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TABLE OF CONTENTS

<i>LIST OF TABLES AND FIGURES</i>	iv
<i>LIST OF ACRONYMS USED</i>	vi
<i>EXECUTIVE SUMMARY</i>	1
1. OVERVIEW OF BIODIVERSITY STATUS, TRENDS AND THREATS	6
Introduction	6
1.1 Israel's unique biodiversity	6
1.2 Trends and threats to Israel's Biodiversity	8
1.2.1 Habitat loss and fragmentation	10
1.2.2 Habitat degradation	12
1.2.3 Invasive alien species and species outbreaks	13
1.2.4 Flow modification.....	14
1.2.5 Harvesting	14
1.2.6 Pollution.....	15
1.2.7 Genetic resources	16
1.2.8 Future threats	16
1.2.9 Protected areas and protected species	17
1.3 Status and threats to biodiversity by main ecosystem categories.....	19
1.3.1 Woodland and shrubland biodiversity	19
1.3.2 Coastal biodiversity	22
1.3.3 Desert biodiversity.....	23
1.3.4 Inland water biodiversity.....	24
1.3.5 Marine biodiversity	27
1.3.6 Agricultural biodiversity	28
1.3.7 Pastureland biodiversity	29
1.3.8 Urban biodiversity.....	29
1.4 Implications of biodiversity loss	29
2. CURRENT STATUS OF NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLANS	30
2.1 Israel's National Biodiversity Plan	30
2.2 Components of the National Plan.....	31
2.2.1 Threats to Israel's biodiversity and ways for its conservation	32
2.2.2 Biodiversity in national planning.....	36
2.2.3 Economic aspects	36
2.2.4 The legal-institutional framework	37
2.2.5 Research and monitoring	37
2.2.6 Education, public awareness and involvement	38
2.2.7 International aspects	39
2.2.8 The proposed action plan.....	40
2.3 Targets and indicators	41
2.4 Progress on Priority Activities	42
2.4.1 Protecting genetic diversity	44
2.4.2 Protecting species and populations	46
2.4.3 Protecting habitats and ecosystem	50
2.5 Way forward.....	52
3. SECTORAL AND CROSS-SECTORAL INTEGRATION OR MAINSTREAMING OF BIODIVERSITY CONSIDERATIONS	54

3.1	The national framework for promoting sustainable development.....	54
3.1.1	National Sustainable Development Strategy	54
3.1.2	Ministry activity within the NCSD	56
3.2	Environmental quality and sustainable use of resources	59
3.3	Forestry	59
3.4	Agriculture	60
3.4.1	The SD strategic plan for agriculture.....	62
3.5	Regional planning	63
3.6	Research, monitoring and Education	65
3.6.1	Research	65
3.6.2	Monitoring.....	67
3.6.3	Education	68
3.7	Legal, institutional and economic aspects.....	70
3.7.1	Economic Instruments and financing	71
3.7.2	Institutional Tools	71
3.8	International activity	72
3.9	Other sectors and activities.....	73
3.10	Conclusions	73
4.	CONCLUSIONS: PROGRESS TOWARDS THE 2010 TARGET AND IMPLEMENTATION OF THE STRATEGIC PLAN	75
4.1	Progress towards the 2010 Target	75
4.2	Progress towards the Goals and Objectives of the Strategic Plan of the Convention ..	83
4.3	Conclusions	85
APPENDICES	87
	Appendix I - Information concerning reporting Party and preparation of national report.....	87
	Appendix II - Further sources of information	89
	Appendix III - Progress towards Targets of the Global Strategy for Plant Conservation and Programme of Work on Protected Areas	91
	A. Progress towards Targets of the Global Strategy for Plant Conservation.....	91
	B. Progress towards Targets of the Programme of Work on Protected Areas	96

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LIST OF TABLES AND FIGURES

Table 1: Species richness within Israeli taxa.

Table 2: The status of Israel's terrestrial vertebrates.

Table 3: Open landscape converted to built area between 1998-2003.

Table 4: Invasive species that currently established wild populations in Israel.

Table 5: The number and total area of nature reserves and national parks in the beginning of 2008.

Table 6: NBS recommendations linked to current BdC activities and CBD articles.

Table 7: Action plans recommended by the NBS and their relevance to the CBD articles.

Table 8: MoEP targets for 2008-2010 relevant to biodiversity conservation.

Table 9: Framework of goals, targets and indicators to assess progress towards the 2010 Biodiversity Target.

Table 10: Goals and objectives of the Strategic Plan and provisional indicators for assessing progress.

Table 11: Recommendations in Israel's NBS and their relevance to the GSPC targets.

Table 12: Means of Implementation of the GSPC in Israel.

Table 13: Progress in Israel towards the targets of the Programme of Work on Protected Areas.

Figure 1: The percentage of Israel's terrestrial vertebrate species that is threatened.

Figure 2: The percentage of Israel's total area allocated for various land use classes, by district.

Figure 3: Population counts of Mountain Gazelle (*Gazella gazelle*) in several locations in the northern part of Israel in the years 2000-2007.

Figure 4: Population counts of Griffon Vultures (*Gyps fulvus*) in the northern and southern part of Israel in the years 1999-2008.

Figure 5: The number, the total area and the mean area of nature reserves and national parks, by district, as to 2008.

Figure 6: Trends in the total area of nature reserves and national parks, by general ecosystem categories.

Figure 7: Yearly rainfall as percent of the multi-annual average at the northern part of Israel.

Figure 8: Trends in new and regeneration planting in JNF-KKL areas in the years 1998-2009.

Figure 9: Trends in the total JNF-KKL managed forests in the years 1990-2009.

Figure 10: The causes for removal from NMP#22 afforestation areas between 1995-2007, by development category and year.

Figure 11: The extent of planted forests and natural woodland that were subjected to wild fires in 1990-2008.

Figure 12: Changes in the cleanliness status of 65 seashore section following cleaning projects in the years 2005-2009.

Figure 13: Trends in the condition of several desert plant species that were chosen as indicators for ecosystem variables in the Eilat region, southernmost part of Israel, in the years 2001-2007.

Figure 14: Population trends of several desert animal species in the last decade.

Figure 15: Trends in water quantity and quality of Lake Kinneret (Sea of Galilee).

Figure 16: Trends in pollutant loads of major westbound rivers between the years 1994-2006.

Figure 17: Trends in water level and salinity level in the coastal and mountain aquifers between the years 1980-2007.

Figure 18: The decrease in the Dead Sea water level in the years 1976-2009.

LIST OF ACRONYMS USED

BdC – Biodiversity Conservation

CBD – Convention on Biological Diversity

INPA – Israel Nature and Parks Authority

JNF-KKL – Keren Kayemeth LeIsrael – the Jewish National Fund

MoEP – Ministry of Environmental Protection

NBS - National Biodiversity Strategy

NCSD – National Committee for Sustainable Development

NMP – National Master Plan

SD – Sustainable Development

SPNI – Society for the Protection of Nature in Israel

EXECUTIVE SUMMARY

OVERVIEW OF BIODIVERSITY STATUS, TRENDS AND THREATS

A unique assembly of species resides in Israel within a small heterogeneous landscape with diverse climatic characteristics. This distinctive combination yields very rich biodiversity on all levels – from the genetic level and up to the landscape level.

Accelerated development and population growth, together with the effects of climate change, are the major driving forces behind the main threats to the local biodiversity, which are: habitat loss, fragmentation and degradation, increase in the number of invasive species, harmful behaviour patterns such as pollution and over-exploitation of resources. A sequence of drought years increased the pressures on natural ecosystems. The negative effects of the main threats are mitigated to a certain extent by activities towards environmental protection and nature conservation, so that the main ecosystem categories show mixed trends:

- The total woodland area is increasing and more active management of its components is implemented to increase its biodiversity and its sustainable use;
- Coastal areas are under an increasing pressure and special efforts are made to protect their diminishing components;
- Desert ecosystems are less threatened than other ecosystems in Israel, yet they have already lost a substantial part of their biodiversity and were adversely affected by the continuous drought;
- Inland water habitats show mixed trends, being among the most endangered ecosystems - streams where restoration efforts were conducted show signs of improvement, whereas ephemeral pools, salt marshes and the unique Dead Sea system show continuous degradation, with over-exploitation of water sources leading to deteriorating quantity and quality of the resource which also adversely affects natural ecosystems;
- The marine environment shows improvement in pollutant loads, yet its general condition is still not good, particularly that of the coral reefs in the Red Sea;
- The decreasing agricultural biodiversity is attended to by special efforts to locate and preserve agricultural land races and crop wild relatives and by applying active management to pasture land to increase its biodiversity and sustainable use;
- Urban biodiversity is threatened by continuous development and urbanization, yet the emergence of some local urban nature projects signals an improvement in the awareness to these assets and in the efforts to protect them.

The number and total area of protected areas is constantly increasing (forming ca. 30% of the total land area). They do not adequately represent the country's diversity of habitats, as most of them represent desert habitats, yet the representation of other ecosystems is growing. Israel puts many efforts into nature conservation activities in different levels; however the status of most endangered species has not improved and probably worsened. Though the total number of endangered species is small relative to the total number of species in Israel, they constitute a substantial proportion of certain taxonomic groups – ca. 17% of Israel's wild plants and ca. 30% of its terrestrial vertebrate species are threatened, with up to 82% of amphibian species threatened and not much known on the threatened invertebrate species.

Biodiversity loss has a dual effect: it decreases ecosystems' stability and its survival prospects and it also decreases the benefits of a large range of ecosystem services they provide.

CURRENT STATUS OF NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLANS

The state of Israel signed the Convention on Biological Diversity in 1992 and ratified it in 1995. Israel's national biodiversity strategic plan (NBS) will be presented to the government in January 2010, and is intended to complement a 2003 government decision on sustainable development.

Israel's biodiversity policy has traditionally been based on classic "nature conservation" – the designation and declaration of protected areas (nature reserves, national parks and forested areas), grounded in nature protection legislation and statutory land-use master plans and on the protection of endangered species. It is mainly characterized by a passive approach to conservation, in which human activities are separated from protected areas where some management activities are held.

The NBS draws on experience gained from the implementation of nature conservation programs, and marks a shift towards a clear active biodiversity management intended to the optimal conservation and management of biodiversity components using a range of tools. These are aimed not only to statutory protected areas but at the entire range of biodiversity and ecosystem services encompassed within the country's area, including those components that are in close contact and interaction with human activities and therefore require active management that will ensure that any form of development will be sustainable.

The NBS links biodiversity conservation to human well-being by stressing that the efforts to maintain biodiversity and ecosystem services are the primary foundation to any sustainable development. The NBS has various components that are included in nine chapters. It:

- Presents and discusses the importance of biodiversity;
- Identifies present and future threats to Israel's biodiversity;
- Discusses various biodiversity conservation policies and management guidelines required to address the threats via management of biodiversity and ecosystems;
- Recommends on supportive measures – using regional planning and legal tools and adopting financial incentives and other economic tools that internalize the dependence of development on ecosystem services, promoting research and monitoring, education and public awareness, enforcement and international cooperation;
- Assembles the recommendations to a proposed operational action plan.

Progress on priority activities is presented:

A) The Ministry of Environmental Protection puts a special emphasis on biodiversity conservation, on decreasing the rate of biodiversity loss and the sustainable use of natural resources, operating at the national, regional and local levels through several channels:

- Promoting the NBS and the preparation of a national plan to address climate change, including its consequences on biodiversity.

EXECUTIVE SUMMARY

- Adopting the ecosystem approach to integrative management of natural resources and promoting regional planning processes, including the planning of biosphere regions.
- Direct protection of open landscape where most biodiversity resides through independent and collaborative activities with other bodies; this includes protection of environmental quality, pollution prevention and promoting the sustainable use of natural resources of open landscapes and their ecosystems.

B) Nature conservation is well developed in Israel, as manifested in legislation and the establishment of dedicated institutions, yet the country has not accorded high priority to the conservation and sustainable use of biodiversity until recent years. Nature conservation is carried out through legislation, enforcement, regional planning, management, monitoring, education and professional supervision on infrastructure development activities.

The current strategy for protecting biodiversity involves activities in different levels, protecting ecosystems and habitats as well as individual species and genetic diversity. Management of habitats and ecosystems is the tool for population conservation of each of its component species, even where knowledge is limited as to its exact role in the ecosystem and in providing ecosystem services. In parallel, efforts for *in-situ* and *ex-situ* conservation of selected species or groups persist, including collection, breeding, reinforcement and reintroduction as well as monitoring and other management measures.

SECTORAL AND CROSS-SECTORAL INTEGRATION OR MAINSTREAMING OF BIODIVERSITY CONSIDERATIONS

Numerous activities relevant to different CBD articles are continuously being implemented in Israel. Nevertheless, not all these activities may necessarily be under the exact title of "biodiversity conservation", as this term has not been widespread in different Israeli sectors and among the general public, and they mainly refer to nature conservation efforts. Some of these efforts also consider specific protection of ecosystem services, their sustainable use and equitable distribution.

A 2003 Government decision on sustainable development (SD) was followed by the establishment of a National Committee for Sustainable Development (NCSD), which includes representatives of multiple stakeholders. The NCSD, lead by the Ministry of Environmental Protection, has been working for several years. It is the main governmental framework dealing with SD; the sustainable use of biodiversity resources and the equitable distribution of their benefits are included among its baseline principles. The NCSD is also the major platform to manifest sectoral responsibility to biodiversity conservation and the main pathway to sectoral and cross-sectoral integration or mainstreaming of biodiversity conservation in governmental policies and activities. So far, the NCSD has not addressed directly specific biodiversity conservation issues, but rather supported them indirectly, to a limited extent, through efforts to conserve open landscapes and their associated ecosystems and natural assets, and through budget allocation to the preparation of the NBS.

The main priority for the near future is to proceed with the promotion of the NBS. The NBS is to be presented to the government in early 2010. The NBS will be further handled by the NCSD,

with a special sub-committee to be appointed to promote its implementation. The action plans later developed from the NBS will be presented to government approval.

The NCSD platform facilitates the integration of biodiversity conservation within the framework of the national strategy for SD and assists relevant cooperation at the ministerial and other administrative level. The ecosystem approach can be best treated through this platform. As the NBS has not been implemented, its effectiveness cannot yet be discussed. Yet, the ecosystem approach and long-term planning are more prevalent in Israel today than they were in 2003, and cross-sectoral cooperation regarding SD has been improving. The development of quantitative targets and indicators for progress assessment has not advanced much in all aspects of SD-related activities, all these procedures being also required for biodiversity conservation.

CONCLUSIONS

Much effort and money have been invested in biodiversity-related activities of different sectors in Israel, contributing to the overall implementation of BCD articles. Generally, the numerous activities applied for the implementation of the CBD seem to have a positive impact towards improving the conservation and sustainable use of biodiversity. It is difficult to assess the degree to which conservation efforts have reduced the current rate of biodiversity loss in Israel, as no quantitative indicators have yet been developed and used.

Most of these activities are held under the national framework of "nature conservation" rather than "biodiversity conservation", and the progress in the promotion of the NBS and its derived action plans should boost a new dimension in biodiversity conservation. However, the discussions involved in the preparation of the NBS have already introduced some changes in conservation and management policies, even before it has been officially adopted. Quite a few policy papers were prepared on SD and biodiversity conservation, presenting analyses, drawing recommendations and suggesting directions for activity, also reflecting stakeholders' viewpoints and interests.

The efforts put into nature conservation and the efforts to translate policy papers into action are often restricted by several obstacles:

- Low budget allocation for biodiversity conservation is the main obstacle for its promotion. Moreover, long-term commitments are difficult to achieve when governmental budgets are re-allocated yearly;
- There are difficulties to gain acceptance and cooperation from stakeholders;
- Lack of appropriate administrative framework, organizing and translating existing activities into action plans with measurable goals, targets, deadlines and designated indicators to assess progress;
- A gap sometimes exists between the professional knowledge that is involved in devising policies and action plans and the administrative or even entrepreneur-like capabilities that are required for their implementation into a long-term efficient process.
- Biodiversity conservation is not located high on the national agenda, with national defence issues always higher on the priority list, and access to biodiversity and ecosystem services not perceived as an immediate human well-being issue;

On the administrative level, it also seems that for a good implementation of the NBS, a coordinating unit with budget and with appropriate authority will be required.

Improvements and progress in planning and management can also be achieved through:

- Upgraded guidelines to environmental planning to better embed the ecosystem approach;
- Upgraded guidelines to EIAs that include a specific reference to biodiversity and ecosystem services;
- Incorporating upgraded guidelines to the management of areas into planning procedures to allow for follow-up on management-related issues and for decisions on intervention to be taken where required.

PROGRESS TOWARDS THE 2010 TARGET AND IMPLEMENTATION OF THE STRATEGIC PLAN

The most significant success recorded so far is with the conservation efforts of freshwater habitats, mainly streams and rivers, using an array of legal, conservation, management, administrative, financial and educational tools. This has a particularly important role in a water-scarce country, where these habitats are particularly fragile and produce multiple ecosystem services.

International activities and collaborations that seem to be instrumental to further enhance the implementation of the CBD at the national level are where professionals participate in international workgroups, discuss problems, share solutions and know-how, and build together action plans and work procedures. These are to be later adopted and implemented at the national level, benefiting from the professional supporting forum, sharing both the ecological, environmental and administrative knowledge.

Israel manifests its commitment to the CBD in the international level also by paying special attention to share its knowledge and existing experience with other countries through the activities of the Ministry of Foreign Affairs. Today, Israel cooperates with over 140 countries, providing training and offering international courses on biodiversity conservation, sustainable practices and combating desertification; these are led by local experts and institutes and held in Israel and abroad, intended for experts from developing countries.

Future priorities and capacity-building needs are linked to the official adoption and promotion of the NBS and its associated activities. Thus, it is crucial to coordinate and concert activities at various administrative levels and with different stakeholders by putting all efforts under the framework of the NBS.

1. OVERVIEW OF BIODIVERSITY STATUS, TRENDS AND THREATS

Introduction

The state of Israel signed the Convention on Biological Diversity (CBD) in 1992 and ratified it in 1995. This report is submitted as part of Israel's commitment to the convention and its implementation.

This chapter is intended to highlight information to decision-makers, giving a general overview of the current status and trends of Israel's biodiversity and the current and future threats affecting it. It does not describe nature conservation, environmental protection and pollution prevention activities, which have helped to improve some biodiversity status parameters and that are further described in chapters 2-4.

This chapter is structured as follows:

- Section 1.1 gives a brief overall picture of Israel's biodiversity;
- Section 1.2 describes the general trends and the major threats to Israel's biodiversity ;
- Section 1.3 portrays the status and threats to biodiversity by main ecosystem categories.
- Section 1.4 deals with the implications of biodiversity loss to human well-being.

1.1 Israel's unique biodiversity

A detailed account on Israel's rich biodiversity was given in the first and in the third reports to the CBD (Gabbay 1997, Frankenberg 2005), of which a brief summary is presented here.

Unique bio-geophysical setup:

Israel has a distinctive location at a biogeographic crossroad. This is a gathering point to a large number of organisms that have originated in different biogeographic realms: species from northern humid ecosystems in Europe and west Asia (palaeartic-Mediterranean components) join others from semi-arid steppe ecosystems in central Asia (Irano-turanian), from arid ecosystems in northern Africa (Saharo-Arabian elements) and from tropical-equatorial ecosystems that have migrated through the Rift valley.

Within the country's relatively small surface area one finds a sharp climatic gradient across varied topography, rock and soil formations, creating numerous combinations of environmental conditions setting the scene for a large variety of habitats and ecosystems.

Species and genetic diversity:

This unique assembly of species within a small heterogeneous landscape yields very rich biodiversity – on the genetic level, on the species level and on the ecosystem level, with amplified genetic diversity through the occurrence of local ecotypes (enhancing genetic variability within species) and by the fact that many populations occur here at the periphery of their distribution range.

Israel's species diversity comprises about 3.5 percent of the globally known species. This is largely attributed to the two species-rich seas – the Mediterranean and the Red Sea. Table 1 presents species richness within Israeli taxa. Israel's flora is very rich for its surface area. It is also one of the world's richest areas in progenitors and relatives of major agricultural crops, with many local varieties, and of domesticated species.

Israel has a fair proportion of endemic species: for example 190 of 1,250 fish species in the Gulf of Eilat, 35 of 150 ant species and 8 of 100 snail species are endemic to Israel and its environs. As a comparison, California, which is 20 times the size of Israel, hosts the same number of bird species.

Table 1: Species richness within Israeli taxa (adapted from Gabbay 1997). For most of the listed taxa rough estimates are given.

Taxon	Number of described species in Israel	Number of species assumed to be found in the future
Kingdom Prokaryota	5,100	
Kingdom Protocista	1,800	900
algae	2,000	100
Kingdom Fungi	800	
Total Lower Kingdoms	9,700	1,000
Kingdom Plantae		
Bryophytes, Lichens and wild ferns	520	?
Spermatophyta- wild	2,780 / 2,400	110
Spermatophyta- cultivated	2,750	
Total Plants	6,120	140
Kingdom Animalia		
Invertebrates (excl. Insecta)	8,160*	720
Insecta	20,500	2,000
Total Invertebrates	28,660	ca. 2,700
Tunicata & Hemichordata	130	
Fish	1,728	150-200
Amphibians	7	
Reptiles	97	1-3
Birds	511	
Mammals	116	1-2
Total Vertebrates	2,589	250
Total species	Ca. 47,000	Ca. 4,000

* (other estimates quote ca 30,000 species)

** including 12 cultivated species

Furthermore, Israel is also located on two major migratory routes – both avian and marine. In certain seasons, the temporary presence of even a larger number of species and the co-existence of local and migratory species adds extra functional complexity to ecosystem diversity. For example, some 500 million birds cross the country twice a year on their spring and

autumn migration; The 206 breeding bird species are then joined by 283 species on their migration route from Europe and Asia to Africa and back.

Ecosystem diversity and ecosystem services:

There are several methods to classify Israel's ecosystems. Israel's National Biodiversity Strategy (NBS) adopted a classification method where 46 ecosystems were assembled to form 11 groups, the largest of which is that of woodland and forests. Nineteen ecosystem services were found to be provided by these ecosystems (Safriel 2009): Cultural services are provided by 90% of the ecosystems, wild relatives of plant crops are supported by 70% of the ecosystems, 60% of these ecosystems support rich or unique biodiversity, half of them are involved with water provision and 20% of them are involved with water purification and water quality maintenance (this analysis does not include agricultural and urban systems, food provisioning, primary production and recycling of materials, control of climate and air quality, control of diseases and pollination).

1.2 Trends and threats to Israel's Biodiversity

The overview presented here, of the main ecosystems and the threats affecting them, is largely based on that given in the NBS (Safriel 2009), supported by additional facts and figures, where available. Currently there is no one document presenting data on the status and trends of Israel's biodiversity and therefore the data presented here was gathered from numerous sources.

In most cases it is not possible to provide indicators, as agreed indicators have not yet been formulated and tested. Where possible, available data currently serving as provisional indicators for some biodiversity parameters will be presented, such as data on the status of and trends in habitat condition or species counts. A National Biodiversity Monitoring Framework is currently prepared and a first report on the status of nature in Israel is also due towards the end of 2010, both will allow to present more accurate indicators and time series data in the future.

Accelerated development and population growth are the major forces behind the main current threats to Israel's biodiversity. These threats include habitat loss and fragmentation, habitat degradation, the introduction of invasive species, illegal hunting, pollution and poisoning, road kills, electrocution and collisions with man-made structures, interaction with feral animals. These threats act at the landscape and ecosystem level, at the species and at the genetic level. The NBS points that accelerated development and population growth, together with the effects of climate change, are the major future threats.

Processes such as habitat loss and degradation or changes in species composition are followed by a lower level of ecosystem functionality and provision of ecosystem services. The NBS identified 17 categories of threats to ecosystems and their services, with some habitats more threatened than others (Safriel 2009). For example, like in many parts of the world, the biodiversity associated with freshwater and coastal ecosystems is among the most sensitive and highly threatened.

Different species are either directly adversely affected through the loss of diminishing or disjoint populations and also through a decrease in the genetic variability of populations. The intra-

OVERVIEW OF BIODIVERSITY STATUS, TRENDS AND THREATS

specific genetic diversity usually responds to the diminishing size of a population long before it is on the verge of extinction; this response is difficult to quantify.

Endangered species:

Of Israel's 2,388 wild plant species, 413 (17.3%) are endangered (of which 36 were extinct, Shmida & Polak 2002). Only 67 of them are among Israel's 268 protected plant species, 66 of them are endemic native plant species, and 203 of them are species whose habitat is highly threatened.

A greater proportion of Israel's 454 vertebrate species (excluding marine species) is threatened - 142 species are endangered; Some 28 species went regionally extinct (4 of which are reintroduced) and 6 have gone extinct, out of which 5 species and 3 sub-species were endemic. The Red Data Book of vertebrates points that 35% of the remaining vertebrate species are endangered (20% of avian species, 62% of mammal species and 82% of amphibian species; see table 2 and Fig1 below).

Table 2: The status of Israel's terrestrial vertebrates (Dolev & Perevolotsky 2002, Alon & Perlmann 2008).

	Total known species (N)	Extinct	Regionally Extinct (RE)	Critically Endangered (CR)	Endangered (EN)	Vulnerable (VU)	Near Threatened (NT)	Least Concern (LC)	Undefined*
Freshwater fish	32	5	1	6	0	0	0	18	2
Amphibians	7	1		2	2	1	1	0	-
Reptiles	103	-	3	13	7	15	9	44	12
Breeding birds	207		4+11**	18	19	13	49	80	13
Mammals	103+1****		9***	11+1****	25	20	6	30	2
Total	452+1	6	28***	51	53	49	65	172	29

* undefined or data missing

** 11 of which extinct as breeders

*** including 4 species that are currently re-introduces

**** including 1 highly endangered Gazelle sub-species

The main causes for vertebrate extinction were hunting, habitat destruction and poisoning. Habitat loss, particularly of wetlands, was the reason for the extinction of many species and keeps threatening other species: more than half of the vertebrate species (18 of 34) and most invertebrate species that went extinct from Israel were associated with wetlands, as still are 20 of the 48 now-threatened vertebrate species. The continuous drying up of wetlands (sources, streams, rivers and winter ephemeral ponds) and the loss of coastal sands are a major threat (see §1.3.2 and §1.3.4 below).

