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# Ecosystem-Based Management for Marine Capture Fisheries

Over the past 50 years, most efforts to regulate fishing and conserve our oceans and seas have had only limited success in preventing the on-going problems of over-fishing, degradation of the marine environment, and irreversible loss of marine biodiversity. Ecosystem-Based Management (EBM) of the oceans is an approach that is likely to succeed where many other initiatives have failed because of its focus on managing human issues and impacts in order to achieve the maintenance of biodiversity. Fishing is an important use of the world's oceans, but the concept of EBM for marine capture fisheries is not clear or fully operational. WWF has prepared a Policy Paper<sup>1</sup> to encourage and inform global debate. The Paper is designed to develop the concept into a workable approach for implementation in individual fisheries in a manner that is consistent with integrating global and regional policy initiatives into national activities.

## THE CONCEPT

EBM aims to achieve 'sustainability' in exploiting natural resources. Two main themes run through the concept: the effect of the environment on the resource, and conversely, the effect of resource exploitation on the environment. EBM is a highly integrated approach that encompasses all the complexities of ecosystem dynamics, the social and economic needs of human communities, and the maintenance of diverse, functioning and healthy ecosystems. Scientists have constructed a set of principles for this approach.

Implementing EBM in marine capture fisheries requires taking careful account of the condition of ecosystems that may affect fish stocks and their productivity. It also requires taking equally careful account of the ways fishing activities may affect marine ecosystems.

Marine ecosystems are very complex, our knowledge of them limited, and the ways in which fisheries affect them is poorly understood, so the EBM approach to managing fisheries accepts that decisions will often be made in a climate of uncertainty. However, uncertainty should never be an excuse for inaction. Management decisions are



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best made using multiple lines of evidence and a precautionary approach: "when in doubt, err on the side of conservation".

In a fishery managed under EBM principles, the burden of proof for demonstrating there are no major unacceptable impacts from fishing rests with the fishery. Some fisheries already use performance evaluation procedures that measure the populations and productivity of fish stocks, for example, to determine future Total Allowable

Catches of target fish species. Evaluating the success of a fishery in meeting EBM principles will necessarily be more complex, because in addition to fish stocks, a range of habitat and species indicators need to be used to determine the health of the ecosystem. However, the general evaluation methods and approach of an EBM system will be familiar to many fishery managers, including the familiar problems of data weakness and model uncertainty. Overall, the EBM concept offers the best prospect of achieving fisheries that appropriately recognise the ecological issues and provide for the conservation of biodiversity.

<sup>1</sup>Policy Proposals and Operational Guidance for Ecosystem-Based Management of Marine Capture Fisheries  
by Trevor Ward, Diane Tarte, Eddie Hegerl and Katherine Short; in press.

## The Principles of EBM

Ecosystem-based management has objectives and targets that:

- Focus on maintaining the natural structure and function of ecosystems and their productivity
- Incorporate human use and values of ecosystems in managing the resource
- Recognize that ecosystems are dynamic and constantly changing
- Are based on a shared vision of all stakeholders
- Are based on scientific knowledge, adapted by continual learning and monitoring.



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## SUCCESSFUL ECOSYSTEM-BASED MANAGEMENT IN FISHERIES

Many existing global, regional, national and fishery-specific initiatives attempt to improve the way ecosystems are considered within fishery management systems. However, they are typically uncoordinated and do not necessarily work in harmony with initiatives designed, for example, to improve the management of fish stocks. Taking into account this range of initiatives, WWF has identified six elements required for EBM in fisheries to be successful.

**1. Operate within a policy framework designed to incorporate EBM principles:** Ecosystem-based management can only operate effectively where there is a supportive framework of appropriate law and practices that

govern and control human activities. The best known example is being implemented in the Antarctic, where the Convention on Conservation of Antarctic Marine Living Resources (CCAMLR) has been pioneering an ecosystem approach to fisheries management since it entered into force in 1982. Agreement on its regulations, called Conservation Measures, is reached by consensus of the 24 Commission Member States, which the States are then obliged to implement.



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Several nations (such as Canada and Australia) are proceeding with the development and implementation of policies designed to facilitate integrated planning and management of their oceans. Australia's Oceans Policy will be implemented primarily through a regional marine planning process based on large marine ecosystems, which will integrate commercial interests and conservation

requirements. Additional provisions that address EBM for fisheries include a comprehensive protected area system and legislative-based strategic assessments of fisheries to determine their sustainability.

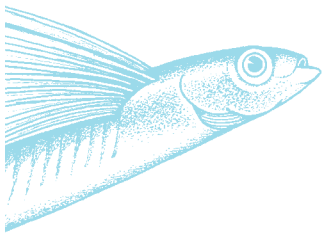
**2. Recognise economic, social and cultural interests:** The interests of all stakeholders in the fishery and the ecosystems where the fishery operate need to be recognised as factors that may affect resource management objectives, targets, strategies and activities. This will involve development of a process for engagement of the stakeholders, and identification of their objectives for marine ecosystems and marine fisheries. These may include access to fisheries, protection of identified important species and habitats, and implementing a precautionary approach. After agreement is reached on suitable objectives, specific management policies or activities can be developed. These objectives and their commensurate controls and activities are documented within a fisheries management plan, which becomes the focus for stakeholder engagement.

