



Legal and Technical Commission

Distr.: General
12 May 2008

Original: English

Fourteenth session
Kingston, Jamaica
26 May-6 June 2008

Considerations relating to an economic assessment of the marine environment in the Area and the use of area-based management tools to conserve biodiversity

Note by the secretariat

1. During the thirteenth session, in the context of its discussions on possible systems for the allocation of sites for exploration for cobalt-rich ferromanganese crusts, the Legal and Technical Commission requested further background information relating to a more specific economic assessment of the value of the Area as a part of the global commons. In particular, the Commission suggested that emphasis should be placed on the fact that the Area represents natural capital accruing to mankind as a whole but that its resources also perform ecological functions and provide ecosystem services which have an economic value. The loss of those ecosystem services could entail a high environmental cost. Such a cost should be taken into account in the consideration of the allocation of exclusive exploration rights.

2. A detailed economic assessment of this nature has never been undertaken and it has not been feasible to undertake such an assessment using available resources. Nevertheless, the present note attempts to indicate some preliminary considerations relating to the valuation of ecosystem services from an economic, scientific, policy and legal perspective. Given that, since the thirteenth session, progress has also been made in developing proposed criteria for the establishment of a representative network of preservation reference zones in the Clarion-Clipperton Zone, the present document also sets out some essential background as to the use of area-based management, among other methods (e.g., codes of conduct, environment impact assessment, guidelines and recommendations) as a tool to assess the deep seabed environment that may be impacted by mining activities. The note should therefore be read in conjunction with document ISBA/14/LTC/2.

I. Valuing ecosystem services

3. Ecosystem services may be defined as the functions performed by ecosystems that ensure that natural cycles, processes and energy flows continue to provide an environment that supports life, including human life, for present and future generations. These include provisioning services such as food and water; regulating services such as climate; cultural services such as recreation, aesthetic enjoyment and spiritual fulfilment; and nutrient cycling. So far the value of ecosystem services in the Area has not been calculated. To do so would include an assessment of the benefits of avoiding loss of biodiversity and the acquisition of knowledge on the deep-seabed environment and its mineral resources. Deep sea ecosystems also provide goods (including biomass, bioactive molecules, oil, gas and minerals) and services, and owing to their profound involvement in global biogeochemical and ecological processes, are essential for the sustainable functioning of our biosphere and for human well-being. Many different values are associated with these functions. Some species have direct-use value. Some are valued indirectly due to their support of valued species and their role in maintaining ecosystem function. Some are of potential value in future research and so carry an optional value, which makes their conservation a global public good. With respect to the development of mineral resources in the Area, which is the responsibility of the Authority, it is arguable that the cost of ecosystem services could be reflected in the fee to be paid by applicants seeking exclusive exploration rights for mineral resources in the Area.¹

4. From an economic perspective, biological resources in areas beyond national jurisdiction, including the Area, are an important and complex part of the global commons. Relevant considerations include the management of individual species (a classic commons problem), the maintenance of ecosystem functions and the preservation of species (a global public good, if the existence of species is valued). Conservation of biological resources is a complex issue as the concept is multidimensional, relating to species diversity, ecosystem function and resilience. If the goal is the maximization of species diversity, conservation should concentrate on the protection of ecosystems rich in species, especially endemics. However, if the aim is the conservation of ecosystem function, it is essential to focus on key species in important ecosystems. The value of an extra species conserved in an area where species are more often redundant in terms of function would thus represent a lesser value than that of an extra species which is biogeographically rare, particularly if this plays an important role in that ecosystem. Yet redundancy is also worthy of conservation as functionally similar species contribute to making an ecosystem more resilient.² The threats are numerous but as far as the Authority is concerned, its mandate is limited to the management of potential impacts as a result of mining.

5. All but one of the phyla found on earth are found in the oceans, with many only being found in the marine realm. The oceans are greater in volume and in biodiversity than the terrestrial environment. Estimates for the number of living species vary from 10 million to 100 million. Deep sea habitats represent the largest reservoirs of biomass and non-renewable resources (e.g., gas hydrates and minerals), and although the census of deep sea life is in its infancy, there is

¹ ISBA/14/C/4, para. 26.

² S. Barrett, "Managing the global commons", background working paper for the Task Force on Global Public Goods, Stockholm, Sweden, p. 4.

increasing evidence that deep sea habitats host a large proportion of undiscovered biodiversity on our planet. The scientific knowledge is limited to existing sampling efforts. Some recent scientific investigations suggest that the conservation of deep sea biodiversity may be crucial for the sustainability of the functions of the largest ecosystem of our biosphere. A study carried out by Danovaro et al.³ suggested that biodiversity loss might impair the functioning and sustainability of ecosystems. However, while the authors note that changes in species diversity are associated with changes in functional diversity, the relationship between these two measures and ecosystem functioning remains “largely unknown”. One case, in the eastern Mediterranean Sea, allowed the authors to identify a clear linkage between ecosystem functioning and functional diversity. In this location it was found that a 35 per cent reduction in nematode functional diversity was associated with a 40 to 80 per cent reduction in biomass of various biological components. However, correlation does not imply cause and effect and as the eastern Mediterranean is a relatively enclosed small water body, care must be taken when applying the results from this location on a larger scale. Although the international focus is often on conservation of species, ecosystem function is a part of the issue. The benefits to humanity are provided by species in their habitats within complex ecosystems. This directs our attention to the importance of geography. Indeed, with respect to management and conservation, biogeography is as important as biodiversity as it provides a planning tool in support of management measures. For much of the deep sea, however, there is at present very little information that can be used to delineate scientifically robust biogeographic units at the level of either province or region, a fairly fine scale, which is of essence for management.⁴