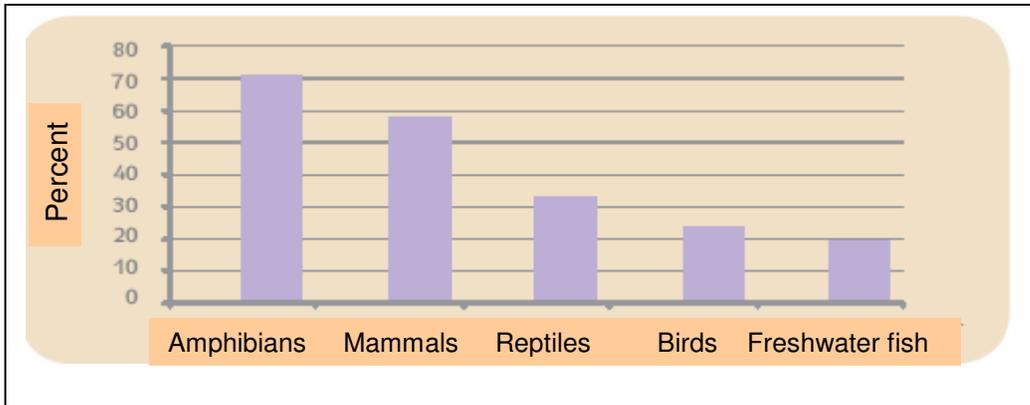


Figure 1: The percentage of Israel's terrestrial vertebrate species that is threatened

Eleven avian species do not breed in Israel any longer, though they are still found as migrants or wintering. A recent report on the status of the birds of Israel declares that of 206 breeding species, 45 are at risk, of which 18 are critically endangered, 19 are endangered and 18 are vulnerable (compared with 39 species at risk in 2001: 15, 8, and 16 species respectively). Compared to their status in 2001, the status of 21 species worsened, the status of 22 remained stable and that of 2 species has improved. Seven of the species observed in Israel are among the 3 world endangered categories. Of these, 2 eagle species are threatened by illegal hunting, electrocutions and poisoning, and another duck species is threatened by hunting (Alon & Perlman 2008).

Not much is known on the threatened invertebrate species. It is difficult to estimate how many invertebrate species went extinct in Israel during the last century, yet we know of 15 out of ca 200 known freshwater mollusc species, 4 leech species, and other 19 insect species related to aquatic habitats that have gone extinct.

Though the total number of endangered species relative to the total number of species may seem small, they constitute a substantial proportion of certain taxons, as illustrated in table 2 and figure 1 above. Some of the endangered species were granted the status of a protected natural asset, and few nature reserves were set to protect them. These passive management tools are usually insufficient, and active management is practiced to reinforce some populations (of both plants and animals) and rapidly increase their size (Safriel 2009).

The main threats to Israel's biodiversity are listed below.

1.2.1 Habitat loss and fragmentation

Accelerated urban development and suburban sprawl lead to a general loss of open landscape, to the loss of threatened habitats and ecosystems and their associated species; this leads to decreased population sizes either by habitat loss and fragmentation, by impoverished conditions in the remaining areas or indirectly by promoting invasive alien and local species' outbreaks. The conversion of open landscape to built land degrades and fragments the remaining open

landscape, decreases water infiltration to aquifers and adversely affects natural and landscape assets

Though on average built areas are only 6% of the total area of the country, most of them are located in the northern part of the country (of which 24% is built). Figure 2 shows the percentage of Israel's total area allocated for various land use classes, by district. Table 3 shows the quantity and proportion of open landscape converted to built area between 1998-2003 (Kaplan *et al* 2009), one of the SD indicators developed and currently tested.

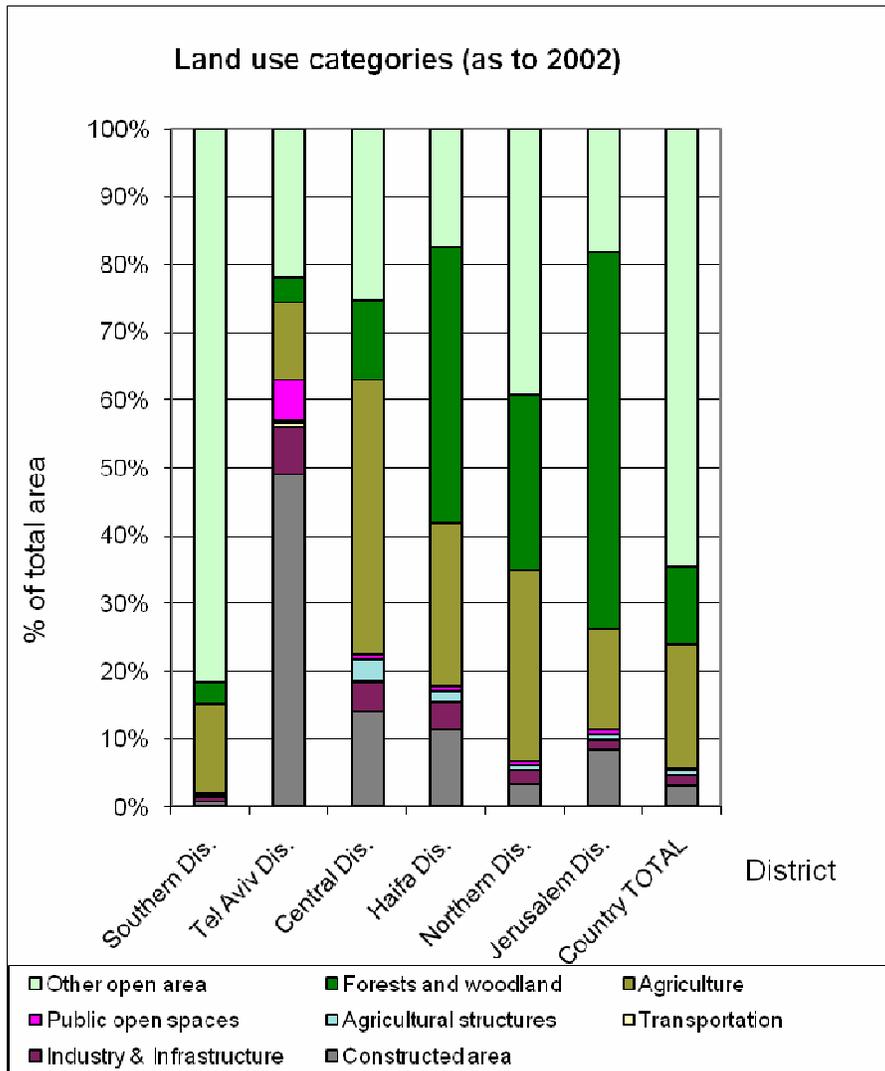


Figure 2: The percentage of Israel's total area allocated for various land use classes, by district. Data from the Yearly Statistical Bulletin (Central Bureau of Statistics (table 1.2), updated to 2002).

Table 3: Open landscape converted to built area between 1998-2003 (Kaplan et al 2009).

	<i>Israel total</i>	<i>Jerusalem District</i>	<i>Northern District</i>	<i>Haifa District</i>	<i>Central District</i>	<i>Tel Aviv District</i>	<i>Southern District</i>
Open landscape lost (km ₂)	39.8	2.4	10.5	4	14.5	1.4	7
Total area (km₂)	22,052	652	4,635	864	1,293	172	14,436

Linear infrastructures, though not occupying much space on their own merit, are major causes for habitat fragmentation, disrupting the connectivity between adjacent habitat patches and contributing to direct mortality of animals through collisions and electrocution.

Another major cause for fragmentation, the magnitude of its impacts are yet unknown, is Israel's security fence, which separates between Israel and the west bank, planned to stretch along 760 km (nowadays only partially built) and cutting through sensitive habitats.

1.2.2 Habitat degradation

Most of the surface area of endangered terrestrial habitats is not protected as nature reserves or national parks. Most of these habitats (such as freshwater habitats, coastal sand dunes, sandy rock (=Kurkar) hills and ridges, loess plateaus and desert sands) are degraded to a certain extent (see §1.3.2, 1.3.4). Not enough is known on marine ecosystems, though habitat degradation was recorded in the Red Sea (see §1.3.5).

Human activity patterns are the major cause for habitat destruction and degradation. Most degraded habitats are where resources are extracted and utilized or where development is highly desired. This is why many of the freshwater habitats have disappeared; habitats of rich soils in valleys have turned to agricultural fields long ago; Kurkar ridges were used for building and for mining; hamra soil shallow areas, Kurkar ridges and loess plateaus were used for agriculture; loess plateaus and Mediterranean shrubland used for grazing; sand dunes used for building and sand mining etc. In the marine environment, coral reefs are particularly adversely affected from human activities.

Various human activities and land use patterns tamper with ecosystem functioning and may eventually lead to habitat degradation. Such are: Mining and extraction of sands; Over extraction of water; Agricultural practices; Intensive activities of travellers and visitors (particularly using 4X4 vehicles and in vulnerable desert terrain); Disturbance by photographers; Army training may disrupt soil, vegetation and animal activity; and human-induced fires.

Special attention should be paid to the massive destruction also caused to natural ecosystems in war times by wild fires and other activities, as was experienced in 2006 in the north of Israel (see §1.3.1).

Some of the protected areas overlap army training areas. This overlap has twofold implications: on the one hand – wildlife is threatened by intensive army activity, on the other hand – as public access to and activity in these areas is restricted, most of these areas and other training zones

(that are not officially declared as nature reserves) convey some protection to most of the natural assets within them.

1.2.3 Invasive alien species and species outbreaks

Invasive species: Invasive species in Israel are increasing both in the number of species and in the degree to which some of them have proliferated. No Israeli law specifically prohibits the introduction of alien species or controls invasive species on ecological grounds, the main restrictions on the import of species into the country are those of the Ministry of Agriculture (mainly considering phyto- and animal sanitation, but with a growing awareness to problems of invasive species), those of the Ministry of Health (prohibiting the introduction of poisonous or narcotic species). Special regulations were defined by INPA in accordance with CITES guidelines and species lists (see details on the 2nd report to CBD, Frankenberg 2001).

Table 4 briefly presents the invasive species that have established wild populations in Israel.

Table 4: Invasive species that currently established wild populations in Israel

Taxon	Number of known invasive species in Israel	comments
Mollusca (snails)	Tens of species	Terrestrial, freshwater and marine
Acariidae	Number unknown	Numerous species
Insects	220	Including <i>Aedes albopictus</i> (Asian tiger mosquito)* and the Little Fire Ant <i>Wasmannia auropunctata</i>
Freshwater fish	29	Including mosquitofish (<i>Gambusia affinis</i>)* that was introduced to combat mosquitos
reptiles	2	
birds	20	Including Indian Mynah- <i>Acridotheres tristis</i> *
mammals	1	Coypu- <i>Myocastor coypu</i> *
Plants	Invasive= 36 species Naturalized = 24 species (=potentially invasive)	Including <i>Lantana camara</i> * and <i>Bidens pilosa</i> *
Marine species	Ca. 300	A main source is through the Suez Canal, from the Red Sea to the Mediterranean (Lessepsian migration)
*=among 100 of the world's worst invasive species according to Global Invasive Species Database		

Certain invasive species also become health hazards; such are the Asian tiger mosquito, *Aedes albopictus*, the Little Fire Ant *Wasmannia auropunctata* and various jellyfish in the Mediterranean shores (which have increase recently both in duration of their stay and in population sizes, making them a major hazard to people).

Some invasive tree species (e.g. *Acacia saligna* and *Ailanthus altissima*) have synergetic effects with other disturbances to ecosystems such as land surface disruptions, land use patterns and wild fires.

Species outbreaks: Local species that tend to outbreak are mainly those that make quick use of food sources available from human refuses (food surplus from human settlements and agricultural practices garbage dumps, dead animals from agriculture). Their populations grow beyond the carrying capacity of their habitat and can later adversely affect other species.

This is the case with some carnivores (particularly the Jackal *Canis aureus*, Wolf *Canis lupus* and Fox *Vulpes vulpes*) whose populations have grown in some locations so that they adversely affect two gazelle populations (Acacia Gazelle in the southern part of the country and a population of the Mountain Gazelle in the northern part of the country), mainly through low recruitment rate, as their young are taken by these carnivores (see in figure 3 the sharp decrease in gazelle counts in the Golan compared to the relatively stable numbers in the other areas monitored).

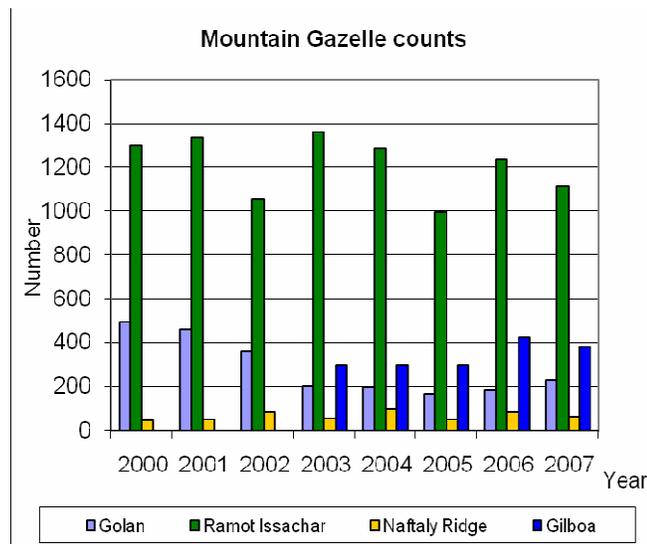


Figure 3: Population counts of Mountain Gazelle (*Gazella gazelle*) in several locations in the northern part of Israel in the years 2000-2007.

1.2.4 Flow modification

Water flow modification for various uses (agricultural, domestic and industrial uses) and the past drainage of wetland habitats (to prevent diseases or flooding) have had a drastic impact on freshwater ecosystems (see §1.3.4 below). Yet, some water works have created artificial habitats such as freshwater reservoirs, sewage treatment facilities or industrial salt ponds.

1.2.5 Harvesting

The excessive use of water resources and the withdrawal of water upstream rather than downstream have caused the deterioration of waterways, a decrease in the level of aquifer ground water, the salinization of water resources and soils and the drying up of many wetland habitats, making their associated biodiversity among the most endangered in Israel (see §1.3.4 below). Five consecutive years of drought and additional pollution of waterways (see §1.2.6 below) further aggravates the situation.

Illegal hunting of wildlife (especially by foreign workers in agriculture) poses serious threats to the populations of wild animals. The non-selective use of illegal traps affects mainly porcupine and wild boar, that in some places are agricultural pests, yet many other species are at risk (208 species were found in traps, including endangered species). A model suggests that ca 6,000 individuals are illegally trapped yearly, making it a major threat to Israeli wildlife, affecting reptiles, amphibians, passerine birds, small mammals and mollusks as well as larger mammals such as gazelles, porcupine and chuckars, and particularly those species that are threatened by other factors as well.

Fishing with explosives as a non-discriminative method used to cause severe local damage.

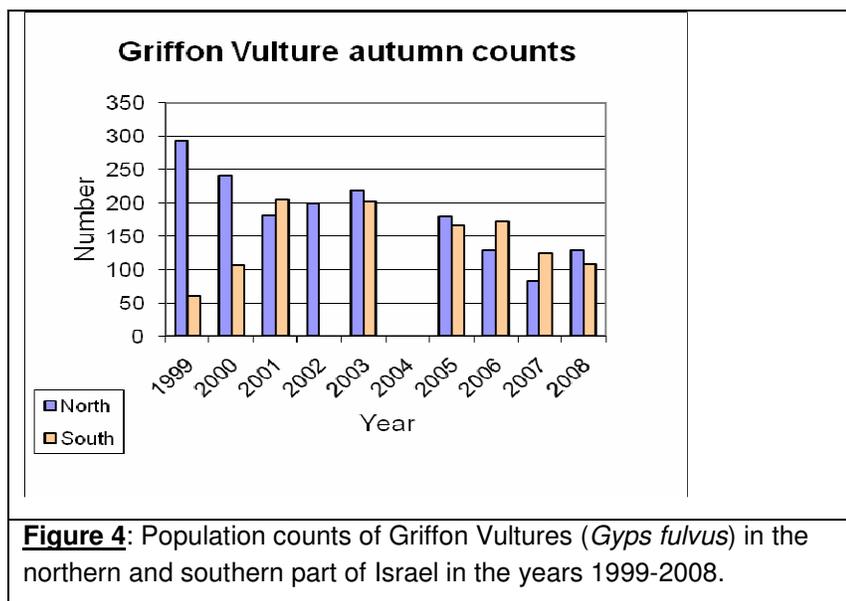
Wood cutting for heating has increased during 2007 in some localities (particularly in rural northern villages) following an increase in petrol prices, leading to local stress on tree populations and to the felling of old and unique trees.

Populations of several wild plants that are used as seasoning may be threatened by massive or commercial harvesting. The threats on wild plants picked for their attractive flowers have nearly ceased thanks to successful long-term education and enforcement.

1.2.6 Pollution

Domestic, industrial and agricultural pollution of air, water and soil is still a major threat to biodiversity, affecting most habitats, though their magnitude decreases thanks to administrative, management and enforcement efforts (for example, see §1.3.2 on coastal cleanliness and §1.3.4 on river restoration). Some of the pollution is diffuse whereas other types are more definite and may affect plants and animals differently.

Poisoning by pesticides is not a major threat as it used to be in the past, but poisoning can still be the cause for massive mortality of certain populations, such as for Griffon Vultures in the northern part of the country (see the decline of the northern population in figure 4).



Animals also eat or get entangled with solid waste, polyethylene bags, strings, metal debris and other hazards that may injure, strangle or poison them.

Solid waste and garbage dumping in open landscape also consumes space and decreases the surface area of available habitat. Other, less familiar types of pollution are noise and light pollution affecting behavioral aspects related to feeding, breeding or to biological clocks (mainly for animals but also for plants).

1.2.7 Genetic resources

The within-species genetic variation is threatened by the same processes that decrease population sizes, even before population size has diminished to the verge of extinction. It is sensitive to habitat loss and fragmentation and to adverse affects on ambient conditions. Isolated small populations are the most vulnerable.

Loss of local genetic variability (ecotypes) can be due to: a) loss of geographically and genetically defined populations from the total of a particular species distribution range; b) human induced distribution of individuals between remote populations, thus diluting local adaptations ("genetic pollution"); c) hybridization of domestic or feral animals and plants with wild relatives. The extent of these problems in Israel is unknown. GMOs are not a significant problem in Israel.

1.2.8 Future threats

The NBS highlights the combined pressures imposed by population growth and the local effects of climate change as the two major future threats to Israel's biodiversity, expected to enhance extinction threats and change biodiversity composition in most of the country's ecosystems.

The expected tripling of the population by 2050 will increase development pressures leading to further habitat loss, fragmentation and degradation, by increasing the proportion of built areas replacing ecosystems and decreasing their ability to support biodiversity and ecosystem services. Future population growth in the Palestinian authority is expected to further adversely affect biodiversity, also in Israel. The increased dry conditions combined with the growing population are expected to increase the demand for water (urban and agricultural demand) that will decrease the amount and quality of water available to wetland ecosystems and severely impair their biodiversity and ability to provide ecosystem services.

The increase in average temperature, the decrease in total rainfall and the increase in climatic instability will probably increase the extinction risk for many species (leading to changes in species composition) as well as increasing the levels of invasions of other species, some of them are harmful to agriculture, to human health and to biodiversity itself, leading to a decrease in the provisioning of ecosystem services.

A more detailed discussion on future threats to each of the major ecosystem categories is presented in §1.3.

1.2.9 Protected areas and protected species

Landscapes, ecosystems and habitats are protected as nature reserves and natural parks (both protected by law, geographically defined and declared in statutory National Master Plan (NMP) #8), and as several types of forests and woodland, both planted and natural (protected by several laws and geographically defined and declared in statutory NMP#22).

The number and the total area of protected areas are constantly increasing, making some 30% of the country's total area. Yet, most of them are located on desert landscapes (being less valuable for development rather than due to their intrinsic value for biodiversity or for ecosystem services, see fig 5), with only about 3% of the Mediterranean region currently protected in nature reserves (see fig 6). Therefore, protected areas by themselves cannot provide the entire ecosystem services required by the remaining 70% of the surface area, and ecosystem services need to be acquired from the entire complex of open landscapes (Safriel 2009).

So far, the following criteria have been set for selecting ecosystems for preservation: wealth of biodiversity, high level of endemism, representative value, undisturbed status, presence of important species and critical ecological value (such as migration path, nesting, food, hydrological significance to the ecosystem). The following criteria have been set for selecting species for preservation: genetic or ecological importance, economic and social importance, level of risk and damage.

Outside the confines of nature reserves, hundreds of plant and animal species have been declared "protected natural assets", with their list last updated in 2005. A more detailed account on nature conservation activities is presented in chapter 2.

Nature reserves and national parks

In the beginning of 2008, Israel had 205 officially declared nature reserves spanning an area of 3892 km₂ and 72 national parks spanning an area of 185 km₂. The remainder, out of a total of 464 nature reserves (spanning 6581 km₂) and 147 national parks (spanning over 285 km₂), are in various planning stages (see table 5 below). With the additional sites under statutory process, the total protected area will grow by 25% (from 4,096 km₂ to 5,075 km₂) and with the proposed protected areas it may grow by additional 44% from the current situation (up to 6867 km₂).

Table 5: The number and total area of nature reserves and national parks in the beginning of 2008

Status	Number	Total area (km ₂)
Nature reserves:		
Declared	205	3892
Under statutory process	81	966
Proposed	178	1724
Total	464	6582
National parks		
Declared	72	185
Under statutory process	34	33
Proposed	44	68
Total	147	286
Grand total	611	6867

Many of the protected areas are small (see mean reserve area in figure 5), particularly in the central part of the country, which is very densely populated. Though most protected areas represent desert habitats, figure 6 shows the trend in the total protected reserves and parks, with increasing representation to addition habitat categories in recent years.

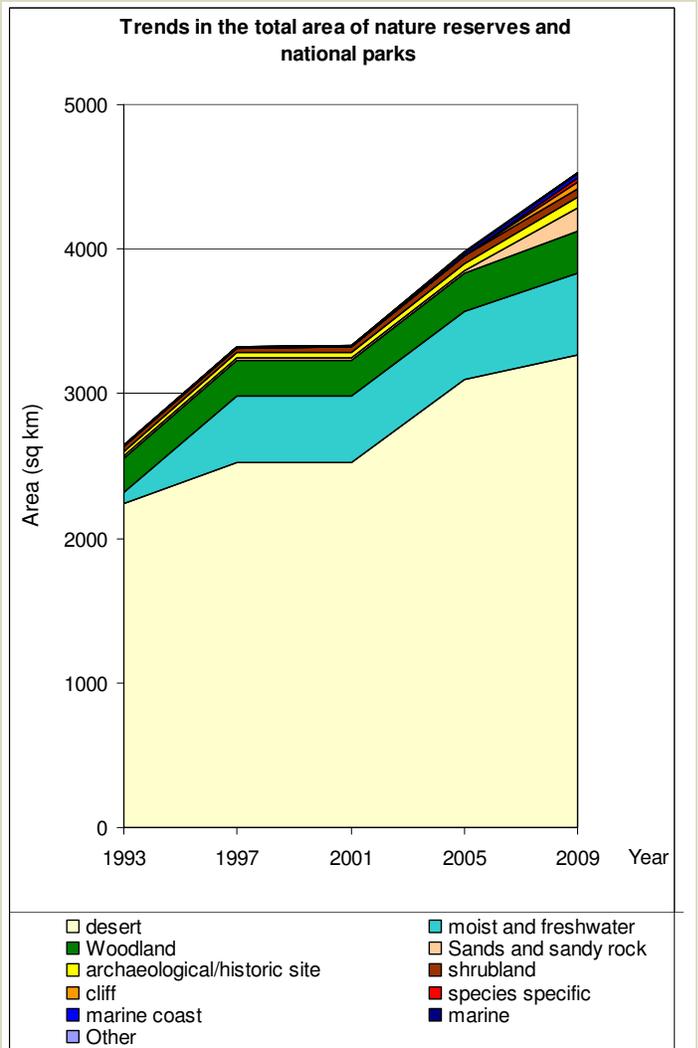
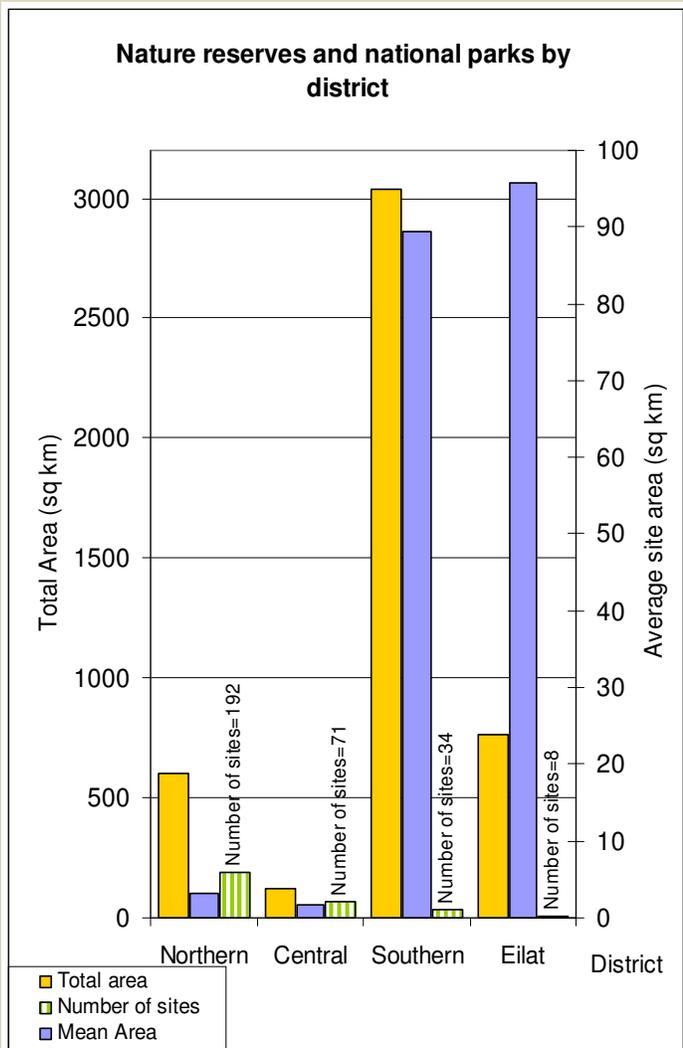


Figure 5: The number, the total area and the mean area of nature reserves and national parks, by district, as to 2008.

Figure 6: Trends in the total area of nature reserves and national parks, by general ecosystem categories.

