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For the UNDP/GEF Yellow Sea Project
Yantai, China, 5-9 January 2008

Suggested Guidelines for Drafting SAP

To complement Document, UNDP/GEF/YS/SDG.1/4 "Draft Structure of SAP," this document describes the fundamental logic of the SAP (Section 1) and specific guidelines on how to compose each section in the SAP (Section 2). SAP Drafting Group members are requested to (i) keep in mind the logic—the linkage between different attributes (e.g., Carrying Capacity of Ecosystem - Regional Targets - Management Actions)—when the members draft the SAP and (ii) review, revise (if necessary), and follow the specific guidelines.

I. Fundamental logic of the SAP

1. The Yellow Sea Ecosystem provides "**Ecosystem Services** (Figure 1):"

   - Provisioning services;
   - Supporting/regulating services; and
   - Cultural services.

2. The Yellow Sea has "**Carrying Capacity of Ecosystem** (CCE)" which is defined as "the ability to sustain the provisioning, regulating/supporting and cultural services [Ecosystem Services] in the Yellow Sea (adapted from Olsen et al. 2006)" (Conceptual Procedure, p. 2).

3. According to the TDA, **five major environmental problems** adversely affect the CCE of the Yellow Sea:

   (1) Marine environment pollution;
   (2) Marine and coastal habitat modification;
   (3) Change in ecosystem structures and functions;
   (4) Unsustainable fisheries; and
   (5) Unsustainable mariculture practices.

4. The objective of SAP Management Actions is to **maintain the CCE by solving the problems** through protecting the coastal and marine environment, promoting sustainable use of coastal and marine resources, and upgrading national capacity to protect the environment.

5. "**Regional Targets**" by year 2020 were established according to the problems. Achieving the Targets is expected to solve the problems and therefore contribute to maintaining the CCE of the Yellow Sea.

6. **Management Actions** were identified to achieve each Target.

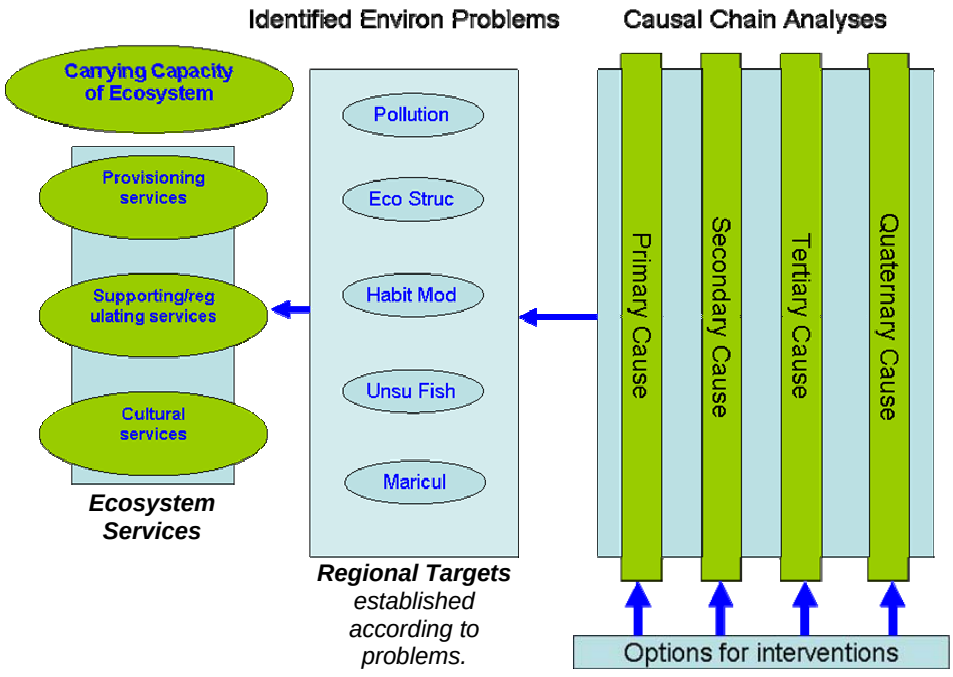

Figure 1. linkage between different attributes to be described in the SAP

II. Specific guidelines

7. For the outline of the SAP, see Document, UNDP/GEF/YS/SDG.1/2 "Draft Structure of SAP."

8. The length of the SAP may be 30 to 40 pages (A4 paper, single space, Arial, 11-point font with 1" margins), excluding cover sheet, list of abbreviations, acknowledgement, tables/figures, references, and annexes. The length of each section in the SAP is indicated in parentheses in the Document, UNDP/GEF/YS/SDG.1/2.

9. Further instructions for each section are described below as well as in the Document.

10. Management Actions will be organised in the SAP by three measures mentioned in Clause 4 above (i.e., protection of the coastal and marine environment, sustainable use of coastal and marine resources, and upgrading national capacity to protect the environment).

    That is, Section 5.1 in the SAP, "Protection of Coastal and Marine Environment," describes the Actions to address Problem (1), (2), and (3). Section 5.2 in the SAP, "Sustainable Use of Coastal and Marine Resources," describes the Actions to address Problem (4) and (5). (Note that the Actions will not be organised according to the Project Components, though Section 5.1 is related to Biodiversity, Ecosystem, and Pollution, while Section 5.2 is related to Fisheries mainly.)

Management Actions will then be organised further by the problems.

11. Institutional and Legislative Management Actions, described in Section 5.1 and 5.2 in the SAP, should include (or should not contradict) recommendations made by Governance Analysis.

12. Section 5.3 in the SAP, “Upgrading National Capacity,” should reflect recommendations made by Governance Analysis.

[It might be better if Section 5.1 and 5.2 discuss only Technical Management Actions; meanwhile, Section 5.3 discusses Institutional and Legislative Management Actions comprehensively.]

13. The details of each Management Action should be provided:

- Objectives of an Action to be undertaken
- Description of methodology (activities that will be carried out)
- Responsible party of implementation
- Timeline or deadline of implementation
- Expected implementation cost
- Description of expected results (contributions to achieving the Target)
- Monitoring and evaluation indicators in line with GEF’s indicator category: process, stress reduction, and environmental status indicators)

(See Appendix 1 in this document for actual examples of Management Actions in similar projects.)

14. Methodology or activities that will be carried out should be described as detailed as possible, although the level of detail and scope of descriptions of Management Actions may depend on each Action. Table 1 summarises the actual examples to show different levels of detail (horizontal direction) and scope (vertical direction) for describing methodology.

15. Level of detail: Methodology should be describes as detailed as the “Tertiary” level whenever possible, although the examples from similar projects show that most Management Actions or their methodologies were discussed at the “Primary” or “Secondary” level.

16. Level of scope: Only the Management Actions with technical feasibility should be discussed.

[Members should agree on the level of detail and scope of the description.]

Table 1. Actual Examples of Management Actions (Summary)

I. Pollution reduction (Black Sea)

Issues	Primary action	Secondary action	Tertiary action
Land based sources of pollution			
High priority point-sources	Basin Wide Strategy should be developed to address the eutrophication problem in the Black Sea.	Each Black Sea coastal state will specify the strategies and timetables for attaining reduced inputs from the hot-spots located in its territory.	National reports on the progress made in addressing the identified hot-spots will be presented to the Istanbul Commission and widely disseminated, in 2000 and 2005. This report should include an assessment of the progress made on the strategy for each site.
Regulation of point sources	Comprehensive national studies on the discharges of insufficiently treated sewage will be prepared by each Black Sea state by January 2000.		
	Implement the Protocol on Land Based Sources to the Bucharest Convention.	Water quality objectives shall be harmonized.	
		Procedures used for monitoring the actual discharge of effluent at point sources shall be harmonised.	
		Adopt and implement, by 1999, the laws and mechanisms required for regulating discharges from point sources.	Adopt and implement efficient enforcement mechanisms by 1999.
		Ensure that the national agencies responsible for licensing, monitoring and enforcement are adequately staffed and that the necessary resources are available to them.	Training courses at local agencies will be organised.
Vessel source pollution	MARPOL 1973/78 shall be more effectively implemented.		
	Harbour reception facilities will be installed: for garbage by December	The use of these facilities shall be made compulsory.	

	1999; for oil by December 2000; and for chemicals by December 2002.		
	A harmonised system of port state control will be established in the Black Sea region through the adoption of a Memorandum of Understanding on Port State Control.		
	Take the necessary steps to enable them to fully exercise their [Black Sea states'] prescriptive and enforcement powers, in accordance with international law, in order to pursue the reduction of illegal discharges by vessels.	A harmonised system of enforcement, including fines, will be developed for the Black Sea region.	
	Present a joint proposal to the IMO, in 1997, for conducting an in-depth study on measures to avoid any further introductions of exotic species into the Black Sea through the deballasting of vessels.		
Pollution from dumping	A total ban on the disposal of municipal garbage in marine, shoreline and estuarine areas shall be imposed by December 1996.		
	Take measures to control any [illegal] dumping activities that may take place.		
	Define concentration levels for trace contaminants in dredged spoils by February 1998.		
	Consider amending the Protocol on Dumping to the Bucharest Convention, in accordance with the London Convention 1972.		
Assessment and monitoring of pollutants	A "State of Pollution of the Black Sea" report will be prepared and published every five years.		
	Monitoring System will be		

	established in compliance with the Bucharest Convention.		
	A uniform measurement technique for bathing water quality with a common quality assurance support mechanism shall be developed.		

II. Sustainable nature use and environment protection (Dnipro)

Issues	Primary action	Secondary action	Tertiary action
Establishment of effective legal and institutional mechanisms	1 Improve legislative/regulatory and institutional mechanisms. 2 Establishment of an institutional framework for the international management of the Basin. 3 Provide a legal and institutional framework for encouraging and promoting public participation in the decision-making process. 4 Harmonise environmental legislation of the riparian countries of the Dnipro Basin with that of the EU.	Enhance environmental legislation and regulations. Ensure compliance with the requirements of environmental legislation and regulations at all levels of state governance. Strengthen the legislative and regulatory framework for water resource management on a catchment's basis. Pursue an economically viable and environmentally sound tariff policy. Sign and ratify the Agreement on Cooperation on Management and Protection of the Dnipro Basin. Establish and ensure the sustainable operation of the International Dnipro Basin Commission. Ensure sustainable operation of the International Dnipro Basin Council. Implement Transboundary Monitoring	

		Programme. Ensure the exchange of environmental information. Jointly develop and implement the environmental action programmes. Increase the level of responsibility and accountability of local authorities and the public. Harmonise legislation relating to prevention of chemical, nutrient and radionuclide pollution in line with the EU approaches.	
		Encourage the active participation of the public in the legislative process;;	Promote the practice of independent review of draft laws. Encourage the active involvement of the public in the preparation and implementation of environmental programmes.

III. Fisheries (South China Sea)

Issues	Primary action	Secondary action	Tertiary action
Proposed targets	Activities at the Regional level	Activities at the national level	
By 2005, determine regional catch levels of key economic/commercially important species.		Conduct resource assessment of fishery resources to determine the level of optimal catch and effort for different fishing grounds in the Region.	
By 2005, establish a regional system of marine protected areas for fishery stock conservation.	Develop criteria for selection of [critical] marine habitats and areas. Identify and prioritise specific areas for future management and	Establish marine protected areas in areas identified as critical habitats. Implement programmes to provide information on fish stock	

	protection. Review [and reduce] destructive fishing activities. Review fisheries management systems. Review compliance to international fisheries conventions.	conservation and sustainable fishery practices among small and artisanal fishing communities. Develop educational and public awareness materials on sustainable fishery practices.	
		Promote the Code of Conduct for Responsible Fisheries.	Organise workshops, build awareness, and translate the Code into local languages.
By year 2005, implement, at chosen sites, a management system that will sustain the exploited resources.	Establish management regimes for the identified areas.	Establish a good management system in selected pilot sites.	

IV. Conservation of Biodiversity (Caspian)

Issues	Primary action	Secondary action	Tertiary action
Increase regional collaboration.	Draft and adopt a Biodiversity Protocol.		
	Establish a regional biodiversity monitoring system.		
	Create a regional 'clearing house mechanism.		
	Develop a framework for international research.		
	Develop and implement an awareness campaign.		
	Ensure biodiversity issues and impacts are taken into account in all EIA applications.		
Maintain and restore key species.	Identify and assess key threatened and endangered species.		
	Ensure adequate legal protection.		
	Create a gene bank.		
Control of introduction and invasion	Develop and adopt a protocol.		

of non-native (alien) species.			
	Develop regional control procedures to manage the introduction.		
	Investigate potential biological control measures to reduce the impact of Mnemiopsis on the ecosystem.		
	Study on the possibilities of development of a Ballast Water Reception facilities.		
Protected areas	Improve effectiveness of management of Caspian protected coastal areas.		
	Create new and expand existing protected coastal areas.		
	Create a regional information network.		
	Develop management plans for the hydrological regimes of the major impounded rivers.		
Identify and restore priority sensitive coastal habitats.	Develop and apply a standardized methodology for assessment of priority coastal habitat health.		
	Design, implement and monitor a minimum of five priority coastal habitat restoration projects.		

Appendix 1

Examples of Management Actions in Similar Projects

Benguela Current

Black Sea

Caspian Sea

Danube

Dnipro

Mediterranean

Red Sea

South China Sea

Tanganyika

ANNEX 6

FINAL DRAFT

STRATEGIC ACTION PROGRAMME

Integrated Management, Sustainable Development and Protection of the Benguela Current Large Marine Ecosystem (BCLME)

III. POLICY ACTIONS

A. Sustainable Management and Utilisation of Living Marine Resources

Living marine resources are harvested by commercial and artisanal and recreational fisheries throughout the BCLME, and fishing is important to the economies of all three countries. Most of the region's important harvested resources are shared between countries, or at times move across national boundaries. Over-harvesting of a species in one country can therefore lead to depletion of that species in another, resulting in potentially irreversible changes to the ecosystem as a whole. In contrast, there may be species that can provide opportunities for sustainable development (e.g. seaweed, some invertebrates) that are not optimally utilised. All principal harvested fish stocks in the BCLME have been subjected to over-fishing in the past – the consequence of colonialism, some inappropriate historical policies and greed. The decline in hake stocks in the 1960s and 1970s can be attributed to the rape of the ecosystem by foreign fleets, and the collapses of sardine and rock lobster were due to greed and mismanagement coupled with a lack of understanding about the impacts of environmental variability. Over-fishing has had a negative impact on other components of the ecosystem too, e.g. seabirds and marine mammals. In order to rebuild depleted stocks and to repair the damage done to the ecosystem by past actions, and at the same time to develop employment opportunities and socio-economic advancement, the governments of Angola, Namibia and South Africa have committed themselves to the development of sustainable integrated management and utilisation of living marine resources through the following suite of policy actions:

29. In order to ensure the sustainable management and utilisation of living marine resources of the BCLME and avoid foreclosure of options for future generations, the following policy actions which address identified priority transboundary issues are agreed to:

(a) ***Regional structure***

A regional structure will be established to conduct transboundary fish stock and ecosystem assessments, to evaluate transboundary resource-environment linkages and to provide advice in these areas to governments. The implementation of this transboundary structure will involve the national focal institutions in the three states.

(b) ***Joint surveys and assessment***

Joint surveys and assessment of shared stocks of key species will be undertaken co-operatively over a five year period commencing in 2001 as a demonstration of the benefits to the individual nations of joint transboundary fisheries assessments. Integral within this collaboration will be the gathering of baseline data, comparisons and validation of survey and assessment methodology. The Activity Centre(s) responsible will give effect to the above and provide a basis for regional advice on shared stocks.

(c) ***Harmonising management of shared stocks***

The IBCC shall, where appropriate, harmonise the management of shared stocks through, *inter alia* addressing technical issues such as fishing gear, mesh size/type, compatible data and assessment methodology. (Note: harmonising management does not necessarily imply joint management).

(d) ***Assessment of non-exploited species***

Co-operative assessments of non-exploited species, both offshore and inshore, which are common to at least two of the countries, will be undertaken where appropriate. This will require the gathering and calibration of baseline information on these species, and assessment of the impact of any future harvesting on the ecosystem. The appropriate Activity Centre(s) will have the function of co-ordinating these activities.

(e) ***Regional mariculture policy***
Mariculture contributes sustainably to the regional economy and the improvement of living conditions of coastal communities. There is considerable potential for the expansion of mariculture regionally. However, it is essential to ensure that future growth of the industry does not at the same time have negative impacts on the ecosystem. The IBCC shall endeavour to develop a responsible regional mariculture policy in co-operation with SADC by December 2002 to harmonise national policies in such a manner that actions of one state do not impact negatively on the economic potential of another, nor on the ecosystem as a whole. The policy shall provide for the implementation of appropriate monitoring actions, including monitoring of harmful algal blooms.

(f) ***Socio-cconomic analysis***
Co-operative analyses of socio-economic consequences of various harvesting methods, the improved use of living marine resources and the economic value of the BCLME as an ecosystem, will be undertaken with a view to appropriate intervention within the framework of improving sustainable ecosystem use/management and quantifying regional and global benefits. Co-ordination of these activities will be undertaken by the appropriate Activity Centre.

(g) ***Fishery conservation measures***
National policies on protected areas and other conservation measures will be harmonised as far as possible.

(h) ***Code of conduct for responsible fishing***
The governments of Angola, Namibia and South Africa commit themselves to compliance with the FAO Code of Conduct for Responsible Fishing.

B. Management of Mining and Drilling Activities

Exploration for oil, gas and minerals (e.g. diamonds) is expanding throughout the BCLME. There is substantial oil extraction in northern Angola (Cabinda Province), and development of oil/gas fields (with pipelines) farther south are planned (e.g. in Namibia). Capped abandoned wellheads hamper fishing, while drill cuttings and hydrocarbon spills impact on the environment. Extensive diamond mining is being conducted by dredging along the coasts and continental shelves of Namibia and South Africa. The ecosystem effects of these activities are not fully known, and conflicts can arise between different sectors (e.g. mining-fishing-conservation).

30. In order to further the objectives of responsible multi-sectoral utilisation of the BCLME and to minimise any negative impacts on the ecosystem of mining and drilling activities, the following policy actions are agreed to:

(a) ***Regional consultation framework***
The IBCC shall develop by December 2002 a regional framework for enhanced consultation, with the objective of mitigating the negative impacts of mining, reducing inter-sectoral conflicts and

Assessment of the utility of and feasibility of a regional link-up with the existing PIRATA moored ocean- monitoring buoy network in the equatorial Atlantic will be undertaken through a demonstration project to assess the feasibility of establishing an early warning system for environmental perturbations in the BCLME.

(b) ***Baseline establishment***

Analysis of existing data series and material archives will be undertaken collaboratively to ascertain and provide a baseline against which to measure future transboundary variability/change, in particular decadal changes, and to ascertain the extent of and trends in variability and change, in particular decadal changes during the 20th century. This work will be facilitated through one of the Activity Centres. The establishment of an environmental baseline for the BCLME is seen as a high priority regionally and is also important in a global context.

(c) ***Improving predictability of extreme events***

Analysis and reassessment of available data and information, augmented where appropriate by new material, will be undertaken to determine the sources and large-scale impacts on the BCLME of variations in seawater oxygen level as well as other extreme episodes of inter-annual variability, with a view to improving predictability of their timing, extent and ecosystem consequences. The improved predictability of major transboundary perturbations will complement in particular resource assessment and modelling and resource management actions, coastal zone management and marine pollution contingency planning. It will also be used to enhance forecasting of regional rainfall and, as a consequence, better planning/management of terrestrial activities such as agriculture that depend on rainfall. This work will be jointly facilitated through the Activity Centres in all countries.

(d) ***Harmful algal blooms (HABs)***

A regional HAB reporting network will be developed during 2001 with a view to its implementation in 2002. Regional contingency plans for assessing the transboundary effects of HABs will be developed and implemented by December 2002. Data on HABs will be an important input into the sustainable development of mariculture, and data requirements will be specified in a plan for regional mariculture policy harmonisation.

(e) ***Climate change***

In view of the role that upwelling systems may play in climate change as sources and sinks of carbon, the three countries will collaborate with the international community to assess the carbon dioxide source/sink status of the BCLME and likely feedback mechanisms to climate.

D. Management of Pollution

Coastal developments and rapid expansion of coastal cities, much of which was unforeseen or unplanned, has created pollution "hot spots" in all three countries, with resultant deterioration in water quality. The problem is aggravated by an increase in marine litter from land and shipping activities. In addition, a substantial volume of oil is transported through the BCLME region and within it, and there is increasing exploration and extraction of oil and gas in the north. There is a significant risk of contamination of large areas of fragile coastal environments from major accidents, damage to coastal infrastructure and to straddling fish stocks.

32. The following joint policy actions to manage marine pollution in the BCLME and minimise ecosystem impacts are agreed:

(a) ***Harmonising environmental quality objectives***
The IBCC will endeavour to provide effective regional communication to co-ordinate efforts to control marine pollution, minimise impacts and develop cost-effective solutions. This will include *inter alia* development of regional environmental quality indicators, proposals for marine pollution control and surveillance, regional monitoring/inspection of the coastal zone and regional enforcement of standards. The focus will be on prevention rather than cure. In the case of point source pollution, the member states will by June 2002 develop waste quality criteria for receiving waters.

(b) ***Oil pollution contingency plans and regional policy***
All three countries have or shortly will have oil pollution contingency plans. The IBCC will endeavour to harmonise these plans as far as possible and to develop necessary mechanisms for sharing technology and expertise, and in the event of a major oil spill, for the sharing of clean-up equipment and provision of expert advice. An appropriate regional policy will be developed by 2003 to minimise transboundary (cross-border) impacts of oil pollution from activities in the EEZs of individual countries. Such activities will be co-ordinated by an Activity Centre.

(c) ***Implementation of MARPOL 73/78***
The Commission will co-operate with the SADC initiative for devising a common strategy for the implementation of MARPOL 73/78 in the BCLME region which is to be devised by December 2000.

(d) ***Marine litter***
The growing problem of marine litter will be addressed first by a regional public awareness campaign (which will have seafarers as its primary focus); and second by harmonising legislation, enforcement and implementation of standards at a regional level. Locally and nationally, activities will be facilitated and co-ordinated.

E. Maintenance of Ecosystem Health and Protection of Biological Diversity

Human impact on the ecosystem by way of fishing, increasing pressure on the coastal zone, pollution etc. has negatively affected components of the system, in particular on top predators such as marine mammals, coastal birds, e.g. African penguins which are now threatened or endangered. Several habitats, in particular coastal habitats, have also been perturbed or lost as a consequence of development and other human impacts, such as loss of wetlands, destruction of mangroves and lagoon. These have transboundary consequences and may be important globally. Moreover, there has been a loss of biotic integrity, including changes in community composition, species diversity and the introduction of alien species.

33. In order to retard or reverse habitat alteration and destruction and to protect vulnerable species and biological diversity, the following regional policy actions are agreed to.

(a) ***Vulnerable species and habitats***

A regional assessment of the status of the most vulnerable species and habitats will be undertaken collaboratively by December 2001. This assessment will be facilitated by one of the Activity Centres. Member states will endeavour to assemble the necessary baseline data and, where affordable, undertake focused research on perceived causality. A regional marine and coastal early warning system will be developed by December 2002 and incorporated into an action that will specify environmental quality criteria and propose the most appropriate regional structure to address the problems. Implicit in this is the development of mechanisms for co-operation between industries, governments and other stakeholders. A needs assessment to improve coastal management expertise will also be conducted. A suite of appropriate projects for marine and coastal areas suitable for GEF and donor funding will be elaborated during 2000. These will include *inter alia* a project to determine the carrying capacity of BCLME coastal zone for tourism.

(b) ***Ballast water policy***

A regional policy on ballast water for the BCLME will be developed in tandem with the existing GEF international ballast water management project. The latter project will include a SADC-wide workshop to raise awareness on the problems associated with ballast water. South Africa can take the lead in this initiative.

(c) ***Marine biological diversity conservation***

A regional marine biodiversity conservation management plan will be developed by December 2003. This plan will include a framework for assessment and prediction of the aspects of environmental change, an assessment of genetic diversity implications of marine resource management, and identification of priority marine protected areas, in particular possible transboundary protected areas. Close co-operation will also be maintained with the SADC programme "The Southern African Biodiversity Support Programme". The GEF SIDS Programme for the South Pacific could serve as a useful framework for the identification and development of protected areas. The process of establishing a management plan will be facilitated by an Activity Centre.

F. Capacity Strengthening

The strengthening of human and infrastructure capacity and the maintenance of existing capacity has been identified as a high priority if not the highest priority, in the region. Existing capacity is stretched to the limit to address national priorities within the BCLME, and there is a serious lack of capacity to address the priority transboundary issues identified in the TDA and highlighted in this SAP. Appropriate strengthening of human and infrastructure capacity in the region is a prerequisite for the sustainable integrated management of the BCLME. This applies at all levels in all transboundary components including, *inter alia*, science and technology based activities and assessment, economic assessment, surveillance, overall management and policy development and regulation and enforcement.

34. Policy actions proposed to develop and maintain capacity in the BCLME are listed below.

(a) ***Strategic plan for capacity strengthening***
A comprehensive collaborative study of human capacity and training and infrastructure needs to address priority transboundary issues will be undertaken during 2000, together with an assessment of the status of existing capacity and trends therein. This needs assessment will use as its point of departure the priority areas identified in the TDA, eg. transboundary resource assessment and management, environmental assessment and prediction of large-scale extreme events which impact across BCLME and national boundaries and ecosystem consequences of extreme events, transboundary pollution management, cumulative impact assessment of mining, system-wide protection of biodiversity, etc.. It will harmonise with other programmes and activity areas such as BENEFIT and the EU-SADC Monitoring-Control-Surveillance (MCS) initiative. It will form a basis for the collaborative development of a comprehensive but realistic regional strategic plan for capacity strengthening and maintenance within the context of the BCLME and focusing on transboundary needs, and will be finalised by June 2001.

(b) ***Implementation of capacity strengthening strategic plan***
Following acceptance of the regional strategic plan for capacity strengthening and maintenance in the BCLME, each country shall endeavour to implement the strategy to the best of its ability.

IV. NATIONAL STRATEGIC ACTION PLANS

35. Each member state shall prepare by June 2000 a national BCLME strategic action plan (10 pages) or other corresponding document, which shall present details of additional national actions to further implement the SAP. These shall include details of responsibilities and specific projects where possible.

V. FINANCING THE STRATEGIC ACTION PROGRAMME FOR THE NEXT FIVE YEARS AND REVIEW

36. The countries will seek the necessary funding for the actions agreed upon in this Strategic Action Programme from national, regional and international sources, through private and general public funding or through the application of specific economic instruments, as well as through grants and loans. Specific projects for international funding will be prepared for bilateral or multilateral funding. Donor conferences for assisting in this process shall be held every five years, starting in the year 2000. Specific funding arrangements for the national policies and measures agreed on in this Strategic Action Programme shall be presented in the National SAPs to be adopted by each of the member states.

37. The SAP shall be reviewed from time to time and updated when and where necessary.

VI. ARRANGEMENTS FOR FUTURE CO-OPERATION

38. The implementation of this SAP over a five-year period will produce a revised programme that will lead to long-term measures to sustain and protect the BCLME. Member states agree to commit themselves to continuing the BCLME Programme beyond the GEF intervention, and will endeavour to (a) adopt appropriate legislation, (b) implement economic instruments and (c) establish a permanent Benguela Current Commission with a supporting Secretariat. A financial

Strategic Action Plan for the Rehabilitation and Protection of the Black Sea

Istanbul, Turkey, 30 - 31 October 1996

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Wider Cooperation

26. Black Sea countries shall individually and jointly encourage the following:

a) Enhanced coordination between the regional bodies which contribute towards the rehabilitation and protection of the Black Sea ecosystem and the sustainable development of Black Sea resources, such bodies include the Istanbul Commission and its subsidiary bodies, the Black Sea Economic Cooperation (BSEC), the Parliamentary Assembly for the Black Sea Economic Cooperation (PABSEC), the future Black Sea Fisheries Commission, and the NGO Forum;

b) Close cooperation between the regional governmental bodies and the NGO Forum through transparency of the negotiating process, widespread availability of information and documents, and, where appropriate, open access to meetings;

c) Close coordination of the activities of donors, including multilateral financial institutions, the European Union, bilateral aid agencies and private foundations, in their aim to secure funding for projects and policies identified in this Strategic Action Plan and to be further developed in the National Black Sea Strategic Action Plans.

d) Close cooperation with relevant international organisations, including UN Agencies and international non-governmental organisations in implementing this Strategic Action Plan.

27. International agreements relevant to the aims and objectives of this Strategic Action Plan should be implemented by each Black Sea state and, where this is appropriate and has not yet been done, it is recommended that Black Sea states consider ratifying or acceding to such agreements. Consideration should also be given to implementing other relevant international instruments.

III. Policy Actions

28. Taking into consideration the need to fully implement the Bucharest Convention and the Odesa Declaration, the findings of the assessment of implementation of the Odesa Declaration and the Transboundary Diagnostic Analysis (TDA), the following policy actions shall be implemented.

A. Reduction of Pollution

Land based sources of pollution

Rivers

29. A Black Sea Basin Wide Strategy, negotiated with all states located in the Black Sea Basin, should be developed to address the eutrophication problem in the Black Sea. The objective of the Strategy should be to negotiate a progressive series of stepwise reductions of nutrient loads, until agreed Black Sea water quality objectives are met. Such a Basin Wide Strategy may also be required to ensure the reduction of inputs of other pollutants into the Black Sea, in particular oil.

30. Given that the Danube is the largest single source of nutrient inputs into the Black Sea, it is imperative that strategies for the reduction of nutrients be adopted for this river. The provisions in the Danube Strategic Action Plan (maintenance of 1995 levels) clearly are insufficient for addressing the eutrophication problem in the Black Sea.

Airborne pollution

31. More attention should be focussed on the issue of airborne pollutants, particularly those that involve transboundary movements, as well as appropriate measures for controlling them at source. In initial assessment of the magnitude of this problem should be undertaken by 1999.

