Principles for Sustainable Governance of the Oceans

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VIEWPOINT

Pressures being exerted on the ocean ecosystems through overfishing, pollution, and environmental and climate change are increasing. Six core principles are proposed to guide governance and use of ocean resources and to promote sustainability. Examples of governance structures that embody these principles are given.

The world's oceans are fundamental to the development and sustainability of human society, the maintenance of peace, and the health of the biosphere. But the pressure being exerted by humanity on global resources is such that even the vast oceans are being impacted, and we urgently need a new paradigm for governance of ocean resources in the face of growing uncertainty. A recent workshop in Lisbon, Portugal (*1*), sought to identify the principles upon which such a new paradigm could be based.

The Problems

Five major problems facing the oceans have been identified: overfishing, ocean disposal and spills, the destruction of coastal ecosystems, land-based contamination, and climate change. These range from traditional ocean resource management issues to ever-broader ecological and social system management issues. Overfishing is notoriously resistant to traditional resource management approaches (*2*), but moving through the list the problems become progressively more complex and difficult to manage. Uncertainties abound, so that traditional "rational" management approaches based on the underlying assumption of predictability become increasingly unworkable. Because traditional approaches also tend to ignore distributional fairness and to limit participation in the decision-making process, they have limited credibility and lack social support for their implementation among the increasingly broad range of stakeholders involved.

Since overfishing is in many ways the simplest of these five problems, it serves as an example. Of 200 major fish stocks accounting for 77% of world marine landings, 35% are currently classified as overfished. Currently, overfishing is diminishing the production of fish as food, limiting the economic productivity of fisheries, restricting subsistence and recreational uses, and reducing genetic diversity and ecological resilience (*3*). Overfishing has multiple causes, which vary by fishery. Fishing is often treated as a right without attendant responsibilities. Under open access, the right to fish is accorded to anyone, and individuals are encouraged by the incentives of open access to capture as many fish as possible in as short a time as possible. Even with controlled access, fishery management decisions are often made at scales that do not incorporate all sources of ecological information, focus on user groups rather than public owners, and fail to consider all costs and benefits. Rule compliance is generally low and pressures within fishery management lead to decisions that err on the side of risk rather than caution.

Lisbon Principles of Sustainable Governance

The key to achieving sustainable governance of the oceans is an integrated (across disciplines, stakeholder groups, and generations) approach based on the paradigm of "adaptive management," whereby policy-making is an iterative experiment acknowledging uncertainty, rather than a static "answer" (*4*). Within this paradigm, six core principles embody the essential criteria for sustainable governance. Some of them are already well accepted in the international community (for example, Principle 3); others are variations on well-known themes (for example, Principle 2 is an extension of the subsidiary principle); while others are relatively new in international policy, although they have been well developed elsewhere (for example, Principle 4). The six Principles together form an indivisible collection of basic guidelines governing the use of all environmental resources, including, but not limited to, marine and coastal resources.

Principle 1: Responsibility. Access to environmental resources carries attendant responsibilities to use them in an ecologically sustainable, economically efficient, and socially fair manner. Individual and corporate responsibilities and incentives should be aligned with each other and with broad social and ecological goals.

Principle 2: Scale-matching. Ecological problems are rarely confined to a single scale. Decision-making on environmental resources should (i) be assigned to institutional levels that maximize ecological input, (ii) ensure the flow of ecological information between institutional levels, (iii) take ownership and actors into account, and (iv) internalize costs and benefits. Appropriate scales of governance will be those that have the most relevant information, can respond quickly and efficiently, and are able to integrate across scale boundaries.

Principle 3: Precaution. In the face of uncertainty about potentially irreversible environmental impacts, decisions concerning their use should err on the side of caution. The burden of proof should shift to those whose activities potentially damage the environment.

Principle 4: Adaptive management. Given that some level of uncertainty always exists in environmental resource management, decision-makers should continuously gather and integrate appropriate ecological, social, and economic information with the goal of adaptive improvement.

Principle 5: Full cost allocation. All of the internal and external costs and benefits, including social and ecological, of alternative

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decisions concerning the use of environmental resources should be identified and allocated. When appropriate, markets should be adjusted to reflect full costs.

Principle 6: Participation. All stakeholders should be engaged in the formulation and implementation of decisions concerning environmental resources. Full stakeholder awareness and participation contributes to credible, accepted rules that identify and assign the corresponding responsibilities appropriately.

Applying the Principles

The sustainable governance of the oceans will require an ongoing, participatory, and open process involving all the major stakeholder groups (Principle 6). It will also require integrated assessment and adaptive management (Principle 4). Below we give a few examples of institutional strategies that can incorporate many of the Lisbon principles simultaneously. They are only starting points.