Woodland and forests

The Israeli afforestation program is managed by JNF-KKL. Israel's NMP#22 has designated 1,600 km² for the development and conservation of 8 types of forest, woodland and shrubland. Afforested area today spans over some 985 km², with continuous afforestation activity (see further on forestry in §3.3). Trends in woodland and forests status are further discussed in §1.3.1.

1.3 Status and threats to biodiversity by main ecosystem categories

Israel has experienced five consecutive years of drought (see figure 7). Being a country of semi-arid and arid regions, the drought adversely affects most terrestrial ecosystems.

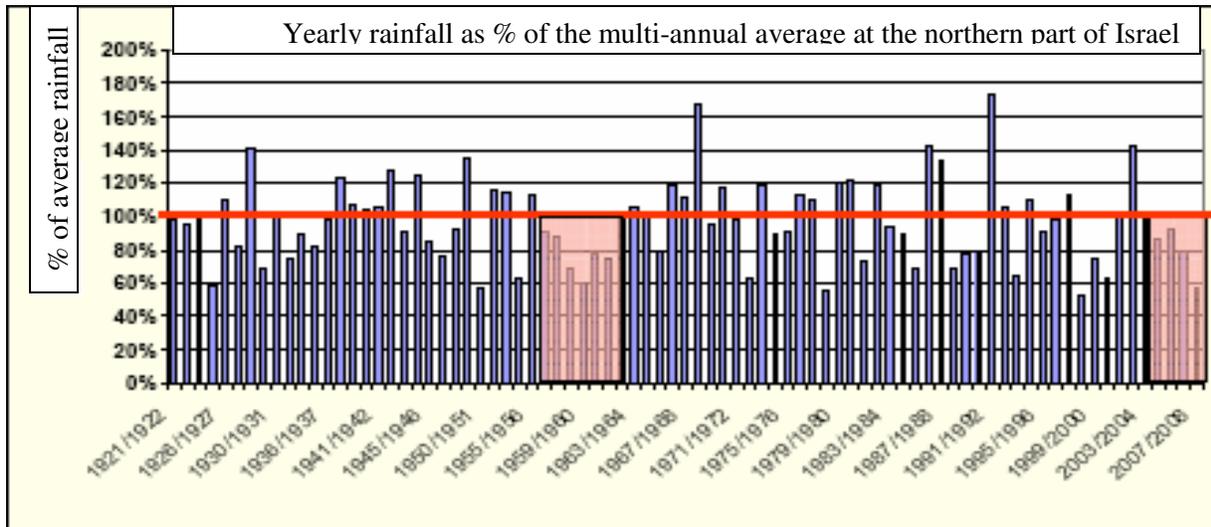


Figure 7: Yearly rainfall as percent of the multi-annual average at the northern part of Israel. The red line indicates the multi-annual average; the pink rectangles show series of drought years.

Biodiversity trends relevant to some major ecosystems are presented below, supported where possible by monitoring data on possible relevant indicators.

1.3.1 Woodland and shrubland biodiversity

Woodland and shrubland are mainly Mediterranean ecosystems that include the entire range from tree dominated forests and woodland (planted and more natural) to shrub-dominated garigue and batha. They may replace each other through succession on the one hand, and through grazing, cutting, fires and agricultural practices on the other hand. Currently in Israel, these ecosystems have a patchy distribution, a large portion of them having been converted to agricultural and urban uses. Most of the woodland habitats are protected either as reserves and parks under NMP#8 or as afforestation area under NMP#22.

Planted and afforested areas convey different ecosystem services than the natural woodland. The current policy of the afforestation organization is aimed at increasing biodiversity within their managed areas.

The total afforested area is generally increasing in size: Figure 8 shows the trends in new and regeneration planting areas over the last 11 years, figure 9 shows the trends in the total JNF-KKL managed forests in the years 1990-2009. Some of the area allocated to afforestation in NMP#22 is nevertheless allocated for other land uses (see figure 10).

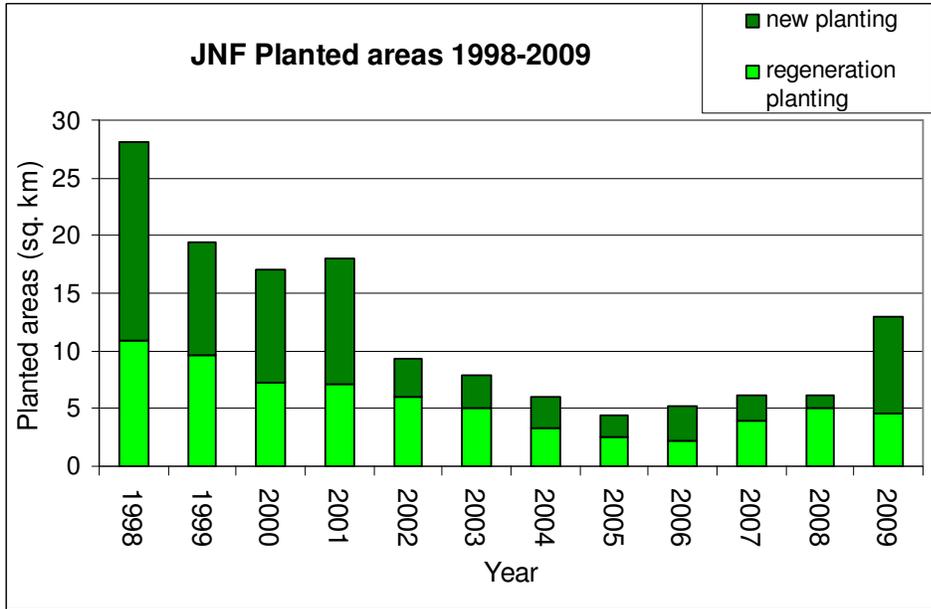


Figure 8: Trends in new and regeneration planting in JNF-KKL areas in the years 1998-2009.

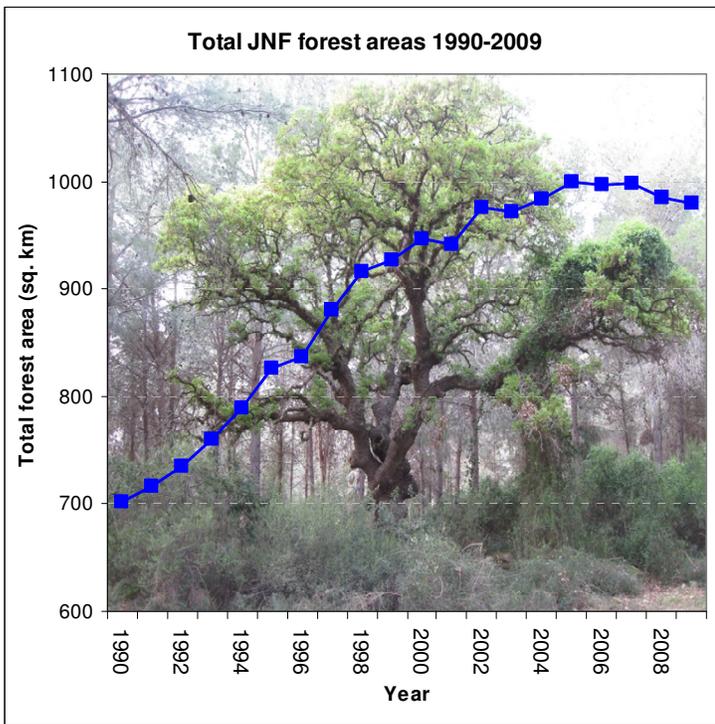


Figure 9: Trends in the total JNF-KKL managed forests in the years 1990-2009

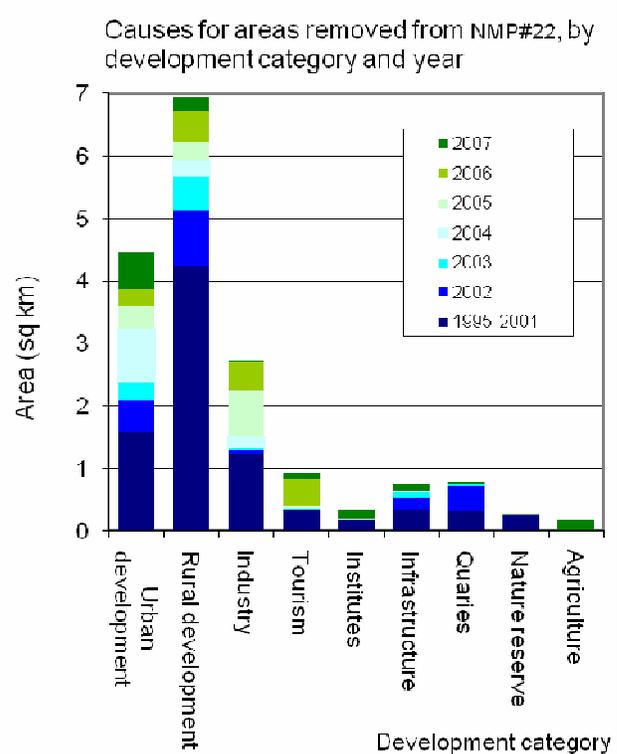


Figure 10: The causes for removal from NMP#22 afforestation areas between 1995-2007, by development category and year.

Wild fires (set by negligence, by war activity or through intended inflaming) can cause widespread damage to woodland and forests in the central and northern part of the country. Figure 11 below shows the extent of forest and woodland wild fires in the years 1990-2008.

Burned areas are further facing the risks of: a) invasive plant species infiltration and proliferation of pyrophytic species; b) a certain amount of soil loss; c) depleted seed bank and regeneration potential by repeated fires.

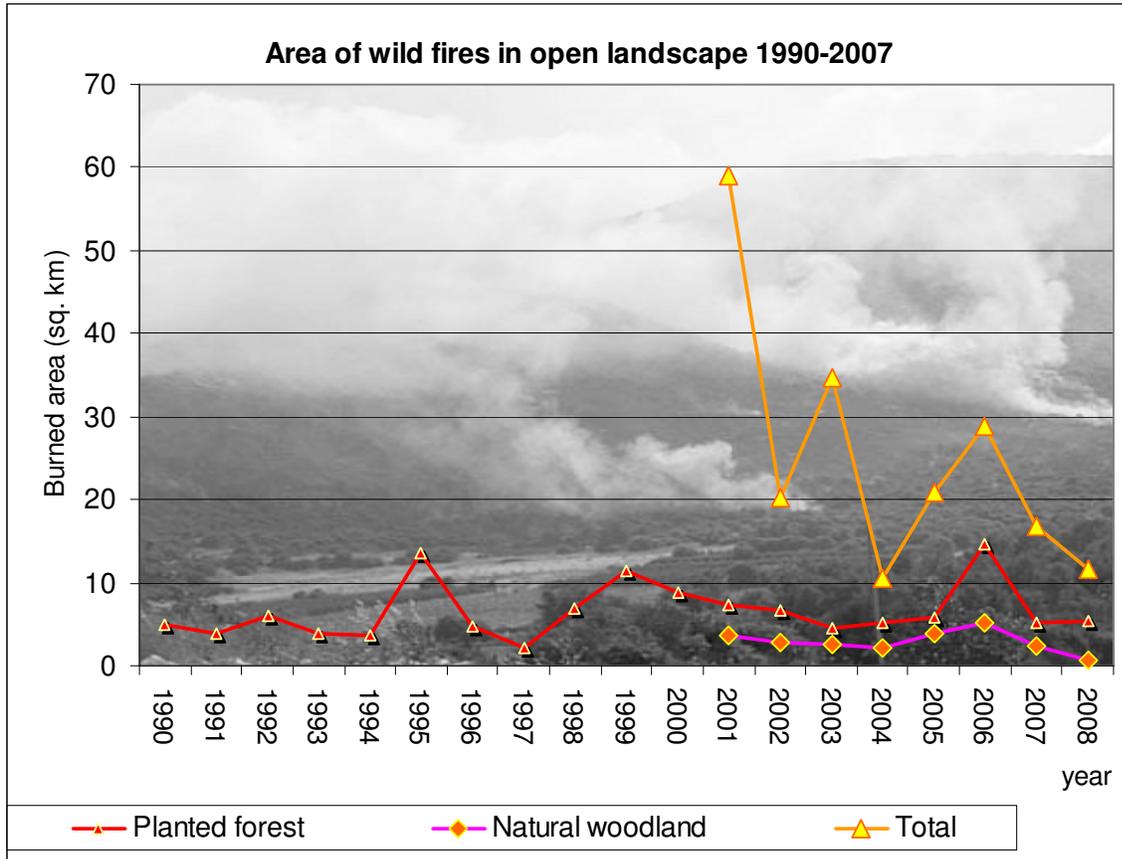


Figure 11: The extent of planted forests and natural woodland that were subjected to wild fires in 1990-2008.

The vast and simultaneous wild fires in the north of Israel, induced by the war in 2006, are special and unprecedented: Rockets induced wild fires over a total area of some 120 km²; the burned landscapes included forest, nature reserves and parks and pasture land. The damage covered whole ecosystems through the full scale of trophic levels, with a greater scope for local extinctions and added damage to adjacent trees and to animal populations.

A strong enforcement of the prohibition on grazing and cutting in the past has gradually turned shrubland into woodland with dense understory layer and subsequent loss of local biodiversity. Current management efforts are aimed to re-introduce managed and selective grazing and cutting to increase both habitat patchiness and local biodiversity. The current drought might have lessened the vitality and resistance of forests and woodlands to diseases and parasites

and to invasive species infiltration (mainly occurring on the periphery of woodlands or where infrastructure work has affected and altered a particular land stretch).

Future threats: The implications of climate change on these ecosystems include an increase in the frequency of fires, increased risk of drought and pathogen invasion, and changes in species composition with a lower contribution of northern components. Unique species that currently inhabit high mountains, some of them glacial relicts, might become locally extinct.

1.3.2 Coastal biodiversity

Much of the coastal area is covered by urban and agricultural landscape: The surface area of the coastal sands today comprises only 50% of the original coastal sands that prevailed in that region in the early 20th century. With 70% of the population living in this region and future approved development plans, only 16% of the original landscapes are to be saved.

The remaining open landscapes support unique ecosystems with a relatively rich biodiversity: sands in various stabilization formations and seashores, Kurkar ridges and hamra soils, deep soils in low places, and ephemeral winter ponds. Like in many parts of the world, the biodiversity associated with coastal ecosystems is increasingly threatened and hosts many endangered plant and animal species. Biodiversity components are threatened by habitat loss and degradation through continuous urban development (particularly building next to the shore edge), by sand mining (both legal and illegal, making it a diminishing resource), by recreation patterns (especially usage of 4X4 vehicles), by sand stabilization processes driven by management practices and by damage to sand transport process along the Mediterranean coast. Past agricultural landscapes of orange groves were dried up due to water scarcity and to urbanization pressures and were converted to built land.

Efforts to improve the cleanliness of the seashores in the last few years have been quite successful (figure 12).

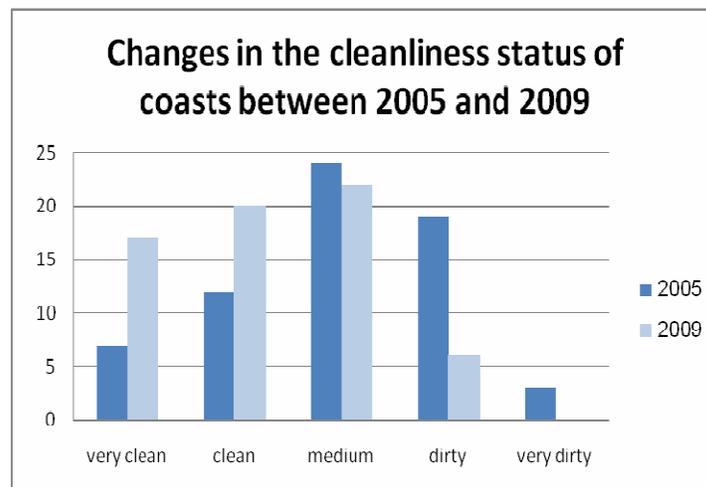


Figure 12: Changes in the cleanliness status of 65 seashore section following cleaning projects in the years 2005-2009.

Future threats: Climate change effects include an increased collapse risk of coastal Kurkar ridges due to increased frequency and magnitude of storms, coupled by the rising sea level, and to increased saline spray levels on sandy coastal ecosystems possibly affecting their size and their species composition. Changes in sea water flow regime may further decrease sand transportation and accumulation at the coast. The decreased precipitation may decrease the survival of the micro-algae forming a stabilizing layer on the sand dunes.

1.3.3 Desert biodiversity

Desert ecosystems consist of a relatively rich biodiversity providing mainly cultural ecosystem services. They are less threatened than other ecosystems in Israel, yet they have already lost a substantial part of their biodiversity.

The main threats to desert biodiversity are through grazing, mining, quarrying and agriculture practices, army and travelers' activity (causing soil impairment, destructing soil structure and protective layers and increasing erosion; also affecting plant distribution, run over soil-dwelling animals and disturbing animal activity patterns), all also degrading soil retaining capability. Desert ecosystems are well represented in nature reserves, yet a study from 2000 has revealed a 20-40% species loss in some areas.

The drought conditions and the decrease in desert floods in the last few years seemed to have had adverse effects as manifested by monitoring of several desert dwelling species. Increased mortality was recorded in some key plant species: Figure 13 illustrates that both *Acacia* tree species (monitored as key species in desert ecosystems) and *Ochradenus baccatus* (monitored as a key species and an important food source for several desert species) show increased mortality; *Alhagi graecorum* that depends on shallow ground water levels in desert salt lands was not adversely affected.

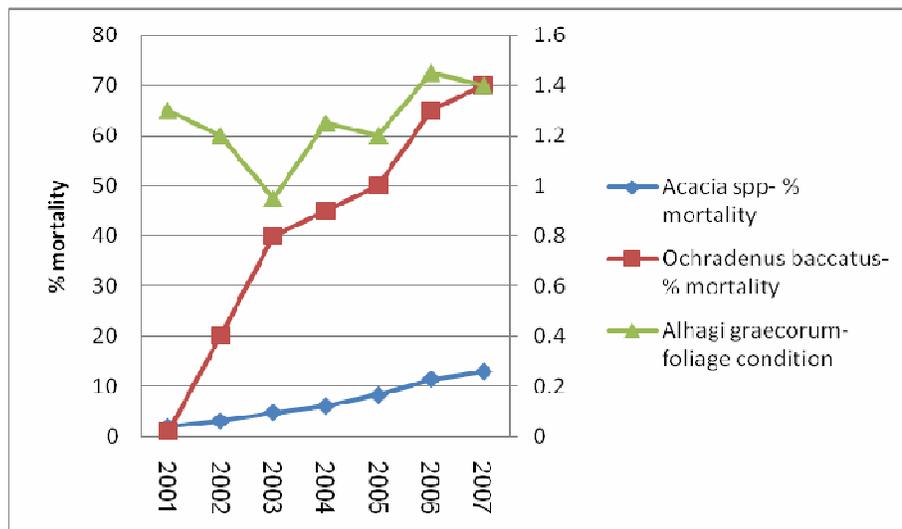


Figure 13: Trends in the condition of several desert plant species that were chosen as indicators for ecosystem variables in the Eilat region, southernmost part of Israel, in the years 2001-2007.

Figure 14 shows population trends of some desert dwelling animals: Habitat loss, in some years coupled with drought conditions, has already affected some ground nesting bird species, such as the Houbara Bustard (*Chlamydotis undulate*), whose numbers are decreasing since the 1980s; the Ibex (*Capra ibex*) populations in Eilat are decreasing, probably due to decrease in precipitation and food availability, whereas those of the Dead Sea oases are thriving and Desert Gazelle (*Gazella dorcas*) numbers are greatly fluctuating with no clear trend.

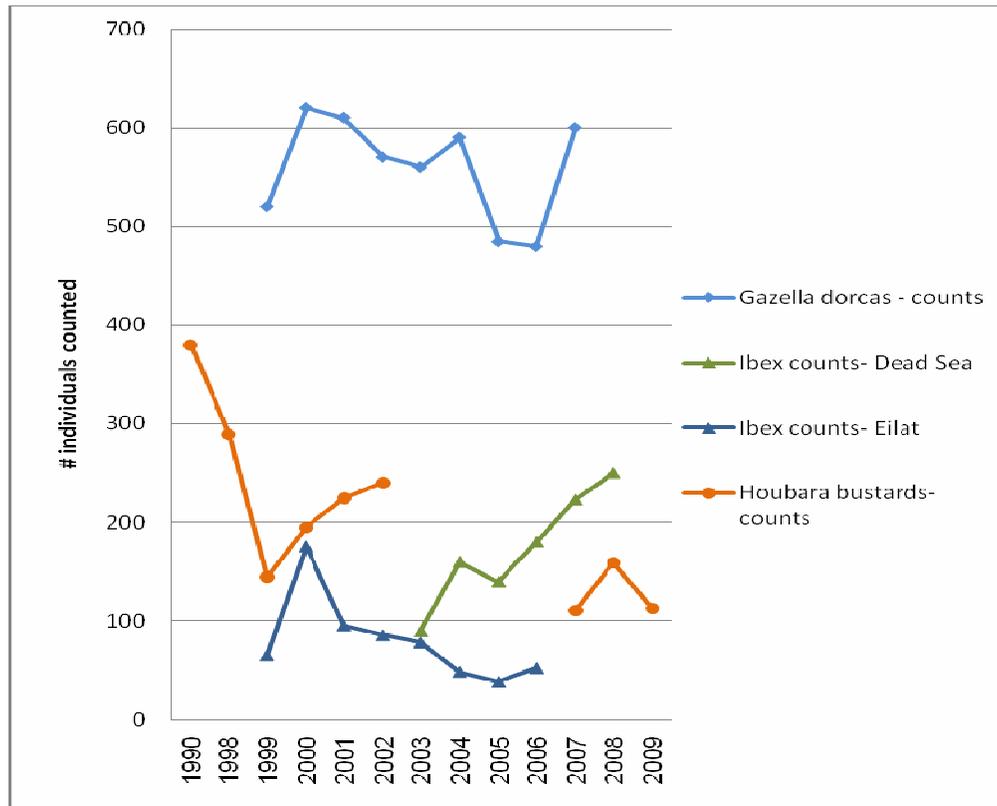


Figure 14: Population trends of several desert animal species in the last decade.

Development pressures are locally threatening certain sites: such is the case with one of the last Samar sand dunes in the southern Arava valley, already decreased in size to a third of its original size, and hosting a unique combination of psammophilic plants and animals, which is to be used for sand mining that will be used as building material in the city of Eilat.

An increasing pollution is observed in West Bank eastbound wadis (see §1.3.4).

Future threats: Desert ecosystems are highly sensitive to climate change and to possible decrease in precipitation level, particularly the climatic transition zone at the northern part of the Negev desert and at the Arava valley probably leading to decrease in species richness.

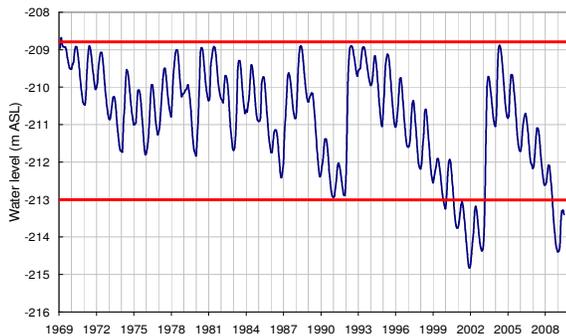
1.3.4 Inland water biodiversity

Like in many parts of the world, the biodiversity associated with freshwater ecosystems such as water sources and streams, ephemeral ponds and salty wetlands is continuously among the most threatened, degraded and endangered.

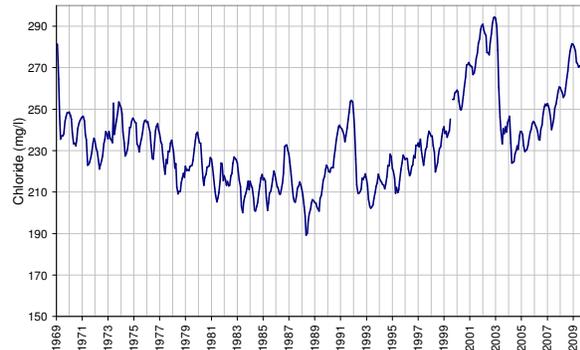
OVERVIEW OF BIODIVERSITY STATUS, TRENDS AND THREATS

Freshwater ecosystems are still hosting a large number of endangered plant and animal species, though the efforts to conserve their biodiversity or improve their environmental quality show some success. These ecosystems yield highly essential ecosystem services. They are mainly threatened by habitat loss and degradation (changing their dimensions), over-exploitation of the water resources (decreasing water quantity) and pollution (degrading their quality). The country's water supply is largely derived from its major lake, Lake Kinneret (Sea of Galilee), and from water sources and streams, as well as from underground aquifer, all relying also on supporting ecosystem services. No direct indicators of biodiversity are yet available (a river biodiversity index is currently tested), but water quantity and quality monitoring can reveal to a great degree relevant trends.

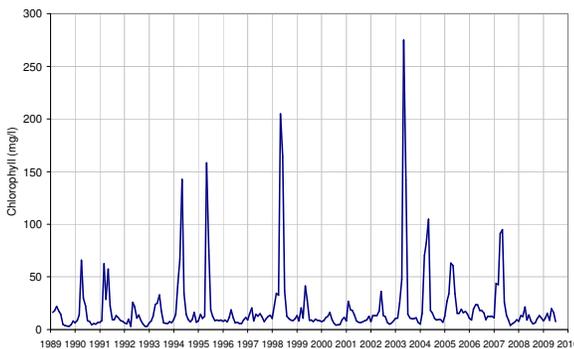
Figure 15 shows that the Sea of Galilee water level is continuously decreasing following 5 years of consecutive drought (a), with increase in chloride concentration due to over-exploitation of this resource (b) and increase in chlorophyll concentration and phytoplankton biomass, probably due to pollution (c,d).



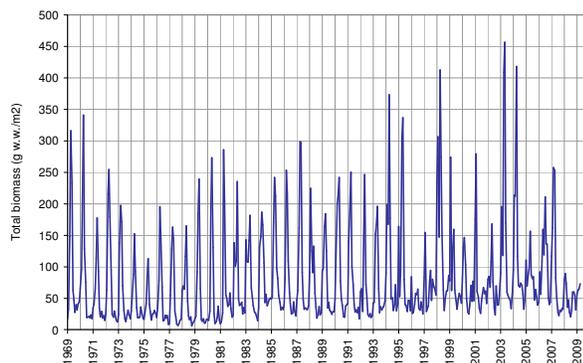
a) Water level in Lake Kinneret (1969 – 2009). Horizontal red lines present Upper (-208.80 m ASL) and lower (-213.00 m ASL) operational levels.



b) Concentration of chloride in Lake Kinneret (1969 – 2009). Data present monthly average values for the upper water column (5 m)



c) Chlorophyll concentration (1989 – 2009): monthly average values for the upper water column (5 m)



d) Areal Concentration of phytoplankton biomass (1969 – 2009): monthly average values.