High priority point-sources

32. A list of high priority sites (hot-spots) for reducing discharges of pollutants has been developed. It will provide the basis for the elaboration of national strategies and timetables for realising substantial reductions of inputs of pollutants from hot-spots, in accordance with agreed water quality objectives. The following procedure has been agreed for the purpose of attaining these reduced inputs by 2006. Each Black Sea coastal state, in its National Black Sea Strategic Action Plan, will specify the strategies and timetables for attaining reduced inputs from the hot-spots located in its territory. In those cases where investments (as opposed to policy changes or economic restructuring) are required, in order to address specific hot-spots, pre-investment and investment studies will be pursued, with donor support where possible.

33. National reports on the progress made in addressing the identified hot-spots will be presented to the Istanbul Commission and widely disseminated, in 2000 and 2005. It is recommended that the Istanbul Commission prepare a consolidated report on this topic in time for the Ministerial meetings in 2001 and 2006. This report should include an assessment of the progress made on the strategy for each site. If the progress made is found to be insufficient to meet the agreed water quality objectives, further steps to reduce inputs will be decided upon at the Ministerial meetings.

Regulation of point sources

34. In addition to the high priority point-sources, comprehensive national studies on the discharges of insufficiently treated sewage will be prepared by each Black Sea state by January 2000. It is recommended that this activity be coordinated by the Istanbul Commission, through its Advisory Group on the Control of Pollution from Land-Based sources. These studies should analyse the national and regional benefits to public health, the environment and recreation as well as the economic costs of installing sewage treatment plants. The studies shall serve as a basis for taking decisions and implementing significant reductions of the inputs of insufficiently treated sewage from large urban areas by 2006.

35. In order to implement the Protocol on Land Based Sources to the Bucharest Convention and with a view to the gradual reduction of inputs of pollutants in general and the elimination of discharges of persistent pollutants of global significance (POPs) the following actions shall be taken.

    a) Water quality objectives shall be harmonised on the basis of the uses of water (drinking water, bathing water, aquaculture, ports etc.). It is advised that the Istanbul Commission, upon the recommendations of its Advisory

Group on Pollution Monitoring and Assessment, adopt such harmonised water quality objectives and where necessary standards by mid-1998. Furthermore, these objectives should be subjected to a comprehensive review every five years.

b) Procedures used for monitoring the actual discharge of effluent at point sources shall be harmonised. It is advised that the Istanbul Commission, upon the recommendations of its Advisory Group on the Control of Pollution from Land Based Sources, adopt such procedures by mid-1998.

c) Each Black Sea state shall endeavour to adopt and implement, in accordance with its own legal system, by 1999, the laws and mechanisms required for regulating discharges from point sources. The basis for regulating discharges will be a licensing system, through which the harmonised water quality objectives can be applied, and through which effluent charges, based on the polluter pays principle, can be levied.

d) Each Black Sea state will also endeavour to adopt and implement, in accordance with its own legal system, efficient enforcement mechanisms by 1999.

e) In order to secure the implementation of the actions agreed to in this paragraph, each Black Sea state shall ensure that the national agencies responsible for licensing, monitoring and enforcement are adequately staffed and that the necessary resources are available to them. Where necessary, training courses at local agencies, will be organised.

f) Each Black Sea state will consider the introduction of policies in which polluters are made to pay for compliance. The application of environmentally friendly production processes or other innovative process which reduce inputs of pollutants may also be encouraged through economic incentives.

Vessel source pollution

36. MARPOL 1973/78 shall be more effectively implemented by Black Sea states, especially with a view to giving effect to its provisions on Special Areas, by 2002.

37. Due to the rapid increase in traffic to Black Sea ports, the capacity of harbour reception facilities needs to be enlarged in order to comply with MARPOL Special Area requirements. Harbour reception facilities will be installed: for garbage by December 1999; for oil by December 2000; and for chemicals by December 2002. The use of these facilities shall be made compulsory. In installing harbour reception facilities close cooperation with the private sector will be pursued, the advice of the IMO will be requested, and the results of the study conducted by the BSEP and the European Union will be taken into account

38. A harmonised system of port state control will be established in the Black Sea region through the adoption of a Memorandum of Understanding on Port State Control. It is advised that the Istanbul Commission adopt such a Memorandum, upon the recommendations of the Advisory Group on Environmental and Safety Aspects of Shipping, by December 1998.

39. Black Sea states shall take the necessary steps to enable them to fully exercise their prescriptive and enforcement powers, in accordance with international law, in order to pursue the reduction of illegal discharges by vessels into the Black Sea.

40. A harmonised system of enforcement, including fines, will be developed for the Black Sea region. It is advised that the Istanbul Commission, upon the recommendations of the Advisory Group on the Environmental and Safety Aspects of Shipping, adopt such a system by December 1998. The primary aim of this system will be to serve as a deterrent for illegal discharges and, where necessary, to exercise enforcement action against illegal dischargers.

41. Black Sea states will present a joint proposal to the IMO, in 1997, for conducting an in-depth study on measures to avoid any further introductions of exotic species into the Black Sea through the deballasting of vessels. Given the danger of such species migrating to other seas in the region, the coastal states of the Caspian and Mediterranean Seas will be consulted.

Pollution from dumping

42. A total ban on the disposal of municipal garbage in marine, shoreline and estuarine areas shall be imposed by December 1996. Each Black Sea state shall develop a plan setting out the manner in which comprehensive enforcement of the ban will be attained by December 1999.

43. Illegal dumping operations in the Black Sea are a matter of concern. Black Sea states, individually and jointly, shall take measures to control any dumping activities that may take place.

44. Black Sea states, through the Istanbul Commission and in accordance with article 3 of the Protocol on Dumping to the Bucharest Convention, shall define concentration levels for trace contaminants in dredged spoils, by February 1998.

45. Black Sea states shall consider amending the Protocol on Dumping to the Bucharest Convention, in accordance with the London Convention 1972, including its subsequent amendments.

Waste management

46. The Black Sea coastal states will cooperate in developing and implementing environmentally sound waste management policies, giving due consideration to waste minimization, recycling and reuse.

Transboundary movement of hazardous wastes

47. Without further delay, Black Sea states, through the Istanbul Commission, and in accordance with Resolution 1, adopted at the Diplomatic Conference on the Protection of the Black Sea Against Pollution, shall complete and adopt the text of a Protocol to the Bucharest Convention concerning the transboundary movement of hazardous wastes and cooperation in combating illegal traffic thereof.

Contingency planning and emergency response

48. A Black Sea Strategy for contingency planning and emergency response shall be developed. It is recommended that the Istanbul Commission, upon the recommendation of its Advisory Group on the Environmental and Safety Aspects of Shipping, adopt such a Strategy, by December 1997. This Strategy should provide a basis for ensuring that the contingency plans developed within Black Sea states are

sufficiently coordinated. It will also serve as a basis for the development of the regional contingency plan.

49. National and local contingency plans, covering both vessels and offshore installations, shall be improved and, where appropriate, adopted, by December 1998. The responsibilities and obligations of governmental agencies in the event of marine emergencies shall be clearly defined. National contingency plans shall be developed in accordance with IMO guidelines, as well as other relevant international instruments, including the Black Sea Strategy for contingency planning and emergency response.

50. A Black Sea Contingency Plan shall be adopted. It is recommended that the Istanbul Commission, upon the recommendations of its Advisory Group on the Environmental and Safety Aspect of Shipping, adopt such a plan by December 2000. The Black Sea Contingency Plan should address the compatibility of: emergency equipment, reporting forms and oil spill data; classification of the scale of spillage's; methods for evaluating the sensitivity of the coast to hazards; and spill decision support systems, including models for forecasting oil movements. In addition, regionally coordinated national classification and risk assessment systems shall be developed.

51. In order to ensure rapid and effective action by national emergency response agencies, each Black Sea state, in cooperation with the private sector and, where appropriate, with international and bilateral agencies, shall ensure that their own national agencies are adequately staffed and that the necessary resources are available to them.

52. Close cooperation shall be sought with the shipping, oil and gas sectors in order to ensure that, to the extent possible, the cost of developing and implementing contingency plans are born by these sectors.

Assessment and monitoring of pollutants

53. A "State of Pollution of the Black Sea" report will be prepared and published every five years, beginning in 1996. It will be based on the data collected through the coordinated pollution monitoring and assessment programmes.

54. A Black Sea Monitoring System, based upon biological effects measurements and measurements of key contaminants, will be established in compliance with the Bucharest Convention. It will consist of the integration of obligatory national monitoring programmes, to be included in the National Strategic Action Plans, and an independent quality assurance system. It is advised that the Istanbul Commission develop such a quality assurance system through its Advisory Group on Pollution Monitoring and Assessment, by 1998.

55. A uniform measurement technique for bathing water quality with a common quality assurance support mechanism shall be developed. It is advised that the Istanbul Commission, upon the recommendations of its Advisory Group on Pollution Monitoring and Assessment, develop this uniform measurement technique by December 1997. Transparency shall be encouraged through the publication and free exchange of data from bathing water quality measurements on at least an annual basis.

56. Data regarding actual and assessed contaminant discharge measurements for point sources, rivers, and, where possible, diffuse sources, shall be compiled and freely

exchanged every five years, beginning in 1996. It is advised that the Advisory Group Control of Pollution from Land Based Sources make these compilations in future.

B. Living resources management

Commercially exploited resources

57. Fish are an integral part of the marine ecosystem, fish stocks thrive in a non-polluted and protected ecosystem and the marine ecosystem profits from properly managed fishing activities. The measures to reduce pollution and to protect biological diversity, habitat and landscape, as agreed upon in this Strategic Action Plan, are therefore pre-conditions for the restoration of commercial fisheries in the Black Sea. In addition, spawning and nursery grounds require special protection.

58. In order to rehabilitate ecosystems, which are of particular importance to Black Sea fisheries as a whole, Phyllophora fields and other critical nursery areas will receive special protection, spawning areas of anadromous species will be restored, and coastal lagoons will be rehabilitated. By 2000, each Black Sea state will develop at least one pilot project which will contribute to the restoration of areas vital to the recovery of Black Sea fish stocks.

59. In order to rehabilitate the Black Sea ecosystem and achieve sustainable fisheries in the Black Sea, fisheries management policies need to be enhanced and fishing effort needs to be adjusted to the status of the stocks. In this regard, the Black Sea coastal states are expected to expedite the adoption of the Fisheries Convention as soon as possible so as to develop a fisheries management system which consists of the following components: regular regionally coordinated stock assessments; national fishing authorisations for all Black Sea fishing vessels; a regional licensing system; and a quota system. In addition, enforcement of fisheries regulations urgently needs to be improved. These measures and others, which are required to attain more sustainable fisheries in the Black Sea, should be taken in close cooperation with the fishing sector.

Biological diversity protection

60. The text of a Protocol on Biological Diversity and Landscape Protection to the Bucharest Convention shall be developed and adopted. It is advised that the Istanbul Commission adopt this Protocol by 2000, upon the recommendations of the Advisory Group on the Conservation of Biological Diversity. The aim is to present the Protocol to the 2001 Ministerial Meeting for signature, after which governments can initiate the national ratification process.

61. A regional Black Sea Red Data Book, identifying and describing endangered species, will be prepared and published by December 1998. It is advised that the work on the Red Data Book be coordinated by the Istanbul Commission, through its Advisory Group on the Conservation of Biological Diversity.

62. With the aim of restoring populations of marine mammals the following measures shall be taken:
    a) A ban on the hunting of marine mammals will be enforced by all Black Sea states with immediate effect.
    b) Regular population assessments of marine mammals shall be conducted and the first assessment will be completed in 1998. It is advised that these

assessments be coordinated by the Istanbul Commission, through its Advisory Group on the Conservation of Biological Diversity.

c) The Centre for the Conservation of Biological Diversity in Batumi, Georgia, shall be provided with the necessary equipment in order to function as a regional rehabilitation centre for captive marine mammals.

d) National centres and sanctuaries for the rehabilitation of marine mammals shall be strengthened.

e) Consideration shall be given to modify fishing practices in order to avoid catching marine mammals, as by-catch, during normal operations. It is recommended that the Istanbul Commission, through its Advisory Group on the Conservation of Biological Diversity and its Advisory Group on Fisheries and other Marine Living Resources, develop a strategy for the reduction of by-catches of marine mammals.

Protection of Habitat and Landscape

63. In addition to the actions referred to in paragraphs 57, 58, and 59 of this Strategic Action Plan, the following measures will also be taken to protect habitats and landscape in the Black Sea region.

64. In marine and coastal areas, and in particular in wetlands, new conservation areas shall be designated and the protection of existing conservation areas enhanced. In drafting their National Biological Diversity Strategies, Black Sea states shall take into consideration the integrity of the Black Sea system, by, for example, designating conservation areas which are of regional significance.

65. With a view to enhancing the protection of habitats and landscape in the Black Sea region, both national and regional regulatory instruments shall be improved through the following actions.

a) A Regional Strategy for Conservation Areas shall be adopted, and it shall be reviewed every five years. It is advised that the Istanbul Commission adopt the plan by mid-1998, and conduct the reviews, upon the recommendations of its Advisory Group on the Conservation of Biological Diversity. The plan, amongst other things, should address the following: priority locations which should be designated as conservation areas; priority locations where current measures for protection should be enhanced; objectives, standards and measures for the protection of conservation areas; and fund raising aspects.

b) Each Black Sea state, by 2000, shall endeavour to revise, and where applicable adopt, in accordance with its own legal system, national laws, regulations and planning instruments for the protection of conservation areas. These laws, regulations and planning instruments shall conform with relevant international instruments, including the Regional Strategy for Conservation Areas. The national instruments, amongst other things, should identify the responsible management authority and the responsible government agency; include procedures for the identification of conservation areas; require that management plans be developed for each conservation area; set standards for managing conservation areas; and, where appropriate, establish procedures for public participation and partnerships between governmental agencies and NGO's for the management of conservation areas.

c) Each Black Sea state, where appropriate with the support of bilateral or multilateral agencies, shall ensure that the authorities which manage conservation areas are adequately staffed and that the necessary resources are

available to them.

66. Public awareness campaigns, including programs for schools, local communities, and natural resource users in the conservation areas shall be developed. Such campaigns, where appropriate, will be coordinated at the regional level.

C. Sustainable Human Development

Environmental Impact Assessment

67. By 1998, all Black Sea coastal states will adopt criteria for environmental impact assessments and environmental audits that will be compulsory for all public and private projects. The coastal states will cooperate to harmonize these criteria by 1999 and where possible, to introduce strategic environmental assessments.

Integrated coastal zone management

68. In order to ensure proper management of the coastal zone, coordinated integrated coastal zone management strategies shall be developed for the Black Sea region. In order to attain this the following actions will be taken.

a) A Regional Black Sea Strategy for integrated coastal zone management shall be developed. It is advised that the Istanbul Commission develop such a strategy by December 1998, upon the recommendations of its Advisory Group on the Development of Common Methodologies for Integrated Coastal Zone Management. The regional strategy should elaborate basic principles and methodologies for land- and water-use planning as well as for designing zoning systems. The methodologies and principles recommended in the regional strategy shall be taken into account when developing or reviewing national strategies and planning instruments for integrated coastal zone management.

b) Each Black Sea coastal state shall endeavour to adopt and implement, in accordance with its own legal system, by 1999, the legal and other instruments required to facilitate integrated coastal zone management.

c) Inter-sectoral committees for integrated coastal zone management shall be established at the national, regional and local levels of public administration, where appropriate, by the end of 1997. These committees shall design and implement national plans for integrated coastal zone management through participatory approaches.

69. Erosion and land degradation have important environmental and social impacts. Coastal erosion, due to the changed hydraulic conditions in many of the regions rivers, is a problem which has transboundary implications. Deforestation is another major factor contributing to land degradation. A survey of coastal erosion problems in the region will be conducted by 1998. It is recommended that the Istanbul Commission, through its Advisory Group on the Development of Common Methodologies for Integrated Coastal Zone Management coordinate the work on this survey. The survey should address the magnitude of the problem, including its

economic implications; propose remedial actions, and include suggestions for pilot studies and demonstration projects.

Development of sustainable aquaculture and tourism

70. Aquaculture and tourism are two areas considered to have scope for economic growth in the Black Sea and to benefit the region in general. In order to avoid environmental damage resulting from these activities, and particularly damage with transboundary implications, their development shall be managed along common environmental norms to be established by 1999. It is advised that that the Istanbul Commission, with the support of its Advisory Groups, adopt these common norms and liaise, where appropriate, with the Fisheries Commission, once this body has been established, to adopt an industry code of practice.

71. Sustainable aquaculture should be stimulated, amongst other things, through the conduct of feasibility studies. In parallel, legislation enabling the regulation of aquaculture should be developed. Such legislation should ensure that aquaculture itself does not present a threat to the environment and should address issues, such as, the location and density of cages, releases of commercial strains, imports and releases of exotic species, quarantining and matters of hygiene. Moreover, aquaculture projects shall be subjected to environmental impact assessments in which the potential effect of the activity upon biological diversity are given careful consideration.

72. Eco-tourism should be stimulated in the region, amongst other things, through the implementation of concrete pilot projects in Black Sea coastal states. In close cooperation with the tourist industry and the national tourism authorities, environmental codes of conduct and training courses in sustainable tourism will be developed. The tourism industry, both for the benefit of the industry and for the benefit of the environment, needs to be more adequately planned with a view to incorporating concerns such as those related to water supply, sewage treatment bathing water quality, the use of natural resources and resort development into newly developed projects from the beginning. Moreover, it shall be required that tourist development projects be subjected to environmental impact assessments.

Involving the public in environmental decision making

73. Participation of all sectors of society is an essential requirement for the development of sustainable policies in the region. It requires the development of education projects, transparent and participatory decision making procedures and open rules on access to administrative and judicial procedures.

74. Municipalities will be closely involved in the implementation of this Strategic Action Plan. Both existing mechanisms, as the International Black Sea Club of Cities, as well as new mechanisms will be used for this purpose. Black Sea municipalities will also be stimulated to cooperate at the national level and with municipalities in other countries and regions. The Union of Governors of the BSEC will also be requested to cooperate towards the implementation of this Strategic Action Plan.

75. NGOs will continue to be closely involved in the development and implementation of both national and regional policies aimed at rehabilitating and protecting the Black Sea ecosystem and the sustainable use of its natural resources.

76. The Black Sea NGO Forum is encouraged to continue giving its support to the actions taken to rehabilitate and protect the Black Sea and, in particular, to support the implementation of this Strategic Action Plan. It is recommend that the Istanbul Commission adopt procedures which facilitate the participation of the NGO Forum, as an observer, in its meetings.

77. Stakeholders will have to be clearly identified for each of the policy areas included in this Strategic Action Plan. Their involvement in the decision making process will be secured and their responsibilities in implementing this Strategic Action Plan defined, through mechanisms such as those provided by new Regional Environmental Centres.

78. Each Black Sea state, in accordance with its own national legal system, will endeavour to adopt and implement, by 2000, rules which guarantee the right of access to environmental information, which provide for the right of the public and NGOs to participate in decision making, and which provide for the right of individuals and groups to appeal to administrative and judicial organs. It is recommended that the Istanbul Commission prepare a draft position paper on this topic.

79. Information about the actions taken to rehabilitate and protect the Black Sea ecosystem and achieve the sustainable use of its resources will be widely disseminated. Each Black Sea state will publish a popularised version of this Strategic Action Plan, in its own language. In addition, the following actions will taken through the BSEP, in close cooperation with the NGO Forum:.

a) An educational information package for use in schools will be developed and each Black Sea state will translate it into its own language;
b) A mobile exhibition will be prepared and translated into the languages of the Black Sea states for display at public functions and educational establishments;
c) A user-friendly Black Sea CD ROM multimedia information package, based upon the existing GIS system, will be developed.

80. Based on harmonised criteria, information on the state of bathing water suitable for advising the public on the potential risks to their health shall be made widely available to the public during the active tourist season, starting in 1998. Frequency of sampling and analytical methodology should be sufficient to inform bathers of conditions which may pose health risks. Additionally, a colour coding system for bathing water quality maps shall be developed and such maps shall be published annually starting January in 1999.

IV. National Black Sea Strategic Action Plans

81. Each Black Sea coastal state shall prepare, by October 1997, a National Black Sea Strategic Action Plan or other corresponding document, which shall present detailed plans for the national implementation of this Strategic Action Plan. These shall include details of specific projects where possible.

STRATEGIC ACTION PROGRAMME (SAP)

FOR

THE CASPIAN SEA

Caspian Environment Programme
As approved at the Tehran Steering Committee Meeting
of November 5, 2003

come the littoral governments will need to give higher priority to job creation, health, and education than to environment protection. Individuals too will be less concerned with safeguarding the environment when they are unemployed and faced with finding adequate food, shelter, education and healthcare for their families. For most part governmental accountability is weak, and coupled with weak and undeveloped civil society. Environmental and natural resources are overseen by a host of ministries and local governments. In most countries government agencies often do not have the resources to conduct the necessary monitoring and enforcement activities to protect the regional environment. Integration of the development planning process and environmental development still remains a distant objective. The countries are not using economic incentives as much as possible in the region in order to promote environmental protection. Limited donor based financial contributions to the region is also a major constraint.

2.2.4 Information

The region suffers from severe limitations in the data and information that is available, both to decision makers and to informed members of the society. Considerable research and monitoring has been carried out in the past, but the data is often not comparable across the region, it is often insufficient, inaccurate or non-harmonized and not freely exchanged and shared among the responsible institutions. The lack of data often promotes regulatory capture and self interest. Further, if when national legislation requires open access to information, it is often constrained by poor dissemination, non-user friendly formats and insufficient media attention to the environmental issues or lack of information technology for information exchange. This sub-optimal availability of information can result in uncoordinated and unsubstantiated policies and measures at regional level.

Section 3: SAP development and prioritization

The TDA identified eight Major Perceived Problems and Issues. These were later refined through further regional consultation into four priority environmental regional concern areas, described above, requiring coordinated efforts by all littoral states. It was determined that these areas of concern, and their root causes, could be most effectively and appropriately addressed through the aims of the five Environmental Quality Objectives (EQOs). Four of these EQOs correlate to the four concern areas, plus one EQO addressing the cross-sectoral issue of strengthening the involvement of all stakeholders. The five EQOs are:

- Conservation and sustainable use of bioresources
- Conservation of Caspian biodiversity
- Improved water quality of the Caspian
- Sustainable development of the coastal zones
- Strengthened stakeholder participation in Caspian environment stewardship

Each EQO consists of a number of targets that are comprised of inter-related interventions that address the root causes of the concern areas. For the regional level interventions, the littoral states and the international partners shall work collectively to take the required steps to fulfill the intervention. The national level supporting interventions will be the responsibility of the littoral countries. The EQOs, their targets and interventions are listed below. The timings of the interventions in order to meet their targets are also listed, whether within the time span of five or ten years. Interventions have only been included in the first five year period if they are supported by a majority of the NCAPs, that is if the national level supporting are included within the NCAP, and they have been identified as priority interventions. The countries have classified each intervention as having either high (H) or medium (M) priority. In addition, in Annex 2 of this document are listed the interventions and their corresponding indicators.

EQO I: Conservation and sustainable use of bioresources

EQO Indicator: Commercial fish stocks are maintained at sustainable levels with reference to the base year (1998)

Target 1: Sustainable use of commercial fisheries resources

1.1 Promote the signature and implementation at the governmental level of a regional agreement on the preservation and management of Bioresources of the Caspian Sea. (H) 1-5 years.

1.2 Further strengthen the regional cooperation for fisheries management, including the development of regional standards of fisheries harvest practices for commercial species, and the setting of scientifically based quota system. (H) 1-5 years.

1.3 Develop compliance, enforcement and monitoring mechanisms for sturgeon fisheries in accordance with CITES Paris declaration. (H) 1-5 years.

1.4 In coordination with national and regional organizations, develop enforcement mechanisms and economic instruments to reduce illegal trade in Caspian commercial fish resources in accordance with CITES Paris declaration. (H) 1-5 years.

Target 2: **Rehabilitate stocks of migratory (sturgeon, inconnu, herring) commercially valuable fish species**

2.1 Carry out national activities to identify, protect, restore and manage natural spawning grounds for sturgeon and other commercially valuable anadromous species, within the framework of regional agreements, including development of a financing strategy. (M) 1-5 years.

2.2 Increase sturgeon hatchery efficiency and capacity through improvement in bio-techniques and fry growth technology as well as enhancing production scales. (H) 1-5 years.

2.3 Strengthen regional cooperation including scientific exchanges on improving hatchery efficiency and the creation of a gene bank for anadromous fish stocks. (H) 1-5 years.

Target 3: **Improve livelihoods in coastal communities to reduce dependency on unsustainable fishing practices via pilot projects**

3.1 Promote more selective fishing methods and small-scale aquaculture. (M) 5-10 years.

3.2 Promote alternative income sources for fishing communities and adoption sustainable livelihoods, and improve access to social/community services. (H) 5-10 years.

EQO II: **Conservation of Biodiversity**

[EQO II was extracted from the CEP Caspian Sea Biodiversity Strategy and Action Plan, developed with support of Flora and Fauna International]

EQO Indicator: Arrest biodiversity erosion due to anthropogenic impacts

Target 1: **Increased regional collaboration to achieve maximum regional benefit for biodiversity**

1.1 Draft and adopt a Biodiversity Protocol to the Framework Convention for the Protection of the Marine Environment of the Caspian Sea. (H) 1-5 years.

1.2 Establish a regional biodiversity monitoring system. (M) 1-5 years.

1.3 Create a regional 'clearing house mechanism' on biodiversity. (M) 1-5 years.

1.4 Develop a framework for international research on Caspian biodiversity related issues. (H) 1-5 years.

1.5 Develop and implement an awareness campaign to highlight the biological uniqueness of the Caspian. (H) 1-5 years.

1.6 Ensure biodiversity issues and impacts are taken into account in all EIA applications. (H) 1-5 years.

Target 2: **Ensure all key species are maintained or restored to viable levels**

2.1 Identify and assess key threatened and endangered species status and publish results. (M) 1-5 years.

2.2 Ensure adequate legal protection for key threatened and endangered species. (H) 1-5 years.

2.3 Provide in-situ and ex-situ protection for key threatened and endangered species. (H) 1-5 years.

2.4 Create a gene bank for key threatened and endangered species. (M) 5-10 years.

Target 3: **Control of introduction and invasion of non-native (alien) species and manage impact of existing introduced/invasive species**

3.1 Develop and adopt a protocol to the Framework Convention for the Protection of the Marine Environment of the Caspian Sea on introduction and invasion of non-native species. (H) 1-5 years.

3.2 Develop regional control procedures to manage the introduction, both purposeful and accidental and spread of alien species in the Caspian, in particular along the key transport routes. (H) 1-5 years.

3.3 Investigate potential biological control measures to reduce the impact of *Mnemiopsis* on the ecosystem of the Caspian. (H) 1-5 years.

3.4 Study on the possibilities of development of a Ballast Water Reception facilities at all shipping exits and entrances to the Caspian Sea. (M) 1-5 years.

Target 4: **Ensure all key coastal and marine habitats are represented in a regional system of protected areas**

4.1 Improve effectiveness of management of Caspian protected coastal areas, including compliance with existing legislation. (H) 1-5 years.

4.2 Create new and expand existing protected coastal areas, where necessary transboundary areas, to encompass priority sensitive coastal and marine habitats. (H) 1-5 years.

4.3 Create a regional information network between Caspian protected coastal areas. (M) 5-10 years.

4.4 Develop management plans for the hydrological regimes of the major impounded rivers in the Caspian basin, the Volga, Kura and Sefidrud. (H) 1-5 years.

Target 5: **Identify and restore priority sensitive coastal habitats**

5.1 Develop and apply a standardized methodology for assessment of priority coastal habitat health. (M) 5-10 years.

5.2 Design, implement and monitor a minimum of five priority coastal habitat restoration projects. (M) 5-10 years.

Target 6: **Identify and restore priority marine habitats**

6.1 Develop and apply a standardized methodology for assessment of priority marine habitat health. (M) 5-10 years.

6.2 Design, implement and monitor a minimum of five priority marine habitat restoration projects. (M) 5-10 years.

EQO III: Improve the water quality of the Caspian

EQO Indicator: A measurable decline in levels of the main contaminant groups in the water, sediment and biota.

Target 1: Strengthen environmental enforcement and management in the littoral states

1.1 Develop regional proposals for strengthening discharge licensing, compliance monitoring and enforcement of pollution control in the near Caspian basin. (H) 1-5 years.

1.2 Increase resources to regulatory bodies responsible for pollution control and improve capacity through targeted training programmes. (H) 1-5 years.

1.3 Develop recommendations for harmonization of pollution discharge and emission standards, and water quality standards. (H) 1-5 years.

1.4 Introduce economic instruments to encourage reduced pollution loads. (M) 5-10 years.

Target 2 : Implement a regionally coordinated water quality monitoring programme

2.1 Develop and implement regional monitoring programme focused on critical contaminants and hotspots. (H) 1-5 years.

2.2 Develop and implement a rapid assessment programme for contaminant levels in all Caspian waters. (H) 1-5 years.

2.3 Provide report on contaminant levels in Caspian every three years, and make proposals for remedial actions. (H) 1-5 years.

Target 3: Development of regional strategies for pollution reduction

3.1 Develop and adopt a protocol to the Framework Convention for the Protection of the Marine Environment of the Caspian Sea for land-based sources of pollution and undertake a comprehensive assessment of land-based sources of pollution in the near Caspian basin. (H) 1-5 years.

3.2 Develop and implement a regional action plan to remedy hotspots identified in the near Caspian basin. (H) 5-10 years.

3.3 Develop and adopt a Protocol on Hazardous Substances to the Framework Convention for the Protection of the Marine Environment of the Caspian Sea and encourage all littoral states to sign and ratify the Stockholm Convention on Persistent Organic Pollutants. (H) 1-5 years.

3.4 Develop and implement a programme to dispose stores of banned agrochemical products in the region in accord with Stockholm Convention on Persistent Organic Pollutants provisions. (H) 1-5 years.

3.5 Through the use of demonstration pilot projects, investigate cost effective means of treating municipal wastewaters and produce regional recommendations. (M) 5-10 years.

3.6 Reduce pollution from existing and decommissioned coastal and offshore oil and gas facilities, including the re-sealing of well heads. (M) 5-10 years.

3.7 Develop and adopt a protocol to the Framework Convention for the Protection of the Marine Environment of the Caspian Sea on dumping at sea. (H) 1-5 years.

