sensors and the advent of realistic modeling on multiple scales provide the basis for powerful four-dimensional, space and time, field equations of the global ocean. Report of Working Group 3 at the Rio +10 Conference, UNESCO, Paris December 2001.

We are facing the need for policy shaping and management in conditions of uncertainty. Under such circumstances decision makers need information about the nature of threats, how each target will be affected, and the types of arrangements that can be collectively developed to address the risks (Haas 2002). Haas refers to the scientific knowledge that is needed as “usable knowledge”: accurate information that is of use to policy makers. Four criteria need to be met:

- (i) Adequacy - include all relevant knowledge or facts
- (ii) Value - contribute to further understanding
- (iii) Legitimacy - be accepted by others outside of the community that developed it
- (iv) Effectiveness - ability to shape the agenda or

advance the debate, and improve the environment and quality of life

However, science has become politicized, and is therefore often neglected and regarded with suspicion in view of not being impartial. Studies suggest that science remains influential when not being associated with politics, being politically insulated. The more autonomous and independent science is from policy the greater its potential influence (Haas 2002, 2001). Political legitimacy depends upon having a process of knowledge development and dissemination that is free of political influence. Political impartiality is vital for technical information to be used as foundation for policy (Haas 2001). "Social Learning" (2001) identifies 6 categories of knowledge useful in the conduct of policy formulation: monitoring, risk assessment, options, goals and strategies, implementation, and evaluation. Each of these scientific functions can contribute to an enhanced effectiveness of governance, when governments learn of new threats and new responses or solutions to the problems. Science is necessary for good policy. This is demonstrated by the successful examples of international action, such as the ozone layer depletion problem. Science is not necessary for international environmental cooperation, as exemplified by developments in the North Sea. However, an effective national environmental policy requires advice from usable science. Leading studies argue that substantive "knowledge systems for sustainability will require an unprecedented degree of integration. Expertise from communities of environmental conservation, human health, and economic development will need to be harnessed in problem-solving efforts. Particularly challenging will be drawing into these collaborative efforts the vast resources of informal expertise that comes from practical experience in grappling with sustainability problems in particular social and ecological settings", (Clark 2001, cited by Haas 2002). The organization and communication of such systematic knowledge is essential for successful policy and management developments.

At the global system level the necessity of involvement of science and technology is demonstrated through the ozone layer problem and the climate change issue. These examples also show how management actions can be stimulated by scientific information and use thereof. They also demonstrate

the need for reasonable consensus in the scientific and technological communities and the need to work across national and sectoral borders. National or sectoral interests cannot be allowed to dictate or prevent implementation of solutions. Consensus must therefore be established over a broad range. The role of civil society in this context can be very significant (e.g. Rayner 1998). In both the ozone layer and climate change cases the very large role of the dynamics of the hydrosphere-atmosphere interactions shows the significance of understanding the geophysical and geochemical processes and cycles. The reactions in society demonstrate the great role social sciences and economy have in helping addressing these issues, and provide information to the public.

The importance of sciences at the local level is demonstrated in many cases of pollution and human health problems, for instance the Minamata case in Japan. This and other cases also show the role of biological and biochemical processes and interactions within the local environment.

Climate change scenarios have been constructed using modeling taking into account the Earth system as a whole (e.g. IPCC 2001). These scenarios demonstrate that the development of the global average temperature signal cannot be accounted for without taking into account the anthropogenic factor. The interaction between the ecological and the economic systems is well demonstrated in this case. The global climate change scenarios are based on available knowledge and observations. It should be stressed that the scenarios could not have been generated without taking into account the role of the ocean and without using ocean observations.

In order to interpret the scenarios as regards ecological and social impacts of the expected changes on various parts of the combined ecosystem and economic system, such as food and freshwater availability, coastal areas and resources, human health and security, there is a need to involve both social and natural sciences and other parts of society. Otherwise the impacts on the systems cannot be appreciated. The interpretations, in form of impact scenarios, will help in specifying the vision for how we want our life-support system to develop. This specification in turn will lead to an identification of the required governance actions, be they

of preventive, adaptive or any other nature.

In order to achieve the required actions of management it is necessary in a democratic governance system that the public be a partner in specifying the vision of the future. Consensus should be achieved. The authority and implementation of management rest with public support and participation. The public should therefore be able to make informed judgments, and not be influenced only by opinions and pressures of various groups. Results of environmental monitoring and assessments should therefore also be converted into public information material and educational programmes.

This process requires that there is a general capability to understand the importance and overall aspects of the problems. Education and capacity building are essential elements.

In the case of the ocean international cooperation and partnerships are required to build the necessary capacity. Partnerships in the fields of marine sciences, ocean observations, and related uses of provision of services have been attempted over the last couple of decades. Such truly international, inter-sectoral partnerships should continue to be stimulated, developed, and supported, involving the public and the private sectors. Some good examples are available. Such efforts can be referred to as WSSD type II partnerships. Marine technology is largely high technology, information, and knowledge based. Technology transfer through joint undertakings or partnerships in research and development respond to the challenge.

Capacity building in marine sciences and technology should also be part of national ocean policies. International partnerships can be utilized to stimulate that process. This is also part of the implementation of UNCLOS, UNCED Agreements, and Agenda 21; the WSSD partnership concept fits very well the needs in supporting the implementation.

Underlying principles for ocean governance

The basic principle underlying maritime law during the past couple of centuries has been “Freedom of the Seas” (e.g. Anand 2002). The area of the ocean beyond a limited zone of territorial sea was open, free, and could not be appropriated or

controlled by anyone. The sea was then used for navigation, trade, and fisheries. However, this all changed due to the scientific, technological, and political, essentially decolonization, revolutions after World War II.

Arvid Pardo in 1967 specified the concept of the Common Heritage of Mankind through four principles:

an economic principle: the Common Heritage has to be developed

an ethical principle: the Common Heritage has to be managed on behalf of mankind as a whole, with special considerations for the poor

an environmental principle: the Common Heritage has to be conserved to be shared with future generations, who are also part of mankind

a dimension of peace and security principle: the Common Heritage has to be reserved exclusively for peaceful uses, otherwise it cannot benefit mankind as a whole.

This was a comprehensive specification for a possible governance system, specifying the scope of the governance. Only with peace and security is it possible to develop resources, to manage and to distribute them equitably, and to protect the environment in a balanced fashion. Since all these factors are closely interrelated, just as the processes in the ocean, one institutional framework or structure would be needed to deal with them in an integrated way. This structure, however, needs to be sufficiently flexible to cope with all aspects. Arvid Pardo’s vision takes us thus far. His principles fully cover the points of Costanza (1998) quoted in the introduction.

Sustainable development is now generally accepted as a long-term goal. It is an accepted vision about which there appears to be consensus. It may be defined as “The use of resources to meet the needs of the present without compromising the ability of future generations to meet their needs”, NATURA 2000, 1997. In order to achieve sustainable development, peace and security are necessary ingredients. In the framework of ecological economics sustainable development also includes maintenance of (Costanza 1998):

An ecologically sustainable scale of the economy relative to its ecological life-support system

- referred to as ecological sustainability

A fair distribution of resources and opportunities, not only between the current generation of mankind but also between present and future generations - referred to as social sustainability
An efficient allocation of resources that adequately accounts for natural capital and provides non-declining capital stocks and economic income into the future - economic sustainability

These 3 aspects of sustainable development are in agreement with the Common Heritage principles. In conjunction with the work of the Independent World Commission on the Oceans (IWCO), a set of principles for sustainable governance was proposed based on an analysis of ecological economics as applied to ocean governance (Costanza et al 1998). These principles are:

1. Responsibility principle
Access to environmental resources carries responsibilities to use them in an ecologically sustainable, economically efficient and socially fair way.
2. Scale - matching principle
Several scales are involved in the ecosystem. Decision making on environmental resources should: (i) be assigned to an institutional level that will maximize information about the relevant ecosystem and take into account that ecological information must be exchanged between the various levels of decision making; (ii) take ownerships and actors into account; and (iii) internalize costs and benefits.
3. Precautionary principle
In face of uncertainty about potentially irreversible environmental impacts, decisions concerning the use of environmental resources should err on the side of caution.
4. Adaptive management principle
Some level of uncertainty will always exist, and therefore ecological, social, and economic information should be integrated on a continuous basis into the decision making process; this must also be harmonized with the precautionary principle.

5. Full cost allocation principle

Internal and external costs and benefits, social and ecological, of alternative decisions concerning use of environmental resources should be identified and allocated.

6. Participation principle

All interests should be engaged in the formulation and implementation of decisions concerning environmental resources; just as in the specification of the vision and consensus-generating process.

Costanza (1998) recasts these principles into principles of sustainable ocean governance, as:

Subsidiary principle - governance to occur at the lowest organizational level possible to enhance democratic participation.

Responsibility principle - rights to use environmental resources carry attendant responsibilities to use them sustainably and fairly.

Precautionary principle.

Participatory principle - parties affected by a decision should participate in the formulation and implementation.

How do these various principles harmonize? Are they compatible? And how do they relate to the three major social systems, namely: hierarchical; egalitarian; market-driven.

Comparing these 4 sets of principles, i.e. Common Heritage; Lisbon; Sustainable Development; and Sustainable Ocean Governance; it appears that they are reasonably consistent with one another. The set of principles of the Common Heritage seems to cover the others. These are possibly a bit more specific as to their implications. In any case Sustainable Development is encompassed by the Common Heritage principles. The further specifications indicated in the other sets of principles are all coupled to scientific aspects and developments, including ecological economics. The conflict between the precautionary principle and the adaptive management principle is a matter of judgment. Science has accepted that certainty can only be achieved to some level, never completely. Thus decisions will have to be made in conditions of uncertainty. The judgment enters in the form of deciding when the uncertainty and thus the risks have been sufficiently narrowed down to merit tak-

ing pro-active management action, including use of insurance when the resources and social actions are deemed insurable.

Considering specifically the set of Common Heritage principles, the economic and environmental ones cannot be achieved without scientific and technological knowledge, inputs and capacities, for instance in the form of partnerships; the ethical and peace and security ones are basically related to the political and social situations and the related institutional capabilities.

The set of Sustainable Development principles are all closely coupled to scientific understanding, in the framework of ecological economics.

The implementation of the Lisbon Principles, scale matching, adaptive management, and full cost allocation must relate closely to scientific information, understanding, and capability, whereas the other 3 principles of the set, namely responsibility, precaution and participation, are more related to the social and political conditions and related institutional mechanisms for their implementation.

The set of sustainable ocean governance principles all appear to be more socially and institutionally than science related.

There is a coupling between the Lisbon and the Sustainable Development principles as follows:

The responsibility and full cost allocations principles are related to economic sustainability

The participation principle is related to social sustainability

The scale matching, precautionary, and adaptive management principles are all related to ecological sustainability

In conclusion, scientific understanding and technological developments are basic to all the principles. This implies that scientific and technological capacities and capabilities are required for implementation. This includes both natural and social sciences and technologies. It is therefore of interest to analyze how the various principles relate to our different social systems. We will return to this in a later section.

An overview of the principles and the decision

making criteria is given in Table 1, which also includes for comparison and easy reference the programmes of Chapter 17 of Agenda 21 and the major targets of WSSD 2002 as regards oceans, coasts, and islands.

Relation to Social Factors

Rayner (1998) presents a discussion of three major social systems, namely: the market driven; the hierarchical; and the egalitarian. He presents them conceptually in a triangular diagram mapping the human values as to their reactions to, or means of dealing with, several social processes, in particular: consumption and basic needs; equity of distribution (fairness), including procedures to achieve fairness and inter-generational equity; and relationship to nature. How do the sets of ocean governance principles considered here relate to the three social systems? The subjective analysis presented below, based on the presentation of Rayner (1998), suggests that all 4 sets of ocean governance principles are mainly oriented towards the hierarchical system, followed by the egalitarian system.

It is generally accepted that the scientific and technological developments over the past century have generated political, cultural, spiritual, and demographic impacts through the vast transformations they have brought about. Furthermore the current social and environmental changes at global level are not temporary. They are due to demographic developments, the decentralization of politics, the globalization of economics, instantaneous communication, and the related internal structural changes of the institutions and mechanisms participating in international processes (see e.g. Kissinger 2002). All this has been achieved and stimulated essentially by scientific and technological developments, in many cases triggered by international conflicts.

It has been said that essential progress is made when idealism and realism have the same goals (e.g. Mann Borgese 1998). In the current situation of large changes and a number of global problems, a somewhat chaotic situation, it would appear that coincidences might occur which could become opportunities. It is now realized that economics and markets are not the only driving factors, but that also cultural, religious, legal, environmental factors, and traditions enter into the equation. This

is also demonstrated by the analysis of Rayner (1998). In principle, all these factors could be taken into account in the ecological economics paradigm.

The Scientific Approach: examples

We may agree that the sciences can provide the realism and that the aim of sustainable development is the idealism. The goal is then to make these coincide, so as to obtain opportunities of sustainable development. Science in its broad sense can provide the basis for sustainable development. However, science and technology often generate conflict in the sense that the management becomes technocratic. The “culture of technical control” (Yankelovich 1991, cited by Costanza 1998) tends to so dominate that the social consensus required for success is not achieved. In order to deal with this problem Costanza et al (1997) proposed a two-tired conceptual model. The first step constitutes the “relation” mode in which a social consensus is sought on broad goals together with a desired vision of the future, involving all partners, including the public. This mode uses scientific models and scenarios. The possible development, depending upon various options of actions is presented in the form of visions. These can form the basis for dialogue between partners and differing interests, and for the informed judgment of the public, i.e., the considered opinion of the public.

The social consensus motivates and drives the second, action-oriented step working towards achieving the vision. This is the implementation of governance. However, there is feedback between the modes in this model, so that the visions, goal setting, and value formations can be adjusted as we go along. They are part of the whole process and are not fixed initial conditions or boundary values.

Education and capacity building form very essential parts of the whole process. Science has made leaps in one generation that exceeds the accumulated knowledge of all previous human history. The development of computer power, the internet, and biotechnology has provided technology with a scope not imaginable by any past generation (see e.g. Kissinger 2002). One implication of all this is that technological progress will enhance the well-being and power of a nation provided it can make

use of it. Thus human intelligence is a major resource. An advanced system of education, including science and technology, has become a prerequisite for the long-term well-being of a country. This is an essential part of the strength and vitality of a society. Without a sufficiently well educated population the country will not absorb the technological developments and the associated abilities to possibly achieve sustainable development. Globalization has helped diffuse economic and technological powers around the world. This part of the globalization process demonstrates the strong need for capacity building as referred to earlier. The partnership principle should be an attractive path to follow. However, this also requires openness, joint developments, and fairness in production of goods and services. This has so far not been achieved.

Instant communications make decisions in one region or sector dependent upon decisions made in other regions and sectors. This also implies that decisions affecting a large number of human beings are no longer under local or national political control. The population becomes marginalized - a very dangerous situation. The political process must catch up with the implications of the phenomenal scientific and technological advances. Governance must align itself with these advances. Here is an important task for the social sciences to address. The formation of various negotiation mechanisms of an intergovernmental nature does not appear to help. Trade negotiations are one important example, which also has implications for an ocean governance scheme. The concept of governance must include the various factors referred to above, i.e., customs, traditions, culture, national and international law, related institutions and processes (Mann Borgese 1998). The need for a comprehensive approach is clear, as is also emphasized in UNCLOS and the Common Heritage principles.

Scientific understanding makes it possible to generate reasonable scenarios for the future development and implications of various management actions or options. These scenarios can be used to help establish visions and considered judgments. They can also help identify possible management options as to their consequences, risks, cost-benefits. The scientific analysis and modeling will help narrow down the uncertainties, identify risks, and

thus make adaptive management feasible. Through public discussion the scenarios and analyses can be used for the value formation.

When the vision and the goals of management have been established, additional scientific assessment and modeling are required to specify the actions and help resolve conflicts. The process of integrated ecological-economic modeling and assessment is an essential part of the adaptive management sequence. Costanza (1998) presents the general principles and characteristics. These include:

- Acceptance that predictability is limited
- Inclusion of multiple assumptions, held by different interests (stakeholders)
- Transdisciplinary approaches required to achieve horizontal linkages
- Involvement of all interests, stakeholders, giving legitimacy to the process and its results
- Scientific community included as stakeholders
- Many forms of uncertainty to be addressed (parameters, processes, data quality)

This framework provides for a creative learning process, which can achieve a balanced decision based on consensus of all interests. Within this framework a step-wise process was developed to implement the integrated assessment (Costanza 1998). The steps include:

- Building and running of a scoping model, with generation of alternative scenarios
- Identification of critical information gaps
- Identification of further work to be done
- Commissioning of detailed modeling
- Presentation of models and results of model scenarios to all stakeholders
- Building of consensus recommendations
- Proceed with and monitor the development of the preferred scenario

Having the results of this process there is need for an appropriate institutional mechanism for implementation. Studies of long-lived institutions can help generate design principles for these. Some long-lived institutions have been able to manage natural, ecological resources in a sustainable fashion (e.g. Costanza 1998). Many traditional communities have realized the necessity of co-existence

with gradual or sometimes rapid changes in the environment, and have in their institutions accumulated a knowledge base for how to respond to feedbacks from the ecosystem (Costanza 1998). They have developed a social mechanism that can interpret the feedback signals. Thus they can cope with the changes before these accumulate and challenge the existence of the whole community (Holling et al 1995). The accumulation and transfer of knowledge from generation to generation makes it possible to be alert to changes and adapt to these in a pro-active way. This surely is a scientific approach.

Adaptive management may be our modern, or present time, response to the identified need for social mechanisms able to deal with changing environmental conditions. Examples are emerging such as the fishery shares system (see below).

Costanza (1998) outlines a new tax system which can give economic incentives to achieve environmental goals. The elements included are: a natural capital (resources) depletion tax, the polluter pays principle, and a system of ecological tariffs. The possibilities of using such economic incentives should be included in the tools available to the international community in designing a system of sustainable governance for the ocean. The concept of sustainability includes strong elements of solidarity. This matches well with the Common Heritage principles. The combination of economic and ecological needs as identified in Agenda 21 is fully in line with the original meaning of the words from Greek: *oikos* meaning household, home, and *nomos* meaning management, government (economic); while *logos* means description, study (ecology). In order to adequately appreciate the impacts of a management or development action or use of a natural resource, the value of this natural capital and the service the ecosystem provides that will be impacted must be incorporated in the economic model.

Integrated Coastal Area Management aims at integrating results of natural science research on coastal environments and their ecology with results of social science research on economic and social processes, or at integrating both research branches themselves; at least this is one aim of ICAM (e.g. Andrade 1998)). This is in line with ecological economics and the Lisbon Principles. Implementa-

tion of these principles will contribute towards sustainable development of coastal areas.

For the ocean as a whole the approach of Integrated Environmental Management (IEM) is becoming an alternative to the traditional sectoral management approaches (e.g. Antunes and Santos 1998). IEM endeavors to conciliate socio-economic development objectives with the preservation of environmental quality and ecological sustainable management. It is a complex procedure involving the study of the complete environmental cycle associated with each part, starting with resource uses, or generation of emissions by human activities; it also involves the evaluation of effects on natural capital and services and the impacts on ecosystem and human welfare. It is an adaptive management approach. Several tasks must be accomplished, including modeling and establishment of scenarios of possible environmental change and other consequences of management options. The steps are visualized in the framework of: Driving Forces - Pressure - State - Impact - Response (DPSIR). This essentially scientific approach requires the definition of a set of indicators which relate to the impact of given "problems". However, the approach is linear and does not account for interactions and feedbacks between several "problems" and impacts. Monitoring systems which can provide information and early warning on the state of the ecosystems and their response to the pressures must also be part of this governance system for sustainable development.

Having identified and assessed the problem at hand, the next step of the IEM is the development of integrated ecological-economic models. These should endeavor to take into account the various physical, chemical and biological processes, the existing species and their interactions in the ecological part; and the multiple social interests and their views in the socio-economic part; indeed a formidable task.. With respect to the ocean environment several scales have to be considered, in space and time; the flow of substances must be combined with the ecosystem trophic levels and the perspectives of the stakeholders need to be included. The difference in time-scales between the economic and ecological process, the mis-match, must also be addressed; the conciliation of these timeframes is a major problem. This depends much upon which

social system dominates the interests of the stakeholders: market-driven, with short time scales; hierarchical, with medium-range timescales; or egalitarian, with relatively longer timescales (e.g. Rayner 1998). Another major problem with respect to the ocean is that the processes of interaction controlling the coupled physical-chemical-biological system are not yet elucidated. Interdisciplinary research and modeling to address this problem is going on in some groups, e.g. at Harvard (Robinson 2001); and is much needed, for instance, as being considered in the programme studying the euphotic zone of the upper ocean. Modeling is an essential part of the research.

The results of the modeling and scenario specification in the IEM process should then be used to identify priorities for management and policy goals. Antunes and Santos (1998) argue that an explicit procedure with already identified criteria accepted by stakeholders should be utilized to achieve optimal decision making in agreement with the vision specification discussed earlier. The criteria should reflect the principles of Ocean Governance, or a chosen set of these.

The set of criteria proposed by Antunes and Santos (1998) include:

- Reversibility - problems potentially leading to irreversible damage should have priority
- Diversity - loss of diversity should receive high priority
- Public health
- Ecosystem functions - problems which can threaten key ecosystem functions are priority
- Economic value of the impacts, damages
- Scale of the problem
- Public opinion, judgment - a vision accepted by informed public judgement is necessary
- Equity considerations - the policy and management must be fair and accepted as such by the public

These criteria are in essential agreement with the Ocean Governance Principles discussed above (Table 1). The peace and security aspects are not referred to, but are assumed implicit in the sustainable development aim.

The implementation of the policy is to be obtained through a set of measures directing the

management. These can in this approach relate to the starting point of the DPSIR framework. The measures are to be the concrete actions required to address the identified environmental and socio-economic problems, i.e. the priorities following the application of the criteria given above. These measures can thus be directed at: the driving forces, the pressures,, the state of the environment, and the impacts. The results of the measures can be checked against the adjustments of the responses to match the goals.

Various instruments to achieve the measures are available, e.g., regulations, command and control, emission or other standards; and incentives or disincentives of an economic nature, for instance, through the tax system referred to above (Costanza 1998). As regards the Ocean Governance application a major problem is enforcement of regulations, agreements, and incentives. It appears in this case that regulations are not working since it is too costly in most cases to enforce them. Another system must be put in place, more aligned to the incentives approach. This could be related to assignments of property rights, shares of fisheries or other resources, transferable development rights, joint management and development, and implementation of shared resources. One model which appears to work in this context is the community co-management system. The WSSD 2002 partnership approach could be utilized to enlarge the use of this model.

The institutional setting is a key element in the design of an Ocean Governance regime, inter alia, with respect to monitoring, enforcement, and cooperation, involving institutions operating at local, regional or global scales. The design and implementation of resources monitoring systems and related protocols is a priority need. The Global Ocean Observing System (GOOS) should go a long way to meet the needs for ocean observations, including the coastal zones. The implementation and use of this system would seem to be also suitable for WSSD 2002 type II partnership developments. The aim is of course support of sustainable development overall. These partnerships could include reaching out to the public and transmittance of the information to users.

These reflections underline the important role of

the sciences (natural, social, others) and technology for the achievement of adequate Ocean Governance. An effective use of science and direct involvement of the scientific community are both required. The scientific and technological developments over the last few decades show that the scientific community must be accepted and included as a valued and influential partner of our society in policy and management actions. The scientific community must be involved not only in making the scientific discoveries but also in the synthesis and interpretations thereof. These should stimulate changes of management actions and introduce economically interesting alternatives to business as usual. The scientific community must also accept this role, and the science valuation must be accordingly adjusted. The examples referred to earlier of ozone layer and climate changes show the direction, but more dialogue is needed to enhance the response of the policy and decision making parts of our society. Why not apply the WSSD 2002 type II partnership approach to this kind of problem?

International Instruments and Involvement of Science

International ocean law has 3 streams (Kimball 2003): (i) sectoral concerns, e.g., fishing, pollution, dumping, various offshore and land-based activities (ii) impacts on marine-coastal environments (iii) protection of species and geographical areas where species are threatened by extinction or areas are to be compromised in regard to research, habitat, aesthetic, or other values. These streams must be put in perspective of broader ecosystem-oriented goals. We must achieve an understanding of ecosystem functions and how these are affected by human actions. Science is therefore an inherent part of most Conventions.

UNCLOS accepts science as an essential part of Ocean Governance. The Convention strongly endorses further research, stressing that knowledge from research and data are necessary for states to collectively establish criteria for the formulation of rules, standards, recommended practices, and procedures. UNCLOS provides a basis for governing science in the ocean, but does not specify a scientific basis for governing the ocean. Agenda 21, Chapter 17, of UNCED 1992 specifies a number of goals for ocean governance which are at least to some extent based on scientific understanding and

endorsement of the role of science and technology. The instrument includes reference to the need for ocean observations (GOOS) and to address the knowledge gaps. However, the implementation of Agenda 21, including its Chapter 17, remains very weak.

The scientific bases for the UN Framework Convention on Climate Change and the Convention on Biological Diversity are evident and there are strong scientific components associated with both Conventions. This is also reflected in their management structures through the scientific advisory bodies. In the case of the UNFCCC the Intergovernmental Panel on Climate Change plays a fundamental role for the assessment work, the preparation of management scenarios, and evaluation of options and response strategies. The members of the IPCC are nominated by governments. Peer reviewed material is used for the assessment work. The scientific communities are necessary partners in the IPCC, including natural, social, economic, medical, and other technical sciences. Cultural elements may be missing except through the social sciences.