Shore-based and co-managed fisheries. Fisheries management has traditionally been carried out on a species-by-species basis. There has been little regard for interactions with other species, ecological effects at relatively small scales, or the pattern of individual incentives created by regulation. In share-based fisheries, rights or "shares" are allocated to the overall fishery and ecosystem, not to individual species. Shares are strictly limited and entry is possible only by purchasing existing shares. In co-management, entry is restricted and a formal governance system instituted. Two examples are the New South Wales (Australia) share-based system and a co-management system under development in the state of Maine (*5*).

Share-based fishery approaches create local-level management institutions with responsibility for conservation to supplement existing "top down" management structures, which exercise authority over larger-scale constraints. Such decentralization has a number of attributes that facilitate integrated approaches to fisheries management. Local institutions are generally better able to identify the recipients of both costs and benefits, and to assign responsibilities that internalize both. They tend to bring local ecological information about habitat and stock interactions into the management system quickly, at the right scale, and with a minimum of information costs. With individual or group property rights, these systems encourage a more precautionary approach to management. Fishers are more likely to be cautious if their share of the system is at risk and they can reap the benefits of restraint. The principal objective of these systems is the creation of individual incentives that are consistent with the social objective of sustainability. The high level of participation required by the system will result in rules that are credible (that is, that users will have confidence that restraint on their part will have the intended effect), that provide assurances that others will follow the rules or be sanctioned, and that are equitable in the sense that individual costs are borne roughly in proportion to the benefits received.

Integrated watershed management. Increasingly, regional (for example, Great Lakes, North Sea, Mediterranean Sea, and Baltic Sea) and subregional (estuary management programs) ocean governance schemes are addressing land-based sources of pollution through integrated watershed management approaches (*6*). Watershed-level analysis can better identify those responsible for the export of downstream problems and aid the implementation of the Responsibility Principle. "Watershed councils" can be effective at involving all stakeholders—both upstream and downstream—in decision-making.

Managing the distribution of human populations, their ecological footprint, and land use is an important component of watershed management (*7*). Managment may involve restricting the spread of land development and limiting density in particularly sensitive coastal and riparian areas, and (particularly in developing nations) taking steps to provide opportunities for settlement away from densely occupied and stressed coastal areas, in line with the Precautionary Principle. Mechanisms can be included to ensure that decisions are made with the full participation of stakeholders, in line with the Participation Principle, and in an adaptive management framework.

Environmental bonding. Environmental bonding incorporates uncertainty about environmental impacts into market incentives by requiring potential polluters to post a financial bond to cover damage that might result from their activities. Bonding complies with the Responsibility Principle by making parties financially responsible for their potential impacts; with the Scale-Matching and The Full Cost Allocation Principles, by internalizing costs at all scales; and with the Precautionary Principle, by requiring payment up front for uncertain future damages. Bonding can provide protection not only against known environmental impacts, but also against unknown factors that could have potentially greater impact on fisheries. But, in order to be effective, bonding must be integral to the design and implementation of governance legislation.

Marine protected areas (*MPAs*). Currently, MPAs comprise less than 1% of the marine environment. Recent assessments suggest that 20% of marine areas should be designated as MPAs in order to maintain sustainable fish stocks (*8*). MPAs conform to the Responsibility Principle by allowing fisheries to be sustainable in the face of harvesting pressure and implying a responsible use of the resource; to the Scale-Matching Principle, by providing a solution to marine overfishing that is consistent with the ecological scale of the problem; to the Precautionary Principle, in that they are a form of ecological insurance against the uncertainties inherent in fish population dynamics and harvesting; and to the Full Cost Allocation Principle, in that they allocate the costs of conservation to the appropriate parties (the harvesters), by setting aside a certain percentage of the potential harvest to assure future harvests. To be effective, MPAs need the participation of all stakeholders, including the scientific community, to determine their location, size, and interlinkages. While enforcement by government against the will of the local community is possible, it is much less effective and less politically sustainable than engaging stakeholders in both the establishment and enforcement of the MPAs.

Conclusions

We recognize that any attempts to achieve globally optimal ocean governance policies in the face of natural and human uncertainty are chimeras. The best hope lies in raising awareness and including multiple viewpoints in an integrated, adaptive framework structured around a core set of mutually agreed principles. We propose the six Lisbon principles as that core set. Adhering to them will help ensure that governance is inclusive, inquisitive, careful, fair, scale-sensitive, adaptive, and, ultimately, sustainable.

References and Notes

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