3.8 Establish waste reception facilities in all major ports. (M) 5-10 years.

Target 4: **Develop and initiate implementation of a regional action plan for contaminated land**

4.1 Undertake a survey of coastal zone to identify and characterize major contaminated land sites and develop a hot spot strategy to be coordinated with POPs enabling activities in signatory states. (H) 1-5 years.

4.2 Implement pilot projects to demonstrate the most cost effective reclamation technologies for a range of contaminants. (H) 5-10 years.

Target 5: **Promote environmentally sound agricultural practices in the Caspian region**

5.1 Establish and promote recommendations for the use of agro chemicals, including application times and rates, handling, storage and disposal. (M) 1-5 years.

5.2 Promote through pilot projects environmentally sound agricultural practices such as soil conservation, creation of river protection zones, use of natural fertilizers, and use of pest resistant crop strains. (M) 5-10 years.

5.3 Combat eutrophication in sensitive coastal zones by controlling soil and water contamination from agriculture and other nutrient sources. (M) 5-10 years.

Target 6: **Disaster prevention and response**

6.1 Finalize and approve national oil spill contingency plans and harmonize mutual aid plans. (H) 1-5 years.

6.2 Sign Memorandum of Understanding on Oil Spill Preparedness and implement a Regional Cooperation Plan. (H) 1-5 years.

6.3 Finalize and adopt a protocol to the Framework Convention for the Protection of the Marine Environment of the Caspian Sea on Emergency Response. (H) 1-5 years.

6.4 Update sensitive area mapping of the Caspian. (H) 1-5 years.

6.5 Undertake risk assessment for oil and hazardous substances spillage from shipping, pipelines, offshore and onshore production and storage facilities. (H) 1-5 years.

6.6 Promote development of regional intergovernmental agreements for liability and compensation in the event of oil spills. (H) 1-5 years.

6.7 Develop regional agreement on minimum standards of maintenance of existing Caspian tanker fleet. (M) 5-10 years.

EQO IV: **Sustainable development of the coastal zones**

EQO IV Indicator: Measurable and sustained increase in human development indices in the Caspian coastal areas

Target 1: **Sustainable use and management of coastal areas through integrated coastal area management**

1.1 Review and revise, as needed, national regulation on coastal area planning and management. (M) 1-5 years.

1.2 Strengthen technical capacity at local and municipal government level for coastal planning and introduce economic instruments to promote rational land use. (M) 1-5 years.

1.3 Develop regional and national data centers and GIS databases for coastal planning and management. (M) 1-5 years.

1.4 Undertake pilot integrated coastal area management planning project in each Caspian state with a view to replicate and develop national guidelines. (M) 1-5 years.

Target 2: **Combat the desertification and deforestation process**

2.1 Where necessary, strengthen national legislation to combat desertification and deforestation and encourage signing of the Convention to Combat Desertification by the Caspian states. (H) 1-5 years.

2.2 Apply remote sensing and GIS techniques to monitor trends in desertification and deforestation in the Caspian coastal region. (H) 1-5 years.

2.3 In critical desertification and deforestation areas, develop and implement pilot restoration projects designed to address both immediate and root causes. (M) 5-10 years.

2.4 In threatened forest areas introduce renewable energy alternatives to fuel wood. (H) 5-10 years.

2.5 In threatened desert areas conduct targeted awareness campaign on sustainable grazing practices. (H) 5-10 years.

EQO V: **Strengthen stakeholder participation in Caspian environmental stewardship**

EQO Indicator: Enhanced involvement of civil society representatives in the NCAPs and SAP implementation, including NGO representation on the CEP Steering Committee.

Target 1: **Increased coastal community involvement in managing the Caspian environment**

1.1 Create a Caspian Environment Center in each littoral state to provide information to public on Caspian environmental issues. (M) 5-10 years.

1.2 Create press bureau for CEP to improve country, regional and international awareness of status of Caspian environmental issues and encourage the media to participate in the dissemination of information. (H) 1-5 years.

1.3 Promote broader public access to Caspian relevant environmental information held by public authorities, in accordance, where applicable, with the Aarhus Convention. (H) 1-5 years.

1.4 Development of academic curriculum materials focusing on Caspian environmental issues and promote academic partnerships at school and university levels. (H) 1-5 years.

1.5 Set up a fund for micro-grants addressing coastal community development schemes and local environmental problems, in partnership with the private sector and international donor community. (M) 1-5 years.

Target 2: **Increase local and regional authorities understanding of importance of environmental issues**

2.1 Establish environmental issues awareness training for local authorities, and national ministries that affect the Caspian environment, emphasizing the need to take into account environmental costs/benefits of proposed projects. (H) 1-5 years.

2.2 Implement national EIA procedures for all appropriate project developments, including provision for public participation, and encourage all littoral countries to sign and apply the ESPOO convention. (H) 1-5 years.

2.3 Hold biennial CEP mayoral conferences sponsored by national and international partners to foster networking

among coastal local authorities and enhance their participation in implementing Caspian environmental policies. (H) 1-5 years.

2.4 Promote the positive aspects of eco-tourism and develop one pilot project in each Caspian littoral state. (H) 1-5 years.

Target 3: Develop active partnerships between CEP and local and multinational enterprises

3.1 Promote NGO/ government/ private sector environmental partnerships to improve monitoring, public relations and educational activities related to specific Caspian issues. (H) 1-5 years.

3.2 Develop a programme to encourage adoption of cleaner technologies by local industries. (M) 1-5 years.

3.3 Set up "Friends of CEP" programme with annual competition for local, national and international company or facility that has achieved the most concrete gains in protection of the Caspian environment in the previous year. (M) 1-5 years.

Section 4: SAP implementation

4.1 National Caspian Action Plans (NCAPs)

The NCAPs are the main foundation of the SAP. Preparation of the NCAPs by the littoral states was started prior to the SAP preparation, based on an assessment of the priority national concern areas, which included, where they were in concordance, regional concerns identified in the TDA. Each country developed objectives, targets, proposed interventions, and drew up a resource mobilization strategy to address their objectives. They entered into a thorough inter-sectoral dialogue as an integral part of a national endorsement process. The NCAPs represent an awareness of and commitment to enhanced environmental stewardship by the littoral states. It is critical that all states continue to make further steps towards improved environmental stewardship at the national levels, with the confidence that even the smallest action can lead to large improvements when taken collectively.

In preparing the SAP, the CEP assembled the NCAP teams of experts from all five states with the purpose of defining the priority regional environmental concern areas to be addressed and agreeing the corresponding Environmental Quality Objectives. Through the following series of regional meetings the targets and interventions needed to meet these EQOs were articulated and this intense national involvement has resulted in a SAP, which contains regional interventions which are supported to a great extent by national interventions contained in the NCAPs. Without this commitment to implement the national supporting interventions the SAP's regional interventions have no foundations and their implementation is undermined.

Whilst the NCAPs feed into the SAP, they are also cohesive, independent documents which detail national objectives, targets and interventions to be achieved. They have been prepared along common guidelines and like the SAP will be implemented in two separate 5-year periods and will be reviewed every four years. Once full government endorsement has been granted the NCAP and will move forward independently of the SAP process.

4.2 Policy Coordination

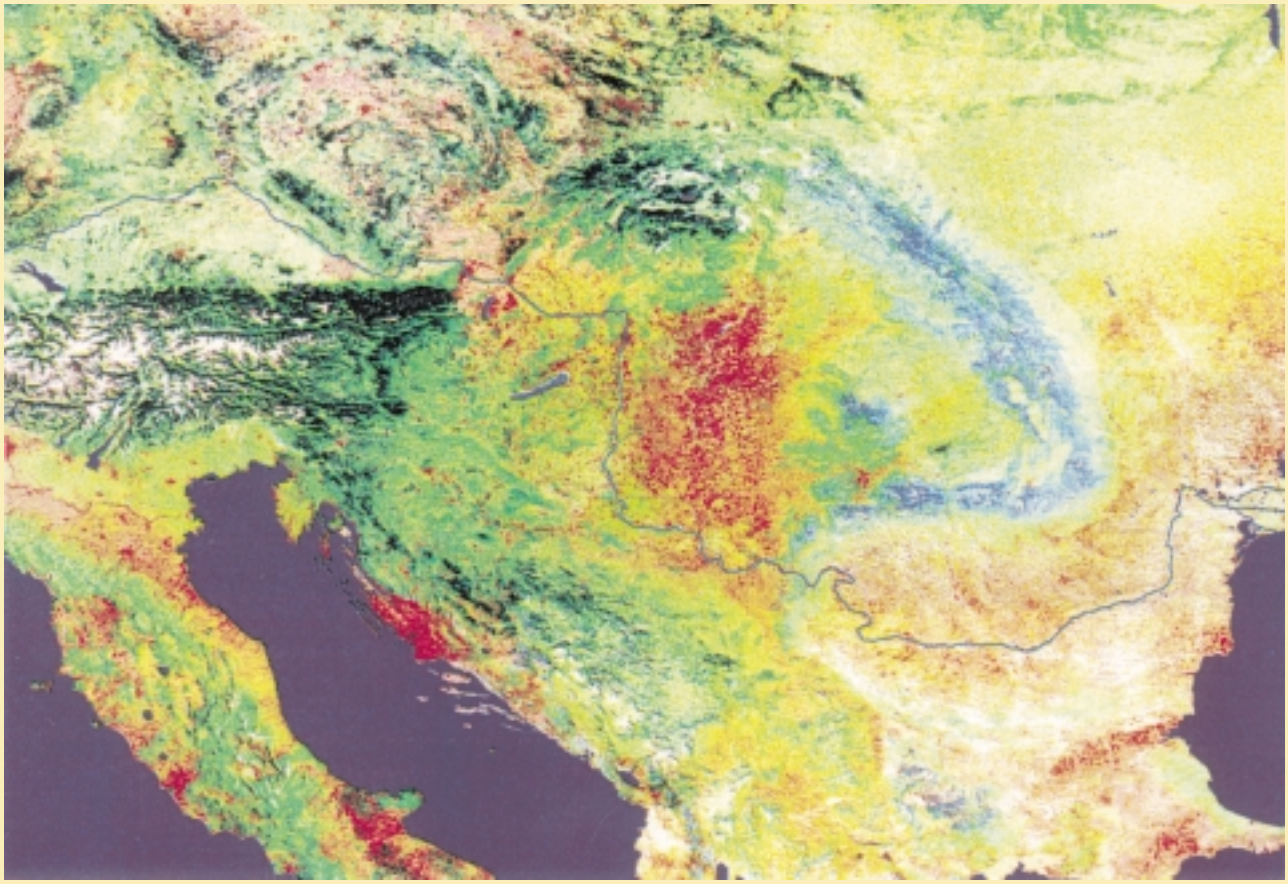
The littoral states have ensured and will continue to ensure that the NCAP and SAP content, policy and measures, are coordinated and consistent with those developed across the sectoral ministries. The NCAP consultation process leading to endorsement was designed to ensure all key government stakeholders were consulted as early as possible to ensure integration. In preparing the NCAPs the littoral states were required to refer to existing development and environment plans, including the National Environmental Action Plan (NEAP) and National Biodiversity Strategic Action Plan and it has been stressed that each littoral state should ensure that its body of laws and regulations is fully coordinated and supportive of environmental policies developed through the SAP.

DANUBE POLLUTION REDUCTION PROGRAMME

STRATEGIC ACTION PLAN FOR THE DANUBE RIVER BASIN

1995 - 2005

REVISION 1999



Programme Coordination Unit
UNDP/GEF Assistance

5.2.3. Description of Sector Objective

5.2.3.1. Description of the SECTOR Objective

The development objective of the industry and mining sector has been defined as:

"INTRODUCTION OF BEST AVAILABLE TECHNIQUES (BAT) AND BEST ENVIRONMENTAL PRACTICES (BEP) AND ABATEMENT OF WATER POLLUTION"

This Sector objective, as well as the result, fully and naturally contributes to the realization of ICPDR Convention objective that has been defined as:

"PROTECTION AND SUSTAINABLE USE OF WATERS OF THE DANUBE RIVER BASIN"

The SAP that supports and complements the Convention and contributes to the implementation of EAP for Central and Eastern Europe has four equally important goals that are derived from the objectives of the convention and the principles of integrated water management:

- Improvement of aquatic ecosystem and biodiversity in DRB and reduction of pollution loads entering the Black Sea;
- Maintenance and improvement of the quantity and quality of water in the DRB;
- Control of damage from accidental spills;
- Development of regional cooperation in water management.

In order to achieve these goals, common strategies and policies have been adopted by the Convention. In view of the problems identified by problem analysis, the following policies and strategies have been identified.

It is necessary to develop industrial and economic policies that integrate environmental considerations. Such policies should enable the conservation of natural resources, avoidance of irreversible damage to the environment and achievement of long-term economic development and growth on a sustainable basis. The underlying message is that environmental protection, industrial development and competitiveness can be compatible provided the right policy, technological and institutional measures are adopted at the national and regional level.

5.2.3.2. Expected Results (Outputs) and Targets by Sectors of Intervention

The Convention sets out that all parties shall strive to achieve, to the greatest possible degree, the goals of sustainable and equitable water management, including the conservation, improvement and rational use of surface and ground waters in the catchment area. In order to attain that goal, emission limits will be set, applicable to individual industrial sectors or industries in terms of pollution loads and concentrations and based in the best possible way on low and no-waste technologies at source. Where hazardous substances are discharged, the emission limits shall be based on the best available techniques for the abatement at the source and/or for wastewater treatment.

Based on the Sector Problem analysis following Sector Objective has been identified:

"INTRODUCTION OF BEST AVAILABLE TECHNIQUES (BAT) AND BEST ENVIRONMENTAL PRACTICES (BEP) AND ABATEMENT OF WATER POLLUTION"

In order to achieve this objective (significant reduction of pollution generated from industry and mining), the following results/outputs are foreseen:

- **Introduction of clean industrial technologies and abatement of water pollution**
- **Implementation of pre-treatment of industrial wastewater**
- **Ensuring adequate management of the enterprises**
- **Treatment and disposal of hazardous substances in proper landfills**

(i) Introduction of clean industrial technologies and abatement of water pollution

The implementation of the principle adopted – to select and introduce clean technologies, both in the existing and newly-planned industries, and the adoption of legal regulations that would ensure that the above principle is respected, either through enforcing the closing down of plants or imposing penalties at the corporate or individual level in case of non-observance, would either result in a decrease in the level of pollution or preservation of the situation.

In order to achieve this result, it is necessary to:

- **Eliminate hot spots**. In order to eliminate hot spots it is necessary to define and adopt legal regulations that will set the rules and conditions for obtaining certificates for commissioning particular industrial facilities. It is necessary to pass the legislation defining priorities and guidelines regarding the elimination of hot spots. The priorities should involve the introduction of new technologies and the replacement of obsolete technologies with new ones, incorporating at the same time in all production processes the norms recognized and recognizable worldwide.
- **Replace old technologies with new ones.** In order to replace the old technologies with new ones, it is necessary to design and pass consistent laws mandating the elimination of outdated processes or the closing down of certain plants, providing at the same time the financing instruments that would encourage producers to adopt state-of-the-art solutions. Within the framework of these laws, priorities should be established concerning the introduction of new technologies, in harmony with EU standards and acceptable from the point of view of environmental protection.

To obtain this result, the following measures and activities have been identified:

- **Measures**: Introduction of new economic and financial instruments for water, air and solid wastes, that will include solutions for the introduction, use and enforcement of this incentive scheme; legislative harmonization Aquis Communautarie according to the stages imposed by the EU; preparation of environmental impact studies and case studies for all hotspots; creation of clean technology centers and their networking to ensure the flow of information and transfer of lessons learned from success stories.
- **Activities**: Development of institutional framework for implementation as a consequence of the introduction of the legal framework; projects for reconstruction and modernization on up-to-date technologies in existing industrial and mining enterprises using “dirty” technologies: chemical industry; iron and steel works; petrochemical; metalwork; pulp and paper; ore extraction and mineral processing, etc.

(ii) Implementation of pre-treatment of industrial wastewater

In order to successfully start building WWTPs, a registry of polluters will be prepared that would serve to rank hot spots on the basis of their impact on the environment, and a list of priorities will be developed, that would locate the industrial facilities in need of an urgent intervention.

In order to achieve this result, it is necessary to:

- **Install waste treatment plants**
- **Put in operation the existing treatment plants**
- **Enforce legal regulations**, by adopting the *polluter pays* principle and cost efficient operation
- **Employ monitoring system**, installed at the wastewater outlet in all the industrial plants that have proved to be of extraordinary importance

To obtain this result, the following necessary measures and activities have been identified:

- **Measures**: Preparation of studies that will register all localities that do not have WWTPs or are inadequately operating, analyze reasons for such situations and prepare a basis for decision on the priority actions to be taken.
- **Activities**: Completion and achievement of all optimum operational parameters of WWTPs at the economic agents; realization of projects for the construction of new WWTPs at the most vulnerable sites, rehabilitation and modernization of existing ones, i.e. improvement of operational parameters, extension of capacities or adding another stage in the treatment process.

(iii) Ensuring adequate management of enterprises

Following the privatisation, i.e. after changes had been made in the ownership structure of the companies which were previously state or socially owned, adequate management of enterprises was ensured through the introduction of technological discipline by means of incentive measures. Training and education of employees has been performed, whereby the level of responsibility of staff has been raised, incentive funds have been provided and modern management instruments have been applied in practice.

In order to achieve this result, the following should be undertaken:

- **Adapt the status of enterprises to market economy policies**
- **Upgrade the performance of enterprises**
- **Make available financial resources**

To obtain this result, the following measures and activities have been identified:

- **Measures**: Strengthening of institutional and management capacities in the industry and mining; preparation of instructions and guidelines for proper management of industrial plants; training of managers on introduction of environmental management system in industrial enterprises;
- **Activities**: Setting up a legal framework encouraging capital investment in environmental protection facilities; development of standardization programme of methodologies and of equipment for environmental quality control.

(iv) Treatment and disposal of hazardous substances in proper landfills

Through a consultation process, an agreement has been reached on the location and building of environmentally appropriate landfills for hazardous substances, which represents a safe and long-term solution to the problem of industrial waste. Substantial progress has been made in the overall efforts to protect water from pollution.

In order to achieve this result, the following should be undertaken:

- **Ensure landfills for hazardous and harmful substances,**
- **Classify industrial waste**
- **Enforce of regulations**

To obtain this result, the following measures and activities have been identified:

- **Measures**: Development of national physical plans defining land use; creation of national registers of toxic wastes
- **Activities**: Rehabilitation and/or closing of the abandoned industrial dumpsite areas; planning and construction of new, environmentally friendly landfills for hazardous and useful substances.

5.2.3.3. Important Assumptions for the Sector Results

Important assumptions are essential for the implementation of policies and strategies of the ICPDR Action Plan, but they are external factors, outside the scope of the ICPDR rather than under its direct control. They will ensure the success of the implementation of policies, strategies and actions and the sustainability of the results.

Important assumptions described in the national reports and essential for the implementation of the ICPDR policies and strategies focus on: economic issues (transition, free market, economic stability) legal issues (harmonization with EU, legal and institutional frame implemented) and environmental issues per se (environmental management, environmentally friendly policies, sustainable economy and policies; state of environment improved). These assumptions, which are of great importance for the realization of expected results, will in turn make an important contribution towards the realization of the goals of the ICPDR. Most of these assumptions are in close connection with the creation of a sound institutional and policy framework that involves modern environmental laws, environmental management practices and efficient administrative arrangements. All this could be achieved if the sector-level assumption is approved and realized in practice, that is:

- **Enforcement of BAT and BEP regulation in industrial sector by authorities remains a priority**

  The adoption of BAT and BEP regulations, i.e. of modern production technologies that generate much less waste and consume a minimum amount of energy is the most satisfactory long-term solution and has economic as well as environmental benefits (win-win). The use of incentives to promote the switch-over to technologies to increase efficiency of water allocation and distribution can encourage firms to adopt water saving technologies, including reuse systems.

The important assumptions for achieving results and outputs that are necessary to achieve the sector objectives include:

- **Favorable economic conditions in the country**

  In much of the region, and particularly in some MD and LD countries, the economic situation makes it impossible for business organizations to finance from their own sources the process of transition and the process of replacement of outdated technologies with modern ones and to realize, in that way, the objectives of the industry and mining sector. Since the industry does not posses sufficient financial means that could be earmarked for this purpose, favorable economic conditions need to be created.

- **Continuation of cooperation with international financial institutions**

  Favorable economic conditions could be realized by promoting cooperation with international financial institutions and continuing the cooperation over a longer period of time. This would serve as a support to the processes of transition to a market-oriented economy.

- **Implementation of environmentally sound industrial policy of the Governments**

  For successful implementation of the ICPDR, it is necessary to design at the government level an environmentally sound policy of industrial development, while continuously attempting to raise the awareness and responsibility of the staff regarding industrial production and environmental protection.

- **Elimination of war effects**

  The elimination of war effects is a basic prerequisite for the realization of the ICPDR objective. None of the above objectives can be reached without a prior elimination of war consequences.

5.2.3.4. Impact Indicators for Sector Results

Important indicators at the sector level outlined in the national reviews involve attempts to establish very direct connections between the implementation of national environmental standards, harmonised with or upgraded to the EU level, with the improved quality of the water, while at the same time enhancing or scaling up the achieved level of production activity, within an appropriate time frame. If these indicators are approved in real situation they will directly indicate that two out of four goals of the Convention have been realised i.e.

- Negative impact of activities in the DRB and on the riverine ecosystem and the Black Sea is reduced; and
- Availability and quality of water in DRB is maintained and improved.

Impact indicator for the whole sector have been defined as follows:

- **Organic and inorganic effluents reduced up to 30% by 2010, and discharge permits for industrial and mining enterprises with regard to BAT/BEP examined and revised by the year 2005**

  Industry and mining represent the most important sources of pollution in the DRB, but efforts are being made to reverse this negative effect. It is of the utmost importance to achieve this impact indicator which can only be reached by introducing a system of issuing and continuously examining discharge permits for significant industrial and mining enterprises with regard to BAT/BAP.

Impact indicators for the implementation of the results/targets necessary to achieve the sector objective, have been identified as follows:

- **Decreasing pollution (heavy metals and micropollutants) in line with the EU norms, at industrial plants with discharge bigger than 0.1 t COD/day, by using BAT/BEP, by the year 2010**

  It is expected that through the introduction of BAT and BEP regulations and taking into account EU norms in identified hot spots, the pollution will be reduced by the year 2010. Successful implementation of BAT/BAP will be assessed through the established system of monitoring of effluents and registering the values of pollution parameters.

- **Decreasing pollution in line with BAT and BEP, by the year 2010, by the construction of pre-treatment plants**

  Results obtained by building and using the WWTPS in line with BAT and BEP will be evaluated through the established control system against the monitoring standards and specific pollution parameters.

- **Adoption by industrial enterprises of internationally approved quality and environmental management systems (e.g. EMAS; ISO 9000/14000), by the year 2005**

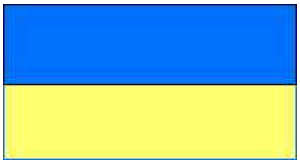
  Through the policy of adoption and application of internationally approved quality and environmental management systems, enforced through legal regulations, successful production in line with principles of sustainable development will be achieved, and consequently, required level of protection of DRB secured.

- **Establishment of inventory of existing and abandoned landfills and application of appropriate measures to eliminate pollution of surface and ground water in old and newly constructed landfills, by the year 2010**

  Resolving the problem of hazardous and harmful industrial waste leads to a decrease in pollution of ground water. Through periodic monitoring of water quality and control of potable water sources, particularly on localities where toxic and hazardous substances were observed, the effect of achieved results will be determined.

Republic of Belarus

Russian Federation



Ukraine

Dnipro Basin Strategic Action Programme and Implementation Mechanisms

Kyiv, Ukraine 2004

IAEA

UNDP-GEF

The transition from a centrally planned to a market guided economy has been accompanied by a sharp decline in standards of living, widened income inequalities and a deterioration in health conditions. The uncertainty of the conditions in which the economic transition is taking place, including the institutional environment and the weak state of law enforcement have; (a) hampered the progress of economic reform; (b) limited the development of market mechanisms; and (c) led to an economy based on immediate profits that gives little emphasis to environmental issues.

III Prevailing attitudes which undervalue the environment

The lack of past attention to the value of the natural environment (as a provider of goods and services and for its intrinsic value) have led to a poor current state of awareness of the consequences of environmental degradation in government and civil society and a limited degree of motivation for environmental protection.

3 Strategy for Environmental Rehabilitation of the Dnipro Basin

3.1 Long-Term Objectives

The Declaration of the UN Conference on the Environment and Sustainable Development (Rio de Janeiro, 1992), further developed and supported by the international community during the Johannesburg meeting in 2002, defined the notion of ***sustainable development*** and its three guiding principles:

- Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature;
- Environmental protection constitutes an integral part of the development process and cannot be considered in isolation from it;
- The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.

Six priority transboundary environmental issues and their root causes, identified in the TDA, can be resolved in a stepwise manner if the above principles are complied with.

Each riparian country of the Dnipro Basin has developed a National Sustainable Development Concept (Doctrine), and incorporated the above guiding principles into the national environmental policy. Pursuant to their identified priorities, the riparian countries of the Dnipro Basin define their socio-economic development strategies in full concordance with the following objectives:

- Ensuring the sustainable nature use and implementation of adequate environment protection programmes at the Basin level,
- Ensuring environment quality that is safe for human health,
- Conservation of biological and landscape diversity.

I Sustainable Nature Use and Environment Protection in the Dnipro Basin

The sustainable nature use and environment protection in the Dnipro Basin shall be ensured through the establishment of an effective legal and institutional framework, including:

- The provision of improved legislative/regulatory and institutional mechanisms that are adequate and appropriate for ensuring the sustainable use of natural resources and protection of the environment at the national level;

- The establishment of an institutional framework for the international management of the Basin, including an adequate legislative framework for multi- and bilateral cooperation, and enhanced cooperation with the international donor agencies in the field of environmental rehabilitation of the Dnipro Basin;

- The provision of a legal and institutional framework for encouraging and promoting public participation in the decision-making process at the national and international level;

- The harmonisation of environmental legislation of the riparian countries of the Dnipro Basin with that of the EU.

II Environment Quality that is Safe for Human Health

Over the past decade of economic recession, there has been a continuous reduction in emissions/discharges of pollutants and application of agrochemicals. However, this has not led to any significant, or at least comparable, improvement in the state of environment.

The history of intensive economic activities has had a profound effect on the environment in the Dnipro Basin. The scale of this effect is so great that some areas of the Basin have completely lost their assimilative capacity.

In all the riparian countries of the Dnipro Basin, the levels of many pollutants in various media have exceeded mandatory limits. The expected growth of production output in all sectors of the economy will exacerbate the environmental situation, leading to a further deterioration of living conditions and a continued decline in the human population, unless the precautionary approach is taken to implement actions to protect and conserve the environment.

The Dnipro Basin SAP defines the mechanisms and specific actions designed to ensure the environmental rehabilitation of the Dnipro Basin and an improvement of environmental quality to a level that is safe for human health and biological diversity.

III Conservation of biological and landscape diversity

The history of intensive exploitation of natural resources in the Dnipro Basin has led to a progressive degradation of natural ecosystems and habitats. This has resulted in a reduction or loss of habitats, changes in population structure, a disintegrated ecological network, the loss of species (both plant and animal) and a decline in population numbers.

The Dnipro Basin Biodiversity Conservation Strategy is seen as an integral part of the overall regional strategy designed to promote and advance the transition towards the principles of sustainable development, and a means for resolving transboundary issues of global and regional significance. It defines a suite of specific actions to be taken to maintain essential processes occurring in the Basin ecosystem, create favourable living conditions for the human population and conserve and restore the amenity value of the Basin environment.

A detailed description of the ***Long-Term Ecological Quality Objectives (LTEQOs), the shorter-term operational objectives devised to ensure progress towards these LTEQOs, and specific***

actions needed to be taken to facilitate the operational objectives is provided in the following sections of this document.

In order to formulate options for achieving the objectives set by the SAP that are fully in line with national policy priorities, the riparian countries of the Dnipro Basin have:

- used the following timescale: 5-10-15 years;
- ranked the actions in terms of their priority: High, Medium, Low;
- estimated the cost of implementation of these actions.

3.2 Steps to be Taken to Ensure the Environmental Rehabilitation of the Dnipro Basin

Each LTEQOs identified in this Programme involves a number of tasks and a series of logical and interrelated steps to be taken to attain it.

In order to measure progress towards each of the agreed LTEQO, success indicators have been identified that refer to a change in the environment quality.

I Sustainable Nature Use and Environment Protection in the Dnipro Basin

Sustainable nature use and environment protection in the Dnipro Basin shall be ensured through the establishment of effective legal and institutional mechanisms.

The steps to attain this objective are set out below:

Step 1.1 ***The provision of improved legislative/regulatory and institutional mechanisms that are adequate and appropriate for ensuring the sustainable use of natural resources and protection of the environment at the national level;***

Step 1.2 ***The establishment of an institutional framework for the international management of the Basin, including an adequate legislative framework for multi- and bilateral cooperation, and enhanced cooperation with the international donor agencies in the field of environmental rehabilitation of the Dnipro Basin;***

Step 1.3 ***The provision of a legal and institutional framework for encouraging and promoting public participation in the decision-making process at the national and international level;***

Step 1.4 ***The harmonisation of environmental legislation of the riparian countries of the Dnipro Basin with that of the EU.***

The following actions need to be taken to facilitate the implementation of these steps:

- The enhancement of environmental legislation and regulations and their integration into the sustainable development concept. Priority: High. Term of implementation: 5-10-15 years.
- Ensuring compliance with the requirements of environmental legislation and regulations at all levels of state governance. Priority: High. Term of implementation: 5-10-15 years.

