

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.

Policy options for the Colombia & Venezuela sub-system

This Policy option analysis will suggest and evaluate policy responses to the main root causes identified in the Causal chain analysis for the Magdalena River Basin.

Definition of problem

Habitat and community modification was selected as the GIWA priority concern for sub-system 3b, Colombia & Venezuela. Habitat modification is the consequence of several environmental issues examined under the other GIWA concerns, in particular, pollution and the overexploitation of living resources. High rates of deforestation are resulting in greater quantities of sediment entering rivers and eventually being discharged into coastal waters where they alter habitats. Aquatic ecosystems have also been degraded by chemical contamination caused by the fumigation of illegal crops and by spills and discharges from petroleum activities. Wetlands and coral reefs have been modified extensively.

Despite considerable efforts to strengthen environment institutions, they still lack sufficient funding and administrative, monitoring and implementation capacity. The sub-system lacks an integrated development strategy and environmental legislation and enforcement is weak. Guerrilla armies hinder environmental protection activities. Poverty drives communities to overexploit natural resources for their short-term survival. Inappropriate incentives and the lack of disincentives encourage farmers to excessively use agro-chemicals. The advantages of adopting cleaner technologies are poorly understood by industry and there is a lack of environmental education programmes.

Political Characteristics

Various institutions and government agencies in the region are involved in addressing and managing water-related environmental issues and problems. In Colombia, a basis for Integrated Coastal Zone Management has been initiated, which is relatively advanced but complex. Environmental policies established to date include the following:

Colombian National Policies

National Environmental Policy for the Sustainable Development of Oceanic Spaces, Coastal Zones and Islands of Colombia (MMA, 2000): The policy facilitates the sustainable development of ocean spaces and the coastal zone, by providing a framework for environmental planning and integrated management, which aims to enhance the quality of life for the inhabitants of Colombia and promote the conservation of marine and coastal resources and ecosystems. The policy aims to develop and execute the concept of "Integrated Coastal Zone Management", based on scientific data and ensuring the participation of entities responsible for coastal and community management, and marine and coastal ecosystem restoration. It also emphasises the need to prevent and control marine pollution from land-based sources.

National Policy for Interior Wetlands (2001): The objectives and actions proposed by this policy aim to promote the rational use, conservation and restoration of wetlands at national, regional and local levels.

National Policy for Biodiversity (1995): The basic principles of the policy are that biodiversity is patrimony of the Nation and has strategic value for the present and future development of Colombia. The benefits derived from biodiversity use should be used equitably in agreement with the community. The National Policy for Biodiversity establishes the general and long-term framework for the national implementation of the Convention for Biological Diversity which was ratified by Colombia and implemented through the Law 165 of 1994.

National Development Plan (2002-2006): The environmental sustainability programme of the Colombian government aims to maintain the natural resource base for the country's future development, to protect environmental goods and services, and to ensure sustainable production trends in order to strengthen the National Environmental System.

The National Policy of Ocean and Coastal Spaces (2002): This policy harmonizes policies of the different marine productive sectors in order to promote economic development in accordance with the sustainable policies of the Ministry of the Environment. It establishes a framework for the governance of maritime activities in terms of institutional, legal, research and technological aspects (INVEMAR 2002).

CONPES Document: Action plan 2002-2004 of the National Environmental Policy for the Sustainable Development of Oceanic Spaces, Coastal Zones and Islands of Colombia

The National Council of Economic and Social Policy (CONPES) approved on May 10th 2002 a document which identified priority actions, institutional actors for its execution, financial resources, and coordination

mechanisms required for the consolidation and implementation of environmental planning programmes, sustainable management of productive activities, ecosystem conservation and restoration programmes, and programmes to improve the population's quality of life.

Institutional framework

CONPES is responsible for social and economic decisions. It is directed by the President of the Republic and includes various ministers. The Colombian Ocean Commission (CCO) is an assessment programme which is consulted when developing national policy regarding scientific, technological, economic and environmental matters associated with the coast or ocean.