6. In spite of this limited scientific knowledge, enough is known to enable us to identify hotspots, to define priority areas and to determine future trends for scientific research. Understanding biodiversity presents one of the greatest scientific challenges facing mankind. There is a critical need to strengthen our understanding of biodiversity and ecosystem services to enable any further refinement of risk-assessment policy response in the future. This will make it possible to take into account environmental costs. In this regard, it may be recalled that marine scientific research focusing on environmental impacts that may arise from activities in the Area is given priority in both the current and previous triennial programmes of work of the Authority pursuant to Part XI of the 1982 United Nations Convention on the Law of the Sea⁵ and the 1994 Agreement relating to the implementation of Part XI. Costs associated with marine scientific research should also be borne in mind in any economic assessment relating to a sustainable development of mineral resources in the Area.

II. The use of area-based management tools

7. A recent report of the Millennium Ecosystem Assessment launched by the Secretary-General of the United Nations in 2001 stressed that most ecosystem

³ R. Danovaro et al., “Exponential decline of deep-sea ecosystem functioning linked to benthic biodiversity loss”, *Current Biology*, vol. 18, No. 1 (8 January 2008), pp. 1-8.

⁴ United Nations Environment Programme, document UNEP/CBD/SBSTTA/13/INF/19, draft report on global open oceans and deep-sea habitats (GOODS) bioregional classification, 11 February 2008.

⁵ Articles 143 and 145.

services are in decline throughout the world. The bottom line is that the current generation is spending the Earth's natural capital and putting at risk the ability of ecosystems to sustain future generations. The decline is reversible but requires substantial changes in policy and behaviour.⁶

8. The international community has expressed in several ways (binding instruments and soft law) and forums that the protection of the environment is a component of sustainable development. In April 2002, at the sixth meeting of the Conference of the Parties to the Convention on Biological Diversity, 123 States committed themselves to actions to “achieve by 2010 a significant reduction of the current rate of biodiversity at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth”.⁷ In the Johannesburg Declaration on Sustainable Development, the World Summit on Sustainable Development observed the continuing loss of biodiversity and resolved to protect biodiversity “through decisions on targets, timetables and partnerships”.⁸ The World Summit agreed to action to significantly reduce the rate of biodiversity loss globally by 2010.^{9,10} The Johannesburg Plan of Implementation mentions various approaches and tools for the conservation and sustainable use of marine biodiversity, including the application of an ecosystem approach by 2010,¹¹ the establishment of marine protected areas consistent with international law and based on scientific information, including representative networks by 2012, and the development of national, regional and international programmes for halting the loss of marine biodiversity.¹²

9. Building on this, the Conference of the Parties to the Convention on Biological Diversity adopted in 2004 a programme of work on protected areas with an overall objective to “Establish and maintain by 2012 for marine areas, comprehensive, effectively managed and ecologically representative systems of protected areas that, collectively, would significantly reduce the rate of loss of global biodiversity”.¹³ In 2006, the eighth meeting of the Conference of the Parties of the Convention on Biological Diversity urged Parties to increase “collaborative activities to protect ecosystems in marine areas beyond the limits of national jurisdiction, in the context

⁶ Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being: Biodiversity Synthesis*, World Resources Institute, Washington, D.C., 2005.

⁷ UNEP/CBD/COP/6/20, annex I, decision VI/26.

⁸ *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August-4 September 2002* (United Nations publication, Sales No. E.03.II.A.1 and corrigendum), chap. I, resolution 1, annex, paras. 13 and 18.

⁹ *Ibid.*, resolution 2, annex, para. 44.

¹⁰ The European States committed themselves to an even stronger objective in 2001: “to halt the loss of biodiversity [in the European Union] by 2010” and to “restore habitats and natural systems” (Commission of the European Communities, document COM (2001) 264 final).

¹¹ *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August-4 September 2002* (United Nations publication, Sales No. E.03.II.A.1 and corrigendum), chap. I, resolution 2, annex, para. 30. The ecosystem approach is defined as “a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way” (UNEP/CBD/COP/5/23, annex III, decision V/6).

¹² *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August-4 September 2002* (United Nations publication, Sales No. E.03.II.A.1 and corrigendum), chap. I, resolution 2, annex, para. 32.

