

Distr.  
RESTRICTED  
LC/R.1781  
19 August 1998  
ENGLISH  
ORIGINAL: SPANISH

---

E C L A C  
Economic Commission for Latin America and the Caribbean

**REPORT OF THE REGIONAL WORKSHOP ON ECONOMIC ASPECTS  
OF COASTAL AND MARINE BIODIVERSITY**

Santiago, Chile, 1-3 December 1997

Report prepared by the Environment and Development Division of ECLAC.

98-3-258



## CONTENTS

	<i>Paragraph</i>	<i>Page</i>
ORGANIZATION OF WORK.....	1-13	1
Place and date.....	1	1
Objective .....	2	1
Attendance .....	3	1
Agenda .....	4	1
Opening of the workshop .....	7-13	2
PROCEEDINGS .....	14-19	3
CONCLUSIONS AND RECOMMENDATIONS .....	20-81	3
Agenda item 1: Sectoral development on the basis of coastal and marine biodiversity .....	20-37	3
First module .....	20-26	3
Second module .....	27-31	5
Third module .....	32-37	5
Agenda item 2: Economic instruments for management of coastal and marine biodiversity .....	38-81	7
First module .....	38-67	7
Second module .....	68-81	10
GENERAL RECOMMENDATIONS .....	82-91	12
Annex I: Background and rationale .....	-	15
Annex II: List of participants .....	-	18
Annex III: Provisional programme .....	-	27



## **ORGANIZATION OF WORK**

### **Place and date**

1. The workshop was organized by the Environment and Development Division. It was held from 1 to 3 December 1997 at the headquarters of the Economic Commission for Latin America and the Caribbean (ECLAC).

### **Objective**

2. The main objective of the meeting was to consider the conservation and sustainable use of biological diversity from a multidisciplinary perspective, within the guidelines of the Agreement on Biological Diversity and chapter 15 of Agenda 21.

### **Attendance**

3. The workshop was attended by experts from Argentina, Brazil, Chile, Colombia and Cuba and by representatives of the Inter-American Development Bank (IDB), the Food and Agriculture Organization of the United Nations (FAO) and the Chilean-European Community Business Foundation. A complete list of participants is presented in annex II to this document.

### **Agenda**

The participants in the workshop adopted the following agenda:

4. **Agenda item 1: Sectoral development on the basis of coastal and marine biodiversity**
  1. Fisheries and coastal and marine biodiversity.
    - (a) Economic analysis of coastal and marine biodiversity;
    - (b) Aquaculture as a modifier of biodiversity.
  2. Tourism in areas of wide coastal and marine biodiversity.
    - (a) Strategies for the rational use of tourist sites in coastal areas;
    - (b) Ecotourism as an option for promoting conservation.

3. Advances in biotechnology with marine and coastal resources.
  - (a) Use of hydrobiological species and genes of resources in the preparation of pharmaceutical drugs;
  - (b) Genetic patents of coastal and marine hydrobiological species.
5. **Agenda item 2: Economic instruments for the management of coastal and marine biodiversity**
  1. Financial resources for restoring degraded habitats and ecosystems in the region.
  2. Clean-up programmes for bays in the region.
  3. Development and transfer of technology for protection of coastal and marine ecosystems.
  4. Economic instruments for promoting the conservation and sustainable use of coastal and marine biodiversity.
  5. The BIOTRADE initiative of the United Nations Conference on Trade and Development (UNCTAD).
  6. Privatization of protected coastal and marine areas.
6. **Agenda item 3: Natural disasters affecting coastal areas**
  1. Uncertainties in management of coastal and marine zones.
  2. Methods for assessing damage to coastal areas caused by natural disasters.

### **Opening of the workshop**

7. The regional workshop on economic aspects of coastal and marine biodiversity was held at ECLAC headquarters in Santiago, Chile, from 1 to 3 December 1997. Background information relating to the convening of this workshop is contained in annex I.
8. The workshop was declared open by Mr. Reynaldo Bajraj, Deputy Executive Secretary of ECLAC, who said that initiatives such as the workshop enhanced the Commission's work of furthering economic and social development in Latin America and the Caribbean.
9. He indicated that a traditional starting point for economic analysis was to attempt to determine how people collaborated in producing goods and services. He added that even the best formulas for achieving this were limited by resources, capital and knowledge and that for a society, development meant transcending those limits.
10. He highlighted the role that technological change had played in such efforts and in overcoming constraints in terms of resources and said that if that was achieved, the conditions would exist for improving the quality of the productive process. Moreover, the development of new resources would be a means of avoiding degradation of existing resources.
11. In conclusion, he pointed out that dialogue with the actors working on the various aspects of the sustainable development of natural resources was vital to ECLAC in its task of formulating effective policy recommendations to member Governments. He was confident that the workshop would make a valuable contribution in that respect.

12. Ms. Helga Hoffmann, Director of the Environment and Development Division of ECLAC, affirmed that the approach adopted by that division was fully in keeping with the description given by the Deputy Executive Secretary and announced that the workshop would be coordinated by Patricio Bernal, of the National Environment Commission of Chile.
13. Lastly, Mrs. Carmen Artigas, Legal Officer of the Environment and Development Division, outlined the specific objectives of the workshop and the work dynamic that would develop around the presentations by participants.

### **PROCEEDINGS**

14. Participants, in their presentations, analysed the economic functions of coastal and marine ecosystems with respect to:
15. Maintaining an adequate supply of fishery resources as an integral part of fish production and aquaculture. In this connection, aspects of sustainable use through the integrated use of resources were studied, especially the development of food and pharmaceutical products.
16. The future need to analyse efficiency in industrial processes (raw material to end-product conversion factors), in the use of discards and by-catch.
17. The assimilation of discards. Some effects of pollution, the economic and financial implications of protection of the marine environment from land-based activities and some experiments in rehabilitation and clean-up operations were described by participants.
18. The generation of direct profit as a public good (scenic beauty, recreation, tourism). Experiments in ecotourism in coastal and marine zones, their implications for sustainable development and aspects of privatization of facilities in protected coastal and marine areas.
19. Sustaining biodiversity (intrinsic value). Some functions of environmental interrelationships, such as evaluation of damage caused by natural disasters and the El Niño phenomenon, were also examined and it was recommended that variables such as red tides and toxic algae growth should also be taken into account.