- Strengthening the legislative and regulatory framework for water resource management on a catchment's basis. Priority: High. Term of implementation: 5-10-15 years.
- Pursue an economically viable and environmentally sound tariff policy in setting charges for natural resource use and environmental pollution. Priority: High. Term of implementation: 5-10-15 years.
- The signing and ratification of the Agreement on Cooperation on Management and Protection of the Dnipro Basin . Priority: High. Term of implementation: 2 years.
- Establish and ensure the sustainable operation of the International Dnipro Basin Commission. Priority: High. Term of implementation: 5-10-15 years.
- Ensure sustainable operation of the International Dnipro Basin Council. Priority: High. Term of implementation: 5-10-15 years.
- Implementation of the Transboundary Monitoring Programme. Priority: High. Term of implementation: 5-10-15 years.
- Ensuring the exchange of environmental information on the basis of the agreed information exchange procedure. Term of implementation: 5-10-15 years.
- Jointly develop and implement the environmental action programmes. Priority: High. Implementation term: 5-10-15 years.
- Increasing the level of responsibility and accountability of local authorities and the public for the ecological status of the Basin. Priority: High. Term of implementation: 5-10-15 years.
- Encouraging the active participation of the public in the legislative process; introducing and promoting the practice of independent review of draft laws; encouraging the active involvement of the public in the preparation and implementation of environmental programmes. Priority: High. Term of implementation: 5-10-15 years.
- Harmonisation of legislation relating to prevention of chemical, nutrient and radionuclide pollution in line with the EU approaches. Priority: High. Term of implementation: 5-10-15 years.

Success Indicators to Measure the Progress towards the LTEQO:

- Integration of the basin management principle into environmental legislation.
- An effective mix of economic and administrative instruments for nature use management.
- Ratification of the multilateral Agreement by the riparian countries of the Dnipro Basin.
- The establishment of a permanent trilateral executive authority for the management of the Dnipro Basin based on the provisions of the Agreement.
- Sustainable operation of the International Dnipro Basin Council.
- Availability of objective monitoring information on the ecological status of transboundary sections of the Basin, and efficient exchange of environmental information on the basis of the agreed information exchange procedure.
- Sustainable cross-border cooperation on environmental issues, based on the existing bilateral agreements signed between the riparian countries of the Dnipro Basin.

Cost estimates for these actions are reflected in Table 3.2.1.

II Environment Quality that is Safe for Human Health

The steps to attain this objective are set out below:

Step 2.1: Ensure safe water consumption and use in the Dnipro Basin

Step 2.2: Achieve a reduction in anthropogenic load for a range of priority chemical substances

Step 2.3: Adjust the level of anthropogenic load to take account of the assimilative capacity of the Basin

Step 2.4: Minimise the threat of the adverse impact of radioactive pollution on human health and the environment.

Step 2.5: Ensure safe living conditions in the areas affected by flooding events and elevated groundwater levels.

The following actions need to be taken to facilitate the implementation of these steps:

- Strengthening the capacity for water use management. Priority: Medium. Term of implementation: 5-10-15 years.

- Improving the technologies for municipal wastewater treatment, storm water treatment, and sludge management. Priority: High. Term of implementation: 10 years.

- Reduce the impact of pollution hot spots on the transboundary sections of the Dnipro Basin (see Annex 3). Priority: High. Term of implementation: 5-10-15 years.

- Strengthening the capacity for industrial and municipal waste management. High. Term of implementation: 5-10-15 years.

- Introduction of an enhanced groundwater/surface water monitoring regime in the Basin, and improved exchange of monitoring information at the national level. Priority: High. Term of implementation: 5-10-15 years.

- Strengthening the capacity for early warning and response to the extreme pollution events affecting surface waters. Priority: High. Term of implementation: 5-10-15 years.

- Introduce a systematic approach to pollution control and prevention in the industrial sector (integrated preventative approach), implement environmental management systems in combination with Best Available Techniques (BATs). Priority: High. Term of implementation: 5-10-15 years.

- Introduce improved and environmentally sound agricultural practices. Ensure improved control over pesticide application in agriculture. Priority: Medium. Term of implementation: 5-10-15 years.

- Establish and maintain water-protective zones and riparian strips to protect water bodies. Priority: High. Term of implementation: 5-10-15 years.

- Implement remedial actions in the areas affected as a result of the Chornobyl accident. Priority: High. Term of implementation: 5 years.

Success Indicators to Measure the Progress towards the LTEQO:

- Increased proportion of population with access to good quality drinking water in quantities that are adequate to meet the essential needs.
- Reduction in chemical and radioactive pollution load of anthropogenic origin, affecting the air, water, and soil.
- Provision of access to reliable monitoring information on environmental quality for state governance bodies and the public.
- Reduction in pollution load from diffuse sources.
- Reduction in damage caused by the harmful effect of waters.
- Reduction in diffuse discharges of radionuclides from the areas affected as a result of the Chornobyl accident.

Cost estimates for these actions are provided in Table 3.2.2.

III Conservation of Biological and Landscape Diversity

The steps to attain this objective are set out below:

Step 2.1: ***Ensure the stable ecological state of water bodies, river floodplains, and riparian ecosystems***

Step 2.2: ***Ensure the conservation and restoration of wetlands that constitute an integral part of the European ecological network***

Step 2.3: ***Achieve and maintain an optimal pattern of nature reserves and agricultural landscapes***

Step 2.4: ***Achieve and maintain an optimal forest cover that ensures the sustainability of the Dnipro Basin ecosystems and takes account of their specific zonal features***

Step 2.5. ***Ensure the stable ecological state of meadows and steppes***

Step 2.6: ***Create and maintain favourable conditions for the reproduction of native, endemic, and migratory fish species.***

Step 2.7. ***Achieve and maintain the optimal network of nature reserves and ecological corridors***

The following actions need to be taken to facilitate the implementation of these steps:

- The establishment of ecological coherent network on the basis of protected areas, protective forests, wetlands and river floodplains that ensures the conservation and spatial interrelationship between typical and rare components of the environment. Priority: High. Term of implementation: 5-10-15 years.

- Compile and maintain the inventory of the most valuable biodiversity conservation areas and carry out an assessment of biodiversity in the Dnipro Basin. Priority: Medium. Term of implementation: 5 years.

- Develop and implement an interstate basinwide programme of actions on the expansion of forests. Priority: Medium. Term of implementation: 5 years.

- Restore closed peat extraction sites and inefficiently used drained areas with peat soil to convert them into wetland areas. Priority: High. Term of implementation: 5–10–15 years.

- Environmental rehabilitation of floodplain landscapes. Priority: High. Term of implementation: 10-15 years.

- Expand the network of protected areas that provide breeding grounds for fish and invertebrate species. Priority: Medium. Term of implementation: 5-10 years.

- Achieve the optimal ratio between the arable land and protected areas to take account of specific features of each soil/climatic zone. Priority: Low. Term of implementation: 5-10-15 years.

- Withdraw from agricultural use about 3.5 million ha of arable land where it has low productivity or is affected and/or degraded by erosion processes, and restore it to its original condition in the following proportion: 1.5 million ha of forest; 1.0 million ha of meadow; 0.5 million ha of steppe; and 0.5 million ha of wetland. Priority: Medium. Term of implementation: 10-15 years.

- Compile the Dnipro Basin Red Data Book. Priority: Medium. Term of implementation: 5 years.

Success Indicators to Measure the Progress towards the LTEQO:

1. Increase in:
   - forest cover,
   - area of restored wetlands,
   - number and area of protected sites,
   - number and area of water protection zones,
   - number and area of protective riparian strips,
   - abundance of native and endemic fish species,
2. Reduction in the number of endangered species.

Cost estimates for these actions are provided in Table 3.2.3.

MEDITERRANEAN ACTION PLAN
MED POL

UNITED NATIONS ENVIRONMENT PROGRAMME

STRATEGIC ACTION PROGRAMME TO ADDRESS POLLUTION FROM LAND-BASED ACTIVITIES

PROGRAMME D'ACTIONS STRATEGIQUE VISANT A COMBATTRE LA POLLUTION DUE A DES ACTIVITES MENEES A TERRE

MAP Technical Reports Series No. 119

UNEP
Athens, 1998

Proposed activities at the National level

- To promote policies and practical measures including the setting of targets and timetables to minimize the generation of radioactive waste and provide for their safe processing, storage, conditioning, transportation and disposal.

- To adopt measures, including BAT and BEP, for the reduction and/or elimination of discharges, emissions and losses of radioactive substances to the Mediterranean Sea.

- To submit reports on: the authorizations granted, data resulting from monitoring, quantities of pollutants discharged from their territories and the action plans, programmes and measures implemented.

5.2.5 Nutrients and Suspended Solids

The effects of the enrichment of water by nutrients are enhanced productivity but these can result in changes in species diversity, excessive algal growth, dissolved oxygen reductions and associated fish kills and, it is suspected, the increased prevalence or frequency of toxic and other species algal blooms. This process is linked to the *"eutrophication"* phenomena.

Eutrophication can result from an augmentation of nutrient inputs to coastal and marine areas as a consequence of human activities. Marine eutrophication is mainly an inshore problem that affects lagoons, harbours, estuaries and coastal areas which are adjacent to river mouths of highly populated river basins and/or which receive sewage from coastal cities.

The main anthropogenic sources of nutrients are: a) Municipal sewage; b) Industrial waste water; c) Agriculture; and d) Atmospheric emissions.

a) Municipal Sewage (see point 5.1.1)

b) Industrial waste water

Many industries produce liquid waste with similar characteristics to domestic waste water. Their main pollutants are: Biodegradable Organic Matter, Nutrients (Nitrogen and Phosphorus), and Suspended Solids, which can be treated with similar techniques. Their pollution load may be reported to population-equivalent and measured as Biological Oxygen Demand (BOD) load.

The most important sources of these substances are:

i) Manufacture of Food and Beverages: Slaughtering, preparing and preserving meat; Manufacture of dairy products; Canning & preserving of fruit and vegetables; Canning, preserving & processing of fish, crustaceans and similar foods; Manufacture of vegetable oils and fats; Sugar factories and refineries; Distillation; Wine production; Beer manufacture;

ii) manufacture of Textiles: Wool processing and Cotton processing;

iii) tanneries and the leather finishing industry;

iv) paper and paper-pulp industry;

v) Phosphatic Fertilizers industry;

vi) Pharmaceutical industry: Basic substances (Fermentation and extraction processes;

Proposed targets

- *By the year 2025, to dispose all waste water from industrial installations which are sources of BOD, nutrients and suspended solids, in conformity with the provisions of the LBS Protocol.*

- Over a period of 10 years, to reduce by 50 % inputs of BOD, nutrients and suspended solids from industrial installations sources of these substances

Proposed activities at the Regional level

- To prepare guidelines for the application of BAT and BEP in industrial installations which are sources of BOD, nutrients and suspended solids.

- By the year 2010, to formulate and adopt, as appropriate, environmental quality criteria and standards for point source discharges of BOD, nutrients and suspended solids.

- By the year 2010, to formulate and adopt guidelines for waste water treatment and waste disposal from industries which are sources of BOD, nutrients and suspended solids.

Proposed activities at the National level

- To reduce discharges of pollutants as much as possible and, in order to do so, to promote the implementation of environmental audits and apply BEP and, if possible, BAT in the industrial installations which are sources of BOD, giving priority to installations located in hot spots.

- To develop National Programmes for the environmentally sound management of waste water and solid waste from industrial installations which are sources of BOD, and to this end to ensure:

  i) By the year 2005, that at least industrial installations which are sources of BOD, nutrients and suspended solids, located in areas of concern, dispose all waste water in conformity with national regulation system;

  ii) to locate coastal outfalls so as to obtain or maintain agreed environmental quality criteria and to avoid the exposure of sensitive environments (such as lagoons, seagrass beds, etc.) to excess nutrient or suspended solid loads;

iii) To promote primary, secondary and, where appropriate and feasible, tertiary treatment of BOD waste water discharged into rivers, estuaries and the sea;

iv) To promote sound operation and proper maintenance of facilities.

v) The reduction and beneficial use of waste water or other solutions appropriate to specific sites, such as no-water and low-water solutions;

vi) The identification of the availability and sustainability of productive uses of waste water sludge, and other waste, such as land-spreading, composting, energetic uses, animal feed, etc.;

vii) To prepare environmental voluntary agreements to which authorities, producers and users are committed on the basis of a reduction plan.

c) Agriculture

The nutrient load from agriculture, mainly intensive agriculture, represents a high proportion of the total anthropogenic load of nutrients to the coastal zones.

Intensive agriculture, which encompasses high crop production or high density animal husbandry, can be a major contributor to nutrients due either to the use of large quantities of fertilizers, or the production of high amounts of solid and liquid manure by farm animals.

Intensive aquaculture can also be a source of nutrients through dispersion of food and excretions from the organisms.

Soil erosion and desertification are one of the most serious problems affecting the region and their contribution to the nutrient budget and sediment load may be important.

Proposed target

- *To reduce nutrient inputs, from agriculture and aquaculture practices into areas where these inputs are likely to cause pollution.*

Proposed activities at the Regional level

- To participate in the programmes and activities of international organizations, especially FAO, on sustainable agricultural and rural development in the Mediterranean.

- To participate in the FAO programme on the sustainable use of fertilizers and to encourage the preparation of national and regional strategies based on the controlled, appropriate and rational use of seeds, fertilizers and pesticides.

- To prepare guidelines for the application of BEP (including good agricultural practices) for the rational use of fertilizers and the reduction of losses of nutrients from agriculture.

Proposed activities at the National level

- To promote national inventories of used batteries.

- To prepare Pilot Programmes for the collection, recovery and safe disposal of used batteries.

- To promote substitution methods and encourage the reduction of the use of batteries.

- To prepare and adopt National Pilot Programmes for the collection, recycling and disposal of used batteries from the public services sector (air, road and railway transport, energy transport and distribution) and from military establishments.

5.3 Physical alterations and destruction of habitats

The increase of populations and economic activities in coastal areas is leading to an expansion of construction and physical alterations to coastal areas and waters. The building of ports and marinas, dredging operations, sand and aggregate extraction, the building of coastal defences, the installation of pipelines and coastal outfalls, the restoration of beaches, the erosion induced by inadequate land use and other activities linked to the urban, agricultural and aquacultural expansion, are giving rise to alterations of wetlands, shore lands, beachfronts and seafloors. Important habitats are being destroyed.

The damming of river systems may result in a reduction of freshwater and sediment loads, with possible changes in estuarine conditions.

Proposed targets

- *To safeguard the ecosystem function, maintain the integrity and biological diversity of species and habitats.*

- *Where practicable, to restore marine and coastal habitats that have been adversely affected by anthropogenic activities*.

Proposed activities at the Regional level

- To formulate guidelines for the preservation of habitats and normal ecosystem functions in coastal areas, particularly in the context of integrated coastal zone management.

- To develop programmes for integrated coastal zone management.

Proposed activities at the National level

- To support programmes for integrated coastal zone management.

- To undertake studies on the potential effects on the environment or Environmental Impact Assessment according to the importance of the

physical alterations and the distruction of habitats related to management projects.

- To establish a system of previous authorization by competent national authorities for works which cause physical alterations of the natural state of the coastline or the destruction of coastal habitats.

6. MONITORING

Assessment of pollution-related problems makes it possible to reduce possible uncertainties when management decisions need to clarify links between inputs, concentrations and the effects of pollutants. An environmental assessment of the Mediterranean started in 1975 in the framework of MAP through its MED POL Programme. Through the adoption of MED POL Phase III in 1996, the Programme now covers all the aspects of monitoring, including trend and compliance monitoring and the monitoring of biological effects.

In order to improve the assessment of the inputs of pollutants into the Mediterranean Sea and to ensure compliance with the conditions laid down in authorizations and regulations, the Authorities responsible should establish systems of monitoring and inspection.

According to Article 6 of the LBS Protocol *"The Parties shall provide for systems of inspection to assess compliance with authorizations and regulations"*. In addition, *"The Parties establish appropriate sanctions in case of non-compliance with the authorizations and regulations and ensure their application".*

Proposed targets

- *By the year 2000, each Party will establish a monitoring programme of the inputs of the priority pollutants identified in this Programme and of the quality of the marine environment.*

- *By the year 2000, the Parties will be establish a permanent river water quality/quantity register.*

- *By the year 2000, the Parties will establish systems of inspection.*

- *By the year 2000, the Parties will establish a monitoring programme of discharges and emissions of the priority pollutants identified in this Programme and of the quality of the marine environment.*

Proposed activities at the Regional level

- To prepare guidelines for local air pollution monitoring programmes in cities and urban agglomerations exceeding one million inhabitants.

- To develop guidelines for river monitoring programmes.

- To promote the establishment of permanent registers of river quality and quantity accessible to all Parties for selected rivers (about fifty).

- To promote the establishment of a data bank on socio-economic indicators related to sea and river quality and pollutant fluxes associated with the Geographic Information System (GIS).

- To promote the establishment of an inventory of major point atmospheric sources following EMEP/CORINAIR guidelines.

Proposed activities at the National level

- The establishment of inspection systems to ensure compliance with the conditions laid down in the authorizations and regulations.

- The establishment of monitoring programmes to evaluate the effectiveness of actions and measures implemented under this Programme.

- The establishment and improvement of local air pollution monitoring programmes as a priority in cities and urban agglomerations exceeding one million inhabitants.

- The establishment and improvement of local and national monitoring programmes to control and assess effluents discharge and the quality of the marine environment.

- The establishment and improvement of river monitoring programmes.
- The establishment of permanent registers of river quality and quantity accessible to all Parties on selected rivers (about fifty).

- The establishment of a data bank on socio-economic indicators related to sea and river quality and pollutants fluxes associated with a Geographic Information System (GIS).

- Improve the inventory of major point atmospheric sources following EMEP/CORINAIR guidelines.

7. CAPACITY BUILDING

The activities proposed aim to improve, inter alia: the scientific base, environmental policy formulation, professional human resources, institutional capacity and capability, both public and private, implementation of environmentally sound technologies, the implementation of policies for cleaner production and technical cooperation, including cooperation in the fields of technology transfer and know-how process. All these measures come under the heading of Capacity-building. As part of the above, the activities will be grouped into two categories:

- To support, promote and facilitate programmes of assistance in the area of scientific, technical and human resources;

- To support, promote and facilitate, as appropriate, the capacity to apply, develop and manage access to cleaner production technologies as well as the best available techniques (BAT) and the best environmental practice (BEP).

The activities to be implemented for each category are to be considered at both national and regional level. All the competent MAP structures will be used for their implementation.

7.1 To support, promote and facilitate programmes of assistance in the area of scientific, technical and human resources.

The primary objective is for each country, with the support of international organizations, as appropriate, to identify the state of its scientific knowledge and its research needs and priorities, in order to achieve, as soon as possible, substantial improvements in:

l) Environmental management institutions.

ii) The scientific base and strengthening of scientific and research capacities and capabilities in areas relevant to the environment and, in particular, to priorities established in the SAP.

iii) Environmental policy formulation, building upon the best scientific knowledge and assessments.

iv) The interaction between scientific groups and governmental institutions, by applying the precautionary approach, where appropriate, to decision-making.

v) Monitoring, inspection and information systems.

In accordance with articles 9 and 10 of the LBS Protocol, the Parties shall cooperate in scientific and technological fields related to pollution from land-based sources and activities. To this end, the Parties shall formulate and implement, at the regional level, training programmes, programmes of assistance and education in the area of scientific, technical and human resources.

<u>Proposed activities at the Regional level</u>

- To support the establishment of networks to improve the exchange of experience among Mediterranean experts, especially in the field of the priorities established in the SAP to prevent marine degradation.

- To formulate and support programmes of cooperation for capacity-building and the development of institutions, including relevant technology and management training, human resources (scientific and technical personal) and public education. These programmes should give assistance to, inter alia, environmental impact assessment, sustainable development planning, environmental auditing and management, environmental education, etc.

- To formulate and implement in the framework of MED POL capacity-building programmes related to the assessment and control of marine pollution.

- To assist in the formulation of projects eligible to be financed by international financial donors.

- To assist and advise on policies, strategies and practices that may contribute to the implementation of the measures and targets included in the SAP.

- To prepare a general manual with guidelines on urban policies directed towards energy saving, non-polluting forms of transport, waste management, the sustainable use of water and the creation of town amenities.

- To prepare a river monitoring manual by the year 2000.

- To prepare guidelines on linking socio-economic indicators to water quality indicators through GIS to check pollution control.

7.2 To support, promote and facilitate, as appropriate, the capacity to apply, develop and manage the access of cleaner production technologies as well as the Best Available Techniques (BAT) and the Best Environmental Practice (BEP)

The Parties should promote, and encourage the private sector to promote, effective modalities for giving access to cleaner production technologies and for the application the best available techniques and the best environmental practice with a view to preventing, reducing or phasing out inputs of pollutants from selected land-based sources and activities. To this end, the Parties should, at the national level, improve their up-to-date information, experience and technical expertise.

Furthermore, there is a need for favourable access to and transfer of environmentally sound technologies through supportive measures that promote technology cooperation and the transfer of the necessary technological know-how, as well as building up economic, technical and managerial capabilities for the efficient use and further development of transferred technology. Successful long-term partnership in technology cooperation necessarily requires continuing systematic training and capacity building at all levels over an extended period of time.

Proposed activities at the Regional level

- To facilitate and promote access, in particular for countries in need of assistance, to new and innovative technologies relevant to each selected land-based source and activity, including those causing physical degradation and the destruction of habitats.

- To promote new information technologies that facilitate the transfer of knowledge within countries and between States, including, in particular, from developed countries to countries in need of assistance.

- To prepare a general manual with guidelines on implementing cleaner technologies, cleaner production and cleaner materials.

- To prepare a general manual with guidelines on introducing alternatives to priority POPs.

- The establishment of networks to improve the exchange and transfer of environmentally sound technologies among Mediterranean experts, especially in the field of the priorities established in the SPA to prevent marine degradation.

- To enhance the access to and transfer of patent-protected environmentally sound technology, in particular to developing countries.

- To promote collaborative arrangements between enterprises of developed and developing countries for the development of clean production technologies.

- To promote join ventures between suppliers and recipients of technologies, taking into account policy priorities and objectives of developing countries.

- To assist and advise on environmental aspects of current technologies that may contribute to the implementation of the measures and targets included in the SAP.

- To assist and advise on the preparation of reports that are required for the LBS Protocol.

8. PUBLIC PARTICIPATION

Information and public participation are essential components of a sustainable development and environmental policy.

Proposed targets

- to provide to the general public access to the information available on the state of the environment of the Mediterranean and its evolution, and the measures taken to improve it;

- to enhance the environmental awareness of pollution, and create a common approach to the environmental problems of the Mediterranean;

- to facilitate public access to activities for the protection and management of the environment and to scientific knowledge;

- to mobilize and ensure the participation and involvement of the major actors concerned (local and provincial communities, economic and social groups, consumers, etc.).

Proposed activities at the Regional level

- to identify potential roles for Non-Governmental Organizations in the implementation of the SAP and to ensure that all relevant IGOs and NGOs have appropriate access to information concerning the SAP and its application;

- to implement coordinated information campaigns and special activities on environmental protection;

- to continue and expand publication and distribution of brochures, leaflets, posters, reports, newsletters and other information materials, as well as the use of the media in all its forms;

- to enhance and strengthen the exchange of information and experience on the environmental problems of the region, and to develop cooperation in this field.

Strategic Action Programme for the Red Sea and Gulf of Aden

Regional Organization for the
Conservation of the Environment of the
Red Sea and Gulf of Aden

4

An Agenda for Action at the Regional, National and Local Levels

AN AGENDA FOR ACTION. The Strategic Action Programme supports and endorses an "Agenda for Action" at the regional, national and local levels, the objective of which is the conservation of the environment of the Red Sea and Gulf of Aden. The SAP includes a series of complementary actions to be implemented in a phased manner over a decade or more (see Box 2). This Agenda recognizes the critical need for high level commitment and improved public awareness for successful long–term management and conservation of the coastal and marine resources of the Region. It emphasizes the integration of these these concerns into the development process through the use of environmental planning, environmental assessment and review procedures and adoption of coastal zone management.

A DIVERSITY OF ACTIONS. The Agenda supports the strengthening of institutions and development of human resources required for environmental management. Importantly, the Agenda proposes a series of preventive policy and technical interventions to avoid potential damage to resources; curative measures to address current problems; and resource management programmes for sustained use and conservation of resources. The development of applied monitoring programmes, use of environmental indicators and conduct of evaluations are recommended to provide routine assessments of progress made in the implementation of the SAP.

FINDINGS AND RECOMMENDATIONS. Key findings and recommendations of the Task Force are presented as a series of tables to allow for comparative review of issues and actions at the regional, national and local level. The transboundary analysis, which evaluates "thematic issues" and "common concerns" shared on the sub–regional and national level, is provided in Tables 2, 3, 4 and 5. The recommendations of the SAP Task Force for actions at the regional level are provided in Table 6; these are complemented by a range of actions identified by the Country Reports and endorsed by the Task Force. They are provided on a country–by–country basis in Tables 7–13.

Long–Term, High Level Commitment and Public Awareness

HIGH LEVEL COMMITMENT. The effective conservation and management of the

unique coastal and marine environments and resources of the Region will primarily depend on long–term, high level commitment by governments. Government support is required to ensure that the priorities established under the SAP are supported through policy measures, effective implementation of laws and regulations, investment activities and capacity building of regional, national and local institutions. Government support for the SAP will be critical given the need to take preventive actions that require control of development in sensitive areas, enforcement of existing regulations, and investments to avoid potential adverse impacts.

ENHANCED PUBLIC AWARENESS AND PARTICIPATION. Environmental awareness is key to obtaining and maintaining public support for environmental protection and nature conservation. The large number of stakeholders involved in the coastal zone requires multi–level awareness programmes targeting different groups. The SAP anticipates broad–based participation by representatives of the general public, private sector associations, academic and applied research institutions and local nongovernmental organizations. The active participation of these parties will promote effective dissemination of information to a wide audience, allowing the programme to benefit from the experience of others.

TYPES OF ACTIVITIES. At the national level, frequent environmental workshops and meetings can be held to trigger interest among decisionmakers in the government and different sectors such as fisheries, industry and tourism. Integration or strengthening of environmental subjects in existing academic curricula is crucial in building awareness among the younger generations. The public media, educational displays and well designed aquaria will reach an even wider audience. At the local level, environmental awareness activities may be facilitated through existing fisheries extension networks. The water conservation outreach programme undertaken in Jordan by the Ministry of Water and Irrigation, with the cooperation of the Jordan Environment Society, is an excellent example of an effective public awareness programme involving government and nongovernmental organizations.

Transboundary Environmental Issues

OPPORTUNITIES FOR REGIONAL COOPERATION. The SAP provides a framework for PERSGA and the cooperating parties to address management of transboundary environmental issues as an opportunity for regional cooperation. The Task Force prepared a transboundary analysis that identified both thematic issues (Tables 2 and 3) and common concerns (Tables 4 and 5). The thematic issues encompass marine pollution, vessel traffic, and many types of fishery resources, among others, that can be effectively addressed only if understood and managed on a broader transboundary basis. Common concerns, on the other hand, are primarily those environmental impacts felt at a national level, but which can also result in significant long–term and cumulative secondary impacts at the regional or sub–regional level. They are most effectively managed by joint activities or adoption of complementary approaches.

SUB–REGIONAL ANALYSIS. In preparing the transboundary analysis, the Task Force evaluated the issues from a sub–regional perspective, recognizing the diversity of environments within the Region, and from a national perspective, given the range of common problems shared by the countries. The sub–regions adopted for use in the SAP are based on scientifically recognized geological and biogeographical units which reflect distinct natural differences of significance for environmental management.

APPLICATION IN SAP IMPLEMENTATION. The transboundary analysis will be used to support planning and organization of SAP–related preventive and curative measures and outreach activities, to allow for more effective cooperation between parties who share an interest in management of environmental issues that transcend borders at the regional and sub–regional level. In designing SAP activities to address specific concerns in the various parts of the Region, the findings of the analysis will promote use of a consistent strategy, effective development of joint actions, transfer of experience and opportunities for collective training.

Preventive Measures

KEY PREVENTIVE ACTIONS. In the Region, especially where environmental degradation is still limited to specific locations associated with coastal development, the timely introduction of enforceable preventive measures can be an extremely cost–effective approach to reducing the risk of major environmental impacts in the future. Suggested measures for prevention include the following:

EMPHASIS ON INTEGRATED COASTAL ZONE PLANNING AND MANAGEMENT. The use of integrated coastal zone planning combined with implementation of approved plans could significantly reduce the degradation of the coastal environment occurring in many parts of the Region. The experience of Egypt, Jordan and Saudi Arabia in the inventory of coastal and offshore habitats and the preparation of integrated coastal zone management plans should be reviewed for application elsewhere. It should be noted that a number of practical guidelines are available to support efforts within the Region.

EXPANDED USE OF ENVIRONMENTAL ASSESSMENTS. At the regional, national and local level, the Programme gives high priority to promoting expanded use of environmental assessments in the planning and review of proposed projects. This is a significant preventive action, which although mandated by many countries in the Region, is not being used on a systematic basis to support environmentally sound development decisions. It is especially important that environmental assessments be prepared for all actions concerning coastal dredging and landfilling, port and harbor development and expansion, siting and construction of major industrial and energy facilities, large tourism developments, and aquaculture.

ADOPTION OF MEASURES TO CONSERVE CULTURAL HERITAGE. All countries in the Region have legislation protecting archaeological, historical and sacred sites. This legislation is normally implemented by government agencies responsible for antiquities, or religious affairs in the case of sacred sites and graves. These organizations, given the limited staff and budgets, are often unable to fully implement the provisions of the laws. Steps should be taken to integrate measures to conserve cultural heritage into the planning and development process. This includes addressing cultural heritage issues in integrated coastal zone management plans. The evaluation of potential impacts to cultural heritage values should be a routine element of all environmental assessments conducted for proposed projects. Given the often high risk of unknown buried sites being encountered during the course of construction activities, the use of archaeological chance find procedures should be a standard part of construction contracts.

REPLICATION OF SUCCESSFUL REGIONAL MODELS IN THE INDUSTRIAL SECTOR. The Region has some successful models of environmental management that should be considered for replication elsewhere. An

example is the effective integration of environmental protection measures into the design and management of the industrial port cities of the Royal Commission for Jubail and Yanbu in Saudi Arabia. The measures used by the Commission and other organizations to promote the use of integrated pollution control, energy– and water–efficient industrial processes and waste minimization approaches in industrial facilities of all scales, should be promoted.

ADOPTION OF MEASURES TO CONTROL EXPLOITATION OF COASTAL AQUIFERS. In the Region, as in the case of the Mediterranean, improved management and protection of coastal groundwater aquifers is a high priority. Measures should be taken by all nations to establish firm regulatory control over the extraction of groundwater and all wells should be licensed. Efforts should be made, especially for non–renewable groundwater, to ensure that the water is being appropriately used, that proper conservation measures are being applied, and that pollution is prevented. Land use planning should include measures to avoid the placement of industrial facilities and waste disposal sites on aquifer recharge zones.

