

# **Legal challenges of ecosystem approach to sustainable use of the sea**

Axel Luttenberger, Ph.D., Associate Professor  
Faculty of Maritime Studies  
University of Rijeka, Rijeka, Croatia  
e-mail: axel@pfri.hr

## **ABSTRACT**

The paper analysis developments in sources of law and practice in the ecosystem approach to sustainable use of the sea and its resources related to protection and preservation of marine environment. An evaluation is made of binding and non-binding international instruments with explicit or implicit references to ecosystem approach, as well as the comparison between conventional and ecosystem approach to ecology issues. In author's opinion the achievement of ecosystem approach and management of marine resources depends both on institutional frameworks for implementation of multiple targets and on multi-stakeholder impact on enforcing the ecosystem approach principles. In the case of Republic of Croatia the author advocates developing the ecosystem approach in national legislation to promote sustainable use of the seas in the course of alignment of Croatian legislation with the European Union acquis.

**Key words:** legal framework, ecosystem approach, sustainable use of the sea, protection and preservation of marine environment

## **1. FOREWORD**

The concept of the ecosystem approach is associated with management-based best understanding of the ecological interactions and processes necessary to sustain ecosystem structure and function, although a legal challenge is the very fact that there is no internationally agreed definition of ecosystem approach, which is interpreted differently in different contexts.

As a collection of parts unified to accomplish an overall goal, the ecosystem approach seeks a balance among the conservation and use of biological diversity in areas where there are both multiple resource users and important national values. This paper is focused on the importance of a use of legal terms in implementing innovative ecological standards based on ecosystem approach.

## **2. INTERNATIONAL LEGAL INSTRUMENTS OF THE ECOSYSTEM APPROACH**

### **2.1. The United Nations Convention on the Law of the Sea (UNCLOS), 1982**

The United Nations Convention on the Law of the Sea provides legal framework for the implementation of an ecosystem approach to all activities conducted in maritime areas. The preamble indicates that problems of the oceans space are closely interrelated and need to be considered as a whole.

The coastal state shall determine allowable catch of living resources in its exclusive economic zone. The coastal state, taking into account the best scientific evidence available to it, shall ensure through proper conservation and management measures that the maintenance of the living resources in the exclusive economic zone is not endangered by the over-exploitation. As appropriate, the coastal state and competent international organizations, whether subregional, regional or global, shall co-operate to this end. Such measures shall also be designed to maintain or restore populations of harvested species at levels which can produce the maximum sustainable yield, including the economic needs of coastal fishing communities and the special requirements of developing states, and taking into account fishing patterns, the interdependence of stocks and any generally recommended international minimum standards, whether subregional, regional and global. In taking such measures the coastal state shall take into consideration the effects on species associated with or dependent upon harvested species with the view of maintaining or restoring populations such associated or dependent species above levels at which their reproduction may become seriously threatened.

In determining the allowable catch and establishing other conservation measures for the living resources in the high sea, states shall take measures which are designed, based on the best scientific evidence to the states concerned, to maintain or restore populations of harvested species at levels which can produce the maximum sustainable yield, as qualified by relevant environmental and economic factors, including special requirements of developing states, and taking into account fishing patterns, the interdependence of stock and any generally recommended international minimum standards, whether subregional, regional or global, and take into consideration the effects on species associated with or dependent upon harvested species with the view to maintaining or restoring populations of such associated or dependent species above levels at which their reproduction may become seriously threatened.

## **2.2. Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Species, 1995**

The afore mentioned agreement obliges parties to assess the impact of fishing on human activities and environmental factors on target stocks and species associated or belonging to the same ecosystem, adopt conservation and management measures for such species, minimize pollution, waste, discards, catch by the lost abandoned gear, catch of non-target species and impacts on endangered species, through development and use of selective, environmentally safe and cost-effective fishing gear and techniques and protect biodiversity in the marine environment.

## **2.3. Convention on Biological Diversity (CBD), 1992**

The objectives of this Convention, to be pursued in accordance with its relevant provisions, are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.

Biological diversity means the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of



which they are part; this includes diversity within species, between species and of ecosystems. An ecosystem is a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit, while habitat means the place or type of site where an organism or population naturally occurs.

