



The Sea and its Resources



Special Courses

Benthos Ecology of Mangrove Forests



Objectives

Mangrove forests are the dominant vegetation of tropical and sub-tropical coasts. They are among the most productive, but also the most endangered ecosystems. Mangroves are natural barriers which protect coastlines from erosion and adjacent coral reefs and sea grass beds from the input of terrestrial sediments. They fix large amounts of carbon dioxide and also serve as nursery sites, feeding grounds and protection areas for many fish and crustacean species, as well as mammals and birds.

Benthic organisms are of ecological as well as of economic importance in mangroves and adjacent tidal flats. They affect internal nutrient cycling and exchange processes with adjacent ecosystems. Benthic fauna is a major food source for numerous juvenile fish and crustacean species and thus crucial for the survival of many commercially harvested species. In addition, benthic crabs and mollusks are important fisheries resources for the local population.

The ongoing degradation of mangroves and exploitation of their living resources calls for coastal zone management and conservation plans. Understanding the response of tropical benthic communities to human impacts is a prerequisite for the development of strategies for the sustainable use of these resources. Therefore, a well-founded understanding of population biology, trophic relationships, life cycles, and the physiology of important species is required.

The major goal of this course is to provide background knowledge on the life cycles and life strategies of benthic fauna and its diversity in mangrove forests and tidal flats. Emphasis is placed on exchange processes between organisms and their habitat and on the response of organisms to natural and human disturbances. The course also provides training in the application of sampling techniques and the identification of species.

Contents

The 1–2 week course will take place at one of the ZMT partner institutions in the tropics.

General introduction:

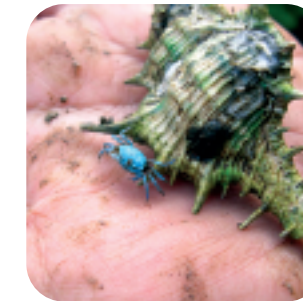
- Taxonomy, anatomy, feeding strategies and life cycles
- Food web and energy flow measurement
- Biodiversity
- Zonation patterns; temporal and spatial variation
- Intra- and interspecific interactions
- Stability of benthic communities
- Impact of benthic organisms on carbon and nutrient cycling
- Sampling design; laboratory and field experiments

Status, uses and threats:

- Use of benthic resources
- Natural and anthropogenic threats; pollution
- Biological indicators of ecosystem health and resilience
- Protection and sustainable use of resources; management issues
- Re-colonization by benthic organisms

Practical work, including field trips:

- Collection of epi- and endobenthic species using different sampling gear
- Sample processing
- Species identification
- Abiotic factors
- Data processing and interpretation



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Participants and Fees

This course (15–20 participants) is intended for students, lecturers, researchers, coastal managers and all those interested in the ecology of benthic organisms and their interaction with the environment. Participants should be proficient in English and hold an undergraduate degree in biology or have equivalent experience. ZMT certificates for successful participants can be issued on request. The ZMT is a non-profit institution. Participation fees will be set by the host institution.



Background

Since 1991 the ZMT has been engaged in educational and training activities in tropical aquatic ecology. This includes special courses for postgraduates in Bremen and at partner institutions around the world. Based on this experience, the ZMT offers tailor-made training courses within its course curriculum “The Sea and its Resources”. They are carried out in close cooperation with scientists from other German research institutions and cover a wide range of topics, including:

- Coastal Marine Systems
- Sampling Strategies and Methods
- Tropical Ecosystems and Resources
- Resource Availability and Vulnerability

Further

ZMT – Special Courses

Ecology and Taxonomy

- Ecology and early life stages of marine organisms; ZMT Bremen
- Coral reef ecology; State Polytechnic College of Palawan, Philippines
- Mangrove ecology; Bung Hatta University, Indonesia
- Benthos ecology with emphasis on tropical coastal ecosystems; ZMT Bremen; CIMAR, Costa Rica
- Taxonomy of corals; Bung Hatta University, Indonesia
- Fish ecology; Belem / Bragança, Brazil
- Taxonomy and ecology of reef fishes; Bung Hatta University, Indonesia

Physiology

- Ecophysiology of tropical marine organisms; Bung Hatta University, Indonesia
- Respiration, activity and behaviour of tropical fishes; Bung Hatta University and Soedirman University, Indonesia
- Respiration physiology of fishes; Belem / Bragança, Brazil

Fisheries Biology

- Population dynamics of marine fishes / Ecology of eggs and larvae of marine fishes; College of Fisheries Mangalore, India
- Fisheries biology and marine fishes; University of Cape Coast, Ghana; State Polytechnic College of Palawan, Philippines
- Early life history of fishes (within BENEFIT); ZMT Bremen
- Fishes in estuaries; Bragança, Brazil
- Introduction to fisheries science; Bragança, Brazil
- Fish population dynamics; Soedirman University, Indonesia

Biogeochemistry

- Coastal pollution, its effect and diagnosis in natural communities; ZMT Bremen
- Biogeochemistry and ecology of tropical coastal seas; Institute of Oceanography, Nha Trang, Vietnam
- Aquatic chemistry; Universidade Federal do Pará, Brazil

Coastal Management

- Coastal zone management planning; Universitas Riau, Pekanbaru, Indonesia
- Coastal management: Options and issues in interdisciplinary work between the social and natural sciences; ZMT Bremen
- Coastal resources management; State Polytechnic College of Palawan, Philippines

Methodology

- Sampling strategies for marine ecological research; ZMT Bremen
- Relational databases in interdisciplinary research; Universidade Federal do Pará, Brazil
- Experimental ecology using different methods of the analysis of variance; Universidade Federal do Pará, Brazil
- Methodology in social sciences, participation and interdisciplinarity; University of Bragança, Brazil
- Introduction into systems analysis; Universidade Federal do Pará, Brazil

Ecosystem Modelling

- Trophic modelling using ECOPATH II – steady state and concepts; ZMT Bremen; Universidad Católica del Norte, Chile; Centro de Investigaciones Pesqueras, Cuba
- Modelling and simulation in ecology and species conservation; Pesina, Italy
- Mathematical modelling in ecology; Universidade Federal do Pará, Brazil
- Food webs and energy flow in marine ecosystems including modelling; Universidad Agraria, Perú
- Neighbourhood modelling in plant ecology; online course, (www-user.uni-bremen.de/~uberger/seminars.html)