The Ministry of Environment, Housing and Territorial Planning also have functions related to the marine and coastal environment, water resources and territorial planning. CORMAGDALENA is responsible for maintaining navigation routes, port activity, land planning and conservation, energy generation and distribution, fisheries resources, and other renewable resources. The Regional Autonomous Corporations are the environmental authorities in their geographical jurisdiction, their duties focused at the executive level on natural resource management. The General Maritime Direction (DIMAR) is a maritime authority, with an objective to coordinate and control maritime activities (established by the Decree 2324 of 1984). The National Planning Department has an objective to prepare, implement and evaluate policies, general plans, programmes and projects for the public sector.

Recommended Policy Options

Policy Option 1: Integrated River Basin and Coastal Area Management

Formulate, develop and implement strategies for the mitigation of impacts from the Magdalena-Cauca Basin that are adversely affecting the ocean, coastal zone and islands of the Colombia & Venezuela sub-system.

Justification

River basin management and coastal zone management face different challenges in terms of the environmental characteristics and processes, the types and intensity of human activities, and the institutional context. It is increasingly recognised, however, that, due to the complex environmental and socio-economic inter-linkages between river basins and the coastal zone, it is necessary to manage them together as an integrated planning unit.

This policy option proposes integrating basin, delta and wetland management with management actions initiated through the National En-

vironmental Policy for the Sustainable Development of Oceanic Spaces, Coastal Zones and Islands of Colombia. Because human activities in the Magdalena-Cauca Basin cause considerable impacts on coastal habitats and marine resources, it is necessary to coordinate actions through integrated river basin and coastal area management.

Integrated management and planning is necessary to mitigate the impacts on the coastal zone and ocean originating from sources in the Magdalena River Basin. The introduction and implementation of an integrated management system is essential in adequately managing hydrological resources, restoring and ameliorating environmental services offered by the ecosystems, and in optimizing the use of resources for economic development. It will also improve the efficiency of political interventions and reduce potential conflicts between upstream, downstream and coastal stakeholders. Although the system will be integrated, special attention to the specific physical and socio-economic characteristics of river basins and the coastal zone should be incorporated into the strategy.

Table 7 shows a summary of the analysis of this policy option undertaken by the GIWA regional team.

Actions

At the national level:

- Establish a mechanism for coordinating all relevant decision-making entities;
- Identify and evaluate the impacts of human activities on aquatic ecosystems;

- Provide guidance on the control and monitoring of environmental threats;
- Prevent, reduce and control marine and coastal pollution from land-based sources;
- Formulate and implement precautionary measures to prepare for predicted climate change induced impacts, in particular sea-level rise;
- Promote the economic valuation of ecosystem goods and services;
- Regularly exchange information amongst the countries in the region regarding experiences of environmental management;
- Adopt objectives, policies, common strategies and government mechanisms that recognise the interconnections between river basins and the coastal zone;
- Conduct environmental impact assessments;
- Develop human resources and strengthen institutional capacities;
- Ensure the participation of stakeholders from both the public and private sectors, and from a range of geographical locations in the sub-system.

At the local level:

- Strengthen land-use planning in order to control development in environmentally sensitive coastal areas;
- Identify and value natural resources and establish priorities for sustainable development;
- Increase the coverage of wastewater treatment services;
- Protect areas of high ecological value, such as wetlands, deltas and estuaries;

Table 7 Performance of policy options for the Colombia & Venezuela sub-system.

