OCEANS Briefing Paper

Oceans and Seas:

Harnessing the Marine Environment for Sustainable Development

The oceans cover some three quarters of the world's surface, but we have only just begun to comprehend the full significance of the seas in their ability to sustain both humans and the natural environment. It has become increasingly clear that the marine environment plays a central role in supporting sustainable development, especially once we begin to identify the many areas which all interact with the oceans and seas. There are strong natural inter-linkages between the atmospheric, terrestrial and marine environments. There are also diverse human interactions, such as from agriculture and food production, tourism, coastal development and transportation. And there are many other vital interrelationships which are yet to be fully understood. This complex mix of coastal and marine interaction calls for a substantial increase in policies, resources and initiatives in order to better understand, maintain and enhance these systems which are so essential to sustainable development. Partly as a result of the huge breadth of issues, this paper concentrates principally on two key areas:

- Unsustainable fisheries;
- Marine pollution and degradation

The paper seeks to chart current approaches for sustainably protecting and managing the marine environment by looking at underlying problems, identifying policy drivers and outlining some of the possible next steps for making progress in the future.

1. The role and state of the marine environment

The marine environment - the oceans, seas, and adjacent coastal areas - have been characterised as providing the "glue" for the world's sustainable development. The reasons for this emphasis are clear:

- Approximately 98% of the total volume of world trade is transported by sea;
- International estimates from the Intergovernmental Oceanographic Commission, the OECD and others, suggest that the turnover of marine-based industries and services (including extraction industries such as oil and gas) are of the order of 3-5% of Gross National Product (GNP) in most coastal countries (totalling an estimated $1.7 trillion);
- The marine environment is the main interface to the world's largest economic sector – tourism. Tourism brings with it many potential benefits, in terms of economic growth, development of infrastructure and public amenities, but also carries potentially huge costs to coastal communities and the environment, as a result of growing numbers of domestic and international tourists visiting the coastal zone;
- The fisheries sector, as well as a major provider of livelihoods, is the main source of protein for some 950 million people, mostly in the developing world;
- The oceans provide many natural services, as a prime source of the world's biological-diversity, as well as a regulator of the world's climate and its wider eco-systems. It is a major determinant of human health and potential source of renewable energy.

As a consequence of these diverse resources and functions, the overall ecological value of the goods and services provided by the oceans and seas have been estimated to total some $23 trillion, a similar level to the total global GNP and about six times the estimated value for the terrestrial environment. Even without such rudimentary monetary estimations it is clear that the world needs a healthy marine environment if it is to make lasting progress on sustainable development. However, in a synopsis of current problems facing the world's oceans and the progress made in addressing them GESAMP's most recent comprehensive report states that, despite some localised successes, degradation of the coastal environment and oceans has continued on a global scale. Most of the problems identified several decades ago remain unresolved, whilst new issues are emerging. The key problems, two of which are closely related to land-based sources of degradation, and the other largely a result of unsustainable fishing, can be grouped as follows:

- *Environment and Health:* Land based sources of marine pollution, including sewage, chemicals and other land based pollutants, derived from agricultural, household and industrial sources, are critical problems. These pollutants result in contamination of seafood and seawater, causing diseases in many coastal communities, microbiological contamination with global health implications, as well as damaging the marine ecological environment. In the open high seas, oil shipping and tourism are also having consequences through oil pollution, discharge of contaminated ballast water and introduction of invasive species.

- *Unrestrained coastal development*: The growth of the tourism sector and development in coastal towns and cities, has resulted in coastal erosion and the destruction of key habitats, such as mangroves, sea grasses and coral reefs (and the loss of associated species), as well as increased the stresses placed upon marine resources.
- *Over-exploitation of marine resources*: Some 70% of the worlds' commercial fisheries are now fully or over-exploited. Only 4% are under-exploited; 21% moderately exploited; 47% fully exploited; (Garcia and De Leiva Moreno, 2001) . Such over-fishing has degraded fish stocks resulting in lower catches and revenues. This has also lead to wider impacts, including undermining the food security and sustainable development of coastal populations. The levels of by-catch (non-target fish catch) have also reached threatening levels (some 29 million tonnes).

The conflict between human use and sustaining of natural resources in marine and coastal areas remains a global problem. Regional trends paint an even more troubling picture of mis-management, overuse and mis-use of the marine environment (Figure 1).

On the face of it, tackling these problems will not be easy and will incur significant financial costs. A World Bank assessment of the total investment required for promotion of environmentally sustainable development for the Mediterranean region alone estimated costs between $US 58 – 78 billion over the period of ten years (1998-2008) equivalent to 1.3-1.8% of the regional GDP. However, when you take into account the oceans considerable value and as you delve deeper into the costs of inaction, a proactive and forward-looking approach begins to reveal its true value. If we compare the first estimate for preventative and proactive measure with the estimated cost of environmental neglect for the Mediterranean region which are in the realm of $US115 –140 billion (double the first estimate) this reality becomes clearer. Furthermore more the estimate of cost only took into account the cost of health impacts, lost of productivity and reduced tourism revenues. It did not factor in the more intangible benefits and services of the wider ecosystem, social well-being and significant interactions with other global systems, such as the atmosphere.

2. Main policy drivers: the sectoral challenge

The linkages between the marine environment and key economic sectors means that the principle marine policy drivers are also those that impact on global sustainable development more generally – globalisation of trade, investment, information, population growth, urbanisation and movement towards the coastal zone, climate change, increasing conflict and insecurity, global income inequalities, high consumption rates and intensification of pressures on the natural environment, such as from agricultural and deforestation, also the growth and distribution of shipping and tourism impacts. The key to uncovering effective and integrated solutions is to understand the inter-play of these global pressures and the impact of specific sectors on the marine environment. These can be best illustrated by looking at the fisheries sector, and the changes that have occurred over the last few years.

2.1 Fisheries

The marine environment makes a major contribution to food security, both directly as a source of food and indirectly in the production of meal and oil for animal feed. Local community dependency on fish as a source of protein remains very high, most notably in developing countries. However, fisheries are also important to some industrialised countries, such as Iceland who are also highly dependent on fisheries for food, as well as a source of income.

