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The World's Coral Reefs Hope for the Future





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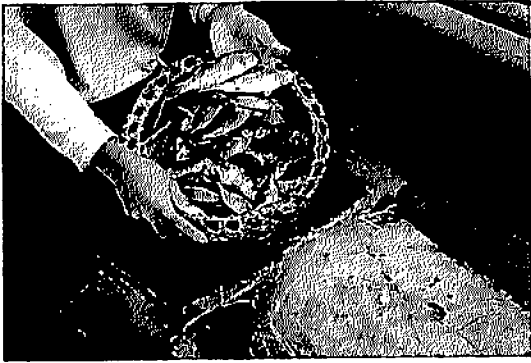


photo by Mark Erdmann: Indonesia

Livelihoods depend on coral reefs

Coral reefs are found in all tropical seas and come in a wide variety of shapes and sizes. Tens of millions of people depend on reefs to protect their coastlines and to provide food and livelihood. Much of the sand which forms beaches on the tropical islands comes from coral reefs. The reefs and the sand that they produce support major tourism industries which are essential to the economies of many countries.



photo by Pr. Chantal Conant: Mayotte Island

High biodiversity and long creation time

Tens of thousands of species may be present on a single reef - more than are known from any other marine ecosystem. Corals form a framework which is filled in and cemented together by other calcium-producing organisms to create a reef. Many of today's coral reefs have been built up gradually over the last 5,000 to 8,000 years, often on the remains of far more ancient reefs.

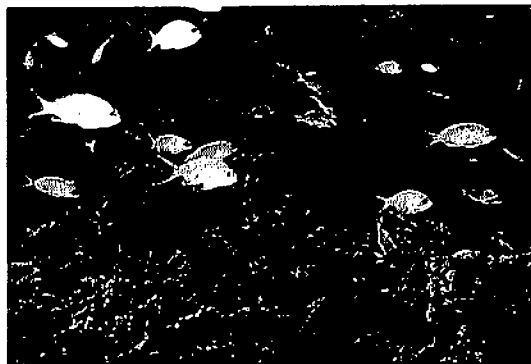


photo by Philippe Zeigler: Egypt

Interdependent ecosystems

Fish are vital components of coral reef ecosystems. Corals provide shelter for many species of fish and support a variety of small plants and animals on which they feed. Changes in the populations of certain groups of fish can lead to an overabundance of seaweed or other ecological changes which can lead to the degradation of the reef.



photo by Mike Ross: Philippines

A breeding ground

The young of most coral reef animals swim or drift within ocean currents for days to months before settling on a particular reef to mature. A given reef may depend on other reefs miles away to replenish their populations. Protecting a single coral reef may require the proper management of a large set of reefs. Coral reef degradation in one country may even affect the status of reefs in a country hundreds of miles down-current.



photo by John McManus: Indonesia

A popular zone to live

Many people avail of the protection from waves provided by coral reefs by building their homes along the sandy shore or on stilts over the reef. This often leads to pollution which damages the reef. Many poor people migrate to fringing reef areas because harvesting reef organisms requires very little capital investment.



photo by John McManus: Philippines

Fishing on the reefs

Most coral reef fisheries are small-scale, and range from people gathering edible species from the reef flat by hand to fishing from bamboo rafts, small canoes and various powered vessels. Small-scale operations provide for more equitable distribution of resource benefits and less wastage than large-scale fisheries.

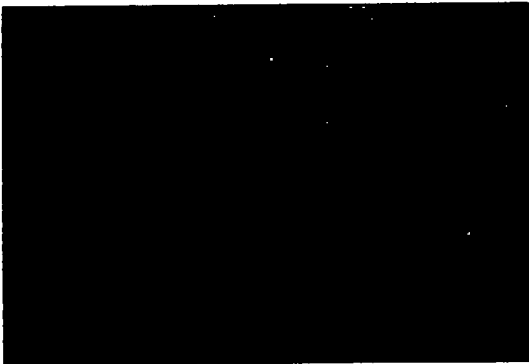


photo by John McManus: Philippines

Overfishing on the reefs

Coastal crowding has led to widespread overfishing. A typical catch on a lightly fished coral reef ranges from 10 - 20 kilograms per day of large fish. In densely populated areas, the daily catch can drop to 1 - 2 kilograms per day of mostly small, immature fish. Some species of edible sea urchins, sea cucumbers and giant clams have vanished from certain reefs because of overharvesting.