*In-situ* conservation means the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties, while *ex-situ* conservation means the conservation of components of biological diversity outside their natural habitats

Sustainable use is defined as use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.

As a basic principle States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.

In-situ conservation includes the obligation of a state to promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings, to rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, *inter alia*, through the development and implementation of plans or other management strategies and to prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.

A state shall, as far as possible and as appropriate, and predominantly for the purpose of complementing *in-situ* measures adopt measures for the *ex-situ* conservation of components of biological diversity, preferably in the country of origin of such components, establish and maintain facilities for *ex-situ* conservation of and research on plants, animals and micro-organisms, preferably in the country of origin of genetic resources, adopt measures for the recovery and rehabilitation of threatened species and for their reintroduction into their natural habitats under appropriate conditions, as well as regulate and manage collection of biological resources from natural habitats for *ex-situ* conservation purposes so as not to threaten ecosystem and *in-situ* populations of species, and cooperate in providing financial and other support for *ex-situ* conservation.

## **2.4. Principles of ecosystem approach and its application**

**Principle 1: The objectives of management of land, water and living resources are a matter of societal choice.** Diverse sector of society view ecosystem in terms of their own economic, cultural and societal needs and societal choices should be expressed as clearly as possible. Ecosystem should be managed for their intrinsic values and for benefit of humans, in a fair and equitable way.

**Principle 2: Management should be decentralized to the lowest appropriate level.** Decentralized system may lead to greater efficiency, effectiveness and equity. Management should involve all stakeholders and balance local interests with the wider public interest. The



closer the management is to the ecosystem, the greater the responsibility, ownership, accountability, participation, and use of local knowledge.

**Principle 3: Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystem.** Management interventions in ecosystem often have unknown or unpredictable effects on other ecosystem, therefore, possible impacts needs careful consideration and analyses. This may demand new arrangements or ways of organization for institutions involved in decision-making to make, if necessary, appropriate compromises.

**Principle 4: Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context.** Any such ecosystem-management program should reduce those market distortions that adversely affect biological diversity, align incentives to promote biodiversity conservation and sustainable use and internalize cost and benefits in the given ecosystem, to the extent feasible. The greatest threat to biological diversity lies in the replacement by alternative system of use of land and this often arises through market distortions, which undervalue natural systems and populations and provide perverse incentives and subsidies to favour the conversion of land to less diverse system. Often those who benefit from conservation do not pay the costs associated with conservation and, similarly, those who generate environment cost escape their responsibility.

**Principle 5: Conservation of ecosystem structure and functioning, in order to maintain ecosystem, services, should be a priority target of ecosystem approach.** Ecosystem performance and resilience depends on a dynamic relationship with species, among species and between species and their abiotic environment, as well as the physical and chemical interactions within environment. The conservation and, where appropriate, restoration of these interactions and processes is of greater significance for the long-term maintenance of biological diversity than simply protection of species.

**Principle 6: Ecosystem must be managed within the limits of their functioning.** In taking into account the likelihood or ease of attaining the management objectives, attention should be given to the environmental conditions that limit natural productivity, ecosystem structure, functioning and diversity. The limits to ecosystem functioning may be affected to different degrees by temporary, unpredictable or artificially maintained conditions and, accordingly, management should be appropriately cautious.

**Principle 7: The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.** The method should be bounded by spatial and temporal scales that are appropriate to the objectives. The ecosystem approach is based upon the hierarchical nature of biological diversity characterized by the interaction and integration of genes, species and ecosystem.

**Principle 8: Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.** Ecosystem processes are characterized by varying temporal scales and lag-effects and this inherently conflicts with the tendency of humans to favour short-term gains and immediate benefits over future ones.



**Principle 9: Management must recognize that change is inevitable.** The ecosystem approach must utilize adaptive management in order to anticipate and cater for changes and events and should be cautious in making any decision that may forecast options, but, at the same time, consider mitigating actions to cope with long-term changes, such as climate changes.

**Principle 10: The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.** Biological diversity is critical both for its intrinsic value and because the key role it plays in providing the ecosystem and other services upon which we ultimately depend. Conservation and use should be seen in the context and full range of measures in a continuum from strictly protected to human-made ecosystems.