Recent recorded increases in fish stock consumption were found to be the result of over-reporting from countries, such as China. When these over-estimations were extracted, it was found that fish stocks have in fact declined over the past 2 decades. One reason for this is that an increasing share of fish production is now going towards feed for animals and fish farms. This is extremely inefficient practice since its estimated that an average of between 2- 5kg of wild fish are used to raise just 1kg of farmed species). Trends suggest that key commercial (and non-commercial) fish stocks are being stretched to capacity. The global production of marine capture fisheries has increased from 17 million tonnes in 1950 to about 80 million tonnes in the mid 1980s, and since that time this level has oscillated between 78 million and 86million tonnes (excluding the untold level of discarded fish). There was almost no increase in the level of global marine catch in the 1990s. This suggests that the world's oceans have, on average, reached their maximum levels of production under current fishing regimes. In 1999, for the sixteen statistical regions of the world's oceans that the Food and Agricultural Organisation (FAO) monitors, four regions are at their maximum historical level of fish catch, eight are slightly below, and only four regions are well below maximum fishing levels. In most areas over-fishing is seen by the FAO as a significant causal factor for these declines. Among the 600 fish stocks, assessed by the FAO, more than a quarter are over-exploited and in need of replenishment. A half of the stocks are exploited close to their maximum level of productivity. These conservative figures confirm the FAO view that the overall limit for these "capture fisheries" has been reached. Moreover, the proportion of low-value species being caught has increased substantially as previously preferred species begin to decline. As a result of these figures the FAO has tentatively stated that fisheries *"production may not be sustainable under present circumstances"*. Putting it more definitively, over-fishing has pushed the sector to its limit. To understand why this is happening and what to do about it we need to look at a number of driving critical problems including:

- *Over-capacity*: excessive and expanding fishing fleets and fishing capacity (in part due to new and efficient catch technologies) are resulting in an over catch of fish stocks. To highlight the huge capacity that currently exists in the fishing industry we need only look at the example of the world's largest fishing vessel recently launched. The MFV Atlantic Dawn, the new flagship of the Irish company Atlantic Dawn Ltd.,

Figure 1. Regional marine and coastal trends

Region	Key Issues
Latin America & Caribbean	• **Fish depletion**: 80% of commercially exploitable fish stocks in the South Western Atlantic are either fully fished, over-fished, or depleted. • **Coastal destruction**: Increased levels of tourism and trade have brought about a rapid and drastic transformation to coastal and marine areas; 65% of Mexico's mangroves have already been lost, and coastal water quality has declined due to increasing discharges of untreated municipal waste. • **Reef destruction**: 22% of Caribbean coral reefs are effectively destroyed and 33% are considered at high risk due to increased run-off and sedimentation caused by deforestation, nutrient contributions from sewage from hotels and shipping, coastal construction and mining.
Asia & Pacific	• **Fish depletion:** 40% of commercially exploitable fish stocks in the South Western Pacific are either fully fished, over-fished, or depleted. • **Declining water quality**: Fertilizer consumption rose by 340% between 1975 – 95 and pesticide use has increased fourfold since 1977. In Australia approx. 10,000 tonnes of phosphorus and 100,000 tonnes of nitrogen are discharged into the sea every year. • **Crude oil contamination**: In Bangladesh about 6,000 tonnes of crude oil are spilled into the sea each year. Spillage of crude oil residue and wastewater effluent from land-based refineries amount to about 50,000 tonnes a year. • **Coastal destruction**: Aquaculture expansion has introduced exotic species and increased the use of chemicals. It has destroyed 3 million hectares of Southeast Asia's mangrove forests, thereby reducing coastal protection from cyclones and storm surges, seawater intrusions, and acidified surface waters. Over 32% of Southeast Asian coral reefs have been severely degraded by human activities and global climate change, with only 12% at low risk of destruction.
North America Western Europe	• **Fish depletion**: Since the 1950's new technologies have increased the efficiency of fish harvesting. The Atlantic finfish catch declined from 2.5 million tonnes in 1971 to less than 500,000 tonnes in 1994. • **Outbreaks of toxic algae**: Outbreaks, believed to be fuelled by increased amounts of fertilizers in the water resulting from urban and farm runoff, have led to loss of fish, dietary health impacts and are the reason for 18,590 beach closures in the US since 1988. "Red Tides" are now frequent in many parts of the Mediterranean due to increased levels of nitrogen and phosphorus. • **Declining water quality**: Eutrophication, chemical and bacterial contamination has increased resulting from river discharges. Phosphorus and nitrate discharges into the North Sea are increasing due to agricultural run-off.
Central Asia & Eastern Europe	• **Fish depletion**: Fish stocks everywhere are being reduced significantly e.g. the Azov Sea, once a rich fishery, has been under constant pressure from major industrial activities and a high discharge of agro chemicals. During the past 30 years the Azovi has suffered eutrophication and became practically devoid of fish. • **Water pollution**: The pacific coast of Asia is polluted with oil, heavy metals, pesticides, and liquid radioactive waste, a consequence of Russian/ former USSR discharges into the Sea of Japan and the rusting of nuclear submarines in Northern naval bases. • **Diminishing water supplies**: The construction of dams and irrigation networks has reduced water supply and caused the Aral Sea to shrink. This, coupled with evaporation, is resulting in the release of salt dust along its shores.
Middle East & North Africa	• **Fish Depletion**: In eastern Mediterranean fish harvests have dropped, due to coastal pollution, over fishing, the use of destructive fishing techniques, and inadequate fisheries management. • **Oil contamination**: The war in Kuwait caused several million barrels of oil to be released into the marine environment. Some 1.2 million barrels of oil are spilled annually into the Persian Gulf. • **Diminishing water supplies**: This is a critical issue for the middle eastern countries and has resulted in growing reliance on water desalination plants
Central & Southern Africa	• **Reduction in tourism**: Coastal zones are important for tourism related revenues, which are heavily dependant on the quality of the coastal environment, yet activities such as dynamite fishing continues to impact Eastern African coral reefs • **Coastal land and reef degradation**: Degradation has resulted from habitat conversion, degradation, overexploitation, pollution and sedimentation, coastal erosion, eutrophication, introduction of alien species and climate change. • **Sanitation**: Marine pollution from major coastal cities has reached toxic levels e.g. in 1990 coastal cities and towns in Southern Africa discharged more that 850 litres of industrial and human waste into the sea daily, largely without any treatment.

