

CONSERVATION OF BIOLOGICAL DIVERSITY

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Located at a biogeographic crossroads and enjoying extremely diverse topography and climatic zones, Israel's biodiversity is extremely rich. However, a high rate of population growth and development imperil Israeli biodiversity. This chapter begins with a review of institutional lacunae related to recording, studying, and monitoring biodiversity. It is followed by a brief discussion of the state of biodiversity education in Israel. The chapter proceeds with a review of specific major conservation problems in Israel. In conclusion, actions are listed that the Israeli government must take in order to conserve its biodiversity.

Introduction

Israel is located at a biogeographical crossroads, a meeting point for fauna and flora that originate from three different continents: Europe, Asia and Africa. The fauna and flora of Israel are therefore extremely diverse, and this diversity is further enhanced by the many climatological zones found in this small country. Israel is situated between the Mediterranean and the Red Seas, and on the most important bird migration route in the eastern hemisphere, which increases the country's biodiversity even more.

Over the past century, Israel's environment has been severely affected by a tremendous surge of urbanization and development aimed at absorbing a tenfold increase in the population (at least a 16-fold increase between the Mediterranean Sea and the Jordan River) and developing a successful agriculture. Unfortunately, these processes have led to sharp habitat decrease, severe habitat fragmentation, rechanneling and contamination of Israel's meager water supply, coastal water and land, and widespread use of dangerous pesticides. All these factors have affected and continued to affect Israel's environment and its biodiversity.

Conserving biodiversity requires a sound scientific basis for actions taken, the ability to take action, and public support which is the outcome of

education resulting in public understanding. Biodiversity research is crucial for forming viable plans and future projections for nature conservation and management. Education is important for developing public understanding and awareness.

The present report focuses on three types of issues: a) institutional lacunae related to recording, studying, and monitoring biodiversity in Israel, b) biodiversity education in Israel, and c) specific conservation issues.

Institutional lacunae related to recording, studying, and monitoring biodiversity

Agenda 21 refers to the need for surveying, monitoring, recording, and studying biodiversity, as follows:

A (l) Promote, where appropriate, the establishment and strengthening of national inventory, regulation or management and control systems related to biological resources, at the appropriate level;

C (c) ...Special attention should be given to the development and strengthening of national capabilities by means of human resource development and institution-building, including the transfer of technology and/or development of research and management facilities, such as herbaria, museums, gene banks, and laboratories, related to the conservation of biodiversity.

C (h) Promote national efforts with respect to surveys, data collection, sampling and evaluation, and the maintenance of gene banks.

B ...the need to develop:(a) efficient methodologies for baseline surveys and inventories, as well as for the systematic sampling and evaluation of biological resources.

Israel has no institution whose mission is to record and study its biodiversity. In most countries, national museums of natural history and national herbaria assume this role. Israel has no national museum of natural history or national herbarium, and the only existing collections are housed and curated by scientists at the Hebrew University of Jerusalem and at Tel Aviv University. The existence of taxonomic expertise in the country therefore relies on the goodwill and dedication of particular scientists and on the development programs in Israeli institutions of higher learning. With the vagaries of academic development and the emphasis in the past several decades on molecular level biology at the expense of organismal level research, taxonomic expertise is decreasing in the country, and it is sorely missing for key taxa. At this point, for want of experts, it is virtually impossible to develop this expertise within the country.

At the Hebrew University of Jerusalem, retired curators have not been replaced by new scientists in this field, and taxonomic expertise has declined dramatically. At Tel Aviv University, where an active group of scientists is still employed, the collections, the chief record of the biodiversity of our region in the past century, are housed in appalling conditions, severely limiting their development and even endangering their very existence.

This problem is particularly severe if one considers the high natural species diversity of the country, the extreme rate of human development, the relatively short tradition of natural history research in Israel, and the paucity of biodiversity research in the entire region.

Making the biodiversity data available in Israel through BioGIS, a national database of flora and fauna established by the Hebrew University, (see Ministry of the Environment [MOE] report) is at present possible only for some plant data, and even that is part of a scientific initiative that has so far not received any public funding.

Israel has no formal biological survey, as do many other countries. Some surveys are conducted by the Society for the Protection of Nature in Israel (SPNI, an NGO) and by the Israel Nature and National Parks Protection Authority (NNPPA) but these are almost entirely limited to some of the larger vertebrates and to vascular or even woody plants. Other taxa are not monitored regularly. Whatever monitoring does take place is carried out by particular scientists in the Israeli academy, usually with a view to their own research rather than a national view. The decline or disappearance of some species (freshwater fishes, for example) was discovered in recent years by a local expert due to his dedication alone. Due to the lack of biodiversity records in Israel, it is almost impossible to estimate and verify loss of biodiversity or other processes and changes (i.e. invasion of species).

Moreover, it is extremely difficult to raise funds for biological surveys in Israel. Scientific funding agencies have no sections dedicated to this issue, so even interested scientists are limited in their abilities. For example, research funds in the Ministry of the Environment do not include biodiversity surveys as research topics, while the NNPPA does not have the appropriate funding opportunities for this type of activity.

