

Coordinating Office for Studies in Ecology

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The primary aim of the ecology curriculum is to provide students with a broad background in ecology, ranging from classical ecology as a biological discipline founded by Ernst Haeckel to modern concepts of general, special, and applied ecology. Detailed instruction in the various aspects of environmental protection is only a secondary aim.



The first (basic) academic level encompasses basics of biological and ecological knowledge, general ecosystem theories, plant and animal ecology, anatomical and morphological structure of organisms, and insights into the diversity of plant and animal kingdoms. This is supplemented by functional aspects on the organismic as well as on the ecosystem level. Basic principles of other biological disciplines are also considered.

The second (advanced) academic level is devoted to deepening the student's knowledge of general ecosystem relationships and providing details on the biology and ecology of specific organismic groups. A wealth of practical laboratory and field courses, accompanied by a broad program of excursions to selected countries covering almost all climatic zones, is offered. Interdisciplinarity is

achieved through project-oriented studies in various fields of applied ecology. Students can specialize in vegetation ecology, limnology, marine biology, ecology of terrestrial animals, ecophysiology etc. Moreover, a variety of topics in human ecology can be chosen, including environmental economics and law, social sciences, and related areas.

Managing the Ecology Studies

The ecology studies were established in 1990. The main task of the coordination office is to manage the ecology studies and to ensure that the curriculum can be executed. In addition, the coordination office provides information for all ecology students and forms the organizing link between institutions involved in both teaching and research in the field of ecology. The staff consists of two academic teachers, a secretary and a technician.

Teaching

Together with colleagues from other institutes, we participate in the following lectures and field courses which are compulsory for ecology students:

- *Applied aspects of ecology* (S) (introductory level). In this seminar, invited guests from federal or governmental agencies or members of organizations involved in environmental control or nature preservation report about their organizations and activities.
- *Ecological field course* (introductory level). A botanist, a zoologist and a limnologist accompany a group of twenty students for a week in the field; one habitat type is demonstrated per day (e.g. forests, grassland, agricultural land, lake, stream). This course introduces measuring instruments, fundamental ecological methodology, principles of field work planning, data processing and data presentation.
- *Interdisciplinary project study* (L,S,P) (advanced level). This is a combination of lectures, semi-

nars, field work and laboratory analysis which focuses on applied limnological aspects of water bodies situated in riverine forests of the Danube likely to become a future national park. The field work focuses on limnochemistry, energetics, population dynamics and bioindication of a variety of taxonomic groups (algae, aquatic macrophytes, benthic invertebrates, fish). A close co-operation exists with the WWF, which uses some of the data as a basis for biotope management.

Advanced aspects of ecophysiology, population ecology and coenology (L,S) (advanced level). This series of lectures offers insights into advanced concepts within all levels of ecology, based on interactive botanical and zoological viewpoints. Upon completion of the lectures, a series of seminars based on the discussion of original papers provides further information on selected topics.

Beyond this, a special effort is made to organize student excursions to foreign countries, especially to Mediterranean, desert and tropical ecosystems. In addition, we offer facultative lectures and courses on plant ecophysiology and limnology and are supervising diploma theses and dissertations.

Research

Although management, service and teaching are the most important tasks of the coordination office, research is the prerequisite for competent lecturing. Our scientific interests focus on plant ecophysiology and limnology.

Ecophysiology of plants (R. Albert)

The research group around R. Albert is investigating mineral metabolism and osmotically active compounds in higher plants. A key goal is the characterization of distinct ecological groups (e.g. halophytes, xerophytes, acidophilic and basiphilic plants). Applied aspects include the influence of deicing salts on urban vegetation and studies relating to current forest decline phenomena. Moreover, contacts to ecological research institutions in tropical countries have been established.

Current research projects are:

- * Ecophysiological characterization of the genus *Carex*.
- * Biochemical and molecular mechanisms of tolerance to aluminium and low nutrient stress in three *Brachiaria* species.
- * Mineral metabolism of oak trees from a variety of habitats in eastern Austria.
- * The impact of the deicing salt K_2CO_3 on the mineral metabolism of urban trees.

- * Pattern of ions and low molecular weight organic compounds in desert plants, halophytes and plants of the tropical alpine region.

Limnology (J. Waringer)

Lotic freshwater research

We have long been interested in stream hydraulics. Based on laboratory work with insect larvae, we developed the „concept of resistance to drift“, which emphasizes the contribution of active and passive elements to drift resistance. Larvae whose total weight keeps them within the range of passive resistance to drift are significantly underrepresented in drift samples. In subsequent publications, a methodology for the experimental determination of the drag coefficient has been developed. Knowledge of this parameter is important in estimating current velocities and drag forces at the moment of dislodgement; this, in turn, is helpful in the interpretation of drift data.

Taxonomy and biology of aquatic insects

Our interest in the taxonomy of aquatic insects dates back to 1985, when the first description of a hitherto unknown Trichoptera larva - based on rearings in the laboratory - was published. Since then, descriptions or keys to twelve species of unknown or poorly known aquatic insect larvae (Trichoptera, Planipennia) have been published. In addition, my co-workers and I conduct field work, addressing problems of habitat selection, bioindication, phenology and distribution patterns of Ephemeroptera, Plecoptera, Odonata, Heteroptera, Trichoptera, Planipennia and Diptera.

Selected References

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- Waringer J (1993) The drag coefficient of cased caddis larvae from running waters: experimental determination and ecological applications. *Freshwater Biology* 29: 419-427
- Waringer J, Graf W (1995) The larvae of *Acrophylax zerberus* Brauer, 1867 and *Leptotaulius gracilis* Schmid, 1955 (Trichoptera: Limnephilidae) from two Austrian mountain brooks. *Aquatic Insects* 17: 41-49