The system oriented approach is required for addressing the biodiversity problem. Biodiversity may be defined as “the collection of genomes, species, communities, and ecosystems in space and time” (e.g. Brandt 2002). The ecology in context of biodiversity research deals with structural and functional relationships between organisms and the biotic and abiotic environment in which they occur, and provides a classification of different types of habitat. Several other biological disciplines are involved in biodiversity research. The marine biodiversity is enormous and the research opens up for an “ultimate gift” (Brandt 2002). It requires research over the full range of biological disciplines. The need for taxonomy should be stressed, taxonomy being the reference system for biology.

The responsibilities of coastal States with respect to marine biodiversity are identified in Chapter 17, para. 17.7 of Agenda 21, including undertaking measures to maintain biodiversity through monitoring surveys, inventories of endangered species and critical habitats, establishment of protected areas, and support of scientific research. Is the capacity to do all this available, even if the motivation is present?

Scientific communities are likewise associated in advisory capacities with the various fisheries Conventions and the Global Programme of Action to Protect the Marine Environment from Land-based Activities.

The WSSD 2002 commitment to the ocean does not reiterate the role of science and technology. However, these elements are inherent in many of the proposed WSSD type II partnerships. Furthermore the WSSD Implementation programme commits to ‘To improve the scientific understanding and assessment of marine and coastal ecosystems as a fundamental basis for sound decision-making,’ with actions which provide for an opportunity to strengthen national capacities.

Boesch (1998) reviews some examples of regional conventions with respect to the involvement of the scientific community in their formulation. In the case of the Mediterranean Action Plan, Haas (1990) emphasized the important role of the so-called epistemic scientific community for its development. The scientists of the Mediterranean countries joined through personal networks, referred to as epistemic communities (Haas 2002), in the effort of formulating a vision and achieving a consensus among themselves. This was transmitted to the policy makers, governments, through personal networks, and carried weight in policy formulation due to the claim of having authoritative policy relevant knowledge. This provides an example of how science can stimulate governance specifications at the regional level. However, implementation may not be stimulated unless the epistemic community continues to be involved and carries a weight matching the national and institutional bargaining interests. These normally emphasize national self-interests, which are not necessarily the most relevant. They are often driven by domestic policy interests and not the common good, at least not for the region.

The developments in other parts of the North Atlantic, including the North Sea and the Baltic Sea, demonstrate this point. There the national interests and domestic policy pressures have been allowed to lead the way so far. This is so despite the existence in that region of the oldest marine organization devoted to fisheries and marine environmental sciences and management, the Interna-

tional Council for the Exploration of the Sea (ICES). This draws from and on the scientific communities of the contracting parties, member states, covering both sides of the North Atlantic. Even if the scientific advice is solid and consensual, drawing from most of the contracting parties, the national interests are allowed to carry the day when it comes to policy agreements, setting of fisheries quotas, etc. The scientific community is not participating in the full process. It is delivering its advice. However, it rather appears as if it has been marginalized since it is not directly involved in the full process. Is this because of the very existence of the intergovernmental ICES? This body is controlled by the participating national authorities and institutions and not by the individual scientists, or the scientific communities.

The same is the case with other regional marine environmental conventions, such as OSPARCOM and HELCOM. One reason for the limited effectiveness of these instruments can be related to the lack of involvement of the whole scientific community in the regions, in the specification of the vision or goals of the conventions, as well as the implementation. The scientific communities are not sufficiently involved in the full implementation process either. The consensus which has been reached by policy makers is not based on sound scientific knowledge, nor taking into account social, cultural, ethical and other related factors, which are detached from ecological and economic factors.

At smaller scales than the regional these factors as well as the scientific ones may be more effectively incorporated and coupled with the ecological, economic factors. The scientific community may then also be more directly involved in the whole process. This may be the case simply because of the proximity of scale: the individuals in the community are directly involved. This is also the case in a community-based co-management system.

Boesch (1998) analyses several such examples and identifies important factors affecting the success in these cases. He identifies: sustained scientific investigations, responsive to but not controlled by managers; clear evidence of environmental or other changes, with the related scale and causes; consensus among scientific factions associated with the various interests and sectors; development of

models to guide management actions; and identification of effective and feasible solutions to the problems. This last point is mostly lacking in fisheries or environmental sciences advice to managers, in that the mostly natural sciences partners cannot offer a solution to the social problems generated by decreased fisheries quotas, stopping the fisheries, or preventing coastal development. For such solutions to be found, the social sciences and concerned communities must also be involved. In most of the regional cases, as in the examples referred to above, they were not, and may still not be involved.

The scientific communities should also be involved in defining the different aspects of sustainability (ecological, social, economic), and the priorities to reach sustainable development. These are not the same everywhere, but depend for example on the existing and on-going level of development in the area or region.

An essential social problem for the achievement of this involvement is that the required transdisciplinarity or transdisciplinary approaches are largely lacking, and mostly only a dream. This situation is to a large extent related to the evaluation and valuation of the sciences that society are using. These favour specialization rather than integration.

The problem is aggravated since the specialization and related compartmentalization of sciences have also led to grave communication problems between scientists from different specializations. The specialists are mostly able and interested to communicate effectively only with scientists in their own speciality. The environmental sciences are, however, of an interdisciplinary nature, involving heterogeneous groupings of disciplines, specialities and scientists. There has been a tendency for these to become separated from the basic sciences, on which they however must also depend. The communication problem needs to be taken into account in the governance system, for instance when identifying the issues at hand and when trying to select priorities. This is evidenced from the examples above. Scientific information and assessments need to be obtained from a broad base. The Mediterranean example referred to above is one positive experience. The use of international cooperation, partnerships, and civil society is attractive in addressing this matter.

On the other hand the scientific community needs to reassess its role and priorities in addressing the pressing problems of society. The scientific community needs to become more involved than so far has been the case in addressing the mis-match between progress in science and technology and progress in society itself, for instance by also using scientific progress in policy shaping. The scientific community needs also to accept that the best possible science for policy shaping is elusive, that cultural ideas, consensus of the public, and politically and morally acceptable decisions have their role to play, and must be taken into account as well, if the goal is to be achieved of sustainable development. The vision of the future needs to be accepted by all interests and sectors of the public.

In order to address some of the most pressing issues of ocean science there is a strong need for interdisciplinarity as well as cooperation between the ocean, atmospheric, and terrestrial science communities, e.g., in studying: the global nitrogen cycle and coastal eutrophication, habitat destruction and loss of biodiversity, the effects of climate change on ocean and coastal environments, sustainable exploitation of living resources (e.g. Boesch 1998), and the interaction between the environmental compartments as well as between the physical-chemical-biological processes. The solution of other issues of society may also be related to such cooperation and dialogue, for instance the freshwater and waste management problem. Here again the utilization of the WSSD 2002 type II partnership idea to stimulate implementation of several UNCED 92 related agreements could be used. In this way, sciences and the scientific communities could also stimulate implementation of an effective ocean governance system, at least at the regional level. In this context the analyses of Rayner (1998) of the role of civil society is of interest. His Polycentric Model of International Decision Making can provide a mechanism through which like-minded groups can coordinate and stimulate policies across national boundaries by networking. This also agrees well with the role of the epistemic scientific community referred to earlier. In present day communication conditions, as far as technology is concerned, the various groups or interests can exchange ideas and information very quickly and efficiently, provided that they can understand each other's professional language. The internet is the technical

tool providing input to the policy shaping process, involving groups across national boundaries and interests, and with common institutional cultures. These can help achieve the internationally shared understandings of the issues, generate consensus, and shape visions. The process can provide the basis for reaching formal agreements as well as creating its own framework for implementation. The polycentric model thus offers the possibility for how international constituencies may reach consensus on how to address the different aspects of large-scale and complex problems, like ozone depletion, climate change, and protection/management of the marine environment issues, without committing nation states to take positions which are domestically controversial (Rayner 1998). This model of networking fits well with current institutional conditions. Participants in the network can generate solutions even if there is no central body of global or regional dimensions formally deciding on a concerted action.

Enforcement and adjustment

Conventionally, governments use command and control regulations, paired with market oriented incentives, to achieve required adjustments. However, the effectiveness of these measures depends upon the power of enforcement. Implementation of laws, etc., cannot be achieved without effective regulatory enforcement agencies. Monitoring and enforcement in the marine environment is even more demanding than on land. This has led to increasing use of market forces and economic incentives to achieve the goals of environmental management. However, this approach also appears to have limited effect (Rayner 1998).

This suggests that forces other than economic ones are influencing the situation: the use of natural resources is closely tied to the need to satisfy a broad spectrum of basic human needs and wants (Rayner 1998). The informal economy plays a large role in most parts of the less-industrialized developing world, and is also an important factor in developed countries with high taxes. Using formal market incentives in those conditions seems to shift even more activities to the informal sector. Market driven systems also tend towards homogeneity, i.e., we shall all use the same products. However, traditionally, most societies have tended to adjust their practices and uses of the environment according to

the conditions of the environment, like climatic, seasonal, and diurnal variations, and availability of freshwater. A shift away from such practices increases the pressure on the environment. Many examples on this from land management and its lack of harmonization with climatic factors and freshwater availability can be given. However, this holds true also for activities on the ocean. Examples are provided by industrialized fishing over the last 5 or so decades, the urbanization of the coastal areas, and eutrophication generated through runoff from excessive uses of fertilizers. Local community-driven management based on traditional knowledge has proven itself to be successful in many areas. When management and decision making is removed from the community to a centralized national system the result in such areas is often a disaster. The local community cannot adjust to changes of management structure imposed from external forces together with new technologies. The system collapses. It is essential to note that uses of natural resources often are expressions of traditional political, economical and cultural structures, applying knowledge accumulated over many generations. The development is exacerbated under current conditions of globalization and the influence of political and economic decisions made far outside of the region in which the country and community exist.

The pure market driven system furthermore separates the producer from the consumer. In our highly technical society this can be a very negative factor in the context of environmental management and conditions. Consumers are not aware of the environmental implications of the products and they do not understand the limitations or the instructions for use. The education level is often not sufficient for this. Examples of this are many, e.g, fertilizers and chemical substitutes. Thus it can be argued that this separation, a result of the market driven system and the related globalization, may inhibit rather than further the cause of sustainable development. This is in line with the observation of E. Mann Borgese (1998) that today's technology cannot be bought, it has to be learned, requiring a close connection between producer and consumer. The importance of education is again demonstrated, from basic literacy to science and technology.

Rayner (1998) concludes that both the market

driven mechanisms and those driven by more direct local control are needed, but that even together they are not sufficient for an efficient governance of the ocean and its coastal zones. He brings in the third set: institutional arrangements which are particularly relevant for changing behaviour and attitudes, namely those of civil society. Those were recognized by Adam Smith, and Rayner (1998) concludes that his vision of sustainable development depended upon an appropriate balance among the forces of the market, the state, and civil society. It is now increasingly recognized that an active civil society is a prerequisite for successful government and efficient markets. This is demonstrated by several regional studies and is consistent with the idea that civil plurality is essential to a well-functioning democracy. It is also consistent with the approach of Arvid Pardo in specifying the Common Heritage principles to include peace and security, a comprehensive approach.

Civil society involves networking, many networks of different interests, and building a civil community with trust among the networks. The existence of these elements in a society may imply that the society has an enhanced capability for complex strategy switching, making it able to adjust to new situations and changing conditions (Rayner 1998). This indeed appears to be true of rather informally built, loose networks such as the NGO International Ocean Institute. This has so far been able to adjust to changing conditions and pick up new challenges over its 30 years of existence.

Sustainable development must be built on the ability of our institutions and communities at local, regional, and global levels to adjust and possibly switch from a strategy that is not functioning, or will not function much longer, to an alternative strategy that may or will work. Sustainable governance of ocean and coastal resources requires this ability to switch strategy, as is demonstrated by the situation with respect to fisheries management, marine pollution, habitat and biodiversity conditions. An assessment of the possible implications of the new strategy before switching must be part of this management approach.

Rayner (1998) invokes three forces: markets, rules and regulations, and civil society. He reviews the roles and responses of the market, hierarchical,

and egalitarian social systems to the various challenges. These three social systems or organizational principles together can provide the minimum of social variety to a functioning, self-adaptive socio-economic machinery. The three social systems can be mapped in form of a triangle, and the combination of their responses and forces can provide for the required resilience. However, the analysis suggests that each of them will collapse when left alone, through corruption (hierarchies), fractionation (egalitarian), or extortion (market). Considering some of the examples discussed here we can see that this conclusion appears true. The essentially market driven fisheries management is collapsing partly because of illegal fishing; the scientific community, which is both egalitarian and hierarchical, is having problems responding to changing conditions and requirements due to a combination of fractionation and corruption; and the hierarchically oriented enforcement system does not function at least partly because of corruption.

The sciences can endeavour to solve problems of overfishing, pollution, etc., but cannot resolve the human problem of how to distribute the remaining stocks or how the institutional arrangements should be to ensure implementation.

Role of Consumption and Fairness

Sciences can reduce the uncertainties for decision making but cannot handle the role of stakes involved in the decision making. Reduction of uncertainty alone is not sufficient to resolve disputes over fishing rights or other resources. For this to be achieved, the values and needs of people, as well as the efficiency and fairness of the distributions must also be addressed. The human preferences and values must be established and mapped in order to achieve sustainable governance of the ocean and coasts. In this perspective basic needs and consumption patterns must be analyzed. Individuals favour different brands, and want to be able to distinguish themselves from others. The market driven system, although striving for homogeneity, to some extent accepts this, responding to varieties of needs, provided the customers can pay. The market does not comprehend standardized consumption levels or brands in the same way as the egalitarian system. This system favours standardized, homogeneous consumption and voluntary frugality. The hierarchical approach to obtain solidarity is based

on institutional allocations according to rank and station in society.

Thus these three systems have different visions of consumption and the satisfaction of basic needs. The market favours choice, growth, plenty of goods; the hierarchical favours security, stability, choice of goods in lumps; the egalitarian favours cohesion, uniformity, undifferentiated goods.

The structure of our society in families, communities, companies, workplaces, and nations also requires fairness and a fair distribution of means and goods. This is an integral part of social solidarity. It obviously relates to the striving for equity at national, regional, global levels. Three principles can be applied to address the practical problems of achieving a fair allocation of resources, following Rayner (1998): proportionality, where rank, contribution and need are criteria; priority, which responds to first-come-first-served; and parity, implying an equal share to all customers. Thus the hierarchical system relates to proportionality; the market driven to priority; and the egalitarian to parity.

The UNCLOS provisions to a large extent are rules about a fair allocation of ocean resources. This is inherent in the Common Heritage principles of Arvid Pardo. How, then, is fairness to be achieved? Procedural fairness is important in negotiations between nations about claims to the same resources, navigation and fishing rights etc., as well as inside nations for rights of local communities. In context of environmental governance one approach towards procedural fairness is to focus on preferred procedures for obtaining consent of risk (Rayner 1998). In a market driven system the risk is supposed to be revealed; in a hierarchical system we are expected to accept the risk in the contract based on trust in our institutions, a hypothetical risk; in the egalitarian system the explicit consent to risk is adopted. A governance system must balance the need to obtain consent to risk from those it governs, in harmony with the need to achieve consensus and to be transparent. In the present open society with rapid information exchange and penetrating journalism it would appear that risks, etc., should not be hidden, and that consent should be obtained as part of the consensus and vision formation process discussed above: the truth will come to the surface

sooner or later, especially if manipulation has been part of the decision making process. This is amply demonstrated in context of some recent events of global significance.

Intergenerational equity is a function of the time-scales the social systems are prepared to consider. The market operates over short time scales with a weak intergenerational responsibility. The hierarchical one favours a long-term time scale with a balanced responsibility for coming generations, while the egalitarian system has a strong intergenerational responsibility. This would favour quick implementation of policies to protect ocean and coasts, with the burden of payment on the present living generation, or the polluter pays principle.

Fairness is an important element to consider in an ocean governance system in harmony with UNCLOS. Fairness is not only related to human beings, nations and institutions, but also in respect to our dealing with natural capital, the ecosystem services and resources. The ecosystem management system should be designed to take this into account. Environmental conditions and our relation to nature are often used to justify value systems, ethical and political preferences, and visions for proper living. However, all these (the values, preferences, visions) depend upon our state of development in present conditions. This is very well demonstrated in global and regional negotiations, and also by actual conditions in different parts of the globe. Would this situation be the same if we had sustainable development? Each social system briefly highlighted here has its view of nature and the ecosystem.

The market system is adopting the view of nature, and the ecosystem, as a flexible resource providing infinite support to human ingenuity. Nature is stable. If disturbed it will return to its original configuration. This is the extreme anthropogenic view, not in harmony with the sentiments expressed in the introduction to this paper. The hierarchical system views nature as a system stable within certain unknown limits, i.e., with some resilience. In this case the role of science can be to judge how much pressure nature can accept. Nature is here regarded as manageable in a technical sense.

The egalitarian view of nature tends to emphasize the catastrophic elements occurring in nature. The egalitarian system has a strong sense of interdependence, supporting extension of rights and ethical responsibilities to nature itself, e.g., animal rights.

The social systems and Ocean Governance principles

As mentioned earlier the characteristics of the three social systems can be presented in a triangular mapping of human values (Rayner 1998). The characteristics are specified according to the way the institutions operate or view the various interacting processes: sovereignty, decision-making procedures, view of nature, diagnosis of cause, policy bias, policy instruments, distribution procedure, trust, liability, consent, timeframes, intergenerational responsibility, discounting, and basic human needs.

The governance system is shaped according to how the institutions in a given society exhibit a mixture of the three systems. Each unit of the society depends upon creation of solidarity among individuals. At large scales the solidarity is built among large aggregations of people bound together in various ways: companies, trade unions, political parties, and industries. The issue of ocean and coastal governance is the challenge to create solidarity at all levels of scale: community, nation, region, global. This is reflected in the Oceanic Circle concept or vision discussed above. The equity problem is very complicated and there is no consensus on a “best” equity principle.

Rayner (1998) argues, on basis of the triangular mapping of human values, that we should not even try to find a “best” equity principle in relation to ocean and coastal zone governance. Instead, we should focus on achieving practical agreements about joint actions among parties upholding different, perhaps incommensurable principles of equity. Fairness can be achieved in this way. This is akin to the joint implementation approach sometimes agreed upon in cases of shared resources, e.g., on the continental shelf. It is also an approach which could be used in context of specifications of WSSD 2002 type II partnerships. The regional cooperative approach in regional seas management also appears to be suitable for this approach. This leads to

agreements on joint actions to address a common problem, or a common threat, yielding fair results for all.

The scientific information can thus help provide a wide variety of civil societies, participating in decision-making, with the best tools for political negotiations among competing interests.

In the analysis here each set of Ocean Governance principles discussed above, namely, Common Heritage, Lisbon, Sustainable Development, and Sustainable Ocean Governance, are related to each of the processes listed above. Each process is allocated a weight in the range of 1-10 as it subjectively appears to be related to the social system (market driven, hierarchical, egalitarian). Thus the decision making process in the Common Heritage principles is considered as being governed by rules essentially of a hierarchical nature; in the Lisbon and Sustainable Development principles, by consensus, essentially of an egalitarian nature. The sets of principles turn out to be quite similar as to their relationship to the social systems. The subjective analysis suggests that: The Common Heritage Principles are 85% hierarchical and less than 10% market or egalitarian oriented; the Lisbon Principles are to 60% hierarchical, 25% egalitarian and 15% market oriented; the Sustainable Development Principles are hierarchical to about 65%, egalitarian to about 30% and less than 10% market oriented; the Sustainable Ocean Governance principles are 60% hierarchical, about 35% egalitarian and less than 10% market oriented. For comparison, the fisheries management system introduced in New South Wales, Australia, and highlighted below is analyzed in the same way. The results suggest that this governance system is only hierarchical to about 35%, egalitarian to about 15% and about 50% market driven. This does bring out the practical or pragmatic orientation of this fisheries governance system, in line with the idea of achieving practical agreements on joint actions among the parties, rather than seeking for some "best" equity principle, as discussed above.

It was also noted earlier that a mixture of the social systems would be required for avoiding collapse at some stage. Based on this observation, the Lisbon Principles would appear the most attractive of the sets considered here.

Forecasting and the social systems

In order to obtain forecasts or study various options of actions as regards consequences, a dynamic modeling approach is required of the interactions between the ecosystem and human systems. Low et al (1998) present such a model effort using a common framework containing the ecosystem and the social components structured in a parallel fashion. The structures include: stocks, flows, controls, and attributes, i.e., characteristics of stocks, flows, controls, and the relationships between these. The stocks are species and organisms and natural capital in the ecosystem, and human actors and human-made capital in the social system. The controls are physical and behavioural laws, selection mechanisms, ecological relationships, or rules in use. The flows are internal as well as external inputs and outputs. The attributes are: heterogeneity, predictability, resilience, decomposability, extent in space and time, and productivity.

The interactions between these parallel systems are in form of various flows: harvest, pollution, enhancement, non-consumptive uses. These are also subject to controls in form of transformations and transactions, as well as having characteristics like observability, enforceability, knowledge, sustainability, equity, efficiency, divisibility, excludability, i.e., the possibility to exclude certain users. The more complete and certain the information about the structure of the ecosystem and about values of key variables that is available, the better the possibility to obtain long-term reliable forecasting and thus to achieve sustainable management and development. This demonstrates the importance of ocean observations.

The dynamics of the systems and the interactions are expressed in finite-difference equations. In both the ecosystem and the social system only one state variable is used, namely, natural capital and human-made capital, respectively. The interaction compartment does not have any state variables, but only two-way flows between the systems. These focus on two relationships relevant to harvest of natural capital: efficiency and strategy.

The model results (runs) present harvest limits as per cent of the carrying capacity for a series of natural capital growth rates. For a growth rate of 1 in a single ecosystem model, sustainability over a

200 year period is achieved for a harvest limit of 24% or less of the initial carrying capacity; this is thus the Maximum Sustainable Yield.

A harvesting limit even slightly above this critical limit leads to a rapid collapse of the stock. The failure is relatively abrupt, which seems also to be observable in the real world. The model does not provide any early warning signal that sustainable limits are being approached.

The authors used the model to study the effects of extrinsic events on harvest rules. With 10% stochastic extrinsic fluctuations, most of the systems studied survive up to 100 years. With severe extrinsic fluctuations of 50% (high natural variability), over 50% of the systems that allowed for a 24% harvest fail by 40 years. However, no sole owner system fails in 40 years; these tend to last longer.

The next study using the model concerns the role of interactions, flows between ecosystems in a three-area spatial representation. The results suggest that with a very low transfer rate, the units will be non-sustainable if the harvest rules exceed 24%. When the transfer rates are higher and the harvest rules in conserving units are low then a unit with a higher than 24% harvesting rule receives some protection from the high transfer rates and from the low exploitation in the adjacent areas. The result thus suggests that the social resource use systems work in an interactive rather than additive fashion. Extrinsic stochastic fluctuations furthermore have a large influence on sustainability.

The scale of inter-relationships in an ecosystem and the scale of decision-making, the scale of the rules of society, are very often different. This mismatch of scales is considered as one basic reason for management failures. Low et al (1998) on the basis of their modeling studies argue that sustainability is enhanced when human-designated rules are matching or “well-tailored” to the ecosystem behavior. This aspect is further elucidated through a series of runs with the same model adjusted to include three populations which can freely move (emigrate) between themselves. Two population structures are studied: (i) with high larval mixing rates, implying that if a local population is reduced or extinguished, its population space will be quickly recolonized by other populations; or (ii) a popula-

tion structure with a discreet local population, reproductively relatively separated from other local populations. In this case, when local populations are extinguished their space will be recolonized much slower than when the mixing among the populations is large.

The resilience of the population then depends upon the relative rates of extinction and recolonization. The model results suggest that with the case of a population that mixes freely and uses localities of spawning in some proportion to its overall state, the mis-matches of ecosystem and management scales tend to lead to few management problems; the scale problem may not be serious. In the other case when the populations do not mix, where the local spawning groups are relatively independent of one another, the model results suggest that the scale mis-match can be a serious problem, thus a serious cause of over-fishing. Then a piece-by-piece reduction of the overall population will occur, in particular in conditions of high natural variability (severe extrinsic fluctuations). The open access harvesting rule leads to a quick decline of the localized stocks. The constant per cent of stock quota and sole ownership harvesting rules also lead to a piece-by-piece reduction of the overall population, but at a slower rate than in the case of open access harvesting. The results thus suggest that over fishing can occur as a result of our misperception of the scale at which populations operate. These results seem intuitively correct.

An improved management will in this case require attention to the structure of local populations, the habitat, and other biotic as well as a-biotic factors. This observation appears to be in agreement with practical results from various semi-enclosed seas. With respect to the management structure these results suggest, or re-confirm, that we should move away from centralized management in favour of a more locally driven management organization, which can fully take into account local ecological conditions.

It seems that dynamic modeling of this kind can help resolve conflicts and give answers as regards harvest rules and long-term sustainability. The information from the model runs can be utilized for the formation of the vision of the management as well as the subsequent specific management

actions. The results of the modeling effort highlighted above seem intuitively correct, and in conformity with some real experiences from local and regional fisheries.

Governance role: the fisheries example

What, then, is governance to do? Governance may be seen as a system which can implement contractual relationships between individuals within an institutional arrangement, the process of making binding decisions for a given collective (Hanna 1998). In this view the governance includes concepts of transaction costs, i.e., the costs of arranging, monitoring, or enforcing agreements, the costs associated with all the exchanges within an economy; and the behavior that links institutions to individuals.