### **CONCLUSIONS AND RECOMMENDATIONS**

#### **Agenda item 1: Sectoral development on the basis of coastal and marine biodiversity**

#### **20. First module**

This module included the following presentations:

- Economic analysis of coastal and marine biodiversity: the case of fisheries. María I. Bertolotti, National Institute for Fisheries Research and Development, Mar del Plata, Argentina.
- Economic and strategic aspects of fisheries exploitation. René Cerda D'Amico, Valparaíso Catholic University, Chile.
- The use of economic instruments for the conservation and sustainable use of coastal and marine biodiversity. Eugenio Figueroa, Centre for Natural Resource and Environmental Economics, University of Chile.

### Conclusions:

21. The valuation of natural assets is important for the design of policies for the conservation and sustainable use of coastal and marine biodiversity and for facilitating decisions relating to the allocation of resources for fishery activities.
22. Economic analysis provides a wide range of instruments for facilitating decision-making, but, in each specific case, it must be borne in mind that these methods have limitations and the assumptions used must be stated in order to improve the interpretation of the results for the purposes of management.
23. The valuation exercise must take into account all types of values including those associated with private and public preferences and, above all, those relating to the life-support capacity of ecosystems, and the cost of inaction.
24. In the interests of the economy of local communities and the conservation of biodiversity, consideration should be given to the establishment of reserve areas for small-scale (artesanal) fishing —similar to the management areas established in Chile for benthic resources. Such management areas would enable legally constituted artisanal fisheries organizations to establish a regulated catch operation for hydro-biological resources in the relevant area through a management plan authorized by the Under-Secretary for Fisheries. This arrangement will make it possible for artisanal fishing communities to exercise full responsibility over their resources and exploit them according to their capabilities.
25. Methods of valuation of fisheries resources should be considered as a specific approach in the context of coastal and marine biodiversity and the analysis of this biodiversity should incorporate that of the ecosystem, the milieu in which the life process of these resources is maintained.
26. Conservation of coastal and marine biodiversity is based largely on the sustainable use of these ecosystems. While the use of an anthropocentric approach in any analysis is ethically correct, it tends to place emphasis on those species that are of direct interest to human beings. However, this approach must not overlook the fact that the conservation of such species, and hence of coastal and marine ecosystems, depends on the sustainability of a number of critical processes — including restoring the mineral balance of organic matter— which, in turn, depend fundamentally on species, such as bacteria and marine worms, which are considered lower from an evolutionary



point of view but are vital for maintaining those processes and conserving the quality of their habitat. It is therefore vital to make headway in understanding these substances and the activities or roles of the species—their ecological niche—within the community in which they are found, which often are not determined by the degree of proximity or distance of their genetic relationship.

**27. Second module**

- Aquaculture as a modifier of biodiversity. Andrés Mena Millar, FAO Regional Office for Latin America and the Caribbean.
- The development of food supplements and drugs from marine resources. Afranio Aragao Craveiro, Federal University of Ceará, Brazil.
- Intellectual property rights and marine genetic resources. Carmen Artigas, Environment and Development Division, ECLAC.

**Conclusions:**

28. The trend should be towards integrated use of fisheries resources to facilitate the extraction of food supplements and medicines from waste products, which, in addition to contributing new employment opportunities, would mean a considerable reduction in pollutants.
29. A study must be carried out on the application of the provisions of the Convention on Biological Diversity relating to access to marine genetic resources and transfer of technology, and the situation with regard to systems of awarding intellectual property rights for both end products and knowledge in order to evaluate the region's potential competitiveness in this area of sustainable use of coastal and marine biodiversity.
30. Aquaculture is important as an income-generating activity, for food production and in the use of expanses of land and coastal and inland waters which are often underutilized or unused.
31. Industrial aquaculture, however, is a drain on environmental resources and is known to have caused at times irreversible damage by introducing into the environment organic substances, parasites and diseases, by altering the genetic characteristics of wild species and by destroying sections of important coastal ecosystems. In this respect, regulations should be established and enforced to ensure that aquaculture is practised in a manner consistent with environmental conservation.
32. **Third module**
  - Methods for assessing damage to coastal areas caused by natural disasters: flood damage. Rosa Aguilera Vidal, Department of Economics, University of Concepción, Chile.
  - Monitoring the southern oscillation of the El Niño phenomenon. Juan Quintana, Meteorological Department of Chile.

- The impact of the El Niño phenomenon on anchovy stocks: southern Peru and northern Chile. Patricio Barría, Fisheries Development Institute (IFOP), Valparaíso.

### Conclusions:

33. The "seven step methodology" is an interesting tool for determining the vulnerability of coastal areas to rises in sea level, and for analysing feasible measures to be implemented in response to this problem in the context of long-term integrated management of coastal zones. It should be noted, however, that this method supposes the availability of significant volumes of data, which, in the case of developing countries, would be difficult to procure in the short term, because of lack of basic information and relevant scientific activity (financial and human resources) concerning the study of natural and socioeconomic systems, in general, and coastal ecosystems, in particular. However, the methodology may be used on the understanding that the evaluation takes the form of a profile and not a prefeasibility or advanced feasibility study. In this way, at the initial phase of the evaluation process, the study provides an adequate indication of the general effects of rises in sea-level which can be used to alert local authorities as to areas that are vulnerable to such rises. If more resources are allocated, the study can obviously be developed in greater depth.
34. On the other hand, with respect to the usefulness of the method as an instrument for decision-making, one must be realistic about the gap between the scale of physical change and the human scale in taking decisions. In the case of rises in sea level over a period of one hundred years, it is difficult for local authorities to assign major efforts to working out strategies in response to the effects of this phenomenon. Usually, Governments have to take decisions of a more pressing nature concerning, for example, poverty elimination or environmental sanitation in order to improve the quality of life of the population.
35. Nevertheless, in the case of natural disasters with significant adverse short-term effects, priorities other than those of Governments can be set, in order to avoid loss of human life and material damage that would be impossible or difficult to repair.
36. In any event, the agencies that conduct studies and seminars on these issues must advise on the appropriateness of taking decisions that go beyond urgent short-term social considerations and recommend assessment of exposure to events that are predictable, even if only approximately so. On the basis of available resources, however scarce provided they are put to optimum use, it would probably be possible to establish in advance strategies to protect the population, economic activities and infrastructure situated in the coastal zone, in such a way as to minimize the occurrence of disasters associated with natural phenomena ("it is better to be approximately right than perfectly wrong").
37. The El Niño variable and other natural phenomena affecting coastal areas should be taken into account among the unpredictable elements in management of the coastal and marine environment and in this connection, anticipatory and contingency strategies should be factored into the different related economic activities.