ACTIONS TO REDUCE RISKS OF MARINE ACCIDENTS. The Programme supports actions to reduce the risk of marine accidents, a major threat to environmental quality in the Region. Establishment of Traffic Separation Schemes and improved navigational aids, especially in high risk areas, should be given priority. The adoption of a system of Port State Control will allow for effective enforcement of marine pollution control and safety standards. The following actions, to be undertaken by the appropriate marine and port authorities, should be viewed as significant contributions to environmental protection:

- *Improved Navigational Systems and Aids*. An important opportunity for preventive action in the Region lies in improvement of navigational systems and aids to lower the risk of maritime accidents. The large volume of vessel traffic, increasingly dominated by oil tankers, warrants significant improvements in navigational services at the regional, sub–regional, national and local levels. At the regional level, an effective coordination mechanism for management of navigational issues should be adopted, complemented by specific arrangements between concerned parties on a sub–regional basis. The development of new and improved Traffic Separation Schemes is a key regional measure, while at the sub–regional level cooperative agreements on vessel traffic management should be given priority for Bab-al-Mandab and the Straits of Tiran. National and local actions include improved navigation management in the Gulf of Suez, the loading points for the Yanbu Petroline and Sumed pipeline, and in the vicinity of all major regional ports. Special measures should be considered for the current and planned free zone ports in Djibouti, Sudan, and Yemen. The Navigation Risk Assessment and Management Plan for the Red Sea and Gulf of Aden, prepared as an element of the SAP, provides detailed recommendations on these issues.
- *Adoption of Port State Control.* The Paris Memorandum of Understanding on Port State Control, operating in Europe, provides a potential model for establishment of a similar system in the Region. Because of ships' right of free passage while transiting through waters that may fall within the Exclusive Economic Zone (EEZ) of sovereign states, the only opportunity for coastal states to ensure that vessels are complying with international agreements that are in force in the Region is through inspections and certification of vessels at port. A systematic and well executed inspec-

tion programme should be operationalized in every major port in the Region, so that vessels will not resort to calling at ports where regulations are lax and reception facilities inadequate. Such a regional system will enable governments to pool scarce resources and ensure that as many ships as possible are inspected for their compliance with International Maritime Organization (IMO) regulations regarding safety and marine pollution prevention. Under the memorandum of understanding, the Port State has the right to inspect vessels entering its national jurisdiction and could detain vessels that did not meet their certification requirements until deficiencies were corrected. The enforcement of such a system in the Region will go a long way to reducing the risks posed by unseaworthy or sub–standard vessels with respect to accidents and spills, and will facilitate the imposition of penalties or fees for violations.

- *Adoption of Complementary Conventions and Protocols*. There are a number of complementary legal instruments that reinforce regional conventions and, if subscribed to on a regional basis, could advance the objectives of the PERSGA agreements. Some of these, such as the International Convention on Civil Liability for Oil Pollution Damage (CLC) of 1969, have already been ratified by selected contracting parties to the Jeddah Convention. The purpose of the CLC is to provide insurance to ship owners for liability for oil spills from their vessels in the territorial waters of a sovereign state. A parallel agreement is the 1971 International Convention on the Establishment of a Fund for Compensation for Oil Pollution Damage (Fund Convention). The purpose of this Fund is to provide compensation to coastal states for damages in excess of the sums provided for by the CLC Convention. The Fund is financed by oil importing countries or oil industries in these countries. Port states that do not import oil, but are vulnerable to pollution because of their location along transport routes, are afforded free and full coverage in the case of an oil spill, provided they are contracting parties to the Convention. In 1992, the CLC and Fund Conventions were amended to significantly increase compensation that coastal states can receive under them for damages caused by oil spills and for the first time, damage by other harmful substances was included. Despite this, only one country in the Region is a Fund member.
- *Radio Communications*. The Global Maritime Distress and Safety System (GMDSS) has come into force and is related to the International Convention for the Safety of Life at Sea (SOLAS 1974), as amended, and the International Convention on Search and Rescue (SAR 1979). Under GMDSS, all ships must be fitted with certain radio communication equipment and coastal states must properly equip coastal stations to communicate with vessels which ply in waters that fall under their responsibility. Such radio communication systems should be established and organized on a regional level to give full coverage to the Red Sea and Gulf of Aden.

STRENGTHENED MANAGEMENT OF OIL SPILLS. Oil is one of the major polluters in the Region, and various surveys of the state of the marine environment indicate that the most significant forms of pollution include pollution by oil. Furthermore, the Red Sea is one of the most important marine routes in the area. Consequently, oil pollution resulting from tank washing and discharges from passing ships is increasing, and as new oil exploration and production

activities take place, the Region is more and more susceptible to major oil incidents. A number of such incidents have already been reported in certain coastal waters.

IMPACTS FROM OIL. At the local level, oil pollution is evidently more severe in the oil–producing areas of the Region. Chronic oil pollution has been observed in the immediate vicinity of some major ports as a result of operations at oil terminals or discharges from power plants. Oil spills and incidents have constituted serious threats and have visible and invisible impacts. The greatest danger to coral reefs from an oil spill is probably the indiscriminate use of dispersants. There is also a threat to all forms of marine life as a result of oil spills. Such spills affect the dugong that are frequently found in shallow inshore waters. There is evidence of significant damage to bird populations, which are normally dependent on the seas and coastlines for feeding and reproduction, and also to fisheries production from impacts on the vulnerable larval stages.

REGIONAL PROGRAMMES TO CONTROL OIL SPILLS. Given these threats and the importance of the Region as an international shipping lane for oil transportation, regional programmes to promote monitoring of oil spills and oil pollution should be established or strengthened. In particular, such programmes should promote enforcement standards for limiting oil spills. Greater attention should be accorded to issues such as coordinating oil pollution monitoring; carrying out pollution studies; undertaking surveillance by ships, aircraft, and satellites within national and international waters; strengthening enforcement procedures; and developing comprehensive Oil Spill Contingency Plans.

CURRENT REGIONAL EFFORTS. Current efforts to address oil spills should be the subject of increased national and international support. A significant contribution in this regard is the current UNEP–funded PERSGA project, entitled "Protection of the Red Sea and Gulf of Aden Environment: Initiation of Marine Pollution Control Policies and Development of Tools for Coastal Area Management." As part of this project, it has been agreed that the first phase of a trajectory model for oil spills in the Red Sea will be developed. This constitutes an important step in the preparation of regional Contingency Plans for oil spills. The development of the model will also assist oil spill working groups in the Region to make the decisions necessary to minimize oil spill impacts and to use available resources to combat oil pollution in a cost–effective manner. Such a model can aid in predicting the spread and fate of oil spills. It also includes calculations regarding the dispersal of oil on water as well as in the water column, oil evaporation, and its spread on the coast. The project is expected to be completed within two years.

OIL SPILL CONTINGENCY PLANS. When an oil spill takes place the most important factor is time. A spill can spread over a large area very quickly depending on the strength of wind and surface currents and therefore no time should be wasted in dealing with it. This can only be achieved if a proper Contingency Plan is in effect and all participants, through regular exercises, accept the proper chain of command and perform their respective roles for spill response. Therefore National Contingency Plans are essential for all countries of the Region. On the other hand, oil spills do not recognize political boundaries and an oil spill in one country could cause far more damage in a neighboring country depending on the strength and direction of prevailing winds and surface currents. Therefore Regional and Sub–Regional Contingency Plans are essential.

MARINE EMERGENCY MUTUAL AID CENTERS. Very few countries in the world

have the full capacity to combat a major oil spill on their own. All the major oil spills that happened recently such as the "*Torrey Canyon*" in the UK, *the* "*Amoco Cadiz*" in France or the "*Exxon Valdez*" in Alaska, USA, required the resources of more than one country. Mutual Aid Centers are therefore most appropriate. At present only one such center exists in the Region. It was established in Djibouti with the help of the International Maritime Organization and financed by the Government of Norway to serve the countries bordering the Gulf of Aden only. The reunification of Yemen with a coastline on the Red Sea as well as the Gulf of Aden and the establishment of PERSGA in Jeddah, call for the revision of the Agreement of the Djibouti Center to make it a Regional Center under the umbrella of PERSGA. Measures should also be taken for establishment of the planned Sub–Regional Mutual Aid Center in Hurghada, Egypt. The Government of Egypt has indicated that it would be prepared to support this initiative through the provision of land and infrastructure for the facility. In addition, a review should be conducted to determine if an additional Sub–Regional Mutual Aid Center is required to provide adequate coverage of the Red Sea.

JOINT MANAGEMENT OF TRANSBOUNDARY FISHERIES RESOURCES. In order to achieve sustainable use of transboundary fish stocks, the management and exploitation of this resource should be regulated in a regional agreement. Joint efforts among the littoral nations are needed to carry out stock assessment of major migratory species, including data on their routes of migration and seasonality, followed by adoption of regional management plans for the concerned species. Sustainable management could include monitoring, surveillance and control of fishing, based on a regionally coordinated licensing and quota system. Special attention is needed to control the export of highly priced fisheries products, such as shark fins.

Curative Measures

KEY CURATIVE ACTIONS. Within the Region a series of key curative actions are needed to address current sources of pollution and resource degradation. These problems tend to be focused in the coastal urban and industrial areas, in the vicinity of ports and major maritime traffic lanes, and in areas with coastal and offshore exploitation of oil. Key issues that need to be addressed through curative measures include the following:

WATER RESOURCES MANAGEMENT. The availability of water is a serious constraint to development in the Region and a major environmental management issue in the coastal zone. Surface water sources occur only on a seasonal basis and play a critical role in the recharge of groundwater aquifers and in the ecology of mangroves, freshwater–dependent vegetation and coastal wetlands. Groundwater resources are being depleted in the cooperating countries through over–consumption, which reduces the quantity of the resource, and pollution of aquifers, which reduces quality. In order to address this issue, priority measures need to be taken in all littoral nations to promote the efficient use of these limited water resources through improved management actions and investment activities.

From a management perspective the most critical issue is to effectively regulate development and allocation to ensure efficient use. Key interventions include a formal permit process for use, demand management programmes to assist users in making a transition to more effective use of water, water charges that promote conservation, and specialized waste reduction programmes in all sectors. Support should also be provided for innovative investments to develop non–traditional sources of wa-

ter, including restricted reuse of treated domestic wastewater and expanded use of brackish water for irrigation. In conjunction with these measures, actions should be taken to control pollution in order to protect the quality of potable water sources and ensure that basic allocations are maintained to support the needs of critical aquatic ecosystems such as mangroves and coastal wetlands.

WATER SUPPLY AND WASTEWATER TREATMENT. Actions to improve water quality through upgrading of water and wastewater services remain a priority at the regional level to protect public health, reduce ecological damage and control adverse economic impacts. Successful development and implementation of projects in this sector requires the commitment of national/local governments and utilities to undertake institutional, financial and technical measures. Such measures should promote the long–term development of autonomous and self–financing institutions that provide reliable services to their customers. Investments in wastewater treatment should focus on technologies that are reliable under local conditions and provide opportunities for full or partial restricted reuse of treated wastewater. Care should be taken in the design of projects to ensure that investments are balanced between water supply and wastewater management. The absence of balanced investments, especially provision of extensive household water services without complementary investments in wastewater collection and treatment, has led to rising groundwater tables, street flooding and standing pools of raw sewage in many cities of the Region.

SOLID WASTE MANAGEMENT. The management of solid waste from household, commercial, industrial and construction activities is a major problem for coastal urban areas, industrial facilities and ports. It is also an increasing problem in the smaller settlements along the coast that often lack formal systems for waste collection and disposal. In many cases, the existing solid waste disposal facilities have been developed and are operated without adequate concern for environmental factors. Often selected sites endanger groundwater aquifers or involve disposal of waste at the margins of mangroves and coastal wetlands. In some instances solid waste disposal has been used as a technique for small–scale land reclamation in coastal areas. Measures should be adopted to support properly located and developed disposal sites in the Region. A special issue is the marine disposal of solid waste from ships in both national and international waters. This is especially a problem in areas that have heavy ferry service traffic. Ship operators should be held accountable for the proper disposal of solid wastes and adequate onshore facilities should be provided to accept these wastes at an affordable cost.

INDUSTRIAL POLLUTION CONTROL. Industrial pollution—thermal pollution, hypersaline brines, particulate matter and chemicals—contributes to land–based sources of pollution affecting the shoreline and coastal waters of the Region. In many cases major industrial facilities, both estates and individual plants, have been sited without regard to their potential environmental impact on groundwater quality, air quality or coastal environments. Within the Region environmental standards regulating industrial facilities are not uniformly prescribed or enforced. Institutional and technical capacity is weak and policy incentives for private sector compliance are inadequate. Activities to strengthen and enforce regulatory standards for industry should be supported; new plants should be subject to environmental assessments and existing plants should have environmental audits conducted on a regular basis; cost–effective control technologies should be adopted

where absent; and support should be provided for the implementation of waste minimization programmes. The success of Saudi Arabia's Yanbu industrial city in integrating environmental concerns into all phases of project development, implementation and operation should serve as a model for major industrial ports and free zone investments. National and local authorities, in particular special environmental units established for industrial ports and free zones, should promote regular environmental auditing by industries and implementation of management–oriented applied monitoring programmes.

PORT RECEPTION FACILITIES. The lack of adequate port reception facilities to collect and process ship waste is a leading cause of illegal dumping and marine pollution by vessels in the Region. A number of major ports do not have adequate waste reception facilities and in others the existing facilities require significant rehabilitation due to inadequate maintenance. Recognizing the ecological sensitivity of coastal and marine resources to these discharges and the impacts on tourist facilities, measures should be taken to ensure that ship waste reception facilities are available at all major ports in the Region and that their use is effectively enforced. This problem should be coordinated on a regional basis, with implementation at the national and local level. The construction of ship waste reception facilities should be mandated for all new industrial port and free zone developments. At established ports that lack facilities or require rehabilitation of existing facilities, priority should be given to these investments. User fees should not be set so high as to discourage operators from using the facilities. Effective enforcement will require cooperation among ship operators, environmental authorities and maritime authorities, including the coast guard and naval vessels operating in the Region.

CONTROL OF POLLUTION FROM OIL EXPLORATION AND PRODUCTION. Operational spills, periodic blow–outs, oil well leakage, gas flaring and oily sludge from drilling operations all contribute to the cumulative impacts of marine pollution in the Region. Little regulatory oversight exists to mitigate these impacts. The Gulf of Suez is particularly vulnerable given its enclosed nature and large number of oil fields. In conjunction with the Jeddah Convention, a protocol should be adopted and implemented that provides clear measures for control of pollution resulting from exploration and exploitation of coastal and offshore oil reserves. PERSGA and national authorities should undertake a dialog with the oil companies, both national and international, to establish an understanding on good environmental practices and to support their cooperative implementation. In addition, the oil companies should undertake environmental audits and, in cooperation with national environmental authorities, establish programmes to address routine operational problems and development of special measures for emergency and accident situations. Applied monitoring programmes should be developed by the operators that evaluate their performance and are subject to review by environmental authorities.

DREDGING AND FILLING. Dredging and filling of coastal areas are permanently eliminating many of the most productive and diverse coastal and marine habitats in the Region, often filling in mangroves and coastal wetlands and suffocating nearby coral reefs. Given the extensive areas of undeveloped coastline in many littoral nations of the Region, these operations are often environmentally unjustified and continue in many places despite government restrictions. Existing legislation prohibiting these activities should be enforced; all proposed dredging and filling operations should require a formal permit and be conducted

consistent with land use and coastal zone management plans; all large operations and those adjacent to environmentally sensitive areas should require the preparation of an environmental assessment; and clear standards should be adopted for environmental management and monitoring of authorized dredging operations. Measures should be developed in the planning process to avoid, to the fullest extent possible, dredging and filling operations that adversely impact mangroves, coastal wetlands and coral reefs unless they are fully justified and have been subject to proper analysis and review. In addition, set backs should be required for all coastal construction to reduce the tendency in many locations to expand existing facilities incrementally by dredging and filling.

Resource Management Programmes

STRENGTHENING RESOURCE MANAGEMENT. A major challenge in the Region is the strengthening of resource management in the coastal and marine areas. This includes adoption and implementation of coastal zone management, a broad range of measures to support conservation of terrestrial and marine ecosystems and habitats, and development of effective programmes for sustainable management of living marine resources.

IMPROVING COASTAL ZONE MANAGEMENT. The use of integrated coastal zone management plans provides an effective mechanism for sustainable long–term use of the coastal zone that forms the interface between land and sea. Throughout the Region adoption of ICZM to support development decisions could significantly decrease unnecessary degradation of coastal and marine environments. This is especially important for long–term development of high value local and international tourism and for maintenance of the rich and diverse cultural heritage of the coastal zone. Coastal zone management concerns can be addressed in a cost–effective manner through integration into land use planning; preparation of environmental assessments and environmental audits; processes for issuing licenses and permits for activities in the coastal zone; decisions on the siting of public and private facilities; and monitoring of development trends and environmental impacts.

NATIONAL AND LOCAL PLANS. It is strongly recommended that priority be given to the development of coastal zone management plans in all littoral countries, as appropriate for the various types of issues that currently or potentially exist in different areas of the coastal zone. In this context, it is anticipated that national plans will be developed to provide an overall framework for coastal zone management, complemented by more specific plans for urban and industrial areas, zones around industrial ports and free zones, and special plans for management of tourist areas and ecologically sensitive areas including coastal and marine reserves. To be effectively implemented, these plans should be developed in cooperation with all the concerned users of the coastal zone and should provide agreed mechanisms for all parties to support sustainable development of these areas. Experience throughout the world has demonstrated that the cooperative process used in development and implementation of ICZM plans provides an important mechanism to achieve consensus on the use of coastal areas and avoids major conflicts between user groups which can be highly disruptive to the development process.

KEY FEATURES OF PLANS. ICZM plans should emphasize siting of new developments and resource exploitation activities in areas that do not adversely affect fragile and non–renewable resources or disrupt coastal processes such as currents, and

that avoid creation of physically unfavorable conditions such as embayments with poor circulation. The plans should give special attention to properly locating coastal urban infrastructure such as power plants, desalinization plants, and wastewater treatment plants. They should support environmentally sound development of industrial ports and free zones by ensuring that construction and operation maximize effective use of the coastal zone and minimize impacts on key coastal resources and industrial facilities. In developing plans, priority should be given to areas of rapid urban, industrial and tourism growth. PERSGA can play a key role in this process by facilitating the sharing of experience between the cooperating parties and by identifying regional experts from the public and private sector.

HABITAT CONSERVATION. The protection and, where necessary, restoration of coastal and marine habitats is of highest priority for biodiversity conservation. Spawning grounds and critical nursery areas of key species are of particular importance. The integrity of the Region must be taken into consideration and areas that are of regional significance should receive special attention. Both national and regional regulatory systems need to be improved to enhance habitat conservation. Specific schemes for key habitats, such as coastal wetlands, salt marshes, mangroves, seagrass beds and coral reefs must be developed. An efficient means of habitat conservation is establishment of a network of coastal and marine protected areas supported by effective ICZM and planning. Management of existing conservation areas should be improved and new areas designated. Public awareness programmes for selected target groups will support habitat conservation efforts. Where appropriate, they should be coordinated at the regional level, so that conservation of migratory species can be achieved and experience and lessons learned shared among countries.

PROTECTION OF THE ARID COASTAL ZONE. The incremental costs of soil erosion are usually much higher than the benefit from livestock husbandry. Therefore the carrying capacity of coastal areas for goats, sheep and camels should be established and livestock access regulated, preferably by promoting traditional conservation schemes. The introduction of exotic species of plants or animals should be banned entirely. In certain cases, the removal of exotic species that are in the process of replacing indigenous flora or fauna may be considered. Vehicle traffic in the coastal zone has to be restricted to clearly marked tracks. Special consideration should be given to the fragile nature of terrestrial and freshwater ecosystems in arid zones when preparing environmental assessments for urban, industrial or tourism development. Sufficiently large terrestrial sectors should be included in coastal and marine protected areas, in order to serve as buffer zones and to protect plant and animal communities indigenous to the area. Re–stabilization of mobile dunes by restoration of the plant cover may be undertaken where necessary.

PROTECTION OF COASTAL WETLANDS. The diversion of water from coastal wetlands should only be allowed where there is good scientific evidence that the amount taken will not adversely affect the ecosystem. Measures to protect quantity and quality of water entering coastal wetlands should be taken, with special attention to critical periods of water availability for aquatic and terrestrial species in these areas. Access to coastal wetlands by tourists and livestock must be regulated. Use of coastal wetlands as disposal sites for liquid and solid wastes must be avoided. The wetlands should also be protected from filling for land reclamation, a common threat

in many areas. Surrounding areas should be protected from overgrazing, to prevent damage to wetlands by wind–blown sediments. The more important coastal wetlands should be included in protected areas and traditional conservation systems should be revived and supported. Direct and indirect impacts to the ecological values of coastal wetlands should be considered in all environmental assessments prepared for water resources development programmes in the drainage area of the Red Sea and Gulf of Aden. Studies for coastal agriculture and aquaculture developments should include systematic evaluation of potential impacts to these fragile and important ecosystems.

MANAGEMENT AND CONSERVATION OF MANGROVES. Because of their value as spawning grounds and nurseries of commercially important fish and shrimp species, the protection of mangrove ecosystems needs special attention. National schemes for forestry management and conservation should be extended to mangroves. Grazing access should be controlled and selected mangrove areas must be set aside for complete protection. It is essential that alternative sources of building materials and fuel for communities living near mangrove areas be explored. The diversion of freshwater from mangrove areas needs strict regulation, to guarantee at least a minimum supply to the mangrove stands, and to prevent sea water intrusion and increased salinity. Environmental assessments for development, especially for construction of shrimp farms, must give special attention to the protection of mangrove areas. Where mangroves have been severely damaged or destroyed, natural recovery must be enhanced, supported as necessary by replantation schemes and establishment of local mangrove nurseries. It is imperative that within these replantation programmes, special attention be given to the genetic source of the seedlings.

PROTECTION OF SEAGRASS BEDS. Because of the value of seagrasses to endangered species and a host of commercially important finfish and shellfish, their conservation and protection must be a high priority in coastal zone management planning. Activities which are particularly detrimental to seagrasses—dredging, landfilling, wastewater disposal, illegal shrimp trawling—need to be effectively managed and existing regulations enforced. Impacts on seagrass beds must be considered in environmental assessments. Especially important seagrass beds, such as those used by dugong, need to be included in Marine Protected Areas. Links between seagrass beds and the value of commercial and artisanal fisheries should be an element in awareness programmes, and the locations of seagrass beds throughout the Region mapped.

CONSERVATION OF CORAL REEFS. Conservation of coral reefs in the face of rapidly growing coastal development requires preparation and implementation of coastal zone management plans. The plans should specifically address the activities that are particularly damaging to coral reefs, including dredging, physical destruction, landfilling, wastewater disposal, and disturbance from excessive tourism activities. This can be accomplished by requiring environmental assessment for all developments. Reefs that are representative and of particularly high value for conservation require protection through the establishment of Marine Protected Areas, ideally as part of a regional network. Laws relating to coastal zone management and Marine Protected Areas must be effectively enforced. A large number of people use coral reefs in a variety of ways that are potentially damaging; these impacts can be limited through controlled access, quotas on the number of visitors, and awareness campaigns addressing the commercial value and ecological significance of coral reefs.

MARINE PROTECTED AREAS. The Region has many sites of unique beauty, that support populations of globally important species or contain ecologically critical habitats. These require protection from human activities, to maintain their ecological importance and their availability to be appreciated and enjoyed by the Region's inhabitants. If protected, they can also serve as areas for scientific research and as valuable assets for raising public awareness. Such sites should be designated as Marine Protected Areas and form an important component of national coastal zone management programmes. A network of Marine Protected Areas throughout the Region will ensure conservation of important representative sites, including sites in the Gulf of Aqaba, the Straits of Tiran, the Sinai Peninsula, the Wejh Bank, the Sanganab Atoll, the Farasan Islands, the Dhahlak Archipelago, and the Socotra Archipelago. The establishment of Marine Protected Areas requires management planning, public awareness, enforcement, supporting legislation, trained personnel, and monitoring and evaluation programmes.

MANAGEMENT OF LIVING MARINE RESOURCES. Proper management of living marine resources is important to sustain the livelihoods of people dependent on the resources, to maintain the ecological integrity of marine communities, and to conserve biodiversity. This is generally the responsibility of national governments; however, in the Region there are a number of important species that migrate across national boundaries, posing additional challenges to management agencies. Management capabilities are further stretched by the impacts of foreign fishermen in national waters, and trends in seafood consumption in international markets. This is exemplified by the demand for shark fins that are increasingly being supplied from the Region. Although it is understood that there is a great reliance for subsistence by coastal populations on marine resources, the extent, intensity, and types of human uses vary throughout the Region. Information about use as well as socio–economic values is inadequate. In some instances there is also very little scientific information available on the species targeted. Tools for management include legislation, specific management programmes (e.g. stock quotas, seasonal closures and gear restrictions), training, applied research, stock assessments, and public awareness.

MANAGEMENT OF COMMERCIAL FISHERIES. Commercially exploited living resources are an integral part of the marine and coastal ecosystems. The sustainable use of these resources depends on proper management of fishing activities and protection of resources essential to the fisheries. Spawning and nursery areas, such as mangroves and seagrass beds, need special protection, or rehabilitation where already damaged. Stock assessment of transboundary species requires collaborative efforts among littoral countries. Where necessary, field guides should be updated and adapted for use as a tool for stock assessment, and training provided to fisheries workers. Based on the results, fishing efforts and methods will be reviewed, fisheries management policies defined, and catch quota assigned to the user groups in mutual agreement. The implementation of a fisheries management programme, and the enforcement of regional and national fisheries regulations will largely depend upon strengthening the enforcement capacity in the Region. Public awareness programmes should stress the linkages between healthy ecosystems and the sustainability of fisheries resources.

SHARK FISHERIES MANAGEMENT. Since many shark species are migratory, both regional and national management systems are required to prevent the collapse of shark populations—as has happened in

many other parts of the world—and to attain a sustainable level of use of this important resource. Management systems should include stock assessments, protection of areas used by sharks for breeding and nurseries, gear restrictions, a coordinated national fishing licensing system for all shark fishing vessels, and a quota system. Greater enforcement of existing regulations will limit exploitation through illegal fishing for the non–sustainable shark fin market outside the Region.

CONSERVATION OF MARINE TURTLES. Thus far, only Saudi Arabia has established a comprehensive conservation and monitoring programme for marine turtles. Such a programme should be extended to the regional level. It should include a survey of nesting areas and feeding grounds; annual tagging of adult turtles and collection of recapture data; protection of nesting sites from egg collecting and other forms of disturbance; and annual monitoring of nesting success. The use of turtle exclusion devices should be compulsory in trawl fisheries. The ban on trade in turtle shells, which already exists in most countries, must be strictly enforced. The success of these activities will be enhanced by a public awareness programme and a rural development programme to improve local food supply and diet, reducing the need for turtle meat as a supplementary food.

CONSERVATION OF MARINE MAMMALS. A survey of the diversity and distribution of marine mammals in the Region is required for sound conservation. Case studies from other regions should be considered to formulate management strategies for individual species in the Region. Consideration should be given to modifying fishing practices that affect marine mammals, as bycatch, during normal operations. Seagrass beds with heavy concentrations of dugong should be included as high priority in Marine Protected Areas.

CONSERVATION OF SEABIRDS. To adequately manage the conservation of seabirds, their status must be assessed regionally, including a mapping of breeding colonies, a census of the number of breeding birds, evaluation of breeding success, and documentation of breeding and feeding biology. These studies should be combined with a ringing programme. Birds must be protected from direct threats, such as non–sustainable hunting, egg collecting, and feral cats. During the breeding season, tourists and fishermen should be kept away from islands with breeding colonies. Major breeding sites should be included in Marine Protected Areas. Nesting and feeding sites of seabirds must be given a high priority in oil spill contingency planning.

CONTROL OF CORAL AND SHELL COLLECTION. In most of the Region, collection of corals and reef–associated invertebrates is illegal, but marine curios are still offered for sale throughout the Region. Existing regulations are in need of revision in a regional context. Control mechanisms and enforcement of regulations should be strengthened and accompanied by an extensive public awareness programme. Existing initiatives in Egypt, Jordan, Saudi Arabia, and Sudan may serve as a basis for the development of a comprehensive programme.

MANAGEMENT OF THE AQUARIUM FISH TRADE. Reef fishes for the aquarium trade can be collected at a sustainable level if properly managed. This requires the identification of suitable reef areas, assessment of fish stock and determination of catch quota and size ranges. Collection should be restricted to suitable aquarium species. Destructive collecting methods and the use of poison or anesthetics must be banned entirely. Divers should be trained to collect fishes with hand nets without damaging the reef. Proper transport and adaptation of fishes to aquarium conditions will assure

high quality, keeping fish mortality low and promoting credibility on international markets.

Outreach Activities

PUBLIC EDUCATIONAL AQUARIA AND NATURAL HISTORY MUSEUMS. Museums and public aquaria play an important role in informing and educating the general public on environmental issues. There is a clear need to improve taxonomic knowledge and plant and animal species inventories, based on well curated scientific collections. Taxonomic research institutes and natural history museums are essential to biodiversity research and conservation. Museum collections provide evidence of organism diversity with documented geographical data and are a major source of comparative information. Well managed museums can provide the needed venue and materials to train local scientists in biodiversity conservation.

PUBLIC PARTICIPATION AND CONSULTATION. Evidence around the world demonstrates that the use of broad–based consultation and participation can, in many instances, improve the quality, effectiveness and sustainability of programmes and projects. Consultation provides opportunities for interested parties to make input into the development, review and approval of proposeds projects. The participation process involves a dialogue with interested parties in the review of key issues and decisions related to the programmes and projects under development and/or implementation. The development of the SAP has benefited from both these approaches and they will be continue to be used at a variety of levels to support the programme.

