

Policy options

This section aims to identify feasible policy options that target key components identified in the Causal chain analysis in order to minimise future impacts on the transboundary aquatic environment. Recommended policy options were identified through a pragmatic process that evaluated a wide range of potential policy options proposed by regional experts and key political actors according to a number of criteria that were appropriate for the institutional context, such as political and social acceptability, costs and benefits and capacity for implementation. The policy options presented in the report require additional detailed analysis that is beyond the scope of the GIWA and, as a consequence, they are not formal recommendations to governments but rather contributions to broader policy processes in the region.

Pollution and Unsustainable exploitation of fish have been identified as the major environmental concerns of the region. In the causal chain analysis the sectors/activities and the root causes of these problems were identified. In the case of pollution, microbiological and chemical pollution are the most severe issues causing a deterioration in the environmental quality of the region, although their severity differs between the countries. Regarding the unsustainable exploitation of fish, overexploitation was considered the most relevant issue due to the importance of the fisheries for the regional economy and because of the shared nature of the main fish stocks.

Pollution

GIWA experts selected pollution as the first priority environmental concern of the region because its impact on economic, social and health issues. Microbiological pollution was the most relevant immediate cause because a high proportion of domestic effluents (80-95%) are

discharged into natural water bodies without treatment (CPPS 2000a, WHO/UNICEF/WSSCC 2001). The region is characterised by low sanitation coverage with around 13 million people without access to this service (WHO/UNICEF/WSSCC 2001). Concentrations of faecal coliforms in waters around the major urban centres in Ecuador and Peru exceed current standards. These inadequate sanitation conditions favour the presence of endemic gastroenteric diseases such as typhoid, cholera and hepatitis. Other sources of microbiological pollution include the effluents from slaughterhouses and food processing plants, as well as the discharge of solid wastes. Extreme climatic events such as the El Niño exacerbate sanitation problems by increasing rainfall and flooding and damaging the sanitation infrastructure.

The root causes of microbiological pollution include:

- Demographic – Overpopulation, migration from rural areas, dynamic and unplanned human settlements and intense use of land.
- Technological – Lack of appropriate technologies for wastewater treatment.
- Economic – Subsidised tariffs, lack of resources for supervision and control, insufficient promotion of private investment, among others.
- Legal and institutional – Overlapping responsibilities, lack of a basin approach to hydrological resource management.

Chemical pollution was considered as the second most relevant issue. The immediate causes are mainly related to industrial wastewater, the use of pesticides and other agro-chemicals (FAO 2002b, UNEP 1999). POPs such as DDT and its metabolites, Aldrin, and Lindane are present in water and sediments throughout the region (CPPS 2000a). Mining discharges are another important source of chemical pollution since Chile and Peru are major copper and gold producers. Several heavy metals such as copper, zinc, lead, cadmium, mercury and chromium have been found in concentrations exceeding national regulations in coastal waters and sediments around mining areas and industrial centres.

The root causes of chemical pollution include:

- Demographic – Concentration of the population in coastal areas, migration and development of informal settlements.
- Technological – Obsolete technology, inappropriate wastewater and solid waste treatment.
- Economic – High cost of treatment systems, lack of promotion of private investment.
- Legal and institutional – Obsolete laws, inappropriate municipal regulations, overlapping responsibilities of institutions in charge of the supervision and control, weak sanctions.
- Knowledge – Unknown carrying capacity of the ecosystem, ignorance about the effects of chemical pollution.

Construction of options

Environmental pollution in the Humboldt Current region is linked with failures in public administration, a lack of education and poverty. It is therefore necessary that the region adopts the principles established at international forums such as the World Summit on Sustainable Development (United Nations 2002) which proposes “the shift towards sustainable consumption and production to promote social and economic development within the carrying capacity of ecosystems by addressing and, where appropriate, linking economic growth and environmental degradation through improving efficiency and sustainability in the use of resources and production processes, and reducing resource degradation, pollution and waste”. Regarding pollution, the WSSD Plan of Implementation also proposes the adoption and implementation of policies and measures to apply the ‘polluter pays’ principle described in the Rio Declaration on Environment and Development (United Nations 1992) and the “increase of investment in cleaner production and eco-efficiency in all countries through, *inter alia*, incentives and support schemes and policies directed at establishing appropriate regulatory, financial and legal frameworks”.