## **Agenda Item 2: Economic Instruments For Management of Coastal and Marine Biodiversity**

### **38. First module**

- Clean-up operations in bays in the Caribbean region. Antonio Villasol, Centre for Engineering and Environmental Management of Bays and Coasts, Havana, Cuba.
- Introduction to the economic and financial implications of the Global Plan of Action for the protection of the marine environment from land-based activities. Roberto de Andrade, ECLAC.
- The experience of the south-east Pacific in the preparation of diagnostic analyses of contaminants from land-based sources. Nora Cabrera, Office of the Superintendant of Sanitation Services, Chile.
- Modelling technology for decontamination of water resources in Chile. Cecilia Parra, Technological Research Institute (INTEC), Chile.
- Regional Autonomous Corporation of Magdalena/German Agency for Technical Cooperation (CORPOMAG/GTZ) project for the rehabilitation of the marshlands of Santa Marta. Carlos Rubio, CORPOMAG/GTZ, Colombia.
- Environmental study on potential leakage of fertilizers and disposal of the wreck of the vessel North Island, which ran aground off San Antonio, Chile. Boris Ramírez Reyes, Catholic University of Valparaíso.

### **Conclusion:**

39. Pollution problems in the countries of the region are due to different factors, the most important of which are outlined below.
40. Pollution caused by discharge of liquid urban wastes, due to lack of treatment facilities, the use of obsolete or inefficient technologies in many cases and lack of proper maintenance of existing treatment facilities.
41. Contamination caused by sewage in cities, due to lack of or inadequate sewerage systems in cities of the region.
42. Pollution caused by solid wastes (both urban and industrial), due to poor infrastructure in cities of the region for the collection, proper treatment and disposal of these wastes and the lack of management projects for resolving the problem. Pollution caused by shipping and port activity as a result of the discharge of bilge water and ship waste-water and lack of proper infrastructure in our ports for the collection, treatment and disposal of wastes resulting from port activity. While

the framework provided by the International Convention for the Prevention of Pollution from Ships (MARPOL) of the International Maritime Organization holds great promise, conditions in most countries of the region do not allow them to exercise effective control or to install facilities to cope with the different types of waste from ships. Similarly, internal regulations relating to the management of wastes in general often establish conflicts with respect to areas of competence and the need to provide for port accommodation facilities under national sanitation strategies often associated with other international conventions such as the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. Lastly, economic feasibility studies should be undertaken on the provision of such accommodation and treatment services, since this would be a profitable activity that could generate capital investment.

43. Pollution due to eroded material (sediments) resulting from the poor management of crop and livestock farming in catchment areas.
44. Pollution due to poor management of fishing activity. The use of harmful fishing techniques, such as dynamiting, are common in the region.
45. Environmental management activity in countries of the region is fraught with difficulty, with frequent reports of the following problems.
46. Lack of coordination between the authorities working on environmental management in countries of the region.
47. The lack of budgetary allocations from governments for action to promote environmental management.
48. Lack of understanding on the part of decision-makers in countries of the region of the great "cost of inaction"; this term is used to define how much more expensive it is to implement environmental rehabilitation initiatives than to take action to prevent environmental damage in the first place.
49. Sources of financing for the implementation of work for environmental rehabilitation are increasingly scarce.
50. Despite the existence of different categories of environmental legislation, there are legislative lacunae and lack of effective control mechanisms and instruments for enforcing compliance.
51. In most of the socio-economic development projects undertaken in coastal areas, no account is taken of the needs or aspirations of communities that live in the area and this causes conflicts of interest, which in most cases are difficult to resolve.
52. Socio-economic development projects that are executed in coastal zones must respect the following basic principles of operation of coastal ecosystems.
53. Sunlight is the primary source of energy of marine ecosystems. If sunlight cannot penetrate a column of water, the primary production of the ecosystem and, hence, its capacity to generate goods of use to mankind, are affected.

54. The natural flow of water should be respected and maintained. Disruption of this flow by human action sets in motion processes that are highly damaging to coastal ecosystems, as occurred in the Santa Marta Marshland in Colombia.
55. An adequate supply of nutrients to marine ecosystems must be maintained. When the natural supply is disrupted by dumping of wastes from urban industrial activity, eutrophication sets in and can alter the environmental quality of the water.
56. It is essential to preserve the structural integrity of the vital components of coastal ecosystems, such as sand dunes in beach areas and mangrove swamps; erosion of beaches as a result of construction on sand dunes for tourist developments and damage to mangroves as a result of indiscriminate shrimp farming are common occurrences in the region.
57. A multisectoral and multidisciplinary approach should be used to cope with shipping disasters and other incidents that perturb coastal areas. Such events require the prompt creation of bodies made up of competent authorities and endowed with sufficient decision-making powers to bring the problem under control and put forward a plan of action based on the consequences and risks involved. Subsequently, a multidisciplinary operational working group should be organized and commissioned to make an environmental impact assessment with a view to generating an operational model based on different risk scenarios and the corresponding levels of control and surveillance, and a cost-benefit analysis of the measures proposed, to enable the decision-making body to decide on appropriate operational measures.
58. With respect to the management of biodiversity and alternative ways of making use of it, the instruments for territorial management and protection of nature must expressly take into account the special characteristics of the relevant coastal and marine area. This is important for the establishment of secure geographical borders since it is possible for very localized impacts to spread to wider areas dependent on coastal systems.
59. In view of the foregoing, planning authorities and those responsible for development and environmental management should recognize that to a large extent, impacts on coastal ecosystems, their resources and inhabitants are land-based and reach the coast through the hydrographic basins, which clearly underscores the fact that management of the upper reaches of these basins transcends interests relating to the use of their riverbeds and the adjacent land areas and therefore, in terms of water treatment costs, opportunity costs and the costs of environmental rehabilitation of coastal areas, an important degree of responsibility is vested in the management entity and users throughout the basin.
60. Consequently, one can readily appreciate the importance of working out a strategy for sensitizing national decision-makers, politicians and the mass media, who influence civil society, to the need to follow through on this recognition by means of specific regulatory measures and cost-sharing. For this purpose, national and international institutions or agencies involved in coastal management and protection should assume a strong leadership based on sound environmental and economic arguments which have been sufficiently demonstrated.
61. Furthermore, Governments should be take note that the development of infrastructure and, above all, of national road systems has the potential to interfere in a serious way with the natural hydrological system, which ultimately affects the efficiency of coastal ecosystems, their