**Principle 11: The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovation and practices.** Information from all sources is critical to arriving at effective ecosystem management strategies and all relevant and any relevant information from any concerned area should be shared with all stakeholders.

**Principle 12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines.** Most problems of biological diversity management are complex, with many interactions, side-effects and implications, and therefore should involve the necessary expertise and stakeholders at the local, national, regional and international level, as appropriate.

The 12 principles have been organized into **five steps**, each step involving a range of actions. Step A articulates the most difficult issues in determining the main stakeholders, defining the ecosystem area and developing the relationship between them. Step B involves characterizing structure and function of the ecosystem and setting in place the mechanism to manage and monitor it. Step C deals with the identification of economic issues that will affect the ecosystem and its inhabitants and step D is pointing out the role of the adaptive management over space to the likely impact of an ecosystem and adjacent ecosystems. Finally, in step E we speak about planning for adaptive management over time which involves long-term goals and flexible ways of reaching them.

## **2.5. United Nations Conference on the Human Environment, 1972**

The Stockholm Declaration sets out the need to protect species diversity and marine life, based on the idea that natural resources, especially representative samples of natural ecosystems must be preserved for the benefit of present and future generations through careful planning and management. It is pointing humankind's responsibility to safeguard, manage and plan for wildlife, the responsibility of states to take steps to prevent pollution that might harm living resources and marine life in the seas, as well as the responsibility of states not to cause damage to the environment of other states or of areas beyond national jurisdiction.

## **2.6. United Nations Conference on Environment and Development (UNCED), 1992**

In the Rio Declaration states recognized the ecosystem approach as the backbone of sustainable development. Environmental protection must constitute an integral part of the



development process and states should therefore cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of Earth's ecosystem.

Agenda 21 was adopted by UNCED as its plan of actions pointing out that the continuing deterioration of the ecosystem is one of the major issues which humanity is confronted with and better protected and managed ecosystems cannot be achieved without the integration of environment and development as well as international cooperation.

Chapter 17 on oceans and seas and their living resources contain principles to promote an ecosystem approach in ocean management. In that sense coastal states are required to promote integrated management and sustainable development of coastal areas and marine environment in their national jurisdiction. Importance is given on multispecies approach management and other approaches that take into account the relationship between species and states are called to identify marine ecosystem exhibiting high levels of biodiversity and productivity and other critical habitat areas and to provide necessary limitation on the use of these area.

## **2.7. FAO Code of Conduct for Responsible Fisheries, 1995**

The Code set outlines principles and international standards of behaviour for responsible practices with a view of ensuring the effective conservation, management and development of living aquatic resources, with the due respect for ecosystem and biodiversity.

The precautionary principle should apply to the conservation of target species and their environment, and selective and environmentally safe fishing gear and practices should be developed and used to maintain biodiversity and conserve the population structure and aquatic ecosystems. It is important to notice all critical fisheries habitats in marine ecosystems should be protected and rehabilitated.

## **2.8. Thematic Strategy on the Protection and Conservation of the Marine Environment, 2005**

The European Union's Strategy with the overall aim to promote sustainable use of the seas and conserve marine ecosystem is focused on the principal threats to the marine environment. The threats that have been identified include the effects of climate changes, pollution, the impacts of commercial fishing, the introduction of non-native species principally through the discharge of ship's ballast water, nutrient enrichment and associated algal blooms and illegal discharges of radionuclide.

As a key element in building the Strategy it outlines an ecosystem-based approach, whereby human activities affecting marine environment will be managed in an integral manner promoting conservation and sustainable use in an equitable way of the oceans and seas, including synergies with other environmental measures and initiatives.

This Strategy introduces the principle of ecosystem-based planning of economic activities, which is necessary to manage the increasing competition between different economic activities in coastal waters. It also includes the designation of marine protected areas, the transition to sustainable levels of fishing and the restoration over time of the ecological health of seas.