An important element of SAP preparation was the use of a consultation process for development and review of the Country Reports, Navigation Risk Assessment and Management Plan, and the Study on the Status of the Living Marine Resources in the Red Sea and Gulf of Aden and Their Management. This process demonstrated that both regional and national level consultations can contribute significantly to the development of a better strategy that is more firmly based on "facts on the ground" and can be more readily implemented due to "broad–based support" for the recommended interventions. They also showed that effective dialogue can be held between representatives of PERSGA, national and local governments, academic and applied research institutions and nongovernmental organizations in development and implementation of programme and project activities in support of the SAP. Expanded use of these approaches will provide widespread information about the fragility of coastal and marine resources and measures for their efficient use and protection to decisionmakers, user groups and the public.

COOPERATION WITH NONGOVERNMENTAL ORGANIZATIONS. The participation of international, national and local nongovernmental organizations will be important for realization of the long–term goals of the SAP. Development of the SAP has benefited from environmental information developed at the regional and national level by international nongovernmental organizations such as the World Conservation Union (IUCN), Birdlife International and the World Wide Fund for Nature (WWF). The preparation of the Country Reports benefited from participation of national nongovernmental organizations in the provision of data, review of threats and identification of recommended actions. Representatives of these organizations also participated in many of the PERSGA–sponsored workshops on the Country Reports.

National nongovernmental organizations are currently playing important roles in implementation of SAP–related activities in the Region. In Jordan, the Royal Society for the Conservation of Nature (RSCN) supports a number of government organizations in planning, development and management of protected areas in several locations. Also in Jordan, the Royal Jordanian Ecological Divers' Society has begun a programme of monitoring coral reefs in the Gulf of Aqaba with the support of a small grant from the GEF. The Sudan Nature Conservation Society, with 5,000 members, plays an extremely important role in promoting public awareness of environmental and conservation issues in the country. The Yemeni branch of Birdlife International has conducted studies of critical habitats for resident and migratory birds and collects data collection on bird migration.

Monitoring, Indicators and Evaluation

MEASURING PROGRESS. The SAP includes support for development and implementation of cost–effective applied monitoring and evaluation of programmes at the regional and national level. Following a review of experience from other regional environmental programmes such as those for the Baltic, Black and Mediterranean Seas, PERSGA will work with the cooperating parties in the development of applied monitoring programmes. Priority will be given to establishment of an affordable programme that includes routine and reliable monitoring of parameters to evaluate environmental management activities. The monitoring programme will complement ongoing scientific programmes that have a research objective. In order to support effective evaluation of the Programme, PERSGA plans to establish environmental indicators for assessment of trends and evaluation of progress in addressing environmental management issues at the regional and national levels. These indicators will be designed to include measures of progress in establishment of a regional framework for cooperation, performance of key preventive and curative actions, and assessment of cumulative and specific impacts from operational activities.

Box 2: An Agenda for Action

The SAP supports and facilitates the primary goal of PERSGA, which is the conservation of the environment of the Red Sea and Gulf of Aden. The aims of the SAP are to develop a regional framework for the protection of the environment and the sustainable development of coastal and marine resources. The Programme outlined in the SAP focuses on both preventive and curative measures required to maintain the rich and diverse coastal and marine resources of the Red Sea and Gulf of Aden.

Long–Term, High Level Commitment and Public Awareness

- High Level Commitment.
- Enhanced Public Awareness and Participation.
- Types of Activities.

Transboundary Environmental Issues

- Opportunities for Regional Cooperation.
- Sub–Regional Analysis.
- Application in SAP Implementation.

Preventive Measures

- Integrated Coastal Zone Planning and Management.
- Expanded Use of Environmental Assessments.
- Measures to Conserve Cultural Heritage.
- Replication of Successful Regional Models in Industrial Sector.
- Measures to Control Exploitation of Coastal Aquifers.
- Actions to Reduce Risks of Marine Accidents.
  - ◊ Improved Navigational Systems and Aids.
  - ◊ Port State Control.
  - ◊ Complementary Conventions and Protocols.
  - ◊ Radio Communications.
- Strengthened Management of Oil Spills.
- Regional Programmes to Control Oil Spills.
- Oil Spill Contingency Plans.
- Marine Emergency Mutual Aid Centers.
- Joint Management of Transboundary Fisheries Resources.

Curative Measures

- Water Resources Management.
- Water Supply and Wastewater Treatment.
- Solid Waste Management.
- Industrial Pollution Control.
- Port Reception Facilities.
- Control of Pollution from Oil Exploration and Production.
- Control of Dredging And Filling.

Resource Management Programmes

- Strengthening Resource Management.
- Improving Coastal Zone Management.
- National and Local Plans.
- Habitat Conservation.
- Protection of Arid Coastal Zone.
- Protection of Coastal Wetlands.
- Management and Conservation of Mangroves.
- Protection of Seagrass Beds.
- Conservation of Coral Reefs.
- Marine Protected Areas.
- Management of Living Marine Resources.
- Management of Commercial Fisheries.
- Shark Fisheries Management.
- Conservation of Marine Turtles.
- Conservation of Marine Mammals.
- Conservation of Sea Birds.
- Control of Coral and Shell Collection.
- Management of Aquarium Fish Trade.

Outreach Activities

- Public Educational Aquaria.
- Natural History Museums.
- Public Participation and Consultation.
- Cooperation with NGOs.

Monitoring, Indicators and Evaluation

- Measuring Progress.

Strategic Action Programme for the South China Sea

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protection of the environment and for the sustainable use of marine resources exists in all countries of the region, including competent institutions having authority for protection of the environment, and adopted legislation and regulations. However, the governments of the region have recognised that past actions at national and regional levels have not been adequate to halt the rate of degradation and that a more strategic approach is required. Consequently, targets have been defined and endorsed by the governments, for each of the priority areas of concern identified in the TDA, namely:

- Habitat conversion and loss
- Unsustainable exploitation of living aquatic resources
- Land-based pollution
- Freshwater shortage and low water quality

3.3 Targets and Priority Actions

Habitat Conversion and Loss

The loss of important habitats is a priority in the region. This is a concern in the case of mangroves, coral reefs, seagrass and coastal wetlands. In most countries, laws and regulations concerning land use planning and coastal development exist and important areas of habitat have been declared as protected areas. The enforcement of these legal measures is not effective in the face of continued economic-pressures for the conversion of these areas to alternative uses. The main reasons for continuing habitat loss are the failure to deal with the socio-economic pressures for development and a failure to integrate environmental concerns into the development process. The national reports identified the need to prepare master plans of institutional and legal reform and action to deal with these problems in an integrated way.

3.3.1 Mangroves

Over the last 70 years the area of mangrove bordering the South China Sea has decreased from 6,321 km^2 to 1,938 km^2 a loss of nearly 70% of the original area. Continuation of losses at the present rate will result in all mangrove being lost by the year 2030. The present distribution of mangrove forests is illustrated in Figure 3.1. Ecologically, mangroves provide valuable habitat for juvenile fish and crustacea of commercial and recreational value, protect the shore from erosion, and provide timber and other products for human use. The value of the products and ecological services provided by the mangrove systems of the South China Sea is estimated at about US$ 15,984 million per year (based on total area of 1.6 million ha as indicated in TDA, and a value of US$ 9990 ha^{-1} $year^{-1}$).

The main causes of mangrove loss result from conversion of the land to other uses, such as shrimp farms, urban development and logging for timber and woodchips.

As the global centre of mangrove biodiversity such losses in this region have both global and wider regional significance. Loss of biodiversity and fisheries productivity are major transboundary issues at a regional scale but trading in mangrove wood products i.e. pulp, charcoal, woodchips and building materials, are also transboundary being driven by international trade in such products. The countries of the region dominate the mariculture production of shrimp which results from high prices
on the world market that encourage low capital, extensive farming systems dependent on tidal regimes for water and natural food inputs, in cleared mangrove areas.

Proposed Targets

By 2010, to maintain the area of mangroves in the region at no less than 90% of the present (1998) area.

Proposed Activities at the Regional level

- Develop criteria for selection of mangrove areas for protection/sustainable management, particularly those of transboundary importance;
- Identify and prioritise specific areas for future management and protection and develop regional and national action plans to maintain regionally important mangroves areas;
- Develop and establish management regimes for the identified areas;
- Establish a regional mangroves database;
- Build the capacity of the governments of the region to understand the issues concerning mangroves and to raise public awareness concerning the national and regional importance of such ecosystems.

Proposed Activities at the national level

- Carry out and/or update inventories of mangrove areas and classify them according to potential ecological functions, using a GIS database;
- Prepare national legislation and action plans for mangrove management;
- Implement and coordinate mangrove restoration projects wherever relevant;
- Study and assess the techniques and methods of mangrove restoration currently in use in the Region with a view to improve restoration projects;
- Build the national capacity to understand the issues concerning mangroves and raise public awareness.

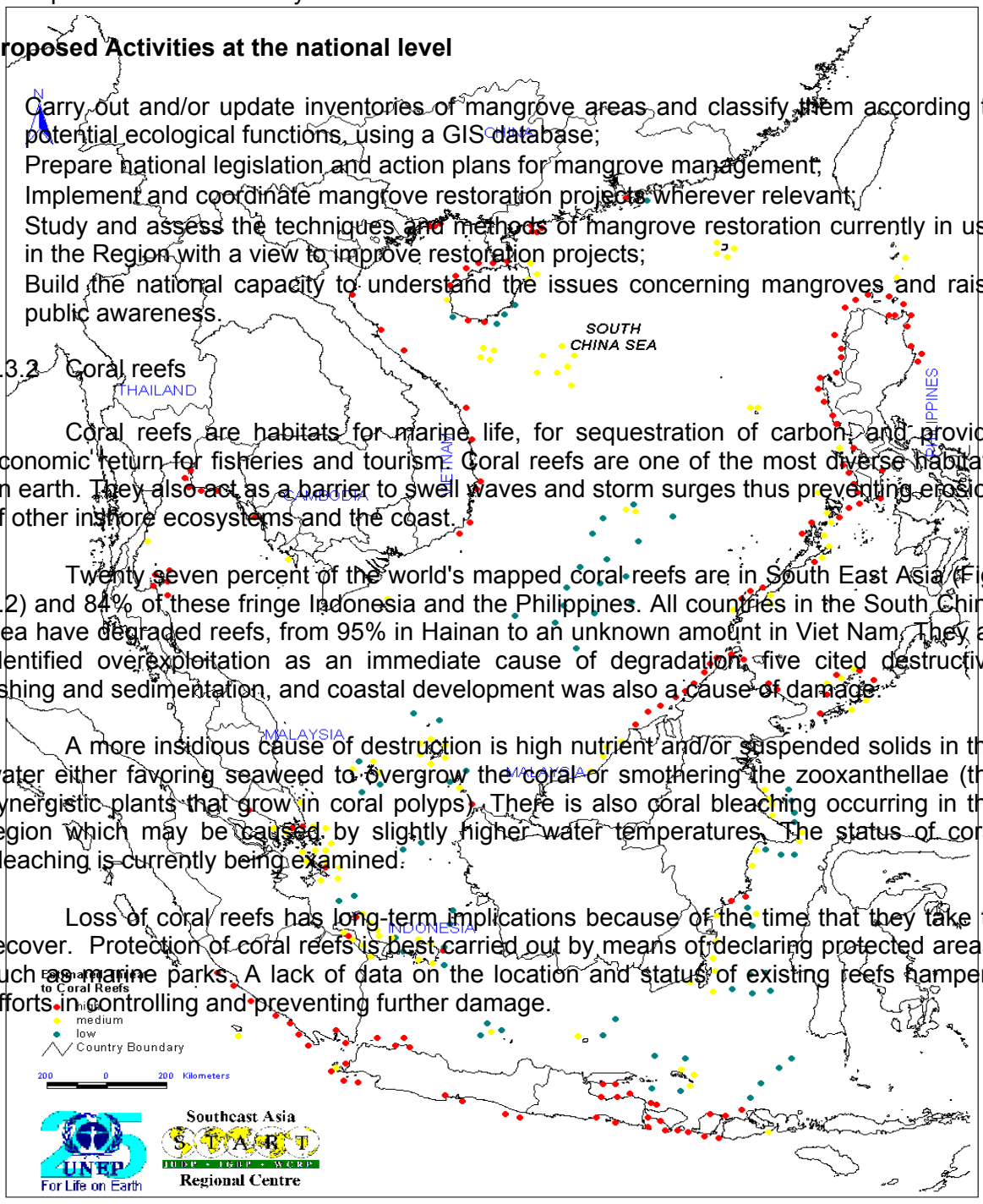
3.3.2 Coral reefs

Coral reefs are habitats for marine life, for sequestration of carbon, and provide economic return for fisheries and tourism. Coral reefs are one of the most diverse habitats on earth. They also act as a barrier to swell waves and storm surges thus preventing erosion of other inshore ecosystems and the coast.

Twenty seven percent of the world's mapped coral reefs are in South East Asia (Fig. 3.2) and 84% of these fringe Indonesia and the Philippines. All countries in the South China Sea have degraded reefs, from 95% in Hainan to an unknown amount in Viet Nam. They all identified overexploitation as an immediate cause of degradation; five cited destructive fishing and sedimentation, and coastal development was also a cause of damage.

A more insidious cause of destruction is high nutrient and/or suspended solids in the water either favoring seaweed to overgrow the coral or smothering the zooxanthellae (the synergistic plants that grow in coral polyps). There is also coral bleaching occurring in the region which may be caused by slightly higher water temperatures. The status of coral bleaching is currently being examined.

Loss of coral reefs has long-term implications because of the time that they take to recover. Protection of coral reefs is best carried out by means of declaring protected areas, such as marine parks. A lack of data on the location and status of existing reefs hampers efforts in controlling and preventing further damage.



The value of the products and ecological services provided by the coral reef systems of the South China Sea is estimated at US$ 13,792 million per year (considering one third of coral areas of the South East Asia are located in the South China Sea, and have value of US$ 6076 ha^{-1} $year^{-1}$) 1)

The transboundary issues associated with coral reef degradation are: loss of biodiversity, reduction in reef fisheries, coastal tourism, threatened or endangered species, and trade in coral, shells and associated biota. There is biodiversity connectivity when ocean currents move planktonic larvae to recruit fringing reefs and oceanic shoals, suggesting the strategic establishment of marine protected areas between interconnected reef systems.

Proposed Targets

- By 2010, to maintain the area of coral reef with more than 50% live cover at the present (1998) level.

Proposed Activities at the Regional level

- Develop criteria for selection of coral reef areas for protection/sustainable management, particularly those of transboundary importance;
- Identify and prioritise specific areas for future management and protection and develop regional and national action plans to maintain regionally important coral reef areas;
- Establish demonstration sites for implementing management models, based on the agreed model of management for the rest of the Region to study;
- Develop and agree on scientific and technical guidelines on the economic evaluation of coral reefs as resources;
- Develop, agree on and implement guidelines on the preparation of national legislation and action plans for preservation of coral reefs;
- Coordinate with other organizations standardising and regionalising coral monitoring, mapping and status and ensuring these are updated on a regional database;
- Build the capacity of the governments of the region to understand the issues concerning coral reefs and to raise public awareness concerning the national and regional importance of such ecosystems.

Proposed Activities at the national level

- Map and describe the status of coral reefs using, where appropriate the organizations currently performing these tasks;
- Establish coral reef protection areas and to implement proper management of coral reef resources;
- Prepare and implement national legislation and action plans for preservation of coral reefs, such as legislating marine parks in the region;
- Actively participate in activities organized by the relevant coral reef monitoring networks and provide information for the use of interested parties;
- Build the capacity of each nation in understanding coral reef based issues.

3.3.3 Seagrass

Seagrasses form the basis of many complex marine ecosystems and provide a valuable nursery for commercially important fish and crustaceans such as crabs and shrimps. When the seagrasses decline the links in the productivity chain are broken and the

whole ecosystem collapses. Seagrasses also play an important role in the cycling of marine nutrients. Dugong and green sea turtles graze on seagrass leaves and rhizomes but other fish do not generally eat seagrasses.

Seagrasses have rhizomes that hold the sediments and form a mat over the bottom preventing erosion along the coastal fringes where they grow. The leaves slow the water movement over them thus causing particulate matter in the water to fall out into the seagrass meadow. Some of this particulate matter is organic and provides food for animals dwelling in the meadows.

Under natural conditions seaweeds (epiphytes) grow on seagrass leaves and stems, but when excessive amounts of nutrients are introduced to the coastal waters this seaweed can bloom (grow unnaturally rapidly). Under bloom conditions the seaweed can smother the seagrass host by blocking out the light the plants need to survive. Without photosynthesis the plant quickly uses up its stored food and dies. Light is also reduced by excessive suspended solids in the water coming from runoff from the land due to deforestation, forest fires, poor agricultural practices and inappropriate engineering works. Seagrass meadows are also damaged in the region by inappropriate fishing methods such as push nets and trawling which mechanically uproots the seagrass.

Seagrass meadows growing in shallow waters close to the shore renders them very susceptible to unplanned and unmanaged urban and industrial development and tourism. These problems are compounded by a lack of environmental assessment procedures for developments, awareness about the importance of seagrasses, and information on their distribution.

Seagrasses are the least studied marine habitats compared to coral reefs and mangroves. An assessment of the extent of habitat modification in the South China Sea is based on a few studied areas in some countries. Anywhere between 20 and 50% of seagrass areas in Indonesia, Malaysia, Philippines and Thailand are damaged. Main seagrass meadows in the region are shown in Fig. 3.3.

As with the other marine ecosystems the main transboundary issues are losses of biodiversity and fisheries productivity. The seagrass nursery areas provide commercial fish for fishing grounds a long way from the habitat of the juveniles. There is also a trade in seahorses and green turtles that live in seagrass meadows.

The best ways to preserve seagrass is by leaving it undisturbed, mainly by preventing trawling, maintaining water quality by reducing nutrient and suspended solids loads and by using appropriate fishing gear.

The value of the products and ecological services provided by the seagrass systems of the South China Sea is estimated at US$ 22,400 ha^{-1} $year^{-1}$. (The area of seagrass is not known. To determine this area is one of the aims of the project).

Proposed Targets

- By the year 2010, to maintain at least 80% of the present area of seagrass in good condition.

Proposed Activities at the Regional level

- Develop criteria for selection of seagrass areas for protection/sustainable management, particularly those of transboundary importance;
- Identify and prioritise specific areas for future management and protection and develop regional and national action plans to maintain regionally important seagrass areas;
- Develop and establish management regimes for the identified areas;
- Establish an accessible database containing maps and status of environmental health of sea grass beds in the South China Sea;
- Conduct training workshops on seagrass management;
- Build the capacity of the governments of the region to understand the issues concerning seagrass and to raise public awareness concerning the national and regional importance of such ecosystems.

Proposed Activities at the national level

- Provide and implement national legislation and action plans for the preservation of seagrass areas;
- Establish seagrass protection areas and implement proper management;
- Encourage monitoring, mapping and research on seagrass for a better understanding of the economic and ecological implications of conserving seagrass beds;
- Conduct economic valuation of seagrass areas as a resource;
- Conduct training on seagrass management.

3.3.4 Estuaries and Wetlands

Wetlands are defined by IUCN in the "Ramsar Convention on Wetlands of International Importance" as "areas of marsh, fen, peat, land or water whether natural or artificial, permanent or temporary, in which water is static or flowing, fresh, brackish or salt including areas of marine water the depth of which at low tide does not exceed six metres." There is no simple definition of the wetlands that do not include mangrove forests, seagrass meadows and coral reefs to six m deep. In this report we will refer to wetlands as peat swamps, swamps, fens and saltmarshes.

Wetlands are the seasonal home to many migratory birds, they have their own suite of animals and plants of great diversity and are the nursery area of some commercial fish and crabs. They function as nutrient traps and some wetlands are used for aquaculture

Wetlands are under threat from urban expansion (land reclamation), pollution from urban sources, and changes to coastal morphology from up stream development (dam building causing downstream erosion through lack of replacement sediment). Their small size makes them especially vulnerable to pollution. Those that are easily accessible or have a high concentration of birds and mammals, tend to attract large numbers of visitors, whose wastes are deleterious to the wetlands. Straightening the meanders of wetland streams and rivers changes the hydrology and/or salinity regime that is deleterious to wetlands. Introduced plants may dominate some wetlands and the classic example of this in many parts of the world is water hyacinth.

The value of the products and ecological services provided by the wetlands systems of the South China Sea is estimated at US$ 190,726 million per year (from Table W1 of the TDA, the total area of wetlands is about 12.9 million ha, and US$ 14,785 ha^{-1} $year^{-1}$ is its estimated ecological and economic value)

Proposed Targets

- By the year 2005, to have management plans for all wetlands, excluding mangroves, in the Region, with emphasis on those in the coastal zone.

Proposed Activities at the Regional level

- Develop criteria for selection of wetland areas for protection/sustainable management, particularly those of transboundary importance;
- Identify and prioritise specific areas for future management and protection and develop and implement regional and national action plans to maintain regionally important wetland areas;
- Develop, establish and implement management regimes for the identified areas;
- Develop and agree on scientific and technical guidelines on the economic valuation of wetlands as resources;
- Establish a GIS-type database providing the necessary information on wetlands in the Region;
- Build the capacity of the governments of the region to understand the issues concerning mangroves and to raise public awareness concerning the national and regional importance of such ecosystems.

Proposed Activities at the national level

- Develop and implement guidelines, standards and measures to control development impinging on wetland areas;
- Establish and implement management plans for wetland “hot spots“ to conserve their ecological and economic functions, including encouraging nations to ratify the International Convention on Wetlands (Ramsar);

- Enhance public awareness of wetlands and assist with capacity building.

3.4 Over exploitation of fisheries

The problem of unsustainable exploitation of living aquatic resources is found in all the national reports. Almost all countries bordering the South China Sea suffer from an ineffective fisheries management system, allowing the non-sustainable use of living marine resources.

The deteriorating resource base, as described in 1.1 and 2.1, is compounded by socio-economic problems. Typically, many small-scale fishermen compete for resources with a few large-scale more capitalised entrepreneurs. Current management policies may exacerbate the problems by providing incentives for over-exploitation, e.g. subsidies for capital investment or fuel, and provision of infrastructure and industrial incentives.

Different levels of development in the countries of the South China Sea lead to uneven resource capabilities. Some countries have large fleets of large vessels that have depleted local resources and are now encroaching on others which have not had the means to fully exploit their resources. This transboundary movement of fishing fleets results in conflicts among countries where territorial water limits are violated.

Where the level of exploitation is now excessive, guidelines to reduce that level to a more sustainable one should be prepared. This sustainable level of fishing can be at many optimal levels, from open access, where a limit on the amount of fish caught is laid down but not on the effort required to catch them, to maximum economic yield, where the catch is limited by the economic return. The maximum ecological yield lies somewhere between.

The prevailing situation is one of open access, where the level of exploitation is in access of the ecological and the economical optimal levels. The choice is thus between whether to continue with open access or to reduce the level of exploitation to either ecological or economic optimum. Economic theory does not provide a clear-cut answer; rather, the choice is between social preference, and the likely response of the ecosystem productivity.

From the perspective of welfare, the main concern is with the maximisation of valued-added product, and the aim of the intervention should be to achieve the level of long-term exploitation that is maximising welfare with maximum economic yield. The target should take into account costs of effort and the productive potential of the ecosystem.

The target for the issue of excessive exploitation should be to reduce the level of effort to the level that is economically welfare-maximizing and still preserve the resource base. The decisions on the form and amount of intervention should establish the actual target levels of exploitation for these resources, and the economic cost to capture them. It should concentrate on the targeted living aquatic resources of each country, and consider the social implications. The question of large versus small-scale fishermen has to be thoroughly recognised and dealt with in these studies realising that the removal of fishing boats and employment will cause hardship and short-term problems. These issues must be included in the action programme.

Proposed targets

- By 2005 to determine regional catch levels of key economic/commercially important species according to levels that are economically welfare maximising, while still preserving the resource base;
- By the year 2005, to have established a regional system of marine protected areas for fishery stock conservation and care for endangered species;
- By the year 2005 to have prepared and implemented at chosen sites, a management system that will sustain the exploited resources.

Proposed activities at the Regional level

- Develop criteria for selection of marine habitats and areas critical to the maintenance of regionally important fish stocks, particularly those of transboundary importance;
- Identify and prioritise specific areas for future management and protection and develop regional and national action plans to develop a regional system of refugia for maintenance of regionally important fish stock;
- Develop and establish management regimes for the identified areas;
- Review destructive fishing activities with the aim of removing and replacing them;
- Review fisheries management systems;
- Review compliance to international fisheries conventions.

Proposed activities at the national level

- Establish marine protected areas in areas identified as critical habitats for fish stock conservation and protection of endangered species;
- Implement programmes to provide information on fish stock conservation and sustainable fishery practices among small and artisanal fishing communities;
- Conduct resource assessment of fishery resources to determine the level of optimal catch and effort for different fishing grounds in the Region;
- Develop educational and public awareness materials on sustainable fishery practices for dissemination in countries;
- Establish in selected pilot sites a good management system which can be tested to determine if it is leading to sustainable exploitation of resources;
- Promote the Code of Conduct for Responsible Fisheries through workshops, awareness building, translate into local languages and educate people about the Code.

There should be close co-ordination and co-operation with the Regional Office of Food and Agriculture Organization (FAO) for the implementation of the actions identified.

3.5 Land-based Pollution

Most of the polluting elements that occur in the sea come from the land, waste from large cities includes sewage, industrial waste and hydrocarbons, while agricultural runoff has nutrients, pesticides and sediment that may pollute the marine environment. The "hotspots" or areas of most concern are shown in Fig 3.4.

3.5.1 Urban/Municipal Waste

Urban waste consists of solid waste, such as plastic, glass, cans etc.; and sewage consisting of organics which increase BOD, nutrients and bacterial coliforms that can damage human health. Solid waste is unpleasant to the eye, can choke marine life and may calm water to such an extent that alga blooms are allowed to concentrate in the mass of floating debris. High BOD loading reduces dissolved oxygen available to fish and other marine life. Usually the pelagic fish swim away from these areas but demersal fish, worms, crustaceans and sessile animals are killed. Lowered oxygen in the water also kills plants such as seaweed and seagrasses. The populations of the seven countries of the South China Sea generate about six million tons per year of organic matter. Only 11% of this is removed from four countries with treatment plants. The main producers of BOD are shown in Fig 3.5.

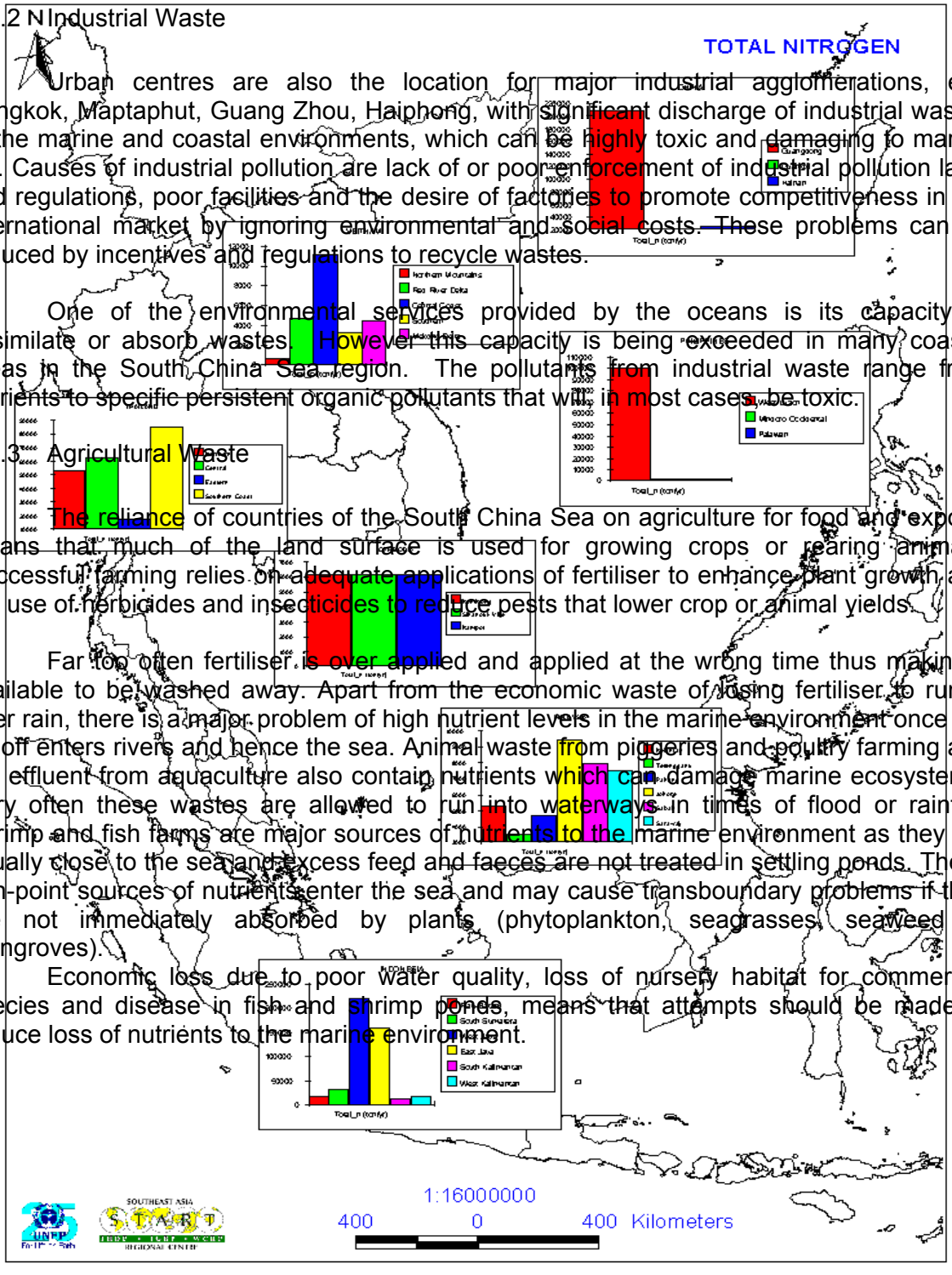
Nutrients from treated or untreated sewage enhance the growth of phytoplankton that may concentrate to such an extent that they form algal blooms. Sometimes these algal blooms are toxic and fish kills and worse, human poisoning, may occur. Excess nutrients in the water column may also be harmful to seagrass meadows. Epiphytes on the seagrass leaves adsorb the nutrients, grow quickly and shade the seagrass so that it can no longer photosynthesise enough food to sustain it. Storage material is used up and the seagrass dies. With the death of the seagrass the organic matter, made up of epiphytes, seagrass detritus and associated flora and fauna, fall to the bottom, use up oxygen as they decay and the BOD rises, eventually leading to anaerobic conditions and virtual desertification of the seafloor. This excess of nutrients is called eutrophication.