biodiversity and uses; rehabilitation may prove much more costly than investment in infrastructure works that respect the functioning of ecosystems.

62. With respect to the need to define terms of reference for the integrated management of coastal areas, it was considered appropriate to recall the following.
63. A coastline policy should be an instrument for incorporating the management of such ecosystems in the general strategy for sustainable development of the country and the region.
64. Consequently, it should not be viewed as an isolated or independent instrument or as a category separate from the conservation or sustainable use of natural resources designed to ensure a better quality of life for the population.
65. The models of integrated management of coastal areas that have been compared are valuable and undoubtedly enriching examples but cannot be applied *stricto sensu* to different situations or in the absence of an endogenous proposal against which its limitations can be evaluated.
66. It should be borne in mind that coastal and marine ecosystems are public environmental goods in respect of which the prime concern should be the public interest; equity in terms of use and enjoyment and the goal of securing long-term sustainability.
67. Mechanisms of participation, coordination, conflict resolution and allocation for use should, in the final analysis, be subordinate to the decision-making level which is capable of protecting the public interest, by maximizing efforts to benefit local communities.
68. **Second module**
  - Ecotourism as a conservation alternative. Juan Gastó, Catholic University of Chile.
  - Agrotourism as an alternative way of supporting the development of protected coastal areas. Jacques Patri Didier, Chilean-European Community Business Foundation.
  - Competitive bidding for government lands in coastal areas in the Atacama region. María Eva Bustos, Regional Ministerial Secretariat for National Property of Atacama, Chile.
  - Tourist activity in coastal areas: challenges for sustainable development. Humberto Rivas O., National Tourism Service (SERNATUR) of Chile.
  - Privatization of services in protected coastal and marine areas. Angel Lazo, National Forestry Corporation (CONAF) of Chile.

#### **Conclusion:**

69. It should be borne in mind that the conservation and sustainable use of biodiversity is not just a matter of ecological interrelationships but should also incorporate the socio-economic variable

and, in this regard, the role of education is vital. Training for sustainable development of tourism and for protection of the coastal and marine environment, should not only be part of formal education—which is a way of integrating the issue into the lives of the people—but should also be organized at the decision-making level. In this regard, consideration should be given to setting up “nature halls” and “marine conservatories” which, through imparting knowledge on species and ecosystems promote action for conservation.

70. It is important to bear in mind that tourism cannot work in isolation as an instrument of economic and social development. It must necessarily be integrated into a wider strategy for sustainable development which incorporates in an appropriate way the visions of the local communities.
71. It is also fundamental to bear in mind that real estate development is not synonymous with the development of tourism, since the latter conforms to a given policy based on scientific evidence concerning what ecosystems can sustain and the social consequences, among other things.
72. It is also relevant, in designing policies for the development of tourism to give careful consideration to the adverse effects of lack of infrastructure for waste disposal and treatment.
73. As has occurred in various natural resource-based services, it is essential to analyse the State's regulatory capacity in allowing private entities access to activities linked to the sustainable use of coastal and marine biodiversity. The regulatory framework should be consistent with the limits of the natural unit being regulated rather than particular jurisdiction and regulations which often reflect historical standards superseded by scientific evidence. In this respect, it would appear worthwhile to analyse comparative experiments for some specific ecosystems, such as mangroves, mudflats and sandbars, where the area of protection measured from the highest tidemark is extended to give due respect to ecosystem requirements.
74. In the same connection, it was suggested that environmental impact assessment systems should take into account the restrictions and limitations of administrative districts and divisions in relation to the reality of the ecosystem.
75. It is essential to weigh up the efficiency of property rights in protecting the common good, and in this regard to take account of tourist activity and private interests in ensuring the public's right to recreation.
76. The absence of any legislation governing subaquatic activities is one notable area of legal deficiency with respect to regulation of the use of protected coastal and marine areas; this means that ecosystems can be seriously affected by the actions of persons who practise such activities without proper knowledge or skill in the most appropriate techniques. Steps must be taken to establish regulations and information and training activities on this issue in order to build awareness among international agencies and diving clubs.
77. Guidelines should be prepared for research into biodiversity within protected coastal and marine areas with a view to achieving sustainable development. These guidelines should be in keeping with the objectives and potential uses of such areas.
78. Tourist activities must be directed towards sustainable development objectives. Both within and outside of protected marine and coastal areas, what is known as ecotourism should be the subject

of appropriate management and conducted in a manner that shows respect for social and cultural values, while generating appropriate alternative sources of income for local communities.

79. It is essential to ensure not only that broad participation in ecotourism activities in coastal and marine zones is offered to communities who pursue their livelihoods in the area, but also that these activities are incorporated in a wider context, encompassing activities in the interior of the country, through integrated rural tourism strategies and experiments with agrotourism, with a view to promoting local communities and boosting activity in depressed areas.
80. Providers of tourism services in the region —and in particular tourism-related business associations or trade unions or those that control coastal areas— should be encouraged to incorporate self-regulating mechanisms in the operation of their activities, on the basis of parameters that ensure sustainable tourism development. The application of initiatives of this kind will help to consolidate the tourist image of some places and therefore to promote them as destinations that may offer a particular level or standard of environmental quality, in this case certified by the private sector.
81. The effort to raise public awareness should be undertaken in conjunction with private tourism agents in order to ensure an on-going dialogue between environmental agencies and private actors in order to sensitize the latter to the value of natural resources, the requirement of sustainability and the possible impact of unbridled tourism, by involving them in information activities available to the respective users of the services.