Policy option	Effectiveness		Political viability		Management capacity	
	Option impact	Obstacles and risks	Feasibility	Opposition management	Existing management capacity	Capacity building
PO 1: Integrated River Basin and Coastal Area Management	Reduce environmental degradation; optimize the use of resources for economic development; improve the efficiency of political interventions; and reduce potential conflicts amongst stakeholders.	Financial and administrative limitations; current lack of integration between sectors; lack of political awareness of benefits of integrated management; information availability; lack of conflict resolution mechanisms; lack of political will; and occupation of large areas of Colombia by Guerrilla armies.	Political opposition if economic interests are affected; there is already a basis of a political framework for river basin, coastal zone and wetland management.	Stakeholder participation; establish conflict resolution mechanisms; increase awareness of benefits of PO through community, institutional and business education programmes.	Among other national systems: National Environmental System (SINA; Decree 632 of 1994); Integrated management of coastal and oceanic areas (PNAOCI, MMA 2000); Plan for river basin planning and management.	Establish mechanisms for inter-institutional coordination and information exchange; evaluate coordination mechanisms; assess the progress of CONPES decisions; develop technical and human resources; and incorporate new policy approaches.
PO 2: Develop scientific capabilities	Accurate, timely and relevant information for effective decision-making; reduce scientific uncertainties; improved inter-institutional data exchange; better implementation of international and regional agreements; and enhanced monitoring of the environment.	Research and technology institutions lack innovation and are reluctant to adopt new methodologies; research is not presented in an understandable manner for policy makers; limited political support and funds for research, and technical and human resources; low priority of research policies; and hindrance of scientific activities by guerrilla armies.	A political framework already exists through which the policy option could be implemented.	Demonstrate economic benefits of PO; periodic meetings of scientists, planners, and investors; and stakeholder participation will improve the acceptability of management decisions that are based on the studies.	National Constitution of Colombia supports research and science (Articles 70, 71 and 209); National System of Science and Technology; National System of Environmental Research; National Environmental System; Regional Commission of Science and Technology; various research institutes and universities.	Develop analytical tools; strengthen the National System of Environmental Research and the National System of Science and Technology; improve information and communication networks; align research with the needs of coastal zone and river basin management; establish inter-institutional coordination mechanisms.

- Formulate strategies to promote sustainable agricultural and forestry practices;
- Protect traditional knowledge when it benefits socio-economic development, environmental protection and guarantees rights and equitable access to coastal resources;
- Rehabilitate degraded ecosystems using traditional or new techniques appropriate to the local conditions.

Policy Option 2: Strengthen the scientific capacity of the sub-system

Strengthen the scientific capacity of the sub-system in order to provide accurate, timely and relevant scientific information for informed decision-making in the management of the coastal zone and river basins.

Justification

To manage the coastal zone and river basins effectively, accurate scientific information is required to allow policymakers to formulate efficient and innovative policies (BID 1998). The Causal chain analysis identified several information deficiencies which are hindering the management of the Magdalena River Basin and its adjacent coastal ecosystems. Changes to the ecosystems need to be monitored in order to assess management actions. It is necessary for scientists and decision-makers to cooperate in order to develop policy strategies based on sound scientific knowledge (GESAMP 1990).

To determine management priorities it is fundamental to know the current status of the sub-system's coastal ecosystems, their economic value, and the intensity of impacts they are experiencing. Decision-makers in Colombia require a systematic, accessible and accurate information tool to initiate sustainable development and social change. The policy option will improve the pertinence and quality of data collected and creates an integrated information system to be shared between institutions and used in the design of plans, policies and programmes in order to improve the success of actions. The enhanced monitoring of the environment will allow such actions to be evaluated in terms of their positive or negative impacts.

Table 7 shows a summary of the analysis of this policy option undertaken by the GIWA regional team.

Actions

At the national level:

- Establish strategic programmes of interdisciplinary research in order to generate knowledge and information to support integrated coastal zone management;
- Strengthen transboundary mechanisms of research, information exchange and resource management;
- Develop methodologies for multi-sectorial assessments;
- Standardise environmental indicators in order to periodically assess the environmental quality of the Magdalena River Basin; socio-economic indicators should be used to monitor human well-being and its relationship with environmental degradation trends (MMA 2000);
- Model the complex interactions of coastal processes so that environmental changes and the affects of human activities can be predicted;
- Develop an information management system for policymakers to utilise in the decision-making process;
- Encourage communication and exchange of knowledge/ideas amongst academic, public and private institutions;
- Disseminate knowledge and scientific information to entities responsible for national and regional coastal management.

At the regional level:

- Undertake studies on the coastal and delta geomorphology, and tectonic activity in the sub-system (INVEMAR 2001);
- Predict the vulnerability of ecosystems and societies to sea-level rise (INVEMAR 2003b);
- Develop an integrated information system to efficiently exchange and process coastal and marine data;
- Research the functional relationships between wetlands, river basins and the coastal zone;
- Orientate research programmes to meet the information needs of integrated river basin and coastal zone management institutions.

Policy options for the Central America & Mexico sub-system (3c)

Policy Options Analysis

Two policy options were proposed for the San Juan River Basin.