The governments of the Humboldt Current region have adopted legal mechanisms and several programmes to address pollution issues such as (see Annex III):

- The Convention for the protection of the Marine Environment and Coastal Areas in the South East Pacific.
- The Agreement on Regional Cooperation in Combating Pollution in the South East Pacific by Hydrocarbons and Other Harmful Substances in Cases of Emergency.
- The Protocol for the Protection of the South East Pacific from Radioactive Pollution.
- The Protocol to Prohibit Transboundary Movements of Hazardous Wastes and their Disposal to the South East Pacific.
- The Coordinated Regional Programme for Research.

- Surveillance and Control of Marine Pollution of the South East Pacific (CONPACSE).
- Regional Programme for the Protection of the South East Pacific from Land-based Activities (PROSET).

The Permanent Commission for the South Pacific (CPPS) has coordinated these agreements, protocols and programmes in the region since 1981 through the Plan of Action for the Protection of the Marine Environment and Coastal Areas of the South Pacific. The selection of policy options most appropriate in addressing pollution in the region should take into consideration and strengthen these regional mechanisms.

Decentralise environmental management:

Policy option addressing the root causes Demographic, Legal and Institutional, and Knowledge.

In the countries of the region, the creation of policies and strategies for pollution control has had a high degree of centralisation. Legal regulations and the sharing of responsibilities involve the participation of several authorities without legal or institutional mechanisms to assure an integral approach to the problem, and excluding the involvement of local stakeholders in the decision-making process (CPPS 2000a, 2001b). Therefore, social problems caused by pollution and environmental degradation will continue until local stakeholders are able to participate actively in finding appropriate solutions. The WSSD declaration appeals to the participation of stakeholders and encourages partnerships to support the implementation of Agenda 21 at the local and regional levels.

Generally, regional governments have shown interest in the establishment of decentralised management strategies, policies and conceptual frameworks, as well as in defining specific projects to address problems with an ecosystem management approach. However, the implementation of these processes is still problematic. Operative mechanisms require coordination in order to evaluate policies and strategies at national and regional levels, and the creation of operative institutions to implement environmental management projects at local levels (i.e. municipalities). This policy requires the corroboration of local governments in order to delegate responsibilities, create policies and establish mechanisms of control according to specific requirements. The participation of multiple stakeholders in this process is fundamental. Local governments may also use the experiences of other municipalities or from neighbouring countries through well-established regional mechanisms of cooperation, such as the Plan of Action for the Protection of the Marine Environment and Coastal Areas of the South East Pacific (CPPS/UNEP 1983).

Convenience

The creation of a unified institutional mechanism, with defined national policies and strategies, and an additional mechanism at the local level, will allow the simple identification and selection of themes and priority problems for environmental management. Furthermore, it will allow the formation of projects, which include the participation of different stakeholders directly related to pollution problems. The integrated approach and institutional cooperation will also provide better possibilities for effective pollution management.

A greater understanding of the pollution problem will promote a more effective use of natural and human resources and the progressive improvement of the environmental situation. The inefficient control of pollution through sectorised actions has necessitated the implementation of policies that assure institutional integration to reduce, and finally halt, the growing pollution problems in the region.

Feasibility

Countries in the region have considerable national experience in developing institutional mechanisms for regional cooperation. For example, the governments of the region established the Permanent Commission for the South Pacific (CPPS) and its Plan of Action for the Protection of the Marine Environment and Coastal Areas of the South East Pacific (CPPS/UNEP 1983). The Commission may be able to assist in the design and implementation of regional policies, in collaboration with their respective national components, to guarantee a system for the mitigation and control of pollution in the region.

The main objective of the Plan of Action is to protect the coastal and marine areas to safeguard the health and well-being of current and future generations through the active cooperation of its members. For this purpose, the Plan of Action coordinates national institutions that conform to an operative network for the benefit of the South East Pacific. The Major sources of pollution in the South East Pacific were identified during the coordinated implementation of programmes such as CONPACSE and PROSET (CPPS 2000a, 2001b). Through the same mechanism, countries of the Humboldt Current region should identify potential donors and international assistance programmes to obtain economic resources in order to develop both the initial designing phase and the execution of the proposed policy.

Acceptability

For a long time, the local governments of the Humboldt Current region have claimed that they should be given responsibility for addressing their own local social and environmental problems. Therefore, municipalities and other forms of local administration would be willing to assume such

responsibilities as long as the national government assign the necessary funds. However, the main obstacle for decentralisation is opposition by the traditional bureaucracy, who fear a subsequent loss of power and influence. The creation of local institutions with sufficient operational capacity to deal with pollution problems would require the reorganisation of the institutions currently in charge of pollution control leading to further opposition from the central bureaucracy.