### **GENERAL RECOMMENDATIONS**

82. Emphasis was placed on the need to promote the making of inventories of river and marine biodiversity, given the complexity of such an undertaking and the real lack of specialists in taxonomy and systematization due to the influence of the market on the range of careers open to biologists. Ways should be found of reversing this trend. The enormous gaps in knowledge of coastal and marine biodiversity require such a huge effort on the part of countries that the only efficient approach is through multilateral regional cooperation mechanisms involving a large number of countries, would provide an efficient multiplier effect.
83. In considering the ecosystems involved in the proper conservation and sustainable use of coastal and marine biodiversity, reference was made to the importance accorded by chapter 17 of Agenda 21 to the impact of hydrographic basins on the adjacent coastal marine ecosystem. The importance of defining some specific ecosystems for studies of a more limited scope, such as those relating to estuaries, reefs, mangrove swamps, deltas and the continental shelf, was also stressed.
84. In view of the specificity of ecosystems and the distinct nature of economic activities, it is essential to compare the relevance of the various methods of economic evaluation available and to identify the most suitable instruments for its application.
85. It is becoming urgent to direct the environment-related work of financial organizations and agencies towards the concepts and objectives of sustainable development articulated in Agenda



21 in order to facilitate national proposals and ensure that the results of the respective projects contribute to social, economic and environmentally sustainable strategies.

86. In view of the difficulty of achieving a precise evaluation of biodiversity, an economic valuation exercise should be conducted in the region on the present use of resources in coastal areas, on the understanding that the outcome does not imply an exhaustive evaluation of biodiversity but rather of the value that the society derives from its use today, which ultimately is an expression of the society itself in terms of the state of current knowledge and the availability of financial and technological resources. In many cases, the livelihood of whole communities depends on this use of biodiversity.
87. It would be worthwhile to consider the possibility of incorporating into this exercise the value of the uses of the resources of aquatic environments throughout river basins, and to estimate the value of the potential use of resources still undeveloped but clearly identifiable as viable.
88. The results of this exercise may be compared with those of preventive measures in activities which have the potential to affect the marine environment, in the interests of demonstrating the need to ensure that individual or sectoral uses contribute in an appropriate manner to protecting the general interest in use of the resources provided by marine biodiversity.
89. The workshop recommended continuing with the practice of holding multidisciplinary and intersectoral meetings of the same type for application of the Convention on Biological Diversity to coastal and marine spaces, since they were the only opportunity for promoting dialogue—from different perspectives and spheres of competence—on issues essential to the design of government policies that would contribute to sustainable development.
90. The host organization was urged to promote the formulation of technical cooperation projects to demonstrate fully the capacity to build on successful experiences that could be replicated at the regional level in fields such as ecotourism, the use of economic instruments for management of coastal and marine areas, models of fisheries sustainability which reflect the ecosystemic dimension of biodiversity and systems for responding to and anticipating the effects of phenomena such as El Niño.
91. On 3 December at 5 p.m., Mr. Patricio Bernal, coordinator of the workshop, announced that the workshop had completed its work, following which it was officially closed by Mrs. Carmen Artigas, Legal Officer in the Environment and Development Division of ECLAC.



## Annex I

**REGIONAL WORKSHOP ON ECONOMIC ASPECTS OF COASTAL AND  
MARINE BIODIVERSITY**

Santiago, Chile, 1-3 December 1997

**Background and rationale**

The integrated approach —combining scientific, technological, economic, social and cultural factors— that is necessary for sustainable development requires further opportunities for dialogue between various disciplines to enhance the complementarity of their individual efforts and optimize the service that each can provide to the others.

One of the scenarios for overcoming conflicts and for seeking complementarity has to do with the conservation and sustainable use of biological diversity, within the guidelines of the Convention on Biological Diversity and chapter 15 of Agenda 21.

Resolution 2 on International Cooperation for Biodiversity Conservation and Sustainable Use of its Components, adopted at the meeting in 1992 at which the text of the Convention was adopted, listed as one of the priority areas in which Governments would require support that of evaluating the possible economic repercussions of conservation of biodiversity and sustainable use of biological and genetic resources and attributing values to biological and genetic resources.

For its part, the text of the Convention identifies as one of the obligations of the parties that of promoting cooperation between government authorities and the private sector in elaborating methods for the sustainable use of biological resources and the adoption of economically and socially suitable measures that act as incentives for the conservation and sustainable use of the components of biological biodiversity.

With respect to the sustainable use of biodiversity, the provisions of the Convention relating to access to and transfer of technology, access to genetic resources and management of biotechnology, and distribution of the benefits thereof also open up a wide area of reflection on the need to combine scientific and economic approaches.

Chapter 15 of Agenda 21 relating to conservation of biological diversity provides guidelines for action for various provisions of the Convention.

Various efforts have been made within and outside of the region to achieve progress in some criteria relating to the economic aspects of biodiversity in general.

In May 1996, at ECLAC headquarters in Santiago, the Regional Office for Latin America and the Caribbean of the United Nations Environment Programme, in conjunction with the Governments of Canada and Chile, organized the Regional Workshop on Economic Valuation of Biodiversity the objectives of which were, among others, to identify and discuss economic issues essential for the

protection of biological diversity and the application of the results of such valuation to the review of economic policy instruments for the conservation and sustainable use of biodiversity.

That workshop focused on terrestrial ecosystems and, therefore, did not consider the specificities of coastal and marine biodiversity that emerge from an analysis of the economic aspects of conservation and sustainable use of such biodiversity.

Work conducted since 1994 by ECLAC and the Regional Office for Latin America and the Caribbean of the Food and Agriculture Organization of the United Nations (FAO) on guidelines for facilitating the application of the Convention on Biological Diversity to coastal and marine ecosystems has produced useful core information for analysing the role of the economy in these areas.