Figure 15: Trends in water quantity and quality of Lake Kinneret (Sea of Galilee). Data source: Hydrological service, Israel Water Commission). (source: http://kinneret.ocean.org.il/Images/multi_Eng.ppt).

Pollutant levels in the major westbound rivers have decreased by 50-86%% following intensive river restoration efforts (see figure 16), making the recovery of their biodiversity more feasible. An increasing pollution is still observed in West Bank eastbound wadis, where untreated Palestinian and Israeli sewage of 2 million people flows in streams, absorbed in the land and infiltrates to the aquifer. West bank stream pollutant load is higher than that in streams within Israel's borders.

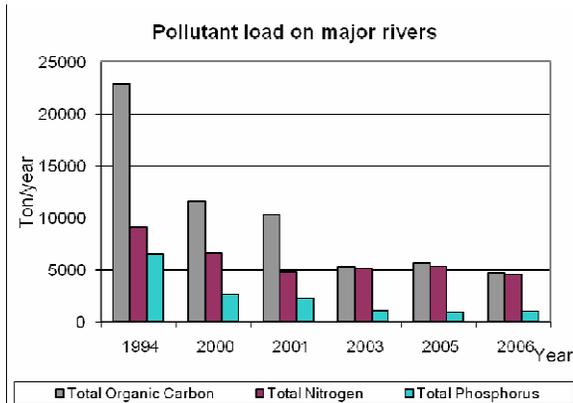


Figure 16: Trends in pollutant loads of major westbound rivers between the years 1994-2006.

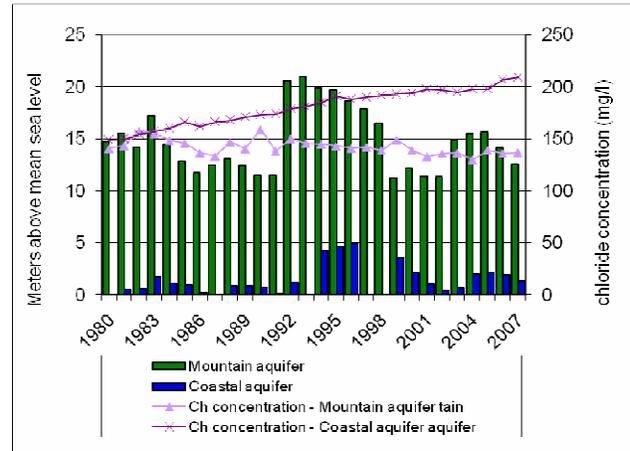


Figure 17: Trends in water level and salinity level in the coastal and mountain aquifers between the years 1980-2007.

Figure 17 shows trends in water level and average salinity level in the coastal and mountain aquifer in 1980-2007. The coastal aquifer condition is still deteriorating, possibly affecting also freshwater biodiversity in related sources. The re-flooded part of the Hula marsh-lake makes promising signs for habitat recovery for the last decade, and nowadays INPA is considering re-flooding one of the coastal swamps that was previously drained.

The Dead Sea water level keeps decreasing, and the sea keeps shrinking (see box below).

Case study: The Dead Sea environmental crisis

The Dead Sea, a part of the rift valley, is a unique site on a global scale, being the lowest elevation on the Earth's surface on dry land (currently 423m below sea level), the deepest hyper-saline lake in the world (ca 375 m deep) and also one of the world's saltiest bodies of water, with a unique chemical composition. It is proposed as a UNESCO world heritage site.

Due to water harvesting in its tributaries and usage of its water for salt industries in Israel and in Jordan, its level has been constantly decreasing and its salinity level increasing during the last decades. The decrease in sea level is currently ca 1.3m/year. This process is followed by environmental-geomorphologic hazards in the surrounding terrain, changes in the salinity level of underground water, changes in above- and below-ground flow regimes, loss of ground water and changes to its unique freshwater and saline habitats, with a severe danger of biodiversity loss: particularly threatened are the coastal water sources on its north-western coast which host a rich composition of hydrophilic and saline species, including tens of endangered species.

A 2004 policy paper by the MoEP suggests that the effects of whatever mitigation measures possibly adopted may not be evident at least for the next 30 years.

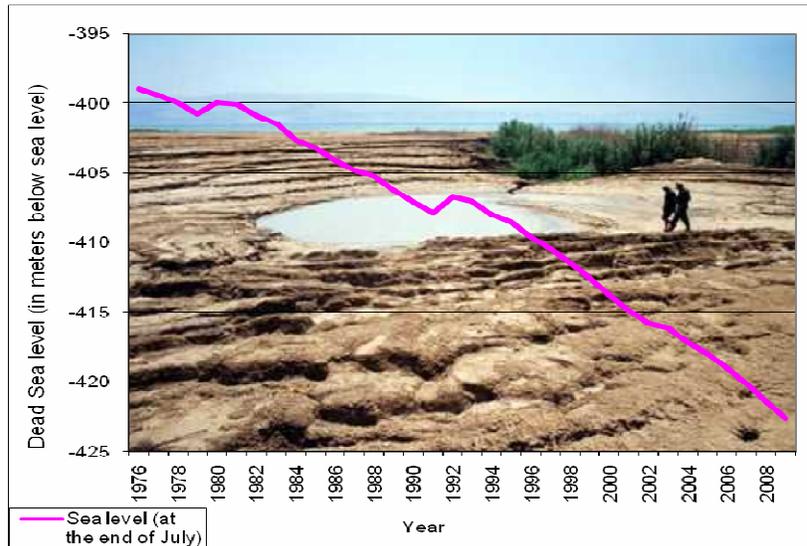


Figure 18: The decrease in the Dead Sea water level in the years 1976-2009.

Future threats: Inland water ecosystems are expected to be under particularly stressful situation, both due to population growth (leading to increased habitat loss and degradation and to increased demand for water) and by global warming effects (leading to further increase in water demand, to decreased precipitation and increased evaporation and desiccation of water bodies, to rise in sea levels and salinization of the coastal aquifer, all possibly leading to decreased water allocation to natural habitats).

1.3.5 Marine biodiversity

The marine biodiversity of Israel's Mediterranean coast is poorer than that generally found in the western Mediterranean, whereas that of the Eilat coasts is richer than the biodiversity generally found in the Red Sea. The ecosystem services involved are: supply of marine food, varied cultural services and support services through a certain degree of coastal protection from degradation (by sedentary snails and coral reefs).

Both ecosystems are susceptible to pollution and other hazards both by those using them and by pollutants from urban, industrial and agricultural systems. The Lessepsian migration of invasive species from the Red Sea to the Mediterranean has intensified (possibly due to global warming), changing biodiversity composition and creating hazards to human health and well-being (e.g. some species of Jellyfish that became an increasing hazard to human well-being along the coast in peak summer months).

The average sea level on Israeli Mediterranean coasts has risen between 1992 and 2003 by 10mm/year (higher than the global average of 3mm/year). The natural balance between sand sedimentation and removal by the waves was impaired by sand mining and the building of marine structures, followed by seashore destruction.

Monitoring environmental quality of Mediterranean coastal waters (Herut et al 2008) shows that following several years of improvement and decreased pollutant levels (nutrients, heavy metals and organic matter), these have stabilized in the last 5 years and are still medium-high. In spite of good progress with river restoration programs (see §1.3.4), several river outlets were found highly polluted, and the decrease in heavy metal loads in shells has stopped. In Haifa Bay micro-algae with potential to emit toxins were found.

Five years of monitoring of the Red Sea (Shaked & Genin 2009) show a continuous stressful condition of the coral reef and continuous pollution and eutrophication (high organic concentration leading to over-abundance of minute algae). The Red Sea reef corals are continuously showing "bleaching effects", due to the loss of symbiotic algae sensitive to high temperatures, leading to coral death. Both the coverage and abundance of corals is still much lower than they were 20 years earlier, with low recruitment rate, though no change was found in species diversity since 2004. A slow and unclear improvement is seen as the aquaculture facilities that were responsible for a large part of the deteriorating conditions are gradually removed from the gulf waters, which may indicate some signs of recovery.

Future threats: Increased sea temperature due to climate change will lead to increased migration from the Red Sea to the Mediterranean and to increased damage to the Red Sea coral reef, threatening its survival. Current degradation of coastal areas (particularly coastal cliffs) is likely to increase due to rising Mediterranean sea levels and increased storm frequency and intensity, threatening sedentary invertebrates in the rocky coastal waters and biodiversity at the seashore and at coastal cliffs.

1.3.6 Agricultural biodiversity

Agricultural plots sustain the natural adjacent biodiversity to some degree (attracting many other species that do not influence their yields but enrich their cultural ecosystem services), and are important in maintaining landscape connectivity, thus supporting adjacent natural populations. Soil biodiversity has a major role in supplying ecosystem services – both for agricultural and general benefit. Agricultural activities (yielding their provisioning services) benefit from other ecosystem services and are also adversely affected by natural pests, some of them becoming outbreak species. On the other hand, agricultural activities pollute other ecosystems, mainly through excessive use of nutrients and pesticides, by the use of polyethylene greenhouse covers, and by burning and discarding agricultural refuse. Apart from the target species, pest control measures usually affect other naturally occurring species that are not harmful to agricultural practices.

About one fifth of the country's original ecosystems have been converted in the past to agricultural systems, using ca. 40% of the water supply, and adversely affecting natural biodiversity. A slow withdrawal from agricultural practices has led to the abandonment of 15% of the agricultural lands, though the feral areas were not re-established as natural ecosystems. Current agricultural practices are relatively more environmental-friendly than in the past. Water allowance to agriculture was cut by 50% in the last decade, yet production rate is still increasing due to more efficient use of freshwater and a greater use of treated water.

Traditional crop species that have gradually been replaced by modern races are collected and preserved in the last few years in the Israeli Gene Bank (see §2.4.1).

Widespread hunting by foreign agricultural workers threatens wildlife adjacent to agricultural areas, and is handled with by the INPA.

1.3.7 Pastureland biodiversity

Pastureland is generally a converted woodland or shrubland Mediterranean or desert ecosystem. Some forms of grazing were prohibited in the past. Improved management research and practices, in some cases joined by fencing, manage to retain most biodiversity in some of the grazed areas. Some areas are not well managed, with overgrazing leading to biodiversity loss and decrease in ecosystem services provisioning (yield and soil properties). Some conflicts may arise between wildlife and the grazing animals or their owners.

1.3.8 Urban biodiversity

Urban biodiversity comprises of introduced elements together with relicts of the previous natural ecosystem and local species that flourish alongside humans and invasive species. The remaining open landscape in human settlements and their surroundings sometime become refuges for wild species.

The awareness in Israel to urban biodiversity is growing and "urban nature sites" are increasingly established, protected and managed. Recently, Jerusalem, the Capital city, has joined the LAB (Local Plan for Biodiversity) program.

1.4 Implications of biodiversity loss

Biodiversity loss has a dual effect: it decreases ecosystems' stability and its future survival prospects and it also decreases the benefits of a large range of ecosystem services they provide. Human well-being is impaired by the decrease in the quality and quantity of ecosystem services that are lost or diminished (such as provision maintenance and control of water quality and quantity, soil retention and fertility, air quality, agricultural crops, harvested species, potential genetic resources for agricultural and medicinal uses etc). The increasing abundance of some of the invasive species amplifies their adverse effects on human health and well-being.

The conversion of open landscape to built land conveys economic damage through the loss of ecosystem services, as well as having adverse effects on the cultural heritage and the general well-being of present and future generations: loss of natural assets within the open landscapes and of heritage landscapes; less open space available for recreation and decreased accessibility to the remaining areas; decreased future possibilities for various uses of open landscapes.

The loss of open landscape also increases inequality in access to some cultural ecosystem services. These are not equally locally available to a growing proportion of the population due to population density and urbanization, mainly in the central part of the country, which is inhabited by 68% of the population but holds only 11% of Israel's open landscape.

2. CURRENT STATUS OF NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLANS

The state of Israel signed the Convention on Biological Diversity (CBD) in 1992 and ratified it in 1995. The CBD defines general means for conservation of biodiversity on the local and global scale, for sustainable use of its components and for equitable distribution of its benefits. It called for parties to develop National Biodiversity Strategy and Action Plans.

A Government decision on sustainable development in May 2003 requires all government ministries to prepare strategies for sustainable development and participate in a governmental committee for sustainable development which includes representatives of the private sector, local authorities and civil society. Israel's national biodiversity strategic plan (officially termed "The National Plan for Conservation of Israel's Biodiversity" and herewith will be referred to as the NBS) is intended to complement this decision.

Recognizing the importance of biodiversity conservation (BdC) in a small and densely populated country, the Ministry of Environmental Protection (MoEP) has coordinated a large-scale study on biodiversity aimed at investigating present conditions and future needs and proposing an action plan for BdC. The NBS is a joint effort of the MoEP, the Israel Nature Reserves and Parks Authority (INPA), members of the academia, other governmental offices and non-governmental organizations. Its preparation process involved several stages:

A group of professional experts has prepared the draft national plan for several years. The NBS is divided into several chapters, each prepared by a team leader supported by a professional steering committee. The teams identified present conditions and future needs, mapped current activities and problems encountered related to BdC, outlined present and future threats to biodiversity, scanned and defined the legal, planning and other institutional tools available or required for BdC and identified strategic options for mainstreaming biodiversity considerations.

The first stage included meetings and consultations with a wider group of professionals, and the first draft was presented for professional and public input in 2006. The final version was completed in 2009 and is currently in press. The NBS is about to be handed to the governmental committee for sustainable development (see §2.5 and §3.1).

2.1 Israel's National Biodiversity Plan

Israel's commitment to ecosystem management and BdC has been largely expressed through classic "nature conservation". This approach designated protected areas and protected species within the framework of nature protection laws and statutory land-use master plans that protect nature reserves, national parks and forested areas; it is mainly characterized by a passive approach to conservation that separates human activities from protected areas, where some management activities are held.

Three central elements in Israel's NBS are: a) the consideration of the full range of Israel's biodiversity and ecosystem services; b) stressing their inherent association with SD; c) the adoption of a more active approach intended to the optimal conservation and management of biodiversity components. The NBS proposes to adopt an approach which identifies and

assesses the full spectrum of biodiversity components and ecosystem services, and links their conservation to human needs and human well-being, by stressing that the efforts to maintain biodiversity and ecosystem services are the primary foundation to any SD.

The NBS marks a shift towards a clear active biodiversity management using a range of tools; these are aimed not only to statutory protected areas but at the entire biodiversity range encompassed within the country's area, including those components that are in close contact and interaction with human activities and therefore require active management that will ensure that any form of development will be sustainable.

2.2 Components of the National Plan

The NBS has various components that are included in nine chapters. It:

- a) Presents and discusses the importance of biodiversity;
- b) Identifies present and future threats to Israel's biodiversity;
- c) Discusses various BdC policies and outlines ways to address the threats via management of biodiversity and ecosystems, based on up-to-date ecological knowledge. Management guidelines are presented on the local and on the national planning level;
- d) Recommends on supportive measures – using regional planning and legal tools and adopting financial incentives and other economic tools that internalize the dependence of development on ecosystem services, promoting research and monitoring, education and public awareness, enforcement and international cooperation;
- e) Assembles the recommendations to a proposed operational action plan.

Chapter 1 - *The essence and importance of biodiversity* - introduces the fundamental nature of biodiversity and its crucial involvement in the provision of ecosystem services. It presents the role of the NBS and points out the difference between its basic point of view and that of classic nature conservation.

Chapter 2 - *Threats to Israel's biodiversity and ways for its conservation* – identifies and presents in detail various threats to different levels of biodiversity – from the genetic, through population and species level to habitat, ecosystem and landscape levels. It also addresses aspects of biodiversity relating to agricultural and urban systems. It further discusses different strategies to address these threats, linking them to existing nature conservation efforts in Israel, to lessons learned from their present or past implementation and to the local administrative-financial situation.

Chapters 3-5 - *Biodiversity in national planning*, *Economic aspects* and *The legal-institutional framework* - discuss ways to mainstream biodiversity conservation through several aspects and tools: national regional planning, economic tools and using the legal-institutional framework.

Chapters 6-7 – *Research and monitoring* and *Educatio, public awareness and involvement* - discusses multiple issues regarding the required research and monitoring, and suggest means by which educational efforts, increasing public awareness and involvement can promote BdC.

Chapter 8 - *International aspects* - discusses the NBS in relation to Israel's international policy and commitments, including the numerous environmental agreements and protocols it joined.

Chapter 9 – *Proposed action plan* – concludes with a synthesis of the recommendations, binding them into a framework of proposed action plans.

Chapters 2-9 are further presented in sections 2.2.1-2.2.8 below.

2.2.1 Threats to Israel's biodiversity and ways for its conservation

CBD addresses diversity within-species (genetic), between species (species diversity) and of ecosystems and their services (including the typical landscapes they form). The core of the NBS discusses the components of biodiversity and deals with the conservation of genetic intra-specific diversity, of species, ecosystem and landscape diversity and of agricultural and urban biodiversity. It presents a theoretical concept for conservation and identifies threats regarding population dynamics, endangered and rare species on one hand and invasive and outbreak species on the other hand, and regarding endangered habitats and ecosystems. Special attention is paid to within-species genetic variability of wild relatives of cultivated species. Israel is home to tens of wild relatives of crop species.

The NBS presents strategies and recommendations to address these challenges, links them to on-going activities indicating possible required modifications, and discusses operative targets and priorities.

The basic conservation concept adopted is twofold: on the one hand – increasing the array of protected areas to fully represent most ecosystems and biodiversity components, and on the other hand – actively managing non-protected areas to complement the functions of protected areas and optimize the sustainable utilization of ecosystem services. The active management of ecosystems is the tool for population conservation of each of its component species, particularly as knowledge is limited as to its exact role in the ecosystem and in providing ecosystem services and as limited resources impede the conservation of particular endangered species.

Special recommendations address specific ecosystems (see also §1.3), which include:

- Woodland and shrubland ecosystems: management should restore the spatial heterogeneity through grazing, controlled cutting and burning, and promote ecosystem services of water supply, soil conservation and flood control.
- Coastal ecosystems: restoration and active management of the remaining patches of kurkar, hamra and sands are required to attain a combination of sandy formations.
- Desert ecosystems: desert biodiversity provides mainly cultural services. Though it is less threatened and better protected than other ecosystems in Israel, attention should be paid as these ecosystems have already lost a substantial part of their biodiversity.
- Freshwater ecosystems: many of these ecosystems can be restored, compensating for the loss of biodiversity and ecosystem services using active water allocations, removal of pollutants and also by the construction of artificial systems.

CURRENT STATUS OF NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLANS

- **Marine ecosystems:** more marine nature reserves are required; better protection of marine biodiversity and its associated ecosystem services will be gained by improving and enforcing regulations protecting them and preventing their pollution.
- **Agricultural ecosystems:** innovative policies and management approaches are required to increase the share of agriculture in the conservation of general biodiversity and the provision of ecosystem services, minimizing the damages to other systems while increasing their provisioning services. Pastoral ecosystems are generally promoting rich biodiversity and should be carefully managed to avoid over-grazing.
- **Urban ecosystems:** conservation of urban biodiversity can contribute to general efforts to protect biodiversity as well as contributing directly to improve human well-being and to increase public awareness and support to BdC. On the other hand, action is required to minimize the influence and distribution of alien and invasive species.

Table 6 presents NBS recommendations for the conservation of Israel's biodiversity, arranged by biodiversity components and conservation and management methods, alongside with reference to NBS proposed action plans (presented in table 7), the on-going BdC activities in Israel and the relevant CBD articles (other than article 6). Most of the recommendations have been operated to a limited degree even before the NBS have officially been operational, restricted mainly by limited budget. They require re-evaluation and further adaptations within a general plan that defines targets, timetables, allocate more budget and set priorities.

Table 6: NBS recommendations linked to current BdC activities and CBD articles. (Action plan# refers to action plan numbers in table 7. For current activities – see further details in the indicated sections.)

NBS Strategies and Recommendations	Action plan#	Current BdC activities (see §2.4)^{a, b, c}	CBD article
Genetic diversity (Intra-specific, inter-specific & ecosystem diversity)			
In-situ conservation: protecting small isolated populations via:			
▪ reinforcement	2a, 2f	▪ reinforcement of populations - §2.4.1	8
▪ Targeted nature reserves	2a	▪ Protecting endangered species - §2.4.2 ▪ Improve and refine protected areas - §2.4.3	8
▪ Maintaining ecological corridors	1c	▪ Protected areas (§2.4.3) and regional planning tools (§3.5)	8
Ex-situ conservation:			
▪ Plants – establish a gene bank for endangered wild plants and wild relatives of crop species.	2i, 2j	▪ New program at the Israeli Gene Bank – for endangered species (§2.4.1)	9, 15
▪ Devise professional principles for genetic diversity conservation of selected species.	2i, 2j	▪ General policy paper prepared (§2.4.1). Currently implemented.	8, 9
▪ Botanic & zoological gardens- upgrade activity	2i, 2j	▪ Plant and animal species kept at botanic and zoological gardens. Some used for reinforcement or reintroduction; special program is currently prepared for refuges - §2.4.1, §2.4.2.	9
Species diversity and endangered/rare species			
In-situ conservation:			

CURRENT STATUS OF NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLANS

NBS Strategies and Recommendations	Action plan#	Current BdC activities (see §2.4) ^{a, b, c}	CBD article
▪ Define priorities and procedures for species conservation	2a	▪ Nature conservation activities continuously involve setting priorities - §2.4	8
▪ Examine suitability of nature reserves to conserve endangered species - also in reserve management programs.	2a, 1a, 1d	▪ Reserve management programs prepared for ca. 50% of reserves §2.4.3	8
▪ Set desired target size for selected populations (as basis for species specific management schemes).	1d	▪ Operated on a limited scale - §2.4.2	8
▪ Update the monitored species list	3	▪ Currently considered within the preparation of a national biodiversity monitoring scheme - §3.6.2	7
▪ Monitor selected populations.	3	▪ Few populations are monitored: revised methodology and priorities are considered	7
▪ Protect other species via protecting the landscapes and habitats of suitable size and condition	1a	▪ Protected areas and activities to protect other open landscape - §2.4.3, §3.6	8
▪ Prepare a list of species endemic to Israel, and their status.	2a, 2b	▪ Exists for higher plants, Bryophytes and for terrestrial vertebrates and freshwater fish ▪ Invertebrate checklist are incomplete	8
▪ Prepare individual species-specific conservation programs for endangered species. (→ priorities, budget, updating red lists)	1d	▪ Procedures for species conservation – exist for few species, including monitoring, reinforcement and reintroduction schemes - §2.4.2	8
▪ Use active conservation management: breeding <i>ex-situ</i> for reinforcement or local reintroduction	1d, 2i	▪ Active management carried out for specific habitats - §2.4.3. Breeding <i>ex-situ</i> – for selected species - §2.4.1, §2.4.2	8, 9
▪ Create a national fund to support emergency activities for endangered species conservation	7b		20, 21
Ex-situ conservation:			
▪ See the above for the genetic biodiversity		▪ See the above for the genetic biodiversity inc. botanic and zoological gardens	9
Invasive and outbreak species			8, 14
▪ Examine criteria for allowing the entry of alien species.	2e	▪ Strategic plan for the ministry of agriculture is to consider such a revision - §3.4	
▪ Restrain and wipe out invasive species	2e	▪ Limited activities to handle invasive plants in nature reserves; action plans were prepared for few species - §2.4.2. ▪ Restricting invasive species that are health hazards - §3.4	
▪ Better enforce law prohibiting introduction of alien species	2e	▪ Currently enforced mainly concerning agricultural hazards - §2.4.2, §3.4	
▪ Prevent excess food from local outbreak populations.	2c	▪ Partially operative, hard to maintain farmers' long-term cooperation §2.4.2, §3.4	
▪ Control local population (accompanied by public relations)	2c, 2d	▪ Limited controlling of several species that have become agricultural hazards - §2.4.2	
▪ Define a list of outbreak species, set priorities and allocate resources for handling.	2c		
▪ Update the list of species for reintroduction.	2f		

CURRENT STATUS OF NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLANS

NBS Strategies and Recommendations	Action plan#	Current BdC activities (see §2.4) ^{a, b, c}	CBD article
Habitats, ecosystem and landscape diversity			8, 14
▪ Map endangered habitats.	1a	▪ mapping of open landscape, by other criteria	
▪ Include endangered habitats in nature reserves	1a, 1c	▪ Partially included with improvement in their representation - §1.2.9.	
▪ Maintain and protect ecological corridors	1c	<ul style="list-style-type: none"> ▪ The term introduced into regional planning and is used for a decade - §3.6, §2.4.3 ▪ refinement of ecological corridor definitions more suitable for planning is underway ▪ Use biosphere zoning principles 	
▪ Examine the gaps between landscape and species conservation.	1a, 1b, 1c, 1d	▪ INPA mapped the gaps between nature reserves and afforested areas where more ecological corridors may be applied	
▪ Upgrade policy for animal passages through linear infrastructure.	2h	▪ Improve connectivity through linear infrastructure - §3.6, §2.4.3	
▪ Comprehensive plan for protected areas to protect biodiversity.	1a, 1d	▪ Preparation of a master plan for biosphere planning - §3.6	
▪ Rank allowed land usage around protected areas.	1a, 1b	▪ See above	
▪ Examine the feasibility of setting alternative habitats.	1a		8, 14, 21
▪ Map and monitor marine habitats.	2	▪ Limited monitoring in Mediterranean and Gulf of Eilat - §2.4.2, §3.6.2	8, 17
▪ Promote wetland conservation.	2g	▪ Intensive efforts to improve water quality and quantity, with active management mainly in nature reserves	8, 10, 14
▪ Examine current management practices	2	▪ Management practices upgraded to more active management procedures - §2.4.3	
▪ Employ active management in protected areas. Re-evaluate management practices of protected areas and experiment various methods to enhance landscape heterogeneity (patches of different types).	2	▪ See above	8, 10, 12, 17
▪ Devise methodology to creation of active management programs.	2, 1d		8, 10, 12
▪ Create a framework and protocol to adaptive management programs (data collection, setting targets, choosing appropriate management tools, monitoring and revisions).	2, 3		8, 10
▪ Define and apply the policy on water allocation to nature, as part of /incorporated within biodiversity conservation policy.	2, 2g	▪ Implemented, but not fully - §2.4.3	8, 10, 14
Agricultural biodiversity			
▪ Policy to handle damage to agriculture from natural causes.	2d	▪ Activities to inform and direct farmers on minimizing conflicts with wildlife -§3.4	11, 13, 20, 21
▪ Create a fund for prevention of wildlife damage to agriculture (R & D).	2d		11, 20, 21
▪ Enlarge the fund for insurance and compensation for natural damage to	2d		11, 20,

NBS Strategies and Recommendations	Action plan#	Current BdC activities (see §2.4) ^{a, b, c}	CBD article
agriculture to include wildlife damage.			21
<ul style="list-style-type: none"> ▪ Improve enforcement on agricultural refuse treatment. 	2c	<ul style="list-style-type: none"> ▪ Implemented, improvement still required 	14
Urban biodiversity			
<ul style="list-style-type: none"> ▪ Change municipal gardening regime. 	2a, 2c, 2d	<ul style="list-style-type: none"> ▪ An agreed list of undesired plant species is currently prepared 	8, 9, 14
<ul style="list-style-type: none"> ▪ Promote urban nature projects. 	2a, 2c, 2d	<ul style="list-style-type: none"> ▪ Few urban nature planning projects are emerging, incorporated into regional and local planning - §3.6 	8, 9, 11, 14
<ul style="list-style-type: none"> ▪ Remove pets and feral dogs and cats from natural systems. (see also above on invasive species) 	2c, 2e	<ul style="list-style-type: none"> ▪ Not allowed by law, at the moment 	8, 14
<p>^a = most recommended activities are already implemented to a certain degree, on a limited scale, for certain species or in certain regions, usually limited by restricted budget and by ...</p> <p>^b = most of the on-going activities require re-assessment of their affectivity and appropriate adjustments.</p> <p>^c = most of the current activities are not held through a process of setting quantitative targets and continuously monitoring of indicators, so that the ability to assess their efficiency is limited.</p>			

2.2.2 Biodiversity in national planning

This chapter discusses issues of regional planning and preparing for future threats. The two major future threats identified were pressures imposed by the increase in human population and the impacts of the local expression of global climate changes. The NBS points that though development requires biodiversity and ecosystem services to rely on, this concept is not fully understood, integrated or expressed in many national level regional planning projects. It also points that although nature conservation plays a role in some national master plans and other non-statutory programs, including projected population growth, most plans ignore climate change consequences.