photo by Thomas Heeger: Philippines

Blast or poison fishing

As coastal populations grow, increasing competition for dwindling resources leads fishers to use destructive fishing gear such as homemade bombs and poisons. These kill not only the fish but also thousands of coral reef species which are essential parts of the ecosystem. The use of explosives and poisons is difficult to control because they are made from common agriculture, mining and metal processing materials.

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27 May 1997

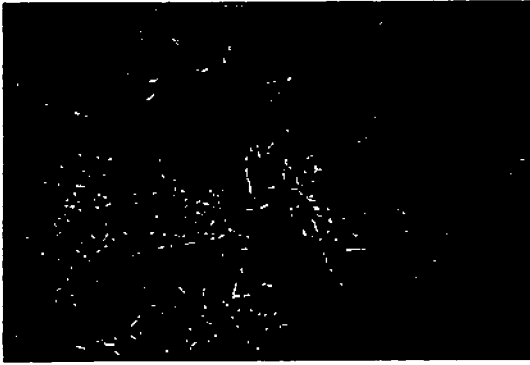


photo by Terrence Hughes: Jamaica

Coral reefs in the Caribbean

Caribbean coral reefs are often characterized by towering stands of elkhorn and staghorn coral, which support large populations of fish. This picture of a reef in Jamaica was taken during the early 1980's. Reefs in Jamaica are important sources of national revenue from fishing and tourism.



photo by Terrence Hughes: Jamaica

Long-term effects of overfishing and pollution

By the 1990's, many reefs along the Jamaica had large numbers of corals killed in a hurricane. Normally, a reef would show signs of recovery within a few years. Here, the reefs became covered with seaweed which inhibits the settlement of new corals. Overfishing may have reduced the populations of seaweed-eating fish. Organic pollution from the coastlines may have also enhance the growth of seaweed. The future of these reefs is uncertain.

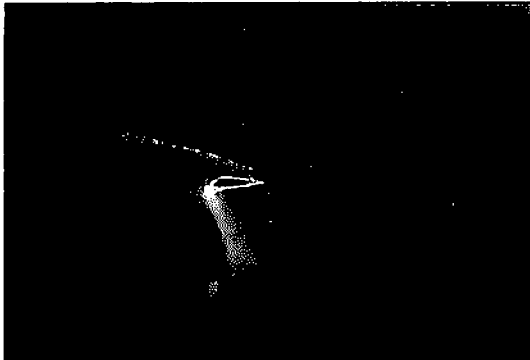


photo by John McManus: Philippines

Pollution and sedimentation

A major cause of the decline of coral reefs around the world is sedimentation. One common source is runoff from land following deforestation or coastal construction. Dredging operations are another important source. However, in this case, the corals died because excess material left over from open-pit copper mining was dumped onto a large reef. This left fish without shelter, and fishers with reduced fishing grounds.



photo by John McManus: Egypt

Managing the reefs for tourism

Tourism is both a solution and a problem. Small-scale tourism can be designed to direct profits to coastal villagers, and to provide alternative occupations for fishers. However, large tourist resorts often do little to help villagers and may result in a loss of fishing grounds without compensation. In all cases, tourists must be prevented from damaging the reefs, and the resorts must avoid polluting adjacent reefs.