Some of the recommendations formulated at the Regional Meeting on the Conservation and Sustainable Use of Coastal and Marine Biodiversity, held in Tamandaré, State of Pernambuco, Brazil, from 5 to 11 October 1996, refer to the promotion and development of new methods of economic valuation of coastal and marine biodiversity, since the conservation and sustainable use of biodiversity provide a good opportunity for the Convention on Biological Diversity to establish real links between conservation and the use of genetic resources and central aspects of economic flows.

At a workshop on protected coastal and marine areas organized by ECLAC and the FAO Regional Office for Latin America and the Caribbean as part of the first Latin American Congress on National Parks and Other Protected Areas, held from 26 to 28 May 1997 in Santa Marta, Colombia, experts stated that it was essential to study the economic and social dimension of *in situ* conservation of the coastal and marine areas in the context of efforts by the region to promote sustainable development and social equity.

They also pointed out that it was necessary to direct tourist activities towards the goals of sustainable development and to ensure that ecotourism, both within and outside protected marine and coastal areas, should be the subject of appropriate management that respected social and cultural values while generating appropriate alternative sources of income for local communities.

The areas in which it is possible to analyse the interactions between the economy and the conservation and sustainable use of coastal and marine biodiversity are varied. Fisheries, aquaculture, tourism, biotechnology applied to species and genes, the rehabilitation of degraded ecosystems, the reduction of pollution of the sea from land-based activities, the role of private entities in the management of protected coastal and marine areas are some possible areas.

The need to assess actual damage or to make provision for the cost of repairing future weather-related environmental damage —especially that associated with the current manifestation of the El Niño phenomenon— raises other issues concerning the role of the economy in the sustainable development of coastal and marine ecosystems.

This workshop will be an open and informal forum for the exchange of experience, concerns and proposals in these various contexts and, rather than leading to definitive conclusions or specific recommendations, its work will consist in raising issues and problems for the gradual future development of guidelines based on actual data.

An attempt was made to establish a provisional agenda representative of the oceanographical/biological and economic viewpoints in order to focus discussion on empirical approaches and to respond to the priority concerns of countries of the region with respect to the integrated management and sustainable development of its coastal and marine areas in accordance with the content of chapter 17 of Agenda 21.

## Annex II

**LIST OF PARTICIPANTS****REGIONAL WORKSHOP ON THE ECONOMIC ASPECTS  
OF COASTAL AND MARINE BIODIVERSITY**

Rosa Aguilera Vidal  
Profesor Asociado  
Departamento de Economía  
Facultad de Ciencias Económicas y Administrativas  
Universidad de Concepción  
Victoria 471  
Casilla 1987  
Concepción, Chile  
Tel 56-41-229-946 / 204-503  
Fax 56-41-231-131  
E-mail raguiler@buho.dpi.udec.cl

Fausto Antonio de Azevedo  
Subsecretario  
Governo do Estado da Bahia  
Secretaria do Planejamento, Ciencia e Tecnologia  
Av. Luiz Viana Filho, 250, 2a. Av. C.A.B.  
Salvador, Bahía, 41750-300  
Brazil  
Tel 55-71-371-6417  
Fax 55-71-371-3206 / 370-3535  
E-mail fauto@seplantec.ba.gov.br

Lina Araya Núñez  
Representante de CONAMA en la  
Comisión Nacional de Borde Costero  
Comisión Nacional del Medio Ambiente de Chile (CONAMA)  
Obispo Donoso 6, Providencia  
Santiago, Chile  
Tel 56-2-240-5608  
Fax 56-2-244-1262  
E-mail: laraya@conama.cl

Héctor Bacigalupo Falcón  
 Jefe de Estudios  
 Sociedad Nacional de Pesca (SONAPESCA)  
 Barros Errázuriz 1954, Of. 206, Providencia  
 Santiago, Chile  
 Tel 56-2-269-2533  
 Fax 56-2-269-2616

Patricio Barría  
 Jefe Unidad Pesquerías Pelágicas  
 Instituto de Fomento Pesquero  
 Huito 374  
 Casilla 8-V  
 Valparaíso, Chile  
 Fax 56-32-212-630

Patricio Bernal  
 Consultor  
 El Comendador 1990  
 Santiago, Chile  
 Tel 56-2-334-9461  
 E-mail: pbernal@uach.cl / pbernal@conama.cl / adetezam@puc.cl

María Isabel Bertolotti  
 Coordinadora de Area (INIDEP)  
 Directora de Proyecto  
 Universidad Nacional de Mar del Plata  
 Francia 2217  
 Mar del Plata, Argentina  
 Tel particular 54-23-72-6637  
 Tel oficina 54-23-86-2586  
 Fax 54-23-86-1830  
 E-mail: maricelb@unidep.edu.ar

María Eva Bustos Carvajal  
 Secretaría Regional Ministerial de  
 Bienes Nacionales, Atacama III Región  
 Ministerio de Bienes Nacionales  
 Atacama 711, Copiapo  
 Chile  
 Tel 56-52-212-783 / 216-558 / (09)542-5256  
 Fax 56-52-213-202

Nora Cabrera F.  
Ingeniero Civil  
Superintendencia de Servicios Sanitarios  
Moneda 673, piso 9  
Santiago, Chile  
Tel 56-2-633-7155 / 633-9230

René Cerda D'amico  
Profesor Titular  
Escuela de Ciencias del Mar  
Universidad Católica de Valparaíso  
Avda. Altamirano 1480  
Casilla 1020  
Valparaíso, Chile  
Tel 56-32-274-249  
Fax 56-32-274-206

Martín Antonio Colil Lastra  
Ingeniero Civil en Geografía  
Avenida Grecia 3664, Ñuñoa  
Santiago, Chile  
Tel 56-2-239-4332

Afranio Craveiro  
Gerente  
Parque de Desenvolvimento Tecnológico  
Universidade Federal do Ceará  
Campos do Pici, Bloco 310  
Caixa postal 6020  
Fortaleza, Ceará, Brasil  
Tel 55-85-288-9983  
Fax 55-85-287-4778