**3. Recognise the risk of the impacts of resource exploitation on ecological values:** Fishing takes place over most of the world's oceans (only tiny amounts are protected from all forms of fishing), but nonetheless, with careful management and use of well-designed gear, areas that are fished may still contribute much to biodiversity conservation objectives. By setting specific protection objectives for ecosystems, habitats and species in fishing grounds, much of the biodiversity can still be maintained within acceptable limits provided that fishing is carefully monitored and controlled.



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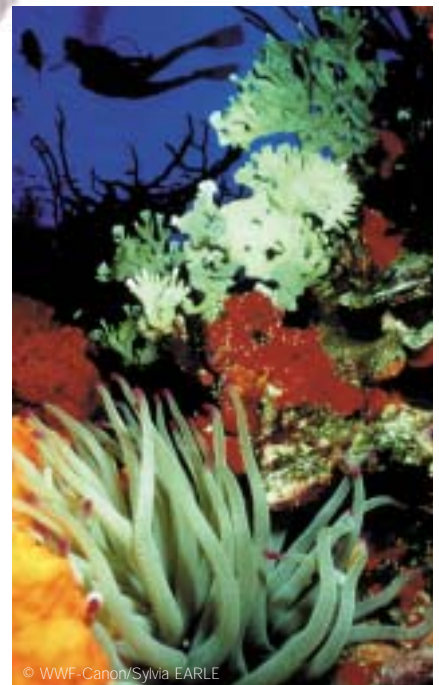
In addition to the biodiversity in fishing grounds, areas where no fishing is permitted (no-take reserves) can make a substantive contribution to conservation of the biodiversity provided they are of sufficient size and are well respected and managed. Many fisheries already have built-in protection for sensitive stages of harvested species, for example by



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closing fishing activities in certain areas during spawning seasons. Most marine protected areas have been established in coastal areas, but it is of vital importance that nations agree to establish new reserves elsewhere within national Exclusive Economic Zones and also in the high seas beyond national EEZs, where pelagic and demersal fishing and industries such as hydrocarbon extraction are now operating.

**4. Incorporate adequate information on exploited species:** Maintaining fish stocks, and protecting populations of marine species impacted by fisheries (for example, cetaceans, birds, turtles, and non-target fish) can be achieved by a range of measures in an EBM approach. Prevention of overfishing can theoretically be achieved by the precautionary application of catch levels, quotas, and harvest (or property) rights. But for success, a spectrum of these measures may have to be applied simultaneously, as experience shows that using one single approach may not be sufficient. The careful design of fishing strategies in



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an EBM system will ensure that the population and genetic diversity of exploited species, natural size range, and geographic distribution of the populations are maintained. Using an EBM approach, both ecosystem and socio-economic factors would be incorporated into cautious Total Allowable Catches for fisheries.

**5. Ensure the fishery management system is adequate for EBM to be effective:** Establishing a sound management plan, with the full participation of all stakeholders, is central to the concept of EBM for fisheries. Such a plan would include clear strategies for implementation, and for monitoring and evaluation of its performance. The management plan also must have clear linkages to scientific research on priority areas of uncertainty in the fishery, including environmental issues.

**6. Consider externalities that may affect the resource:** A range of factors can affect critical fisheries habitats. For

# Healthy and Well-Managed Fisheries



example, sediment, pollutants, or high nutrient loading originating from activities on land can contaminate seagrass beds and their commercially valuable shellfish. Fishing grounds may be close to tourist areas and ports, or may overlap with offshore oil and gas fields or shipping lanes. In implementing EBM for fisheries, such external issues must be taken into account.

## IMPLEMENTING EBM IN A FISHERY

For EBM to be effective, the principles and elements of EBM need to be translated into actions and control measures that are applied within a fishery. WWF has identified **12 operational components** that form the basis for implementing EBM in a typical fishery. These components provide detailed guidance for fisheries managers to develop and apply EBM within the context of their own fishery. Also, the details of intended outcomes are identified to permit cooperative implementation in conjunction with the community of stakeholders and partners.

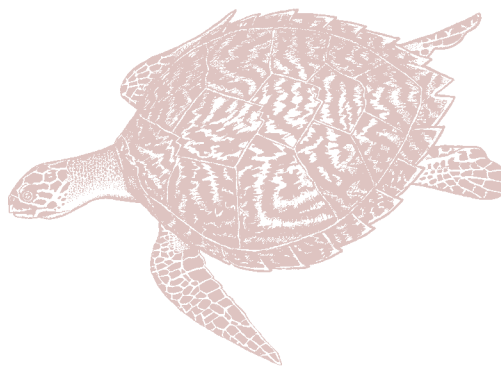


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## EBM AT THE INTERNATIONAL LEVEL

Many fisheries operate in coastal areas belonging to two or more nations, or on the high seas outside national jurisdictions. Most existing international legal frameworks do not effectively support an ecosystem-based approach for fisheries management, especially for the commercially valuable resources found in the high seas. Improved international governance is key to restructuring fisheries and their management to meet the demands of EBM, and to address such issues as conserving migratory fish stocks, and controlling Illegal, Unreported and Unregulated fishing. Access agreements that regulate the exploitation of a nation's marine resources by distant water fishing fleets also need to incorporate EBM principles to avoid damaging the livelihoods of coastal fishing communities.