Sources: GEO 2000, UNEP 1999, Wilkinson 2000.

is over 144 meters long, 24 meters wide, has a crew of 60 and the capacity to freeze about 350 tons of (pelagic) fish every day;

- *Distorting subsidies:* fiscal incentives in the fishing industry are encouraging the present levels of over-capacity;
- *Poor statistics and monitoring:* the failure to adequately collect and report on fish catches makes it difficult to assess the actual levels of fish production and stocks. This is also linked a general lack of resources are available to ensure independent collection and verification of data;
- *Poor species and ecosystem knowledge*: A lack of information has also meant (1) a general lack of knowledge of the actual stock sizes and recruitment rates of commercial and recreational fish species in the wild; and (2) poor understanding of the relationship between habitat loss and modification and the carrying capacity of ecosystems for fisheries;
- *Lack of regulation*: poor monitoring and regulation of fisheries is especially problematic in the high seas (seamounts, deep sea ridges and plateaus) which increases the risk of over-fishing. Illegal, Unreported and Unregulated (IUU) fishing is widely recognised as a major threat to the sustainability of the world's fisheries. The FAO reports that in certain fisheries IUU fishing accounts for at least 30% of the total catch, and in one instance it has been indicated that IUU fishing could be at levels as high as three times the permitted catch level;
- *Export market domination*: fish have become the most internationally traded food, with developing countries now providing some 50% of fish in international trade. Asian countries are at the centre of world fish consumption (accounting for some two-thirds of the total at the end

of the 1990s). However, in some of the poorest areas where fish are key to maintaining local food security, the ever-expanding possibilities of export markets has meant a drop in the quality and quantity of fish available for local markets.

The indications are that it is likely we will see a further intensification of these trends in the future and as such certain steps will be required. Firstly, acknowledging that there are practical limits to marine capture fisheries, means that by 2030 fish and shellfish aquaculture (freshwater and marine farming) will have to dominate fish production. However it should be noted that aquaculture also needs to be further assessed for its sustainability. Past aquacultural experiences indicate that there are many problems, e.g. the destruction of important habitats, such as mangroves for shrimp farms, as well as pollution of waters surrounding aquaculture pens from the overuse of feeds, antibacterial washes and chemicals. Secondly, declining stocks have forced fishers to seek out new deepwater species, whose robustness and relationship to their ecosystems and marine food chains remains poorly understood. Thirdly, tackling IUU fishing is hampered by the use of "*flags of convenience*" by fishing nations, which allow for fishing in non-national territories, increasing the level of capture beyond specified national limits. Greenpeace recently estimated that there are over 1300 industrial-scale fishing vessels flying such flags. Fourthly, are the local effects of over-fishing, where current trends may undermine the viability of local communities and their livelihoods. The destruction of Africa's largest marine sanctuary, the Banc d'Arguin, is one illustration of the impact of such problems to the local level.

Fisheries Governance

Fisheries governance, from local to global levels, is changing due to growing pressures and because of shifting international processes. This includes those ideas set in motion by the 1992 Rio Earth Summit as well as legal and management frameworks for capture fisheries established through the UN Law of the Sea, the 1995 UN Fish Stocks Agreement, along with the development of regional fisheries agreements and organisations. Yet, despite these initiatives, many of the international efforts have faltered because of a lack of government support and implementation of these agreements at the national and regional levels. This lack of political will is closely related to the lack of authority and capacity presently given to regional and local fishery regulatory bodies. Such weak authority also puts further restraints on the development of essential tasks, such as establishing an effective marine science base, technology transfer and capacity building.

Given the pressures on capture fisheries and implementation weaknesses, there has been an increasing emphasis on the need to adopt an "*ecosystem based*" management approach. The approach recognises that modifications in one aspect of an ecosystem can affect other areas. Ecosystem management is designed to reflect the broad value of marine resources, to indicate where unsustainable fishing practices undermine not only the wider marine resource base, including other species, but also people's livelihoods. There is growing acceptance that only within an ecosystem framework will it be practicable to ensure that capture fisheries can continue to be a key source of food and income (See Box 1).

International agreements, such as the FAO Code of Conduct for Responsible Fisheries and the related Compliance Agreement, applying to all fisheries in marine and freshwater, as well as the Provisions of the UN Convention on the Law of the Sea (1982) relating to the *Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks* (Doc A/CONF 164/33), need to be further implemented, regulated and monitored at the national and regional levels. The FAO has generally promoted the acceptance of the precautionary approach in marine and fisheries management and also supports a more integrated approach through further mobilising the regional fisheries organisations in tackling key problems. Port and coastal fishing controls should encourage the wider involvement of all representatives of the fishing community in planning and policy development and implementation, including the establishment of realistic and fair allocation of fishing targets / quotas for fisher folk.

Live fish trade and Small Island Developing States (SIDS)

Small isolated countries and islands, as well as elsewhere, are facing greater pressures of exploitation from the live fish trade for the food industry in Asia, particularly China and Japan. Larger fish can be removed from coral reefs through the use of cyanide (to stun the fish) but this results in long term coral loss and wide spread death of other species associated to coral habitats. This billion dollar trade is now expanding out from Southeast Asia, where extensive damage has already occurred, into the Indian and Pacific Oceans. Financial incentives are offered to villagers from live fish traders in order to gain permission to strip reefs of the highly demanded breeding stocks of fish. This fishery might be made more sustainable and profitable for coral reef communities, if it was better managed, such as scheme practiced around the Great Barrier Reef. Many SIDS are in urgent need of assistance to develop and encourage sound management and policy strategies, in order to capitalise more effectively on the growing demand for and value of live fish, whilst ensuring the harvesting fish stocks at a renewable level and protecting habitats. Organisations, such as the FAO and UNEP, must assist the transference of sustainable techniques, along with other agencies, such as the International Marinelife Alliance and more localised groups, by undertaking the necessary research, the development of policy guidelines and through building awareness and capacity within all countries.

2.2 Marine pollution and degradation: Emerging problems

As already mentioned there are numerous sources of marine pollution and degradation, both from land (Box 2) and marine based sources. Some of the key and emerging issues are outlined below.

Box 1. Tools for ecosystems management

Responsible management requires an integrated ecosystems management approach. This includes continuous scientific evaluation and research to ensure that marine and coastal ecosystems and species are able to maintain their health and populations alongside present and future levels of human consumption and interaction. Two tools to assist this approach are outlined below.

1. Integrated Coastal and Marine Management (ICM)
ICM recognises that coasts and the marine environment are of strategic importance to social and economic development. The integrity of these systems needs to be maintained through setting limits on the use of coastal and marine resources, whilst allowing for multiple uses that are complimentary and integrated. Effective ICM involves establishing the necessary machinery (policy, legal, financial, technical) for sustainable coastal and marine management. This includes:

- Broad scale and interdepartmental management and cooperation, linking national and local levels, including managing maritime Economic Exclusion Zones alongside coastal activities;
- Activities to reducing and mitigating unsustainable behaviour, as well as Improve environmental and resource quality e.g. waste reduction programmes, pollution charges, establishing "no take" fishing zones;
- Monitoring and assessing Marine and Coastal information to assess areas of conflict and identify policy options;
- Ensuring the durability and enforceability of policy solutions and regulations;
- Coordination between authorities in ICM plans, both within and between countries. Establishing ICM plans with broader National Environmental Action Plans (NEAPs). Linking training and education programmes, particularly at the regional level;
- The participation of key stakeholders, particularly local communities, in the development and implementation of a ICM plan;
- National support (including financial, tax incentives, technical, information resources) for local ICM efforts;
- Moving beyond ICM planning, to full scale and long term ICM programmes

