HUMAN ACTIVITY AND WILDLIFE PROTECTION: CONFLICTS AND CHALLENGES

Delicate mountain gazelles roaming over hills; foxes, jungle cats and other mammals in wooded areas; Nubian ibex with majestic horns leaping over desert crags; chameleons, snakes and agama lizards creeping along desert landscapes--these make up only a small fraction of Israel's rich animal life. Yet, according to Israel's foremost zoologists, Professors Heinrich Mendelssohn and Yoram Yom-Tov, about one-third of Israel's vertebrates have suffered either extinction or a drastic reduction in their populations in this century alone. The culprit--human activity, whether hunting, agricultural practices, urban and industrial development, or poisoning. While some of these changes were inevitable (e.g., veterinary supervision and increased irrigation), others were preventable such as the controversial draining of Lake Hula in the 1950s which destroyed a unique wetlands ecosystem.

Indubitably the main reason for the general decline in Israel's fauna since the beginning of the century has been the dramatic increase in human population. Since the beginning of the present century, the area west of the Jordan River has undergone major changes, with a tenfold increase in population and a similar increase in standard of living. Furthermore, changes in agricultural methods, such as more irrigated areas and large-scale use of pesticides, have had a pronounced effect on wildlife. Today, the greatest danger to Israel's wildlife lies in the continued cultivation and urbanization of Israel's already limited open space landscapes, a process which threatens to destroy more and more natural habitats, more and more species.

Wildlife Protection Legislation

In light of the magnitude of the challenge, the Nature Reserves Authority (NRA) is faced with a formidable task. The NRA, established in 1964 as the main authority charged with preserving and developing nature reserves and natural assets, protecting wild animals, and safeguarding landscape quality, derives its power from the National Parks, Nature Reserves, National Sites and Monuments Law.

In a small country, with a high rate of industrialization and urbanization, nature reserves help secure the biodiversity of the natural environment. Israeli law defines a nature reserve as an area containing unique and characteristic animal, plant and mineral forms which must be protected from any undesirable changes in their appearance, biological composition or evolution. To date, 155 nature reserves, spanning an area of some 3.5 thousand hectares, have been declared, and a similar number are undergoing various stages of declaration.

Outside the confines of nature reserves, hundreds of plant and animal species, as well as inanimate natural assets such as fossils and beach rocks, have been declared "protected natural assets." Animals such as the leopard, gazelle, ibex and vulture have been declared protected species, and special rescue operations, including establishment of feeding stations and nesting sites, have been initiated to protect them.

Side by side with the protection of "natural assets," the Wild Animals Protection Law has proved to be an effective instrument in the protection of wildlife in Israel. This 1955 law, which was designed to protect birds, mammals, reptiles and amphibians,

has been responsible for the recovery of many wildlife species. According to the law all species of wild animals anywhere in Israel are completely protected except for designated pest species and species that are declared as game. Hunting of game and pests is restricted to the hunting season (September 1 to January 31) and requires a license and strict compliance with established guidelines. Hunting of hares, wild boars, partridge and some duck species is permitted, although in limited numbers.

Challenges and Conflicts

While nature conservation legislation, enforcement, management and research are well established in Israel, the reality of life in a small and densely populated country inevitably results in innumerable conflicts between wildlife protection and human activity. In the Mediterranean region, where about 105 declared nature reserves are dispersed in a total area of 250 km^2, the main problem facing nature conservation is habitat fragmentation. While most of the wildlife of Israel still lives and is protected outside nature reserves, the decrease in open areas may well make nature reserves the last stronghold for many species. However, the small size of most reserves (63% are smaller than 1 km^2 and 25% are smaller than 10 km^2) makes them vulnerable to impacts from their surroundings, thus placing the future of the flora, fauna and ecosystems in the reserves at risk.

It is already clear that protecting migration routes of birds flying from Europe to Africa is impossible in such a system and that the protection of many other populations including bats, sand dwelling reptiles, ungulates, predators such as wolves, and leopards, and other mammals such as gazelles will be nearly impossible to achieve within the reserve system. The problem is compounded outside the bounds of nature reserves where development pressures, habitat fragmentation, and conflicts with agriculture and other human activities make it especially difficult to preserve Israeli populations.

Although hunting was the main cause for the extinction of several species in the beginning of this century, the destruction of habitats through housing and development projects, road construction, urbanization, and the large-scale use of pesticides and poisons in the agricultural sector have been responsible for the disappearance of large numbers of species in the second half of the century.

Local fauna was especially affected by the extensive use of chemicals in agriculture, particularly DDT which began to be used at the end of World War II. The most dramatic incident of poisoning occurred in the early 1950s when an intensive poison campaign, targeted at rodents, seriously affected 37 out of the 39 species of raptors which were known in Israel prior to the use of pesticides. Mendelssohn and others have reported that species which were common breeders, such as the griffon vulture, Egyptian vulture, kestrel and lanner falcon, became very rare breeders while less frequent or rare breeders such as the lappet-faced vulture, bearded vulture, spotted eagle and others became either extinct or their populations decreased drastically. Today, some species have made a come-back, the most successful being the kestrel. Others are being introduced through captive breeding programs.