Problem Definition

In the Central America & Mexico sub-system, habitat and community modification was identified as the priority concern. The transboundary ecosystems have been severely degraded as a consequence of the expansion of agriculture, increased pollution loads and inappropriate forestry practices. The analysis of the San Juan River Basin, shared by Costa Rica and Nicaragua, showed that the degradation of ecosystems and the overexploitation of the resources are attributed to a range of sectors and immediate causes including agricultural expansion, changes in land use, and development. The expansion of agricultural and livestock activities in the basin has resulted in the deforestation of practically all the lowland forests in Costa Rica and the modification of indigenous forests in Nicaragua. These deforested areas have been exposed to soil erosion, which has increased water turbidity. In the San Juan Basin, there is a lack of economic alternatives, there has been mass migration from rural areas to cities, and the productivity of agriculture has declined.

The environmental problems were traced back to their root causes. There is a lack of environmental planning and protected areas are inadequately managed. The activities of coastal zone and river basin management programmes are not integrated, and both lack the capacity to effectively regulate activities which are modifying the sub-system's habitats. There is an absence of environmental education programmes and a lack of research programmes that develop sustainable technologies. Many stakeholders are excluded from what is fundamentally a centralised system of decision-making. Coordination between civil society and State institutions is flawed, with information exchange and dissemination ineffective. Further, poverty forces the inhabitants of the sub-system to exploit resources at an unsustainable rate; as their land becomes unproductive they are forced to migrate to more environmentally sensitive areas.

Recommended policy options

Policy Option 3: Institutional strengthening

Design and implement a capacity building programme which aims to strengthen the relevant institutions and develop human resources, and economic and legal instruments for the prevention and reversal of degradation trends in the San Juan River Basin.

Justification

In Nicaragua and Costa Rica there is a lack of institutional and technical capacity to implement environmental management policies. Environmental institutions need to be strengthened in order to implement and evaluate environmental management in the San Juan Basin. There needs to be an institution responsible for the overall coordination of environmental management activities so that decisions can be harmonised. The integrated management of freshwater and coastal resources will enable the protection and restoration of environmental goods and services and optimize the efficiency of resource use. The coordinating institution should be responsible for creating research programmes for sustainable technologies, formulating environmental education strategies and establishing pollution control and monitoring facilities.

Before developing an integrated management system, a strategic plan would clearly define the roles and responsibilities of the institutions within the basin. River basin plans should promote economic development whilst ensuring the sustainable use of natural resources. Education programmes about the effects of increased erosion and sedimentation, and the impacts on ecosystems and societies will improve the acceptability and success of the plans. Stakeholder participation should be a fundamental component of the decision-making process. Economic incentives can encourage producers to adopt sustainable practices that, for example, reduce erosive processes in the San Juan River Basin.

Actions

At a local level:

- Develop land-use plans for the San Juan River Basin and its adjacent coastal zone;
- Design environmental education programmes;

- Evaluate the functions, responsibilities and capacity of governmental institutions;
- Increased regulation of agricultural practices;
- Establish regular communication between the private and public sectors, and scientific community, in order to coordinate decision-making;
- Formulate strategies to combat soil degradation and inappropriate deforestation.

At a regional level:

- Create a monitoring network of environmental and socio-economic indicators, which involves the participation of communities from both riparian countries;
- Conduct a cost/benefit analysis of environmental goods and services to establish conservation priorities;
- Enhance the basin information system as a tool for decision-making;
- Establish guidelines for mining activities located in close proximity to water bodies;
- Design and implement national and regional water policies that define the responsibilities of Costa Rica and Nicaragua regarding the management of the San Juan River Basin;
- Support the implementation of the “Strategic Action Programme (SAP) for the integrated management of water resources and the sustainable development of the San Juan River Basin and its coastal zone”;
- Within the framework of the Mesoamerican Biological Corridor, establish action plans to streamline and coordinate the activities

of the bilateral commissions and municipalities of both riparian countries;

- Formulate strategies to secure national and international funding for education and technical training and to purchase equipment.

Policy option 4: Promote sustainable production

Promote the sustainable exploitation and production of environmental goods and services in order to alleviate poverty and improve the human well-being of inhabitants in the San Juan River Basin and its adjacent coastal zone.