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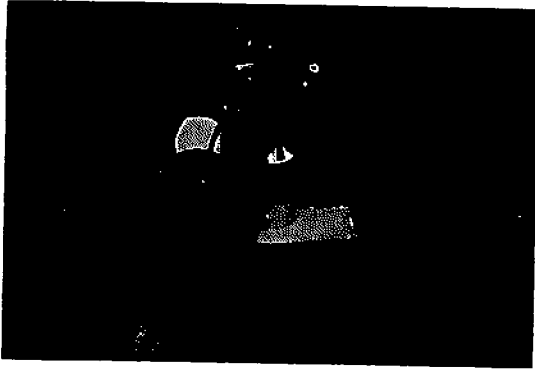


photo by John McManus: Philippines

Collecting information on coral reefs

Coral reef degradation is widespread throughout the tropics. However, it is often difficult to obtain quantitative information on its causes and consequences. Through ICLARM's ReefBase Aquanaut System, scuba instructors are certified to train sport divers, park rangers and others to collect ecological information on coral reefs from sites where coral reefs may be monitored year after year. The data is made widely available through the Internet and the annual ReefBase CD-ROM.



photo by Philippe Ziegler: Philippines

Marine protected areas

Establishing marine protected areas is a step toward protecting coral reefs. Fishery reserves have been shown to increase the yields of fisheries in nearby coral reef areas. Marine parks can be planned to protect reef ecosystems while generating income from tourism. Reefs can be included in coastal protected areas so that land-based activities which might damage the reef are controlled. Many experts in natural resource management advocate setting aside 20% of all coral reefs as protected areas.



photo by John McManus: Philippines

Coastal zone management and the coral reefs

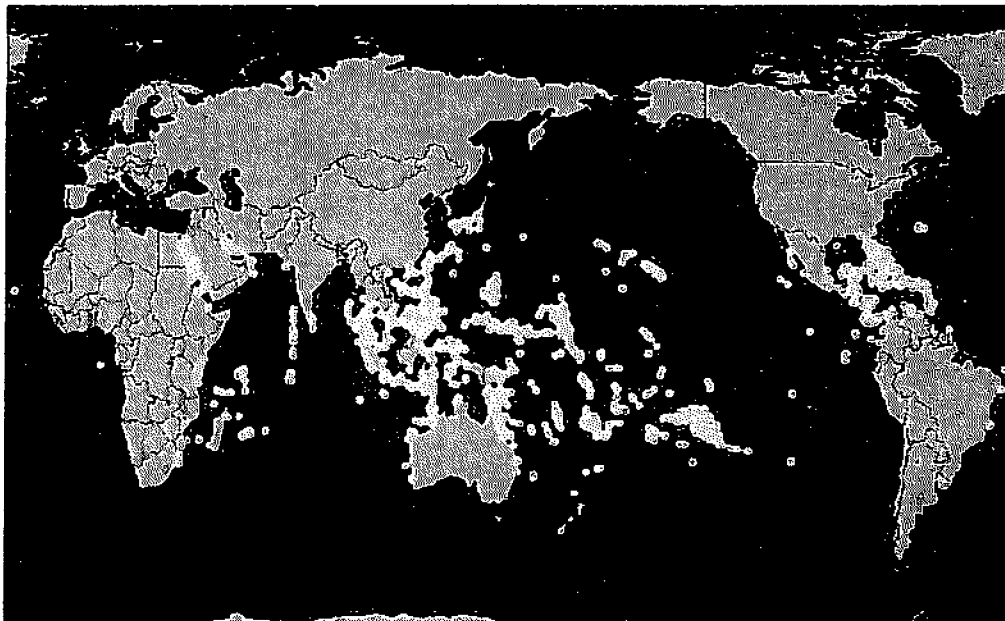
Integrated Coastal Management requires balancing a wide range of ecological, social, cultural, governance and economic considerations. An important element is co-management, in which local stakeholders share aspects of governance with the government. Scientists play a key role by providing sets of management options and their potential consequences. There is an urgent need for research in many areas, such as coral reef ecosystem health and its relationship to the welfare of the people who depend on coral reefs.



photo by C.F. Dai: Taiwan

International Coral Reef Initiative

The International Coral Reef Initiative is a strategy to promote the proper management of coral reefs. A Framework for Action has been endorsed by more than 80 governments and a variety of intergovernmental and non-governmental agencies. The Framework supports specific activities, including the implementation of integrated coastal management, international data exchange and the Global Coral Reef Monitoring Network.