2. Marine Protected Areas (MPAs)
Establishing MPAs can offer many benefits, protection of commercial fish species, insurance against management failures and stock collapses in traditional fishing grounds, also protection of essential habitats (e.g. mangroves, sea grass beds and coral reefs, which act as spawning grounds, feeding sites and protective cover for both commercial and non-commercial fish species, as well as support productive, rich and diverse ecosystems). MPAs offer additional benefits, such as protecting genetic diversity, sites of scientific reference or benchmarks to measure impacts of human activities. Also they present opportunities for tourism, recreational and educational activities. Although over 1,300 MPAs exist they currently only cover approximately 1% of the ocean and their management is reported to be of variable quality. Proposals for enhancing MPA establishment and regulation include:

- Extending MPAs to include selected areas of the high seas (seamounts, deep sea ridges and plateaus);
- There is a need for global recognition of these parks and development of international guidelines for effective MPA management based on key indictors'
- There could be greater regional connectivity between parks e.g. establishment of marine protected corridors, as well as exchange of management and scientific evaluations;
- Ensuring all MPAs "*work for people and for nature*" through the involvement marginalised groups e.g. poor, women and indigenous communities, as well as local communities, academia, NGOs and private sector are involved in their development and management, to help ensure that MPAs not only protect the natural environment but also address livelihood concerns.

Sources: IUCN and IISD

Marine biodiversity
A number of agreements have been established in an attempt to tackle polluting and degrading practices, however all of these need to be further ratified and implemented at the national and regional level. The One example is the Jakarta Mandate (created under the Convention for Biological Diversity), calls for improved co-ordination and monitoring of key habitats such as coral reefs, mangroves and seagrasses, as well as pelagic and benthic ecosystems of the open waters of estuaries, continental shelves and the deep sea which also support much of the world's biodiversity. It also refers to the development of Integrated Coastal Zone Management Plans (ICZMs), marine protected areas, non-fishing zones and non-take seasons within Economic Exclusion Zones (EEZs), and exploration of the possibility of defining internationally protected areas in the high seas. Related agreements include the RAMSAR Wetlands Convention, which seeks broad protection of the inter-connected coastal habitats (e.g. mangroves, sea grasses and coral reefs) that provide key natural resources and services (e.g. fishery spawning and nursery grounds, coastal protection from storms, habitats for adult fish, as well as maintenance of wider ecosystem integrity).

There is a need to encourage establishment of new agreements to limit fisheries by-catch and protect other marine species and systems. The Rio Principles, and specifically application of *the Precautionary Principle*, calls for greater prudence and stringency to protect marine biodiversity from the uncertain impacts of human activities. This includes imposing adequate restrictions against potential risks conferred from the release of Genetically Modified Organisms into the marine environment e.g. modified fish species. With regards to marine *bioprospecting*, an untold number of new and undiscovered marine species need protection since they carry considerable potential benefits e.g. as treatments for new diseases and in the production of new materials. Thus principles for good practice in marine bioprospecting need to be better defined, alongside elaboration of international guidance and codes of conduct to support the protection of marine resources, as well as to ensure the effective, equitable and environmentally sound use of these resources (IISD).

Shipping
1997 saw the 12th consecutive year of growth in the shipping industry. Sea-borne trade reached a record high of 4.95 billion tons. By the end of 1997 the world's merchant fleet had reached a record 775.9 million (dead weight) tons. Of this, oil tankers and dry

bulk carriers dominate, carrying 71% of the total tonnage. Ageing of ships may increasingly be a problem, since a large number of vessels are over 25 years old. Whilst the major owners of tonnage are also the world's biggest traders, more than half of world's merchant weight tonnage is not registered in countries of domicile of the parent enterprises (i.e. where the controlling interest of the fleet is located). This regulatory problem is also related to the need to tackle IUU fishing.

The International Maritime Organisation (IMO) takes the international lead in addressing marine pollution, and has adopted a coherent and systematic approach through the MARPOL regime (International Convention for the Prevention of Pollution from Ships, 1973, and modified protocol in 1978). With its series of annexes, the regime sets out activities to tackle specific areas, including oil pollution. However, further impetus needs to be given to ensure global implementation of the regime. Work is currently underway to develop a global agreement (under the auspices of the IMO), seeking to tackle the problem of invasive species, and the further elaboration of the mechanisms for designating "*particularly sensitive sea areas*". Port State controls need to be strengthened, including national support for the joint efforts of the IMO and FAO in tackling IUU fishing. There also needs to be significant steps to ensure the wider adoption and tightening of waste disposal by cruise ships, to bring guidelines for effective disposal into common environmental practice. The 1996 Protocol to the London Convention on Dumping at Sea also still needs to be entered into force in order to globally outlaw dumping at sea.

Tourism

Coastal and marine areas are strongly influenced by the rapid growth in tourism industry, now the largest industry globally. Tourism is linked to a growth in mega-cities around coastal areas and the consequential impacts of such development to the coastal and marine environment. At the same time, there is an urgent need to tackle a growth in urban and coastal poverty, most especially in developing countries and Small Island Developing Sates. The implementation of the work programme on tourism and coastal development, developed by the UN Commission on Sustainable Development, should be applied to encourage better tourism development and practice around coastal and marine areas. This would include the introduction and wider application of effective verifiable codes of conduct and regulated business management systems in the tourist industry, working in conjunction with appropriate UN bodies, local authorities, communities and other stakeholders. Also tourism strategies need more effectively integrated into the development and implementation of local and national Integrated Coastal Zone Management (ICZM) plans.

Box 2: Land based sources of pollution: UNEP's regional seas programme

The Regional Seas Programme initiated by UNEP in 1974 is a global programme implemented through regional components. The Governing Council of UNEP has repeatedly endorsed a regional approach to the control of marine pollution and the management of marine and coastal resources. It has requested the development of regional actions plans. The UNEP Regional Seas Programme presently includes 13 regions, with over 140 coastal states and territories participating in it. In addition, there are 3 non-UNEP regional seas (for the Arctic, North-East Atlantic (OSPAR), and the Baltic (HELCOM)). All of these programmes are conceived as action-oriented and comprehensive strategies, concerned not only with the consequences but also the causes of environmental degradation in marine and coastal areas.