Elizabeth Errazti  
Licenciada en Economía, Docente-Investigadora  
INIDEP  
Universidad Nacional de Mar del Plata  
Paseo Victoria Ocampo 1, Escollera Norte  
Domicilio partic. Entre Ríos 2187, p. 14, Depto. E  
Mar del Plata, Argentina  
Tel particular 54-23-91-8394  
Tel oficina 54-23-86-2586  
Fax 54-23-86-1830



Marcelo Ferrada Cortés  
Coordinador Proyectos Pesqueros  
Secretaría de Agricultura, Ganadería, Pesca y Alimentación  
Paseo Colón 922, of. 321  
Buenos Aires, Argentina  
Tel 54-1-349-2350

Eugenio Figueroa  
Director, Centro de Economía de los  
Recursos Naturales y el Medio Ambiente  
Facultad de Ciencias Económicas y Administrativas  
Universidad de Chile  
Diagonal Paraguay 257, Of. 1604  
Santiago, Chile  
Tel 56-2-678-3419  
Fax 56-2-678-3413

Juan Gastó  
Profesor  
Facultad de Agronomía  
Universidad Católica de Chile  
Vicuña Mackenna 4860  
Casilla 306, Santiago 22  
Santiago, Chile  
Tel 56-2-686-4142  
Fax 56-2-552-6005

Mary Jane Holupka  
Statistics and Economic Projections Division  
ECLAC  
Casilla 179-D  
Santiago, Chile  
Tel 56-2-210-2414  
Fax 56-2-208-1946 / 208-0252

Miguel Huerga  
Jefe Area Ambiental y Social  
Programa de Servicios Agrícolas Provinciales (PROSAP)  
Secretaría de Agricultura, Pesca y Alimentación  
Paseo Colón 922, piso 2, Of. 240  
Buenos Aires, Argentina  
Tel 54-1-349-2069 / 349-2068  
Fax 54-1-349-2063  
E-mail mhuerg@sagyp.mecon.ar

Angel Custodio Lazo Alvarez  
Jefe Unidad de Ecoturismo  
Corporación Nacional Forestal  
Avda. Bulnes 259, Of. 604, Santiago Centro  
Santiago, Chile  
Tel 56-2-696-0783 / 698-1632 Anexo 293  
Fax 56-2-671-2007

Andrés Mena-Millar  
Oficial Principal de Pesca  
Regional Office of Latin America and the Caribbean  
Av. Dag Hammarskjöld 3241  
FAO  
Santiago, Chile  
Tel 56-2-337-2100  
Fax 56-2-337-2104

Ricardo Méndez  
Consultor área Pesca y Acuicultura  
Arlegui 682, Depto. 501  
Viña del Mar, Chile  
Tel 56-2-970-291  
Fax 56-2-881-152

Cecilia Parra Lagos  
División Tecnologías Ambientales  
Corporación de Investigaciones Tecnológicas  
INTEC Chile  
Santa María 6400, Vitacura  
Santiago, Chile  
Tel 56-2-242-8214  
E-mail [ceparra@intec.cl](mailto:ceparra@intec.cl)

Beatriz Ramírez Miranda  
Profesional Area Medio Ambiente  
Servicio Nacional de Pesca  
Yungay 1731, Of. 419  
Valparaíso, Chile  
Tel 56-2-211-259  
Fax 56-2-259-564  
E-mail [depadpes@chilesat.net](mailto:depadpes@chilesat.net)

Oscar Horacio Padin  
Director de Recursos Ictícolas y Acuícolas  
Secretaría de Recursos naturales y Desarrollo Sustentable  
Presidencia de la Nación  
San Martín 459 (1004)  
Buenos Aires, Argentina  
Tel 54-1-348-8531 / 348-8533  
Fax 54-1-348-8534

Jacques Patri Didier  
Jefe de Proyectos  
Fundación Empresarial Comunidad Europea-Chile  
Hernando de Aguirre 1549  
Santiago, Chile  
Tel 56-2-204-9363  
E-mail eurocap@chilesat.net

Juan Quintana  
Jefe Subdepartamento de Meteorología Aplicada  
Dirección Meteorológica de Chile  
Aeropuerto Arturo Merino Benítez (interior)  
Casilla 717  
Santiago, Chile  
Tel 56-2-676-3452  
Fax 56-2-601-9590  
E-mail clima@meteo Chile.cl

Boris A. Ramírez Reyes  
Profesor Titular  
Universidad Católica de Valparaíso  
Av. Altamirano 1480  
Casilla 1020, Valparaíso, Chile  
Tel 56-32-274-244 / 2740235

Humberto Rivas Ortega  
Servicio Nacional de Turismo  
Av. Providencia 1550  
Santiago, Chile  
Tel 56-2-236-1420  
Fax 56-2-251-8469

Fernando Soares Bretas  
Sectoral Specialist for the Environment  
Inter-American Development Bank  
Esmeralda 130, piso 20  
Buenos Aires  
Argentina  
Tel 54-1-320-1807  
Fax 54-1-320-1830  
E-mail fernandob@irdb.arg

José Iván Sepúlveda Vidal  
Docente-Investigador  
Departamento de Oceanografía  
Escuela de Ciencias del Mar  
Universidad Católica de Valparaíso  
Av. Altamirano 1480  
Casilla 1020, Valparaíso 1  
Valparaíso, Chile  
Tel 56-32-274-267  
Fax 56-32-274-206  
E-mail jsepul@chilesat.net

Carlos E. Rubio Gómez  
Gerente Proyecto Ciénaga Grande  
Corporación Autónoma Regional del Magdalena (CORPAMAG)  
Calle 23 # 4-27, Of. 907  
Edificio Centro Ejecutivo  
Santa Marta, Colombia  
Tel 57-54-210-446 / 210-930  
Fax 57-54-210-979  
Celular 936-420117  
(Res) Carrera 6 # 6-79, Ap. 501  
Edif. Palos de Moguer, Cartagena  
Tel 57-56-653-956

Antonio Villasol Núñez  
Director  
Centro de Ingeniería y Manejo Ambiental de  
Bahías y Costas (CIMAB)  
Fca. Tiscornia, Carretera del Asilo s/n  
Casilla postal 11700  
Havana, Cuba  
Tel 53-7-624-387  
Telefax 53-7-338-250

