

COMBINING ECOLOGICAL RESEARCH WITH ENVIRONMENTAL EDUCATION

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The relationship between ecological research and environmental education programmes at the Hazeva Field Study Centre in Israel is described. Mutual benefits to both researchers and students are discussed and the benefits to the environment outlined.

INTRODUCTION

The Society for the Protection of Nature in Israel (SPNI) is a non-governmental, open-membership organization. Its principal aim is advancing nature protection by education, public action, research and practical conservation work. Some of the senior instructors at the SPNI's 25 Field Study Centres are given the opportunity to carry out scientific research along with their educational work. This research is usually related to the subjects dealt with by the SPNI, and the results contribute either to nature protection or to the educational programmes of the SPNI or to both. In this paper I will describe a network of ecological seminars which were developed at the Hazeva Field Study Centre combining the scientific work in this region with environmental education.

THE STUDY AREA

Hazeva is located in the Syrian-African Rift Valley, in the south-eastern part of Israel. Although the climate is typical of an extreme desert (annual rainfall averages only 70 mm), the vegetation is of a pseudo-savannah type with many trees and large shrubs. The combination of abundant ground water and high temperatures enables the growth of large acacia trees (e.g. *A. tortilis*) of Sudanian origin, and they in turn support many animal species of African origin.

A growing number of researchers have singled out this part of the desert (Zahavi, 1975; Rudich & Danin, 1978; Eidelman, 1979; Bouskila, 1983, 1986a). Their studies of the geology, flora and fauna have contributed to the understanding of this region. Every study that was completed in this area and all the ongoing studies have been incorporated into the ecological seminars.

THE ECOLOGICAL SEMINARS

The aims of the ecological seminars entail curiosity stimuli, development of a scientific way of thinking, understanding the relations in the ecosystems and their sensitivity to interference and damage. In most seminars much time is allocated to active learning by self-work in small groups. The age of the students participating in the seminars is usually 17-20, mostly from Israel, although some groups come from other countries. The first seminars were guided in 1980, achieving their final structure and their popularity in 1984. To date near 1 500 students have participated in these seminars for periods of 2-16 days. Seminars longer than six days are usually conducted in a series of four-day seminars given to the same students at different seasons of the year. A detailed description of the various seminar types and the groups guided is given elsewhere (Bouskila, 1986b).

Upon their arrival at Hazeva students are taken to

an observation point on a hill from which the main biotopes can be distinguished. In an introductory lecture on site, they become acquainted with the climate, geology and geomorphology of the region. The procedure of the seminar includes data gathering in various physical fields (e.g. soil salinity and microclimatic measurements) and in the biotic components of the ecosystem. Rodents and reptiles are caught live in a permanent system of traps. Many of the reptiles are also caught during night surveys of the area. All the specimens are released later at the site of capture, after recording required data. Most of the reptiles in the study area are marked as part of the ecological research that is done on them, and rodents are marked for capture-recapture analysis. Apart from this, the activities of reptiles and rodents are recorded using a 300 metre sand trail, which is rubbed clean at fixed intervals. The number of tracks crossing it is used as an index of the activity, and is calculated separately for each one of the principal species in the area. The activity is then correlated to some of the physical factors such as temperature, relative humidity, wind speed, moonlight etc.. The site of the activity (e.g. soil type, vegetation) of the different species, including the birds which are observed during the day, is recorded too and used later for analysis of habitat selection. The quantitative data are complemented by observations on the behaviour of some of the species.

The vegetation is surveyed along a sample cross-section, and some of the plants are collected for experiments in the laboratory (e.g. transpiration measurements or diet preferences of the rodents).

The seminar is summarized in various ways, depending on the type of the group - in some cases the analysis of the data is divided between the students, and each one presents in a short talk the conclusions from his/her analysis. The synthesis is provided by the instructors. In other cases, each subgroup of students summarizes all the data gathered by them, at least in three different seminars (totalling 12 days of field work) and presents a written report structured as a scientific paper.

THE ADVANTAGE TO THE STUDENTS

Such ecological seminars offer students an invaluable opportunity for intensive study of one or more desert ecological systems, as well as being in contact with the scientists conducting research in these systems. Apart from enjoying their stay in the field, the students learn to gather scientific data and get the feeling of being young researchers. They have to analyse the same type of data as in 'real' studies, and try to find the answers to ecological questions they have posed, the only difference being the sample size, which is of course much smaller in the students' projects. The instructors try to avoid giving the students answers to their questions - whenever possible they lead the students to design an experiment or a set of observations that might give them the answers. If later the conclusions reached by the students are only partial answers, they will be completed by the instructor, but only after the

attempts were made by the students. Strong emphasis is placed on creative thinking, as some of the students have asked the most original questions in their projects and have reached interesting results in attempting to resolve them.

BENEFITS TO THE RESEARCHER

A researcher participating in such an ecological seminar can benefit in many ways, excluding the use of the data gathered by the students. This point should be clarified. In our ecological studies in Hazeva we do not use the students' data if the researchers themselves did not record it together with them. This is to avoid using data gathered by people whose reliability or experience is not known. There are many other benefits:

- The students may help in certain tasks that are part of the research as well as part of the seminar (e.g. setting up a new array of traps in the study area or excavating and studying deep burrows). These tasks, when done by several students together with the researcher, are not as time-consuming as when done by one person only, and they contribute to both the students and the researcher.
- Creative students can pose questions that will lead to the development of new directions in the study. New experiments or techniques used by the students can act as preliminary trials and may help in their incorporation into the main study.
- Unusual observations by the students may direct the researcher to some neglected aspect of his study or to a rare phenomenon that only after its causal discovery by the students, will be given suitable attention.
- Research projects that were completed can be offered to students to further develop untouched areas, thus testing the possibility of continuing the research in this direction in the future.

THE CONTRIBUTION TO CONSERVATION

Enhancing the interest of the students in the main research through the seminar can lead to awareness of related conservation problems and the students might serve as carriers of the conservation message (e.g. participation in projects on free living reptiles can lead to their protection in other parts of the country).

The personal involvement of the students in the study of a certain biotope usually develops into a deep involvement and concern for this area. The students care about damage that is caused from time to time to the study area (such as damage by off-road vehicles) and they show interest in helping to prevent it. Many seminars end with clean-ups of wind-blown litter in the study area and its surroundings and so the study of the environment leads to action for the environment.

The study areas are part of the Shezaf Hills, a regions subject to controversy. Conservationists have been trying for the past six years to get the area declared as a nature reserve, but an agricultural settlement is planned on a portion of the region. The ecological seminars form an excellent opportunity to stress the uniqueness of the area, and through the presentation of the growing demand for natural areas for agriculture, mining and firing zones for the army, the importance of the protection of the Shezaf Hills is emphasized.

CONCLUSION

The fact that the SPNI employs staff members who are involved in ecological research as well as in environmental education has led to the combination described here. Similar seminars exist also in other Field Study Centres, according to their areas. Although this kind of activity differs between Field Study Centres, the principle is always the same - the ecological seminars benefit from the direct contact with the scientists in the field, and they in turn benefit in various ways from the educational work with the students. This combination contributes to some of the principal aims of the SPNI:

- Environmental education is given more professionally and more effectively,
- scientific study and data gathering is advanced,
- practical conservation work is done and finally, attitudes towards conservation improve. Educational seminars based on the same principles can be programmed also in countries which do not have an organization involved in both education and research, by co-operation between educational bodies or wildlife clubs with scientists from universities, museums etc.

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