Fishery governance must shape behavior so that the transactions of management accommodate limited information, safeguard social objectives, and are conducted at minimum costs. Fishery governance may be decomposed into two basic components: organizational scope and organizational structure. The scope or aim is related to the long-term planning, the vision for the fishery, expressed in a set of operational objectives for the different fishery components. The structure is related to the ability of the governance to accommodate the behavioral incentives of the users (Hanna 1998). At present, transaction costs are rising due to declining availability of fish, increasing intensity of fishing, increasing complexity of regulations, disputed management objectives, increases in spillover effects, attacks on the integrity of scientific advice, and questions of legitimacy of management. Technical innovation in the fisheries, combined with adequate scientific information lagging behind, strong market driven interests, and increasing number of fisheries have obviously led to over-exploitation. Fisheries management is in a crisis. This is reaching beyond fisheries since fishery governance is concerned with the management of a complex, dynamic and publicly owned resource - thus reflecting issues of most other uses of the ocean. The governance problems of fisheries can therefore indicate basic problems in regulation and management of the ocean overall (Hanna 1998) - an observation which is clearly true.

The scope of the present fishery governance is

characterized by a lack of vision. A fishery has economic, social, cultural, political, biological, and ecological components. At present, it appears that a fishery may be managed to accommodate these components individually, depending upon political needs which vary with time, and over short time scales in many cases. Thus there is no long-term focus and no stability, no solid framework to coordinate with various other interests or for responding properly to changes. The governance structure needs to provide stability and consistency for decision making while being able to retain sufficient flexibility and ability to adapt to changing conditions. This poses a dilemma. However, the main characteristic of the environment fishery management has to work with is variability, which the governance must be able to take into account, or be shaped by. The importance was demonstrated in the modeling results presented above, and is of course confirmed time and again in the real world. At the same time the governance system must be able to accommodate the behavioral incentives of the fishery users. These are all human incentives, the main ones being: to minimize or shift transactions costs, reduce uncertainty, and competition and market needs.

The uncertainties result from: lack of knowledge about the ecological, economic and social systems: how they function, the driving factors, the interactions; and from lack of certainty regarding tenure due to unspecified property rights or changes in the management scope, undermining assurance about access. In conditions of such uncertainty people tend to intensify rates of use, avoiding investing in the future. Thus to achieve success in governance it appears mandatory that resource users and managers share the same long-term vision for the development of the resources, generating confidence that claims to the resources will be protected and free-riding minimized. Such conditions provide the incentive to behave as a user so that ecosystem health and economic productivity are both maintained. Consensus must be built with dialogue between all stakeholders and representation of users in the management structure. However, reduction of tenure uncertainty by introduction of well-defined property rights introduces another great uncertainty, namely about the distributional consequences. This is obviously coupled to the variability of the environment.

The competition can be of two kinds (Hanna 1998): each user behaves individually to capture resources in a race against the other users; or manipulation to make it difficult for competitors, for instance by lobbying the management process. This type of competition has increased over the years due to the expansion of national jurisdictions and development of a complex of national and international agreements. The large fishery subsidiaries provided to the industry in some regions also implies uneven competition.

Fishery governance must also strive to accommodate multiple objectives: many species, ecosystem management, as well as many interests of society and of an individual nature.

Hanna (1998), on basis of the overview highlighted here, argues that, following the introduction of the EEZ, the fishery management scope and structure have been opposite of their desirable characteristics; the structure has been sluggish (inert) instead of adaptable; the scope (aim) has been variable instead of stable. The result is biological overuse, loss of economic results, costly management, inequitable processes, and outcomes. There is a need to stabilize the scope, i.e., the aim and purpose, within nations and regions. A flexible management structure must also be constructed, based on well-defined rules of participation and decision making, well-specified property rights, responsibilities, incentives encouraging full dissemination of information, containing transaction costs, anticipating competition, and ensuring monitoring. Quite a task.

Can this be achieved when fisheries is only a small part of the national economic base, even smaller than earlier in many developed countries? This implies decreasing political base and public support for funding. At the same time, the expanding international markets for seafood imply greater distances between points of production and consumption. This makes control even more difficult than before. The conclusion may be that efforts should be put into managing or better governing other uses of the ocean where the economic importance may be much larger and the public concern and interest also much larger than in the case of the fishery sector. This can clearly vary between countries depending upon the status and importance of

the fisheries sector. Production of food from the sea may be turned more and more towards cultured production. This trend is obvious over the last decades. It can be accepted in any case that there are strong needs for alternative or different fishery management (governance) systems. Ecosystem management approach is being pursued in some areas, and is encouraged in the WSSD 2002 commitments. The ecological-economic approach discussed here is of that nature as well as the related sustainable development principles. However, this approach also has many uncertainties. Some of these can be specified and addressed so that the adaptive management strategy can be utilized. However, other governance alternatives may also be sought.

One such is the system of fishery management designed for New South Wales, Australia (Young 1998), and highlighted below. It has been stimulated by similar efforts in New Zealand. It is similar to the individual transferable quota (ITQ) systems now pursued in many countries. However, it is more based on a share system with allotments of shares for fisheries. Fishery is including all the species in the particular region. The system is not species specific, contrary to many industrialized fisheries. The basic idea, however, is that fisheries thus defined (i.e., not species specific) can be managed according to the principles used to guide corporations. Each qualifying fisher is given a set of shares in all the species of fish in the fishery. According to periodically reviewed management plans, revised as required, the shareholders are entitled to a share of any gear restrictions and quotas. Entry into the fishery is only possible by acquiring shares from the existing shareholders, and likewise if anybody wants to expand their part. This is a corporate-like structure of management. The system acknowledges that the knowledge about the fishery is very incomplete. An adaptive management approach is therefore used. This is achieved through a periodic (5 yearly) review of the situation. All shareholders, including the scientific advisory mechanism, are aware of this periodicity and can adjust actions accordingly. The term share implies that each shareholder owns a legally enforceable share of the fisheries commercial opportunities. A core property right is established as a legally transferable entitlement. The share is related to the fishery rather than specific species or

gear. The linkage between the whole resource and its users is maximized. This should help achieve sustainability since the industry has the responsibility and needs to consider the impact of its practices.

In this share-system the fisheries are defined first by region and habitat type and, where needed, by species and gear. The unit of management is the biological resource. The management by fishery facilitates the integration with the property-right system. The periodic management plans identify the goals (scope) and vision, for each fishery, the conditions of exploitation, the period and process for review and possible revision of the plans. The status of the management plans is raised to one of a legally enforceable instrument. It is not an advisory product. The periodic review process creates a possibility and an expectation of change among shareholders. By formalizing the review process the administrative efficiencies of all involved in the review process are strengthened or forced to function. All know when the information is required, for instance of the scientific advice. The management includes a bottom-up participatory requirement in consultations and decision-making. Co-management arrangements involving different categories of interests are possible, for example commercial and recreational fishers and administrators. The share system gives each fisher an interest in building an ecological sustainable industry. Strong incentives for industry-based self-enforcement are built into the system, for instance to pursue mechanisms that increase the value of shares, minimize compliance and transaction costs, and with consultation maximize the sense of ownership. An offender can also risk losing shares or parts thereof, in proportion to the size of the offence. Rights and management obligations are coupled. This system is under testing. The subjective analysis here of its relationship to the three social systems suggests that it is slightly market driven but quite balanced with respect to an association to all 3 systems.

Much of fisheries management concerns fishing technology and its adjustment. There have been several efforts to limit or ban use of particularly harmful or destructive fishing methods, e.g., excessive drift nets and certain trawling techniques. It is of great interest to develop, recover or rediscover ecosystem friendly fishing techniques. They may be selective and avoid disturbances of other parts of

the ecosystem. One such technique appears to be the set-net fishing developed and practiced in Japan and in a few other countries. Its selectivity and catch limitations appear very attractive. Ocean governance could endeavor to promote and introduce such technologies.

Conclusions

The international legal instruments and agreements for ocean governance implementation are in place.

Sets of principles for ocean governance have been proposed. These all require some scientific inputs in their application. Their coupling to the economic and market oriented forces appears weak: many other factors enter the equation. Effective governance cannot be achieved without a broad consensus about goals involving all interests. The sciences can help create scenarios for future development and for the implications of management actions. The ecological economics scientific framework may be one useful approach, working with adaptive management, and having sufficient flexibility to address different conditions. The complexity is such that no one single approach can be expected to work in all conditions. Scientific understanding and technological developments are basic needs for all the governance principles analyzed here. Scientific and technological capabilities are required for their implementation. The important role and contribution of the social sciences must be stressed.

The direct involvement of the scientific communities as partners is a necessity for achieving effective ocean governance. The science results can stimulate the governance development and implementation. The communication problem between scientific disciplines must be borne in mind in the governance implementation.

Sustainable governance of ocean and coastal resources requires the ability to adjust to changing conditions. A major issue is to create solidarity and achieve fairness of distribution of the resources and uses at all levels. Focus should be on finding practical solutions of joint actions involving parties having different interests and principles of equity. Dynamic exploratory modeling should be used to obtain forecasts and ideas about sustainable yields,

consequences of different harvesting rules, and other resource uses. In all these problem areas the scientific communities should be involved to help find solutions.

The present fisheries management is in crisis. Alternatives must be found to the present scope and structure. Ecosystem management is being pursued, but other alternatives should also be explored. Perhaps the recently introduced system based on corporate principles involving a system of shares of the whole fisheries, i.e., with core property rights, is a feasible alternative. Likewise, alternative catch methods should be more fully explored, such as the traditional but modernized set-net fishing technology developed in Japan.

Since fishery governance is concerned with management of a complex, dynamic, publicly owned resource, thus reflecting issues also related to most other uses of the ocean, the crisis of the fisheries management reaches beyond fisheries. The governance problem of fisheries indicates basic problems in regulation and management of the marine environment in general. The governance system must be able to take into account the variability of the environment. It needs to provide stability and consistency for decision making while retaining sufficient flexibility to adapt to changing conditions.

Civil society, of which the scientific communities are a part, can play a large role in helping achieve a common vision. Flexible, adaptive organizations and networks like the Global Forum on Oceans, Coasts and SIDS as well as the IOI can be active partners in this process.

Ocean governance should be implemented for the sake of society, the whole global environment system, and not for the sake of the ocean alone. The scientific community must be a partner, including the natural, social, economic, and medical sciences. There is a need to take into account how various cultures, societies, communities use the environment and natural resources and react to changes, and formulate their visions for the future.

The biosphere must not be seen as a resource only, but as a fundament for our life support system. The stock must be maintained for sustainable

development, ecological sustainability. The major global biogeochemical cycles need to be further studied so as to elucidate better the human alterations of these cycles, in particular C, N, and P. Population and demographic developments are key factors which must be taken into account as parts of the whole system. In most applications the governance has to deal with the behavior and attitudes of the human parts of the system. Ocean governance, thus, cannot be seen in isolation from other governance schemes.

Education and capacity building are essential parts of the whole process of governance. An advanced system of education, including science and technology, has become a necessity for the sustained well-being of society. The political governance process must catch up with the implications of the great scientific and technological advances achieved during the last several decades. The opportunities and tools provided by these results must be utilized in and by the governance system.

Locally driven management should be favored rather than a centralized approach. The local scale can better take into account the local ecological conditions, and can better involve the communities than a remote centralized system. Both market driven mechanisms and those driven by more direct local control are needed for implementation, together with adequate institutional arrangements. Integrated coastal management cannot be applied without proper linkages between institutions at all levels. These institutions need to work in harmony at all levels of management.

The mis-match of scales of the ecosystem and the decision making and economic systems is one reason for management failures. To achieve success, resource users and managers must share the same long-term vision for the development of resources. This will generate confidence that claims to the resources will be protected and honored.

Table 1: Main Headings of Ocean Governance Principles; Chapter 17, Agenda 21; WSSD 2002

Common Heritage of Mankind	Lisbon principles	Sustainable Development	Sustainable Ocean Governance	Decision making criteria	UNCED 92 Chapter 17 Agenda 21	WSSD 2002 Major targets Oceans, Coasts and Islands
<p>Economic: be developed</p> <p>Ethical: managed on behalf of all</p> <p>Environmental: conserve to share with future generations</p> <p>Peace and Security: exclusively for peaceful purposes</p>	<p>Scale matching: of economic and ecosystem</p> <p>Responsibility Principle</p> <p>Precautionary Principle</p> <p>Adaptive Management</p> <p>Full cost allocation</p> <p>Participation</p>	<p>Economic Sustainability: allocation so that natural capital does not decrease</p> <p>Ecological: sustainable scale of economy</p> <p>Social: fairness of distribution</p> <p>Ecological Economics: broad trans-disciplinary perspective</p> <p>Integration of natural and social sciences and policy process</p>	<p>Subsidiary principle: governance at lowest common denominator, democracy;</p> <p>Responsibility principle</p> <p>Precautionary principle</p> <p>Participating principle</p>	<p>Reversibility</p> <p>Diversity</p> <p>Public Health</p> <p>Ecosystem functions</p> <p>Economic value of impacts</p> <p>Scale of problem</p> <p>Public opinion and judgment</p> <p>Equity considerations</p>	<p>Integrated management and Sustainable Development of Coastal and Marine Areas</p> <p>Marine Environment Protection</p> <p>Marine Living Resources of the High Seas</p> <p>Marine Living Resources under national jurisdiction</p> <p>Addressing Critical Uncertainties for Ocean management and climate change;</p> <p>Strengthening International Cooperation and Coordination</p> <p>Sustainable Development of SIDS</p>	<p>Integrated Ocean and Coastal Management: ecosystem approach</p> <p>Fisheries: maintain or restore depleted stocks</p> <p>FAO International Plans of Action</p> <p>Conservation of biodiversity</p> <p>Protection from marine pollution – GPA/LBA</p> <p>Science and Observation: regular reporting on state of the marine environment</p> <p>SIDS: community-based initiatives, control waste and pollution;</p> <p>Barbados Programme of Action.</p>

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オーシャン・ガバナンスの実施 第1部：根底にある諸原則と理論的基礎

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要約

本稿は、オーシャン・ガバナンスの実施を実現するための方法と手段の探究を目的とする。それには、諸科学（自然、社会、経済）とオーシャン・ガバナンスの発展と実施、そして管理をつなぐ役割も含まれる。本稿では、人類の共同の財産概念、経済及びセキュリティに言及しつつ、オーシャン・ガバナンスの必要性、その基礎、そしてその役割を簡潔に論ずる。海洋が我々の生命維持システムの不可欠の一部をなすということはよく知られているが、我々の経済と社会全体を支えるにあたって海洋が果たしている極めて大きな役割は、ようやく少しずつ知られるようになったにすぎない。海は人類の共同の財産でもある。しかしながら、オーシャン・ガバナンスあるいは海洋の管理は、幾つかの場所において局地的に、または国内的にいっらか存在するのを除けば、存在しない。これは実現されなければならないということが、次第に認識されてきている。科学は、その過程において積極的な役割を果たすべきである。そこで、2002年の持続可能な開発に関する世界サミットは、小島嶼を含む海洋と沿岸の持続可能な開発を実現するために緊急に行動する必要性があることに合意した。いくらかの先導的な国家において、いくらかの活動が行われ、また開始されようとしている。たとえば、既存の立法を改正する必要性、海の状況と人の健康の関連を研究することなどである。2002/03年に、先進8カ国（G8）の指導者は、海洋汚染を防止するための措置を呼びかけた。海洋と海岸が、世界経済において、気候系において、環境汚染と沿岸での滞留に関して、国際法、国際関係、平和と戦争の一分野として、中心的な役割を担うことについては疑いがない。

社会が持続可能な開発の枠組みの中で海洋環境とその資源を中・長期的に開発していくことに関する見通しとコンセンサスを持つ必要があることを本稿で検討する。気候変動、淡水の利用可能といった世界的な問題並びに食糧の供給、安全な輸送、人の健康そしてセキュリティといった地域的問題に言及しながら、科学を関係させることの必要性を例証する。一つの例として、科学がサンゴ礁の管理において指導的な役割を果たしていることに留意する。

Ocean Governance Implementation
Part II: Motivations, Strategies and Opportunities

Gunnar Kullenberg

Ocean Governance Implementation Part II: Motivations, Strategies and Opportunities

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Abstract

The motivation for ocean governance implementation is here primarily related to the role of the ocean and its resources in our current service-oriented economy, the role of the ocean in the climate system and the hydrological cycle, the enormous importance of the coastal zone, and the opportunities now available in these contexts. It is of course to be realised that the ocean is a necessary part of the life-support system. However, in view of the great complexity in implementation of comprehensive ocean governance an opportunistic approach is suggested. There is a necessity to motivate the stakeholders, authorities, governments, and the public. There are several management approaches that are being pursued in various contexts and these are reviewed, and ecosystem based and regional management approaches are also discussed. This includes consideration of various conventions. A series of examples of ecosystem oriented approaches are presented. These include: the application of the Marine Protected Area technique, its relation to international agreements and its problems; the use of the Large Marine Ecosystem approach, being strongly supported by GEF with several on-going programmes and being regionally oriented, including catchment basins; the use of integrated Coastal Area Management, its linkages to the other approaches and in particular the Global Programme of Action to protect the Marine Environment against Land-based Activities, GPA-LBA. The aims of ICAM, the development of demonstration sites, and use of regional cooperation are considered. Several other specific scientific-technical tools related to ecosystem and comprehensive management approaches are highlighted in the subsequent section, including carrying capacity evaluation, risk assessment, and integrated information management systems.

The implementation of most of the related actions will become national responsibilities. National and community-based aspects are reviewed. This includes discussion of various concerns with respect to policy specifications, legislation, implementation, enforcements, management responsibilities, the need for human resources development, education and public awareness creation.

A series of opportunities to implement ocean governance are presented, including the motivations, the needs, expected outputs, and constraints. The opportunities are all cases where the economic, social, environmental and security interests coincide, and for which the scientific-technical bases are available to support the implementation, with the aim of achieving sustainable development. This is well related to the principles for ocean governance and the need for involvement and support of knowledge, science, and technology, under present-day conditions. The role of the international agreements is also brought out. The opportunities are specifically related to the coastal possibilities and needs, the great importance of ocean borne transport, the climate variability and change issue, the freshwater availability problem, and other potential opportunities related to ocean resources.

The conclusion is that ocean governance implementation is within reach and that the opportunities considered here provide for very substantial motivation for all interests.

This paper is the continuation of the paper on Ocean Governance Implementation Part I: Underlying Principles and Theoretical Basis. Originally the two papers formed one report with cross-references. These have been deleted here although the papers are connected.

MOTIVATIONS AND STRATEGIES

General motivation

A primary strategy consideration with respect to implementation should be motivation of stakeholders, authorities, and the public. Why do we need ocean governance? We have seen from the overview of principles and needs that it is a very complicated process to achieve comprehensiveness. The links to society's needs and priorities should therefore be established as the first strategic action. This can include a mapping of the basic needs of local communities and the country as a whole. Such a mapping will help identify how ocean management actions can help achieve these needs and how the outputs from the management actions can be utilized by society. The mapping of the priority needs will also help identify motivations and design of a common vision for the future.

A sectoral review or mapping of the state of development and needs and the economic situation will also identify the relationship to the ocean and coastal services and resources, and how critical are: maritime transport and safety; tourism; coastal protection and preparedness for flooding, storm surges, tsunamis, erosion; fisheries and mariculture; marine pollution sources, coastal urbanization, agriculture and other land-uses; freshwater and food security; human health problems; poverty and vulnerability of coastal populations and developments, rural and urban; what is the state of health of the coastal and maritime zone; are there any baseline information on pollution levels, habitat degradation, fisheries depletion, coastal erosion rates; what is the state of the river basin management, changes of river flow, damming, and irrigation if applicable.

Before launching an ocean and coastal governance, or management, programme such an overview should be prepared of the state of the society, communities, and coastal and inland populations with respect to development, poverty, social situations and needs, education, the social systems which appear to dominate the society; cultural and traditional customs and knowledge; the economic situation and primary employment sources; and possibly other factors depending upon the particulars of the area or community. Clearly such a mapping should be carried out with the existing plans, taking into account zonations and development plans, demographic projections, and rural and urban

planning. An intersectorial effort involving all stakeholders, the public, and authorities is desirable. Information or mapping of the existing understanding and knowledge about the environmental and ecosystem situation should also be undertaken, noting that sustainability can be enhanced when the human economic system and ecosystem scales are matching.

The economy is normally of great significance for society and individuals. A major motivation for establishing ocean governance can therefore be sought in the importance of the ocean and coastal services and resources for the economy of the region, country, or locality. The populations on the coasts may be expected to be involved in coastal and marine activities and therefore know about marine conditions and their importance. This sector of the population may therefore be most easily motivated to establish ocean and coastal governance.

Having achieved the mapping, the next steps should be, (i) to elucidate and assess how actions of ocean governance can help meet the needs, achieve the common vision of sustainable development and related adequate protection of the coastal and marine environment as well as population and properties; and (ii) to identify priorities for management with respect to the ecosystem.

The assessment should be made available in understandable form to the public, and explained as well as to the economic sectors, stakeholders, authorities, and policy and decision-makers. Without the endorsement and participation of these partners the implementation of ocean-coastal governance will not succeed.

The role of the ocean in the service economy Overview

Our service economy relies on services, distribution, transportation, global connections, and communications. In ocean economics we are seeing a shift from resources to services even more than in other parts of the economic system. The ocean provides a multitude of services for our society and economy. The most important ones include: maritime transport; food production; the role of the ocean in the climate system and hydrological cycle; ocean and coasts for recreation and tourism; waste

recipient services; other financial and product services, e.g., for freshwater, oil and gas, renewable energy, employment, and poverty reduction. Ocean economics used to focus on resources. However, marine-based services are far more important economically in current terms: sea-borne trade, ocean and coast dependent tourism, and sea-floor fibre optics (Mann Borgese 2002).

We may therefore argue for the need of an ocean economics branch as a separate part of environmental economics, which so far has had a focus on land-oriented resources and services. Ocean economics should be included in the education curriculum for ocean governance. The ocean resource potential has been reviewed by Mann Borgese (1998, 2000). Ocean-dependant and ocean-related goods and services presently generate revenues to the order of eight trillion USD annually. The largest factors are international sea-borne trade, accounting for about five trillion USD, and tourism accounting for about half a trillion. This is followed by the offshore hydrocarbon industry, which is expanding deeper and deeper into the ocean. New technologies are being developed, generating joint ventures and innovation in the structure of the industry. Exploration and exploitation of methane hydrates found in the permafrost zones of the Arctic and the Antarctic and in the deep sea-bed may follow in the coming decades; some countries have initiated related national programs.

The renewable energy from the ocean will also gain importance and large related industrial developments can be expected. Sea-bed mining is beginning to become a reality through the exploration of Sea-floor Massive Sulphides (SMS) by one company with a license from the Government of Papua New Guinea.

Living resources from the sea are extremely important as a source of protein especially for many poor, developing countries. However, fisheries are in a crisis situation. The only growth sectors presently are mariculture and so-called 'genetic resources', i.e., micro-organisms found in the ocean and the sea-bed. Mariculture is presently contributing about 20% to the global fish and sea-weed production, and growing 6-8% annually. However, the process can also generate serious pollution problems, and there is a strong need for improved man-

agement and governance. Economic interests have been allowed to dominate the management. This is one example showing the strong need for an ecosystem-based approach in management. The economic system driving the industry must be changed, so as to enhance nutrition and job creation in poor coastal communities, rather than maximizing short-term profits and ignoring social and environmental needs. There is an imbalance between the readiness of society to initiate exploration and exploitation of ocean resources before the scientific basis and understanding of the potential consequences have been achieved; this imbalance must be addressed.

The potential of the 'genetic resources' found in the sea-bed associated with the hydrothermal vents for the bio-industry and pharmaceuticals is considered very large, possibly generating very considerable revenues. Many applications are being explored, such as treatment through bio-remediation of hazardous wastes and bio-mining.

In addition to these goods and services come the 'ecosystem services' provided to our society by the coastal and marine ecosystems. These are very difficult to estimate in monetary terms, however, attempts have been made by Costanza et al (1997). They made calculations for 17 categories of 'goods and services' provided by 16 specialized 'biomes', including oceans, estuaries, and tropical forests. The authors come up with a figure of some 30 trillion USD annually; of these the ocean and coastal systems provided for 21 trillion.

It is clear that the economic value of the ocean is enormous, and that the state of the marine environment and health of the ocean have an impact on many of the economic values and services of great importance for society. A brief review of individual sectors follows.

Maritime transport

The importance of shipping is increasing. Sea-transport remains by far the most cost-effective way of moving goods and raw materials around the world, including the most important ones of grain and oil-gas. The role of the transportation sector for our economy is crucial. Shipping and trade are large shares of the GDP: 14% in the USA, 24% in Japan, 60% in Nigeria, and 94% in Gambia. The European

Union has about 14% of the global trade by ships; 90% of the EU international trade goes by ships, and 40% is EU intra-trade. EU is very sensitive to shipping. The maritime transport sector influences decisions of the countries and the regional political bodies.

Developing countries generate a huge amount of world trade, but they have been marginalized in the management of maritime transport. Efforts to increase developing country involvement in shipping have failed largely because of flags of convenience. Flag states no longer maintain control over shipping. This is done by 5-6 leading companies or alliances.

Maritime fraud is a great and increasing problem and includes: piracy,; illegal fishing, illegal transports, arson, insurance fraud, and sale of non-existing cargo. Flag state control does not work, and port state control is only possible in developed countries. Freedom of navigation does no longer apply; there is a lacuna in ocean governance with respect to the shipping sector. It is imperative that all countries can participate and play an active role in the distribution system for the benefits of the globalization to reach all and generate enhanced equity.