César Osvaldo Williams Fuentes  
Sectoral Specialist  
Inter-American Development Bank  
Esmeralda 130, piso 20  
Buenos Aires  
Argentina  
Tel 54-1-320-1800  
Fax 54-1-320-1830  
E-mail cesarw@iadb.org

Ana Isabel Zúñiga Sanzana  
Profesional Unidad Economía Ambiental  
Comisión Nacional del Medio Ambiente (CONAMA)  
Obispo Donoso 6, Providencia  
Santiago, Chile  
Tel 56-2-240-5600  
Fax 56-2-244-1262  
E-mail azunica@conama.cl

#### **Secretariat**

Helga Hoffmann  
Director  
Environment and Development Division  
ECLAC  
Casilla 179-D  
Santiago, Chile  
Tel 56-2-210-2291  
Fax 56-2-208-1946 / 208-0252

Carmen Artigas  
Legal Officer  
Environment and Development Division  
ECLAC  
Casilla 179-D  
Santiago, Chile  
Tel 56-2-210-2296  
Fax 56-2-208-1946 / 208-0252

Roberto de Andrade  
Consultant  
Environemt and Development Division  
ECLAC  
Casilla 179-D  
Santiago, Chile  
Tel 56-2-210-2000 / 210-2159  
Fax 56-2-208-1946 / 208-0252

René Salgado  
Consultant  
Environement and Development Division  
ECLAC  
Casilla 179-D  
Santiago, Chile  
Tel 56-2-210-2166  
Fax 56-2-208-1946 / 208-0252

## Annex III

**PROVISIONAL PROGRAMME****REGIONAL WORKSHOP ON THE ECONOMIC ASPECTS  
OF COASTAL AND MARINE BIODIVERSITY****1 DECEMBER**

8:30-9:30 a.m.	Registration of participants
9:30-10:00 a.m.	Opening session
10:00-10:30 a.m.	Economic analysis of coastal and marine biodiversity: the case of fisheries. María I. Bertolotti, National Institute for Fisheries Research and Development, Mar del Plata, Argentina
10:30-11:30 a.m.	Economic and strategic aspects of fisheries exploitation. René Cerda D'Amico, Catholic University of Valparaíso, Chile
11:00-11:15 a.m.	Break
11:15 -11:45 a.m.	The use of economic instruments for the conservation and sustainable use of coastal and marine biodiversity. Eugenio Figueroa, Centre for Natural Resource and Environmental Economics, University of Chile
11:45 a.m.-12:15 p.m.	Discussion
12:15-12:45 p.m.	Aquaculture as a modifier of biodiversity. Andrés Mena-Millar, FAO Regional Office for Latin America and the Caribbean
12:45-1:00 p.m.	Discussion
1:00-2:30 p.m.	Break
2:30-3:00 p.m.	The development of food supplements and drugs from marine resources. Afranio Aragao Craveiro, Federal University of Ceará, Brazil
3:00-3:15 p.m.	Discussion
3:15-3:45 p.m.	Methods for assessing damage to coastal areas caused by natural disasters. Rosa Aguilera Vidal, Department of Economics, University of Concepción, Chile
3:45-4:00 p.m.	Break

- 4:00-4:30 p.m. Environmental study on the potential leakage of fertilizers and the disposal of the wreck of the North Island, the vessel that ran aground off San Antonio, Chile. Bros Ramírez Reyes, Catholic University of Valparaíso, Chile
- 4:30-4:45 p.m. Discussion
- 4:45-5:15 p.m. Topics to be confirmed by participants

## **2 DECEMBER**

- 9:00-9:30 a.m. Clean-up operations in bays in the Caribbean region. Antonio Villasol, Centre for Engineering and Environmental Management of Bays and Coasts, Havana, Cuba
- 9:30-10:00 a.m. Introduction to the economic and financial implications of the Global Plan of Action for the protection of the marine environment from land-based activities. Roberto de Andrade, ECLAC
- 10:00-10:15 a.m. Break
- 10:15-10:45 a.m. The experience of the south-east Pacific in the preparation of diagnostic analyses of contaminants from land-based sources. Nora Cabrera, Office of the Superintendant of Sanitation Services, Chile
- 10:45-11:15 a.m. Development and transfer of technologies for protection of coastal and marine ecosystems (the case of Bahía de Concepción, Region VIII, Chile (INTEC))
- 11:15-11:45 a.m. Regional Autonomous Corporation of Magdalena/German Agency for Technical Cooperation (CORPOMAG/GTZ) for the rehabilitation of the marshlands of Santa María. Carlos Rubio, CORPOMAG/GTZ, Colombia
- 11:45 a.m.-12:30 p.m. Discussion
- 12:30-2:30 p.m. Break
- 2:30-3:00 p.m. Experiences in ecotourism in coastal and marine areas. Ricardo Soto, Centre for Research on Marine Sciences and Limnology, University of Costa Rica
- 3:00-3:30 p.m. Ecotourism as an option for promoting conservation. Juan Gastó, Catholic University of Chile
- 3:30-3:45 p.m. Break
- 3:45-4:15 p.m. Agrotourism as an alternative for the development and valuation of protected coastal areas. Jacques Patri Didier, the European Community/Chilean Business Foundation, Eurochile



4:15-4:45 p.m.	Discussion
4:45-5:15 p.m.	Competitive bids for State-owned lands in coastal areas in the Atacama region. María Eva Bustos, Regional Ministerial Secretariat of Atacama, Chile.
5:15-5:45 p.m.	Discussion

### **3 DECEMBER**

9:00-9:30 a.m.	Use of the coast for tourism: economic, social and environmental considerations. Representative of the National Tourism Service of Chile
9:30-10:00 a.m.	Privatization of services in protected coastal-marine areas. Representative of the National Forestry Corporation of Chile
10:00-10:30 a.m.	Discussion
10:30-10:45 a.m.	Break
10:45-11:45 a.m.	Additional presentations, comments and presentation of draft conclusions and recommendations
11:45 a.m.-3:30 p.m.	Break for preparation of the report
3:30-4:00 p.m.	Adoption of the report
4:00 p.m.	Closure of the workshop