In recognition of the fact that 80% of pollution in the world's oceans and seas comes from land based sources, such as agricultural and industrial run off and discharges, the international community (in 1995) agreed upon the Washington Global Programme of Action (GPA) for the Protection of the Marine Environment from Land Based Activities. The GPA seeks to support an integrated management approach, and mobilise effective support for developing countries' activities. And the regional seas programmes were identified as key fora ensuring the effective implementation of GPA. The GPA was reviewed in Montreal, 23-28 November 2001, with a view to developing multi-stakeholders platforms around the work of the regional seas programmes. A key aim will be to establish an ecosystem-based approach at the regional level.

Offshore oil and gas

In order to more sustainability operate oil and gas installations there needs to be wider utilisation of robust environmental management systems, including implementation of ISO 14000 activities such as, environmental impact assessments, life cycle analyses. There also needs to be establishment of clear regional goals and guidelines to be applied by such installations, building on the 1997 Noordwijk Workshop and subsequent UN Commission on Sustainable Development's recommendations.

Science: Information and monitoring gaps

There have been improvements in data systems, modelling, and mapping in recent years but there is a lack of tie-in between up-to-date scientific information and policy-making. Current gaps in knowledge include:

- *Climate change and marine links:* The unprecedented increases in carbon levels globally have potentially huge consequences for ocean chlorophyll and phytoplankton distribution, which are critical primary producers in the marine food web. However the effects of climate change on marine systems and coastal areas, to fish stocks and less directly, to food security and human health, remain hard to predict and with large uncertainties;
- *Socio-economic and Marine Sciences:* There is poor interdisciplinary research undertaken between studies on human dynamics and the marine environment. Incorporation of socio-cultural and economic data, alongside environmental assessments, would further enhance a more integrated analysis of bio-physical data, particularly to better understand the relationships and influences between various systems;
- *Information exchange*: Wider cooperation and exchange of knowledge between monitoring networks and bodies e.g. UNEP, NOAA, GPA, Global Oceans Observation Systems (GOOS) would further assist monitoring of the marine environment as well as development of policy recommendations;
- *Reporting*: Regular and standardised state of the oceans reports, as well as further consolidation and integration of national and regional reports would help to develop unified strategies for regional ocean groupings;
- *Data collection:* The marine environment needs on-going and accurate data to monitor trends and highlight emerging problems. Data is par-

ticularly required to increase access to timely information about changes occurring in marine and estuarine ecosystems and their potential consequences. In relation to this there is a real need for the development of SMART (specific, measurable, accurate, relevant and time-based) indicators for monitoring the state of the marine environment. A wide variety of stakeholders should be involved in the development, use/data collection and monitoring of indicators to more effectively assess marine environment systems. (see Figure 2)

Initiatives like the World Ocean Circulation Experiment - a system of satellite monitoring of ocean circulation and climate variability - and Global Oceans Observations Systems (GOOS – see Box 3) are seeking to tackle these gaps in information and exchange. However despite this work but there needs to be significantly greater support (financial, technical and capacity building) and coordination between such programmes. Also efforts should be made to support wider involvement of academic, private and public collection of data and research to assist the formation of sound policy to tackle critical problems e.g. utilising the findings of the Global Coral Reef Monitoring Network (GCRMN) which collates reef monitoring data from different organisations and individuals into global status reports every 2 years.

Box 3. Global Ocean Observing System (GOOS)

GOOS is a joint effort of IOC-UNESCO in response to the mandate of Ch.17 of Agenda 21 to effectively monitor marine systems. Through developing an international framework aiming to coordinate, enhance and supplement existing monitoring and research programs, to provide the data and information required for more timely detection and prediction of changes in the state of coastal ecosystems and the resources they support. GOOS is being developed through two related and convergent modules:

(i) a basin-scale module focused on ocean-climate systems;
(ii) a coastal module focused primarily on changes in coastal-marine and estuarine ecosystems and their effects on marine operations, public health and well-being, ecosystem health, and the sustainability of living resources.

There has been recent development of Regional GOOS Alliances, including EuroGOOS, MedGOOS, GOOS Africa, and NEARGOOS. National GOOS groups are also starting to emerge. This major research coordination effort will require unprecedented levels of multilateral and multi-sectoral coordination and collaboration. And as such it needs to be more widely endorsed and requires significantly increased international support (financial, capacity building, information exchange) if it is to fulfil its potential role.

Link: www.ioc.unesco.org/goos

Trade and MEAs: There needs to be clarification of linkages and the potential for conflict between trade, and the use and management of marine resources (including both *goods*, such as pharmaceutical products from biodiverse systems and fish, and *services* e.g. coral reefs as carbon sinks, or mangroves acting as storm barriers). This will require clarification of the relationship between existing international environmental agreements e.g. application of the Biosafety Protocol and the Precautionary Principal and the WTO's agreements e.g. Trade Related Intellectual Property Rights and Agricultural agreements. Also the implications of landmark legal cases, as such as that of the Southern Blue Fin Tuna case, need to be further explored when dealing with future trade and marine environment disputes. At present these questions are dealt with on a case-by case basis. The International Community needs to reach a consensus about these issues before they can be adequately and consistently addressed by the WTO and other regional and international bodies. Particular recommendations include:

- Clarification of the role of an international tribunal to settle such disputes;
- Addressing how the Precautionary Approach can be more clearly applied in international law. The precautionary principle is incorporated into WTO mechanisms for dispute resolution but there remains ambiguity and tensions over which areas (i.e. trade liberalisation or risk avoidance) should take priority;
- The creation of a UNEP - FAO - WTO working group could help address potential conflicts between marine agreements and trade related measures, in order to clarify the core principles in advance of future disputes.

3. The Way Forward

3.1. Policy integration and framing the delivery

What do we need to create an effective and integrated management system, which works from local to global levels, supporting and enhancing the international marine environment? Such a system needs to demonstrate and maintain:

- Active policy integration, linking in the economic sectors to socio-cultural aspects, as well as wider resource issues, including ecosystem and precautionary approaches;
- Mainstream marine activities, around the delivery of shared environmental and development goals, both within countries and regional groupings, as well as by the international community generally, embracing the UN system as a whole, the donor community, regional fisheries institutions and multi-stakeholder roles;
- The right mechanisms and international machinery of environmental and developmental governance to sustainably deliver marine services.