The majority of local stakeholders would be willing to adopt a new approach to tackling pollution since they will be the beneficiaries of a healthy environment. However, polluters, such as industries, could oppose stronger regulations, and therefore local institutions should be strengthened and given greater legislative powers by the national Government and the Congress whose responsibility it would be to provide a new legal framework. This framework should take into consideration the necessity to improve the efficiency and level of coverage of sanitation and freshwater services and to include modern concepts of management, such as the privatisation and self-regulation approach for industrial wastewater.

Harmonise criteria and environmental quality standards and develop common indicator systems for environmental management:

Policy option addressing the root causes Technological, Economic, and Knowledge.

The countries of the Humboldt Current region have developed their own criteria and environmental standards for the control of effluents discharged into water bodies, air and soil. There is therefore no regional coordination of national regulations. An important step towards reducing pollution levels will be a study of the characteristics and efficiency of the current standards and actions taken in these countries, identifying opportunities to initiate a process of harmonisation of regulations and to define mechanisms of evaluation and control of the results obtained both at national and regional levels. It will be necessary to identify appropriate indicators to evaluate the achievements obtained as a result of the implementation of such regulations to adequately support the process of control and mitigation of the more important pollution issues in the region. This could be achieved through the organisation of regional workshops coordinated by the Plan of Action of the South East Pacific under the auspices of the programmes CONPACSE and PROSET, which are concerned with the mitigation of the pollution concern. The governments of the region demonstrated their commitment to resolving the pollution issues by ratifying the Convention for the Protection of the Marine Environment and Coastal Areas of the South East Pacific also known as the Lima Convention (CPPS 1981) and also by adopting international agreements such as the WSSD (United Nations 2002) and UNCED (United Nations 1992).

Convenience

This policy aims to establish regional regulations and standards, in order to mitigate and control pollution in the region. Particular importance should be given to sanitation criteria for wastewater discharges, both domestic and industrial, and their treatment, identified as the major cause of pollution and environmental degradation (CPPS 2000a). Chile has the highest standards in the region regarding the control of water pollution. This significant achievement may be the result of the harmonisation of environmental criteria and the establishment of guidelines for appropriate legal frameworks that include the new principles of wastewater management, such as the 'polluter pays' principle.

Feasibility

The experience and advances of the Plan of Action for the Protection of the Marine Environment and Coastal Areas of the South East Pacific include institutional cooperative structures in each country of the region, containing structural elements and operative facilities necessary for the implementation of this policy. Unfortunately, countries of the region have not been able to take advantage of this regional mechanism to promote a healthier environment. Countries have not taken the initiative to establish environmental regulations at the regional level like countries that are members of economic blocks such as the European Community (EC) or the North American Free Trade Agreement (NAFTA). The adoption of such regional standards will be necessary in the short-term if the Humboldt Current region is to progress.

Acceptability

As previously noted, the governments of the Humboldt Current region have signed agreements and protocols that aim to foster cooperation in combating pollution and develop regulations and operative mechanisms to reduce and control pollution in the South East Pacific (Annex III). These mechanisms include a variety of issues related to pollution, from wastewater to radioactive contamination. There is consequently a tendency among the countries to accept regional compromises regarding pollution. The next step is to implement practical actions in order to harmonise criteria, create regional standards of environmental quality and establish a common system of indicators. The WSSD declaration pledged to focus and give priority attention to conditions that threaten sustainable development, including environmental degradation.

Conclusions

Two policy options were selected to address the GIWA concern Pollution in the Humboldt Current region regarding convenience, feasibility and acceptability: *Decentralise environmental management and Harmonise criteria and environmental quality standards and develop common indicator systems for environmental management*. The first policy attempts

to devolve environmental management to local governments and to promote the active participation of local stakeholders in the decision-making process. This policy requires the strengthening of local governments through the creation of an appropriate legal framework in order that local governments assume such responsibilities. Decentralisation of environmental management is considered the most convenient way to address pollution problems, although it requires the political will of each country to adopt such administrative changes and to assign the necessary economic resources for its implementation.

The second policy demands the active participation of governments and technical institutions to develop common standards and environmental regulations for the Humboldt Current region. Countries of the region have developed several regional mechanisms of cooperation to deal with pollution problems such as the Plan of Action for the protection of the Marine Environment and Coastal Areas of the South Pacific (CPPS/PNUMA 1983) (see Annex III) and specific programmes to assess the impact of land-based sources of pollution (CONPACSE and PROSET). Unfortunately, countries have not been able to take full advantage of such mechanisms for the benefit of their populations. Ecuador and Peru could benefit from the experience of Chile, a country with higher environmental standards and lower levels of pollution.