### **3. THE RESPONSIBILITY OF HUMANS IN MARINE ECOSYSTEM AND SUSTAINABLE USE OF THE SEA**

#### **3.1. Administrative capacity for implementing the ecosystem approach**

By putting humans and their uses of space and resources at the heart of a decision-making process, the ecosystem approach recognizes humans' responsibility while at the same time providing them with the opportunity to find better management solutions.

An ecosystem approach calls for a comprehensive look at all dimensions of the problem and in finding sound solution based on coordinated action of society at different levels and scales, such solution may imply trade-offs, but will benefit all in longer term.

Marine ecosystems are indispensable for human wellbeing through their provisioning, cultural and supporting services. For that reason the health of the marine ecosystem, is not only fundamental to the environment, but also of utmost importance to the existence and development of human society.

The proper administrative capacity is a precondition for the implementation of the ecosystem approach. The requirement include an early identification of likely obstacles and means to overcome them, as well as improved coordination between stakeholders due to overcome the bureaucratic inertia. One of the core issues is to offer a clear legal framework and jurisdictions defining responsibilities and accountability. For capacity building it is necessary to have agreed strategy and action plans, generated through participative and transparent planning process, in addition to deterrent penalties and credible enforcement. One of the key requirements is also an adaptive management plan with objectives and indicators, including the adoption of minimum environmental norms jointly with defensible use of rights.

#### **3.2 The stakeholder participation**

The important factor is creating and maintaining commitment from stakeholders. An initial focus on manageable problems starts the process and creates confidence in it. Visible success can generate new activities involving a greater number of people. If stakeholders are entitled to make decisions and implement agreements, their involvement will increase. Successful participation requires a high level of trust and building of trust takes a long time. Confidence is an important driver in the process and facilitates capacity-building among stakeholders.

#### **3.3. Adaptive and integrated management**

Flexibility and the ability of the management system, to adopt itself to change stimulate learning by all those involved. The sciences are an important tool in adaptive management process and follow-up can provide rapid feedback on the results of management measures. Coordination and cooperation among institutions and stakeholders create a more flexible management system that can be adopted to work on different levels.

The ecosystem approach is a basic parameter for an integrated management of ecosystems and not a *modus operandi*. For that reason it should be operationalised for specific ecosystem of the sustainable use of the sea.



#### **4. THE LEGAL DISTINCTION BETWEEN THE CONVENTIONAL AND THE ECOSYSTEM APPROACH**

The ecosystem approach, as opposed to the conventional approach, is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompass the essential structures, processes, functions and interaction among organisms and their environment. It identifies that humans, with their cultural diversity are an integral component of many ecosystem.

The conventional approach has few objectives, while the ecosystem approach has multiple objectives. Additionally, the characteristic of conventional approach is sectoral and the features of ecosystem approach cross sectoral or integrated. Likewise, in the conventional approach we articulate target or non target species, whilst the ecosystem approach deals with biodiversity and environment. The attribute of conventional approach is predictive opposed to the adaptive quality of ecosystem approach. In addition, using scientific knowledge is typical for a conventional approach, while the ecosystem approach is based on extended knowledge.

Moreover, the method of the conventional report top-down and corporate and the modus operandi of the ecosystem approach are interactive or participatory and public and transparent. Besides prescription in the conventional approach, the ecosystem approach is focused on incentives.

#### **5. CONCLUSIONS**

The commitment to sustainable use of the sea should lead to a more integrated approach to policy making and management because each policy sector should also consider side-effects on other sectors and the marine ecosystem. The ecosystem approach is an evolving concept and during the past years not only lawyers, but also more and more other disciplines, sectors and institutions have been involved in defining, analysing, operationalising and applying the ecosystem approach.

The features of ecosystem exist in a space with boundaries that may or may not be explicitly delineated and ecosystems are distinguishable from each other based on their biophysical attributes and their location. Furthermore, an ecosystem includes both living organism and their abiotic environment, including pools of organic and inorganic materials. Also, the organisms interact with other and interact with each other and interact with the environment. In addition, an ecosystem is dynamic, its structure and function change with time and an ecosystem exhibits emergent properties that are characteristic of its type and that are invariant within the domain existence.