Usually, in the sea, nitrogen is the limiting nutrient to plant growth so it is usually monitored in preference to phosphorus if monitoring facilities are limited. Total nitrogen includes organic nitrogen as well as the inorganic form taken up readily by plants. Total nitrogen from different sub-regions or districts of the South China Sea is shown in Fig. 3.6. Untreated sewage contains much organic matter that has a deleterious effect on demersal communities. The organics from sewage are most easily removed in the treatment plant and can be used for mulch and organic fertilizer. High coliform counts in rivers, estuaries and coastal waters cause health problems to users of the water bodies. *E. coli* is killed by sunlight and settling ponds usually reduce coliform counts. Another sources of bacteria in coastal waters is urban runoff from roads, gardens and footpaths where domestic animals' faeces are washed into the drains, rivers and out to sea.

Cities in the coastal areas of the South China Sea are large and growing, e.g. Guang Zhou, Hong Kong, in China, Ho Chi Minh City in Viet Nam, Bangkok in Thailand, Manila in Philippines, Jakarta in Indonesia and Singapore. Few have sewage treatment facilities, so that waste is released directly into the rivers and seas. This inappropriate management results in severe pollution through high BOD loadings, eutrophication, fish kills, red tides, damage or loss of seagrass habitat and public health hazards.

Some of these problems can be addressed by installing waste treatment facilities. However, this approach has been hampered by lack of finance and cost recovery of facilities. Information on the damage caused by sewage pollutants and the economic loss due to pollution should be provided to the governments and public. There are alternatives to coastal dumping, such as using the two scarce commodities, freshwater and fertilizer, in forestry, crop growing or playing field management.

3.5.2 Industrial Waste



Urban centres are also the location for major industrial agglomerations, e.g. Bangkok, Maptaphut, Guang Zhou, Haiphong, with significant discharge of industrial wastes to the marine and coastal environments, which can be highly toxic and damaging to marine life. Causes of industrial pollution are lack of or poor enforcement of industrial pollution laws and regulations, poor facilities and the desire of factories to promote competitiveness in the international market by ignoring environmental and social costs. These problems can be reduced by incentives and regulations to recycle wastes.

One of the environmental services provided by the oceans is its capacity to assimilate or absorb wastes. However this capacity is being exceeded in many coastal areas in the South China Sea region. The pollutants from industrial waste range from nutrients to specific persistent organic pollutants that will in most cases be toxic.

3.5.3 Agricultural Waste

The reliance of countries of the South China Sea on agriculture for food and exports means that much of the land surface is used for growing crops or rearing animals. Successful farming relies on adequate applications of fertiliser to enhance plant growth and the use of herbicides and insecticides to reduce pests that lower crop or animal yields.

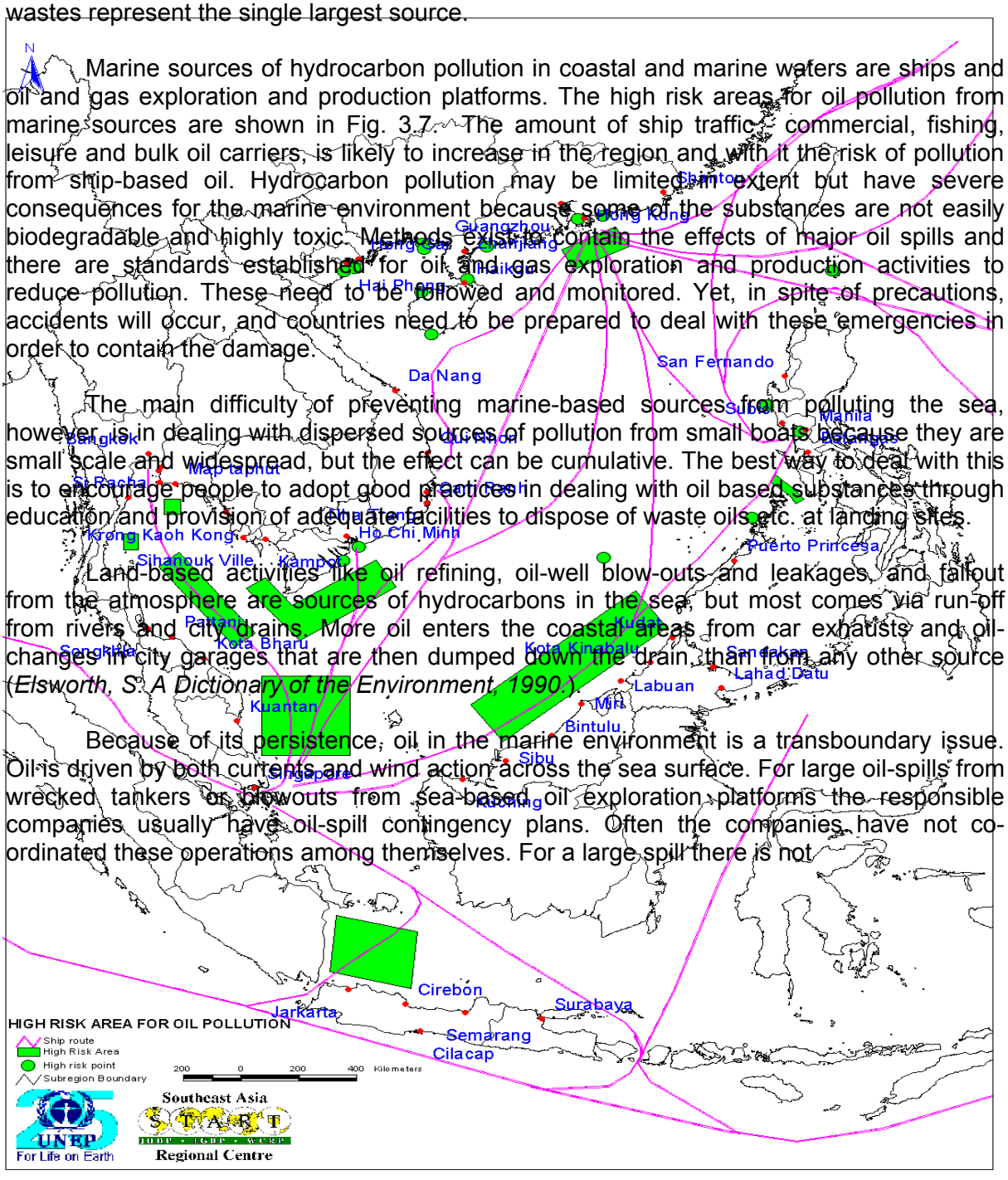
Far too often fertiliser is over applied and applied at the wrong time thus making it available to be washed away. Apart from the economic waste of losing fertiliser to runoff after rain, there is a major problem of high nutrient levels in the marine environment once the runoff enters rivers and hence the sea. Animal waste from piggeries and poultry farming and the effluent from aquaculture also contain nutrients which can damage marine ecosystems. Very often these wastes are allowed to run into waterways in times of flood or rainfall. Shrimp and fish farms are major sources of nutrients to the marine environment as they are usually close to the sea and excess feed and faeces are not treated in settling ponds. These non-point sources of nutrients enter the sea and may cause transboundary problems if they are not immediately absorbed by plants (phytoplankton, seagrasses, seaweed or mangroves).

Economic loss due to poor water quality, loss of nursery habitat for commercial species and disease in fish and shrimp ponds, means that attempts should be made to reduce loss of nutrients to the marine environment.

As insects and weeds become more immune to chemicals, larger applications are made. Cost benefit analysis often suggests that applying the extra pesticide to kill the last 5-10% of a pest is not economic and the extra pesticide is often wasted by also entering waterways. These pesticides have varying effects on the marine environment. Some may be persistent and accumulate in animal or plant tissue, others may accumulate in the sediment and be released during storms. The damage they do is also variable and ranges from causing impotence in gastropods to moving up the food-chain to human food.

3.5.4 Hydrocarbons

Oil-spills from wrecked ships are not the major cause of oil pollution in the sea. The UNEP *The State of the World Environment 1987* states that half a million tonnes of the 1.6 million tonnes annually discharged into the sea by shipping is released accidentally: The remainder results from regular discharge by ships of contaminated ballast water and water used for flushing out tanks. Later figures estimated total marine pollution at 3.5 million tonnes, with 48% coming from land (*World Resources, 1987*). Municipal and industrial wastes represent the single largest source.



Marine sources of hydrocarbon pollution in coastal and marine waters are ships and oil and gas exploration and production platforms. The high risk areas for oil pollution from marine sources are shown in Fig. 3.7. The amount of ship traffic - commercial, fishing, leisure and bulk oil carriers, is likely to increase in the region and with it the risk of pollution from ship-based oil. Hydrocarbon pollution may be limited in extent but have severe consequences for the marine environment because some of the substances are not easily biodegradable and highly toxic. Methods exist to contain the effects of major oil spills and there are standards established for oil and gas exploration and production activities to reduce pollution. These need to be followed and monitored. Yet, in spite of precautions, accidents will occur, and countries need to be prepared to deal with these emergencies in order to contain the damage.

The main difficulty of preventing marine-based sources from polluting the sea, however, is in dealing with dispersed sources of pollution from small boats because they are small scale and widespread, but the effect can be cumulative. The best way to deal with this is to encourage people to adopt good practices in dealing with oil based substances through education and provision of adequate facilities to dispose of waste oils etc. at landing sites.

Land-based activities like oil refining, oil-well blow-outs and leakages, and fallout from the atmosphere are sources of hydrocarbons in the sea, but most comes via run-off from rivers and city drains. More oil enters the coastal areas from car exhausts and oil-changes in city garages that are then dumped down the drain, than from any other source (*Elsworth, S. A Dictionary of the Environment, 1990.*).

Because of its persistence, oil in the marine environment is a transboundary issue. Oil is driven by both currents and wind action across the sea surface. For large oil-spills from wrecked tankers or blowouts from sea-based oil exploration platforms the responsible companies usually have oil-spill contingency plans. Often the companies have not co-ordinated these operations among themselves. For a large spill there is not

enough equipment to contain the oil and not enough is known of the whereabouts of vulnerable areas to make decisions on where to place limited clean-up equipment. A mapping program to map vulnerable underwater habitats would be useful if seagrass meadows and coral reefs are to be saved. Co-ordination between companies and countries within the Region may help save some of the more valuable ecosystems if a large spill occurred.

3.5.5 Suspended Solid/Sedimentation

Inappropriate agricultural practices and deforestation may leave bare soil available to erosion by wind and rain. Land clearing of forests for agricultural crops is a major supply of suspended solids and silt in rivers and coastal areas. The recent floods in China, although the largest on record did not result from the largest rainfall on record, rather, the amount of deforestation caused vast areas of loose sediment to be removed which silted up rivers and hence river water broke over the rivers' banks and flooded the land.

Inappropriate engineering practices also lead to large volumes of sediment being washed into rivers and the sea. The slope of unprotected earth walls in shrimp farms, causeways, bridge approaches and roadsides are potential sites for erosion. With long-term planning it should be obvious to engineers that repairs will be needed after a few years of erosion. Artificial coverings such as Geotextile can be used, or slopes and banks can be revegetated using seed of a fast growing annual which will stabilise the bare soil long enough for more robust perennials to take over.

Eroded soil is washed into waterways and this suspended solid material reduces water quality. Reduced water quality in this case means less light to benthic plants and may result in a loss of benthic vegetation. Many of the rivers of the South China Sea are heavily laden with suspended solids and some of these rivers have picked up these solids in countries other than that in which the river enters the sea, thus a transboundary problem occurs. Rivers that discharge large volumes of water often have plumes of suspended solids which cross ocean boundaries and are therefore transboundary on their effect on the marine environment.

There is an amount of suspended solids which has always washed out to sea caused by floods and natural erosion, in recent years this natural loss of soil and sediment has increased due to human activities. It is necessary to determine what is an acceptable flow of suspended solids and what is caused by inappropriate human activities. Some of these activities may be irreversible and this should be identified before attempts are made to change the situation.

River-borne sediments are a major contribution to the water bodies in the South China Sea region. Sediments perform useful functions by replenishing the coastline, maintaining the land area for human habitation and supplying nutrients to the water bodies. However, human actions in the upstream regions significantly affect the process of river sedimentation. Dam construction can trap the flow of sediments and reduce the supply to replace the beach material eroded by tidal action, resulting in eroding shorelines and threat to coastal structures.

Proposed Targets

- By 2003 develop and agree on regional water quality objectives; make recommendations for water quality standards for use in coastal waters; make recommendations for effluent standards/or mitigation measures for municipal, industrial and agricultural (including aquaculture) activities;
- By 2003 develop guidelines for monitoring coastal waters, taking into account already published guidelines;
- By 2003 determine principal pollutants in the region, estimate the carrying/assimilative capacity of relevant ecosystems for relevant pollutants - BOD, nutrients, metals, sediments etc.
- Establish a regional contingency plan for South China Sea to handle incidents of oil and chemical or hazardous waste spillage;
- By 2004 develop a regional South China Sea Plan of Action for land-based activities to meet regional water quality objectives;
- By 2005 identify 10 Priority Discharge Sites for action and develop appropriate mitigation activities;
- By 2005 develop regional funding mechanisms for mitigation activities;
- By 2006 initiate mitigation activities on the Priority Discharge Sites;
- By 2008 review recommended water quality standards in national legislation.

Proposed Activities:

Determine regional water quality objectives and water quality and effluent standards:

- First meeting to review and assess existing knowledge of regional water quality, determine information gaps, set a programme for carrying/assimilation capacity evaluation, discuss GPA-land-based activities guidelines/action programmes (2002);
- Second meeting to agree on water quality objectives, determine a regional South China Sea Plan of Action (based on GPA-land-based activities);
- Third meeting to agree on regional water quality and effluent standards;
- National meetings for endorsement of South China Sea Plan of Action (2005);
- International organisations, such as UNEP EAS/RCU, will initiate the production of package programmes to help member countries facing problems associated with land-based activities that pollute the South China Sea.

Determination of Regional Priority Hot Spots (2005)

- Discuss and agree on criteria for evaluating the regional importance of nationally identified pollution "hot spots" (severity of pollution, feasibility/ease of mitigation, transboundary effects);
- Assess and evaluate data relating to national “hot spots” and prepare and agree on regional priorities;
- Conduct a preliminary evaluation of the costs and benefits of alternative mitigation measures for selected “hot spots”;
- Develop and agree on a South China Sea strategic approach to mitigating regional “hot spots“, including priority investment portfolio, cofinancing arrangements, national and regional actions.

- Carry out capacity building activities that lead to improvement in water quality testing and hence cleaner water. Determine the carrying capacity of ecosystems for specific pollutants, realising that the carrying capacity of a human-made toxic chemical is zero. Analyse secondary data and, where appropriate, carry out some primary studies to improve water quality testing and hence water quality. (2003)

3.5.6 Regional Cooperation

To achieve collaboration and co-operation among countries it is usual to have legal frameworks that cover the areas of interest between the interested parties. However, there is no legal framework that directly relates to forming a marine environment protection co-ordinating body and few that relate to the marine pollution problems prioritised by the member countries of the South China Sea. The development of a legal framework between member countries requires negotiation and compromise at the highest level. The objectives of a legal framework (or protocol) are to protect and manage the marine environment and coastal areas of the South China Sea region, including actions on:

(a) Taking all necessary measures to prevent, reduce and control pollution of the South China Sea area, particularly dumping, land-based sources, activities causing habitat loss and airborne pollution;

(b) Protecting and preserving rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other marine life in specially protected areas;

(c) Co-operating in dealing with pollution emergencies in the South China Sea area;

(d) Co-operating in assessing environmental impacts in the South China Sea area and in exchanging data and other scientific and technical information;

(e) Establishing rules and procedures for the determination of liability and compensation for damage resulting from pollution in the South China Sea area.

There are some global and regional conventions/protocols that cover these issues but none that directly apply to pollution from land-based sources in the South China Sea or the East Asian Seas. Table 3.1 Global and Regional Conventions/protocols on the Protection of Marine Environment

Proposed Targets

- Further develop the SAP by holding national expert and intergovernmental consultation by the year 2001;
- By 2002, convince a high level meeting of government officials and experts to formulate a legal framework for regional co-operation for the protection and sustainable management of the marine and coastal environment of the South China Sea;
- By 2005, complete a draft agreement on the legal framework for regional co-operation for the protection and sustainable management of the marine and coastal environment of the South China Sea.

Proposed Activities at Regional Level

- Initiate negotiations on the establishment of a legal framework for regional co-operation for the protection and sustainable management of the marine and coastal environment of the South China Sea;
- Prepare a draft legal framework for regional co-operation for the protection and sustainable management of the marine and coastal environment of the South China Sea, taking into account existing expertise within UNEP, and national institutions;

- Discuss a draft legal framework for regional co-operation for the protection and sustainable management of the marine and coastal environment of the South China Sea; and
- Submit a draft legal framework to the national focal points for their consideration on its adoption.

Proposed Activities at National Level

- Provide necessary information and expertise on the negotiation and establishment of a legal framework for regional co-operation for the protection and sustainable management of the marine and coastal environment of the South China Sea;
- Assist in preparation of a legal framework by active participation in the whole process of negotiation;
- Co-ordinate with relevant national institutions concerned in preparation, negotiation and adoption of a legal framework.

4 COST BENEFIT ANALYSIS OF PROGRAMME ACTIONS

In this section the evaluation is focussed on:

- The economic and ecological valuations of the resources;
- The costs of the actions to meet the targets as identified in Section 3;
- The value saved by meeting the targets identified by specific actions of the project;
- The benefits obtained after the GEF project is complete.

4.1 Valuation Considerations

The valuation of the resources of the South China Sea estimates the value of ecosystems in terms of ecological functions and economic values which follows that used in Costanza *et al*. 1997 (The value of the world's ecosystem services and natural capital. Nature, 387, 253-260).

Ecological functions include: regulation of atmospheric gas concentrations, climate, protection of other ecosystems from disturbance, water supply, erosion control, soil formation, nutrient cycling, waste treatment, pollination, biological control and provision of habitat/refugia.

Economic values include food and fibre production, raw materials, genetic resources, recreation and cultural values. Constanza *et al.* (1997) estimates the value in terms of flow of services per unit area per year, hence the area estimations for the different ecosystems reported in the TDA are used. The reason we used the Constanza approach is that this is the first global attempt to give values to ecosystems and, to be consistent, we used the same methods for each of the ecosystems.

The base line for the cost benefit evaluation is that if nothing is done, then habitat loss will continue. The rate of habitat loss is based on the findings reported in the TDA, and takes into consideration the future threats, also reported in the TDA. Rates of loss have varied in the past for the different periods given by each country. These rates also change with economic conditions so that each scenario we have used reflects differing future socio-economic conditions. The "with project" scenario is based on the targets for each ecosystem laid out in Section 3, and the details are provided in the relevant sections.

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5 A Programme of Priority Actions

The following sections give details of the high priority actions defined in the TDA and adopted as the immediate focus of attention for the SAP.

5.1 Integrated Development

For ease of discussion, the proposed actions have been organised under four general action areas:

- Reducing the Impact of Fishing - Development of a Sustainable Fisheries
- Pollution Control
- Sediment Management
- Habitat Conservation

However this sectoral classification is a convenience; while the main thrust of a proposed action may be to reduce the impact of fishing pressure, the identified actions may include the promotion of improved agriculture as a means of diversifying livelihoods and reducing pressure on fish stocks.

Underlying all actions is the recognition of the need for an integrated approach to counteract what at first sight appear to be single sector problems.

In addition, while the potential geographical scope of these interventions includes the watershed and the wider economic catchment, the focus of attention is on actions that impact on the lake. Priority is given to those activities with the greatest impact on the lake and on lakeshore communities, and indeed the majority of activities will be directed at improved and integrated management of the coastal zone.

5.2 Crosscutting Themes

Crosscutting themes are sets of activities that are common to many of the proposed national actions. As such it is possible that components that are common to different proposed actions could be combined into a project that deals with these as a common theme.

This will have the added benefits of helping to identify synergies between activities, promoting the exchange of information between countries and ensuring consistency with other sectoral policies.

In many cases cross-cutting projects will function at the national level and be developed in conjunction with the detailed project planning.

5.2.1 Information Management

The effective management of the lake will depend on the timely provision of key information to planners and decision makers. Many of the proposed interventions include further research and monitoring as an action to support management decisions, however, much of this information will have wider relevance and should be used to support other interventions. There is therefore a clear need to continue to

provide resources to a central information service, responsible for maintaining the existing GIS database, the literature reference system and other shared data sources.

5.2.2 Socio-economic Development

There is invariably a need for socio-economic development as a component of sustainable development initiatives.

As a result, many of the proposed actions include common socio-economic inputs such as the review of alternative livelihoods, cultural opportunities, patterns of resource use, gender issues and participatory approaches to management, leading to proposals for appropriate interventions.

Where a decision has been made that a number of separate national or regional actions will be undertaken simultaneously, these recurring socio-economic components could be managed as a single supporting project.

5.2.3 Environmental policy

Integration of the proposed actions into the framework of environmental policy (including biodiversity strategies) is another important crosscutting issue. Tools of environmental policies include law and environmental education as well as economic instruments and support to local initiatives.

5.2.4 Institutional Reform and Capacity Building

The over-riding institutional problems are identified in the first level of the TDA: lack of resources; poor enforcement of regulations; lack of appropriate regulations; and lack of institutional coordination. In the interim period this last component will be directly addressed by the ILTMB.

More generally, this cross-cutting theme could combine aspects of different actions that relate to training and physical infrastructural development, as well as aspects such as legal review and revision.

5.2.5 Environmental Education

Many of the proposed activities will depend for their success on awareness creation both at the community level and at administrative and political levels. Environmental education is seen as a key component of many separate activities, but could be combined in a cross-cutting project managed in support of a number of regional and national actions.

5.3 Baseline Monitoring

Biodiversity monitoring is a relatively new field, unlike fisheries monitoring, which often has decades worth of statistical data from which to analyse trends in fish stocks. Monitoring biodiversity in Lake Tanganyika has entailed establishing a new discipline that did not previously exist in the lakeside national institutions of the riparian countries. Many of the methodologies used by the LTBP Biodiversity Special Study teams for surveying fauna were developed, tested and modified specifically for

conditions in Lake Tanganyika. Biodiversity survey and monitoring capacity has been established in each of the four countries and national teams have collected up to two years of qualitative and quantitative data on biodiversity levels of fish and molluscs. In order to manage the biodiversity and sustainable resources of Lake Tanganyika into the future, it is necessary to continue to monitor biodiversity and the threats against it, so that changes in biodiversity as a function of environmental parameters may be assessed[9].

The recommended monitoring programme takes a two-tiered approach: a biodiversity monitoring programme and a threat-based monitoring programme. The biodiversity monitoring programme would monitor four sites in each country on a minimum of a quarterly basis. Sites would include one relatively pristine control site and sites impacted by pollution, sedimentation and fishing (these sites have been identified in collaboration with their respective special studies teams). Threat-based monitoring would cover pollution, erosion and sedimentation and fishing at these sites to allow for analyses of biodiversity as a function of the different threats.

In addition to collaborating with the biodiversity teams, it is recommended that the threat-based special studies continue their own monitoring programmes of pollution, sedimentation and fishing so that the magnitude of these environmental threats may be assessed in each country. This entails the pollution teams monitoring water quality at selected sites, the sedimentation teams continuing their river-gauging programme and the fisheries departments continuing their catch assessment programmes.

This monitoring will be supplemented by additional monitoring and research considered necessary to guide and evaluate the impact of activities implemented by the SAP, incorporated as a specific project sub-component.

The lake management body would ensure that the monitoring system is a management support tool and responds to management needs. This will require a regular flow of information between the field and the management body and would include the timely identification of new threats and changes in the scale of threats so that preventive measures can be put in place.

5.4 Development of a Sustainable Fisheries

There are two distinct but overlapping fisheries in the lake, the near-shore fisheries and the offshore fisheries – the littoral zone and the pelagic zone. The overlap is both ecological and economic, and both fisheries are linked to shore communities and interrelate with their other economic activities.

While the focus of the LTBP was on coastal activities and other activities within the watershed that impact on the littoral zone, the LTR Project (Research for the

[9] The GEF Scientific and Technical Advisory Panel (STAP) convened a meeting in January 2000 in Malawi to assess the progress of GEF interventions in the three African Great Lakes. The meeting recognised that major breakthroughs in science are often the result of analysing years to decades worth of data on the state, pressures and responses of systems. To this end one of the principle needs identified in the meeting was the implementation and reinforcement of basic monitoring research across a variety of sub-disciplines in each of the African Great Lakes.

Management of the Fisheries on Lake Tanganyika) focussed on the pelagic zone. The conclusions of the projects are fundamentally the same. The management of both inshore and offshore fisheries, and the management of activities affecting the coastal zone, has to take place within an integrated planning framework that takes accounts of the physical, social and economic links between shore based activities and the lake resources[10].

While the biodiversity focus is on the rich littoral zone, interventions need to address fisheries issues in both zones. If the pelagic fisheries collapse, then this will place additional pressure on the littoral fisheries.

Within any lake shore community, there are likely to be groups who concentrate their fishing activities in the offshore zone, at the same time as other groups focus on the littoral zone for both subsistence and commercial activities. Meanwhile, other family members and the men themselves are usually also engaged in farming. The balance between these activities depends on the season, the fluctuation in fish stocks, labour availability and changes in markets.

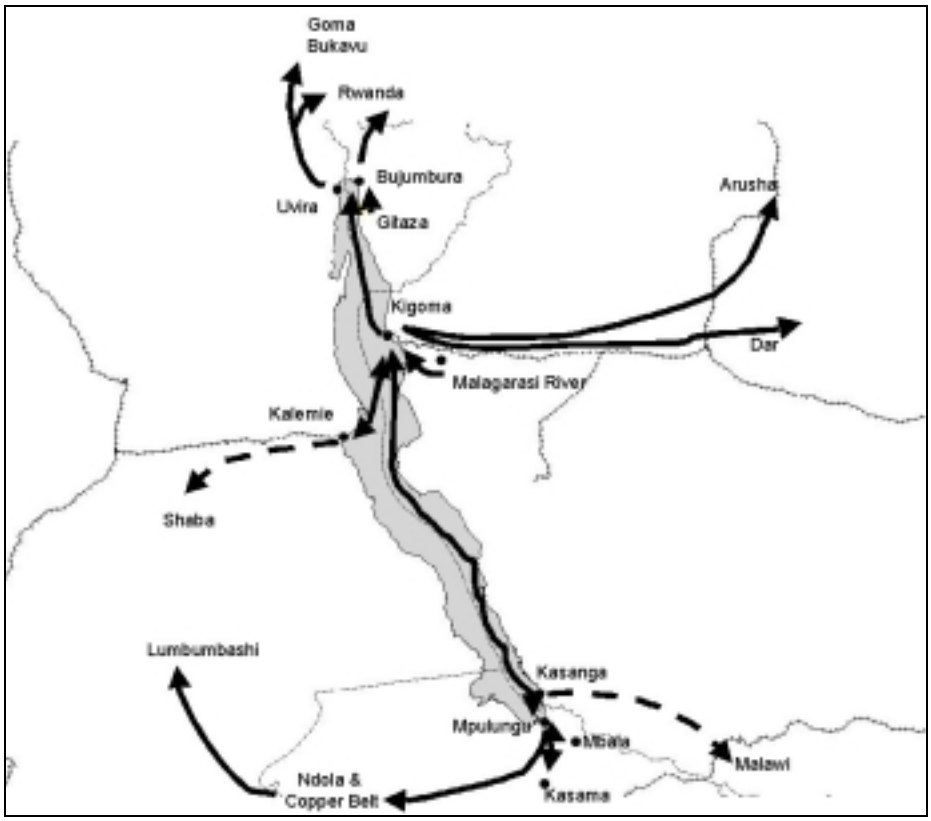
Over 50 different fishing gears were recorded during surveys of the lake fisheries. Of these, twelve are considered to be of key significance, and there is some overlap between the pelagic gear and the littoral gear. The problem is not only one particular type of fishing gear but of the cumulative fishing pressure of all gears combined. This is the case for both the littoral and the pelagic fisheries.

The development of sustainable fisheries addresses both pelagic and littoral fisheries, and the activities of those communities dependent on them. The LTR proposals for the future development of the pelagic fisheries also acknowledge these issues. However, the LTR proposals are, at present, still focussed on the development of policy and management and planning capacity and the improvement of fisheries monitoring systems. The LTR proposals include a pilot programme for fleet restructuring and a pilot programme aimed at improving post harvest practices and trade.

The LTR proposals are complimentary to the fisheries actions defined in the SAP, and where appropriate should be managed as a single enterprise under one programme.

[10] The LTR Fisheries Policy, Planning and Management proposal specifically identifies the need for the "…use of integrated development strategies and coastal area management models in order to accommodate interplay and possible conflicts between fishing and non-fishing activities and to reduce pressure on the fishery resource base through economic diversification".

Map 2 Main Fish Trade Routes



5.4.1 Excessive Fishing Effort in the Littoral Zone

The littoral fisheries are complex. They are multi-species, multi-gear, and involve both artisanal and subsistence fishermen. Many of the inshore fishing grounds (0-40m depth) adjacent to areas of high population settlement are already under heavy pressure from a range of gears and there are indications of reduced catch, changing catch composition and in some areas collapse.

Previous management interventions to control these fisheries have depended on state legislation limiting fishing effort through licensing or banning a particular gear. This approach has not been successful, partly as a result of lack of enforcement capacity and partly as a result of fishermen switching gear without reducing overall effort.

An alternative approach, increasingly adopted in the management of fisheries world-wide is to look toward partnership arrangements, or co-management amongst groups of people with a stake in the fishery (e.g. fisher communities, NGO's and governments). This approach will require a major change in perspective towards increasing participation of local stakeholders and a changing role for the institutions formally charged with fisheries management.