As a result, environmental impact assessment reports, even when they have an ecological aspect are usually limited to a small number of taxa (woody plants, birds, mammals) and do not reflect any other biodiversity com-

ponents. Plants are often considered fairly insensitive to disturbance, so using them as indicators may be misleading in allowing development.

Biodiversity education

Agenda 21 refers to the need for awareness and education:

C There is a need where appropriate to: (c) promote and encourage understanding of the importance of the measures required for conservation of biological diversity and the sustainable use of biological resources at all policy-making and decision-making levels in governments, business enterprises and lending institutions, and promote and encourage the inclusion of these topics in educational programs.

The change of emphasis in biological research has influenced the trends in Science Education in schools and in informal frameworks. The educational systems, at a time lag of 20 years, changed their focus from field biology to biochemistry as expressed in physiological systems. In the Israeli social and cultural arena, these universal trends coincide with a transformation from agrarian romanticism to hedonistic urbanism. Thus, the idealistic Zionism of the early decades of last century orchestrated a dissonance between glorifying modern development and construction on the one hand—poetically invoked as “clothing the land in concrete”—and a romantic bonding with the land of the Bible its fauna and its flora on the other. However, in the last three decades a rift is growing between the public and the natural landscape.

Today, the biological curricula is dominated by the science education approach of ‘Science and Technology in the Society (STS). A new curriculum was recently introduced to elementary and middle schools, as well as to non-science high school students, in which there is only minor status given to biodiversity issues. The curriculum of the high-school biology stream has a chapter on ecology, but no serious discussion of human-biosphere interactions. However, this curriculum is now under preliminary revision and it has been suggested that ‘Biodiversity’ be introduced as a topic with greater weight. Thus, one can conclude that there is no serious attempt within the formal school system to educate future citizens to an understanding of, and responsibility toward, environmental biodiversity.

There are some initiatives outside of the formal school system, led mainly by NGOs, which attempt to develop biodiversity education programs. Many of these suffer from the fact that much of the NGO teaching work is carried out by people without formal training or education. A new initiative of Tel Aviv

University recently established a biodiversity center named 'Nature Campus'. The audience for these activities is as yet very limited, and many of Israel's children and adults never receive any exposure to biodiversity issues.

Specific biodiversity conservation issues

- The most severe threat to biodiversity worldwide is habitat loss and fragmentation. Therefore, careful and educated planning is key to biodiversity conservation, in particular in a small country like Israel, where entrepreneurs are aggressively pushing for many building projects. In February 2002, the Israeli government succeeded in approving a major change in planning procedures, by piggybacking the legislation onto the yearly national budget. This change implies that projects deemed as 'national' can be planned and executed without the approval of the regular professional planning channels of the country. A further worrisome fact in this respect is that the new national-level plan for Israel's development, that does have the value of open spaces and habitat corridors in mind, is now being blocked as a result of political pressure.
- Israel has very few railways, so most of the transportation is based on roads, whose development has been accelerated in the past decade. Most, if not all, of these roads are constructed without a view to their effect on habitat fragmentation. In many of the wider roads, the cross traffic is separated by concrete blocks that run for miles, practically fragmenting all populations of non-volant species.
- Although the MOE report states that 25% of the country is designated as nature reserves, most of these reserves are not yet approved, and they are not equally distributed. Most of this land is in the arid Negev desert, where development pressure is low. It should be noted, however, that a large fraction of this designated area serves the dual purpose of nature reserve and military training zone, with tanks, artillery and infantry sharing the land with biodiversity, to the latter's detriment. Under 3% of the Mediterranean zone of Israel is designated as nature reserves (contrary to the 10% of the IUCN recommendations [International Union for Conservation of Nature and Natural Resources]) and this implies the dire need for careful and responsible land management.
- Many areas designated in the different plans as nature reserves and national parks have not been formally declared as such for years. This

implies that the level of protections that they are currently under is much lower than what they would be entitled to once approved. It is hard to understand why this process must be so lengthy.

- Agenda 21 states the following:

A (j) Promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of these areas.

Israel's small size, coupled with its intensive agriculture and development, imply that in many protected areas this recommendation is not heeded. For example, Ein Afeq, one of Israel's two Ramsar designed major wetlands (see MOE report), is a small nature reserve surrounded by agricultural fields where intensive agriculture is being practiced. The fields, including the fertilizers and pesticides therein, drain into the nature reserve. The concept of biosphere reserves incorporates these curbed development approaches, but Israel has a single biosphere reserve, whose functioning is questionable, and plans for a second biosphere reserve have recently been halted.