The aim of the ecosystem approach is to restore and sustain the function of ecosystems, based on their health, productivity and biological diversity and the overall quality of life through management systems that are fully integrated with social and economic goals, for the benefit of current and future generations. In particular, the goal of ecosystem approach to fisheries is to plan, develop and manage fisheries in a manner that addresses the multiplicity of societal needs and desires, without jeopardizing the options of future generations to benefit from full range of goods and services provided by the marine ecosystem.



In author's opinion in the case of Republic of Croatia it is necessary to institute the new national institutional legal framework in the course of alignment of Croatian legislation with the European Union acquis with the aim to promote sustainable use of the seas in implementing multiple targets of the marine ecosystem approach.

#### REFERENCES:

1. The United Nations Convention on the Law of the Sea (UNCLOS), 1982, Official text of the United Nations Convention on the Law of the Sea with Annexes and Index, Final Act of the Third United Nations Convention on the Law of the Sea, Introductory Materials on the Convention and Conference, New York, 1983
2. Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Species, 1995, A/CONF.164/37
3. Convention on Biological Diversity (CBD), 1992, [www.biodiv.org](http://www.biodiv.org)
4. Decision Decisions V/6 from meetings of the Conference on Biological Diversities parties, [www.biodiver.org/decisions](http://www.biodiver.org/decisions)
5. United Nations Conference on the Human Environment, 1972, A/CONF.48/14/Rev.1
6. United Nations Conference on Environment and Development (UNCED), 1992
7. Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, United Nations publication, Sales No.E.93.I8
8. FAO Code of Conduct for Responsible Fisheries, 1995, [www.fao.org](http://www.fao.org)
9. Communication from the Commission to the Council and the European parliament, Thematic Strategy on the Protection and Conservation of the Marine Environment, COM (2005)504 final
10. Convention on Biological Diversity (CBD) Handbook, Secretariat of the Convention on Biological Diversity, 2<sup>nd</sup> edition, Montreal, 2003
11. Global Biodiversity Outlook, Secretariat of the Convention on Biological Diversity, 2001
12. Smith, R.D., Maltby, E., Using the Ecosystem, Approach to Implement the Convention on Biological diversity: Key Issues and Case Studies, IUCN Publication Services Unit, Cambridge, UK, 2003.
13. Hartje, V., Klaphake, a Sciliep R, The International Database on the Ecosystem, Approach: Critical Review, International Actors, Obstacles and Challenges, Bundesamt fur Naturschutz, Bonn, 2003
14. Wang, H., Ecosystem Management and its Application to large Marine Ecosystem: Science, Law and Politics, Ocean Development and International Law, vol.35 (1), 2004, pp.41-74
15. Borg, Joe, The Future Maritime Policy and the Regions, Structured dialogue between the Commission and the European and national association of regional and local authorities, [www.ec.europa/comm/fisheries/news\\_comer/discours/speech90\\_en.htm](http://www.ec.europa/comm/fisheries/news_comer/discours/speech90_en.htm)



UNESCO-sponsored conference

# 4<sup>th</sup> DUBROVNIK CONFERENCE ON SUSTAINABLE DEVELOPMENT OF ENERGY WATER AND ENVIRONMENT SYSTEMS

HOME

PAPERS

VENUE

ORGANISERS

June 4-8 2007, Dubrovnik, Croatia

## Organisers

University of Zagreb, Zagreb, Croatia

Instituto Superior Técnico, Lisbon, Portugal

## In cooperation with

Aalborg University, Aalborg, Denmark

INP, Grenoble, France

National Technical University of Athens, Athens, Greece

University of Rome "La Sapienza", Rome, Italy

Kuwait University, Kuwait

Delft University of Technology, Delft, The Netherlands

University of Zaragoza, Zaragoza, Spain

University of Pennsylvania, Philadelphia, USA

## Journals

Energy

Energy Conversion and Management

Thermal Science

Hydrogen Energy

Built Environment

Management of Environmental Quality

Utilities Policy

## Sponsors

UNESCO, Paris, France

TWAS, Trieste, Italy

Ministry of Science, Education and Sports, Zagreb, Croatia

Ministry of the Economy, Labour and Entrepreneurship, Zagreb, Croatia