Fishing vessels carry out many violations, opposing fisheries management and conservation. There is a strong need for much more surveillance and enforcements. Regional cooperation can help address all these problems.

Food from the ocean

Food from the ocean is the oldest service it provides, still being very important. Over the last 50 years the annual harvest has increased by about a factor of 5, due to a large and rapid geographical expansion of fisheries and technological advancements. Now however marine fisheries are at a crossroads. According to FAO about half of the global marine resources are fully exploited; a quarter has some potential for increased catches, while the remaining quarter is over-exploited. A review is given by Caddy and Garibaldi, 2000, on the basis of available FAO data.

Over fishing has reached serious levels in many coastal areas, particularly in regions with high population densities, but also in many high-sea fish-

eries. Without effective action by both governments and users it appears over fishing and long-term decline in production will continue. Socio-economic pressures are very large. FAO has estimated that by 2010 the contribution of marine fisheries to the supply of human food could fall to 40 million tonnes per year. By-catch and discards are a problem in most fisheries, reaching globally to about 30 million tonnes annually. Illegal, un-reported, and un-regulated fisheries also constitute a very serious problem. As also demonstrated in section 2.14, there is a need for a new management approach, and the sector is aware of this. The fisheries situation in many poor developing countries in Africa and elsewhere is of great social concern. The pressure from industrialized fishing by foreign fleets in the EEZs is enormous. The countries are unable to control these fisheries and the allocated quotas are often surpassed. Instead, much of the fisheries on the coasts and shelf seas could be managed through a community-based system using small vessels and high employment for the fishing. This would address the increasing poverty as well as human health and other problems. Fishing is also one of the most important human impacts on many shelf areas, e.g., by depletion of leading predators in the ecosystem. Fishing and production are vulnerable to ecosystem and climate changes.

The Role of the Ocean in the climate system and hydrological cycle

Climate is defined as weather averaged over time and space; a period of time and a geographical region. Climate is what we may expect, weather is what we get. Climate varies at all time scales. The causes are natural, and were only so until about 100 years ago. Climate is a resource in itself. It influences availability and productivity of many other resources and industries, for instance, food production, agriculture, freshwater availability, forests, recreation, and tourism. Climate variability can be a hazard and a blessing, both exemplified by the El Nino-Southern Oscillation or ENSO phenomenon. Activities of human society now have an influence on climate and climate variability. This can be noticed globally, regionally, and locally. Our use of fossil fuel has increased greenhouse gas concentrations in the atmosphere to about 30% above the levels of around 1850. Large cities influence the local climate through elevated temperatures and changes in precipitation.

Ice and sedimentary records show that climate has changed rapidly in past periods. An example is the abrupt cooling which occurred during the last deglaciation about 12,400 years ago. The cooling period returned temperatures to one third from glacial temperatures and lasted about 1000 years. It ended very abruptly with warming and temperatures rising to interglacial values in a few decades. The temperature has remained surprisingly stable since then.

The ocean plays a role in the climate system that is complementary and of comparable importance to that of the atmosphere. It stores heat and releases it later, often in a different place. It transports heat in amounts of the same magnitude as the atmosphere. The evaporation from the ocean is the major source of water vapour, the main greenhouse gas, and provides for about 60% of the annual freshwater input to the land. The ocean absorbs and releases carbon dioxide. The thermohaline ocean circulation, in particular in the North Atlantic, is one part of the climate system which has been most clearly identified as one which might be significantly modified by small changes. If the surface layer salinity is reduced then the cooling may not be sufficient to produce water dense enough to sink to great depths, let alone to the bottom. This could happen during present conditions in the northern North Atlantic and North Pacific.

The ocean takes up carbon dioxide from the atmosphere through direct absorption from the air in contact with the sea surface, by CO² being dissolved in the surface water, by the sinking of cool surface water with relatively high amounts of CO², and through biological utilization of the dissolved CO² by the phytoplankton (plants) converting it to organic matter in the presence of sufficient sunlight. The plants are consumed by the zooplankton and other animals, which are in turn consumed by other organisms. Debris falls out from the surface layer, transferring considerable amounts of CO² into the interior of the ocean.

The ocean through these processes absorbs about 30-40 % of the excess CO² society injects annually into the atmosphere from our fossil-fuel driven society. If the rate of injection of CO² into the atmosphere was sufficiently reduced, then the ocean could possibly cope and maintain an equilib-

rium.

Global climate change is generally considered as our present most important environmental problem. The third assessment of the IPCC, in 2001, stated clearly that there is solid scientific foundation behind the statement that the global climate does change due to human impact. Recent research has made it possible to simulate with adequate accuracy the evolution of the most important global climate parameters, and to show that it is only when the models take into account both natural and anthropogenic factors affecting the climate that the simulations resemble satisfactorily the past changes. The projections of the CO² levels in the atmosphere show that with the business as usual scenario these will be about 700 ppm by 2100, i.e., about 3 times as much as in 1850; with frozen emissions as of today, the level will be about 400 ppm; and only with Draconian measures will there be a decrease of the CO² levels, starting from around 2050. The models project that the corresponding average temperature increases would be 2-3 degrees Celsius and about 1 degree Celsius for the frozen and Draconian measures, respectively. This is for the 100-year time scale. However, the climate system has a very large inertia, and we should consider also the evolution over longer time scales, on the order of 1000 years. According to recent model runs, the Kyoto Protocol requirements would over such time scales lead to potentially unacceptable temperature changes. The frozen emission scenario would yield an average increase of 5 degrees Celsius; the business as usual scenario an 8 degree increase. These figures are comparable to the changes the Earth has experienced since the last deglaciation 12000 years ago.

The IPCC report of 2001 states that most models show a weakening of the ocean thermohaline circulation as a result of the expected global warming over the 100 year time scale. The models also show an increase of the sea-surface temperature in the tropical areas of at least 1-2 degrees Celsius over the coming 50 years; in some areas of the Indian Ocean and western Atlantic an increase of at least 2-3 degrees Celsius. The impacts of such changes are still to be elucidated. Most model-runs suggest that the warming will be amplified in northern polar regions, see e.g., Ryabinin, 2003.

However, one effect we know, and that is an increase of the evaporation over these tropical parts of the ocean. Satellite observations of the radiation budget combined with surface observations have shown that the greenhouse effect increases significantly with sea surface temperature. This constitutes one example of a positive feedback involving the ocean. A potential feedback for the climate of western Europe is given by the possible weakening of the North Atlantic thermohaline circulation, which would imply a decrease in temperature. However, this will probably not compensate for the potential temperature increase due to warming.

There are many elements in the ocean which are still very unsatisfactorily known and which are not included in existing models. The capacity of the ocean to take up CO₂ is not sufficiently well known; the processes and the effects thereof at high latitudes in the Arctic Basin and the Antarctica-Southern Ocean are even less well known.

Evidences of massive transformation of Arctic and Antarctic ice are recalled. Dwindling Arctic ice cover and weakening of the permafrost layer will have serious consequences for coasts there, for the circulation at large scales and the ecosystem.

The impacts on the tropical and sub-tropical zones of the temperature increase are also of large concern. The most vulnerable systems are: glaciers, coral reefs, and atolls, mangroves, polar ecosystems, and estuaries: these are all interfaces. The most serious present problems associated with the climate change are: inundation and flooding; fresh water availability; food security, including fisheries; and impacts on coastal zones and all related activities.

It should be stressed that we are discussing scenarios, not forecasts of global climate change. We cannot make such detailed forecasts. We can at present make predictions of such phenomena as the El Nino-Southern Oscillation over the coming season or so, as well as rainfall and temperature patterns over a few months in a climatological sense, and we can provide scenarios for the development of various climate factors over longer timescales. This brings in the importance of climate variability. The scientific and technological breakthroughs have made it possible to provide useful forecasts of such

variabilities and events. A key to this possibility is the availability of adequate ocean observations.

The ocean also plays a very important role as part of the hydrological cycle. Freshwater is a resource of great value and great concern. Most of the annual freshwater input to the land comes from the evaporation over the ocean. This reaches the land as rain, the rain there being about 25% of the evaporation from the ocean.

The Coastal Zone and EEZ

The coastal zone is a very large national resource. About 50% of the global population lives within about 150 km from the sea-land interface, corresponding to about 10% of the global land area. About 70% of all marine food products result from the coastal zone. According to FAO 20-30% of the total animal protein intake in poor countries of Asia and Africa comes from fish. The coastal ecosystems also serve as cleaning agencies for much of our waste products, most of which ultimately ends up in the sea. The impact of society on the marine environment is most seriously felt and also most obvious in the coastal areas. The coastal zone has seen an enormous urbanization over the last couple of decades. About two thirds of all cities of over 2.5 million inhabitants are coastal. Coastal megacities with populations over 8 million will reach about 35 by 2015, with 30 in the developing world, many of them in Asia.

These megacities are very large economic power centers, urban areas generating by far most of the GNP, in particular in middle-and high-income countries. At the same time they contain enormous poverty, and are extremely vulnerable to natural as well as economic disturbances.

The acceptance of the EEZ concept in UNCLOS was revolutionary. It implies the elimination of freedom of fishing and substitution of coastal States sovereign rights over exploration and exploitation, along with the conservation and management of living resources in the EEZ. It also implies that the coastal State undertakes the responsibility of adequate and proper management and protection of the resources and the environment of the EEZ.

The EEZ has added a new dimension to the coastal zone and a new province to the adjacent

country. It provides for the possibility or potential of an added dimension to its development. About 90% of all known and estimated hydrocarbon reserves under the sea fall under some national jurisdiction as a result of the EEZ. The same is the case for almost all known and potential offshore mineral resources. The most valuable fishing grounds are predominantly in coastal zones and hence in EEZ waters. It was also the desire of coastal states to control the fisheries in their adjacent waters that was the major driving force behind the creation of the EEZ. The potential benefits brought to individual states are evident. Most coastal states have also established the EEZ. Hence almost 90% of the world's fisheries now fall under national jurisdiction of coastal states. Land-locked states are excluded and the establishment of the EEZ has taken away a very large part of the area proposed by Arvid Pardo to become the Common Heritage of Mankind. It should be the aim as noted in para. 17.74 of chapter 17 of Agenda 21, that coastal States obtain the full social and economic benefit from sustainable utilization of marine living resources, as well as other resources, within their EEZ, as well as other areas under national jurisdiction. This has so far not been the case for many developing nations.

One would have thought that the introduction of the EEZ would then at least have had a positive effect on fisheries management. However this is clearly not the case. The establishment of the EEZs has had a negative impact on ocean protection and management, in that most countries have not had the capability or been able to fulfill their management responsibilities or duties in accordance with UNCLOS. This aspect has only recently been fully realized and gradually taken into account in capacity building efforts. Furthermore there are several other aspects of the new concept of EEZ, which give rise to different interpretations and views. These may potentially generate conflicts primarily of a traditional security and sovereignty nature; see for instance the report on *The Regime of the EEZ: Issues and Responses*, East-West Center and IOP, 2003.

The ocean, the coastal zones, and small islands provide the basis for much recreational and tourism activities. Tourism is globally the largest single industry, about 500 billion USD per year, and

largest employer, about 260 million jobs, and is still growing fast, expected to double over the first decade of this century. Environment and climate conditions, together with security and stability, are major requirements for this development. The developments subsequent to the events in the fall of 2001 demonstrate the vulnerability of this leading industry to security and stability factors.

The ocean is a waste recipient. This is having very serious negative consequences for the coastal environment in many areas, impacting marine food produce, human health, tourism, local living conditions, and amenities. Other land-based activities of society also have large impacts on the coastal zone. These impacts include habitat destruction; changes and loss of biodiversity; erosion; and alteration of river inputs of both water, particulate matter, and dissolved substances. It should be recalled that the coastal ecosystems provide a service to society by their ability to cope with a limited load of waste material and other disturbances as long as the ecological carrying capacity is not surpassed. These services have been estimated at about 12 trillion USD annually. These amounts should be included, internalized, in economic evaluations, for instance through application of the ecological economics approach. The integrated coastal zone (area) management, ICAM, is the adopted approach to address these problems together with the Global Programme of Action to protect the Marine Environment Against Land-based Activities, the GPA-LBA. Both these instruments were adopted through the UNCED 92 process. The increased vulnerability and uncertainties regarding implications of management and development actions have implied that both risk assessment and risk management are essential elements of ICAM. This brings in the precautionary principle, as part of any insurance scheme. The impacts of natural hazards have led to many severe losses and concerns about insurability, in particular in relation to the extreme vulnerability of many poor areas.

A large number of the human population is concentrated along the coast and this population is increasing rapidly. As the population increases, the demands on the coastal ecosystem increase to provide more commerce, recreation, and living space from a limited resource. Thus we must better understand the coastal ecosystem in order to make better

decisions that ensure the coastal resource is managed using best management practices. Protecting and managing responsibly the coastal ocean is not just the responsibility and effort of one nation alone, but requires the attention of all nations together. The ocean does not notice political boundaries. There are two major pollution issues threatening the coastal zone, namely nitrogen management in food and energy production: increased nitrogen has numerous negative effects on human health and the environmental health; and for sewage and related health hazards, see the Report of WG 3 at the Global Conference Rio + Ten, UNESCO, Paris, December 2001.

New needs and emerging issues

There are a number of emerging uses of ocean space and related issues, closely related to the economy: new classes of marine contaminants are reaching the ocean, influencing populations of marine organisms, reproduction, genetics, endocrine functions; there is an accumulation of persistent pollutants in the deep sea sediments; exploitation of the deep sea-bed continues with respect to the hydrothermal ecosystems, the gas hydrates (clathrates), deep sea drilling for oil and gas; the potential exists of storing carbon dioxide in the deep ocean, using it as a carbon dioxide repository. These issues require considerable scientific attention in order to be addressed adequately. In conclusion, it is clear that the ocean and its resources have an enormous influence on our society as regards its economy, development and security, quite apart from the fact that the ocean is a necessary part of our life support system. These elements all provide for strong motivations to implement ocean governance. However, in order to achieve implementation it is necessary to more effectively communicate and explain the role of the ocean to society at large. This inclusion of education and public awareness enhancement and participation should be an essential part of ocean governance implementation..

The Ecosystem and Regional Management Approaches

Proper ocean management must take into account the interplay between the ecosystem and other systems, human and socio-economic. There are also interactions between different components of the ecosystem and the related processes. These

are often non-linear. Many ecosystems and processes cover large space scales. Presently there are strong moves towards overall use of an ecosystem-based management approach. This implies finding an appropriate scale of management units. These should include the distinct biological and physical characteristics of an ecosystem, and also the major influences on it, such as from rivers, air-sea interaction, intrusions from the adjacent ocean in the form of biology, chemistry, mixing, and water masses. Within such large scale systems, there may also exist smaller distinct systems which need consideration, such as coral reefs, mangroves, sea-mounts, coastal upwelling zones.

WSSD 2002 committed governments to the application of ecosystem management by 2010. Such management must rely on sound scientific understanding and definition of the system, have the ability to adjust to changing conditions, ensure involvement of related stakeholders and organizations, and have long-term commitments. Kimball (2003) identifies three main principles underlying the ecosystem-based management approach:

- (i) there are defined limits of stress beyond which coastal marine ecosystems will no longer return to their original functioning; this relates to the hierarchical view of nature. We may not be able to identify the precise limits of acceptable stress, but sufficient evidence is available to adopt management actions which can anticipate change and avoid further stress on the systems;
- (ii) management decisions should take into account all different sources of stress impacting the ecosystem; changes in the ecosystem may be due to many impacts and management should endeavor to identify cause-effects. In many cases management must find responses to immediate concerns while also endeavoring to address underlying factors and policies.
- (iii) ecosystems and their linkages should be used to determine the appropriate geographic scale for assessments and response actions.

Analysis of the problems of achieving ecosystem based management (EBM) has brought out the following: difficulties of defining EBM and con-

veying the concept to stakeholders; the fact that most management or regulatory regimes are politically based and do not recognize ecosystems; that transformation to EBM will be a costly and complex process; that the approach may lead to economic advantages in the long term, but these advantages need to be sold to stakeholders; that EBM may lead to enhanced sustainable use of resources and maintenance of ecosystems, but that there are governance, management and political hurdles that will have to be overcome if EBM is to be properly carried out (results of Ecosystem Based Management Workshop, by National Oceans Office of Australia, Cairns, June 2003).

In ocean management there is a distinct move towards management at the regional and sub-regional scale, with the exceptions of global issues like shipping and whaling. Many of the problems of ocean governance will have to be dealt with at the regional level. At the same time, the local community-based co-management model is also being applied. Through net-working this can feed into the regional scale and provide much information to that level of management. Regional marine environmental conventions are mostly defined geographically through the contracting parties. Regional fisheries agreements are associated with target species and approximate their ranges. The Large Marine Ecosystem approach endeavors to include the whole ecosystem, sometimes matching the geographical coverage of a related regional convention. An example is CCAMLR, the Convention on Conservation of Antarctic Marine Living Resources.

Several efforts have been made to specify logical regional management units. These include (see e.g., Kimball 2003): the Regional Seas of UNEP; the Special Area designations of MARPOL 73/78; Regional Fishery Organizations associated with FAO as Regional Commissions or Committees or as non-FAO Regional Organizations; Large Marine Ecosystems (LME); and Marine and Coastal Protected Areas, individually or as an Ecological Network. Several regional conventions have also been established, in many cases logically coinciding with other regional delimitations, perhaps in particular LMEs and the UNEP Regional Seas. Such conventions exist for (see e.g. Kimball 2003): the Europe-North Atlantic Ocean, the North East Atlantic, the Baltic Sea Area, the West Africa-South Atlantic

Ocean, the West and Central African Region, the Mediterranean, the Black Sea, the Caspian Sea, the Western Asia-East Africa-Indian Ocean, the East Asia-South Pacific Ocean, the East Asia-Northwest Pacific Ocean, the Latin America-Pacific Ocean, the Caribbean Sea, and the Antarctic-Southern Ocean.

There are distinct advantages with a combined regional and ecosystem approach in management. The tasks of management include: information gathering and assessments; using appropriate standards and criteria to support decision making; implementing base-line studies; identification of technical-science based and policy response options; provision of scientific, technical and financial support to implementers; sharing of knowledge and support for capacity building; and ensuring accountability and performance and progress reviews. Ecosystem based management primarily aims at managing human activities that impact the ecosystem, the coastal, and marine systems.

An ecosystem based assessment of marine problems and their causes requires information with quality assurance, with harmonized standards, and established baseline conditions. Local and national data need to be collected on physical, chemical, and biological conditions, on pollution sources and impacts, as well as on socio-economic conditions, all which can be aggregated and integrated in relation to the ecosystem. For an ecosystem-based problem diagnosis such information on conditions, trends, and threats are required. The information can be organized by individual sector or human activity, indicating impacts; and/or by ecosystem type and the problems encountered for each ecosystem type.

Regional monitoring programmes have been operating in several regions since the 1970's. However, there is still a serious shortage of information on marine environmental conditions and trends thereof in different regions. There is an inadequate knowledge about and integration of many local, national, regional efforts. Enhanced integration at regional levels is needed. This would help increase global understanding and find solutions as well as identify gaps and inadequacy.

Assessments can refer to different substance-

specific, technology-specific, or site-specific evaluations of impacts or to an overview of trends and conditions. GESAMP (1994) defines marine environmental assessments as “the collection, analysis, and interpretation of information with the purpose of assessing the quality of marine areas”. GESAMP points out that this is not the classical EIA which is carried out to study effects of a proposed development on the environment. It is rather a process comprising the collection of reliable data and information to assess the impact of human activities against a background of spatial and temporal variability. Several assessment initiatives are on-going, such as: the GESAMP evaluation of profiles of harmful substances; the GESAMP evaluation of the state of the marine environment; assessments of impacted species using CITES criteria; the Global International Waters Assessment (GIWA), endeavoring to assess conditions in about 60 different international waters regions, to identify priorities for action; the Millennium Ecosystem Assessment of the United Nations on goods and services produced by ecosystems and the pressures on them; the Global Marine Assessment, which is being specified as to approach and coverage.

A major concern is how to improve the communication of appropriate response options. The approach of the DPSIR should ideally be used. The problem is of course to obtain the required quality-assured information. Considerable work has been devoted to specify indicators as quantitative measures of changing conditions which can alert management. The indicators are often used to evaluate different components of the DPSIR cycle, e.g., state, pressures, response. Indicators are also being developed to measure the accomplishments of management and the progress towards sustainable development. In this context, indicators also take into account socio-economic conditions. The scale matching problems of different scales of the ecosystem and the economic system needs to be taken into account. The use of ecological economics and associated modeling as tools for the management should be recalled. Much work is underway to develop sets of indicators which can be applied in different contexts so as to achieve comparable and harmonized results; see e.g. Kimball (2003).

There is a need for inter-regional comparisons under present conditions of globalization, including

reference to implementation of UNCLOS and how it is addressing global change problems. There will be an increasing need for interactions between regional and global conventions and other agreements. Cooperation at regional levels can address concrete problems in a focused way and work out solutions to shared problems with joint management and implementation ventures. Such cooperation can also attract private sectors and discussions involving authorities and stakeholders can generate solutions to specific problems, including finding financial mechanisms to support implementation. Information exchange between regions can be stimulated through relevant international organizations, with reference to global conventions and particular types of shared problems. Such exchanges can stimulate further actions at the regional level. This will also provide feedback to the national and local level. The regional cooperation in turn needs feedback and information from the local-national level, as regards both environmental and socio-economic conditions. A common Action Plan is often used as a basic framework, allowing the regional cooperation also to direct international development efforts.

Ecosystem management requires considerable research. There is a strong need for management to keep informed about new research results and also to pose questions to be addressed by the research communities in both the natural and social sciences. It is therefore most appropriate that the scientific communities are brought on board as partners in the management structure. There is also a strong need for information sharing and strengthening the ability to collect, organize, and transmit knowledge from local to national to regional and global levels, as in the Oceanic Circle model. Information inventories and documentation on specific knowledge needs to be developed so that lessons learnt in various localities can be shared widely and so tested approaches to solve identified problems can be widely applied. The ecosystem-based approach provides for a logical way to organize data and data retrievals on conditions, trends, threats, and solutions; it can also diagnose problems and linkages and identify responses. There are strong arguments in favor of pursuing this approach in ocean management.

Examples of Ecosystem-oriented Approaches Protected Areas

There is a growing use of protected areas, reserves, and no-take zones, where regeneration and repopulation can occur, and which exclude extractive activities, and this line is also being pursued in marine environmental management. The concept of a Marine Protected Area is not new, as it was used in old cultures. However, in the last decades there has been an increased interest in their design and implementation. Now we often use the expression Marine and Coastal Protected Areas (MCPAs). These can be designed to help restore depleted fisheries, protect fragile or unique habitats, protect the rights of local communities, and protect biodiversity and productivity. The MPA approach originally focused on the protection of coral reefs. The International Coral Reef Initiative of 1994 constitutes a good development of the approach.

There are however several problems associated with the concept in achieving an adequate level of protection. For example:

- The ocean is dynamic and open, so even very large reserves cannot protect biological diversity or ecosystem functions when surrounding areas continue to degrade. Hence such areas outside the MPAs must also be managed in some way; protected areas cannot function in isolation. This reflects the Arvid Pardo principle that all processes in the ocean are interconnected and the ocean needs to be treated as a whole. One way to address the issue is to design networks of reserves or protected areas, but this raises other technical and policy issues.
- The establishment of protected areas outside national jurisdiction. Although international soft law exists for doing this, the process is only beginning. The legal system needs to be harmonized and made more comprehensive.
- The need for communication and collaboration between natural and social scientists and the stakeholders. The management of MPAs and networks of these or seascapes requires management of people, as does most management.
- The need for enhanced understanding among the public on how humans engage with other parts of the natural world, for improved communica-

tion with the public, for education, and for realization that the ocean is vulnerable. Both formal education and increased awareness are needed.

- There is no firm scientific evidence that the MPAs can ensure protection of biological diversity or achieve an adequate protection of the ecosystem.

Special consideration has been devoted to coastal wetlands, including mangroves, sea grass beds, coral reefs, inter-tidal zones, and estuaries. These special areas and their associated ecosystems are both very important and very vulnerable. Through the Ramsar or Wetlands Convention of 1971 a number of such areas are protected. Recently this management approach was formally extended to include upstream conditions and areas, thus linking the coastal wetland situation to river systems. The Convention offers guidance and has expertise and is encouraging Parties to address wetlands within ICAM, as well as integrating the management with the river basin management and hydrology. In this context the World Heritage Convention of 1972 should also be referred to as an instrument for protection of special areas.

UNCLOS provides overall support for establishing marine protected areas in national and international regions: Article 192 states that “States have the obligation to protect and preserve the marine environment”. This general obligation is further elaborated in various Articles of part XII of the Convention.

Chapter 17 of Agenda 21 further emphasizes the protection of the marine environment and the need to apply the precautionary principle rather than the reactive approach. The Agenda recommends application of IMO principles with respect to shipping in areas designated particularly sensitive sea areas, which are not limited to areas of national jurisdiction.

The Convention on Biological Diversity of 1992 likewise proposes and endorses the establishment of protected areas or areas where special measures need to be taken to conserve biological diversity. The definition given is: “Protected area means a geographically defined area which is designated or regulated and managed to achieve specific conser-

vation objectives”.

With respect to fisheries, the Agreement for the Implementation of the provisions of UNCLOS relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (the Straddling Stocks Agreement) provides a legal instrument for protection, which can be used by regional fisheries management organizations to implement the protective measures also in protected areas.