- Although alien invasive species are considered the second most serious threat to biodiversity worldwide, no systematic research of alien invasive species has been conducted to date in the country, and awareness of this issue among the public and among policy-makers is very low. Invasive species in the country include plants imported in order to stabilize sand dunes, nutrias, exotic aquaria fish and other exotic marine species, etc. In the Sea of Galilee we are now aware of a number of invasive species that have established large populations in the lake. Furthermore, there are species that regularly escape fish farms, as well as the regular restocking of the lake with native and exotic fish. These species affect the lake by preying upon native species, turning over the sediment, etc. It is noteworthy that the controversial aquaculture initiative in the Gulf of Eilat—already considered by many marine biologists as a threat to the ecosystem and the coral reef due to its enriching of the Red Sea waters—also implies the introduction of an alien fish species to the Red Sea, and the introduction of some alien fish diseases as well. Still, no practical actions have been taken so far. A much better understanding of these problems and suitable legislation are required. The controversy over the status of the aquaculture in the Gulf of Eilat is ongoing.
- Israel is currently undergoing a freshwater crisis. The dearth of freshwater, and over-pumping, produce lower water tables, and the

result is the drying up of Israel's wetlands. Moreover, Israel's rivers are drying up, since their waters are generally curbed upstream. This, coupled with severe contamination from chemical plants and other industries, has severely harmed many of Israel's freshwater species. Moreover, treated sewage in Israel, which may become the major type of water available for Israeli rivers, is not reclaimed to a high standard, and this may be a limiting factor for some of Israel's aquatic species. The Hula Nature Reserve, Israel's flagship wetland designed as a Ramsar site (see MOE report), suffers severely from this problem. Much of the water in this reserve is recycled from fish ponds, and the implications of this situation are clear. The major problem is that there is no strict allocation of freshwater for nature in Israel, and this issue requires legislation.

- Poaching has become an issue in Israel in recent years, due to the large number of agricultural workers from Thailand (currently *ca.* 25,000 workers). In a small country with only 4000 registered local hunters, many of whom are not active, this number of Thai poachers is having a severe impact in some areas. Although poaching activities have been documented time and again, it is difficult to deal with; there is a long delay between pressing charges and legal action, and a large number of vertebrate and marine invertebrate species are apparently suffering severe losses. Here the problems are compounded—with enforcement, legislation, cultural awareness, and politics all playing a part.
- Pesticides are used intensively in many parts of the country, resulting in both potential health hazards and in a real risk to wildlife. The topics of pesticide registration with regard to wildlife risk assessments, control of pesticide usage, and monitoring effects on wildlife, are far below the standards practiced in most developed countries. This problem has affected particular populations of raptors in the country, but other species have also been harmed. It is important to remember that migratory birds are affected by the use of pesticides as well, so the effect of these substances reaches beyond the borders of the country.
- One of the major problems plaguing biodiversity conservation in Israel is low allocation of funds and human resources for enforcement. Many harmful activities such as driving all-terrain vehicles and illegal sand mining are rampant and the current workforce is unable to control them. With political friction and the rise in violence in the region, enforcement becomes even more difficult. The budget of the NNPPA, which is in charge of enforcement, is based to a great degree on the

public's visits to NNPPA reserves and parks. Over the past year, these visits have dropped precipitously due to the situation in our region and the NNPPA cannot carry out its duties without heavy government aid. This unhealthy situation invites political involvement to the detriment of nature conservation. A recent move by the Israeli government, to remove a force of 31 rangers of the Green Patrol from under the supervision of the NNPPA, and to transfer them to the Ministry of Infrastructure is bound to make the situation even worse. By comparison, the NNPPA has a staff of only some 45 rangers, so removing 31 is a severe blow to enforcement.

Conclusions

- Although, generally speaking, there is a growing awareness in Israel of the need to conserve biodiversity, the formal institutions for studying, recording, and monitoring biodiversity are lacking. It is imperative that a national museum of natural history be established, in order to study and to record the biodiversity of the country. Moreover, a biological survey is necessary in order to monitor changes in biodiversity. The two can be united institutionally, and careful planning may enable both to function within, or in collaboration with, Israeli universities, in order to save funds and to make use of the current facilities. However, national funding for these activities is crucial, and national guidance is required in order to ensure the continued monitoring of the country's biodiversity.
- Any public agenda, such as nature conservation, depends on public demand and consent. Conservation has a price-tag to it, and involves many opposing interest parties. Without public support of the toll paid for conservation, a campaign cannot be pursued. This support is the outcome of educating the public, decision-makers and the layperson voter or her/his children, to the crucial importance of conserving biodiversity, for the benefit of all. To this end, biodiversity education should be promoted at all levels.
- A specific allocation of water for nature conservation is required. Reclaimed water that goes into rivers must meet much higher standards than the current ones.
- More strict control, enforcement, and legislation regarding the use of pesticides are required.

- Funds for enforcement, and more strict enforcement measures, are crucial, if biodiversity in Israel is to be preserved. Low funding means poorer enforcement and greater dependence on the whims of political forces.
- Sustainable development practices and the preservation of biodiversity should be major considerations in the planning process in such a small and overpopulated country as Israel. Laws for bypassing national planning procedures are to be condemned.
- The declaration of designated nature reserves and national parks should be expedited.