The NBS proposes to rank most of the country's regions by conservation classification using two existing planning tools: a) biosphere zoning – to better define development vs. conservation; b) ecological corridors - to link fragmented areas of varying risk levels to ensure maintenance of ecosystem services provisioning (see also §3.5).

2.2.3 Economic aspects

An inherent problem with most ecosystem services involved in control, support and maintenance is that they do not have a market value, and thus biodiversity components involved in their provisioning are at risk both due to adverse human impacts and to difficulties to finance their protection.

The NBS stresses the important role of the government in ensuring the provisioning of these services and financing their protection. It stresses the importance of economic cost-benefit analysis when deciding on conversion of natural ecosystems to developed areas, to assess the value of ecosystem services lost and to compare it with the proposed benefits of development,

and to better rank priorities for conservation. This requires increased cooperation between ecologists and environmental economists.

The NBS recommends on examining the suitability of several economic incentives to finance the costs required to minimize hazards to biodiversity, that will be used in conjunction with regulative and other tools such as allocation of property rights, using markets and evaluation of costs, using fiscal tools such as taxes and subsidies and using bonds and other commitments. This search should include incentives for biodiversity-friendly uses in open landscape such as leasing of open landscape as a tool to minimize damage, examining the economic feasibility of converting open landscape to agricultural ecosystems, incentives for BdC activities related to agricultural sector and incentives to the afforestation sector.

2.2.4 The legal-institutional framework

There are over 15 legal tools (laws, regulations, master plans, orders and directives) protecting species, habitats, natural resources and natural assets. The NBS points that though they do not specifically refer to biodiversity and ecosystem services, these legal tools can be used for this purpose, with indirect protection to habitats also given through legislative tools regulating land and water uses. Yet, the continuous damage to Israel's biodiversity implies that these tools are inadequate for BdC: a) they are promoting the passive rather than the active approach and with laws being restrictive rather than necessitating authorities to actively protect biodiversity, targeted for "protection" rather than "management"; b) they do not provide solutions to ecosystems, targeted for "nature" rather than "biodiversity".

Some 15 institutional frameworks are responsible to the implementation and enforcement of the above mentioned legal tools – governmental ministries, governmental authorities, administration, and a corporation. Only few of the tools are solely dedicated to biodiversity and only four of the institutions have been given the legal mandate to protect and manage biodiversity. Ten of these tools are handled by more than one institution; the degree of overlap and the conflicts between institutions create bureaucratic obstacles to their efficient implementation and enforcement. The NBS recommends to:

- Re-examine the allocation of individual institutional authority, mapping the obstacles and identifying their causes to improve the efficiency of existing legal tools;
- Increase institutional cooperation to fully implement the existing tools;
- Proceed towards designated legislation focused on biodiversity, setting a uniform framework for its implementation.

2.2.5 Research and monitoring

The main tool for BdC and management is the scientific research of biodiversity and of the approaches for its conservation, particularly regarding relevant planning and management policies. Its supporting infrastructure is monitoring, databases and scientific collections – all these exist in Israel but are not efficiently operated and not coordinated to truly support BdC and management. The NBS considered activity channels to minimize knowledge gaps on Israel's

biodiversity and its conservation and defined priorities to minimize them, regarding the scientific research and mentoring and the organization and infrastructure required.

a) Scientific research

The NBS pointed that a better knowledge of specific biodiversity components (species, habitats, ecosystems) in Israel, their spatial distribution and better knowledge of cross-cutting issues is required to guide the required activities necessary for BdC and optimal provisioning of ecosystem services.

There are knowledge gaps regarding all levels of biodiversity components and of processes and risk situations, and it is not known which species can best serve as indicators, and to what phenomena; the scarcity of taxonomists hinders the recognition of species (especially invertebrates) and their role in providing services; the approaches for embedding biodiversity in planning have not been developed and the suitability of master plans to future threats has not been tested. Current monitoring involves only few species and selected ecosystems and cannot answer the needs of BdC management due to lack of awareness to the benefits of monitoring and as to knowledge gaps required to its appropriate planning and operation.

The NBS defined the research topics of top priority for documenting biodiversity, better characterizing endangered species and habitats, and ecosystem structure and functions, and defined the required planning and management applications and the priorities involved.

b) Organization and required infrastructure

Three major obstacles were identified at the organizational level: Lack of coordination and integrative view; Lack of designated efficient financial tools to operate research, continuous monitoring and their supporting infrastructure; Lack of uniform coverage in the research and monitoring activity –across biodiversity components and in their geographical location.

NBS recommendations:

The NBS recommends on establishing:

- Designated frameworks dealing with BdC and management that will operate relevant research, establish and operate the monitoring system and the other infrastructures supporting this research, handle specifically allocated budgets and set priorities for budget allocation, coordinate activities and make full benefit from them. The recommended priorities for research and monitoring are applicability, urgency, existing infrastructure and possible external financing.
- A national biodiversity long-term monitoring system that can reveal the responses of biodiversity to changes (via the effects of environmental, social and economic processes). It should be well-coordinated and used both to direct research and management, and to assess the results of conservation efforts.

2.2.6 Education, public awareness and involvement

Many achievements in nature conservation in Israel were gained with wide public support. Yet, there is only little public awareness to the dependence of human well-being on biodiversity, so that its conservation is perceived as competing with economic benefits.

Increasing public education and awareness to BdC is regarded as a strategic tool that can increase public involvement in protecting biodiversity and decrease the needs for legal tools and their enforcement, decrease the dependence of BdC in economic incentives, and also promote fund raising for the required research and monitoring. The main strategic target defined is increasing the number of citizens supporting a policy of BdC and restoration, and it requires a broader infrastructure than that required for nature conservation.

The NBS recommends on four major activity channels:

- 1) Increasing public ecological literacy and understanding of biodiversity issues;
- 2) Broaden these citizen's influence on the formation of national policy according to biodiversity consideration ;
- 3) Increase the awareness of citizens to their own impact on biodiversity;
- 4) Employ public policy and personal activities that will help to decrease biodiversity loss.

The NBS recommends on specific activities and tools and defines possible partners to promote these activity channels; it also recommends on forming a national framework to:

- Examine the degree of public awareness regarding biodiversity;
- Increase the number of channels to share scientific knowledge with the general public;
- Lead thorough discussions on environmental education;
- Track the implementation of education and information programs.

2.2.7 International aspects

Israel has signed several international conventions and agreements relevant to BdC – CBD, CITES (trade in endangered species), CMS (migratory species), Ramsar Convention on Wetlands, UNESCO world heritage convention. Israel also ratified the UNCCD (combating desertification) and UNFCCC (combating climate change), Barcelona convention to protect the Mediterranean, and other protocols and agreements within these conventions.

The NBS recommends that Israel will use its experience in BdC and management to take a more active role in the international community, to contribute to international cooperation on cross-borders issues, to exchange professional information and contribute to global progress in this issue and to expand its foreign aid to developing countries.

It lists more specific recommended activities to better link between the national and international activities and to enhance them, such as:

- Join other international protocols, agreements, projects and initiatives concerning BdC;
- Promote international cooperation with data sharing systems such as GBIF;
- Promote cross-border initiatives;
- Attain an agreed governmental policy on trade and breeding of wild animals and plants;
- Examine and update conservation laws in view of climate change;
- Improve planning and adopt policies that decrease pressures on resources, cut harmful subsidies and include climate change issues in social strategies;
- Define indicators to assess implementation of conventions considering the invested resources, the effort made and the actual outcome.

2.2.8 The proposed action plan

The implementation of the NBS recommendations will require the formulation of specific action plans to address the issues raised and turn the recommendations into action. The action plans recommended by the NBS and their components are listed in table 7 below.

Table 7: Action plans recommended by the NBS and their relevance to the CBD articles

#	Action plans recommended by the NBS	CBD article#
Regional planning and future threats		
1	Action plan to update and adapt national master plans in BdC aspects. It involves preparing or updating national plans:	6
1a	▪ Updated plan for protected areas	8, 10-14
1b	▪ Plan for biosphere regions	
1c	▪ Plan for ecological corridors	
1d	▪ Updated Species-specific protection action plans	
1e	▪ Plan for Biodiversity monitoring (see also #3)*	7
Conservation		
2	Action plan for <i>in-situ</i> conservation and management that will include specific plans: Species whose populations show alarming trends:	6, 8, 10
2a	▪ Action plans for endangered and rare species	9
2b	▪ Action plan for charismatic and endemic species	
2c	▪ Action plan for outbreak species	
Handling species that convey damage:		
2d	▪ Action plan for agricultural pests	
2e	▪ Action plan for alien species	
Biodiversity restoration plans:		
2f	▪ Update reintroductions plan	
2g	▪ Action plan for conservation and restoration of freshwater ecosystems	
2h	▪ Action plan to address fragmentation by infrastructure	
Ex-situ conservation:		
2i	▪ Action plan to conserve and manage intra-specific biodiversity (management protocols and gene bank activities)	
2j	▪ Action plan for botanic and zoological gardens and the gene bank (may be dealt with under #4)	
Monitoring		
3	Action plan to monitor biodiversity. It includes:	7
▪ Establishing and operating a national monitoring system (network of monitoring stations)		17-18
▪ Managing and budgeting of the national monitoring system		
▪ Managing and analyzing monitoring data		
Research		
4	Action plan for bridging knowledge gaps. The plan includes:	7, 9, 12, 15-19
▪ Establishing a advisory forum for biodiversity research and resource allocation		
▪ Establishing a national fund for budgeting of biodiversity research and monitoring		
▪ Embedding the results of research and monitoring in management and conservation activities		
4a	▪ Action plans to promote taxonomical research, biological collections and databases	

#	Action plans recommended by the NBS	CBD article#
	Education and public involvement	
5	Action plan to increase public awareness, support and involvement in BdC and management. It includes:	13
5a	▪ Action plans to promote biodiversity education in education systems (schools, universities, museums, zoos and botanic gardens)	
5b	▪ Action plan to promote awareness to BdC through the media	
5c	▪ Action plan to promote local community activities (e.g. capacity-building, activism)	
5d	▪ Action plan to promote public awareness and involvement in protecting urban biodiversity	
5e	▪ Action plan to involve economic sectors in biodiversity protection	
5f	▪ Action plan to expose governmental decision makers to BdC issues	
5g	▪ Action plan to monitor public awareness and attitudes to BdC	
	Economic aspects	
6	Action plan for economic incentives to the promotion of BdC. It includes:	10, 11, 20, 21
6a	▪ Action plan for cost-benefit research	
6b	▪ Action plan for incentives to biodiversity-friendly uses in open landscape. ** ▪ Establishment of the Open Landscape Fund	
	Legal and institutional aspects	
7	Action plan to promote legal and institutional tools for BdC and management, including:	10, 11, 20, 21
7a	▪ Action plan to promote designated legislation	
7b	▪ Action plan for an institutional framework to coordinate the implementation of legal tools	
	International aspects	
8	Action plan for the international commitment	22, 23

* The plans should represent knowledge and concepts on biodiversity and ecosystem services, and refer to population trends and to forecasts on climate change.

** The proposed economic aspects involve: economic valuation (relevant to article 7), incentive measures (relevant to articles # 6, 8, 10, 11, 14, 16, 20, 21) and financial measures (relevant to articles # 8, 9, 12, 15, 16, 20, 21).

Contribution to Implementation of CBD Articles

The NBS generally supported CBD articles. Tables 6 and 7 link the NBS recommendations to specific CBD articles and to current BdC activities, that are further presented in §2.4.

2.3 Targets and indicators

The NBS has not defined targets and indicators, though it addressed them in some of its recommendations: these are to be formulated through a stakeholder dialog process regarding the specific action plans.

Current operational indicators of habitat condition and of target species or groups are the yearly counts of certain species (e.g. *Gazelle* spp. *Capra ibex*, wintering water birds, nesting raptors – see §1.2, §1.3 and further details in CBD 3rd report, Frankenberg 2005), the monitoring of aquifer condition and river pollutant load (§1.3.4), and the monitoring of marine pollution and condition (§1.3.5). See also on monitoring in §3.6.2.

A preliminary group of indicators for sustainable development is currently tested, which includes an indicator for the availability of open landscape (see §1.2.1). This study recommends on improving the tested indicators and proposes to develop further indicators such as: the degree of protection on open landscape, open landscape connectivity, and the proportion of the population living adjacent to main recreation centers.

An indicator for river biodiversity has been proposed and requires testing (see §2.4.2). Another indicator under development is an indicator for biodiversity in afforested areas.

2.4 Progress on Priority Activities

The main priority for the near future is to proceed with the promotion of the NBS as planned (see §2.5 and §3.1). As the NBS has not been implemented, its effectiveness cannot yet be discussed. The NBS draws on experience gained from the implementation of nature conservation programs (for more details see also Frankenberg 2005 and §3.6.2). Here we present a short account of on-going BdC-related efforts, with few case studies.

Environmental Protection

The MoEP SD strategic plan from 2007 puts a special emphasis on promoting the NBS, on the preparation of a national plan to address climate change including its consequences on biodiversity, and on the conservation of open landscape in agriculture (see §3.4) and within local authorities (see §3.6). It has adopted the ecosystem approach to integrative management of natural resources and promotes the regional planning of biosphere regions (see §3.6). Further details on the MoEP activity are given mainly in §3.1.2, §3.2. The activities supported by the Ministry include: Applying the NBS, establishing the national monitoring scheme, distribution of information on biodiversity and its conservation among decision makers and the general public, mainstreaming in governmental SD programs.

The Ministry's main targets (see also table 8) for 2008-2010 include:

- Conservation of biodiversity and decreasing the rate of biodiversity loss
- Preparing for climate change
- River restoration
- Improving environmental quality for socially-weak sectors and regions
- Promoting SD in the agricultural sector
- Conservation of open landscape for public benefit

A first report on the status of nature in Israel is to be prepared by the end of 2010.

The preparation of the NBS is domestically funded, with limited resources. The preparation of sectoral action plans will require pooling of financial resources allocated to different governmental offices and agencies, and NGOs and funds.

Some activities where Israel joined an international initiative (such as the EBONE/BIOHAB monitoring scheme) receive external funding.

Table 8: MoEP targets for 2008-2010 relevant to biodiversity conservation

Target	Due	Progress made
1) Publishing the NBS	January 2010	In press
2) nominating an NBS application team (under the SD committee)	June 2009	In progress
3) Preparation of an operative governmental program for the prevention of habitat fragmentation; Development of indicator for habitat fragmentation	December 2009	
4) Development of indicators for environmental condition and sustainable use of resources: <ul style="list-style-type: none"> ▪ Developing the methodology ▪ Defining indicators ▪ Producing a report on Environmental condition 	up to Dec2009, during 2010, 2012	
5) Coordinating with INPA for a preparation of a national monitoring protocol	February 2009	In progress
6) Establishing a national monitoring system for biodiversity and ecosystem services	Within 2010	
7) Contracting advisors to embed BdC in SD programs of the Ministry of Agriculture and the Ministry of Infrastructure	June 2009	In progress
Expected Outcomes		
Biodiversity Action Plan in the Ministry of Agriculture and the Ministry of Infrastructure	December 2009	
National monitoring of the decrease rate in biodiversity loss	Prelim report- 2015	
Decrease in the rate of habitat fragmentation	After indicator development	

Nature Conservation

Although nature conservation is well developed in Israel, as manifested in legislation and the establishment of dedicated institutions, the country has not accorded high priority to the conservation and sustainable use of biodiversity until recent years. Financial constraints have also impeded adequate progress in implementing the CBD. Israel's biodiversity policy has traditionally been based on the designation and declaration of protected areas, grounded in nature protection legislation and statutory land-use master plans and on the protection of endangered species. Current strategy for protecting biodiversity on a genetic, population, species and ecosystem level involves both *in-situ* and *ex-situ* activities, protecting ecosystems and habitats as well as individual species. Nature conservation is carried out through legislation, enforcement, regional planning, management, monitoring, education and professional supervision on infrastructure development activities (see also in chapter 3).

Knowledge gaps and insufficient funding are usually the main obstacles for the enhancement of conservation activities, obstructing conservation efforts of particular endangered species: the status of most endangered species has not improved and probably worsened. Therefore, management of habitats and ecosystems is the tool for population conservation of each of its component species, even where knowledge is limited as to its exact role in ecosystem services. In parallel, efforts for *in-situ* and *ex-situ* conservation of selected species or groups persist,

including collection, breeding, reinforcement and reintroduction as well as monitoring and other management measures (see below).

It is difficult to assess the degree to which conservation efforts have reduced the current rate of biodiversity loss in Israel, as no quantitative indicators have yet been developed and used. Israel does not have a national biodiversity monitoring scheme, monitoring ecosystem level on a regular basis. Currently, few species and selected ecosystems are monitored. A national biodiversity monitoring scheme is under preparation and is due in mid-2010. Further details on monitoring and its relationship to biodiversity research can be found in §3.6.2.

A policy paper on Israel's adaptation and mitigation practices in response to climate change has been prepared, including recommendations for: protecting Red Sea coral reefs from pollution, physical protection to coastal cliffs, adaptations required to nature reserve and forest management, and funding for biodiversity monitoring.

The NBS argues that nature conservation activities should be maintained within a larger framework dealing also with ecosystem services, accounting for expected climate change and using a more rigorous active management approach.

2.4.1 Protecting genetic diversity

In-situ conservation

The *in-situ* protection of within-species genetic diversity is carried out on a very limited scale through the protection of small isolated populations via reinforcement, targeted protected areas and maintaining connectivity through ecological corridors – the same tools that are used to protect endangered species as a whole, in conjunction with *ex-situ* conservation. It is also supported through regional planning, by the attention given to the maintenance of ecological corridors and to animal passages through linear infrastructure aiming to minimize fragmentation effects and enhance connectivity, and to biosphere planning (see §3.5)

Ex-situ conservation

Ex-situ genetic conservation is carried out by collection of seeds to the Israel Gene Bank (see below) and through collection and rearing of individuals in botanic and zoological gardens and zoos. This activity is mainly important at the species level, for the mere conservation of species and not necessarily to fully preserve its within-species genetic diversity, but for the activity of the gene bank.

The Israeli Gene Bank

The Israeli Gene Bank (IGB) is a unit of the Ministry of Agriculture & Rural Development, responsible for the collection, preservation and evaluation of plant species indigenous to Israel including landraces and primitive cultivars, maintaining a large collection of agricultural species. The IGB is set up to preserve plant genetic resources and the endangered genetic variability of the Israeli flora. IGB is the main *ex-situ* conservation agent, with few additional small *ex-situ* targeted collections located in other research institutes. IGB's base collection contains over 26,000 accessions belonging to 1144 species. Some 12,000 of these accessions were collected in Israel, mainly from wild populations. In addition, there is a wide collection of landraces. IGB

administers the seed bank and three *ex-situ* germplasm collections, in which plants are maintained vegetatively, including collections of fruit-trees, spice plants, some of them holding native landraces and wild accessions.

IGB works in affiliation with numerous research and conservation institutions and is actively involved in international collaboration: It has established and developed mutual cooperation with gene banks from various countries and international institutions engaged in biodiversity research and conservation, Israel participates in four networks and plays an active role in several targeted working groups. The IGB has bilateral collaboration agreements on seed conservation with the Millennium Seed Bank in the UK based on a legally binding Access and Benefit Sharing Agreement. In a special collaboration project with the Biodiversity & Environmental Research Center of the Palestinian Nablus University for the collection and preservation of traditional wheat species (Land Races), funded by Yad Hanadiv Fund, 18 species were collected in the field and 37 other species were re-imported from USDA.

IGB has upgraded its facilities in 2008 and developed a new program that also covers the collection of wild species (see case study below). First priority was given to three groups: a) crop wild relatives; b) rare and endangered species; c) land races of crops. Thus, efforts are made to preserve both natural and agricultural biodiversity, applying conservation not only to species related to agriculture but also to other endangered or rare wild native species. In parallel, country-wide collections of the most important wild relatives of crop plants are made, irrespective of an immediate danger they may face. This is necessary for an adequate representation of these species in the seed bank.

Case study: devising professional principles for genetic diversity conservation

A priority list of 323 plant species was created for *ex situ* conservation in the recently inaugurated IGB, through a consultative process with the country's leading plant breeders and botanists. This list represents the most important plant species to be included in the initial collections. The list includes crop wild relatives, selected according to their contribution to humans: edible plants (grains, vegetables, oil); forage plants; species with potential industrial and biotechnological applications (e.g. spices, medicinal plants, aromatic plants, fibers, dyes), and species with horticultural and forestry potential. These species were further ranked on the basis of assessed values for each of seven characteristics: distribution range in the country; also representing distribution, uniqueness and imminent threat of extinction. The sum of the assessed values for these seven characteristics was used to group the species on the list into four main prioritized-collection schemes.

Seed collections for *ex-situ* conservation of wild endangered species were carried out in 2007 and 2008: based on the carefully prepared priority list, some 1900 collections of 450 wild plant species from 26 geographical locations were deposited in IGB, including ca. 100 endangered species. In addition, 26 rare wild species were collected in 2008 for cultivation in nurseries to create a seed mass for future storage (in cooperation with INPA). Seed collections will be enlarged in future with a focus on endangered populations, in collaboration with an updated program for botanic gardens (see §2.4.2 below).

2.4.2 Protecting species and populations

Conservation efforts aimed at specific species or populations involve the preparation of species lists and distribution maps for certain taxonomic groups, creation of lists of endangered species and red data books, creation of specially designated nature reserves and active conservation management (including breeding *ex-situ* in botanic and zoological gardens for reinforcement or local reintroduction), minimizing human-wildlife conflicts and treating outbreak and invasive species. Both zoological and botanic gardens do not usually cover variability between populations of a certain species.

Endangered species – red data book

Endangered species may be protected through the protection of their habitat, through their designation as protected species (an update version of the law protecting natural assets was approved in March 2005, substituting the previous one from 1979, adding more plants and animals to the lists), and through direct conservation means or reinforcement activities.

Two red data books were compiled: The red list of threatened vertebrate species was compiled in 2002; it lists highly endangered vertebrate species – 6 freshwater fish species, 2 amphibian species, 13 reptile species, 15 nesting bird species and 12 mammal species; 23 vertebrate species have gone extinct. The first of two volumes of the red book of endangered plants of Israel was published in 2007, and the list is being constantly updated (listing 418 "red" endangered species as to September 2009, of which 65 are among Israel's 268 protected plant species, and ca. 200 of them are species whose habitat is highly threatened). The preparation of this red data book involved the development of a methodology to construct red numbers for setting conservation priorities of endangered plant species (see case study).

Case study: developing methodology for red data lists:

A common problem in conservation policy is to define the priority of a certain species to invest conservation efforts when resources are limited. A pragmatic method of constructing red numbers for plant species was devised, in order to set priorities in conservation policy.

The suggested red number is an additive index, summarizing values of four parameters: rarity, declining rate and habitat vulnerability, plant attractivity, and distribution type (scoring endemic species and peripheral populations).

The plant species of Israel were scored according to the parameters of the red number; a "post mortem" analysis for the 34 extinct species of Israel yielded a significantly higher score than the average of the current red list, and also indicated that rarity is not the only important factor for extinction in Israeli flora.

Endangered species – reinforcement, reintroduction and relocation programs

Active management programs are implemented for several endangered species, with future plans to include several more species. These programs for wildlife species include: reintroduction programs for 7 species (such as Wild Ass, Arabian Oryx and Red Deer) and future programs for several other species, and population reinforcement of animal species

(particularly raptors, Otter, turtles, amphibians, and coral reinforcement in the gulf of Eilat) of which the largest and most prominent scheme is that for sea turtles (see case study below).

Case study: reinforcement program for sea turtles

The reinforcement program for sea turtles has been operated since the early 1990s. The program includes the location of nests in the coastal sands, removal of the eggs to breeding centers and yearly release at the Mediterranean Shores of thousands of young recruits immediately after hatching. It also includes the protection of certain sections of coast from trampling and predation through fencing, enforcement and educational activities to the public.

In 2004, for example, ca. 4,150 young *Caretta caretta* and ca. 800 young *Chelonia mydas* were released to sea; some 15 injured adult sea turtle were treated and released.