## WWF's PROPOSALS FOR ACTION

WWF is committed to developing innovative, workable and cost-effective ways to implement EBM, in close consultation with relevant stakeholders such as policy and fishery managers, scientists, fishers, NGOs and donors. WWF has identified nine proposals for pursuing Ecosystem-based Management that can benefit fisheries:

- 1. Get the message across:** A policy paper describing the basis of EBM and how it can be implemented in marine capture fisheries is being published for global distribution.
- 2. Develop models for stakeholder engagement:** Identify 'best practice' models for effective stakeholder engagement, taken from both the fisheries sector and from other sectors such as forestry, agriculture and tourism. Test the models for applicability to regional and international fishery management systems, commercial coastal fisheries and small-scale fisheries. Publish and distribute to fishery managers.
- 3. Define procedures for good EBM planning:** Work closely with a small number of fisheries to design a robust



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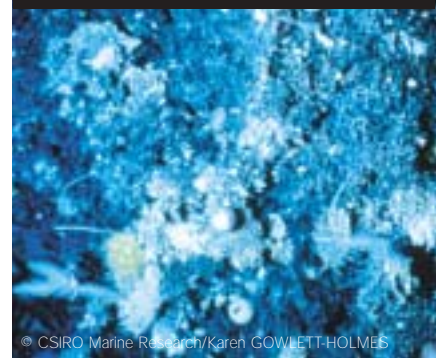
A squat lobster (*Gastropylchus* sp.). Many species of squat lobster live on and in the nooks and crannies of the reef, on mountains 1000 metres underwater off southern Tasmania.



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scientific approach to developing ecosystem objectives, indicators and targets for integrating EBM into their management systems, following a basic "Ecosystem Assessment Procedure", customised for each fishery. Document and publish successes and failures.

Surface of a seamount showing an underlying reef matrix at 1000 metres off Tasmania.



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- 4. Undertake an 'ecological audit' of major global fisheries:** Invite key partners such as governments, inter-governmental and non-governmental organisations, scientific institutions, donors and fishers to design and implement an assessment of management systems of major global fisheries in the context of EBM, using a 15-point checklist as a starting position.

- 5. Promote the benefits of marine protected areas for fisheries:** Bring coastal and offshore fishery managers, and other stakeholders, into the process of designing and implementing a pilot fully-protected reserve system to provide demonstrated benefits to fisheries.

- 6. Integrate regional planning and management:** Support, and where necessary advocate and promote, integrated regional planning and management programs, whether government or community-initiated, and encourage the incorporation of EBM principles into management of coastal EEZs and the high seas. Monitor the implementation of the Oceans Policy initiatives within Australia, Canada, and the United States to identify critical obstacles to success.



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## 7. Develop a Global Fishery Restructure

**Fund:** Promote the establishment of a Global Fishery Restructure Fund to operate in the international domain for the benefit of fisheries and fishing communities at all scales. Entry would be open to fisheries anywhere, prioritised by their level of ecosystem impacts, and dependent on their agreement to implement the principles and practices of EBM.

**8. Engage in case studies:** Design and implement case studies of different fishery systems in a small number of specific fisheries, to demonstrate how EBM management systems can be improved, or where absent, how EBM could make a difference. Document lessons learned and publish outcomes.

## 9. Extend EBM to other sectors:

Develop an operational model for EBM in marine tourism, and then for other sectors as the opportunity arises.

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Marine Stewardship Council.  
Certified Western Rock Lobster.

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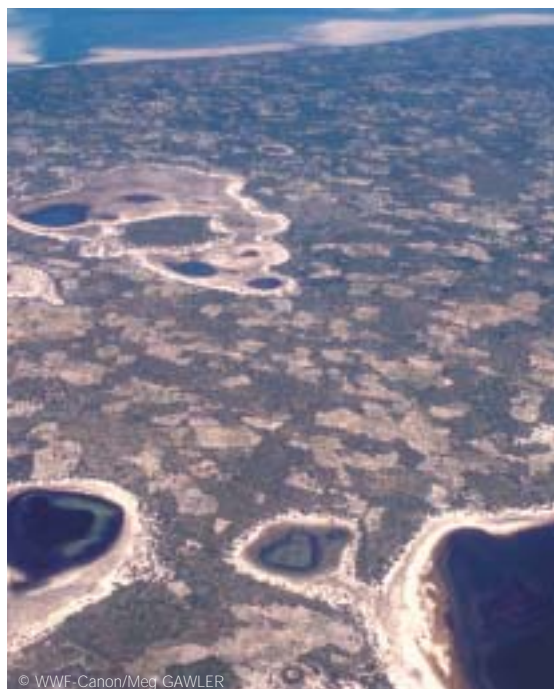
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