

# Biodiversity

## Research and



### The Importance of Biodiversity in Fisheries and Aquaculture

**T**he long-term sustainability of fisheries and aquaculture depends to a large extent upon conservation of aquatic biodiversity. Most capture fisheries are direct exploitations of wildlife and fishing is always selective. Fisheries have considerable genetic impact upon the fished populations, reducing their capacity for replenishment and for adaptation to environmental changes.

A few capture fisheries are dependent upon or enhanced by captive breeding and stocking of open waters, and this mode of production is likely to be further developed. In such fisheries, the hatchery-reared "seed", often from a narrow genetic base, comprise the bulk of the fished populations and can also have genetic and other environmental impacts through interactions with wild populations and their habitats.

For aquaculture, there are many hundreds of aquatic species that have yet to be evaluated for their farming potential. Moreover, the documentation, evaluation, sustainable utilization, and conservation of the genetic resources of the relatively few species that are widely farmed at present have yet to receive much attention.

Diversity of marine organisms decreases with increasing depth and increasing latitude and the most diverse marine communities are found in tropical coral reef, sea grass and mangrove ecosystems—often interlinked in super-ecosystems.

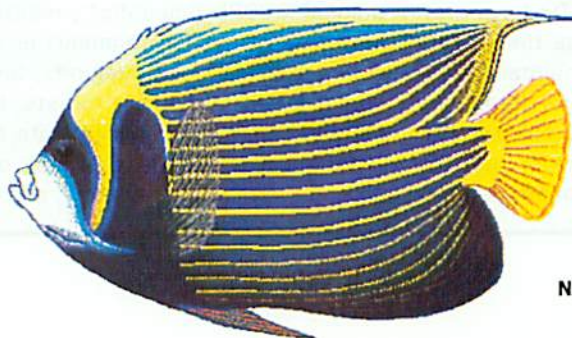
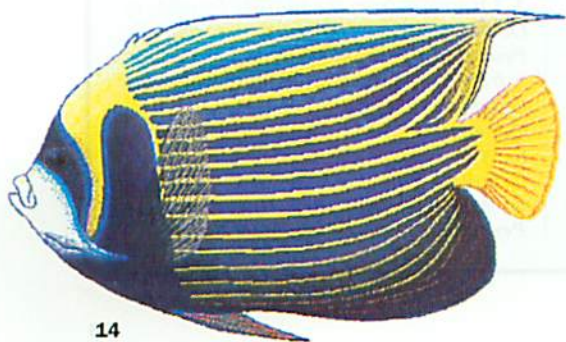
The problems encountered in attempting to promote the conservation of biological diversity in tropical oceans differ dramatically from those encountered in terrestrial habitats and inland waters, because farming techniques do not yet exist for most of the enormous array of marine animals. Moreover, most marine plants cannot be conserved as seeds or spores. For those few tropical marine species which can be farmed,

precautions have to be taken against swamping natural habitats with hatchery-reared stock with a narrow genetic base. Very few tropical species are currently reared with such precautions.

Unless remedied, the above-mentioned problems will jeopardize the prospects for fisheries and aquaculture to make wise and sustainable use of biodiversity, avoiding some of the mistakes made in agriculture—where there have been tremendous losses of plant and animal biodiversity. The threats to aquatic biodiversity are already alarming: overfishing; pollution and other degradation of habitats; indiscriminate transfers of exotic species, etc.

ICLARM's role in biodiversity research, as envisaged in its Strategic and Medium-Term (1994-1998) Plans, will be strategic and synthetic: working with other collaborators in developed and developing countries to evolve better

*FishBase provides color images of the species covered.*





# ICLARM

methods for the documentation, evaluation and sustainable utilization of aquatic biodiversity. The Center is a member of the World Conservation Union (IUCN) and assists in matters of aquatic resources.


## ICLARM's Current and Medium-Term Activities

### FishBase

To document fish biodiversity, ICLARM, in collaboration with FAO and with the support of the European Community, is developing a global database which combines key information on fish with time series data on their occurrence and abundance and with their currently recognized status of threat. It is planned to make FishBase and related management tools available free to researchers and managers in developing countries together with computers and training courses. The release of the first CD-ROM version of FishBase is scheduled for late 1994. See also p.17.

### Marine Protected Areas

Marine protected areas (MPAs) are needed because the farming potential of most marine organisms, including many obvious candidates, has never been examined. For example, stocks of giant clams were eliminated in many



areas before farming techniques were developed. ICLARM's work will include the development of a sound scientific basis for the establishment of MPAs and studies of the social, economic and legal problems involved in creating MPAs.

### ReefBase

The ICLARM ReefBase project, a global database on coral reefs, will document the location, extent and depth zonation of the reefs and their exploitation and conservation status. More details on p.16.

### New Species for Marine Aquaculture


A program will be mounted for evaluating the potential of "new" species for aquaculture and fisheries enhancement. Many marine fishes and

invertebrates of potential use for aquaculture are relatively rare in nature, much sought after and therefore vulnerable to extinction. This program will be undertaken in conjunction with MPAs in which newly established stocks can be reared to maturity, interbred and propagated.

### Breeding Programs with In-Situ and Ex-Situ Conservation of Germplasm

ICLARM is engaged on selective breeding research for the main groups of farmed freshwater fishes—carps and tilapias. This is done largely through a UNDP-funded project Genetic Improvement of Farmed Tilapias (GIFT) and an International Network on Genetics in Aquaculture (INGA) linking aquaculture genetics research and researchers in institutions across the world. Biodiversity research is part of the INGA scope of work, particularly in countries that are rich in aquatic biodiversity such as India, Malawi and Vietnam. The role of ICLARM includes the development of new methods and approaches and helping to improve international codes of practice for transfers of aquatic organisms so as to safeguard the environment, including biodiversity conservation. The GIFT project and INGA activities also include research for the *in-situ* and *ex-situ* conservation of aquatic germplasm including protected areas, captive breeding populations and cryopreservation of fish spermatozoa.

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The GIFT tilapia (lower) is 60% bigger than a commercial strain (upper) of the same age.