A framework for action towards sustaining the marine environment does exist. In 1982, ten years before the Rio Earth Summit, the United Nations Convention on the Law of the Sea was opened for signature in Montego Bay, Jamaica. It established a comprehensive regime dealing with all matters relating to the law of the sea, recognising that the problems of ocean space were closely interrelated and need to be considered as a whole. The Earth Summit went further, recognising that the marine environment (the oceans, seas and adjacent coastal areas) is an essential component of the global life-support system, and, through Chapter 17 of Agenda 21, it set out an approach for integrated management for achieving sustainable marine management. Together with subsequent agreements, such as the Washington Global Programme of Action (GPA) and the UN Agreement on Straddling and Migratory Fish Stocks, there are

Figure 2. Example of Marine Indicators

	Sector	Example indicators
Environment	Pollution and degradation	Oil Spills (Metric Tonnes) Release of Nitrates and Phosphates (N and P separately in Tonnes per year) Land use change e.g. deforestation, coastal development (km2 per year) Habitat change e.g. coral reef, mangrove, seagrass, benthic systems Algae Index (algae per litre of liquid) National implementation of Convention on biological Conservation (including protocols), RAMSAR, World Heritage Convention, Climate Change Convention, Helsinki Convention
	Fisheries	Maximum Sustainable Yield Fishing fleet capacity Fishing gear type Fishery authority, with "adequate" resources and powers of enforcement National implementation of Migratory and straddling fish stocks agreement and CITES
Social – Cultural	Employment	Proportion of working positions associated to marine and coastal activities e.g. tourism, transport, fishing, oil rigs
	Education and research	% Population with access to formal and informal facilities with teaching about oceans Availability of research institutes and multidisciplinary studies, analysing human interaction with marine and coastal systems National implementation of Principle 10 (Agenda 21) or Aarhus Convention
	Health	Prevalence of diseases and infirmities associated to contaminated marine water, fish and other species % Population wit h nutritional dependence on protein from fish
	Intellectual Property Rights	Recognition of traditional and indigenous knowledge of marine and coastal environment in national IPR law
Economic	GNP derived from:	(+) Fish production and other marine products (+) Sea born trade (+) Coastal and marine Tourism (+) Offshore oil, gas, and non-fuels minerals (-) Costs of coastal flooding, habitat loss and storms, associated to climate change and land use changes and over-fishing
	Market efficiency	Removal of environmentally and economically "perverse" subsidies
	Market Externalities	Use of fines and eco-taxes for polluting activities, over capacity in fishing
Sources: UNCED, Borgese		

therefore agreed international blueprints for the protection and sustainable development of the marine environment. All of these need to be more coherently linked and significantly more endorsed, financed and implemented.

3.2. Fisheries

Sustaining our global fisheries is a pressing and growing challenge for subsistence and commercial fishers alike. A number of tools have been proposed to help deal with over-fishing, over-capacity and other problems. One example of a group working to towards this goal is the Marine Stewardship Council (MSC). In a bid to reverse the continued decline in the world's fisheries, the MSC aims to harness consumer purchasing power towards changing and promoting environmentally responsible stewardship of the world's most important renewable food source. The MSC has developed an environmental standard for sustainable and well-managed fisheries. It uses a product label to reward environmentally responsible fishery management and practices. Consumers, concerned about over-fishing and its environmental and social consequences will increasingly be able to choose those seafood products that have been independently assessed against the MSC Standard (The Standard measures the state of the fish stock, its effect on the local marine habitat and management of the resource.) and labelled to prove it. This will assure them that the product has not contributed to the environmental problem of over fishing. Box 4. details the MSC's Standard, with proposals from other groups. More general recommendations for governments and marine bodies include the need to:

- Encourage consumer demand for sustainably managed fisheries, especially in industrialised countries;
- Support "rights-based" fisheries management (see below);
- Adopt an "ecosystems" approach for fisheries management (see Box 1);
- Ratify and fully implement the key international agreements which seek to restore fishing capacity;

- Aquaculture: Less intensive and more environmentally-sound principles of site selection and management need to be developed, particularly in areas like SE Asia.

Rights Based Fishery Management (RBFM)

Rights based fishery management systems are a function of the legislative, economic, social, cultural, biological and political institutions that shape the environment. Making the transition from open access, unregulated, over-fished and under-stocked fishing systems to a fair and sustainability managed system requires the application of some basic principles at local to global levels. As already discussed, in many fisheries, ineffective strategies for regulating access to fish stocks has lead to excessive levels of fishing. The current global fishing fleet needs to be reduced by as much as 40% in order to prevent further overcapacity. However to get to this level of reduction will require significant reframing of the fishing industry. Part of the solution lies in assigning the appropriate rights of access to natural resources through the involvement of a wide variety of groups or communities. This can be done though a clear process establishing property rights which define and allocate individual fishing quotas or commercial fishing quotas. This includes:

Clear and equitable *Definition of Rights:*

- Introducing clear and explicit rights, recognition of rights that already exist and equitable allocation of rights to facilitate maximum benefits for society;
- Precise definition of rights in terms of their limits, mode of enforcement, transferability and expected cooperation between right holders;
- Establish an authority to manage rights, ensure equity and avoid over-capacity;
- Raise awareness through education and training schemes between stakeholders about benefits of rights-based management;
- Identification of the costs and benefits of changing to RBFM e.g. job losses, wastage of redundant equipment, to ensure that transitional costs are incurred by those who benefit most from the change and minimise the impact to those most vulnerable i.e. poorer individuals;
- Encourage wide stakeholder involvement, especially for major decisions, to ensure that a right-based approach is applied in allocation of fishing quotas. This particularly includes those often marginalized by such processes, particularly indigenous fishing communities who can bring considerable artisanal knowledge to the management of fish stocks

Systematic *Assessment and Analysis* of RBFM requires:

- Research into socio-economic aspects of fishery, ecosystems management approaches. Assessment of the effects of habitat degradation on productivity of fishery resources. As well as conduct independent resource surveys and ecosystem monitoring;
- Application of the precautionary approach to new fishing approaches, recognising potentially negative consequences of change, clarifying the dynamics between systems, as well as agreeing in advance possible responses to any evidence suggesting negative outcomes;
- Increasing confidence and understanding of scientific information by improving the transparency of scientific procedures to public and encouraging involvement of a range of stakeholders in the procedures, as well as introducing peer review.

Effective *National Governance and Jurisdiction* needs to ensure:

- An “exclusive rights” system which is both clear and enforceable, increases efficiency and provides incentives to reduce overfishing;
- An authority which has sufficient powers and resources to provide for stakeholder participation, guarantee the interests of the rights holders and develop clear mechanisms for allocation, compensation (for non-allocation), registration, monitoring and enforcement;
- The transferability of rights, with long-term viability (although some powers of amendments should be retained by the management authority);
- National governance systems to ensure appropriate and balanced decision-making systems and stakeholder participation takes place, as well as key legislation is further developed.