The IMO is the international organization to pursue the protection of the ocean and seas from pollution by shipping, just as FAO is the leading international organization as regards fisheries management. The particularly sensitive sea area concept has been designed and agreed to by the IMO. The aim is to protect environmentally sensitive sea areas, within and beyond national jurisdiction, from being harmed by shipping. The IMO has been called upon to prepare an inventory on a global scale of sea areas in special need of protection against marine pollution from ships and dumping, taking into account the sensitivity with respect to renewable resources or scientific research. Particularly sensitive sea areas are defined as: “areas which need special protection through action by IMO because of their significance for recognized ecological or socio-economic or scientific reasons and which may be vulnerable to damage by maritime activities”.

Guidelines for the designation of special areas under MARPOL 73/78 and the identification of particularly sensitive sea areas have been prepared and adopted by IMO. The criteria include: ecological, social, cultural, economic, scientific, and educational. Member States of IMO can submit proposals to designate particularly sensitive sea areas to the Marine Environment Protection Committee of IMO.

Revisions to the original guidelines have been considered as to the possibility of particularly sensitive sea areas as complements to Marine Protected Areas. However, the identification process still does not clarify sufficiently the relationship of these areas or concepts with the major international conventions, e.g., UNCLOS and CBD.

At the regional level, the conventions established through the UNEP Regional Seas Programme include in many cases protocols dealing with specially protected marine areas, e.g., in the Mediterranean, East African, South-East Pacific, and Wider Caribbean regions. The objectives of specially protected areas include, to safeguard:

- representative types of coastal and marine ecosystems of adequate size to ensure their long term viability and to maintain their biological diversity;
- habitats critical to survival, reproduction and recovery of endangered, threatened or endemic species of flora and fauna.
- These Protocols do not apply in areas beyond national jurisdiction.

The intergovernmental mechanisms of the UN system are thus addressing the issue of marine protected areas, but mainly focusing on areas under national jurisdiction. The non-governmental society has also been actively advocating the use of protected areas. In particular the IUCN and the World Wide Fund for Nature have been and are very actively pursuing this path.

Protected areas are tools designed to reduce the pressure from human activities on the marine environment. “No take zones” have been established as part of local fisheries management in some regions. Studies in the Philippines over decadal time scales of such localities have demonstrated that the no-take zones can have a significant positive effect on productivity (Alcala et al 2003). However, the need to also consider the areas adjacent to the protected area and other problems in the application of the MPA concept have led to the development of networks of MPAs. The purpose of such an ecological network is to establish a coherent system, constructed and managed to maintain or restore ecological functions, while also allowing appropriate opportunities for sustainable uses of the related natural resources (e.g. Kimball 2003). The most critical areas in a region can be identified on the basis of an ecosystem approach and a network of small MPAs may be a specified mechanism to achieve key conservation goals.

The Great Barrier Reef Marine Park Authority provides one model of governance and government, which can be used and adapted to different national circumstances. Multiple use marine parks provide a model for how to achieve an integrated natural resource management regime, where the policy instruments and institutional arrangements are fully aware of the inter-connectedness within the complex marine environment.

WSSD 2002 agreed on the establishment of representative networks of MPAs by 2012. On basis of this a joint high seas initiative has been developed by international organizations, IUCN, WWF International, and WCPA, to support the establishment of MPAs in the high seas associated for instance with sea mounts, cold water coral reefs, and hydrothermal vents. The 5th World Parks Congress in 2003 also supported the establishment of a global system of high seas MPA networks by 2012. These could include selected open-ocean features such as eddies, fronts, and upwelling areas. It is however not at all clear how these areas would be specified and managed.

These are all very ambitious plans. It should be noted that so far the MPA approach has not been overly successful. This may be due to insufficient financial and technical resources for their proper management. It may also be due to the wide definition of what constitutes an MPA or MPCA. Improved documentation and more data are needed for the international dimension of the MPA concept.

Large Marine Ecosystems

Large Marine Ecosystems are defined as relatively large regions of the ocean or seas equal to or larger than 200,000 Km², characterized by unique bathymetry, hydrography and biological productivity within which marine populations have adapted reproductive, growth, and feeding strategies. The concept has been under development since the early 1970's, and has gained considerable support.

On a global basis LME's represent geographically distinct units for managing marine resources. By the turn of the century up to 64 Large Marine Ecosystems had been identified or conceptualized. Presently, in 2003, sixty-five LME's have been specified. Ninety five percent of the global fisheries catch comes from these sixty-five systems. The

Global Environment Facility (GEF) is recommending LMEs and their associated freshwater drainage basins as the area for identifying and integrating changes in sectoral socio-economic activities. LMEs are transboundary systems and thus international cooperation is normally required in addressing them.

By early 2000, studies had been conducted of 33 LMEs, identifying the principle driving forces affecting the biomass yield. Based on the lessons learnt a five module strategy has been developed to provide the science-based information required for the monitoring, assessment, and management of LMEs. The 5 modules are: productivity, fish and fisheries, pollution and ecosystem health, socio-economic benefits, and governance. A process based on so-called Trans Boundary Analysis and a specification of a Strategic Action Programme has been designed to put actions in place. This approach is applied at the regional seas level.

The LME concept focuses on total ecosystem management, including management of multi-species assemblages, and sustainable development of ocean resources. The main aim is forecasting of biomass yields or trends thereof. The use of the LME approach has made possible useful comparisons of different processes influencing large-scale changes in the biomass yields of living marine resources within the LMEs. The regional research and monitoring programmes conducted in a systematic fashion over long term periods have and are producing the necessary data for identification of dominant driving factors, thus allowing some trend analysis and forecasting. The LME approach is an example of close linkages between applied sciences and management. It shows the value of a scientific approach and understanding, while introducing a concept attractive to management and national interests. This approach can be very useful in achieving reasonable preservation of the marine environment. It requires a shift from a small spatial scale to a large one, and from short-term to long-term perspectives. Priorities must be set on how to address transboundary issues, reaching across political borders of nations.

The Global Environmental Facility (GEF) is providing considerable support to 10 LME projects at present, including adjacent freshwater basins.

These projects aim at piloting and testing how integrated management of oceans, coasts, estuaries, and freshwater basins can be implemented through an ecosystem-based approach (e.g. Duda 2003). GEF has included the LME concept in its operational strategy as a vehicle to foster ecosystem-based management of coastal and marine resources in the international waters focal area.

Integrated Coastal Area Management

Integrated Coastal Area Management, ICAM, also referred to as Integrated Coastal Zone Management or sometimes Integrated Coastal Management, as a major tool or framework for sustainable development of coastal areas, was adopted or encouraged by UNCED 92, and included in Agenda 21, chapter 17. In paragraph 17.5, Coastal States commit themselves to integrated management and sustainable development of coastal areas and the marine environment under their national jurisdiction. To this end it is necessary among other things to:

- (a) Provide for an integrated policy and decision-making process, including all involved sectors, to promote compatibility and balance of uses;
- (b) Identify existing and projected uses of coastal areas and their interactions;
- (c) Concentrate on well-defined issues concerning coastal management;
- (d) Apply preventive and precautionary approaches in project planning and implementation, including prior assessment and systematic observation of the impacts of major projects;
- (e) Promote the development and application of methods, such as national resource and environmental accounting, that reflect changes in value resulting from uses of coastal and marine areas, including pollution, marine erosion, loss of resources, and habitat destruction;
- (f) Provide access, as far as possible, for concerned individuals, groups, and organizations to relevant information and opportunities for consultation and participation in planning and decision-making at appropriate levels.

The Integrated Coastal Area Management approach has become widely recognized as a coherent framework to organize sustainable management of coastal areas. Although many coastal problems are transboundary or regional, the implementation and institutional arrangements for ICAM must be largely driven at national level. There are presently

over 100 national on-going ICAM programmes. Regional cooperation can stimulate actions, and through regional conventions or action plans a harmonized regional strategy can be developed and adopted by the riparian states. For instance ICAM has been promoted in a systematic way in the Mediterranean through the Mediterranean Action Plan and related regional institutions and programmes. This led to the preparation of "Guidelines for Integrated Coastal Area Management in the Mediterranean", published by UNEP/MAP/PAP in 1997, and several other publications examining efforts of implementation of ICAM programmes; see e.g., Cocossis 2003. Similar processes to stimulate ICAM implementation are active in other regions, including the Seas of East Asia, notably through the PEMSEA Programme. This has developed a number of demonstration sites where coastal zone management is implemented, addressing problems existing at the site. The decadal development demonstrates that ICAM can be implemented at localities with involvement of all interests. Trust, transparency and time are needed. Funding is important but the aim must be to achieve a self-sustained programme.

Despite these efforts in different regions there is still a long way to go before coastal management is on top of the problems facing most coastal areas. To date, no overall evaluation of the efficiency of ICAM has been made. However, it is a continuous, pro-active, and adaptive process, aiming at achieving sustainable development and sustainable uses of resources in coastal areas. The overall objective is to provide for long term sustainable use of coastal resources and development so as to maintain the most beneficial coastal environments in harmony with economic growth. It is not a protection or conservation programme. Since poverty is one major reason for coastal as well as other environmental degradation, economic development, employment generation, and provision of security, including protection against natural hazards and for human health, should be part of ICAM and its goals. The growing pressures from development and population growth, mainly through migration to the coast, are also major reasons for coastal zone degradation and increasing problems. Basic for ICAM is thus an understanding of the relationships between uses and abuses of coastal resources, the impacts on natural capital and the economy, society, and environment

as a whole. The understanding of the social processes and mapping of basic human needs and traditions should be stressed. Social sciences must be involved. Coastal areas and resources are used by many sectors, and natural and social processes interact, making it necessary to proceed with an integrated, inter-sectoral approach. ICAM should thus be in harmony with the ecosystem management approach. A successful implementation requires participation of all stakeholders and interest groups. Horizontal and vertical dialogues must be generated, together with agreements and compromises involving all parties, so as to achieve a common vision of sustainable development.

Thus, ICAM basically aims at:

- (i) strengthening cooperation between sectors and interest groups, including through training, education, awareness creation;
- (ii) preserving and maintaining productivity and biodiversity of coastal ecosystems, through controlling and limiting to acceptable levels habitat destruction, pollution, and exploitation of natural capital;
- (iii) promoting sustainable development and sustainable utilization of the coastal area and its resources.

However, it is a complex procedure to implement integrated management. The main reasons for this are: the interactions between ocean spaces at all scales; the interactions and conflicts between different uses as well as users of the coastal zone; and a lack of knowledge and understanding, which give rise to considerable uncertainty.

ICAM must take into account both land and sea uses and conditions. It involves planning, coastal resources management over a range of time and space scales; support activities, including research, monitoring, education and training; economic, social, and legal perspectives; and institutional developments. This is a large task. Ecological economics can be used as a supporting tool to help provide the required scientific insights and bases. Policy formulation, implementation, monitoring and evaluation of results, possibly resulting in revisions of policy and approaches, are all elements of successful ICAM programmes. There is often a need to identify and specify the priorities so as to address the major issues of concern.

Developing an ICAM programme is an iterative process, requiring time and successive project generations: identification of problems and generation of attention and awareness of these; establishing inter-sectoral dialogue, cooperation and trust, coordination of activities, and gradually comprehensiveness and integration. The process is being applied in many countries and regions, as noted earlier. One example is provided by the previously mentioned PEMSEA Programme.

Most of the environmental coastal area problems are due to the land-based activities of our society. This realization is behind the establishment of the Global Programme of Action to protect the marine environment from Land-Based Activities, the GPA-LBA, adopted in 1995 as a result of the UNCED 92 process and stipulated in chapter 17 of Agenda 21. The implementation of the Programme has turned out to be difficult. There are therefore efforts to link the implementation to the Regional Seas Programme of UNEP and its revitalization, and to other existing regional programmes, such as those of OSPARCOM and HELCOM, and to utilize the integrated coastal area management approach as a tool. This has been achieved by the PEMSEA Programme. This established eleven ICAM demonstration sites, in nine countries, in partnership with the related local and central government agencies (see e.g., Ebarvia 2003). The demonstration sites are showing that ICAM provides practical tools to build capacity, enhance governance, mobilize strategic planning and participation of stakeholders, and produce concrete commitments and on-the-ground action. In these cases focus is on addressing the problems of land-based sources of pollution, a large part of the GPA-LBA concerns.

The ICAM programme is also being used as a response and management approach to deal with transboundary environmental issues. The results from the demonstration sites show that the ICAM approach does provide a framework for implementing environmental management and achieving sustainable development in coastal areas. It provides a system for enhancing governance and capacities and for tracking, managing and improving performance related to mitigation of land-based pollution as well as other environmental policy requirements. Through these results from the demonstration sites, the various national governments can be or are

stimulated to adopt ICAM as a national policy and tool.

The PEMSEA strategy included: stakeholder consultations on each site concerning key environmental and socio-economic issues, including land-based activities and use-conflicts affecting the coastal environment; specification of a shared vision for the coastal development, drafting and adoption of a Coastal Strategy with the vision; the missions of various stakeholders, and the strategies and action programmes that would address the issues, roles, and responsibilities of each key sector and agency (e.g. Ebarvia 2003). The Coastal Strategy provides the local authorities, governments, and stakeholders a map on how to achieve the long-term goals, the common vision, and the desired results for their site. Public awareness creation and education activities, with NGOs, coastal communities, and key stakeholders were included from the start. Continued dialogue and participation in relevant management activities can create a sense of ownership and enhance political good will, reduce conflicts, and lead to long-term collaboration, partnerships, and cost-effective and socially acceptable solutions to the identified problems. This is all part of the ICAM strategy. It includes transforming ideas and people so as to achieve the desired goals and vision for enhanced quality of life. Implementation of the GPA-LBA is one highly desirable goal.

The GPA-LBA framework identifies steps for reaching agreements on objectives, priorities, goals, taking into account nine source categories. This framework can be applied at national and regional levels. The objectives cover four themes: food security and poverty alleviation; public health; coastal and marine resources and ecosystem health; and social and economic values and culture. The framework calls for integrated national and regional strategies to address cumulative impacts, based on integrity of ecosystems and their functions. There are calls for links between management of coastal areas, watersheds, and coordination with sea-based activities. Very few dedicated measures have been developed to deal with land-based pollution, even if solutions exist. Project guidelines have been developed for instance by the World Bank for coastal development projects. The linkage to ICAM and possibility of using ICAM is clear and nicely demonstrated in practice through the PEMSEA

results.

Other scientific-technical support tools

There are several other integrating tools which are being developed or refined. Some examples will be presented briefly here, to show also that basic and applied sciences respond to the needs of society for appropriate and scientifically sound management tools. They highlight some recent specific developments of scientific and technological knowledge to be used for improved management of the coastal and ocean environments.

Environmental Carrying Capacity

The Environmental Carrying Capacity, sometimes referred to as ecological carrying capacity, can be linked to land-use planning, aqua-or mariculture, tourism, pollution, fisheries or marine living resources and standing stock production, depending upon the particular activity under consideration (Chou Loke Ming and Bermas, 2003). At the ecosystem level it may be defined as the range of change that a process or variable may undergo within the system without driving its structure and function beyond acceptable limits. The ECC refers to the ability of the particular environmental system to assimilate impacts without suffering unacceptable changes; it is a measure of resilience. The concept can be used to help achieve sustainable development goals. For the application of the concept, common ways of quantifying the ECC needs to be developed for specific types of resource use.

It may not be possible to establish the carrying capacity but simplify the approach to use of threshold assessments. Thus two approaches to determine the ECC emerge: the active approach involving modeling and research to measure thresholds and the passive, adaptive mode where threshold levels are presumed and subsequently adjusted on basis of responses in the system to management actions. ECC may be expressed as a set of thresholds beyond which development is no longer environmentally sustainable. The thresholds are determined for each type of development. The ECC for a large ecosystem would then be the aggregation of measured thresholds on temporal and spatial scales, for the various types of developments operating in the system.

Risk assessment

The assessment of hazards and risks posed by substances entering the marine environment is a long established practice. The approach was much used in conjunction with concerns over release of radioactive material. A certain formalization was associated with the 1972 London Convention on prevention of marine pollution from dumping of wastes and other matter and the MARPOL 73/78 Convention.

Environmental risk assessment is a technique which makes use of scientific information to identify priorities for environmental actions, helping making the right decisions. The risk assessment involves estimating likelihoods of harm being done to society, human health, resources, and ecosystems, through factors resulting from human activities, reaching targets through the natural environment. Based on scientific information and techniques, likely consequences of exposure to risk factors for targets of interest are specified. The risk assessment provides a means to control activities and conditions, for instance concentration levels of pollutants, to levels that should not cause unacceptable harm. This approach was initially used in the context of exposure to radioactive substances and other types of radiation. The critical pathway approach is a well known technique, whereby the most critical target for atomic radiation is identified through following the path of the radiation to various targets. The most critical target then defines the acceptable level of radiation.

Environmental risk assessment must rely on collection and interpretation of existing data and information on conditions in the environment as well as on properties or characteristics of the activity or process under consideration, for instance of the substances which are potential pollutants. The characteristics of the substances in the form of the profiles prepared by GESAMP can be used. Specific assessment methods are used to obtain comparative information on risks, posed by various factors, to human and ecological targets and the potential consequences. This can help identify priorities of environmental concern. The identified risks can relate to the process or factor, which need to be addressed, controlled or managed. The process to establish the risk assessment will also identify data gaps and uncertainties.

Risk assessment provides one scientific input to subsequent risk management. This process also requires knowledge about social, economic, political and other society-related factors. Sustainable development will reduce vulnerability and risk of disaster. This implies risk reduction and enhancement of insurability. The possibility of insurance can mean provision of financial resources, in that the action or the resource or the target can be insured. This implies possibilities to secure investments. There is a need to expand risk management into the insurance process and bring in the insurance and re-insurance sectors into coastal area management (see IOI, 2002).

The implementation plan for a coastal strategy can use the priorities identified through the risk assessment for prioritization of action programmes, and thus the most appropriate use of limited resources. An integrated environmental monitoring programme can be constructed so as to address the priorities, data gaps, and uncertainties identified in the risk assessment. The integrated monitoring programme can include pollution monitoring, resource and habitat evaluations, and human health monitoring in relation to environmental conditions. These efforts of integration will also bring together the environmental managers and the scientific experts from various disciplines and agencies.

The main challenge in the use of risk assessment is the availability of data and other reliable information. Data gaps and uncertainties are exposed in the assessment process so that the applicability of the results can be judged. Updating and refinement and verification are also part of the process.

In this context the overwhelming importance of adequate observations in time and space with regular data quality control and data delivery must be stressed. This is also emphasized in chapter 17 of Agenda 21 and reiterated in the Commitment of WSSD 2002. The significance of long time series of data based on comparable and calibrated observing techniques is demonstrated for instance by the atmospheric observations of carbon dioxide in the Pacific, by the global temperature records used by the IPCC and others, by the weather ships observations in particular in the North Atlantic, and by the satellite observations of the ozone layers and the Antarctic ice conditions. It certainly is an applica-

tion of the precautionary principle to ensure that relevant observations of the environmental conditions are carried out. In order to establish trends and observe and verify results of management actions, time series of observations are necessary components. These are also needed for modeling and inter-comparisons, necessary parts of management for sustainable development.

Integrated Information Management Systems

As noted, data and observations of various kinds are absolutely necessary elements in any management or governance system concerned with the environment. This is particularly so with respect to the coastal and marine environments due to their dynamic complexities, and the need to know about the physical, chemical, and biological conditions and processes, and likewise for the associated ecosystems. Adequate observing systems are usually costly. It is therefore necessary to ensure that they are well organized, properly maintained with data quality control, delivery and access. Data exchanges and management should therefore be integrated parts of the observing systems. In many cases, however, the data accessibility and availability are not properly ensured. Integrated environmental management in particular need integrated data delivery systems. International information repositories need a common approach with easy access. The large number of agreements as regards marine pollution also calls for a comprehensive information system. This may stimulate an organized approach to specialized information sources. This is much needed, and one way forward can be the use of integrated information management systems. Developments of such systems as tools are being pursued. In some areas, such as the Baltic and North Seas covered by the International Council for the Exploration of the Sea, reasonably integrated data exchange systems and databanks are well established as part of the international cooperation through ICES. Similar developments have occurred in the Mediterranean since the initiation of the Mediterranean Action Plan in the 1970s.

At the global level the Global Ocean Observing System is gradually being established. This is also based on a regional approach in its construction. Presently two components are being pursued: the climate variability and change component; and the

coastal seas component. Several regional components exist and are operational. Regular data delivery to agreed receivers, with data quality assurances and control are parts of these systems. The International Oceanographic Data Exchange programme provides a model. It was established in the 1960s in cooperation between IOC and ICSU.

In the Seas of East Asia the PEMSEA Programme has endeavored to develop an integrated information management system, see Gervacio and Ross 2003. The aim was to address constraints encountered by the Programme in assessing data, including: (i), lack of a standardized system for data collection, data quality assurance, and source information; (ii), inadequate data analysis and interpretation and packaging for use by the managers and planners; and (iii), inaccessibility of the data due to inadequate reporting systems or unwillingness of agencies to share and exchange data.

PEMSEA pursued the development of an integrated information management system in order to demonstrate to managers, planners and decision makers the benefits of access to data in a timely manner and an appropriate format. It is expected that the system will ultimately serve as a required, well-recognized, practical tool and an integral component of coastal, marine resources and environmental management actions. Three stages were used in the development: software development and data-base establishment; linkages of data-base to external software; and sustainability of the system.

The database contains 9 categories, 39 classes and 204 subclasses, all identified by experts from various fields, with standardized and tested entry forms and formats. The categories of data include: site boundaries, biological resources, socioeconomic data, demography, institutional data, monitoring data, physiographic data (oceanographic, geological, hydrological), and model data inventory (model scenarios archived for future use). Such integrated information management systems have been established as of 2003 for 9 PEMSEA sites.

Linking with external software of various kinds, including other databases and predictive models, has been tested and is being further pursued. The sustainability of the existing systems has to be ensured through proper management at each site.

This requires updating, data acquisition and provision, uses by the sectors, and networking. The use of the integrated system has helped in achieving implementation of strategies, obtaining environmental risk assessments, for public awareness enhancement, for investments and coastal use zoning, and to stimulate monitoring programmes. The implementation shows many benefits of such systems, including:

- ready access to multi-sectoral databases
- standardized system of data collection, formatting, recording, quality assurance and control
- harmonized and predetermined procedures for analyzing data, packaging and presenting scientific information with interpretation, in a format serving different users, including managers, decision-makers, the public
- ability to assess the effectiveness of management actions by identifying environmental, economic, and social trends in time and space
- strengthening the local governance and government by enhancing information access and its use by decision-makers, planners, and managers in the respective government units.

The problems in establishing such systems are related to the reasons for trying to establish them: data access, release, data base management skills, language, maintenance and upgrading, and sustainability. The availability of data with quality assurance and regularity will facilitate and stimulate development, testing, verification, and use of modeling as a tool in designing management goals as well as obtaining a common vision and scenarios for its achievement.

National and community-based aspects

It is for individual States to establish a national ocean policy. This process is going on in many countries. Many States are introducing ocean management regimes within their area of sovereignty. The implementation of the national ocean policies is still in very early stages. As part of the process trans-sectoral, inter-ministerial, interdisciplinary mechanisms are emerging for specification and implementation of integrated ocean policy. Legislation to provide the legal basis for co-management, regulation, and standard-setting as well as enforcement, whether at national or regional level, is likely to remain the responsibility of States. States need to

ensure that government is available as an institution with the ability to implement ocean governance, measure performance, and with the authority to gain compliance.

As part of the national ocean policy States should also develop their priorities and strategies as regards marine research, ocean and coastal observations, and monitoring. Chapter 17 of Agenda 21 specifies a number of actions or needs which ought to be taken into account in shaping the national policies. Examples include the coordinating mechanism referred to above; the need for human resources development in most of the programme areas; the need for adequate capacities to collect, analyze, assess and use information and data; the need for adequate systems for coastal and ocean observations; the need for appropriate international, regional, and global, cooperation.

It is to be noted that the national ocean policy should be coupled to related legislation. In some countries, Canada, for instance, this is the case, whereas in others, such as Australia, it is not. Experience shows that it must. Australia has adopted a comprehensive ecosystem management approach for its EEZ. However, the various economic interests convinced the government that environmental management and implementation of ocean policy should be pursued through existing sectoral arrangements (McPhail 2002). This is so despite the fact that the policy itself reinforces the need for an integrated approach in order to meet the multiple objectives of the various sectors: environment, social, economic. Australia is a Commonwealth. The sharing of power between the State governments and the Commonwealth government has led to time consuming negotiations and differences and obstacles in implementation or adoption. This demonstrates the need for a powerful coordinating mechanism anchored in legislation for the implementation of ocean governance. No Australian state had by the end of 2001 signified endorsement of the national Oceans Policy (McPhail 2002).

Nations need to review their existing national legislation dealing with marine environmental and ocean matters. Harmonization and compatibility must be ensured with the ocean policy legislation. Experience also points at the need to have a unified maritime law enforcement regime. Enforcement

cannot be left to sectors or consensus alone. For Ocean Governance to be effective a real integrated management approach must be adopted; a patch-like system will not work.

A regional ocean policy has been adopted for the South Pacific region, and a regional Sustainable Development Strategy for the Seas of East Asia was adopted in the end of 2003 through the PEMSEA Programme, PEMSEA 2003. For several other regions one may argue that regional ocean policies are in place through the reasonably comprehensive regional Conventions in operation there: for instance the Baltic, the North Seas, and the Mediterranean Sea. However, this does not mean that the regions or the riparian States have adopted a regional or a national ocean policy, with associated legislation. This may however be stimulated by the regional Conventions. It can be noted that national plans for ICAM are still required even if a regional policy has been adopted. Such national plans are urgently needed for all Pacific Small Island Developing States (South and Veitayaki 2002). Most nations in the region lack the legislation required to enact regulations required for ICAM, as well as the human resources and skills. All this must be developed at the national level.