Unsustainable exploitation of fish and other living resources

The second priority environmental concern was the Unsustainable exploitation of fish and other living resources. Overexploitation was considered to have a severe impact in the region due to the steady reduction in landings of small pelagic fish and changes in abundance and the composition of species, most of which are considered highly or fully exploited (i.e. Anchoveta (*Engraulis ringens*), South American pilchard (*Sardinops sagax*), Inca shad (*Trachurus murphyi*), Chub mackerel (*Scomber japonicus*), Pacific thread herring (*Opisthonema* spp.), Araucanian herring (*Strangomera benticki*) (FAO 1997). Demersal species (South Pacific hake (*Merluccius gayi*), Southern hake (*M. polylepis*), Patagonian grenadier (*Macruronus magellanicus*)) and several invertebrates are similarly exploited and some are considered overexploited (including sea urchin, clams, scallops, crabs and other crustaceans). The reduction in fishing resources has caused serious economic and social consequences, especially in artisanal communities that are highly dependent on marine resources (CPPS 2003b). Destructive fishing practices, excessive by-catch and discards, which have an impact on the biological and genetic diversity, were considered to have a slight impact.



Figure 16 Fishermen pull their catch onto their boat off the coast of Peru.
(Photo: CORBIS)

The immediate causes of overexploitation include: an increase in fishing effort by both artisanal and industrial fleets; a decrease in the recruitment level of commercial species, particularly of small pelagic schooling fish; a change in the distribution of fish populations, either due to habitat destruction or natural climatic variability; and the use of non-selective fishing gear which produces high rates of by-catch and discards.

The root causes of the unsustainable exploitation of fish include:

- Economic – Increasing demand for fisheries products, demand for specific species of high value, inadequate evaluation of environmental costs.
- Socio-cultural – Demand for products to satisfy selective markets, change in consumption patterns.
- Legal and institutional – Weak application of the responsible approach to fisheries, insufficient application of the current management normative, lack of regional management approach, conflicts among sub-sectors, weakness of institutions responsible for fisheries management.
- Technological – Limited adoption of cleaner technologies.

- Knowledge – Research focused mainly on the exploited species rather than applying the ecosystem approach, insufficient and fragmented information.
- Governance – Lack of policies and strategies with an ecosystem approach at the regional level, conflicts among stakeholders, weak control and enforcement.
- Natural processes – Natural events have increased anthropogenic impacts on some fishing resources.

Construction of options

Based on the Causal chain analysis, three policy options were developed according to the criteria of efficiency, equity, political feasibility and capacity of implementation at the regional level:

1. Rationalisation of fishing production
2. Development of knowledge and indicators
3. Regulation of fishing effort

The chosen policies are in concordance with chapter 17 of Agenda 21 and paragraph 31 of WSSD regarding the conservation and management

of the oceans. These policies attempt to maintain the productivity and biodiversity of the South East Pacific Ocean in the long-term through the sustainable management of its resources. The policies also help to implement the ecosystem approach to fisheries, eliminate destructive fishing practices and facilitate the diffusion and exchange of knowledge between the countries of the region.

The policies also promote the regional management of transboundary fishing resources as proposed by Zuzunaga (2002) through coordination and cooperation between the countries. These policies should be implemented through well-established regional mechanisms such as the Permanent Commission for the South Pacific (CPPS), which has been coordinating technical cooperation in the region regarding coastal and marine issues for the past 50 years. Progression in this direction by the South East Pacific countries was demonstrated through the signing of the Galapagos Agreement in 2000, which includes the conservation and management of living resources beyond the countries' jurisdiction (see Annex III).

Rationalise fishing production

Policy option addressing the root causes Economic, and Socio-cultural.

Since most of the fishing production from the South East Pacific Ocean is used as raw material for fishmeal, this policy attempts to promote the rationalisation of fishing production according to the following aspects: 1) opportunities and market conditions; 2) possibilities of diversifying exploitation and producing added-value products; 3) necessity to internationalise environmental protection costs; 4) maintain the base of exploited resources; and 5) ensure equity and benefits for society.