Carnivores are yet another group which suffered from poisoning in Israel. In the 1960s, the Plant Protection Department of the Ministry of Agriculture, decided that

jackals, one of the few mammals not protected at the time by the Wild Animals Protection Law, were responsible for agricultural damage. However, the widespread anti-jackal poisoning campaign which ensued affected not only the jackal but several mammal predators as well. In addition, the campaign upset the delicate predator/prey balance, ultimately leading to an increase in the rodent population and greater damage to agricultural crops.

Yet another senseless poisoning episode resulted in a serious decrease in the insectivorous bat population. The fumigation of caves in an effort to eradicate fruit-eating bats which were considered as pests to some fruits resulted in serious damage to all 19 species of the cave-dwelling insectivorous bats which, ironically, are known to be beneficial to agriculture.

Today, implementation of the Wild Animals Protection Law, which is applicable to the entire area of the country, continues to generate conflicts between wildlife protection and agriculture. However, bitter experience has taught all involved that the use of poisons and pesticides can injure animals--and not always the ones they were intended for--and upset the balance between carnivores and herbivores, raptors and rodents. Therefore, the Nature Reserves Authority, as the body responsible for wildlife protection, makes every effort to minimize the conflicts between wild animals and farmers through a number of activities including:

- Collection and processing of information on damages that wild animals cause to agriculture.
- Maintenance of constant contact with farmers, with recommendations on how to reduce risks and how to keep animals away from cultivated fields.
- Provision of hands-on help with pressing problems.
- Enlisting the help of other bodies, such as hunters' associations, to promote problem-solving
- Proposals and research designed to help farmers and wild animals coexist. The ideal solution would ensure that wild animals do not harm agriculture and that agricultural practices do not adversely affect animal populations.

Only as a last result, when the size of the population of a particular species exceeds the natural carrying capacity of an area, is hunting permitted. This is now the case with the wild boar population of northern Israel, which has grown at such a fast pace and has caused so much damage to the farming sector that a general permit to hunt boar was issued.

Conflicts between human activities and animal protection are not confined to the ground alone. A major problem has involved the coexistence of birds and airplanes in the skies, with tragic consequences to both. Birds have been known to cause considerable damage and even loss of human life as a result of collisions with airplanes. To eliminate these tragic events, special means have been developed to keep birds away from the places where they might pose a danger. A special unit works in every airport in Israel in an effort to prevent accidents using such means as noise and visual devices to frighten away birds. In recent years, the results of a scientific study on bird migration patterns, sponsored by the Air Force, the Society for the Protection of Nature in Israel and Tel Aviv University, has made a major impact. While pilots have always been aware of the perils of bird-plane collisions, the results of the survey on the migration routes of some 150 million birds which fly through

Israel in both spring and fall, has led the Air Force to institute new procedures to avoid bumping into birds. These include specifically defined paths, heights, and timesof flight during the migration season.

Restoring Israel's Faunal Legacy

Several species of vertebrates, mostly mammals, disappeared from Israel at the beginning of this century. The introduction of firearms to the Middle East by the end of the 19th century and the tradition of hunting were followed by the disappearance of four ungulates (roe deer, fallow deer, Arabian oryx and Syrian onager), three carnivores (Syrian bear, cheetah, the northern subspecies of the leopard), the ostrich and the Nile crocodile.

As nature and wildlife protection gained new prominence, major efforts were made to rehabilitate and reintroduce some of these species to nature. One of the methods used was reintroduction-- the process of returning wild animals to natural areas in which they have existed in the past, and from which they have disappeared due to human activity (such as hunting).

In the 1960s, the Nature Reserves Authority set out to reintroduce populations of animals present in historical times, as supported by biblical reference, but no longer found within modern Israel. Two breeding cores, Hai-Bar Carmel (1975) and Hai-Bar Yotvata (1964), were established to breed animals suitable for release; the former for Mediterranean species, the latter for desert species. The founder animals for each species came from all over the world both from zoos and from the wild. Five species have been chosen: ostrich, roe deer, Asiatic wild ass, Persian fallow deer and white orxy (also known as Arabian oryx). Of these, all except the roe deer are globally endangered.

Worldwide, reintroductions have become an important component of conservation programs for threatened and endangered mammals. Procedures for reintroduction were drafted by the International Union for the Conservation of Nature in 1987 in order to enhance the probability of success. Four stages are included: feasibility, preparation, release, and post-release monitoring. In all cases, the breeding core must be large enough to support the removal of a herd for reintroduction and have good reproductive success to enable future boost releases. Prior to release, animals are transported to habituation enclosures at the release site, kept in the enclosure for a given time period and released after being marked and radio-collared and receiving appropriate veterinary care. Israel's reintroduction procedures closely follow these recommendations. Successful reintroductions into the wild have already been implemented for the Asiatic wild ass (since 1982, nearly 100 individuals have been released in the Makhtesh Ramon area of the Negev desert), the fallow deer (the first release took place in 1996 in the Nahal Kziv area of the Western Galilee), and most recently, the white oryx.