These yellow dots represent more than 7,000 coral reefs about which information is available in ReefBase: a Global Database on Coral Reefs and their Resources. ICLARM scientists enter data from published and unpublished reports on specific reefs, and from surveys conducted by governmental and non-governmental organizations and individuals. It includes many maps of coral reefs from the World Conservation Monitoring Center. ReefBase is the database of the Global Coral Reef Monitoring Program, under which coral reefs are being assessed using standard methodologies and data is exchanged and summarized at national, regional and global scales.

This photo essay was produced from pictures in ReefBase: a Global Database on Coral Reefs and their Resources. The text is by John McManus. ReefBase is available on CD-ROM for PCs, and may be obtained by sending a certified check or money order made out to ICLARM for US\$95.00 (or US\$50 for upgrades) to:

ReefBase, ICLARM, MCPO Box 2631, 0718 Makati City, Philippines

The database is free to those who send at least 20 high quality photographs which we accept for use in ReefBase and related publications. The photographs may include aerial pictures of reefs, underwater scenics, and pictures of reef uses and abuses. Data should include the reef name, location in coordinates, date, and depth for underwater shots if known. Copies of slides or prints are acceptable. ReefBase will not be responsible for the return of submitted materials.

Information on the ReefBase Aquanaut Volunteer System can be obtained from the same address. The ReefBase webpage is at <http://www.cgiar.org/iclarm/reefbase>.

ICLARM is a non-profit non-governmental scientific organization which conducts research in support of the management of aquatic resources. Further information on ICLARM and its programs can be found on the Internet at <http://www.cgiar.org/iclarm/>.



ICLARM

International Center for Living Aquatic Resources Management

And finally

FishBase is fun to work with. It has more than 10,000 pictures of fish, with many underwater shots from renowned scientific divers.



(*Amphiprion percula*, Photo by J.E. Randall)

Divers, anglers and aquarists can create their personal database of where and when they have seen, caught or acquired what fish.

And it has a Fish-Quiz, to test your (or your students') knowledge of fish!

FishBase has been developed by the International Center for Living Aquatic Resources Management (ICLARM) in collaboration with the Food and Agriculture Organization (FAO) of the United Nations and many other institutional and individual partners. The project was made possible through the support of the European Commission (EC) of the European Union.

Any more questions? Want to order?

Questions or suggestions are always welcome. You may also consult our WEB page on the internet at

<http://www.cgiar.org/iclarm/fishbase/>

The price of **FishBase** is US\$ 95. This includes the CD-ROM, a manual and the cost of airmail. Payments can be made either through American Express Card or by sending a check, payable to ICLARM and drawn from a US-based bank.

Inquiries should be sent to:

FishBase Project
ICLARM
MC PO Box 2631
0718 Makati City, Metro Manila, Philippines

Tel.: (632) 812 8641
Fax: (632) 816 3183
e-mail: fishbase@cgnat.com

Annual updates of the database are available since 1995. ICLARM also plans to produce versions of **FishBase** in French and Spanish.

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MCPO Box 2631, 0718 Makati City, Metro Manila, Philippines
Tel: (632) 818 0466 / Fax: (632) 816 3183
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PROJECT

FishBase

**The World's Most
Comprehensive
Electronic
Encyclopedia
on Fish**

FishBase is a repository of available information on the taxonomy, biology, ecology, occurrence and utilization of fish. It brings the world's literature on fish to your desk. It contains published information on more than 17,000 of the existing 25,000 finfish species, arranged in 55 subject tables, accessed through user-friendly software on a CD-ROM.

At the heart of **FishBase** is the authoritative taxonomic fish classification established by *W.N. Eschmeyer* (California Academy of Science). It ensures that all information on fish is assigned to the correct species, even if a publication uses an outdated taxonomy.

FishBase

ICLARM



What it is

FishBase is a CD-ROM database for education and research on all aspects of finfish (Pisces). The database gives access to standardized data and explanatory text, extracted from more than 10,000 sources such as books, journals and scientific publications. All information is properly referenced.