These aspects demand that economic studies identify opportunities and markets be developed both for new fishing products and for new processed products. The key objective of this policy is to maintain fishing productivity in the South East Pacific and increase incomes through the sustainable management of fishing production. This policy agrees with the Code of Conduct for Responsible Fisheries (FAO 1995) that establishes, in paragraph 11, the necessity that countries cooperate to facilitate the production of value-added products in developing countries. This is also part of the identification and selection of good management practices for the region.

Development of knowledge and indicators

Policy option addressing the root causes Knowledge, and Natural causes.

A second priority was given to the development of knowledge and indicators of change that occur in the exploited populations to allow

policy makers to make informed decisions in the management of the fisheries. The policy requires the development of research, the exchange of information and the implementation of measures at a regional level.

Countries of the Humboldt Current region have been actively cooperating in fishing research under the coordination of the CPPS through its Coordination Commission of Scientific Research. Scientific programmes conducted jointly by countries of the region include the following: the Regional Study of the El Niño Phenomenon (ERFEN); the Joint Regional Cruises Programme; and the Integrated Management of the Large Marine Ecosystem of the Humboldt Current (see Annex III). Part of this cooperation includes training programmes in themes such as hydro-acoustic assessments of resources, and marine biodiversity, among others. Furthermore, countries should increase cooperation to develop baseline studies to establish indicators, especially for transboundary resources, to develop regulations at the regional level to ensure their conservation and management as stipulated in the FAO Code of Conduct. The highly variable oceanographic conditions of the region and the presence of extreme events such as the El Niño and La Niña have important consequences for the fisheries in the region (Csirke et al 1996), which demand highly dynamic management in which all the countries exploiting the same resources participate in the decision-making process. As mentioned earlier, the advantages of such a regional approach for the main fisheries of the South East Pacific have been demonstrated through modelling analysis (Zuzunaga 2002).

Regulation of fishing effort

Policy option addressing the root causes Legal, Governance, and Technological.

The third priority was given to the regulation of fishing effort. However, caution should be taken when issuing measures to regulate fishing effort since environmental conditions also play an important role in the availability and distribution of fishing resources. Csirke et al. (1996) stated that due to the changes in abundance of the Peruvian anchovy as a result of natural variability, a dynamic management system should be adopted that takes into account the fluctuations in its population regime.

Countries in the region are currently implementing measures aimed at reducing fishing effort. For example, Ecuador imposes annual closed seasons for shrimp trawling fishing, as well as for some invertebrates, such as clams and crabs. Peru has imposed closed seasons and quotas for anchovy, sardine, mackerel and hake, and Chile has closed seasons for some coastal invertebrates. However, no measures other than those for the tuna fishing fleet in the Eastern Tropical Pacific by the Inter-American Tropical Tuna Commission (IATTC) have been taken with a

regional approach. The industrial fishing sector has shown in several cases a disproportionate increase in fishing effort compared with the potential of the fishing resource (IMARPE 2002a). The FAO Code of Conduct also calls upon governments to prevent or eliminate excess fishing capacity as a means of ensuring the effectiveness of conservation and management measures. An alternative to reducing fishing effort is to change fishing gear to exploit new fisheries, especially in deeper waters. Promoting investment in new technology capable of catching under-exploited resources should be included in the strategy to redistribute fishing effort.

The regulation of fishing effort at the regional level could be implemented based on advances in knowledge regarding the fisheries. This process may be facilitated through the participation of CPPS as part of the implementation of existing mechanisms of regional cooperation, such as the Galapagos Agreement.

Conclusions

Three policy options were developed to address the issue of overexploitation of fishing resources according to the criteria of efficiency, equity, political feasibility and capacity of implementation at the regional level: *Rationalisation of fishing production, Development of knowledge and indicators and Regulation of fishing effort.*

The first option attempts to maximise the benefits for the counties by taking into account market opportunities, diversifying products and internationalising environmental costs, but maintaining the current basis of exploitation. The second option requires the development of knowledge of the exploited population in order to adopt sustainable fishing management practices. For this purpose the region has developed regional mechanisms of cooperation such as the Regional Study of the El Niño Phenomenon (ERFEN), the Joint Regional Cruises Programme and the Integrated Management of the Large Marine Ecosystem of the Humboldt Current (see Annex III). The ultimate aim is joint management of shared fish stocks in the region. The third policy aims to regulate fishing effort to achieve sustainable fishing management, but takes into account that some resources in the Humboldt Current ecosystem show a high susceptibility to environmental fluctuations. Countries are currently adopting restrictive measures such as closed seasons and quotas for some stocks. However, an alternative to reducing fishing effort on depleted stocks is to develop new fisheries and to promote investment in new technology.