The relocation of the African Softshell Turtle *Trionyx triunguis*, a critically endangered species in the Mediterranean region, from a natural refuge that it inhabited for the last 40 years back to its original habitat – the coastal streams, is also an indication to the affectivity of river restoration efforts (see §2.4.3) . Efforts to reintroduce the Sand Cat, *Felis margarita*, failed because its habitat has critically diminished.

Conservation efforts and active management for endangered plant species include reinforcement of several species, also in collaboration between INPA and botanic gardens, and relocation. Other measures currently implemented to protect plant species include:

- Plant surveys in areas designated for future development;
- Monitoring plants in nature reserves and in special habitats, such as wetlands;
- Monitoring of selected species and populations (e.g. *Irus* populations);
- Collection of seeds of rare and endangered species, in collaboration with IGB and botanic gardens;
- Examining mapping and monitoring techniques (see §3.6.2);
- Implementing various tools to combat invasive plant species (see below).

A special program for the conservation of rare and endangered plant species on a national scale is currently prepared by a professional team led by INPA, aimed to upgrade the attention given to rare plant conservation to that given to rare animals.

The program is to use a variety of conservation tools for endangered plant species, including: the establishment of more refuges and promotion of legislation to protect those species that are not yet protected; preparation of a policy paper defining conservation principles, setting priorities and outlining possible conservation methods; preparation of species-specific conservation programs; creation of an updated database on those species that are held in botanic gardens, refuges, IGB, nurseries or with private people; completion of seed collection by IGB; exchange of specialized information on appropriate breeding and growing techniques; and increasing public awareness to the problem of plant extinction and the importance of their conservation.

Botanic gardens

Botanic gardens act as *ex-situ* conservation tools for many years. There are several botanic gardens countrywide; the largest and most active ones are the Hebrew University of Jerusalem

and in Tel Aviv University. They serve as refuges and produce seeds and seedlings for specific reintroductions or reinforcements, as well as for storage in the IGB. Tel Aviv and Haifa Universities also hold small collections of agricultural plant species.

A 2006 botanic gardens law is dedicated to support and strengthen botanic gardens, and allocate budget to their activities. At the moment, there are ca. 15 botanic gardens that qualify for this support (i.e. scientifically managed, holding more than 3,000 species documented in database, and serve for either conservation of special species, for acclimatization or for research and teaching). The Jerusalem Botanical Garden at the Hebrew University of Jerusalem, for example, holds 130 species, endangered on the local or national level, and also houses 700 wild plant species that breed spontaneously. It is involved in *ex-situ* conservation of species, in re-introductions of wild plants, in plant/seed exchange with other botanic gardens and with the IGB, and its future plans include the establishment of a refuge botanic garden for endangered species.

Zoological gardens and zoos

Zoological gardens, zoos and special centres help to promote wildlife conservation:

- The zoological garden at Tel Aviv University holds a large representative collection of animal species and serves for research and to support reintroductions and reinforcement efforts for particular species.
- The Yotvata Hai-Bar is a safari-type large enclosure, mainly holding species for reintroduction (5 species of herbivores and ostrich, and 11 species of carnivores).
- The INPA, MoEP and the Zoological Center of Ramat-Gan established the Israeli Center for Wildlife Rehabilitation, treating injured wild animals and releasing them back to nature, combining veterinary treatment with identification of the risks *in situ* and educational work. In 2007 it treated 1,169 injured terrestrial vertebrates, mainly birds (88%).

Other tools to protect wildlife

Numerous activities are implemented to protect wildlife from various hazards and to generally support and protect wildlife (see further details in Gabbay & Barzilay 2008):

- Prevention of wildlife damage to agriculture to minimize possible conflicts (see §3.4);
- Prevention of raptor indirect poisoning by agricultural poisons;
- Prevention of avian-air traffic conflicts, decreasing disturbances to breeding birds and crashes with soaring migratory species ;
- Restricting hunting to species and time of year allowed under the wildlife protection law and enforcement of wildlife protection from injuries or illegal hunting;
- Involvement and supervision on wildlife trade and import (in accordance with CITES) and combating illegal capture and trade in wild species, particularly reptiles and passerines;
- Technology transfer and international cooperation in combating wildlife hazards.
- Maintaining feeding stations for raptors;
- Breeding endangered species (7 raptor species) in captivity for future release to reinforce wild populations;
- Preparing a program to protect birds from electricity power lines (electrocution/ collisions);

- Veterinary activities to minimize human-wildlife conflicts by transfer of disease agents, to support wildlife breeding and release programs, to treat injured animals, to mark wildlife for research and to supervise some 200 zoos and animal centers hosting wild animals.

Invasive species and outbreak species

Preliminary lists of invasive species have been prepared by INPA and academics, followed by specific surveys and research on invasive plant species. The issue is also addressed through guidelines to planners, in EIAs and in statutory instructions for combating specific invasive species. INPA is preparing a national strategy for invasive species that will include a scientific program to create lists of desired and non-desired species for import to Israel and for trade to complement CITES list, a list of plants not recommended for gardening and a proposal to change the status of several wild species to be treated as natural hazards.

INPA is selectively controlling certain invasive plant and animal species, mainly in nature reserves. More efforts are put in checking the applicability of targeted chemical treatment against two main invasive tree species, *Acacia saligna* and *Ailanthus altissima*. The institute for sea and lake research addressed the public in an appeal to report on observed jellyfish, as a part of international efforts to combat their infestations (CIESM Jellywatch Programme).

Case study: Combating the Little Fire Ant *Wasmannia auropunctata*

A major invasion and outbreak of the Little Fire Ant in the Jordan valley has severely affected the local human population and involved damage to agriculture.

Governmental intervention was called upon when the ant was already resident for 8-9 years and turned into a major hazard. The official response was delayed for several months until an interagency committee was established (with representatives from the Ministries of health, agriculture, MoEP, and INPA and academic supervision) and had agreed on the appropriate response: concentrating on health and agricultural aspects, the measures taken have substantially lowered the damage level, aiming to control if not to eliminate this species.

This serves as a case study to form a better, more efficient mechanism to handle future invasion cases:

- 1) High level of inter-agency cooperation is required to handle similar cases. A proper handling of invasive species requires a permanent interagency team that can quickly respond and apply a pre-defined protocol;
- 2) Mechanisms to identify invasive species as soon as possible are crucial;
- 3) A clear handling protocol is required to coordinate activities, inform the public and call for additional reports, allocate budgets, approve usage of selective pesticides if required (and a shortened procedure of pesticide registration if required), and monitor the geographic distribution changes and the effects of the control activities. A national-level mechanism and protocol to handle invasive species is being prepared.

Efforts to limit several outbreak species include the prevention of excess food deriving from improperly treated organic refuse, and selective control of local populations, especially where they become agricultural pests or adversely affect other species (see example in §1.2.3).

Most invasive species are treated by the INPA, as hazards to biodiversity. Other cases that involve hazards to human health and well-being require coordinated efforts and are treated by the MoEP in cooperation with the Ministry of Health (see case study above).

2.4.3 Protecting habitats and ecosystem

Israel's nature conservation policy is primarily using targeted legislation and regional planning tools (see §3.5), as it is mainly directed to protecting habitats and ecosystems through the system of protected areas. INPA is promoting the declaration of new nature reserves through the statutory procedures, and is in charge of their consecutive management, preparing management programs and implementing them. In 2008, nature reserves and national parks that have been officially declared covered some 20% of Israel's land area, though some habitats are only poorly represented(see §1.2.9).

Ecological corridors, that were defined to link protected areas and other open landscape and decrease fragmentation impacts, are currently revised and fine-tuned. Recently, INPA mapped the gaps between nature reserves and afforested areas where additional ecological corridors may be applied. Biosphere planning is currently developed and tested to enhance the protection and sustainable use of larger areas (see §3.5).

Additional planning activity is targeted to the protection of other open spaces inhabited by biodiversity components, accompanied by special project to map habitats in open landscape and categorize them by their sensitivity to further development, a special project to create a uniform categorization of vegetation formations and landscapes, and other enforcement and educational activities. Environmental quality parameters, particularly of wetlands, are regularly monitored by INPA and MoEP, with INPA planning and management activities recently upgraded with respect to aquatic habitats – both wetlands and marine habitats.

Special habitat surveys are used to better guide regional planning or to update guidelines (such as guidelines for sustainable use of wild plants in open landscape).

Active management

Management activities have gradually changed and now include: wetland habitat restoration through increased water availability, better water quality and modification of land features to increase structural diversity; woodland thinning to increase woodland and shrubland biodiversity and decrease the risk of wild fires; prevention of sand dune stabilization to increase habitat heterogeneity and biodiversity; driving out domestic herds from nature reserves allowing there only controlled grazing; controlling public use of open landscape (restricting the use of 4X4 vehicles, restricting entrance to protected areas, restricting hunting and harvesting); decreasing disturbance to coral reefs in the gulf of Eilat.

Active management is mainly carried out in protected areas and not in other open landscape. During the last decade, management programs have been prepared for ca. 50% of the nature

reserves, incorporating new active management concepts. Management protocols for some reserves have not been completed due to limited budget. The effects of the active management procedures are checked for reevaluation and modification, where required.

Special conservation attention has been given lately to habitats previously neglected, such as planning guidelines to the conservation of Mediterranean Batha (low shrubland), a habitat inhabited by many endangered species which was not appropriately represented in nature reserves. The incorporation of urban nature sites in planning is briefly described in §3.5.

River restoration

Special attention is also given to wetland conservation and restoration where alongside with the reduction of pollutant levels and the improved sewage treatment, BdC efforts are aimed towards active restoration of wetlands, including reintroductions. The MoEP and INPA have given high priority to the protection and restoration of rivers in Israel. A National River Administration, which coordinates responsibilities, financial resources and professional knowledge in cooperation with a number of stakeholders, was established in 1993 and is dedicated to the restoration of rivers and rehabilitation of adjacent landscapes and ecosystems. A country-wide river restoration program that has been operated since the early 1990s presently includes all westward bound streams and most eastward bound ones. A major challenge is to reconstruct habitat structural complexity to facilitate the recovery of the original species composition.

To protect the water needs of Israel's ecosystems, a 2004 amendment to the Water Law allocates 50 million m³ of water for nature, for the conservation and rehabilitation of natural assets and landscapes including rivers, springs and wetlands.

River restoration also involves aspects of public health, social and equity aspects and economic considerations (e.g. management to avoid flooding and damage to neighboring property, as most rivers are characterized in a torrential yearly flow pattern).

Achievements and obstacles of the river restoration program:

The intensive activity for the conservation of rivers and wetlands is one of the major achievements of nature conservation efforts, with an improvement in the condition of many wetlands, though they are still considered endangered habitats. The means defined to safeguard water quality in the major aquifers are affecting not only human health, but also natural ecosystems that are fed by the same sources.

Endemic species that were kept *ex-situ* in special refuges have been reintroduced to certain rivers. The target is to keep at least parts of the river in a condition that can support the aquatic habitat and allow the river to function also as an ecological corridor.

Individual river restoration programs include surveys where taxonomic lists are prepared as a planning act. No consecutive regular monitoring is held due to limited budget, yet these surveys are the baseline for assessing restoration progress.

A preliminary methodology to assess river condition using chemical-physical and biological indicators, mainly representatives of large invertebrate taxa, has been developed and requires testing through adaptation to specific river conditions; testing is scheduled for 2010.

Among the green bodies participating in river restoration there are different views as to the ultimate targets of the project: attaining a healthy river ecosystem or recovering as much as possible the original ecosystem and its surrounding vegetation.

Two main obstacles to river restoration are:

- Difficulty to keep pollutants away from rivers; A law requiring an upgraded water quality output of sewage treatment facilities is underway, and progress in river restoration also depends on its adoption and implementation
- technical and bureaucratic stages involved in preparation and approval of a water allocation program to a specific river (at watershed level) under the water authority allocations, so that today there are only few approved water plans: of the 50 million m³ of water allocated for nature by law, 25 million m³ were granted of which only 9 were effectively implemented, and the rest will be allocated by 2015; a special adaptation was also required since 2009 was the 5th year of consecutive drought.

2.5 Way forward

The steps forward, mainly via the governmental SD committee, (see §3.1) are to: Publish the NBS; Attain governmental approval to the NBS; Allocate budget and staff for its implementation; Set a implementation team under the framework of the SD committee; Nominate professional teams, with stakeholders representation, to finalize the recommendations into an action plan that is due within 2010, and for the preparation of sectoral action plans; Advise governmental offices on updating and incorporating BdC aspects in their specific strategic plans; Coordinate all the BdC-related activities and mainstream biodiversity conservation considerations in sectoral and cross-sectoral activities.

The action plans are intended to set targets and timetables, define the participants in the implementation and define the required budget.

Mainstreaming of biodiversity conservation in different sectors

So far, BdC has been mainly taken into account in the nature conservation activities of the "green" agents - environmental governmental offices and authorities, semi governmental bodies and NGOs, usually without the general view of biodiversity and of ecosystem services, which the NBS is suggesting.

The NBS recommends on the preparation of specific action plans for various sectors and issues (see above). Their careful design with specific definitions of means and tools and implementation should mainstream BdC in these sectors. Chapter 3 describes the mainstreaming of biodiversity conservation in various sectors, mainly within the governmental SD framework. Some progress has been made where biodiversity considerations have been incorporated – at the Ministry of Interior, through regional planning processes, and at the Ministry of Agriculture, in the formulating strategic plan – yet both ministries are still lacking the tools to address them properly.

Achievements and obstacles

As shown in §2.4, nature conservation activities in Israel are numerous and comprehensive. Yet, it is difficult to assess the impacts of these efforts on the whole, since no quantitative indicators are used to measure them and no national monitoring scheme is yet implemented. Chapter 1 presents a mixed picture showing some success in protecting genetic, species and habitat biodiversity, though the continuous pressures on ecosystems and their services are generally pushing towards biodiversity loss.

Financial constraints and inadequate financial allocations for BdC implementation have impeded the integration of work programs for the implementation of CBD articles into national policy and action plans. However, the implementation of various CBD articles is carried out within the framework of academic, national and non-governmental institutions, on a piecemeal basis.

The NBS pinpoints a basic difference between nature conservation and biodiversity conservation efforts, in that BdC is aimed at maintaining and protecting biodiversity and ecosystem services in all open spaces, not only in protected areas; it states that the continuous damage to Israel's biodiversity implies that the existing tools and efforts are inadequate for BdC, because they are promoting the passive rather than the active approach and because they do not provide solutions to ecosystems.

The preparation of the NBS involved long consultation procedures, with professionals, NGOs and the general public responding to the first draft. A lengthy correction stage followed, whereby considerations as to the best strategy to gain governmental acceptance, budgeting and full cooperation with the implementation, based on previous experience of the team leaders in the national bureaucratic arena. The resulting decision was therefore to prepare a strategic document, the equivalent of a master plan, with recommendations that will be taken forward, finalized and implemented by the governmental offices in charge of each aspect.

From this point onwards the process is not going to be instantaneous as well, as it involves nominating and operating teams and sub-teams to prepare specific action plans.

It is worth mentioning that the discussions involved in the formulation of the NBS have already promoted the implementation of quite a few of its recommendations, even before it has officially been approved and operated.

3. SECTORAL AND CROSS-SECTORAL INTEGRATION OR MAINSTREAMING OF BIODIVERSITY CONSIDERATIONS

Numerous activities relevant to different CBD articles are continuously being implemented in Israel (see §2.4). Nevertheless, not all these activities may necessarily be under the exact title of "biodiversity conservation", as this term has not been widespread in different Israeli sectors and among the general public, and they mainly refer to nature conservation efforts, though some of them also consider specific protection of ecosystem services, their sustainable use and equitable distribution.

The NBS was drafted as a complementary measure to the Government decision on SD of 2003, aiming to promote the implementation of the CBD. It points out the key means for the conservation of biodiversity and of ecosystem services and recommends on ways to tie up and upgrade all the on-going activities in a coherent conceptual and institutional framework, and is to be translated into numerous action plans.

Key means

The key means currently applied for biodiversity conservation and sustainable use of its resources and their sectoral and cross-sectoral integration include:

- Using the national framework for sustainable development as the main platform for mainstreaming of biodiversity conservation (see §3.1);
- Direct activities for nature conservation (see §2.4);
- Protection of environmental quality and sustainable use of resources, thus affecting ecosystems and individual species, populations and other natural resources (see §3.2);
- Centralized regional planning (§3.5), usage and management of open landscapes, mainly in forestry (§3.3) and agriculture (§3.4);
- Research activity, monitoring, scientific and technical education as well as education activities for school students and to the general public (see §3.6)
- Legal, institutional and economic tools (see §3.7).
- International activity and related national activity (see §3.8).
- Activity of other sectors such as that of NGOs (see §3.9).

3.1 The national framework for promoting sustainable development

3.1.1 National Sustainable Development Strategy

A 2003 Government decision requires all government ministries to prepare strategies for sustainable development (SD) and participate in a National Committee for Sustainable Development (NCSD), which also includes representatives of the private sector, local authorities and civil society (a coalition of environmental NGOs).

The NCSD activity

The NCSD, lead by the Ministry of Environmental Protection, has been working for several years and is the main governmental framework dealing with SD. Mainstreaming of SD issues is in rather preliminary stages, with ministerial strategic plans either still under preparation or in first stages of implementation.

The process has defined 16 principles for SD so as to establish a common ground between the government ministries, including the sustainable use of biodiversity resources and the equitable distribution of their benefits. These principles are the common ground for the work of the committee and to the ministerial SD strategies and action plans.

To promote some common themes, several sub-committees have been formed. As from 2006 onwards, cooperative activities were also initiated between ministries and with NGOs.

This NCSD is also the major platform to manifest sectoral responsibility to biodiversity conservation (BdC) and the main pathway to sectoral and cross-sectoral integration or mainstreaming of BdC in governmental policies and activities. So far, the NCSD has not addressed directly specific BdC issues, but rather supported them indirectly, to a limited extent, through efforts to conserve open space/ natural landscapes and their associated ecosystems and natural assets, and through budget allocation to the preparation of the NBS.

Israel's procedures to join the OECD may further enhance the inclusion of environmental assessments prior to decision-making, probably incorporating also information on the implications of these decisions on biodiversity conservation.

The NCSD as the future platform to promote the NBS

Once the NBS is presented to the government, it will be further handled by the NCSD and a special sub-committee is to be appointed under the NCSD to promote the NBS implementation. A professional consultant will review the strategic plans devised by the ministries and update them with aspects relevant to biodiversity conservation. The action plans derived and developed from the NBS will be presented to government approval.

This platform should facilitate the integration of biodiversity conservation within the framework of the national strategy for SD and assist relevant cooperation at the ministerial and other administrative level. The ecosystem approach, linking biodiversity conservation with economic and social considerations can be best treated through this platform, particularly with the contribution of the NGOs participating in this forum and their demand for a more holistic viewpoint and activity.

Indicators for SD and for biodiversity conservation

A study on indicators for sustainable development also included a chapter on proposed indicators for biodiversity status and trends. The NCSD has started to test the applicability of several SD indicators using data already available at the National Bureau of Statistics. Of these, the indicators relevant to biodiversity, though indirectly, are those on open landscape availability and to a lesser extent – that monitoring aquifer status (see §1.2.1 and §1.3.4 respectively). Other activities relevant to indicators are presented where monitoring is discussed (§3.6.2, §2.4).

Achievements and obstacles

The ecosystem approach and long-term planning are more prevalent than they were in 2003, and cross-sectoral cooperation has been improving; whereas the development of quantitative targets and indicators for progress assessment has not advanced much in all aspects of SD activities, all required also for biodiversity conservation. Israel's budget is re-allocated yearly, thus interfering with long-term planning.

Low budget allocation for biodiversity conservation is the main obstacle for its promotion. The NCSD has allocated within its work plan for 2009 substantial funding to promote biodiversity conservation under this framework (ca. 130,000 USD).

3.1.2 Ministry activity within the NCSD

Several ministries have completed their strategic plan for sustainable development. As mentioned above, most of them do not directly consider biodiversity conservation, but address it indirectly to some extent, mainly through efforts for the conservation of open landscape where natural ecosystems reside and of natural resources and assets. Ministerial activities relevant to SD and BdC are briefly presented.

Ministry of Environmental Protection – In 2007, the ministry initiated a comprehensive and in-depth strategic process aimed at setting long-term policy, including defining a ministerial vision, setting multi-annual targets, formulating goals for the years 2008-2010, setting priorities and measuring progress by means of performance indicators. The multi-annual targets included:

- Protection, increased efficiency of use and rehabilitation of environmental resources and ecosystems for future generations;
- Fair distribution of environmental costs and benefits among different population groups;
- Increased efficiency and effectiveness of policy tools: regulatory, informative, economic and operational to achieve ministerial targets (see further in Gabbay & Barzilay 2008).

This SD strategic plan puts special emphasis on promoting the NBS, on the preparation of a national plan to address climate change (including its consequences on biodiversity) and on the conservation of open landscape in agriculture (see §3.4) and within local authorities (see §3.5). It has adopted the ecosystem approach to integrative management of natural resources and promotes the regional planning of biosphere regions (see §3.5).

The activities supported by the Ministry include: Applying the NBS, establishing the national monitoring scheme, distribution of information on biodiversity and its conservation among decision makers and the general public, and mainstreaming biodiversity conservation in governmental SD programs (see also §2.4, §2.5).

Ministry of Finance – the principles and criteria for its SD program include:

- Promoting the saving of common goods (mainly air, land and water resources);
- Ensuring that the usage of renewable resources will not exceed their renewal rate;
- Decreasing the use of non-renewable resources.

Ministry of Health – its strategic SD plan includes:

- Monitoring, research and publication of information regarding environmental hazards that may adversely affect public health;
- Activities associated with biodiversity assets or hazards (such as invasive species: see case study on the Little Fire Ant in §2.4.2);
- Activities to safeguard the quality of drinking water;
- Cooperation on medical research and on activities of health organizations that benefit from proper taxonomic identifications and biological expertise.

Ministry of Foreign Affairs – its activities on SD include:

- Follow up on the environmental conventions that Israel has signed and representation in international meetings;
- Promoting SD issues within the bilateral and multilateral peace process;
- Knowledge exchange, such as joining GBIF (Global Biodiversity Information Facility), sending experts to international activities and offering international courses for experts from developing countries on BdC and related topics (see §3.8);
- Activity towards joining other conventions and protocols

Ministry of Education – has produced guidelines for teachers on embedding SD issues in its programs. The Ministry collaborates with the education units of the MoEP, INPA, JNF-KKL and various NGOs in developing and implementing educational programs on nature protection and conservation and on SD. The educational year 2009-2010 was proclaimed as "The Year of Biodiversity" in the formal education system.

An action program on SD and biodiversity was prepared in collaboration with the MoEP and NGOs, emphasized sustainability as the main theme for the year 2008-2009.

The ministry's web site for teachers hosts a special clearing house for teachers dedicated to SD which holds ca. 80 documents referring to biodiversity and its conservation. Textbooks describe the term "biodiversity" and introduce it to students in elementary, middle and high school.

The Ministry of Agriculture – is currently preparing a SD strategic plan. Special attention is to be given to open landscape conservation and to active involvement in BdC, to handling natural hazards to agriculture and to policy regarding alien or invasive species. It will include planning tools and economic incentives to agriculture to promote the use of techniques that support BdC (see further details in §3.4).

The Ministry of Construction and Housing – its SD strategic plan includes: Adopting principles of rational use of natural resources and protection of ecosystems; Research and setting guidelines for SD planning and building. Conservation of open landscape is included as a target in the yearly plan for 2009.

The Ministry of Interior – is concerned with biodiversity conservation and the protection of open landscape mainly through its planning administration, concerning national, regional and local planning. Several statutory National Master Plans are protecting habitats, natural resources and natural assets. These are further supported by guidelines for ecological corridors and by guidelines for animal passages in roads (see §3.5). The planning administration also promotes

the inclusion of plans for urban nature, intended also to protect natural relicts in the urban environment and its surroundings.

The ministry is promoting SD strategies and action plans in local authorities, of which the most relevant to BdC are those concerning development policies in rural areas, with ca. 30 regional councils at a process of planning towards sustainable development. It also promotes SD in local authorities through funding and through sustainable use of resources.

The ministry of science – its agenda for SD includes promoting research on biodiversity conservation, mainly through financial support to: the Israeli Gene Bank, the national biological collections, the marine biological research in the gulf of Eilat, to national and regional academic biodiversity research projects. It participates in the steering committee for the Long-term Monitoring project.

The Ministry of Social Affairs and Social Services is in the process of preparing a strategic plan. It promotes public involvement in planning processes, also those relevant to sustainable development and to biodiversity conservation, and helps developing community-level mechanisms for their implementation..

The Ministry of tourism – its SD strategic plan includes:

Definitions of environmentally sensitive touristic development; Inclusion of SD and BdC criteria for project funding such as protection of endangered resources, recovery of damaged resources and contribution to open landscape conservation. It has started to develop a program for sustainable tourism, linking development efforts to databases on ecologically sensitive areas and natural assets.

The Ministry of National Infrastructure – its activities relevant to SD and to BdC are:

- Cooperation on pollution prevention of natural habitats (especially wetlands);
- Developing and implementing policies for sustainable mining, in particular to safeguard coastal sandy habitats and to promote quarry restoration.
- Monitoring the marine and the Dead Sea environment and participating in the joint steering committee on policy to the complex environmental problems of the Dead Sea.
- A strategic plan for SD in the water authority and for sustainable water management, including desalinization of water, water saving schemes and changes in the organizational framework of the authority. These have major implication for the conservation and restoration of wetland habitats.
- Allocation of highly treated wastewater to river restoration programs, supporting wetland conservation efforts;

Israel Land Administration – protecting lands with unique ecological values and protecting ecologically important open landscape have been included in the administration's SD criteria.

The Ministry of Industry, Trade and Labor promotes the development of water technologies and involved in the development of a national program for advancement of environmental friendly technologies.

The Ministry of Public Security – is involved in enforcement activities relevant to combat illegal mining of sands and other minerals; its target for 2005-2007 was a decrease of these activities by 10%.

3.2 Environmental quality and sustainable use of resources

The MoEP is engaged in BdC and the sustainable use of natural resources, operating at the national, regional and local levels through several channels:

- Direct protection of open landscape where most biodiversity resides through independent and collaborative activities with the INPA (see §2.4) and with several river authorities (over which it has ministerial responsibility);
- Regional planning processes (see §3.5);
- Protection of environmental quality and the sustainable use of natural resources of open landscapes and their ecosystems, thus safeguarding their quality and promoting their long-term sustainability.

Pollution prevention is not described here in detail, yet it has a major role in BdC efforts.