Justification

The relationship between poverty and environmental degradation is particularly evident in Nicaragua and Costa Rica. The socio-economic situation of the San Juan Basin is characterised by extreme poverty, high population growth rates, inadequate sanitation conditions and a lack of employment opportunities. Economic hardship and soil degradation force inhabitants to migrate to marginal lands, such as mountains slopes, which they convert to agricultural lands. To halt this vicious cycle of land degradation, migration and forest colonisation, sustainable production techniques need to be adopted so the land can sustain future generations. Sustainable production, therefore, can not only provide environmental benefits but can also alleviate poverty by protecting natural resources and providing alternative income sources. This has proved effective in other countries of Latin America (e.g. Colombia and Argentina).

The World Summit on Sustainable Development (WSSD 2002) highlighted poverty eradication as the greatest challenge facing the world

Table 8 Performance of policy options for the Central America & Mexico sub-system.

Policy option	Effectiveness		Political viability		Management capacity	
	Option impact	Obstacles and risks	Feasibility	Opposition management	Existing management capacity	Capacity building
PO 1: Institutional strengthening	Enable the protection and restoration of environmental goods and services; optimize the efficiency of resource use; a strategic plan would clearly define the roles and responsibilities of the relevant institutions; enhanced quality of life for the basin's inhabitants; participative democracy; and harmonization of policies.	Limited economic resources to fund the proposal; institutional coordination and communication has proved difficult; information availability; lack of stakeholder cooperation; lack of political interest in conservation; political instability prevents the implementation of long-term sustainable policies.	Large-scale farmers and the industrial and mining sectors fear that more environmental regulations decrease the competitiveness of their products.	Stakeholder participation; use conflict resolution mechanisms during the design and implementation of the PO.	Costa Rica has been developing policies and technical capacity to preserve its national resources and has developed a significant ecotourism industry; the future success of which depends on a healthy environment.	Greater institutional coordination; decentralization of decision-making processes; increased stakeholder participation; develop technical knowledge and environmental awareness; provide timely and accurate information; and organise and assess scientific research.
PO 2: Promote sustainable production	Environmental benefits; poverty alleviation by stimulating alternative income sources; sustainable use of natural resources; a participative democracy; harmonization of national and sectorial policies; greater binational integration; and increased public awareness of sustainable development.	Absence of a specific policy for the promotion of sustainable products; a lack of incentives for the adoption of sustainable technologies; limited economic resources; time-consuming and complicated administrative processes; fragmented and weak legislation; and institutional weaknesses.	Industries may be unwilling to adopt sustainable technologies; PO is more feasible in Costa Rica where there are many environmental initiatives; the international market for sustainable products is rapidly growing.	Publicity campaigns about benefits of sustainable production; stakeholder participation; and economic incentives for industries.	Costa Rica has developed a National Forest Development Plan; the Mesoamerican Biological Corridor initiative has built capacity in the institutions of the region; and the UNTACD's Biocommerce initiative supports such policies.	Increase awareness of the advantages of developing the market in sustainable products; create economic incentives for developing markets in sustainable products; undertake training programmes in using cleaner technologies; and increase stakeholder participation.

and called for specific measures to address this issue. In the WSSD Plan of Implementation, paragraph 13 states that “all countries should promote sustainable consumption and production patterns”. Some international initiatives support the trade of goods and services produced in a sustainable manner. Since 1996, the Biotrade Initiative of UNCTAD has promoted the market for biological products produced from sustainable techniques so they have a higher domestic and international market value. Further, the DOHA Declaration, within the framework of the World Trade Organisation, opened negotiations to reduce or eliminate customs duty on environmentally sustainable products from developing countries.

Actions

At a local level:

- Design a national and binational policy for trade in sustainable products;
- Create economic incentives for the adoption of sustainable production technologies;
- Conduct research on locally compatible, sustainable technologies for chemical industries.

At a regional level:

- Modernise the forestry sector so that its products are competitive on the international market;
- Research and design cleaner production technologies;
- Market the basin’s sustainable environmental goods and services to the international market.

At a global level:

- Identify international partners to support sustainable production initiatives;
- Remove customs duties for the trade in goods and services produced using sustainable methods;
- In accordance with the Rio + 10 Action Plan, request the transfer of cleaner technologies;
- In accordance with the Rio +10 Action Plan, promote actions which encourage more sustainable consumption and production patterns.