¹³ UNEP/CBD/COP/7/21, annex, decision VII/2B.

of international law (including the United Nations Convention on the Law of the Sea) and based on scientific information”.¹⁴

10. The world’s oceans have a very low level of representation in protected areas, with only 0.6 per cent of the oceans and 6 per cent of territorial seas protected, compared to over 12 per cent of the Earth’s land surface. These protected areas cover only a small percentage of the variety of marine habitats, and this is even less so in respect of the deep seabed environment. Some recent examples of protected areas include the Micronesia and Caribbean Challenge and the establishment of large marine protected areas such as the Phoenix Islands Protected Area (Kiribati)¹⁵ and the Papahānaumokuākea Marine National Monument in the north-western Hawaiian Islands. The latter comprises 105,564 square nautical miles and was established in June 2006. Several States have also taken action to establish marine protected areas around hydrothermal vent sites in areas under national jurisdiction. For example, Canada established pilot offshore marine protected areas in 1998 at the Bowie Seamount and at the Endeavour Segment of the Juan de Fuca Ridge.¹⁶ The same year, Portugal designated the Dom João de Castro Seamount as a Special Area for Conservation and a Site of European Community Importance in conformity with the 1992 European Community Habitat Directive.¹⁷

11. The policy approach of the European Union recognizes that biodiversity is not evenly spread and that certain habitats and species are more at risk than others. As a result, it affords special attention to the creation and protection of a substantial network of sites of highest nature value called Natura 2000. The basis for European Union action in this regard is provided by the Birds and Habitats Directives.¹⁸ While these have not yet been fully implemented in all member States, substantial progress has been made towards designation of the Natura 2000 network. This consists of sites containing “sufficient” areas of the most important habitat types in the European Union. European States have committed to completing the Natura network at sea by 2008 and agreeing on and instigating management for all Natura 2000 by 2010. In this connection, the Helsinki Commission and the Commission for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) have adopted a joint work programme on the creation of a network of marine protected areas. The objective is to ensure that by 2010 there is an ecologically coherent network of well-managed protected areas for the maritime areas of both the Helsinki and OSPAR Conventions.¹⁹

12. Achievement of the 2010 target of the World Summit on Sustainable Development will require accelerated implementation at all levels. Over the last decade, the international community has expressed concerns over the conservation and sustainable use of biodiversity both within and beyond national jurisdiction. The

¹⁴ UNEP/CBD/COP/8/31, annex I, decision VIII/24, para. 11.

¹⁵ The Phoenix Islands Protected Area was established by the Government of Kiribati on 28 January 2008 and encompasses an area of 410,500 square kilometres.

¹⁶ For information see www.dfo-mpo.gc.ca/CanOceans/INDEX.HTM.

¹⁷ For information see www.joel.ist.utl.pt/dsor/Projects/Asimov.

¹⁸ Council Directive on the Conservation of Wild Birds 79/409/EEC of 2 April 1979 (OJ L 103, 25.4.1979) and Council Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora 92/43/EEC of 21 May 1992 (OJ L 206, 22.7.1992).

¹⁹ Convention on the Protection of the Marine Environment of the Baltic Sea Area, Helsinki, 9 April 1992; Convention for the Protection of the Marine Environment of the North-East Atlantic, Paris, September 1992.

General Assembly has called upon States and relevant international organizations at all levels to urgently consider ways to integrate and improve, on a scientific basis, including the application of precaution as set out in principle 15 of the Rio Declaration on Environment and Development, the management of risks to vulnerable marine biodiversity within the framework of the United Nations Convention on the Law of the Sea, consistent with international law and the principles of integrated ecosystem-based management.²⁰

13. Having the responsibility to manage and develop the mineral resources of the Area, the Authority manages risks to deep sea biodiversity by adopting regulations governing activities in the Area, by monitoring the activities of contractors who are carrying out exploration or exploitation and by promoting scientific research, especially on the impacts of mining activities on the environment.²¹ It is in this context that the Commission is invited to consider a proposal to establish criteria for preservation reference zones²² in the Clarion-Clipperton Zone, where potential commercial nodule deposits occur. The proposal is outlined in document ISBA/14/LTC/2.

14. The establishment of a network of preservation reference zones would contribute to achieving three goals: the environmental regulatory functions of the organs of the Authority, monitoring the activities of the contractors, and obtaining better knowledge from research related to the protection of the marine environment. Furthermore, the scientific information that preservation reference zones in the Clarion-Clipperton Zone will provide will be useful for the adoption of rules, regulations and procedures incorporating applicable standards for the protection and preservation of the marine environment in line with beginning the process of environmental regulation at an early stage.²³ This will also enable periodic review of environmental regulations and recommendations based on adequate available scientific information.

²⁰ General Assembly resolutions 58/240 (para. 52), 59/24 (paras. 70 and 72), and 60/30 (paras. 71-77), 61/22 (paras. 96-101) and 62/215 (paras. 99 and 109-112).

²¹ Agreement relating to the implementation of Part XI of the United Nations Convention on the Law of the Sea, annex, section 1, para. 5 (h) and (i).

²² This is not defined in the Convention or in the Agreement but in Regulation 31 (7) of the Regulations on prospecting and exploration for polymetallic nodules in the Area: “‘Preservation reference zones’ means areas in which no mining shall occur to ensure representative and stable biota of the seabed in order to assess any changes in the flora and fauna of the marine environment.”

²³ Agreement, annex, section 1, para. 5 (g).

Annex

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