As has been highlighted here the vast range of human activities affecting the oceans and coasts requires integrated planning and management to help ensure that development goals, user projects, uses, and strategies do not operate at cross purposes. Integrated planning and management need also to take into account the upstream and land-based activities which can impact the coastal and ocean areas. Well-integrated national development plans can form a basis for policy specification and can help avoid inter-sectoral conflicts. They can also elucidate returns from management investments and provide for motivation. They ought to be based on a common vision, approved by stakeholders, including the public. The legitimacy and authority of the decisions and the related process depend upon public involvement in the debates and formulations. In this context the importance of civil society should be recalled, and the possibility considered to utilize it to develop understanding and insight. Civil society can be a strong national resource in support of sustainable development. In democratic nations the policies reflect democratic

choices.

Implementation and effectiveness rest on public understanding of the importance of the conditions of the environment and the natural capital, and an appreciation of causes of degradation and costs thereof. The results of environmental assessments, of monitoring and of management actions must be communicated to the public in an understandable and transparent way. The findings should be converted into public information and educational programmes that are meaningful to different constituencies. These matters should be addressed at national and community based or local levels. The national political and administrative structure will play important roles in this process.

It is likewise important that the goals of international ocean conventions and their programmes be explained at national and local levels, through seminars and other mechanisms. How do these instruments improve the local quality of life, development, and the overall national well-being? This needs to be elucidated. It will help by strengthening the capacities to address the problems, to diagnose and to respond, as well as to negotiate at the international level. The conventions also help establish a common cause to respond to ecosystem deteriorations.

At local levels a form of community-based co-management is emerging as an attractive option. This system is based on two principles: horizontal integration, involving all stakeholders in decision making; and vertical integration, generating joint decision making among local communities, authorities and, national governments. The approach reflects the new emphasis on decentralization and community empowerment (Mann Borgese 2002). This approach should be taken into account in the national policy shaping, noting also the usefulness as well as vulnerability of the traditional knowledge-based community management. The existing community-based catchment management initiatives need to be supported by related legislation and institutional capacities in order to address adequately the downstream impacts of land-use. It is important for the local communities to have an understanding of the need for management actions, as well have the capabilities to implement such actions. It is also important at the national level,

including for proper use and management of the EEZ. The knowledge existing in local communities and information on traditional management approaches should be collated and applied in the national system. Such knowledge may also be pieced together at the regional level from many sources, to enhance response and generate information inventories.

Managers at all levels are responsible for implementation and compliance to the public and organizations they serve. They need to ensure compliance with national laws and also take into account the relevant international instruments. However, at the international level governments are accountable for fulfilling their international legal obligations. Governments have the responsibility to enforce these laws and give them effect. In many countries the institutional capacity to enforce existing laws is not available or is insufficient. Hence the very strong need also for institutional capacity building. The situation as regards the use and management of the EEZs provides good examples of this need. This requires human resources development. Education is a very important element, and this must be a national responsibility.

The human resources required to ensure proper management must be developed. The people at large should also be educated and trained to understand the meaning of sustainable development and the proper sustainable utilization of natural resources. New technological and scientific results and skills need also to be communicated to users. A functioning educational system is needed at both school and university levels. The development of social science and a social conscience needs to be stressed. Human behavior and lack of human resources and expertise are often the limiting factors. Human resources development, which will also help change human behavior, remains then a great challenge to sustainable development of the marine sector.

New scientific results are regularly produced and the knowledge base and understanding increase regularly, sometimes in quantum jumps. New insights need be converted to useable knowledge so that management can use it. At the same time management needs to have a dialogue with the scientific community so that the community can take up

problems that need to be solved. A decentralized approach to the use of research also seems most appropriate. Natural and social science as well as law and economics need to be utilized in order to achieve comprehensiveness. The scientific and academic communities also need to be stimulated and acknowledged for their work. Such work, contributing to integrated system-oriented knowledge, needs to be considered as a merit. It is in the national interest to increase the communication between the scientific communities of various disciplines, and also stimulate dialogue between these and management communities. A serious problem is the limited availability of scientific experts in ocean and coastal management, including in natural and social sciences, in many countries. None of these areas of expertise are as yet seen as professions. There is a very limited choice of university level education and there is no mainstream, internationally accepted curriculum for such education. It is important to address this gap and stimulate universities to take up the challenge. Furthermore, in order to achieve a comprehensive approach most sectors of society need to be involved, as well as communities and user groups. Participation of all in a harmonized way requires education over a wide range of actions as part of the response of society to common problems. A shared vision and understanding of the need for coastal and ocean management, of the need for co-existence with the ocean, and for the need to understand to at least some degree the ocean itself should be part of the goal of the national policy.

In order to strengthen education as regards coastal and ocean management, it has been suggested that universities and other relevant institutions recognize the importance of ocean governance (Terashima 2003). They should take an interest in the related issues and establish relevant training activities in consultation with national and other authorities. This process may be related to national policy and may utilize civil society. It is also proposed that exchanges be organized at the international level, between institutions, among students, academics, and courses, and that an internationally harmonized curriculum be specified (Terashima 2003; Kullenberg 2002). Linkages with local actions in the education efforts should also be ensured. In this way a critical mass of expertise and institutions may be achieved at the national level

with an international association. Networking should be encouraged.

Coastal populations, that is, local coastal communities, are normally involved with marine activities, and are most likely to be directly affected by the degradation of the environment and the depletion of natural resources. The coastal population likewise will suffer directly from extreme events originating at sea, and also be most aware of these. Hence there is probably a motivation in coastal communities to undertake coastal and ocean management. This can be utilized as an opportunity by local authorities to implement such management. Also in this situation, however, there is a need to develop the required expertise. Local authorities and education and research institutions should cooperate to build up the education at the local level, so as to obtain the needed expertise. This will also enhance understanding for management needs and help create jobs and employment, which are part of the shared vision for sustainable development. Networking of local institutions at the national and international level should be encouraged. Programmes such as PEMSEA can help such developments (Terashima 2003).

Many international agreements, conventions and organizations use the system of national reporting to strengthen and encourage implementation. With well-defined reporting requirements, implementation and accountability can be increased. National reporting has the potential to increase the effectiveness of management (Kimball 2003).

OPPORTUNITIES FOR IMPLEMENTATION OF OCEAN GOVERNANCE

Motivation

It may appear to be most logical to start by specifying and agreeing on a National Ocean Policy, with associated legislation. This would then be followed by implementation requiring various steps as indicated in the previous sections, including administrative, institutional arrangements and their relation to the economic sectors and public and civil society. An opportunistic approach could be adopted for a step-wise implementation, based on a priority evaluation.

However, we have seen the complexities of achieving Ocean Governance implementation,

including the fact that strong political, sectoral, and economic interests are difficult hurdles to overcome. Likewise, the national administrative structure can be a difficulty, such as in a federation of states of semiautonomous local governments, e.g., prefectures. These problems are of course different between States. An alternative approach under these conditions can then be to initiate Ocean Governance implementation using an opportunistic approach. One may then start with a subject area which can yield noticeable results and benefits over short to medium time scales, and which may also be related to major national and international concerns. These are normally coupled to an international convention or agreement, such as on climate change, biological diversity, land-based sources of marine pollution, or freshwater. The very existence of these instruments may also be seen as an opportunity to be used to argue for implementation, provided the country has ratified the instrument. Following this argument the implementation should start with areas or sectors, subjects where social and economic benefits can be demonstrated. The benefits should reach the sectors concerned and the population and be understood also by policy makers and the government.

Let us recall the definition of Ocean Governance given by E. Mann Borgese (1998), where governance is taken in the broad sense. It includes the ways families are organized in terms of customs, traditions, and culture. Ocean Governance thus refers to the way ocean affairs are managed not only by governments but also by local communities, industries, and all other concerned parties. This concept includes national and international law, public and private law, as well as custom, tradition, culture, and the institutions and processes they create. Mann Borgese endeavored to order the complex system of Ocean Governance in a logical sequence, including the legal framework, the institutional framework, the tools for implementation, and effects of the historical context (Mann Borgese and Baillet 1998; Mann Borgese 1998; Kullenberg 2002a). The historical context can to some degree be interpreted as reflecting the opportunity, for instance when that society may be ready for certain actions, or when normally differing interests show convergence. Several of the other aspects have been highlighted in the previous sections here. One particular example is the fisheries sector. The implica-

tion of the broad definition of Ocean Governance and of the ocean as the great integrator is that practically all sectors of our society and economy are affected by the ocean and therefore also have an interest, directly or indirectly, in the ocean, its services and processes. The implementation of Ocean Governance ought to utilize this and follow a pragmatic approach using opportunities. Through a step-wise approach of implementation, it may be possible to convince individual specific sectors and economic interests, as well as governments, about the need for and benefit of Ocean Governance implementation. Trying to overcome the whole directly is too large a task. Even with a step-wise approach a system oriented requirement can be met in that the natural and the social systems are always taken fully into account. Scientific and technological advances can be utilized, uncertainties narrowed down to the extent possible, and interactions between ecological and economic systems put to beneficial use. Examples of opportunities include those areas where recent scientific results can help achieve sustainable development, where the realism of science and the idealism of the vision of sustainable development coincide.

The policy and legal framework will provide the overall basis for pursuing Ocean Governance. However as we have seen this is not sufficient. In order to find and design solutions there is also a need for knowledge about how the systems function, the scientific basis. In order to succeed there is also the need to secure participation of and information to all interests. Management includes information, analysis and assessment, testing and refining solutions, finding agreement on measures to be taken, adoption of laws, and a regular process of review, so as to ensure feedbacks (Kimball 2003).

Governance also needs government. There must be the institutional abilities to implement the policy of governance, and this needs to be supported by proper legislation. Experiences from long-lived institutions can be used as guidance.

There must also be financial mechanisms to support the implementation. Part of the financial support must come from the public sector, the Government. In order to secure such support and commitment there is also a need to demonstrate the benefits which are of concern to Government. These

include improved security for human life, health, and resources or developments; improvements of productions from agriculture, aqua- mariculture; and improved management of freshwater and energy and the environment. Some of these benefits may not be welcome to related industrial or economic sectors, and this needs to be considered. Another part of the financial support should come from the private sector, from the various user sectors. They then also need to be convinced about the benefits and the economic return. This all shows the requirement for dialogue, coordination, transparency, and the possible advantage of a step-wise opportunistic approach. In this context the discussion on the role of the ocean in our present service-oriented economy is recalled.

Effective management, governance, and sustainable use depends on the ability to more or less continuously detect and anticipate changes in the environmental status on national to global scales. The Global Ocean Observing System, GOOS, is intended to provide an international framework for integrating, coordinating, and enhancing ocean monitoring activities world-wide on a planned, timely, quality-controlled, sustained and operational basis. It embraces the economic and environmental applications of marine data and enables these applications to be linked to scientific research, so becoming an essential underpinning for managed sustainable development in coasts and oceans. GOOS is mainly being built on existing observing activities and organizational entities.

GOOS has been divided into two thematic areas.

1. An Ocean and Climate Theme focused upon physical observations, especially relating to oceanic influences on weather and climate. This theme is already partly developed and critical pilot activities are underway to test its operational feasibility. Further national commitments will be needed for its complete implementation.
2. A Coastal Theme focused on the rapid detection and timely prediction of environmental phenomena affecting public safety, well being, the health of the marine ecosystems, and the sustainability of living marine resources. Due to the complexity, the variety of variables to be included, and the lack of pre-existing observing systems on

which to build, the development of this theme is proceeding more slowly and with less national commitment than the other theme.

However, a first generation of Coastal Ocean Observing and Prediction Systems are currently being established in several regions off coasts of scientifically advanced nations. These will provide an entirely new level of quantitative support for the management of coastal regions and EEZs.

The level of development should also be taken into account, partly because it reflects peoples' and governments' priorities. Management enters after some level of development has been achieved: environmental management appears to have very low priority when the level of development is low, or the poverty is high. The population is then more concerned about their own survival. The relation between poverty and environmental degradation seems to prove the point. It should be noted that in the cases of Ocean Governance implementation presented below as opportunities, the actions would help address poverty and would improve some essential components of a reasonable quality of life. However, both the government and the population must be convinced about this in order to provide the required support.

International agreements

The Law of the Sea Convention provides the overall international legal framework, including for the agreements adopted through the UNCED process. Agenda 21 of UNCED identifies institutional and operational implications of UNCLOS, especially at local and national levels; the Code of Conduct for sustainable fisheries complements both the UNCLOS and the Straddling Stocks agreement; the conservation of fish stocks enhances the Biodiversity Convention, and genetic resources are living resources; pollution from land based activities is part of the GPA-LBA, which, along with the climate change convention may frustrate implementation of all the instruments due to the implications; and the SIDS Programme of Action is a case study for the application of all the other instruments. A holistic and integrative approach, equity, and sharing of benefits is required of all of them (Mann Borgese 2000a). Together, the instruments make up a quite coherent and comprehensive system that mirrors the emerging environmental awareness

related to the pressure of demography and development on the environment as well as on the social system. This is also coupled to the scientific realization of potential environmental disasters, and the realization that we are all in the same ship and have need for a system oriented approach. It is coupled to the new relationship between nature and humans that envisages a holistic approach and a new social consciousness that demands social justice, eradication of poverty, public health, and public education (Mann Borgese 2000a). At the same time the very existence of several global instruments demonstrates the conflict between the theory of integration and the reality of sectorialism and competing interests. The realization of this situation provides for the opportunity to advocate for the establishment of a forum capable of considering problems in their interactions,, avoiding duplications, coordinating activities, and giving directions to the sectoral agencies, programmes and institutions, so that the eight legal regimes reinforce rather than duplicate one another, at the national, regional and global level. The creation of the UN Open-ended Informal Consultative Process at the global level should stimulate similar moves at the regional and national level. The need for implementation of the GPA-LBA, which focuses on the regional level, provides for another stimulation at the regional and national level.

Some of these points are brought out in Chapter 17 of Agenda 21. The need for international cooperation and coordination is stressed. This includes provision of technical cooperation in developing capacity and for strengthening existing institutions. In particular, with respect to ocean observations, States should create a high-level inter-agency coordinating mechanism to develop and integrate systematic observation networks. This should be coupled to the establishment of a national, inter-sectoral coordination mechanism for integrated management and sustainable development of coastal and marine resources.

The application of the precautionary principle is emphasized in Agenda 21, with an anticipatory rather than reactive mode of operation (para. 17.21). This implies adoption of precautionary measures, use of impact assessments, clean production techniques, recycling, waste minimization, use of sewage treatment facilities, all of considerable eco-

conomic consequence. Much of this relates to implementation of GPA-LBA and ICAM. The obvious need to address the coastal zone deterioration which is generated through pollution and land-based activities provides for an opportunity to implement Ocean Governance. It can be agreed or argued that the policy and the legislation exist through the adopted international instrument.

The marine environment is vulnerable and sensitive to climate and atmospheric changes. Rational use and development of coastal areas, all seas, and marine resources requires the ability to determine the present state of these systems and to predict future conditions. Systematic collection of data on marine environmental parameters will be needed to apply integrated management approaches and to predict effects of global climate change and variabilities on living marine resources and on the marine environment as a whole (para. 17.97). A long-term cooperative commitment is required to obtain the data. This includes coordination of national and regional observation programmes for coastal and near-shore phenomena related to climate variability and change and provision of improved forecasts of marine conditions for the safety of population and maritime operations (para. 17.101). The need for data and systematic observations is also stressed in the WSSD 2002 Commitments, also suggesting an opportunity to implement Ocean Governance.

The need to strengthen the implementation of the Conventions and agreements related to marine environmental impacts from shipping and offshore activities also provide for an opportunity to implement Ocean Governance. This includes pollution from sea-based activities, establishment of reception facilities, particular attention to areas of congested shipping as regards safety of navigation, use of various control measures as regards transport of hazardous material, as well as crimes at sea. International Conventions to address these problems exist, such as the Basel Convention, the Convention on Prior Informed Consent as regards certain chemicals, the Convention for the Suppression of the Unlawful Acts against the Safety of Maritime Navigation (SUA Convention). The demonstrated seriousness of these problems also provides for an opportunity to implement Ocean Governance, where economic, safety and environmental interests

coincide, and are in agreement with the requirements for sustainable development.

The same concerns the obvious need for improvement of management of marine living resources. International instruments are available as well as the technical means to control and enforce at least some technologies and rules. Here again it is essentially a question of managing humans and human interests, and behavior. However in this case the political and economic interests are not in harmony with the interests of sustainable development. This situation relates to both the high seas and national jurisdictional cases.

The Coastal Opportunities: Development, Problems and Management

A priority is undoubtedly the implementation of coastal management as part of Ocean Governance. The internationally endorsed approach is referred to as Integrated Coastal Area Management. This is based on the realization that we need a holistic approach, a system-oriented one, with vertical and horizontal integration.

The coast, including the adjacent land and water, has always attracted the human population. Here land, ocean, atmosphere, and most human activities as well as most humans meet and interact. The processes and forces associated with this interaction are enormous and complex. The coast is a resource in its own right, which also harbors many other resources.

Through the interaction between ocean and land at the coast, good conditions are fostered for agriculture, forestry, and freshwater resources on land. for food production in coastal waters, for transportation, trade and urbanization. Many are the conflicts which have arisen and can arise between competing interests.

Other coastal resources of great demand include: building material (sand, gravel, etc), minerals, salt, freshwater through desalination, which is increasingly required to meet freshwater demands, renewable energy through currents, tides and waves, mariculture, and for recreation and tourism, which are very important industries in many developing countries. The coastal ecosystems, and in particular wetlands, also serve as cleaning agencies for our waste

products. This means the natural system can break down and decompose much of the sewage and associated waste products through natural biological processes. The increasing population pressure is putting an enormous demand on the coast. Recent assessments show that the capacity of some coastal waters to cope with the waste inputs is being reached (GESAMP 2001). The coast is already over-exploited in many parts, and before long the capacity of coasts around the world to cope with increasing pressure will be surpassed.

The impacts on sensitive habitats such as mangroves, coral reefs, and sea grass beds in the tropical and sub-tropical areas, are globally felt. It is estimated that at least 19% of coral reefs have been destroyed beyond recovery. This is particularly affecting the poorest segments of society, since they depend most, in relative terms, on these resources for income and food. Physical disturbances including erosion of the coast are universal problems as is pollution. Original coastal populations are pushed away from or prevented access to the coast by various industrializations, such as tourism and aquaculture. It can be concluded that we are in a prelude to serious conflict (Goldberg 1994).

The recent review by GESAMP (2001) concluded that: the impact of society on the ocean is most severely felt and seen in coastal areas, including the coastal terrestrial strip and the adjacent waters; the natural homes for biological activities or habitats have already been severely impacted and are threatened with further damage; this includes sea grass beds, mangroves, wetlands (important for birds), estuaries, and coral reefs; the risks to public health from exposures to contaminated seafood and coastal waters through swimming are more significant than so far appreciated, and existing quality standards for bathing waters and seafood do not provide adequate protection.

As has been discussed previously we must have an integrated approach to manage the problems, which takes interaction into account as well as the various sectoral interests of society: integrated coastal area management. This includes the land and the sea which together form the coastal area or zone. It is a system-oriented approach with humankind as part of the system which requires participation of all stakeholders and especially the

local populations. The model developed in the Netherlands over several centuries is very illustrative of the needs: a horizontal and vertical integration, with a delegated, decentralized decision making process and a high level of participation and transparency. In this way a sustainable coastal development can be achieved and potential conflicts addressed and avoided. Economic and social incentives are used to achieve implementation of management rather than regulations, and equity and fairness in uses of resources can be achieved.

The study, management, and development of the coastal area as a resource in its own right must be pursued. Impacts and threats of many uses and users of that zone, of pollution, aquaculture, sanitation and sewage disposal, and freshwater contamination, constitute increasingly serious national security problems in many countries, including the poor ones. The global change potential is also generating increasing risks and uncertainties of great concern for coastal areas, particularly in many small islands and low-lying countries.

Regions of coastal seas are influenced locally and remotely by oceanic, atmospheric, bottom, and terrestrial interactions. This constitutes the forcing of the coastal seas. These factors generate over a broad range of scales many phenomena, including waves, tides, fronts, vertical movements, horizontal currents, meanders, eddies, filaments, plumes, stratification, water masses and ice formation and transformations, turbulence and mixing. These phenomena can occur, or not, with varying strength in different regions. Regions can be different or similar with respect to the mix of coastal phenomena that are present.

Through the EEZ regime of the Law of the Sea the coastal states are given full rights over the resources, but also full responsibility for management, for environmental conditions, pollution control, and all other related matters. This provides the potential for a focused and agreed management regime. However, we know it does not work as it should, and we are aware of several reasons for this situation: the need for capacity building, education and public awareness enhancement, as well as to overcome structural and administrative hurdles. The coastal problems are related to most of the current major issues and the motivations for attempting to

generate and implement national ICAM plans are certainly convincing. However, these perhaps need to be expressed in quantitative economic terms. This can be achieved when reviewing coastal problems: impacts of climate change, sea level changes, frequency and strength of cyclones and other storms, ENSO phenomena; freshwater availability and sanitation, sewage disposal being a universal issue; eutrophication and biological diversity, human health and harmful algal blooms, red tides, marine pollution; and coastal changes, food production and food security, relation to proper nutrition of large parts of poor populations. The importance of aqua-or mari-culture is increasing, but serious food safety hazards associated with aquaculture have been demonstrated, including: parasites, bacteria, antimicrobial resistance, endocrine disrupting substances; effects of residues of chemicals, including drugs and heavy metals, and pesticides probably originating from feeding sources.

In development one of the first aspects to consider is the balance between development and environmental uses of the coastal resources. It is very important that a zonation for various uses is made and agreed to early on. This should take into account oceanographic, tidal, sea level conditions, river runoff, beach and coastal morphology, and natural resources, both living and non-living. In order to avoid future conflicts it is desirable to find the right balance between developmental goals for a limited area and the environmental concerns for a larger area, since impacts of the development normally go beyond the developed area itself. This whole process is related to specifying the vision for development.

Many of the development actions such as heavy constructions, filling, and land-reclamation will bring about irreversible physical changes. The economic investments are substantial. It is therefore important that space is allocated the right uses. Furthermore the conditions on land itself will change through actions, for instance generating faster and more surface runoff than before. The impacts must be assessed.

Hence the early specification of goals for management and development, and agreement on the issues to be addressed, in harmony with the vision of sustainable development, is essential. Thereafter

there should be established a public, social, and practical agreement on the plans, with specific management recommendations and identified control mechanisms before implementation is started. The three aspects of marine space, water front land, and the hinterland must be considered together, in all cases taking into account social matters. The linkage between land and sea for operation of ports, industries, construction, groundwater, and building material extraction must be clearly recognized. Transportation to and from the waterfront from land needs be evaluated. There are several examples of important failures in planning generating problems in over-urbanization of coastal areas. These include groundwater problems, environmental degradation, and sinking cities. Experiences from many large coastal urban areas show very clearly the need for and benefits of having a sound, well developed, politically and socially accepted coastal management plan, based on natural and social science considerations. There is a demonstrated need for training of urban planners in coastal area sustainable development.

There are many uncertainties associated with any coastal management, due to both limited information and lack of abilities to forecast critical hazards, natural or man-induced. These latter are growing in importance with the size of urbanization. It is therefore also important to prepare an approach towards risk assessment, risk management, and mitigation in the plan. Various types of indicators may then have to be used. The whole prospect of insurability also enters into this context. For development, certain insurance provisions are usually required, and hence risk evaluations, together with efforts to achieve risk reduction. Decisions will always have to be made in conditions of uncertainty.

Social indicators are of special interest for coastal conditions and urbanization. These are aiming at reflecting achievements towards length of life, health, knowledge, and standard of living. They are calculated for the area, then normalized in defining minima and maxima for every area. Comparative measures define which area or country is most achieving. These human development indicators will also indicate uses and the health or state of coastal waters. There are many missed opportunities of economic development for rural coastal populations arising from absence of integrated manage-

ment and failures to address poverty reduction in the area. This demonstrates the significance of the human development indicators. Land-use and income distribution data, population diversities in the coastal area, annual marine fish catches, and existence of protected areas---all these provide clues to the intensity of uses of coastal and marine resources.

It is suggested that the coastal zone is the richest zone on Earth and at the same time the most vulnerable and complex one. The vulnerability is brought out in monetary terms by noting that in the 1990s the average total economic loss through natural disasters hitting the coastal zone was 25-30 billion US dollars; in the 1980s it was about 10 and in the 1960s less than 5 billion dollars. The coastal zone is becoming increasingly squeezed between the land, the sea, and the human society.

Practically all of the problems of the coast start on land, through our land-use patterns. These include changes in river inflows to the coastal zone, which can have very strong impacts on conditions there. Naturally, many of the problems are trans-boundary, requiring international cooperation in being addressed. Here, regional cooperation enters, and many examples have been referred to earlier. At the global level the importance of the GPA-LBA effort is recalled.

The most serious problems presently affecting the coastal areas are (GESAMP 2001):

- Alteration and destruction of habitats and ecosystems;
- Effects of sewage on human health;
- Widespread and increasing eutrophication;
- Decline of fish stocks;
- Changes in inflow of particulate matter (sedimentary material) due to changes in river flows (hydrological changes).