Table 2 National Actions in Response to Excessive Fishing Pressure in the Littoral Zone

Specific Problem	Proposed Actions and Key Agency
Burundi: Excessive fishing pressure **Stakeholders**: Fisheries administration (including MAE–Fisheries Dept and Territorial Admin.); Fishermen; Owners of fishing units; MINATE (INECN); NGOs; Local associations and communities; UB **Uncertainties**: Potential of resources	Ascertain potential, fishing standards and acceptable licensing quotas – MAE Support other income generating activities or those that supply animal proteins – MDC Strengthen capacities for Fisheries Dep. to control and supervise – MAE Raise awareness and train (fishermen, boat owners, administration) – MAE Update and issue draft law and by–laws, as well as ordinances – MAE Translation in Kirundi and extension – MAE
Congo: Excessive fishing pressure in the northern part of the lake **Stakeholders**: Min Env; Fishermen and associations of fishermen; Local authorities; CRH; Fish sellers; NGOs and local communities; MINAGRI **Uncertainties**: Maximal exploitable production	Strengthen regulations : introduce licence system (according to type of FU) with recording of existing fishermen; regional harmonisation – Min of Env Strengthen control – Min of Env Improvement of statistics – CRH Assessment of potential (maximal exploitable production) both in Northern and Southern zones – CRH Feasibility study of tax raising system aiming to regulate fishing effort (feeding at the same time a lake management fund) – CRH Identify reasons for catches increase in the South – CRH Identify actions to develop fish farming – CRH Raise awareness – information – Min of Env Research aiming at establishing how better fish conservation could decrease pressure on stock and favour transfer of demand towards bigger fish – CRH
Tanzania: Lack of quota on fishing licences **Stakeholders**: Fisheries; Communities; Local Authorities; TAFIRI **Uncertainties**: Optimal quota; Available Stock; Impact on Biodiversity	Review LTR conclusions – TAFIRI Assess relevance to fish biodiversity issues – TAFIRI Assess trend in expansion of licensing – Fisheries Dept. Review licensing procedures – Fisheries Dept.
Zambia: Excessive coastal fishing **Stakeholders**: Artisanal Fishermen; Subsistence Fishermen; Dep. Of Fisheries; Local Leaders; Community Based Organisations **Uncertainties**: Optimal level of extraction; Impact of fishing gear on fisheries and biodiversity	Promotion of alternative livelihoods – Community Development Assess impact of fishing gear – Dep. of Fisheries Raise awareness – Dep. of Fisheries Strengthen capacity to implement activities – Dep. of Fisheries Negotiate co–management with identified communities in specific fishing zones – Dep. of Fisheries

5.4.2 Excessive Fishing Effort in the Pelagic Zone

Although the pelagic zone is less rich in biodiversity than the littoral zone, any collapse in the pelagic fisheries will have a dramatic knock-on effect on the littoral zone, both through increased fishing pressure in the diverse littoral zone and indirectly through intensified farming practices. The improved management of the pelagic fisheries is essential for the economic well-being of the region.

The pelagic fishery supports large numbers of fishermen throughout the lake. The most 'visible' practices are the purse seine fleet, the light assisted beach seines and the lift net fleet. However, the pelagic species fishery is also an important livelihood option for many smaller scale artisanal fishermen who paddle some distance from the shore and use jigged lines to target the Perch *Lates stappersi*.

It is important to note that fishing pressure is not the only factor influencing the status of the commercial stocks. Environmental changes such as temperature are thought to contribute to the relative abundance of clupeids and perch species. These environmental changes and their effect on the fish stocks are not fully understood. Thus management of the fishery has to be undertaken within some uncertainty and be guided by the precautionary principle.

The LTR project has supported research on the pelagic fisheries since 1992 and drawn up a "Framework Fisheries Management Plan", which has been endorsed by the CIFA Subcommittee for Lake Tanganyika. This plan identifies five critical components requiring further investment to develop a sustainable fisheries.

1. Fisheries Policy, Planning, and Management
2. Fisheries Statistics and Information Systems
3. Monitoring, Control, and Surveillance
4. Promotion of Responsible Fishing Operations and Fishing Fleet Restructuring
5. Post Harvest Practices and Trade

Underlying this are a number of principles that are common to the SAP, including:

- Partnerships with local stakeholder groups in management decision-making and in fashioning modalities of enforcement and compliance;
- Allocation of access and fishing rights at local community levels; and
- Use of integrated development strategies and coastal area management models in order to accommodate interplay and possible conflicts between fishing and non-fishing activities and to reduce pressure on the fishery resource base through economic diversification.

The LTR proposals include implementing a number of pilot projects, aimed primarily at fleet and gear management and post harvest practices. These have not been specifically included under the SAP, but will integrated with future iterations.

Table 3 National Actions in Response to Excessive Fishing Pressure in the Pelagic Zone

Specific Problem	Proposed Actions and Key Agencies
Burundi: Excessive offshore fishing **Stakeholders**: Fisheries administration (including MAE–Fisheries Dept and Territorial Admin.); Fishermen; Owners of fishing units; MINATE (INECN); NGOs; Local associations and communities; UB **Uncertainties**: Acceptable catch	Establish standards and quotas for acceptable fishing practices – MAE Put in place a sufficient capacity to control lake fisheries – MAE Review national and regional components of the Framework Fisheries Management Plan within the context of the SAP – MAE Incorporate additional activities into national programmes within the framework of the SAP – MAE
Congo: Uncontrolled offshore fisheries **Stakeholders**: Min. of Env; Fishermen; Local Authorities; Fish traders; Net manufacturers; CRH; NGOs; Local Communities **Uncertainties**: Optimal mesh size and net type; Impact on biodiversity	Research into best mesh sizes and fishing methods – CRH Studies on secondary species – CRH Legislation distinguishing three levels of activity, banning excessively fine nets, limited permits for appropriate net types and banning destructive fishing practices – Min of Env Support to control capacity – Min of Env Education and awareness raising – Min of Env Review national and regional components of the Framework Fisheries Management Plan within the context of the SAP – Min of Env Incorporate additional activities into national programmes within the framework of the SAP – Min of Env
Tanzania: Inadequate control of offshore fisheries **Stakeholders**: Fisheries Division; TAFIRI; Ministry of Regional Administration and Local Govt.; Fisheries investors; Communities; NGOs **Uncertainties**: scale of problem	Build district statistics capacity– Fisheries Division Establish the existing fishing pressure (vessels, gear, fishermen…), differentiate between industrial and artisanal – Fisheries Division Establish optimal fishing pressure– Fisheries Division Set up appropriate monitoring, control and surveillance – Fisheries Division Implement education and awareness programmes for fishing communities – Fisheries Division Enforce regulations – Fisheries Division Review national and regional components of the Framework Fisheries Management Plan within the context of the SAP – Fisheries Division Incorporate additional activities into national programmes within the framework of the SAP – Fisheries Division

(continued)

Table 3 (continued) National Actions in Response to Excessive Fishing Pressure in the Pelagic Zone

Specific Problem	Proposed Actions and Key Agencies
Zambia: Excessive Industrial and Artisanal Fishing **Stakeholders**: Commercial Fisheries; Artisanal Fishermen; Local Authority; Dep. of Fisheries; Community Based Organisations; Local Leaders; Licensing Committee **Uncertainties**: Optimal fishing levels; Market Distribution	Raise national and Local Political Awareness – Dep of Fisheries Negotiate interim acceptable fleet and means of reducing fleet – Dep of Fisheries Establish optimal fleet composition – Dep of Fisheries Review licensing procedures – Dep of Fisheries Strengthen local capacity to monitor and enforce regulations – Dep of Fisheries Review national and regional components of the Framework Fisheries Management Plan within the context of the SAP – Dep of Fisheries Incorporate additional activities into national programmes within the framework of the SAP – Dep of Fisheries

5.4.3 Excessive or Uncontrolled Extraction of Ornamental Fish

The aquarium trade is focused primarily on the capture of cichlid fish for export to overseas markets, although there are a few non-cichlids that are also of interest. While there is little precise information available, the trade is inherently threatening to biodiversity as the targeted species are endemic, rare, localised and hence vulnerable. Information from the trade does reflect these concerns, with certain export species disappearing from preferred collection sites.

Although there are licensing systems in place, these are rarely enforced and have not been updated to reflect market values. Nevertheless, the export is a specialised trade and could also be monitored from the end market. In addition there are relatively few individuals within the countries who control the collection and marketing, making monitoring less onerous.

The potential for improved management is quite high, and licensing for export could pay for the enforcement of legislation. Meanwhile the export of these species continues to draw attention to the lake biodiversity value, and can help direct donor attention to the lake management problems.

There is the potential for promoting community involvement in the industry and hence promoting livelihood alternatives. Environmental education, and possibly the management of a few aquaria have been proposed as means of raising awareness.

Table 4 National Actions to Control the Ornamental Fish Trade

Specific Problem	Proposed Actions and Key Agencies
Burundi: Excessive or uncontrolled extraction of ornamental fish **Stakeholders**: MINATE (INECN); MAE (Fisheries dep.); Exporters; Sellers; Customs; BRB; NGOs; Local associations and communities **Uncertainties**: Scale of problem and impact	Prepare list of threatened species and proposal of inclusion in CITES lists – MINATE (INECN) Regulations, control, monitoring– MINATE (INECN) Encourage fish farming of those species – MAE Raise awareness– MINATE (INECN) Set up protected areas (demarcation, eco – tourism development, management plans) – MINATE (INECN)
Congo: Excessive or uncontrolled extraction of ornamental fish **Stakeholders**: Local authorities; CRH; Customs; Exporters; Min Environ; ICCN **Uncertainties**: Vulnerability of all the species potential per species and per site	Improvement and strengthening of licence delivery (authorised species, quantities, extraction sites) – Min of Env Strengthen extraction and exporting control– Min of Env Establish natural reserves : Luhanga, Pemba, Kalamba, Kiriza(Ubwari) and Bangwe – ICCN Additional prospecting in order to expand the network of protected areas – CRH Inscription of lake Cichlides on CITES list, except fish identified as capable to support extraction – Min of Env
Tanzania: Excessive or uncontrolled extraction of ornamental fish **Stakeholders**: Licensed Traders; Fisheries; TAFIRI; Foreign Affairs; Home Affairs; Customs **Uncertainties**: Endangered species; Extent of threat	Identify threatened species – TAFIRI Regional agreement on exportable species by country of origin – Fisheries Dep. Monitor numbers and species exported – Fisheries Dep / Customs Raise senior level awareness of problems – Fisheries Dep Establish species quotas – TAFIRI Review number of licensees – Fisheries Dep Examine possibility of inclusion in CITES list – Fisheries Dep
Zambia: Excessive or uncontrolled extraction of ornamental fish **Stakeholders**: Commercial Fishers; Local Authorities; Fisheries Dept; ZAWA; Museums; Communities and Local Leaders; Revenue Authority **Uncertainties**: Scale / Impact of Extraction	Ascertain Scale and Impact – Fisheries Dep Raise Public Awareness – Establish Aquarium – Fisheries Dep Define Levels of Extraction – Fisheries Dep Review License / Export Fees – Fisheries Dep Establish Local Regulations – Fisheries Dep Evaluate Potential for Captive Breeding – Fisheries Dep Review Inclusion of Species in CITES – ZAWA

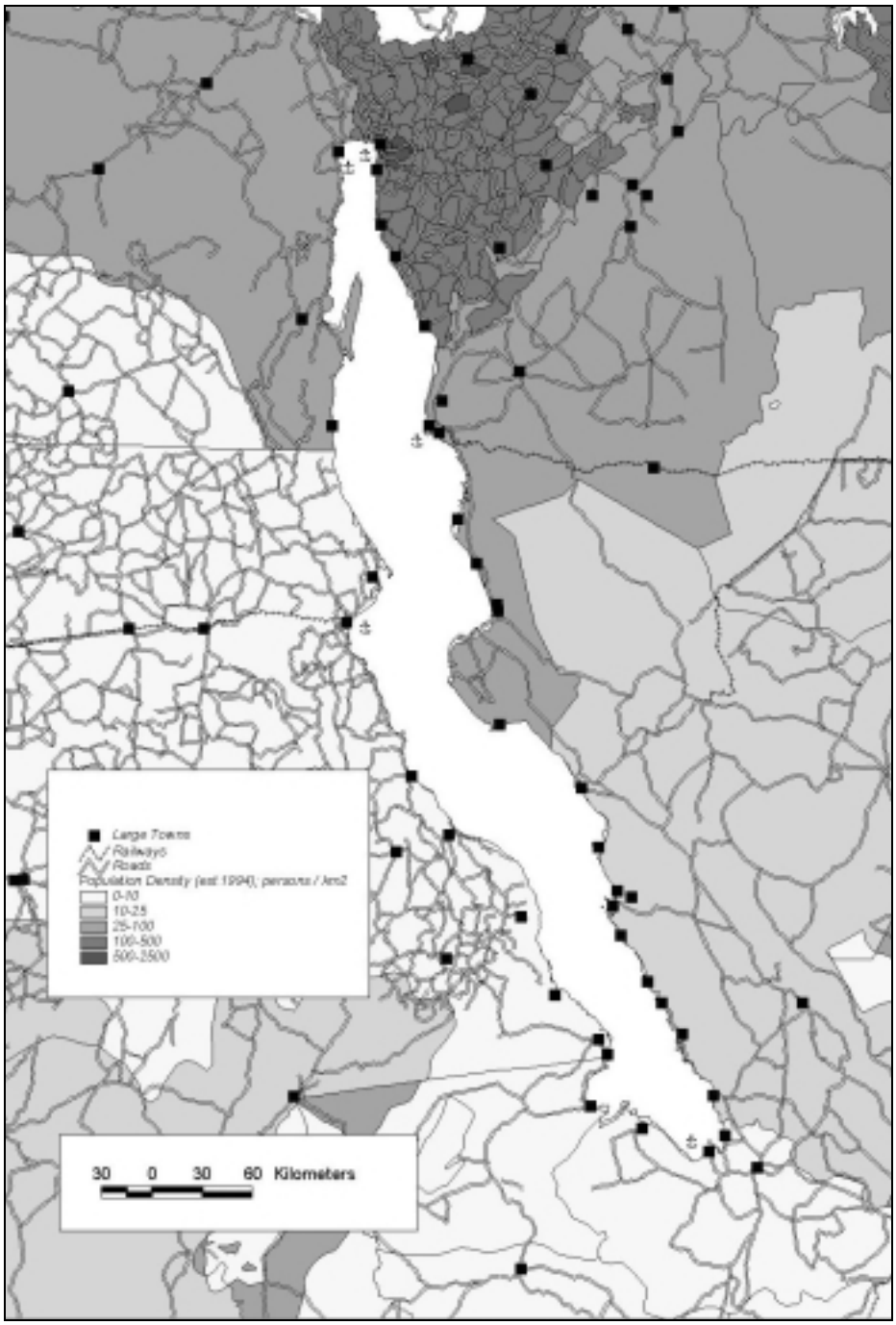
5.5 Pollution Control

The potential impact of pollution on the lake is a major concern, and was given due weight in the full title of the LTBP – Pollution control and other measures to protect biodiversity in Lake Tanganyika.

Pollution is the result of human activities within the catchment and is predominantly linked to settlements, ranging from villages to towns to capital cities. These settlements are scattered throughout the catchment and are centres for a variety of potentially polluting industries and activities. Possible sources of damaging pollution

include: domestic waste; farming with fertilisers and pesticides; ports, harbours and marine traffic; industrial factories and small-scale registered and unregistered industries; petroleum products depots and power stations; commercial fishing industries and slaughterhouses; mines and quarries.

Map 3 Main Urban Settlements and Population Density



5.5.1 Urban and Industrial Pollution

Urban and industrial pollution are closely linked. Urban centres attract industries and form major market and transport hubs, which in turn attract more settlement. Urban population growth in all the riparian countries greatly exceeds rural population growth.

The largest city on the lake is Bujumbura with an urban and peri-urban population of around 600,000. With the other coastal towns in Burundi, and with Uvira in DR Congo, with a population of around 300,000, the northern part of the lake is the major concentration of urban settlement on the lakeshore. In Tanzania, Kigoma with a population of 135,000, is the major settlement and port facility, and to the south of the lake, Mpulungu in Zambia with a population of 70,000 is also a major port.

Bujumbura has two major industries, brewing and textiles, that discharge significant quantities of waste water that passes untreated into the lake. There are, in addition, many other potentially polluting industries. These include the production of batteries, paints, soap, pharmaceuticals, slaughterhouses, oil depots and garages. In Uvira, the main concerns are petroleum products, cotton processing and sugar production.

In addition, the increasing volume of domestic waste and effluents linked to growing urban settlements is an issue in all countries around the lake. Even where the settlements were originally planned to incorporate sewage and solid waste management, their growth has outstripped the planned capacity of their waste disposal systems.

In Kigoma bay, where water circulation is restricted, there are already signs of eutrophication. The water intake for the town is located very close to the discharge points for untreated sewage from a number of institutions and the waste entering the lake from the town's power station.

While the problem is technically easy to solve and fairly localised, it requires the commitment of local government and the communities involved, as well as major financial investments. The benefits to public health are immediate and direct, with improved water quality benefiting many direct users. The long-term benefits to fisheries and biodiversity relate to a reduction in excess nutrient load and the reduction in harmful leachates from poorly sited or managed solid waste disposal sites.

Table 5 National Actions to Control Urban and Industrial Pollution

Specific Problem	Proposed Actions and Key Agencies
Burundi: Pollution from urban waste Particularly from Bujumbura and Rumonge **Stakeholders**: MINATE (DG ATE ; INECN); Mairie (SETEMU); MCIT; CCIB; Regideso; MTPE; MSP; BBN; NGOs; Local associations and communities **Uncertainties:** Nature and quantity of effluents; Impact of pollutants on biodiversity	Expansion of treatment capacities – Mairie (SETEMU) Set up controlled site disposal and collect waste – Mairie (SETEMU) Raise awareness and train – MCIT Regulations for marketing of dangerous products for environment (notably batteries) – MINATE (DG ATE) Develop standards for enforcement of legislation relating to waste – MINATE (DG ATE) Implement land use plans in the framework of planning schemes – MTPE Strengthen capacities for INECN to monitor and control – MINATE (INECN) Support development of secondary urban centres – MTPE Surveying pollution and impact levels, monitor and follow up – MINATE (INECN)
Burundi – Industrial Pollution from Bujumbura town (with particular concern to the paint industries, tanneries, soap industry, food industries, textiles and chemicals) **Stakeholders**: MINATE (DG ATE ; INECN); Mairie (SETEMU); MCIT; Industrial Enterprises – the paint industries, tanneries, soap industry, food industries, textiles and chemicals; CCIB; Regideso; MTPE; MSP; BBN; NGOs; Local associations and communities **Uncertainties**: Scale of pollution, pollutant discharges and impact on biodiversity; Acceptable standards	Pre–treatment of industrial sewage and put to work the water treatment plant – Mairie (SETEMU) Expansion of the treatment capacities – Mairie (SETEMU) Set up controlled site disposal and collect waste – Mairie (SETEMU) Treatment, recycling and transformation of waste – Mairie (SETEMU) Improve industrial procedures – MCIT Raise awareness and train – MINATE (INECN) Regulations for facilities likely to pollute (Prior EIA technical specifications) – MINATE (DG ATE) Regulations for marketing of dangerous products for environment – MINATE (DG ATE) Develop standards for enforcement of legislation relating to waste – MINATE (DG ATE) Implement land use plans in the framework of planning schemes – MTPE Strengthen capacities for INECN to monitor and control Surveying pollution and impact levels, monitor and follow up – MINATE (INECN) EIA prior to industrial development – MINATE (INECN)

(continued)

Table 5 (continued) National Actions to Control Urban and Industrial Pollution

Specific Problem	Proposed Actions and Key Agencies
Congo: Pollution by domestic effluents and waste **Stakeholders**: Ministry of Environment; Local Authorities; Population; NGOs and Local communities; Urban services; INERA; Ministry of Energy **Uncertainties:** Nature and quantity of pollutants and impact on the Lake biodiversity	Identification of pollutants, evaluation of impact – CRH Sanitation (construction of latrines, installation of controlled disposal sites and waste collecting, setting up waste and sewage network connected to a treatment plant) : Uvira, Mboko, Kalemie, Moba, Baraka – Min of Env Health education – Health Services Research – focused on recycling through agricultural and energy – INERA Develop appropriate legislation and support enforcement capacity – Min of Env
Congo – Industrial Pollution Kiliba Sugar Factory **Stakeholders**: Kiliba sugar factory; CRH; CRSN; INERA; ISDR; NGOs and Local Communities; Min. of Energy; Ministry of Environment **Uncertainties**: Impact of pesticides / lime on biodiversity; Alternatives	Recycling of by – products (bagasse, treacle, lime) – Min of Env Assessment of the impact of herbicides on the Lake waters and the biodiversity – CRH Research for more appropriate fertilising modalities – INERA Update legislation – Min of Env Control – Min of Env
Congo – Pollution from Kabimba cement factory **Stakeholders**: Ciment–lac; CRH; CRSN; INERA; ISDR; NGOs and local Communities; Ministry of Environment **Uncertainties**: Impact of ashes; dusts and smokes on lake biodiversity	Assessment of the impact and identification of the measures to be taken – CRH Feasibility study of agricultural recovering of ashes – INERA Implement recommendations – Min of Env Update legislation – Min of Env Control – Min of Env
Tanzania: Discharge of untreated domestic waste, Kigoma Town **Stakeholders**: Local Council; Regional Authority; Min of Water; Min of Health; Min of Lands **Uncertainties:** Impact on biodiversity; Quantity and type of effluents	Review existing town development plans – Min of Lands Incorporate proposals for sewage, waste water control measures and water supply – Min of Water Propose developments & promote awareness to counteract existing situation of open drains etc. – Min of Lands Monitor effluents – Min of Water
Tanzania: Discharge of untreated waste from institutions (Police, Prisons, Railway Station, Docks) Kigoma Town **Stakeholders**: Police; Prisons; TRC; Local Council; Min of Water; Min of Health; Min of Transport; Regional Authorities **Uncertainties:** Impact on biodiversity; Quantity and type of effluents	Enforce regulations – Min of Water Identify reasons for non–compliance – UWS&S Dept Promote Senior level awareness – Local Authorities Identify and propose practical treatment works and disposal sites – Min of Water Implement proposals and regulations – Min of water Monitor effluents – Min of Water

(continued)

Table 5 (continued) National Actions to Control Urban and Industrial Pollution

Specific Problem	Proposed Actions and Key Agencies
Tanzania: Inappropriately sited solid waste dumps Kigoma Town **Stakeholders**: Local Council; Regional Authority; Min of Water; Min of Health; Min of Lands; Communities **Uncertainties:** Impact on biodiversity; quantity and quality of leachates	Identify appropriate dump sites – Town Council Review present collection and disposal procedures – Town Council Check existing and introduce appropriate local regulations; Develop appropriate landfills – Town Council Monitor quantity and quality of leachates – Min of Water
Tanzania – Industrial Pollution Kigoma TANESCO Power Station **Stakeholders**: TANESCO; Local Council; Min of Water; Min of Energy; **Uncertainties**: Extent of Pollution	Implement appropriate management practices and structures – Energy Department Implement both short and long term remedial measures – Energy Department Review TANESCO plans for rehabilitation, including funding – Energy Department
Zambia: Discharge of untreated domestic effluent, Mpulungu and Shoreline Settlements **Stakeholders**: Local Authority; Water Affairs; Fisheries Dept; Local Communities; District Health Management Team; D–WASHE; ECZ **Uncertainties:** Scale of problem and impact on biodiversity	Assess scale of problem and impact on biodiversity– ECZ Review design of existing sewerage systems, assess potential for alternatives – Local Council Link with existing D–WASHE programme– Local Council Implement alternatives– Local Council Monitor effluent disposal – ECZ Raise awareness of issues – ECZ
Zambia: Uncontrolled Waste Dumping in and around Mpulungu **Stakeholders**: Transporters; Fishing Companies; Local Authority; Water Affairs; Zambia Revenue Authority; Fisheries Dept; Local Communities; District Health Management Team; ECZ **Uncertainties:** Scale of problem and impact on biodiversity	Assess scale of problem and impact on biodiversity – ECZ Raise awareness of issues – ECZ Monitor disposal – ECZ Enforce regulations – Local Council
Zambia – Transboundary movement of industrial pollution **Stakeholders**: Communities; Min of Energy & Water Depart.; Dept. of Fisheries; Local Authorities; Min of Environment; NISIR; ECZ; Maritime **Uncertainties**: Types of pollutants, distribution and buildup	Identify sites for monitoring – ECZ Establish a functioning monitoring programme – ECZ Training in monitoring lake pollution – ECZ

Table 11 National Actions to Support Parks Management

Specific Problem	Proposed Actions and Key Agencies
Burundi: Encroachment in the Rusizi Natural Reserve **Stakeholders**: MAE (incl. Fishing dep.); MINATE (INECN); Territ. Adm.; Farmers; NGOs; Local associations and communities **Uncertainties**:	Compensation for expulsion from sensitive zones – MINATE (INECN) Extend the reserve into the littoral zone to 1000 metres offshore of the 774 metre contour – MINATE (INECN) Plant hedge to demarcate the reserve in the Rusizi delta – MINATE (INECN)
Congo: Lack of protection of the Congolese side of the Ruzizi delta **Stakeholders**: ICCN; CRH; CRSN; NGOs, Local Communities **Uncertainties**	Establish a "protected area" in the Ruzizi delta, adjacent to the Burundi Natural Reserve – ICCN
Tanzania: Exploitation of fisheries within parks **Stakeholders**: TANAPA; Fisheries Department; Local Communities **Uncertainties**: Compliance of local communities	Raise awareness of parks issues – TANAPA Involve local communities in parks management – TANAPA
Zambia: Community pressure on Nsumbu National Park **Stakeholders**: ZAWA; Lodge Operators; Local Communities; Fisheries **Uncertainties**: Support from Local Communities	Involve communities in Parks Management – ZAWA Training in Aquatic Parks Management – ZAWA Define and mark aquatic parks boundary – ZAWA

5.7.2 Conservation of Sensitive Coastal Habitats

The following proposals deal with the protection of areas outside the formal protection systems of national parks or reserves. The areas under consideration include sites with high biodiversity interest, and critical spawning and nursery grounds for the major economic species.

At present these areas have not been protected under existing formal or informal agreements, and suffer from the same management constraints as other littoral areas. Management proposals will therefore have to take direct account of community interests and will rely on a process of negotiation to reach agreements on limited access and possible mitigatory or compensatory mechanisms.

In the long term, these negotiations may not be that different from those required for the wider management of the shore zone, and could be used to develop a framework applicable for many other lake shore areas and communities. However, it does provide a clearly defined focus on a few communities or sites to start this process of negotiation.

Previous surveys indicate that the Congolese territory hosts very high aquatic biodiversity. Three sites have been identified as key habitats meriting some protection status, these are Pemba, Luhanga and Bangwe. These sites are still relatively unaffected by human activities and have high biodiversity value. They are close to Uvira, and hence provide a valuable research/study area for the Centre de Recherché en Hydrobiologie. Currently, the major threat to their biodiversity is from sedimentation due to deforestation and farming of the slopes above them.

Additional key protected habitats could include a number of rocky sites in the area of Gitaza in Burundi, the waters next to the Kitwe Wildlife Sanctuary and south of Kigoma in Tanzania.

From the perspective of fisheries and biodiversity protection, it is essential that some protection status be given to the coastal wetlands and the nursery and spawning grounds for economically important fish species. Key areas include the unprotected parts of the Rusizi, the Malagarasi delta, the Lukuga effluent, and the Lufubu/Chisala river mouths, and Chituba Bay.

Table 12 National Actions to Conserve Sensitive Coastal Habitats

Specific Problem	Proposed Actions
Burundi – Degradation of sensitive coastal areas **Stakeholders**: MAE (incl. Fishing dep.); MINATE (INECN); Territ. Adm.; Farmers; NGOs; Local associations and communities **Uncertainties**: Extent of lake shore activities and impact on biodiversity	Mapping supra littoral area and cultivated area – MINATE (INECN) Raise awareness – MINATE (INECN) Participative management and restoration of natural resources – MINATE (INECN) Declare sensitive areas as protected areas (Murembwe, Nyengwe, Rwaba) - MINATE (INECN) Control lake shore vegetation exploitation – MINATE (INECN) Protect the rocky coastline through tree planting between Gitara and Flugara – MINATE (INECN)
Congo – Risk of degradation of coastal zone; lack of protection of specific key zones (Rusizi, Lukuga, Luhanga, Pemba, Kalamba, Kiriza, Kazimia, Burton Bay) **Stakeholders**: ICCN; CRH; CRSN; NGOs, Local Communities **Uncertainties**:	Establish a protected area – Lukuga – ICCN Establish a protected area – Rusizi – ICCN Establish protection forsites of special scientific interest – Luhanga, Pemba, Kalamba, Kiriza, Kazimia, Burton Bay – ICCN Participative preparation of a management plans – ICCN Hydrologic monitoring (Lukuga, Mutambala and Ruzizi) – CRH

(continued)

Table 12 (continued) National Actions to Conserve Sensitive Coastal Habitats

Specific Problem	Proposed Actions
Tanzania – Degradation of wetland areas – in particular the Malagarasi **Stakeholders**: Communities; Fisheries Dept; TAFIRI; Local Government; Tourism and Natural Resources **Uncertainties:** Impact on Biodiversity; Optimal size of protected areas; Community Compliance	Negotiate access with communities – Min of Agric Gazette areas – Min of Agric Raise Awareness – Fisheries Ban destructive fishing practices – Fisheries Evaluate stock – TAFIRI Conduct hydrological and limnological monitoring – TAFIRI
Zambia – Damage to Sensitive Habitats Lufubu and Chituba Bay and Chisala River Mouth **Stakeholders**: Min. of Agriculture; Min. of Env.; Min of Tourism; Local Authorities; Local Communities; Traditional Leaders **Uncertainties:** Extent of degradation and impact on biodiversity	Evaluate destructive fishing practices – Fisheries Ban specific destructive practices (poison, explosives…) – Fisheries Negotiate designation of Chituba and Lufubu bays and Chisala river mouth as conservation areas – Fisheries Negotiate with communities acceptable management practices – Community Dev Develop procedures for capital empowerment of communities to alleviate impact of zone designation – Community Dev Negotiate designation of Lufuba mouth as Ramsar site ECZ Monitor stock levels – Fisheries