3.3 Forestry

All afforestation areas fall under legislation. Forest, woodland and shrubland areas are protected under National Master Plan#22, which protects a total area of 1,604 km₂, consisting of 8 vegetation categories. The main agent for forest management in Israel is the Jewish National Fund (KKL-JNF), the non-governmental organization currently managing ca. 1,000 km₂, largely in areas with semi-arid climates and with rocky, hilly terrain unsuitable for agriculture and where the risk of land degradation is high. The afforested areas are used for tourism, pastureland, and wood industry as well as providing other general ecosystem services, contributing to the water budget, and to stream restoration. In fact Israel is one of the only nations in the world that has more trees today than it did a hundred years ago.

The objectives of afforestation in Israel are as follows:

- Improving the landscape, biological diversity and natural ecosystems
- Developing parks, recreational, and hiking areas for the public
- Improving the public's connection to forests and participation in planting
- Preservation of Israel's open spaces.

The countrywide afforestation program is run for decades and has gradually changed its orientation towards increased biodiversity considerations. The last decade marks a shift towards ecologically oriented forest management with a growing emphasis on fostering of woodland biodiversity. The conifer-dominated forestry has changed to mixed woodland management, allowing the regeneration and penetration of wild tree and shrub species into carefully managed areas and increasing biodiversity wherein. About 55% of afforestation areas are to remain as open space with natural woodlands contributing to soil fertility and in many cases sanctuaries for protected wildlife. There is some exchange between different woodland categories; allocate areas may be converted to agriculture on one hand and to protected nature reserves and parks on the other hand, or allowed for development where necessary.

In 2005, the JNF adopted a commitment to "sustainable forestry" involving the implementation of ecological principles in planting, rehabilitation, management methods and pest control and increasing biodiversity within JNF-managed areas.

Afforestation activities also include:

- Statutory protection for safekeeping the areas under NMP#22 areas through preparation of detailed plans for specific forests and involvement in steering and planning committees;
- Involvement in the preparation of surveys and policy papers;
- Community outreach through education and other activities;
- Special projects to combat desertification in Israel's semi-arid region.

Achievements and obstacles

The outcomes of the shift in afforestation activities in Israel are increased attention to biodiversity considerations, more heterogeneous planted forests and the use of more environmental and biodiversity friendly management methods. An observed overall increase in precipitation in Israel's semiarid southern coastal area and northern Negev is attributed by some researchers to the afforestation, to intensive irrigated agriculture and to grazing restrictions that jointly reduced surface albedo and increased convection during daytime s (Tal, 2008), thus enhancing diurnal rain.

The process of defining the relevant meaning of "increasing biodiversity" is on-going, mainly engaged in ways to measure fluctuating biodiversity and finding the appropriate indicators that are relevant to forest health and resilience.

3.4 Agriculture

Agricultural activities contribute to the general pressure on biodiversity and natural ecosystems through land-use change, nutrient loading, pollution of various types and poisoning, over-exploitation of natural resources, introduction of invasive species and human-wildlife conflicts (see §1.3.6). On the other hand, agriculture supports additional habitats that the natural fauna and flora can use temporarily or regularly.

The challenges of the rural sector in Israel are similar to the worldwide experience. As in many parts of the world, agricultural lands have been abandoned in the last decades and efforts are made to maintain them, also for safekeeping of open landscape and prevent their conversion to built areas. The total area designated to agriculture is about 19% of Israel's total area; in 2006 the total area used for cropland and fruit orchards was ca 2,900 km².

The Grazing Authority has the responsibility, through grazing statutes and policy implementation, of maintaining the sustainability of some 2,000 km² of public rangelands, with oversight for 300,000 grazing animals, of either stationary farmers (typically in the Jewish sector) or nomadic herders (typically Bedouin). The Authority provides extension support focused on maintaining rangeland fertility and productivity, reducing fire hazards and fencing of vulnerable areas to control grazing levels and protect soil and biodiversity within.

Some sustainable agricultural practices in arid and semi-arid drylands contribute to Israel's efforts on combating desertification, through centralized national water management combined

with national policy for land preservation and active erosion control programs, measures taken to increase soil productivity, regulation of nomadic grazing, and the promotion of water-saving, salt-tolerant crops with advanced agricultural techniques (Tal 2008).

The share of treated wastewater in agriculture has greatly increased in the last decade as freshwater quotas to agriculture were gradually reduced due to water scarcity; this was guided by research on the proper use of treated wastewater so as not to damage soil quality and not to adversely affect underlying aquifers. Upgraded sustainable water management for drylands, based on effluent recycling, desalination, water harvesting techniques and the establishment of watershed management projects also contributes to Israel's efforts in combating desertification. Yet, Soil conservation and drainage activities may also adversely affect biodiversity.

The Israel Gene Bank is a unit in the Ministry, working in collaboration with the Ministry of Science and INPA, active in the preservation of genetic diversity of crops and of wild plants. To widen the scope of the IGB's activities in this direction, the Ministry of Environment is about to become one of its controlling ministries (see §2.4.1).

Agricultural activity in Israel has always been guided by intensive inter-disciplinary research activity; research has also dealt with biodiversity in open agricultural landscapes, yet there are only few research projects on ecology and agriculture (agroecology), and few on SD of forests and their biodiversity and their association to the agricultural field. Long-term research helped, for example, in adapting crops and techniques to the local soil and climate conditions, in developing more efficient methods for water usage and reuse of effluents, in the efforts to prevent soil erosion, in understanding the important role of goats in rangeland management (also enhancing biodiversity) and in averting desertification risks when transforming rangeland to cropland in semi-arid regions. Agriculture expertise in arid and semi-arid zones is an area where Israel's experience contributes to the international knowledge base (see also §3.8).

Agriculture-wildlife conflict handling

Damage to agriculture through wildlife activity is widespread, covering numerous taxons and a wide array of agricultural activity. The Ministry of Agriculture & Rural Development cooperates with INPA and with farmers to minimize human-wildlife conflicts and damage to both agriculture and wildlife using various means:

- Decreasing and preventing wildlife damage to agriculture through management and international cooperation, such as avian management by supplying external feeding sites (see case study below) or wolf predation on cattle;
- INPA has published special guidelines to farmers, including recommendations for fencing, deterring, sanitation (removal of possible attractions to wildlife), protection of equipment, trapping (legal) as well as combating illegal hunting that is threatening wildlife (especially by foreign workers in agriculture, see §1.2.5).

Case study: Pelicans and fishponds

Bird migration carries through Israel between September and November some 45,000 pelicans yearly. Pelicans feeding in fishponds were recently either shot by fish growers or electrocuted when fleeing from shooting, after an arrangement between SPNI, INPA and fish growers was broken, and in 2008 nearly 50 pelicans were killed.

According to a new arrangement the pelicans are to be fed in special feeding sites so that they can quickly continue their migration and not over-winter in Israel. The Ministry of Agriculture, INPA and MoEP (each) allocated 300,000 NIS to finance the 15 ton of fish required for their feeding (with damage costs otherwise accumulating up to 2 million NIS).

Nekudat Hen

Nekudat Hen framework was established by Yad Hanadiv Fund (the Rothschild foundation in Israel) in 1999. It aims to promote professional know-how on multifunctional scenic agriculture and to foster its interaction with ecology and broad environmental concept in Israel, under the basic assumption that well-managed agriculture provides food and other important resources and contributes to the environmental protection. Nekudat Hen creates opportunities for convening, learning, and discussion for agricultural and environmental researchers, farmers, environmental activists, and policy makers. Its projects and activities seek to build a professional and interdisciplinary knowledge base which can contribute to the formation of a common language between the different disciplines and to encourage informed dialogue, though the benefits of these projects are not yet fully used. It:

- Funds short term research projects that focus on agricultural land use and its effect on the environment and on life quality. So far, more than 70 projects were supported;
- Organizes a conference to disseminate the results and highlights of some of the supported projects. The Conference features guest speakers from outside Israel;
- Publishes project reports, conference proceedings and other publications through its website.

3.4.1 The SD strategic plan for agriculture

The Ministry of Agriculture & Rural Development has undertaken a SD strategic process as part of its activity within the NCSD framework (see §3.1.2). A report analyzing the current activity of the agricultural administration identified a change of attitude among officials in the ministry from economic emphasis to a broader ecosystem (environmental-economic-social) perspective.

The report commented on the lack of adequate attention to issues of BdC (such as ownership over land or water resources, wildlife poisoning or the introduction of invasive species) and to the lack of attention to harm caused by agriculture to nature (only to natural hazards to agriculture), to the contribution of agriculture to enhance biodiversity (like that of well-managed grazing or traditional olive groves) and noted that the biodiversity within agricultural fields are not appropriately appreciated and handled, as the relationship between biodiversity and agriculture is perceived as a conflict so that the ministry's approach is mainly targeted towards minimizing the negative effects of natural components on agriculture.

The report also pointed at the lack of incentives and other economic tools to promote organic agriculture, conservation of open landscape and natural assets or scenic agriculture (but for pasture and through natural hazard insurance policies) and that biodiversity considerations are not taken into account in the financial support to intensive agriculture. It noted that efforts to prevent excessive use of natural resources (protection of genetic resources, preventing over-grazing, restricting fishing of fisheries and protecting trees) have generally succeeded.

The strategic SD plan is under preparation, with its long-term targets including the conservation of open landscape and the promotion of agro-ecological programs that support it through:

- Regional and agricultural planning;
- Decreased pesticide use and increased share of IPM and biological control of pests;
- Promoting of agro-tourism practices that are based to a large extent on local biodiversity components;
- Promoting organic agriculture and sustainable resource use.

The recommended direction is towards multi-functional agriculture with increased attention to biodiversity issues: decreasing negative effects of agriculture practices on natural ecosystems and checking whether agriculture's contribution to biodiversity is sufficiently addressed. One of the proposed operative targets is to promote the benefits of agriculture to natural and environmental resources, including BdC.

Achievements and obstacles

Current biodiversity-related activities include conservation of biodiversity and agro-biodiversity through the gene bank activities, conservation of pastureland, combating desertification, efforts to prevent the entrance of invasive species (even if they are potential biological control agents), decrease of pesticide usage and supporting Integrated Pest Management, biological control of pest species, and organic farming.

The emerging SD strategic plan intends to pay greater attention to biodiversity considerations. The required change in attitudes and priorities may be an obstacle in this respect.

3.5 Regional planning

Regional planning is currently the main channel to address the perceived conflict between pressures for development and the need to preserve landscapes and ecosystems. This is largely lead by the Ministry of Interior's Planning Administration which applies several legal and institutional tools to protect biodiversity components, mainly through land use allocation in planning:

- National master plans: The National Master Plan #35, the combined plan for construction, development and conservation, defines a clear policy for conservation of open landscape and embeds it statutorily, in conjunction with the national master plan for nature reserves and national parks (NMP#8) and the national master plan for forestry and afforested areas (NMP#22).
- Environmental Impact Assessments (EIAs): EIAs call for information on the impact of development plans on biodiversity components. Revised regulations from 2003 broaden the possibility to require EIAs for proposed development in environmentally sensitive areas,

such as coasts and riverbanks. Most EIAs consider species and habitat diversity, endangered species, and connectivity issues (through ecological corridors). TORs for EIAs occasionally directly consider "biodiversity impacts", though not as a regular rule (see case study below).

- Ecological corridors are meant to connect statutorily protected areas and open spaces so as to provide conduits for the passage of animals and plants in a fragmented landscape. Several major axes were recommended for protection as ecological corridors, and are taken into account where development is considered.
- Open landscape sensitivity to development: mapping of "hotspots" and open landscapes that are more sensitive to development via the integration of vulnerability, continuity and functionality provided a basis for open space sensitivity maps which delineate the "value" of open spaces throughout the country (Frankenberg 2005).
- Connectivity and animal passages through linear infrastructure: is further addressed in the 2008 updated guidelines for landscape and environmental planning, published by the Israel National Road Company, incorporating guidelines to enhance connectivity and mitigate habitat fragmentation effects of roads using animal passages below and above roads, and via the implementation of ecological considerations in planning, rehabilitation and management of road verges and other areas affected by road construction.
- Biosphere planning: Two biosphere regions are in planning stages, in central and northern Israel, aimed to improve ecosystem protection beyond that given by statutorily protected areas. Biosphere planning adopts the ecosystem approach to planning and management. A national plan for locating suitable areas for biosphere regions is currently prepared, having the conservation of biodiversity and agro-biodiversity among its major goals, with emphasis on traditional agricultural and pastoral practices and on the conservation of landscapes that can help increase local biodiversity and agro-biodiversity.
- Urban nature conservation: has been given greater attention in the last few years. Urban nature conservation is being embedded in several regional or local plans, with a growing degree of supporting surveys and public involvement.

Case study: Rare butterfly changed building plans

The EIA guidelines for a building project in the northern part of Israel specifically requested to evaluate the project's impact on the population of a rare butterfly known from that area, *Apharitis cillissa* (Lycaenidae), as part of Israel's commitment to CBD.

A two-year study on the butterfly populations in the region recommended on changes to the original plans, reducing the size of the proposed built area and adapting it spatially to safeguard the main habitats where populations of the butterfly were observed and maintain the connectivity between them. Further management recommendations were drawn to improve the suitability of the non-built area to the butterfly's requirements.

To further help guide decision making on development plans in Israel in a manner which would reduce ecosystem fragmentation and biodiversity loss, additional projects were initiated by the MoEP and NGOs:

- The classification of Israel's landscapes according to sensitivity and value criteria. These include vulnerability, continuity and functionality and are also based on surveys to identify landscapes deserving of protection.
- A policy document from 2003 provides planners with tools for the sustainable use and development of landscapes in the short and medium term and with operational principles for the long term. It brings together the economic, legislative, social, and other tools necessary for the protection of essential open spaces.

Achievements and obstacles

Regional planning has greatly increased its attention to considerations of ecosystem well-being, though the specific term "biodiversity" is not often used and ecosystem services are usually not considered. According to the NBS, the understanding that development relies on biodiversity, thus not being in conflict with biodiversity, has not been fully embedded in regional planning. Furthermore, all plans ignored the effects and future threats of climate change, which in Israel may be even stronger than previously perceived, on biodiversity.

3.6 Research, monitoring and Education

3.6.1 Research

In Israel biodiversity-related research is mainly carried out by universities and research institutes, sometimes in conjunction with other professionals, NGOs and amateur naturalists. Great concern is given today to the academic knowledge base required to handle biodiversity issues: taxonomic expertise in Israel is already dwindled with a low recruit to taxonomic research, and of the few remaining taxonomists and systematists, only fewer are able (by their position) to advise graduate students. New relevant initiatives are led by the Israel Academy of Sciences and Humanities and funded by the planning and budgeting committee of the council of higher education (VATAT).

Biological collections:

The national biological collections of natural history are university-based, housed at the Hebrew University of Jerusalem and at Tel Aviv University, providing the infrastructure and support for basic taxonomic, evolutionary, biogeographic, conservation and agricultural research and provide a dynamic record of the fauna and flora of Israel. With a substantial national funding for the last 5 years, the collections have been upgraded (through improved maintenance, buildings to house them and advancement of professionals). For example, the entire infrastructure of the national collections of natural history at Tel Aviv University is funded at ca. 1,500,000 USD per annum; in the academic year 2006/2007 the Hebrew University has invested ca. 400,000 USD in this infrastructure and scientific field. Current national support in taxonomy has increased and partially guaranteed for the next 5-year period (In the last 3 years a total of 300,000 USD per annum was provided by VATAT to support the national collections and this support is expected to continue in the 5-year plan starting 2008/2009, ensuring the continued recording of biodiversity and the maintenance of the record).

Training and research:

VATAT acts to promote research and technical positions and advance specialists on specific taxons, aimed to employ and attract more taxonomists to academic research towards conservation through:

- Providing 12 half academic positions in Israel to encourage the hiring of the next generation of curators. Until those are hired, these funds are available to hire additional collections managers at ca. 400,000 USD per annum.
- Stipends for young researchers in taxonomy have been set, but not yet materialized: VATAT set a special 3-year program for post-doctoral fellowships for taxonomic research (2 years abroad and 1 year in Israel) to encourage the training abroad of new Israeli taxonomists; in the coming 3 years 5-6 new fellowships will be made available annually (estimated at a total of 1.35 million USD). A complementary initiative is the "Israel Taxonomy Initiative" (see case study below).

Conservation and management:

Much effort is given to issue-specific research, carried out by research institutes and universities in collaboration with managing bodies such as INPA, JNF-KKL or ministry of Agriculture (pasture authority) to develop and test appropriate management, to answer conservation and management needs.

Case study: The " Israel Taxonomy Initiative" –

Taxonomy for a sustainable future: Promoting biodiversity research in Israel.

A unique collaboration project between academics, governmental bodies and NGOs (covering the relevant representatives of all organizations in Israel for whom taxonomic research and/or biodiversity surveys can be of value) has been launched in spring 2009, led by Tel Aviv University. It aims to create a joint appeal to pool private and national funds in order to promote biodiversity research, mainly through support in taxonomic research and in biological collections.

The project seeks to answer the urgent need to train and hire taxonomists in Israel in the higher education system and in governmental agencies to meet the challenges of studying, protecting, and managing the natural and human-dominated landscapes of Israel in a sustainable way; it is expected to fill in the lacunae in the current situation by developing a methodical program for the duration of the period proposed, training experts, upgrading the collections as a research infrastructure and establishing a significantly improved survey database.

The project will support 10 doctoral and 10 post-doctoral positions to promote biodiversity surveys (with preference to taxonomic groups with many species, those where Israeli taxonomic knowledge is lacking and those with economic or agricultural significance). It also allocates grants for 30-50 visiting taxonomist for biodiversity surveys, that will also give a short course/ workshop on their special field and allow for a short survey/research, expected to provide a key to the fauna/flora of their specialty. Priority is given to taxonomic groups where knowledge is deficient or of economic and agricultural importance.

Israel-LTER – the Ma'arag network:

The Ma'arag is a national network of ecological research organizations, a consortium of 4 Israeli universities with 12 research stations country-wide, under the sponsorship of the Israel Academy of Sciences and governmental organizations. Its mission is to provide natural resource managers with the scientific information necessary to promote long-term biodiversity and sustainable development through: State-of-the-art long term ecological research (LTER); A national program of biodiversity monitoring; A center for ecological synthesis and modeling; Educational programs for resource managers; A library of research data and publications.

3.6.2 Monitoring

In Israel there is no Biological Survey and no funding agency that targets biodiversity surveys. The NBS states that current monitoring involves only few species and selected ecosystems and cannot answer the needs of BdC management due to lack of awareness to the benefits of monitoring and as to knowledge gaps required to its appropriate planning and operation (Safrieli 2009). Currently, there is no regular monitoring at the habitat or ecosystem level, and monitoring is held by several bodies for various purposes: the INPA, the JNF-KKL, the Ma'arag network and surveys by or in collaboration with the SPNI. Several efforts were made to create a united national monitoring framework and today Israel is in the process of developing a National Biodiversity Monitoring Framework (see below). The development of tools for the valuation of biodiversity is a high priority.

Currently INPA monitors several species for the purpose of their own conservation or as indicators for ecosystem status. Environmental monitoring includes monitoring of water quality (for human health and for ecosystem health), use of treated water, mapping of stream sewage pollution (GIS) on aquifer feeding areas, and monitoring for pest control (mosquitoes, flies, the invasive ant species). Monitoring of illegal hunting is also carried out.

Monitoring selected species and habitats:

INPA monitors various species, some annually and some periodically, some on a national scale and some locally: breeding raptors (with emphasis on Vultures), Gazelles (mainly *Gazella gazelle*), aggregating birds (that are agricultural hazards such as Great Cormorant), bats (not annually), chuckars, Ibex, Houbara bustards, Otter, wolves and other carnivores, rare plant surveys (not annually) and Acacia trees (monitored locally as key species in desert ecosystems).

Habitat monitoring is done locally (e.g. INPA monitoring wetland habitats for the last 4 years in the central part of Israel).

The Red Sea at Eilat Gulf has been monitored for the last 5 years, following increased pollution and damage to coral reef, which led to the gradual removal of aquaculture from the gulf waters. This scheme measures pollutant levels and indices to coral health and biodiversity; The Mediterranean coastal waters are monitored regularly for pollutant levels and for eutrophication and invasive species.

River restoration scheme: Periodic monitoring involves mainly pollutant indices. A new biodiversity index is developed, with its testing and implementation yet budget-dependant.

Biodiversity surveys: those carried out by scientists are currently very limited as they are funded only through specific studies. Nevertheless, these funds amount to fairly large sums per year. In addition, surveys for planning, conservation, or agricultural purposes are held by INPA, KKL-JNF, the SPNI Open Lands Institute, the Ministry of Agriculture, some supported by private funds. These surveys are usually targeted to a limited number of taxa at specified locations and for specific purposes

EBONE/BIOHAB landscape and biodiversity mapping project: In the last few years Israel has participated in an EU-led multinational project for the mapping and monitoring of habitats. In Israel the project is in testing/research stage: In 2007 the INPA introduced and tested the use of BIOHAB landscape and habitat recording and monitoring system, and in 2008 the INPA joined EBONE (EU 7th Framework project – European Biodiversity Observation Network), whose main objective is to establish a pan-European biodiversity monitoring scheme, with the goal of adapting the European system and developing a local biodiversity observation network. Israel is responsible for one of the teams testing mapping and monitoring methods outside Europe, mainly in Mediterranean and arid regions. This work also involves the selection of suitable indicators for biodiversity monitoring, adaptations to the BIOHAB methodology to local conditions and using satellite imagery to upgrade the scale of monitoring and the ability to detect changes at the landscape level.

Development of a National Biodiversity Monitoring Framework: The LTER-Ma'arag team is preparing a draft monitoring plan, which currently includes 6 arrays:

1. Mapping landscape (habitat and ecosystem) and species diversity, mainly using vegetation structure, land use and few representing taxonomic groups, as well as monitoring specific unique populations;
2. Monitoring functioning of dominant ecosystems through species diversity of selected taxons and key factors or indicator species.
3. Identifying large scale changes to open landscape using remote sensing and GIS mapping;
4. Following the dynamics of woody vegetation. The parameters to be recorded may serve as important indicators for climate change and for important ecosystem function;
5. Following disturbances, drought or specific issues as rare or invasive species;
6. Monitoring management practices and their impact.

3.6.3 Education

Biodiversity conservation education is implemented on both the formal k-12 education system, in academic education, as well as through various activities addressing the general public. The term is just slowly introduced to the public arena, but is still far less used than "sustainable development" or "sustainability".

Several educational programs were prepared, usually coupled with education for nature conservation and sustainability (see case study below), though some of the programs specifically address BdC.

BdC is mentioned or discussed in numerous web sites and web pages, that distribute information, educational material and papers on environmental issues (see example below), and promote BdC activities (such as the websites of INPA, MoEP, Israel Open Spaces coalition, SPNI and other NGOs, several sites hold information and databases on Israeli flora, the Hebrew University of Jerusalem's BioGIS project (see also Gabbay and Barzilay 2008). Some of these sites are linked to GIS or database information facilities.

The INPA, JNF-KKL and NGOs gradually increase their biodiversity education through their educational and information activities, which are performed as a part of their public and community outreach, aimed to create affiliation and commitment to BdC and to minimize damage to and pollution of natural habitats and resources. Sessions are held to schools, to rural populations harvesting natural resources, to tourists using open landscape, reserves and parks, to police units and to judges involved in legal protection of biodiversity through enforcement, punishment and penalties and to army units. Special activity projects are initiated (e.g. Week of love to Nature, Water and the Environment; Clean Beach; Links to nature reserves with neighboring communities).

Case study: biodiversity education using the university infrastructure and the internet

A special educational centre was established by Tel Aviv University to promote public education on science, nature and environment and to bridge between academic research and the general public. It relies on the infrastructure of the national biological collections and of the botanical and zoological research gardens and holds guided activities to a varied audience, hosting organized groups of children and students for science days and science workshops and training nature guides, rangers, and school teachers on biodiversity-related topics (ca 10,000 people yearly).

The centre works in collaboration with governmental and local authorities, NGOs, UNESCO representatives and is supported by national and private funding.

The center holds a special educational web site presenting its activities, mainly suitable for teachers. The site introduces scientific research on nature and environment and discusses biodiversity, natural resources, ecosystem services, the environmental crisis and sustainability, presents information on invasive species and additional information and links, including a virtual tour to the botanic and zoological gardens (<http://www.tau.ac.il/lifesci/campusteva/virtual.html#>) and usage of live webcams (<http://www.tau.ac.il/lifesci/zoolive/>).

Its team developed, with funding from the ministry of Environmental Protection, a special series of presentations about biodiversity: part 1 introduces the term and its hierarchical levels, discussing its importance to ecosystem services; part 2 presents the biodiversity crisis; and part 3 presents biodiversity in Israel, its sources, present conditions and actions required for its conservation (<http://campusteva.tau.ac.il/campus/?cmd=knowledge.1321>).

Other information tools include visitor centers in nature reserves, where information on the biodiversity of a given area is presented by displays, maps and pamphlets, and the production of varied education and information materials such as brochures, stickers and leaflets are produced.

Achievements and obstacles

Increased attention is given to scientific taxonomic activity, with pooled efforts and budget allocation. The benefits from allocated budgets were not fully drawn.

Biodiversity monitoring is advancing towards a national framework. This will require continuous efforts to coordinate the individual monitoring schemes and adapt them to the united framework while maintaining the interests of each scheme.

Biodiversity education is slowly spreading, having yet a great challenge to meet a far larger audience, including decision makers.

3.7 Legal, institutional and economic aspects

The country's environmental legislation, included in a wide range of legislative instruments, rather than in a single environmental law, encompasses laws for the protection of nature and natural resources. Regulative tools include some 15 laws protecting habitats and ecosystems, special sites, natural assets and specifically trees, national master plans (see appendix 6 in Gabbay and Barzilay 2008). Most laws protect discrete biodiversity components but do not refer to ecosystem services or to genetic biodiversity, yet they can be used for that purpose. Indirect protection to habitats is also given through legislative tools regulating land and water uses. The most important are:

- The National Parks, Nature Reserves, National Sites and Memorial Sites Law and the Protected Natural Assets Law provide the legal structure for the protection of natural habitats, natural assets, wildlife and sites of scientific, historic, architectural and educational interest in Israel.
- National master plans:
 - * The National Master Plan for Nature Reserves and National Parks (NMP#8) and the National Master Plan for Forests and Afforestation (NMP#22) guide Israel's conservation efforts and help prevent development which threatens the country's biodiversity;
 - * The Comprehensive National Master Plan for Building, Development and Conservation (NMP#35) limits development in conservation worthy areas and gives protection to landscape ensembles, ecological corridors, coastal and river strips.
- A 2004 amendment to the Water Law allocated 50 million m³ water for wetland conservation and rehabilitation.
- Israel ratified several international conventions on nature conservation, all of which are also reflected in national legislation (see §3.8).
- The 2004 Protection of the Coastal Environment Law aims to sustainably balance between the protection of the coastal environment and its management, development and use.