Several examples of costs to human health are provided based on WHO evaluations, as follows. Occurrence of about 250 million cases of sickness annually, respiratory and gastroenteritis, from swimming in polluted waters, at costs on the order of 1.2 billion USD; consumption of contaminated seafood resulting in 5-10 million cases annually with related costs in the range of 10-20 billion USD; and around 4 million cases of hepatitis A, of

which 40.000 annually are fatal. It is clear that natural hazards as well as seafood and health safety associated with aquaculture, sanitation, and sewage disposal are becoming critical issues in many countries. The very large ecosystem-based service the coastal waters are providing to society should be recalled in this context. These have been estimated to be of the order of 12 trillion US dollars annually.

It can be concluded that the economic costs of failing to take action to control the land-based activities generating these impacts are enormous. The international dimensions are obvious and well recognized. This concerns the global implications of economic and biological diversity losses, as well as the fact that financial, technical and social cooperation is required between developed and developing countries if we are to adequately deal with these problems. The commitment and priority given to the implementation of the GPA-LBA by WSSD 2002 are well founded. Experience suggests that there are three broad approaches to ICAM implementation in practice (GESAMP 2001a):

- An integrated institutional mechanism, where one organization is responsible for most or all aspects of coastal management; an example is the Great Barrier Reef Marine Park Authority in Australia
- An institutionally coordinated approach, where one institution coordinates the plans and work for the others; an example is the Chesapeake Bay Programme in the United States
- Institutional co-ordination achieved through consultation within a legislative framework. An example referred to is the lead taken by the Ministry of Lands and the Environment in Zanzibar to develop a holistic strategy for protecting the coasts. This is based on working closely with other sector ministries and in partnerships with local communities. A similar approach has been adopted in Mediterranean countries and in demonstration projects.

In the East Asian Seas region a number of demonstration projects putting the ICAM approach into practice have been established by the PEMSEA Programme over the last decade in most of the countries of the region. These are successfully

demonstrating the use of ICAM.

In conclusion, there is a very obvious need for action. Experiences from several countries also show that positive results can be obtained, despite the difficulties referred to, as long as those difficulties are taken into account in management actions. This is an obvious opportunity to take action and initiate Ocean Governance through application of Integrated Coastal Area Management. Implementation can be initiated on an opportunistic basis through demonstration sites, also in context of regional cooperation. At the local community level such opportunities may be found where the economic, livelihood, social security, and environmental interests coincide; examples may be localities dedicated to recreation or tourism, or to mariculture. These latter localities often depend upon both good environmental conditions and the linkages and interactions between the atmosphere, the land, through river and other runoff, and the open ocean through the associated current system. A system-oriented approach is required which takes into account these linkages and interactions, these being the basis for healthy, productive conditions for mariculture. Such an opportunistic case development would help address the mariculture problem in strong need of an ecosystem based management approach.

Transportation across the sea: a case for Ocean Governance Implementation

The sea-borne trade, related services and institutions are of fundamental importance to society. According to IMO, 80-85% of the world goods are transported by ships. Of all the maritime activities the sea-borne trade has the largest economic impact, globally and mostly also nationally. A world without shipping is today unthinkable. However, can we depend upon shipping? There are several subsidiary questions to the overall question of if we can continue to depend upon shipping to provide the flow of goods, grain, oil, gas, and tourists. Can the ocean and coastal areas take the pressure? Can the technology, management, legislation, and international cooperation developments take it? Can the human resources required for security of the operations be developed and maintained? Can sufficient safety at sea be maintained and shared economy be achieved to ensure availability of risk capital? Can piracy and other crimes and abuses at

sea be controlled? Can the energy sources required for propulsion be maintained? And probably there are other questions. The answer to most of these points is probably a yes, but this demonstrates that there is a clear need for implementation of Ocean Governance also with respect to this sector.

The risks associated with maritime transport and the potentially large economic gains from it were recognized relatively early on. Thus the concept of insurance, closely related to the precautionary principle, was introduced through marine insurance long before other types of insurance were established. In Greek, Roman, possibly even Phoenician times a type of insurance system was put in place. The assurance and policy notions were first introduced in Genoa around 1400. The London Assurance and the Royal Exchange Assurance were established as marine insurers in 1720. Lloyd's was initiated in 1666 in a coffee house owned by Edward T. Lloyd, and was incorporated as Lloyd's in 1871. Today the global average market share of marine insurance is 2-3%; however in many developing countries, depending upon imports and with very little personal insurance in place, the market share can be up to 50%.

While the dangers due to natural forces are very significant at sea, those due to human interferences were and still are dramatic. Human errors in operations are responsible for about 95% of accidents at sea, and piracy on the high seas is well known throughout history. Piracy and other crimes at sea today occur in the form of traditional piracy and armed robbery, illegal fishing, abandonment of ships, illegal transportation of dangerous goods, toxic or other wastes, drugs, arms, as well as people, leading to illegal immigration. Piracy concerns all kinds of shipping and pleasure craft. There has been a dramatic rise of piracy occurrences in particular in Southeast Asia, the South China Sea, the Caribbean, and outside West Africa. These events have almost tripled during the past decade. It was reviewed by the UN Informal Consultative Process at its session in 2001, but efforts by IMO and other international bodies have not been able to stop its growth. Piracy causes serious threats to human life, safety of navigation, international trade, property, and the environment. Victimized ships have been found drifting in congested traffic areas without steering or propulsion, with the crew killed or

locked in by pirates. These acts are frequently linked to organized crime and strong syndicates, who are also involved in drug trafficking and illegal transportation of people and other goods. Recent reports from the Piracy Reporting Center, Kuala Lumpur, of the International Maritime Bureau also identify political piracy and attacks on chemical and oil tankers, suggesting that maritime security is not improving. Barges and tugboats are now also becoming piracy targets in the Strait of Malacca. The IMO expressed concern in early 2004 that governments, shipping lines, and other stakeholders are not responding sufficiently to the commitments to enhance security made at the end of 2002 as a consequence of the terrorist strike in September 2001. These commitments include a ship-and-port security code as a framework to be set up to evaluate risk, and the installment of a ship-to-shore security alert system on the bridge and one other location of the ship. When the system is activated, shore-based monitors will know that the ship, with its identity and location known, is under attack.

Piracy and other crimes at sea are now reaching such proportions that they require cooperative action in an organized, legally, and jurisdictionally accepted way by the international community. This must be part of the international implementation of Ocean Governance. Actions have been taken by the UN General Assembly, and the Convention for the Suppression of Unlawful Acts against Safety of Maritime Navigation (SUA Convention) is in place.

The International Convention for the Safety of Life at Sea (SOLAS) was initiated relatively recently, after the Titanic disaster in 1913. It covers practically all aspects related to safety at sea with respect to life and property, and several elements of the Convention are also highly relevant to the safety of the marine environment. The Convention was amended in 2000 with respect to measures against international terrorism, and the SUA Convention is being reviewed for the same purpose.

Several other conventions are addressing the protection of the marine environment from various maritime operations. Most of these were also triggered by a disaster, the major oil pollution catastrophe in 1967 in European waters. A very important one is the International Convention for the Prevention of Pollution from Ships (MARPOL) adopted

by the IMO in 1973, and modified by a Protocol of 1978, and therefore known as MARPOL 73/78. The Convention provides regulations regarding practically all potential sources of pollution from ships. It has currently 6 Annexes, aimed at controlling pollution from ships from releases of oil, noxious liquid substances, harmful substances, sewage, garbage, and air contaminants. These Annexes specify the related technical details. The dumping of wastes at sea is regulated through the London (Dumping) Convention of 1972, which entered into force in 1975. The purpose of the Convention is to control any deliberate disposal at sea of wastes, materials, or other substances from ships. It has a protocol of 1996 superseding the Convention. This entered into force at the end of 2003. The International Convention on Oil Pollution Preparedness, Response, and Co-operation of 1990 aims at contracting parties being prepared to combat and respond properly to oil spill incidents from ships, oil platforms, ports and oil handling facilities. It entered into force in 1995.

All these Conventions and the related efforts by the industry and the community have had very important and positive results. International cooperation has been strengthened as have national legislation and control. Maritime accidents also need to be related to maritime transportation figures. About 3000 tankers are moving on the order of 2 billion tons of oil annually over an average distance of 4,700 nautical miles, and only a very small fraction of about 5.10^{-6} of the oil is spilled, or about ten thousand tons annually. Shipping is also carrying over 2.4 billion tons of dry cargo across the ocean, using some 25,000 vessels (Gold 1998).

However, there are other concerns. Problems occur at the crossroads and in the straits linking major ocean basins, where traffic jams can and do occur. There are also some regional sea areas where marine traffic is very dense and problems can arise. Examples are: the southern tip of Africa, the North Sea, the South China Sea, the Caribbean, and the Mediterranean.

The greatest problems are associated with some of the most complicated and most trafficked straits. These include the Turkish Straits, the Dover Strait, the Straits between Denmark and Sweden, the Strait of Gibraltar, and the Strait of Malacca. In addition

we have the Suez and Panama Canals.

The Turkish Straits, as an example, consist of the Dardanelles, which connect the Aegean Sea and the Sea of Marmara, and the Bosphorus, which connects the Sea of Marmara and the Black Sea. The total length is 260 km. The Bosphorus is the most complicated part, being 30 km long with 12 abrupt turns, a width varying from 750 m to 3,6 km, and a depth ranging from 36 to 124 m. There are strong currents and navigation is difficult, running through the city of Istanbul with its 11 million inhabitants. About 50,000 tankers and cargo vessels pass through this strip of water annually; about 5% are supertankers. Accidents happen frequently, and disasters could very well occur. The Straits have become an artery of the oil supply of the world, and in particular Europe, following the collapse of the Soviet Union and the opening up of oil exports from the former Soviet republics of the Black Sea. Very large tankers carry about 230 thousand tons a day through the Straits. A cut-off could have very significant economic effects. This is confirmed by the effects of security measures and bad weather conditions generating traffic jams in the last parts of 2003. Delays of up to 3 or 4 weeks were experienced, causing reductions in operations in refineries in several European countries, in particular Italy and Spain. So the Bosphorus problem can hit very hard, including through increased tanker charges. The geopolitical complexity is demonstrated by the fact that Turkey controls the Straits, including the security measures. Transit through the Straits is controlled by Turkey exercising sovereign power in the Straits, but governed by the Montreux Convention of 1936, through which the Bosphorus was made an international sea lane. Turkey cannot prevent innocent passage, but severe constraints can be put on free passage through security regulations related both to weather, and environmental and cultural heritage protection. The Turkish Straits are referred to in UNCLOS as being governed by "long-standing international conventions", unaffected by the Law of the Sea Convention.

Vessel traffic in the Strait of Dover, where the traffic density is very high, has been managed for about 150 years. Carefully identified traffic separation schemes have been established through national, regional, and other international bodies. Cooperation between all parties has been established.

As a result the number of accidents has declined considerably.

However, while traffic control works, pollution control does not seem to function as well. It has proven very difficult to enforce pollution control measures. In order to remedy this situation the approach of "port state control" was first put in practice in Europe. This gives ports responsibility to monitor vessels entering the port and authority to take actions when required. This system of enforcement replaces or supplements the flag-state enforcement system, which is inadequate due to the use of flags of convenience.

The Strait of Malacca is another very important and complicated area, linking the Indian and Pacific Oceans, with about 150 ships passing through per day. It is a shallow area, with tidal variations of water level amounting to 1.6 to 3.7 meters, depending upon locality, and with shifts in the seabed through wandering banks and dunes. There are considerable navigational hazards. Large efforts have also been made to survey and chart the Strait of Malacca and establishing up-to-date navigation and control systems. The latest is a pilot experiment, called the Maritime Electronic Highway. Through this all available navigational information aids will be passed to ships in real-time mode, and an automatic ship tracking system will be used. A traffic separation scheme has been put in place and a limitation of size of ships by requiring an under-keel clearance of at least 3.5 m at all times. Malaysia and Indonesia have asserted their right to control the Strait of Malacca. The water body is part of their territorial sea and is not an international strait. An essential problem that has been debated for some decades concerns who is going to maintain and pay for the navigational aids, including dredging, current, and sea level observations in the Strait. This has not yet been satisfactorily resolved.

There are several other important straits through which maritime commercial traffic is of worldwide importance and where control rests with one or two states. Although customary international law, UNCLOS of 1982, or "long-standing international conventions" normally govern the right of innocent passage in peace time, the adjacent States have considerable rights to protect their interests and security. The Law of the Sea defines some restrictions on

innocent transit: ships must comply with generally accepted international regulations, procedures, and practices for safety at sea, reduction and control of pollution; also, ships must proceed without delay and must not use any force or threat. The States bordering the straits can adopt regulations for “the prevention, reduction and control of pollution, by giving effect to applicable international regulations regarding the discharge of oil, oily wastes, and other noxious substances in the Strait”. It is clear that the straits issues are complex and have the potential to lead to conflicting situations and conflicts. It would from this point of view be highly desirable to have an international Ocean Governance regime as regards transportation, which could or should involve all stakeholders. This mechanism does not yet exist.

There are other ocean areas where congestions of traffic occur and where delicate situations can arise due to the great importance of transportation for States. One such area is the South China Sea, part of the most direct route between the Pacific and Indian Oceans, and hence the passageway for almost all maritime traffic between the Far East and Europe, Africa, the Middle East, and South Asia. This amounts to more than 10,000 ships of greater than 10,000 dwt southward moving and almost as much northward moving annually. There are many un-surveyed or poorly surveyed parts of the area, and it is also complicated meteorologically and oceanographically. As a consequence, recommended shipping routes are defined and chartered. Nevertheless accidents are frequent and relatively often disastrous.

The economic, scientific, and technological developments over the last decades or so have changed the demand for transport and related services. Technological developments and changes in national policies have made it possible for the shipping industry to respond to the challenges. A major development has been containerization. The shipping industry is high technology and developments occur rapidly. It is very difficult for the developing world to follow. The concentration of transport capacity rests with the industrialized countries in the West and in Asia. However, according to UNCTAD, shipping is of relatively greater importance for the developing than the developed world. Developing countries are very concerned about

their small share of the maritime transport sector. If this is not changed the developing countries will become increasingly marginalized and this is not in the interest of the developed countries. It appears that greater cooperation among the developing countries, the opening up of boundaries and introduction of democratic, non-centralized governance and economy could help.

The maritime transport sector is of concern to almost all sectors of society, directly or indirectly. A very small number of multi-national alliances controls the sector. There is strong cooperation between the sector and the insurance-reinsurance industry. Insurance economics, standard setting, premium setting and certification by classification societies are making important contributions to safety at sea. However, the linkages and power are also open up for abuse, which has been well documented (e.g. Couper 2000). Technological changes, including the development of navigation aids, containerization, and the increasing size of ships, have large influences on the ports. Some traditional ones have been marginalized, while others have lost their status because of lack of adjustment, or issues related to the size of the hinter-land they are serving. This has led to creation of very large ports often coupled to mega-cities. This development has had severe consequences for land use patterns.

Ports have also been forced to adjust to the requirements of the international environmental and other conventions. MARPOL 73/78 requires the establishment of reception facilities and ballast water exchange systems. There is an overall requirement for sustainable development of port infrastructure, including advanced systems for vessel traffic management and control of vessel safety. The port state control system is based on the Memorandum of Understanding on Port State Control adopted in 1982 in Paris by 15 European States. Canada is now a member and the USA participates through the Coast Guard. The port state control mechanism now covers working and living conditions on ships, safety standards, and marine pollution prevention measures. For the Asia-Pacific region a Memorandum on Port State Control was signed by 15 maritime authorities in Tokyo in 1994. The system is also taking effect in the Caribbean. The IMO Assembly has adopted resolutions urging member States to consider application of port state

control through regional co-operation. The IMO and ILO are associated as observer partners in the Port State Control Committee, which is the Governing body.

The members of the Port State Control System commit themselves to a dedicated effort of implementation. This is done in an international context through which the States demonstrate a political will to co-operate in this implementation effort. Co-operation is again the key towards progress. Each country commits itself to a 25% inspection level of the number of ships entering its ports over a 12 month period. At a regional level this in practice translates into an inspection rate of about 90%. Inter-regional co-operation, exchange, and training are also going on. This should ensure similarity in applications of rules, avoid unfair competitions, and lead to mutual acceptance of inspection results. Through IT all inspection results can be linked, which should lead to the establishment of systematic and comprehensive safety profiles of ships. This would eventually lead to focusing attention on that part of the fleet that really needs attention. This will save money and time for others, and thus be another argument in favor of adopting standards and enforcing them through the sector itself as a co-operative effort. The inter-regional co-operation could lead to tracking of ships and could gradually come to address the piracy and other crimes at sea problem.

The demand on the human resources manning the ships has changed over time and has recently broadened. The technological developments go fast and are not limited. They require more or less continuous on-the-job training. The demands of increasing international and varying national legislations are very high. The master of the ship is liable to prosecution if adequate conditions are not met. Training and professional upgrading is provided internationally through the IMO and ILO and nationally through state and shipping companies.

It can possibly be argued that Ocean Governance to some extent is implemented in the case of the transport sector. However it is not enough. Most sectors of society are affected, the economic, security, and safety issues involved are enormous, and the global impacts of disruptions are unavoidable. It therefore seems that there is a strong need for broadening the implementation of Ocean Gover-

nance in this case to enhance transparency, security, and protection of vulnerable interests, and to increase equity and the participation of developing nations.

Climate variability and change: opportunity for Ocean Governance Implementation

Global climate change is presently regarded as our major environmental concern. Associated with the change may be climate variability and increased severity of weather events causing natural hazards. Major concerns associated with climate change itself are the impacts of warming, enhanced sea surface temperature, and rising sea level. This latter threatens in particular many SIDS and low-lying territories. Combination of sea level rise and both enhanced frequencies and strength of severe storms can generate major disasters in coastal areas. Climate variability, which has always been with us, also affects major human activities in coastal and inland areas, through influencing freshwater availability, the timing and amplitude of seasonal changes, flooding, and drought. Increased temperature and humidity will spread diseases, in particular tropical ones. Enhanced sea surface temperatures will enlarge the belt where tropical cyclones can occur, the critical temperature being about 27 degrees Celcius.

Results of international research efforts over the last several decades show that in many regions of the world the seasonal climate is potentially predictable, and that climate variability can be reasonably modeled and predicted (Goddard et al 2001). This is a major scientific advancement. Modeling resulting in forecasting is an important tool. However, an effective utilization of the forecasts has not yet resulted. This is partly due to the lack of communication between the potential users and producers of the forecasts, but also due to the lack of observations required to improve forecasts. In order to remedy the situation, there are now increasing efforts to have the user communities specify their needs and involve them in the development of products and uses of the forecasts. The community developing the skills and the predictions is increasingly taking into account user needs and demands in their work. This also leads to improved specification of the observations needed to generate and improve the predictions. It is not the intention here to discuss the theory of predictability

or the various methods used or details of how to realize the potential benefits of the predictions; reference is made to recent review articles such as by Goddard et al (2001) and Hansen (2002). For the purpose of the present subject, ocean governance, it should be stressed, however, that it is the long memory of the ocean that makes it all possible. This is combined with technological developments of ocean observations, computer power, modeling, and data assimilation, to generate the forecasts. In the atmosphere the memory is short, a temperature signal or a heat input is quickly mixed with the air masses and its signal dissipated. Atmospheric observations alone will only permit weather predictions of 5-10 days. In the ocean it takes about 1000 times longer time to dissipate the trace of a heat input than in the atmosphere. Thus including the observations and the thermal inertia of the upper ocean provide a degree of predictability of up to a few months. This can be further increased by taking into account the persistence of land surface characteristics and coupling the upper ocean dynamically to the atmosphere. Real-time or near real-time data from ocean observations are fed into the evolving forecasts using data assimilation techniques.

It is mainly through using observations from the ocean, combined with other relevant information, including as regards the land surface, and modeling, that climate change scenarios can be produced, as are those used by the IPCC. These are indispensable in specifying possible responses of society, as abatements or adjustments. The role of the ocean may well be decisive for the timing and size of the climate change. In view of the importance of the ocean and the great concern for climate change and climatic variabilities, it seems that the situation provides for a very promising opportunity for Ocean Governance implementation. This implies putting in place the required ocean observations, the capabilities to use these to produce forecasts, and the capabilities of user sectors and society groups to utilize the forecasts and related products. This would also be in accordance with the precautionary principle with respect to early warning signals for potential climate change.

At the national level the process could start with obtaining information on the needs of various sectors, communities, industries, and locations for forecasts, the potential uses and users of the fore-

casts, and which types of forecasts would be most useful, such as rain, drought, temperature, and seasonality. The forecast information must address a real and perceived need. The benefits will only arise through decision options sensitive to the forecast information, and the benefits depend upon forecast of the relevant components of climate variability (see Hansen 2002). Estimates of the benefits should also be made if possible. These can relate to enhanced security, protection of life and property, as well as increased returns on productions, reduced management costs, adjusted uses of energy, freshwater, and food. Forecasts and observations will help assess the risks and achieve risk management. This may reduce the risks to acceptable levels to make insurance feasible. An example of such an achievement is the forecasts of tropical cyclones which have been organized through cooperation between research and insurance interests (see Malmquist in IOI 2002). The insurance industry has in the last decade experienced strong growth in damage costs due to climate variabilities.

The need for control and management of the uses and users of the forecasts must also be considered in Ocean Governance implementation. This should be done in relation to the goals and the common vision of sustainable development. Forecasts can be used to overtax the natural system, counter to the aim for sustainability, just as well as for limiting the uses of the natural capital to sustainable levels. There is accordingly a need for a firm national policy and coordination mechanism on delivery of forecasts and related products. Resource users and managers must share the same long-term vision. There has to be an agreement on definition of receiving societal groups and benefits, and on how dissemination of forecast information is to be carried out. This relates to an understanding of the limitations of the forecast, how the forecast will be interpreted by the recipients and users, and which types of forecasts should be disseminated. The national policy needs to decide on a possible requirement for quality control or standardized method of validation of forecasts distributed by public agencies and possibly by others. This is done as regards weather forecasts, and may be established also for seasonal to interannual climate forecasts. There is also need for considering provision of education as part of ocean governance education as well as outreach to users. Such education would,

among other things, provide for a basic understanding of the climatology of the region or country; of how to interpret information of a probabilistic nature; of judging the reliability and level of uncertainty; increase ability to separate observations from model results, and help in judging the potential impact of forecasted events on given sectors, industries, or society groups. Such specific education should be part of the Ocean Governance implementation scheme. This would also enhance general understanding about the role of the ocean for society, which is also part of the ocean governance goal. Detailed discussions of those aspects are given by Broad, Pfaff and Glantz (2002) and Hansen (2002) and several others cited by these authors.

Forecast dissemination can have no or even negative effects if the various constraints as regards their uses are not adequately addressed. The indicated theoretical and practical challenges to utilizing climate-related forecasts are brought out by several analyses, see Broad et al 2002. They concern: access, understanding, distortion of information, competing forecasts, misinterpretation, and private and sectoral reactions that may result in rejection of forecasts. This latter is often experienced in relation to storm and cyclone warnings. Ocean Governance implementation needs to address these matters.

The El Nino-Southern Oscillation (ENSO) phenomenon is presently the most dramatic, most energetic, and best defined pattern of climate variability. El-Nino, the ocean component of ENSO, is a reversal of the ocean circulation pattern in the equatorial part of the Pacific Ocean. Under normal conditions the trade winds blow fairly consistently from east to west, driving the equatorial current system. The water absorbs much heat during the passage from east to west across the Pacific. A pool of very warm water builds up in the western equatorial Pacific. When the temperature reaches a certain level the normal circulation weakens, due to the ocean-atmosphere interactions, and is gradually reversed in the ocean and the atmosphere. The warm water returns from west to east along the equator, mainly on the southern side.

This reverses the situation along the South American coast, particularly along Ecuador and Peru. From having a relatively cold surface layer coming from the south and from sub-surface layers

through the coastal upwelling driven by the southerly winds, the surface water becomes warm and relatively poor in nutrients during an EL-Nino. The surface layer also deepens and the coastal upwelling is interrupted. These changes in warm water distribution have global consequences for climate characteristics that are second only to seasonality. Very heavy rains fall in the normally dry regions of Ecuador and Peru, and droughts occur in Australia and Southern Africa. Unusual tropical cyclones occur in the central Pacific. The fisheries outside Ecuador, Peru and partly Chile are disrupted. Other climate patterns can also be disrupted, for instance the Indian Monsoon, the seasonal rains in northeast Brazil, and the regional climate patterns in East Asia, North America, and Africa. The 1997-98 El Nino was the most extreme in the 150 years during which observations are available. It is estimated to have caused over 34 billion USD in damages and the loss of 24,000 lives. The 1982-83 El Nino also hit hard in several countries. Since the mid-1980s forecasts of El Nino have been made possible. It is through increased scientific understanding of the ocean-atmosphere interactions, ability to model the coupled ocean-atmosphere system, and the establishment of regular observations of the tropical zones, at first in the Pacific Ocean, that the forecasting of the ENSO phenomenon and other climate fluctuations in particular seasons in many parts of the world is made possible. These forecasts will always contain considerable uncertainty. They are therefore best interpreted as shifts of climatological probability distributions.

We now understand that the El Nino phenomenon is a part of the normal global climate system. It is a recurrent process with an average return period of about 4 years, although its occurrence can be between 2 or 8-10 years apart. Records show it has long been with our climate system. This being the case we should be able to prepare for it. We now understand it sufficiently well and can make the required observations so as to be able to identify an onset of El Nino and make forecasts and adjust our management accordingly.