At the level of *International Governance* all fishing states need to:

- Ratify and implement of 1995 Fish Stocks agreement, as well as the Convention on Biological Diversity, including the Jakarta Protocol, and also the Biosafety Protocol which specifically called for the recognition of traditional and indigenous knowl-

Box 4. MSC standard

The following draft Principles & Criteria aim to guide the efforts of the Marine Stewardship Council towards the development of sustainable fisheries on a global basis. They define a sustainable fishery, for the purposes of MSC certification, as a fishery which:

- can be continued indefinitely at a reasonable level;
- maintains and seeks to maximise, ecological health and abundance;
- maintains the diversity, structure and function of the ecosystem on which it depends as well as the quality of its habitat, minimising the adverse effects that it causes;
- is managed and operated in a responsible manner, in conformity with local, national and international laws and regulations;
- maintains present and future economic and social options and benefits;
- is conducted in a socially and economically fair and responsible manner.

*Principle 1:*A fishery must be conducted in a manner that does not lead to overfishing or depletion of the exploited populations and, for those populations that are depleted. The fishery must be conducted in a manner that demonstrably leads to their recovery.

*Principle 2:*Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

*Principle 3:*The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

Source: Marine Stewardship Council http://www.msc.org.uk

edge of marine biological systems;
- Strengthen and extend the Fish Stocks agreement, to include other (commercial and non-commercial) fish species present in the high seas (sea mounts and oceanic ridges), and allow for arbitration in cases of dispute or violation of agreement;
- To fully support an International Code of Conduct for Responsible Fishing, bringing wider responsibility across the sea-food industry from fish production to retail;
- To put into place efficient and fair fishing *Trade and Subsidies* through: phasing out subsidies harmful to the continuation of fish stocks; ensuring that unbudgeted and indirect subsidies are made transparent; interpreting Articles XX9b) and (g) of the GATT (1947) and the WTO Agreement on the Technical Barriers to Trade (1994) according to international fisheries law. (WHAT)

3.3 Linking in local solutions to global sustainable development

The challenge for the marine community and the Johannesburg Summit is to set out a strategy to deliver real changes over the next decade and beyond. In broad terms, what is required is a package of mutually supportive measures, in order to focus the marine community together for concerted action, through fostering partnership between the different sectors and across different scales. At the global level, ministers need to bring a strong message of political intent regarding the implementation of key agreements, as well as increasing their support of the work of the UN. At the regional level, there is a need is to modernise the approach and build up the capacity of the existing mechanisms around a common operational focus, based on sustainable management and stakeholder involvement. At the national and local levels, there needs to be an emphasis on building awareness, stakeholder partnerships and strategic policy integration and direction. Specifically, the necessary measures include:

Global activities

UN Machinery. In order to provide the necessary underpinning principles and ongoing high-level pressure for these initiatives, the following changes to the UN machinery of Government are also important:
- **International consultation**: Authorization of the UN's Informal Consultative Process on the Oceans to become a permanent part of the oceans machinery, to include wide stakeholder participation
- **Policy analysis and monitoring**: Strengthening the Intergovernmental Oceanographic Commission (so as to fulfil its role as an effective inter-agency oceans co-ordinator) notably through co-operation with UNEP and IMO over marine science, research and monitoring, and thereby providing a focus for co-operation on oceans and climate change issues
- **Internal integration**: Establishing an effective and coordinated internal UN structure, such as through the current ACC committee on the oceans and seas – that bids greater internal UN coherence as well as clarifies links with external multi-lateral bodies e.g. WTO and regional economic blocks.

International regulation. The following recommendations have been proposed toward enhancing international marine agreements and conventions, to:
- **Coordination:** A clearer international framework on regulating the management and conservation for oceans is urgently needed. Greater inter-agency coordination should be developed, for example GEF, UNDP and the International Maritime Organisation collaborated over a pilot project for the Bohai Sea. Regional fisheries bodies need to be strengthened and coordinated within a global fisheries forum. Also further synergies should be developed between initiatives, e.g. along marine protected corridors, to avoid gaps between different projects. Clustering of agreements which relate to marine and coastal issues, functions and regional activities for international agreements would also aid the processes of reporting and reduce burden on governments;
- **Regulation:** The International community needs to address the present and future exploitation of seabed resources, genetic, mineral and otherwise, to define principles of sustainable management and use. Further ratification and implementation of the UN Agreement on Straddling and Highly Migratory Fish Stocks, and the FAO Compliance Agreement. Implementation of the FAO Code of Conduct for Responsible Fisheries and the various FAO Action Plans, including relating to IUU fishing. Governments need to take the UNCLOS framework and surrounding agreements and implement them in the form of national legislation;
- **Monitoring**: Further implementation of Washington GPA, and its 2001Review. With regard to GOOS, good progress has been made in the development of the ocean-climate module, however the coastal module remains in its infancy. High priority must be placed building international support for this process and particularly on the development of the coastal module and for capacity building in developing nations to help them contribute to and benefit from the observing system.
- **Capacity building**: Supporting agencies like UNEP have historically focused on compliance and enforcement of the agreements to enable implementation will require more work on capacity building of countries to assist them in their progress. Twinning arrangements between industrial and developing countries may assist this further. For example the Ecoplata project for the coast in Uruguay in cooperation with Canada. The legislators themselves need to be further educated to address inter-linkages between international agreements and their implications for national legislation. There remains a massive need for the developed nations to invest in sustainable capacity building in developing nations.

Funding arrangements. Funding of effective and integrated marine management is a Global Public Good. Therefore the IFIs, and donor community generally, including the Global Environment Facility , as well as the UN system, need to factor in marine issues more effectively into their budgets and development programmes. This should include additional funding for marine science and capacity building activities.
- **GEF Financing**: 17-20% of GEF funds are allocated to international waters programmes. However GEF needs significant replenishment if such work is to continue. Also a more ecosystems type approach could be adopted better to link up funding projects targeting different areas.
- **Development Finance**: The World Bank also earmarks funds for marine and coastal issues. This could be duplicated across WB initiatives e.

g. Poverty Reduction Strategies, as well as other development institutions e.g. the regional development banks and funding bodies.

- **New Financial Mechanisms**: The carbon fund established though Kyoto Protocol might be applied to protect critical marine and coastal habitats i.e. Coral reefs which act as carbon sinks, and may be the first major ecosystem to exhibit severe damage from global climate change.
- **Fisheries Sector:** Marine species are generally more effected by large scale industry than local practices, however, in developing countries where local communities are more dependant on coastal fisheries, further incentives need to be provided to encourage sustainable management from the fishery sector e.g. the live food fish trade in coral reef fishes.
- **Tourism Sector**: Since tourism typically targets coastal areas, ecotourism and sustainable tourism could offer a means to protect the coastal and marine environment whilst also generating economic gains. However, such practices need thoroughly mainstream sustainability throughout their operations, including taking extra account of the benefits and costs of such tourism development to domestic and local economies, and ensure that local communities have a key part to play.
- **Other industries**: the polluter pays principle could be imposed through charges on industries (e.g. agriculture, oil, manufacturing and even households) that pollute and/or degrade the marine and costal environment.