Many scientific institutions and fish specialists around the world have agreed to have their own large electronic databases or archives incorporated into **FishBase**. Among these are:

- Museum National d'Histoire Naturelle, Paris
- Musée Royal de l'Afrique Centrale, Tervuren
- IUCN Red List of Endangered Fish
- FAO Fish Catches
- FAO Aquaculture Production
- Welcomme's database on fish introductions
- Eschmeyer's Genera of Recent Fishes

FishBase
has information about:

- ✓ Nomenclature
- ✓ Distribution
- ✓ Population Dynamics
- ✓ Trophic Ecology
- ✓ Reproduction
- ✓ Ichthyoplankton
- ✓ Morphology
- ✓ Physiology
- ✓ Genetics
- ✓ Aquaculture
- ✓ Ecotoxicology
- ✓ Status of Threat and more

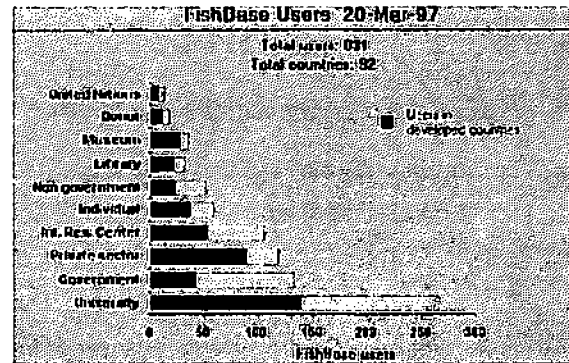
What you can find

You work in Sénégal and need to know what kind of fish a "Bédj" is? **FishBase** contains over 60,000 common names of fish in 150 languages. (*Bédj* is the Wolof name for *Claroetes laticeps*.)

RESEARCH SCIENTISTS and FUNDING

AGENCIES will find it useful to gain a quick overview of all the fish existing in a country and what is known or still unknown about any of the fish species.

POLICYMAKERS may be interested in a chronological, annotated list showing the introductions of fish species to their country.



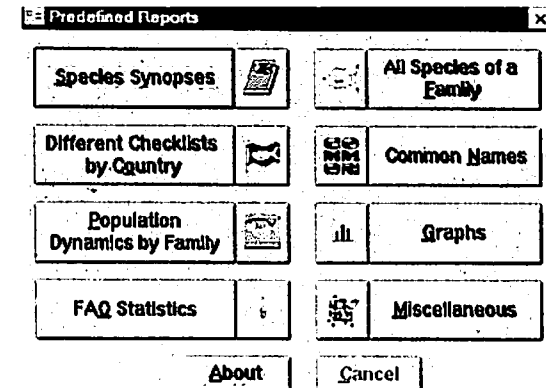
FISHERIES BIOLOGISTS will find the largest compilation of data on fish population dynamics, morphology, metabolism and other biological parameters.

ECOLOGISTS can extract a description of preferred habitats, environmental tolerance, prey and predators, and food consumption.

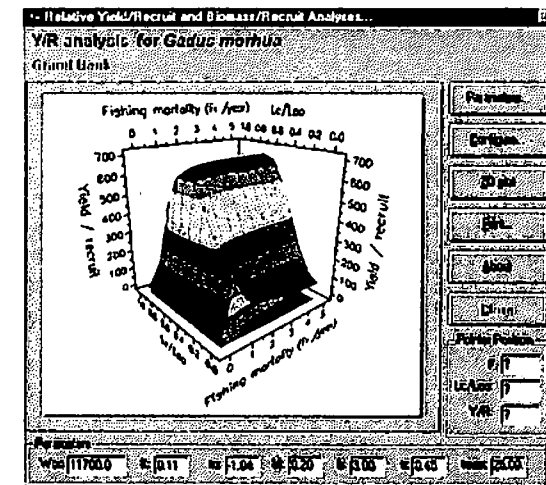
AQUACULTURISTS will find information on genetic traits and important results from culture experiments.

Yet, there is more

FishBase is a research tool in its own right. A user-friendly interface leads to many built-in routines that analyze all relevant data and present the results in graphs and tables.



Producing, e.g., a "Yield per Recruit" analysis for the Atlantic cod (*Gadus morhua*) is a matter of a few keystrokes:



FishBase can be used to create national databases on fish. These databases contain all information available in **FishBase**, but are freely accessible for further input by national scientists.