The El Nino occurrences of 1987, 1991-92, and 1997-98 were all forecasted. On the basis of these successes the scientific forecasting community considered that society would be best served if climate predictions were to be issued on a regular basis and

not only when El Nino was expected. Such regularity would generate user groups, including government agencies and private enterprises. The International Research Institute for Climate Change now provides seasonal temperature and rainfall forecasts for all regions of the world based on an evaluation of observations and results from a variety of climate models (see IRI 2002/2003). However, successful application of such seasonal climate forecasts depends upon both the climate and society systems, just as ecosystem management depends upon the ecological and the society systems and their interactions. Forecasts of regional climate variability have higher uncertainties than the El Nino forecasts. This is partly due to inadequate understanding of the influence of the Indian and Atlantic oceans on the regional climate and on as yet limited observation systems in these parts of the ocean. Seasonal forecasts are therefore typically presented as probabilities that total rainfall, or average temperature, for a 3-month period will fall in one of three possible periods: the wettest (warmest) third of years; the normal third of years; the driest (coldest) third of years, relative to the historical record. The problem is now how these forecasts are used and interpreted. This brings out the need for education and training of the users, as discussed above. Civil society, epistemic communities, and networks can be used in implementation by providing education, training, and awareness generation. The progress demonstrates the opportunity for Ocean Governance implementation, through international cooperation and individual national efforts to ensure the most benefits for society and individual users. Over a period of time these tools will be further refined and there will be more and more users and applications. It is therefore important to begin putting in place an adequate Ocean Governance regime as soon as possible, so as to ensure the desired equity, fairness of distribution and use, and the goal of sustainable development.

The essential international cooperative part and institutional setting for the implementation of this Ocean Governance scheme is the establishment and operation of an adequate ocean monitoring system. This, the Global Ocean Observing System, GOOS, is under development. The existing part of the system in the equatorial Pacific Ocean confirms its usefulness through the forecasting of El Nino. This must be implemented for the rest of the World

Ocean.

Freshwater availability, an opportunity for Ocean Governance implementation

“Forests, Rivers, Oceans, and Skies-the Water goes around and around on our planet in a cycle regulated largely by the Oceans”.

The freshwater problem is high on the international agenda and is a major issue for many nations. It also provides for an opportunity to implement a system-oriented management regime involving most of the hydrological cycle. As discussed in the previous section, ocean possibilities of forecasting the climatic variabilities that drive precipitation conditions are now becoming increasingly available. Freshwater management is pursuing an integrated catchment management approach. This needs to be closed or completed through inclusion of the ocean part. This should be provided by the ocean community and the climate forecasting community. In this global perspective the local perspective is also strongly involved. Climate is a resource in its own right, and is also influencing the availability and production of vital resources. One of these is freshwater. The ocean is part of and plays a large role in the hydrological cycle as well as in the climate system.

It is well accepted that freshwater is a resource which society must treat with care, in some places a delicate resource and a limiting factor for development. Today about 550 million live in areas with a shortage of water; this is estimated to increase to 1 billion people by 2010. Access to freshwater can become a determining factor for security and peace. Population increase has elevated freshwater usage and need. The global annual freshwater withdrawal at the end of last century was about 3800 km³ and is projected to increase to around 5200 km³ during the first quarter of this century. While the population has increased by a factor of 3 since around 1900, the amount of freshwater has remained essentially the same. The amount of clean and safe freshwater has even decreased considerably. On Earth about 40 billion km³ is freshwater, or 2.5% of all water. Of this about 0.3% is available as renewable freshwater for our consumption, or around 120 million km³. Where does the water come from?

The most important source of freshwater is the

ocean. The source of rain is evaporation over the ocean and the evapotranspiration over land. This latter is less than the precipitation over land by about 60%. The evaporation over the ocean is the major source of water vapor in our atmosphere. The warmer the air is the more water vapour can be stored in it. Very large air masses are carried by regular winds from the ocean to the land and across it. At the land natural processes of cooling forces the warmer air to release much of its water content as rain or snow. This is the freshwater society must make use of in the wisest way possible. Freshwater is necessary for most human enterprises and it is a critical resource for ecosystem health. Problems related to freshwater in the context of human health and the economy are top management issues.

For enhanced management of freshwater amounts it would be very valuable if we could know sufficiently in advance when the water is going to come as rain, snow, and river flow, as well as how much, or if it is not going to come as expected under “normal” conditions. Such advanced knowledge will make it possible to arrange for storage, for protection against flooding and temporary drought, and for the most appropriate agriculture. As we have seen in the previous section such advanced knowledge can now be obtained in several areas through long-range forecasting up to months and seasons. This is possible with given uncertainties through the combination of ocean observations and modeling with real-time use of the observations through data assimilation. The key is the role of the ocean in providing the necessary memory.

In light of the concerns globally about freshwater, food, and human security at large, there is presently a large interest in the ENSO phenomenon as a tool for forecasting climatic conditions over some months, so as to identify potential occurrences of “abnormal” situations such as drought, flooding, and modified tropical cyclone seasons. It is the scientific understanding of the interactions between the ocean and the atmosphere which lay the foundations for this tool. Preparedness can help in mitigating social impacts, in adjusting management of freshwater, fisheries, and agriculture, so as to make the best of the situation. This can all be used to help achieve the common vision of sustainable development.

Several recent studies show the relations between El Nino and changes in freshwater resources. Such studies are being carried out in Australia, Japan, South-East Asia, and Central and North America. In South America the advance in using the tool of forecasting has been strongest. In Argentina and Brazil relations have been demonstrated, together with considerable usefulness of forecasting for management of freshwater resources. Forecasting has also been used in Peru for preparedness with respect to flooding and for management of fisheries and agriculture.

A more regular phenomenon than El Nino is the monsoon occurring in the Indian Ocean and over Asia. The Indian Ocean monsoon is a seasonal wind pattern over large parts of the northern Indian Ocean. During the summer months of May/June to September the southwest monsoon brings rainfall to large parts of the Sub-continent. The winds are coming from the sea towards the land; they are blocked by the Himalayan Mountains and rain is generated. The cause of this process is the enormous heating of the landmass during the summer season, generating vertical rising motion and low-pressure over land. The rising air masses are replaced from the ocean. During the winter months the reverse occurs. Due to the cooling a high pressure is established over land, with a relative low pressure over the ocean since the ocean keeps much of its heat content longer than the land and mountain masses. The wind reverses and blows out towards the sea, signifying dry conditions over land.

The southwest monsoon is the major source of freshwater, agriculture support, and energy for India. A normal monsoon brings an even distribution of rain and other weather conditions over most of India. This is essential for the whole country. An abnormal monsoon brings too much rain and flooding in some places and too little rain in other areas leading to drought and possibly famine. A failure of the monsoon, considered as such when the rainfall is insufficient, and with long gaps between individual rains, leads to major drought years. Over the past hundred years about 20 such major droughts have occurred.

The forecasting of the monsoon, the time of its start, and its character is of major importance. It

will influence management of agriculture, water supply, preparedness for flooding and drought. However, forecasting of the monsoon is very complicated, since many factors influence it and these vary between and during years. Ocean observations are key requirements for improvements and modeling. So far, forecasts of the monsoon are much based on statistical methods, although dynamical modeling is going on (see e.g. Shetye 2003, Yamagata 2003).

The Asian monsoon is also subject to much study, being of great importance for conditions in much of Asia. Its forecasting will depend upon abilities to perform interactive modeling, including the whole interacting natural system.

River water largely originating from the ocean is being extensively used by society. The runoff to the ocean is being reduced, resulting in an imbalance in the global freshwater cycle. This can have significant local to regional consequences. The water withdrawal implies serious deteriorations of estuaries and deltas. The suspended and dissolved materials are withdrawn with the water. This means less nutrients for the biological activities at the coast, and increasing coastal erosion. The sea continues to withdraw its part of solid material from the coast. Since this is not replaced through the river input the delta is gradually lost, eroded away. This is now the case in most major river mouths. However, other activities may compensate by enhancing the supply of sedimentary material, for instance forest depletion, agricultural practices, and other land uses. Furthermore, the pollution loads from the rivers have an impact on marine life and food produce in the coastal zone. Thus the impacts of water resource uses, variations, and depletion are influencing both the terrestrial and marine food production.

It seems clear that implementation of Ocean Governance to support the management of freshwater resources is an opportunity. The forecasts to be used are basically the same and much of the training and education components and needs for coordination are likewise. There is the additional need to communicate, link, and cooperate with freshwater management and user communities. Interaction between the ocean community and these other ones are going on but must be strengthened. An effort to stimulate the process was made at the 3rd World

Water Forum in Japan 2003, through the session called "Dialogue between the ocean and the freshwater communities", see SOF 2004. Interactions between the communities, along with their related sectors and economic interests, should already be taking place when considerations to initiate the Ocean Governance scheme are begun. The financial and cost-benefit evaluations should be part of the initial consultations. The socio-economic benefits of the Ocean Governance scheme must be estimated, including the possible returns through risk reductions and insurance.

The essential international cooperative parts of the implementation of Ocean Governance is the establishment, maintenance, and consolidated, coordinated use of the ocean monitoring system. The Global Ocean Observing System, GOOS, is under development through a cooperative effort involving IOC of UNESCO, WMO, FAO, UNEP and IMO, in association also with ICSU. What is required however is a concerted action to put in place the necessary components and ensure usage. Contacts and exchanges with user communities are required. This observing system has aims to cater for the open ocean and the coastal seas at the regional level and to provide the observations-monitoring required for several applications, including the ones discussed here.

Other Development Opportunities and Ocean Governance Implementation

Without a healthy ocean there is no healthy life on Earth, and without the ocean no life at all. We have always drawn resources from the ocean, and also been stimulated to achievements from the nature of the ocean. A quotation from E. Mann Borgese seems appropriate, "It is the nature of the ocean that pushes science and technology into the foreground. Without marine science and technology we would be blatantly unable to explore, exploit, manage, and conserve marine resources or to navigate safely or to protect our coasts. And it is the nature of the marine environment that forces us to recognize that this science must be interdisciplinary, integrating physical, chemical, biological, and social sciences, and that it must be international, to cover the global dimension of the ocean and its interaction with the land and the atmosphere."

The effective management of coastal and ocean-

ic ecosystems in our changing environment requires the causes and effects of the changes to be understood to the greatest extent possible. The knowledge base needs to be continuously updated and developed. Over the past decades science and technology have advanced rapidly. This provides for major opportunities to implement ocean governance as already argued above. New concepts and methods for observing and predicting the ocean now provide a technical basis for effective assessment and management of the coastal environment. The growing capacity to acquire, disseminate, and analyze environmental data in near real time is making it possible to provide advice to help in decision making and response. However, meeting the challenge of implementing integrated management of the marine environment requires: (1) significant advances in the acquisition, analysis, and synthesis of interdisciplinary environmental data and (2) the establishment of mechanisms to enhance the exchange of data and information between the science and management communities.

There is thus a strong need to be able to detect and predict changes in the coastal ocean in a timely fashion and with skill to meet the needs of integrated management and also other applications. High priority should be placed on continued development and expansion of the Global Ocean Observing System, with particular effort directed to the implementation of the coastal components of the system, from estuaries to the limits of the EEZ. The observing system is necessary to provide the data and information required to: (1) routinely produce quantitative assessments and predictions of changes in the state of the marine ecosystems, their health, the public health risks, and the sustainability of exploitable living resources and aquaculture and (2) improve operational marine services and forecasts and (3) predict the impacts of global and basin-wide climate events, such as El-Nino and ENSO, on coastal ecosystems, conditions, and society. Enabling actions must be part of this governance effort to make it possible for all nations to participate and contribute to and benefit from the observing system. It should also be designed so as to adapt over time to accommodate evolving needs of various users and communities, as well as be able to incorporate new technologies and knowledge.

The knowledge about and understanding of

interactions and linkages between marine, terrestrial and atmospheric systems, and how human activities influence the interactions, should be enhanced through synthesis and improved insight of the ocean-climate system and of the coastal systems that are affected by the ocean-climate system and land-based human activities. The aim should be to:

1. Enhance the predictability of climate variability and change to provide the basis for decision-making for adaptation and mitigation of global change, based on data and information obtained through the Global Ocean Observing System that is integrated, interdisciplinary, and operational. The system must include sustained satellite missions, in addition to both broad scale and long time series of in situ observations; and
2. Achieve and advance the comprehensive, interdisciplinary understanding of the dynamics of the coastal systems with the goal of developing a classification scheme that will enable effective detection and prediction of changes in coastal systems on local, regional and global scales. Such a scheme must be based on an understanding of the dynamics of the coastal systems and the forces impinging on them from the ocean basins, coastal drainage basins, and the atmosphere. The linkage between science and management should be strengthened so as to ensure an effective use and exchange of data and information for the benefit of society as a whole. The scientific communities need be involved as partners with management.

The ocean contains a vast amount of resources other than those already referred to. These other resources include renewable energy from several different sources: saltwater; freshwater through desalination; phosphorus; pharmaceuticals, medicines, and marine toxins from coral reefs, deep sea vents, and other living organisms; oil and gas, and other potential sources of fossil fuel in the form of gas hydrates; building materials, such as sand, gravel, corals, and minerals; mud rich in iron, manganese, zinc, copper, cadmium, lead, and silver; many potential developments from the ecosystems and processes associated with the deep sea hydrothermal vents. Most of these newly discovered resources at the deep sea bed are not explicitly covered by UNCLOS and thus not by the Interna-

tional Sea Bed Authority.

It is, however, clear that all these resources provide substantial opportunities for development and will be utilized eventually. Hence there is a strong need to pursue the implementation of the related Ocean Governance through UNCLOS, the Earth Charter-Rio Principles, and the related mechanisms and processes. One aim is to help achieve equity and a balanced, sustainable exploitation, based on adequate scientific knowledge. Governance should help ensure that the knowledge base is reasonable and that the precautionary principle is applied. The same holds true for exploitation of the other resources. The current international momentum of concern for the marine environment must be utilized, and the international agreements obtained through the UNCED and WSSD processes provide for an opportunity.

Throughout this paper the need for adequate education, public awareness, and involvement of the scientific communities in governance-management has been stressed. There is now an opportunity to pursue this through use of the new Information Technology, IT. This provides for a system through which the public and the educators can have access to reliable, quality controlled environmental information. At the same time, by using it the capacity to use the IT will be enhanced. Ocean Governance should take up this opportunity, using and developing appropriate networks. Through these the diversity and national-local needs can be properly taken into account in the education and information services. An international stimulation is currently provided by the UN Decade of Education for Sustainable Development. The IOI Virtual University concept was an attempt to pursue this line.

There are new scientific developments which provide for opportunities to address some of the major issues, including poverty and equity, perhaps in particular bio-technology. In the case of marine bio-technology research and development, this ought to be pursued within an adequate Ocean Governance scheme, as is biological diversity. Another opportunity for science and technology as well as industry is the need to pursue the delimitation of the continental shelf area for potential national developments, seen and pursued as part of implementation of UNCLOS and Ocean Governance. This may

also give rise to international cooperation through joint management schemes. The opportunity is also linked to possibilities to stimulate technical and scientific cooperation at a regional level, including technology transfer. The development of ocean economics should be pursued within the Ocean Governance scheme, elaborate on the services provided by the ocean and the marine ecosystems and on the impacts on these of actions of society. The economics of the Common Heritage should be further studied, in particular in relation to Ocean Governance.

In order to achieve enhanced equity in the use of ocean resources and ocean generated information, such as forecasts of hazards or climate variability, Ocean Governance is required. In this way, Ocean Governance will help achieve peace and security and other aspects of Sustainable Development.

CONCLUSIONS

The basis for establishing national ocean policies is available, as is the international basis for a cooperative implementation of ocean governance, through the UNCLOS and UNCED 92 results and subsequent processes, including the WSSD 2002. The common vision endorsed through UNCED is that of sustainable development, for which requirements and principles for implementation have been specified.

The economic values and services of the ocean and its resources are very large. Hence the state of the marine environment and health of the ocean have an impact on most of the economic and social values and services of great importance for our societies. A major motivation for implementing an ocean policy and ocean governance therefore lies in the importance of the ocean and coastal services and resources for the local, national, regional, and global economy and well-being. The specific links to needs and priorities of society should be established as a first or initial strategic action.

The enormous influence of the ocean and its resources on our societies as regards economy, development, security and general well-being must be more vigorously communicated to society at large, including through epistemic communities and civil society. This is an essential part of ocean governance implementation, and includes ocean education and awareness creation, so as to achieve co-

existence with the ocean. This should also be part of a national ocean policy.

Human behaviour and lack of human resources and expertise are often limiting factors for achieving implementation of sustainable development of ocean resources. Human resources development that will help change human behaviour remains the great challenge to sustainable development of the ocean. Civil society can be an important national resource in support of achieving the required change of behaviour and sustainable development.

It is imperative that all nations participate and play an active role in the distribution system for the benefits of globalization to reach all and generate enhanced equity. Ocean governance implementation can lead the way in this process.

However, the complexities in achieving ocean governance implementation, including strong political, sectoral, and economic interests, are very difficult hurdles to overcome. Therefore, initiation of ocean governance implementation could use an opportunistic approach when economic, security, social, and environmental interests coincide. Several such coincidences and opportunities are now at hand..

A real integrated management approach must be adopted; a patch-like system will not work. There is therefore a need to review existing legislation at national levels dealing with marine environmental and ocean matters, and ensure harmonization and compatibility with ocean policy legislation. A unified maritime law enforcement regime is required. The enforcement cannot be left to individual sectors or built on consensus alone. A major problem of ocean governance implementation and applications is enforcement of regulations and agreements. Regulations do not seem to work since they are presently too costly in most cases to enforce; another system is needed, for instance building on incentives.

Governance needs government. There must be institutional abilities to implement ocean governance and an ocean policy supported by proper legislation. Multiple use marine parks give a model for how to achieve an integrated natural resources management regime where the policy instruments and institutional arrangements are fully aware of the

inter-connectedness within the complex marine environment. The same can be achieved through integrated coastal management demonstration sites, and through integrated local management efforts driven by common economic, environmental, social and security interests, full participation of the local community, and a system-oriented approach taking into account the interactions between the environmental compartments.

Monitoring systems which can provide information and early warning on the state of the ecosystems, the marine environment and the health of the ocean, and the responses to the pressures from human society, must be part of the governance system for sustainable development. Adequate ocean observations in space and time, with regular data quality control and delivery, are of overwhelming importance as part of ocean governance implementation. The main challenge in many applications, including risk evaluations and assessments, is the availability and lack of data and other reliable information.

A very promising opportunity to initiate ocean governance implementation concerns climate variability and change. This implies putting in place the required ocean observing system as part of ocean governance; producing quality controlled forecasts which can be disseminated in a fair and transparent way; and providing the education and information required to obtain the capabilities to use the forecasts and related products to help achieve sustainable development. This approach of implementation is in complete harmony with the precautionary principle, data and information being mandatory parts of any early warning system for changes. This is also needed to estimate risks, possibly achieve risk reduction, and maintain insurability as a major requirement to achieve financing. An essential part of the global system is in place in the equatorial Pacific Ocean. This demonstrates its usefulness through providing the basis for El Nino forecasting. Coastal Ocean Observing and Prediction Systems are being established in several regions off the coasts of scientifically advanced nations.

How do the opportunities discussed in this part reflect the principles discussed in Part I, summarised in Table 1 here? It may be concluded that an implementation of ocean governance addressing

these opportunities will contribute to; the strengthening of peace and security; the application of the principles of responsibility, precaution, and participation; the use of adaptive management and full cost allocation. In addition, ethical and environmental principles will be addressed as well as economic, ecological, and social sustainability. Ocean governance implementation will contribute to the achievement of the common vision of sustainable development and thus also to the achievement of WSSD 2002 major targets and Agenda 21. Ocean governance implementation that addresses the opportunities discussed here would contribute towards human resources development and the changes in human behaviour required to achieve sustainable development. It would enhance involvement and active participation of developing nations in the various actions and sectors. Enforcement would be helped by common interests, by participation, and by the socio-economic benefits resulting from the ocean governance implementation. This would likewise help in the financing and sustainability of the activities. Finally, this implementation could be strongly related to local and national needs and priorities, which is necessary for success.

Table 1: Main Headings of:- Ocean Governance Principles; Chapter 17, Agenda 21; WSSD 2002

Common Heritage of Mankind	Lisbon principles	Sustainable Development	Sustainable Ocean Governance	Decision making criteria	UNCED 92 Chapter 17 Agenda 21	WSSD 2002 Major targets Oceans, Coasts and Islands
<p>Economic: be developed;</p> <p>Ethical: managed on behalf of all;</p> <p>Environmental: conserve to share with future generations;</p> <p>Peace and Security: Exclusively for peaceful purposes.</p>	<p>Scale matching: of economic and ecosystem;</p> <p>Responsibility Principle;</p> <p>Precautionary Principle;</p> <p>Adaptive Management;</p> <p>Full cost allocation;</p> <p>Participation.</p>	<p>Economic Sustainability: allocation so that natural capital does not decrease;</p> <p>Ecological: sustainable scale of economy;</p> <p>Social: fairness of distribution;</p> <p>Ecological Economics: broad trans-disciplinary perspective;</p> <p>Integration of natural, social sciences and policy process.</p>	<p>Subsidiary principle; governance at lowest common denominator, democracy;</p> <p>Responsibility principle;</p> <p>Precautionary principle;</p> <p>Participating principle.</p>	<p>Reversibility;</p> <p>Diversity;</p> <p>Public Health;</p> <p>Ecosystem functions;</p> <p>Economic value of impacts;</p> <p>Scale of problem;</p> <p>Public opinion and judgment;</p> <p>Equity considerations.</p>	<p>Integrated management and Sustainable Development of Coastal and Marine Areas;</p> <p>Marine Environment Protection;</p> <p>Marine Living Resources of the High Seas;</p> <p>Marine Living Resources under national jurisdiction;</p> <p>Addressing Critical Uncertainties for: Ocean management and climate change;</p> <p>Strengthening International Cooperation and Coordination;</p> <p>Sustainable Development of SIDS.</p>	<p>Integrated Ocean and Coastal Management: ecosystem approach;</p> <p>Fisheries: maintain or restore depleted stocks;</p> <p>FAO International Plans of Action;</p> <p>Conservation of biodiversity;</p> <p>Protection from marine pollution ? GPA/LBA;</p> <p>Science and Observation: regular reporting on state of the marine environment;</p> <p>SIDS: community-based initiatives, control waste and pollution;</p> <p>Barbados Programme of Action.</p>

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オーシャン・ガバナンスの実施 第II部：動機、戦略及び機会

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要約

現在のサービス志向経済の中であって、オーシャン・ガバナンスを実施に移す動機とは、ここでは、海洋とその資源の役割、気候系及び水循環における海洋の役割、そして沿岸域のとても重要な重要性と、その文脈において現在利用することが出来るようになってきている様々な機会である。もちろん、海洋は生命維持システムの不可欠の一部であることを我々は認めているが、包括的なオーシャン・ガバナンスを実施することが極めて複雑であることに鑑みて、日和見主義的なアプローチが提案されている。利害関係者、当局、政府そして一般の人々に動機づけを与えることが必要である。様々な文脈で追求されているいくつかの管理アプローチが存在するので、それらを検討する。生態系ベースの管理、地域的な管理アプローチを論ずる。ここでは、様々な条約についても考慮を払いつつ、一連の生態系志向のアプローチの例を紹介していく。それらには、次のものが含まれる。すなわち、海洋保護区の技術の応用、その国際協定との関係並びに問題について；地球環境ファシリティによって強く推進されている現在進行中の計画や集水域を含む地域志向の計画を含む、広域海洋生態系を使用するアプローチの利用について；統合沿岸域管理（ICAM）の利用とその他のアプローチ、特に陸上活動から海洋環境を保護するための地球行動計画（GPA-LBA）との関係についてである。ICAMの目的であるデモンストレーション・サイトの発展、そして地域協力の利用を検討する。その後の節では、生態系アプローチや包括的管理アプローチに関係して、特別な科学技術を用いる他のいくつかの手法を浮き彫りにする。そうした手法には、環境容量評価、リスク評価、そして統合的な情報管理システムが含まれる。

関連するほとんどの行動を実施することは国家の責任であるので、国内的な側面及び共同体の側面から検討する。これには、政策の特定、立法、実施、執行、管理責任、人的資源の開発、教育及び社会的意識の向上に関する関心についての議論を含む。

動機、ニーズ、期待される結果と制約を含む、オーシャン・ガバナンスを実施するに当たっての一連の機会が示される。こうした機会はすべて、経済的利害、環境的利害、セキュリティに関する利害が同時に存在する例であり、持続可能な開発を実現する目的を持って、それに対して実施を促すために利用可能な科学的・技術的な基礎を利用することができる。このことは、オーシャン・ガバナンスの諸原則及び、今日の状況の下での知見、科学と技術を関わらせ、促進する必要性に大きく関係する。国際協定の役割についても取り上げる。これらの機会は、沿岸域の可能性とニーズ、海上輸送の大きな重要性、気候の変動と変化の問題、淡水の利用という問題そして海洋資源に関する他の潜在的な機会に特に関係する。

結論として、オーシャン・ガバナンスの実施は、手の届く範囲にあるものであること、ここで検討された機会は、全ての利害に対してまさに実体的な動機を提供するものであるということである。

本稿は、「オーシャン・ガバナンスの実施 第1部：根底にある諸原則と理論的基礎」の続編にあたる。当初、これら2つの論文は相互に参照する一つの報告書を構成するものであった。本稿ではその部分を削除しているが、両論文は連続したものである。

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