The case of the white oryx serves as an interesting example of the reintroduction process in progress. The white oryx, frequently mistranslated as the unicorn, once inhabited over 3 million square kilometers of Middle East desert, but due to hunting, not a single white oryx was known to survive in nature by 1973. Fortunately, when the white oryxes' impending extinction became evident, naturalists collected several

of them from nature and zoos and created a "World Herd." They were carefully protected, bred, and ultimately provided calves to restore the species to its rightful habitats. Today, white oryx reintroduction projects are under way in Jordan, Saudi Arabia, Oman and Israel.

Israel's herd of white oryx is located in the Hai-Bar Reserve in Yotvata, a 12 square kilometer fenced reserve in the Aravah valley, about 30 kilometers north of Eilat. It was started from a nucleus of eight animals from the San Diego Zoo in 1978 where the captive herd of oryx was created in the 1960s. Today, Israel's herd of 90 animals can support reintroduction and a program using habituation enclosures is being implemented. In March 1997, 21 of these magnificent animals were released into the wild, equipped with radio-collaring equipment, and in the case of one female oryx with a satellite transmitter.

Reintroduction: In the Skies

Early travelers to this region--most notably Henry Baker Tristram whose published work *Fauna and Flora of Palestine* (1884) earned him the title of "father of the nature study of Palestine"--reported on the large number of raptors which existed in Israel, especially griffon vultures and black kits. Today, the existing populations of breeding raptors are only a fraction of their former populations. Compared to the dozens of pairs of griffon vultures which bred in the Galilee and on Mount Carmel before the widespread use of agricultural poisons began, none are known to nest today. The situation is similar with respect to the lappet-faced vulture, the largest of Israel's birds. While 25 pairs of lappet-faced vultures were reported in the Negev in the 1940s, none breed there today.

The causes for the drastic decline in raptor populations in the latter half of the 20th century are attributed to hunting, poisoning, inadequate food supplies and reduction of open spaces and nesting sites. The introduction of veterinary care which prohibits, *inter alia*, the disposal of carcasses into the environment, coupled with changes in the Bedouin lifestyle (which have minimized or eliminated the number of carcasses left in the field), have drastically reduced the food supplies necessary for the survival of several raptor species. In order to facilitate the survival of these endangered raptor populations, a series of feeding stations were set up in Israel where carcasses are supplied. At these stations, wolves, hyenas and foxes, and occasionally other carnivores, feed as well as vultures. Special efforts have recently been made by the SPNI, the NRA and the Israel Electric Corporation to protect vultures from the risks of electrocution as well.

Major work on captive breeding and reintroduction of raptors into the wild began in earnest in 1980. In one program, based at Tel Aviv University's Zoological Gardens, efforts concentrated on the lappet-faced vulture. Seven years after the first chick was taken from its nest in the Arava in 1981 and brought to the zoological garden in Tel Aviv University, the first hatching anywhere of an egg laid in captivity by Negev lappet-faced vultures took place. Concomitantly several other reintroduction schemes were started, most notably in Ramat Hanadiv in the south of Mount Carmel near Haifa. This program includes such raptors as the griffon vulture, of which 30 individuals have already been released, and lanner falcons, of which 40 individuals have been successfully released.

Other projects now being undertaken include the rehabilitation and reintroduction of the white-tailed sea eagle in the Hula Valley as well as similar programs for the Egyptian vulture, lesser kestrel and other raptors. In addition, surveys have been initiated to identify all of Israel's nesting sites and to carefully map them in an effort to promote monitoring and risk management. One practical result is expected to lead to the prohibition of Air Force flights near sensitive nesting areas.

Many reasons have been cited for reintroduction including ecological reasons aimed at the restoration of biodiversity, emotional reasons related to the uplifted feelings aroused by the sight of animals, especially when these are associated with the revival of biblical Israel, and economic reasons which include new tourist attractions. Perhaps one of the most important reasons, however, is the contribution of reintroduction to open space preservation in the face of growing pressures for development. In many parts of the world, the reintroduction of endangered or unique species has been an incentive to conserve the area in which the animals are released.

In a country which is as densely populated and developed as Israel, the preservation of open spaces takes on special significance in the struggle to protect wildlife species. Israel cannot allow its varied landscapes and rich wildlife habitats to be transformed into a desolate megalopolis of roads and cement. The right doses of awareness, law enforcement, scientific research and open space management may yet transform conflict into resolution, challenge into opportunity, by ushering in a new era which will see the protection of Israel's rich zoological heritage.

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