Regional activities

Regional action needs to be more explicitly linked to meeting the international obligations that underlie the principles for marine planning and management. Greater coordination within and between regional marine groupings has considerable potential to build a more integrated approach to marine management.

- **Regional Indigenous Organisations (RIOs)**: RIOs, such as the Caribbean Community (CARICOM), the Pacific Island Forum, Med Forum, Association of South East Asian Nations (ASEAN), North America Commission for Environmental Cooperation are all seeking to mobilise ownership, management and policy recommendations throughout their marine areas. Such experiences should be shared and applied in regions elsewhere.
- **Multi-stakeholder programmes**: revitalise the Regional Seas Programmes through establishment of multi-stakeholder platforms, bringing together governments, UN agencies, MEAs, donors, regional financial and economic institutions, NGOs, representatives of fishing and coastal communities, the private sector and other groups, around the implementation of the programmes, as well as agreements such as the GPA.
- **Regional management**: Develop the Regional Fisheries Bodies into genuine cornerstones of sustainable regional fisheries management, with a particular emphasis on the initial process of capacity building, through encouraging and facilitating wider use of marine science and stakeholder collaboration. Regional GOOS alliances should be also be acknowledged and further endorsed. Likewise, the Regional Seas Conventions provide a useful framework for implementing the GPA. This should be acknowledged and endorsed.
- **Knowledge and capacity building**: Establish twinning and joint working arrangements, both within and between the Regional Seas and Fisheries Commissions, as well as within and between the relevant MEAs and UN agencies. For example, regional experiences can be shared in the adoption of new management approaches.

National activities

Regional coordination is not a substitute for implementation and action at national and local levels. Activities from governments and other public institutions include:

- **Integrated implementation**: marine and coastal activities need to be incorporated, where applicable, into national sustainable development strategies, so contributing to the international development targets, as well as relevant educational programmes. Action between government departments and ministries needs to be harmonised. The marine Economic Exclusion Zones and coastal areas need to be jointly managed between local and national authorities. Where possible a single marine body should be established at the national level to ensure effective coordination of activities from local to global levels.
- **Monitoring**: national action programmes under the Washington GPA need to be adopted so as to establish marine priorities and link in with broader investment programmes. This includes building the links with academic and scientific bodies that are actively researching and monitoring the marine and coastal environments. National GOOS programmes are developing rapidly. Again, this should be acknowledged and endorsed. Greater linkages between marine science and policy makers need to be established, as well as support for wider marine community and multi-stakeholder involvement in monitoring of coastal and marine areas;
- **Sharing knowledge and learning from experience**: This is key to assist implementation at national and local levels. For example in the marine environment, local authorities and governments can share experiences of establishing MPAs and ICM plans. In fisheries, such groups can jointly assess the benefits of no-take zones, and no-take seasons (to allow fish stock recovery)
- **Public involvement**: Increase aware in the public about the need for management of the marine environment e.g. though establishing national monitoring networks and ocean development plans.

And greater participation of fishing community needs to be developed for marine policy making and implementation e.g. in establishing fishing quotas, monitoring of the coastal and marine environments, implementing international agreements into national legislation, as well as involving a wide cross-section of society, particularly coastal residents, indigenous peoples and marine industries. Rationalisation of fishing industry, including tightening of quotas, fishing fleets and removal of subsidies should be based- on a rights based approach

Private Sector

There is substantial need for support from private sector – across fishing, shipping, tourism, and other sectors, and especially were active in developing countries in adopting good marine practice – both domestically and overseas (not clear). Governments could aid

this process though enabling:

- Wide dissemination and sharing of codes of conduct;
- Support of independent certification and verification schemes;
- Development of both incentive and regulatory mechanisms to encourage sustainable practice;
- Regular environmental and socio-economic assessments and reporting from the private sector.

NGOs and wider civil society

As already alluded to, the role of NGOs cuts across a range of aspects to enhance marine and coastal environment, these activities need to be recognised and encouraged through resources and more inclusive processes. These roles include:

- Monitoring and information networks e.g. the Global Coral Reef Monitoring Network;
- Support for implementation, policy advocacy and capacity building e.g. WWF, Greenpeace, Climate Action Network;
- Create incentives to encourage sustainable and well-managed fisheries e.g. Marine Stewardship Council;
- Marine mammals and other endangered marine species can be used as flagship species to highlight more widespread environmental problems to the public e.g. IUCN Red list species;
- Mobilise support for seeking larger solutions for sustainable development e.g. policy think tanks.

4. Conclusion

The Summit process is set to carry out a formal review of the whole of Agenda 21, including Chapter 17 on Oceans and Seas. It is therefore important to use the Summit as an opportunity to press home key messages on marine issues. This paper has aimed to highlight some options and recommendations for the Summit on two key marine issues. Central to this will be to take a fresh look at the delivery mechanisms necessary for effective implementation. Such mechanisms need to be founded upon principles of integrated management and good governance, increased resources, expanded public awareness and stakeholder involvement. Underpinning all this is the need to establish and build-up a large marine constituency that carries a common understanding of the importance of the marine ecosystem, both in relation to fisheries and land-based activities, as well as utilising the medium of key regional institutions and processes. The World Summit can play an important role in this process by highlighting and endorsing a package of measures to help build this constituency, and in so doing demonstrate how improved oceans governance will contribute to sustainable development globally, including improved food security, health, economic growth, ecosystem integrity and poverty alleviation.

A forerunner to WSSD was a meeting on Oceans in December 2001 in Paris. Scientists, NGOs, politicians and other groups gathered to discuss the progress being made towards the sustainable management of the global marine and coastal environment. The meeting highlighted the fact that the many of the problems are commonly known, as indeed are many of the solutions – technical, social, regulatory, political, environmental, economic or otherwise. It is clear that the right words are no longer enough. What is needed now is a collective sense of urgency to put these proposals and principles into action.

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Convention on Biological Diversity, including the Jakarta Mandate on the conservation and Sustainable Use of Marine and Coastal biodiversity and the Biosaftey Protocol http://www.cbd.org

Convention against the Illegal Trade of Endangered Species (CITES) http://www.cites.org

Convention on Migratory Species http://www.cms.org

Convention concerning the Protection of the World's Cultural and Natural Heritage (World Heritage Convention) and the Convention for the Protection of Underwater Heritage http://www.unesco.org/whc/

Framework Convention on Climate Change, including the Kyoto Protocol http://www.fccc.int

International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78) http://www.imo.org/Conventions/mainframe.asp?topic_id=260

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