The NBS states that these tools are inadequate for BdC, as manifested by the continuous damage to Israel biodiversity and recommends on adopting a pro-active approach (§2.2.4).

3.7.1 Economic Instruments and financing

Most currently available economic instruments used in Israel (including taxes, fees, charges, fines and environmental subsidies) are generally included within the framework of environmental legislation and refer mainly to the protection of environmental quality.

Economic tools for BdC are under development, mainly through research studies on the benefits and economic values of ecosystem services and of various types of landscapes and natural assets. Incentives for the protection of agricultural land for its landscape and biodiversity value are under review and development. The NBS points that special economic tools need to be formed specifically for the purpose of biodiversity conservation (for example, a fee imposed on owners or holders of coastal facilities that caused damage to the coastal environment, will be paid to the Maintenance of Cleanliness Fund for the protection of the coastal environment).

Most BdC-relevant activities are supported through the governmental budget allocated for the INPA or the MoEP. Philanthropic foundations help to provide essential funds for environmental projects implemented by non-governmental organizations. In recent years foundations have supported such priorities as open landscape protection and environmental education.

3.7.2 Institutional Tools

Several administrative tools are relevant to BdC:

- INPA with its governing council, coordinated by the MeOP, is in charge of nature reserves, national parks and other biodiversity components and natural assets that reside in unprotected open landscape.
- The Israeli Gene Bank for Agricultural Crops (IGB) is affiliated with the Ministry of Science & Technology and the Ministry of Agriculture & Rural Development. To widen IGB's scope of the activities, the MeOP is about to become one of its controlling ministries. The IGB collaborates with scientists from academic institutions and with Israel's seed industry for proper conservation and sustainable use of Israel's plant genetic resources.
- Several statutory committees operate under the National Planning and Building Board, Israel's national level planning body in the Planning Authority and are relevant to BdC: A committee on the implementation of NMP#22 on Forests and Afforestation, a Protection of the Coastal Environment Committee and a committee for the Protection of Agricultural Lands and Open Landscape – aiming to protect their specifically designated areas.
- A National River Authority (with 3 statutory river authorities) is coordinated by the MeOP, includes a variety of stakeholders and holds local administrations for river restoration.

Cross-sectoral cooperation as a major tool for mainstreaming biodiversity conservation:

Many of the activities presented in this report are carried out as cooperative efforts between institutions and organizations – various administrative bodies and NGOs. Such cooperation usually involves formulation of agreed targets and resource pooling and is more commonplace among the different "green" agents (between the MoEP, INPA, JNF-KKL, SPNI, universities and other research institutes), usually requiring the formulation of agreed targets to bridge over gaps of different agendas or mandates, also involving financial and professional resource pooling.

Cooperation also occurs between these bodies and other administrative sectors such as Israel Land Administration, Water Authority, the Planning Authority and other governmental institutions, the Electricity Company (which is a semi-independent company) and to a lesser extent – specific projects with the industrial and the business sectors, with local authorities and other NGOs.

The NBS suggests ways to incorporate existing activities into a larger framework with a broader title and a broader conceptual view of targets. The existing infrastructure of cooperation channels can be upgraded to encompass "biodiversity conservation" once the term and the concept will be applied more fully.

3.8 International activity

Israel has signed on several environmental conventions: CBD, CITES, the Convention on Migratory Species, Ramsar, the World Heritage Convention, UNCCD, Barcelona convention for the Mediterranean, ENP with the EU. A limited budget allocation withholds the signature on additional protocols (such as Agreement on the Conservation of Cetaceans of the black sea Mediterranean sea within the Convention on Migratory Species), and limits the country's ability to participate in some of the associated international activities.

These commitments are reflected in national legislation and in national activities. Progress and international cooperation in these channels is coordinated through the Ministry of Foreign Affairs in conjunction with the MeOP, INPA and other professionals.

International cooperation:

Israel manifests its commitment to the CBD, despite the restricted budget allocated to biodiversity conservation, also by paying special attention to share its knowledge and existing experience and know-how with other countries through the activities of Israel's Center for International Cooperation (known as MASHAV in its Hebrew acronym), which is a part of the Ministry of Foreign Affairs. MASHAV is responsible for initiating and implementing Israel's development cooperation program worldwide and aims at transferring the expertise and technologies which have assisted Israel in its own path to development to other countries. It is active in fields ranging from agriculture to medicine and from community development to entrepreneurship.

Today, Israel cooperates with over 140 countries, providing training in Israel and abroad. MASHAV collaborates with local experts and institutes and offers international courses for experts from developing countries on BdC, sustainable practices and combating desertification, such as: Conservation of biodiversity in desert ecosystems; Ecological considerations for sustainable agricultural development projects; Desert agro biology; Sustainable vegetable production systems; Trees for arid lands and planting native trees to combat desertification; Agro-forestry development; Social , economic and political challenges in nature conservation.

Other international activities that seem to be instrumental to further enhance the implementation of the CBD at the national level are where professionals participate in international workgroups, discuss problems, share solutions and know-how, and build together action plans and work procedures to be later adopted and implemented at the national level, benefiting from the

professional supporting forum, sharing both the ecological, environmental and administrative knowledge. These international collaborations include, among others, hosting international conferences and seminars (e.g. the JNF-KKL hosted an international conference on forestry and desertification) and collaboration in biodiversity research and monitoring schemes (e.g. the above mentioned EBONE/BIOHAB project).

3.9 Other sectors and activities

NGO activity on BdC is implemented mainly through education and through regional planning.

The biodiversity-related activity of most NGOs takes place in two channels: One is targeted to BdC through efforts to protect open landscape and endangered species, through help in preparation of red data books, surveys and policy papers and through lobbying and advocacy. A major active participant NGO is the SPNI's Open Landscape Institute that aims to promote the protection of land resources and open spaces in Israel and the region. It has been involved in the preparation of numerous policy papers, research activities and landscape surveys (where habitat and species mapping are the basis for defining sensitivity to development); The other is targeted towards sustainable development, where BdC is treated both *per se* and as part of equity issues.

Biodiversity conservation was further introduced as an issue to the political agenda with the establishment of a new green party at the end of 2008.

3.10 Conclusions

Much effort and money have been invested in biodiversity-related activities of different sectors in Israel, contributing to the overall implementation of BCD articles. Quite a few policy papers were prepared, presenting analyses, drawing recommendations and suggesting directions for activity, reflecting the different viewpoints and interests of various stakeholders. A long editing process and personnel changes have delayed the final publication of the NBS.

Biodiversity considerations are not generally integrated into poverty reduction strategies, as the issue of economic dependence of low-income sectors on biodiversity is generally irrelevant to Israel: most poverty reduction efforts are targeted to urban populations, and are not necessarily related to agriculture or to natural resources. Yet, biodiversity considerations are linked to equity issues, as part of the discussion on resource availability, mainly related to the availability of drinking water, to the access to marine and inland coasts, and to the availability and accessibility of natural areas for recreation to socially-deprived sectors.

It seems that there are several obstacles in translating policy papers into action:

- There are difficulties to synthesize all the professional input into concrete and precise action plans, to find or allocate the appropriate budgets, to gain acceptance and cooperation from stakeholders, to translate the recommendations into priorities, targets, deadlines and indicators for progress, to perform and to monitor performance through the designated indicators. Audit-like processes are not customary in Israel's administration and are currently gradually introduced to administrative procedures.

- A gap sometimes exists between the professional knowledge that is involved in devising policies and action plans and the administrative or even entrepreneur or business-like capabilities that are sometimes required for the translation, adaptation and application of the recommendations into a long-term efficient process.
- Long-term commitments are difficult to achieve when governmental budgets are allocated yearly.

It seems that for a good implementation of the NBS, a coordinating unit with budget and with authority/ mandate will be required. For example, the preliminary recommendations for a SD strategy in the Ministry of Agriculture & Rural Development advise to establish a special unit within the ministry to promote the application of the strategy and of action plans.

Improvements and progress in planning and management can also be achieved through:

- Upgraded guidelines to environmental planning can be better and more fully established as to how to relate and handle BdC and how to shift from a phase of strategic planning and policy papers into a more ecosystem approach. Currently, planning is not always integrative, for example some of the infrastructure planning may not integrate with BdC planning.
- Upgraded guidelines to EIAs that include as a rule a specific reference to biodiversity and ecosystem services, though not easy to assess. Currently these are referred to mainly by attention to endangered habitats and endangered or unique species, whereas the functional aspects of biodiversity are referred to via the concern over ecological corridors and maintaining connectivity.
- Guidelines to the management of areas can be incorporated into planning, since defining land use is not enough to protect biodiversity, and the way an area is managed also matters. For example the lack of management definitions in the national master plan for afforestation is occasionally a cause for conflicts between the two managing agents, INPA and JNF-KKL, whose agendas are not identical. At the moment, there is also no formal way for follow-up on management-related issues and for deciding on intervention and care where required, though part of the areas are under the management of INPA or JNF-KKL.

4. CONCLUSIONS: PROGRESS TOWARDS THE 2010 TARGET AND IMPLEMENTATION OF THE STRATEGIC PLAN

4.1 Progress towards the 2010 Target

Israel has basically adopted the global targets, until the NBS-derived action plans will formulate their specific targets and goals. As portrayed in §2.3, the NBS has not defined targets and indicators, though it addressed the global goals and targets in its recommendations. Hence we shall mainly refer in this chapter to specific activities relevant to the global targets, if applicable to Israel.

In most cases, no data is available on the effectiveness or success of the measures taken regarding biodiversity status and trends. As there are currently hardly any official indicators in use, in this report we used, where available, some provisional data to supplement for indicators, describing the status and trends of biodiversity in Israel (see §1.2, §1.3) and discussing monitoring (see §3.6.2). In the tables below we shall refer to the same data sources. Table 9 presents activities in Israel that are relevant to the framework of goals, targets and indicators to assess progress towards the 2010 Biodiversity Target.

Needs and priorities identified are mainly discussed in the previous chapters.

Table 9: Framework of goals, targets and indicators to assess progress towards the 2010 Biodiversity Target [in columns marked by a-d: a) integration of targets: 1=none , 2=global targets adopted, 3= national targets established; b) incorporation of target into relevant sectoral and cross-sectoral strategies, plans and programmes: 1=no; 2=in NBS; 3=in other programmes; c) indicators for measuring progress: c1= No (no specific indicators are available), c2=Yes (what); d) obstacles]

Goals and targets Action taken/ progress made	Comments Relevant indicators [c], obstacles [d]	[a]	[b]
PROTECT THE COMPONENTS OF BIODIVERSITY			
<i>Goal 1. Promote the conservation of the biological diversity of ecosystems, habitats and biomes</i>			
Target 1.1: At least 10% of each of the world's ecological regions effectively conserved.		2	2, 3
<ul style="list-style-type: none"> On-going activity to declare more nature reserves, with efforts to increase the coverage of the less represented habitats. The coverage of protected areas in Israel is constantly increasing, with total protected area >20%, and more areas under statutory process (§1.2.9, §1.3.1). Regional planning pays increasing attention to the need for nature conservation (§3.5) 	Not all habitats and ecosystems are equally represented. Data is not available on the specific extent of selected protected biomes, ecosystems and habitats. [c1] ; [d= Many reserves are of relatively small area ; long statutory process involved]		
<ul style="list-style-type: none"> Updated management plans prepared for over 50% of nature reserves 	Allowing better protection of biodiversity within protected areas. [c1] ; [d= preparation of management plans is limited by budget]		
<ul style="list-style-type: none"> Special attention and priority to protect habitats previously less attended; In process of protecting more marine and coastal areas. 	(e.g. as Batha shrubland, coastal and marine habitats, sandy and kurkar habitats). [c1]		

CONCLUSIONS: PROGRESS TOWARDS THE 2010 TARGET AND IMPLEMENTATION OF THE STRATEGIC PLAN

Goals and targets Action taken/ progress made	Comments Relevant indicators [c], obstacles [d]	[a]	[b]
<ul style="list-style-type: none"> Forest area is growing, with its management more sustainability and biodiversity oriented (§1.3.1, §3.3). 	Statutory designated area is ca 7%, and actually afforested area is ca 4.5% of Israel's land area		
Target 1.2: Areas of particular importance to biodiversity protected		3	2,3
<ul style="list-style-type: none"> More areas of importance to biodiversity are protected in nature reserves 	The number of nature reserves increases, with improving coverage of unique biodiversity [c1]		
<ul style="list-style-type: none"> Updated management plans prepared for over 50% of nature reserves 	Allowing better protection of biodiversity within protected areas [c1] .		
<ul style="list-style-type: none"> Additional laws protecting ecosystems: protecting the coastal environment, water allocation for natural ecosystems. 	Water allocation to nature – in process of planning, improving the status of inland aquatic ecosystems (§2.4.3). [c1]		
<ul style="list-style-type: none"> Target incorporated into regional planning programmes and strategies. Vulnerability of open landscape to development, including identification of "Hot Spots" for plants and for avian species, was mapped and incorporated into regional planning considerations (§3.5). 	[c1]		
<ul style="list-style-type: none"> Target set to improve habitat connectivity using ecological corridors and is increasingly incorporated into regional planning 	[c1]		
<ul style="list-style-type: none"> Ecosystem assessment to identify open landscapes that need further protection (Frankenberg 2005). 			
<ul style="list-style-type: none"> Preparation of policy papers on the protection of arid, wetland and coastal ecosystems 			
<ul style="list-style-type: none"> Surveys and EIAs progressively used as tools to assess the sensitivity of open landscape for specific development projects. 			
<ul style="list-style-type: none"> River restoration program implemented, showing improvement in physical conditions, water allocation increased, efforts to exclude invasive species from nature reserves. 	Pollutant load decreased (§1.3.4).		
<ul style="list-style-type: none"> On-going "Clean Coast" project yields improvement in seashore physical conditions; more protection for sea turtles, more enforcement preventing damaging activities 	Cleanliness indicator shows improvement (§1.3.2)		
<ul style="list-style-type: none"> Red sea coral reef: Aquaculture removed, efforts to prevent sewage pollution, possible slow recovery 	Monitored indicators: less eutrophication and pollution, yet corals still show stress signs (§1.3.5)		
<ul style="list-style-type: none"> Trends in the abundance and distribution of selected species that are monitored show a mixed picture. 	Amphibians and mammals at highest risk. The condition of some desert species is worsening due to prolonged draught.		
<ul style="list-style-type: none"> Special attention and priority given to protect habitats previously less attended (e.g. as Batha shrubland). In process of protecting more marine and coastal areas, preparing statutory and management plans. 	[c1]		

CONCLUSIONS: PROGRESS TOWARDS THE 2010 TARGET AND IMPLEMENTATION OF THE STRATEGIC PLAN

Goals and targets Action taken/ progress made	Comments Relevant indicators [c], obstacles [d]	[a]	[b]
<i>Goal 2. Promote the conservation of species diversity</i>			
Target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups.		2	2,3
<ul style="list-style-type: none"> Updated management plans prepared for over 50% of nature reserves, allowing better protection of biodiversity within protected areas 	[c1]; [d=Management programs do not necessarily include indicator development]		
<ul style="list-style-type: none"> Action plans to protect certain species and taxonomic groups (e.g. raptors, insectivorous bats, amphibians; see Frankenberg 2005) were developed and implemented. 	Vertebrate population censuses for selected species reveal a mixed picture (§1.2.6, §1.3, §2.4).		
<ul style="list-style-type: none"> Reinforcement programs are implemented, the most elaborated is the Sea Turtle reinforcement program operated from 1990s (Frankenberg 2005, §2.4.2) 	[c1 – no sufficient indicators on their success]		
<ul style="list-style-type: none"> Re-introduction efforts for several species, mainly ungulates are partially successful (§2.4.2). 	There is no clear single trend for all species involved.		
<ul style="list-style-type: none"> Gene bank activity helping to protect and reintroduce endangered plant species. A new protocol and a species list were devised for collection of endangered wild plants (§2.4.1). Target set for ca 320 wild species of which 75% have already been collected. Additional <i>ex-situ</i> cultivation of 28 wild endangered plants to create a mass of seeds for future storage. 	List for collection in 2009 updated following insights from 2007-08 collecting efforts.		
<ul style="list-style-type: none"> <i>Ex-situ</i> breeding in refuges and botanic and zoological gardens for future reinforcement. A new programme prepared for plant refuges (§2.4.2) 			
<ul style="list-style-type: none"> The status of Amphibians is still deteriorating, with their habitat diminishing. 	A survey of ephemeral ponds shows their decrease in number and individual size due to habitat loss.		
<ul style="list-style-type: none"> A strategic decision made to identify and promote the protection of biodiversity within JNF-KKL managed forests was taken and currently further studied. 	[c1]		
<ul style="list-style-type: none"> The Israel Marine Mammal Research & Assistance Center is a NGO dedicated to the study and conservation of cetacean populations that inhabit the Eastern Mediterranean and the Gulf of Eilat/Aqaba 			
<ul style="list-style-type: none"> A Strategic Action Plan for the Conservation of Fish in the Mediterranean Sea and a Strategic Action Plan for the conservation of Shore Birds 	Prepared by academics at Israel's universities but have not yet been implemented		
<ul style="list-style-type: none"> Coral reef biodiversity seems currently stable (§1.3.5) 	Despite stress indications, no decline was recorded in species diversity		
Target 2.2: Status of threatened species improved.		2	2,3

CONCLUSIONS: PROGRESS TOWARDS THE 2010 TARGET AND IMPLEMENTATION OF THE STRATEGIC PLAN

Goals and targets Action taken/ progress made	Comments Relevant indicators [c], obstacles [d]	[a]	[b]
<ul style="list-style-type: none"> Red Data Books prepared for terrestrial vertebrates (2202) and for higher plants (2007, vol1 of 2) 	<p>More species are listed under endangered categories for plants and for terrestrial vertebrates. The methodology for scoring plant endangered species were modified and adapted: trends are therefore not straightforward to assess. Among vertebrates, amphibians are at highest risk.</p> <p>[d= assessments for vertebrates are not based on on-going monitoring or surveys; limited budget does not allow for repeated surveys to update assessments and reveal trends]</p>		
<ul style="list-style-type: none"> Management programs for more nature reserves are prepared and operated. Their aims include better protection of threatened species. 	<p>[c1= No data is available on the success of these measures regarding biodiversity status and trends. Indicators are to be developed]</p>		
<ul style="list-style-type: none"> River restoration and increased water allocation to nature to improve the status of wetland-related endangered species 	<p>[c1]</p>		
<ul style="list-style-type: none"> 2005 amendment added more plant and animal species to the list of protected natural assets. 			
<ul style="list-style-type: none"> See above in 2.1 on conservation action plans, reinforcement, <i>ex-situ</i> breeding and gene bank activities. 			
<p>Goal 3. Promote the conservation of genetic diversity</p>			
<p>Target 3.1: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained.</p>		3	2,3
<ul style="list-style-type: none"> Gene bank activities upgraded, protecting more cultivated, crop wild relatives and endangered plant species (see above and also Frankenberg 2005). 	<p>More species are kept <i>ex-situ</i> under improved conditions according to updated protocols. Studies on dynamic <i>in-situ</i> conservation</p>		
<ul style="list-style-type: none"> Special Gene Bank project to protect traditional wheat species (Land Races) 	<p>64 wheat land races collected from various sources; 42 of which further grown to create a seed mass for storage.</p>		
<ul style="list-style-type: none"> Past projects documented traditional medicinal uses of plant species according to several traditions; on-going studies on the medicinal and pharmaceutical value of native plant species. 			
<ul style="list-style-type: none"> Organic farmers with Gene Bank promote the protection and use of vegetable land races via seed exchange 			
<ul style="list-style-type: none"> Protection of harvested spice plant populations 	<p>Genetic diversity is not studied or monitored.</p>		
<ul style="list-style-type: none"> Illegal hunting threatens mainly mammals in agricultural areas 	<p>[c1= exact magnitude and trends are not clear]. Only general assessment available and enforcement efforts to minimize the problem</p>		
<p>PROMOTE SUSTAINABLE USE</p>			
<p>Goal 4. Promote sustainable use and consumption.</p>			
<p>Target 4.1: Biodiversity-based products derived from sources that are sustainably managed, and production areas managed consistent with the conservation of biodiversity.</p>		2	2

CONCLUSIONS: PROGRESS TOWARDS THE 2010 TARGET AND IMPLEMENTATION OF THE STRATEGIC PLAN

Goals and targets Action taken/ progress made	Comments Relevant indicators [c], obstacles [d]	[a]	[b]
<ul style="list-style-type: none"> • Forest management is upgraded to sustainable management (§3.3) 	[c1= forest biodiversity and well-being indicators are lacking: under development.]		
<ul style="list-style-type: none"> • SD strategy for the agricultural sector is under development, with a clear commitment to promote sustainable practices 			
<ul style="list-style-type: none"> • River restoration efforts and water allocation to nature (described above and also in §1.3.4, §2.4.3). 	Where river restoration efforts held, water quality is generally improving. Generally, human water consumption and extraction patterns are unsustainable.		
Target 4.2. Unsustainable consumption, of biological resources, or that impacts upon biodiversity, reduced.		2	3
<ul style="list-style-type: none"> • Regional planning guidelines restrict the use of land for various uses and aims to minimize habitat fragmentation (§3.5) 	[d= development and political pressures sometime overcome professional planning guidelines.]		
<ul style="list-style-type: none"> • River restoration efforts and water allocation to nature (described above and also in §1.3.4, §2.4.3). 	Generally, human water consumption and extraction patterns are still unsustainable.		
<ul style="list-style-type: none"> • Management and enforcement efforts to prevent illegal cutting of trees, harvesting of spice plants and grazing 	[c1]		
Target 4.3: No species of wild flora or fauna endangered by international trade.		2	3
<ul style="list-style-type: none"> • All CITES species are protected by law, under Israeli legislation. Commercial use of local species is prohibited by law 	[c1= no indicators to the affectivity of policy]		
ADDRESS THREATS TO BIODIVERSITY			
<i>Goal 5. Pressures from habitat loss, land use change & degradation, and unsustainable water use, reduced.</i>			
Target 5.1. Rate of loss and degradation of natural habitats decreased.		3	2,3
<ul style="list-style-type: none"> • Regional planning guidelines restrict the use of land, aiming to promote SD, minimize urban sprawl and minimize habitat fragmentation (§3.5) 	[c1= habitat loss continues, no indicators to rate of loss; no exact indicators or mapping of the extent of specific habitats or ecosystems]		
<ul style="list-style-type: none"> • Management plans to better protect biodiversity within nature reserves 	[c1]; [d= many nature reserves are small, and pressures from the ambient environment are substantial]		
<ul style="list-style-type: none"> • Studies and dedicated activities to combat invasive species, particularly in nature reserves. Targets are usually to restrict rather than eradicate. 	Great attention to testing methodology to combat <i>Acacia saligna</i> .		
<ul style="list-style-type: none"> • Legal protection to the coastal environment (supported by enforcement, see Frankenberg 2005) 	[c1]		
<ul style="list-style-type: none"> • Management and enforcement efforts to prevent illegal cutting of trees, harvesting of spice plants, hunting, sand mining and grazing 	[c1]		
<ul style="list-style-type: none"> • River restoration efforts and water allocation to nature (described above and also in §1.3.4, §2.4.3). 	Water pollution decreased where river restoration was held. Generally, human water consumption and extraction patterns are still unsustainable.		
<ul style="list-style-type: none"> • Special management efforts to protect soil from erosion after forest fires. 	Numerous studies after 2 major fire events indicate that the measures taken were useful		

CONCLUSIONS: PROGRESS TOWARDS THE 2010 TARGET AND IMPLEMENTATION OF THE STRATEGIC PLAN

Goals and targets Action taken/ progress made	Comments Relevant indicators [c], obstacles [d]	[a]	[b]
<ul style="list-style-type: none"> Preparation of policy papers and guidelines to decrease the loss of specific habitats: sand dunes, Kurkar and hamra, loes plateaus. 			
<ul style="list-style-type: none"> Ministry activities and strategies within the NCSD include sustainable use of natural resources and prevention of their degradation (§3.1.1). 			
<ul style="list-style-type: none"> Promotion of biosphere planning to better harmonize development with well-being of adjacent ecosystems 			
Goal 6. Control threats from invasive alien species			
Target 6.1. Pathways for major potential alien invasive species controlled.		3	2,3
<ul style="list-style-type: none"> Tighter control of Ministry of Agriculture on allowed import of alien species 	[c1, general assessments indicate that the number of invasive species increases]		
<ul style="list-style-type: none"> Efforts to update the lists of species allowed to Israel and of species regarded by the Ministry of Agriculture as invasive 			
<ul style="list-style-type: none"> Preparation of an updated national strategy and action plan to combat invasive species – in process 			
<ul style="list-style-type: none"> Formulating response protocols to prevent further introduction of a detected invasive species 	[d= involves coordination between several ministries, detection time may be several years from actual introduction]		
Target 6. 2. Management plans in place for major alien species that threaten ecosystems, habitats or species.		3	2,3
<ul style="list-style-type: none"> Studies and dedicated activities devised to combat specific invasive species through a combination of methods, particularly in nature reserves. 	Great attention to testing methodology to combat <i>Acacia saligna</i> . [d= lack of resources usually limits these activities; Target is usually to restrict rather than eradicate.]		
<ul style="list-style-type: none"> Several alien species were declared invasive and removed from planting activities. 			
<ul style="list-style-type: none"> Formulating response protocols to handle invasive species that are also health hazards 	[c1, general assessments indicate that infestation levels of some species are still increasing]		
Goal 7. Address challenges to biodiversity from climate change, and pollution			
Target 7.1. Maintain and enhance resilience of the components of biodiversity to adapt to climate change.		2	2
<ul style="list-style-type: none"> Long-term studies on the possible impact of climate change on Mediterranean and semiarid ecosystems. 	GLOWA-JR and Israel-LTER. Mainly on plant species composition, seed germination and survival		
<ul style="list-style-type: none"> Special conservation attention is paid to populations in periphery of their distribution range, particularly to the semiarid region in Israel (see Frankenberg 2005). 	[c1]		
<ul style="list-style-type: none"> Attention given to maintaining ecological corridors, mainly through regional planning tools, and to enhance connectivity across linear infrastructure 	[c1]; [d= habitat loss and fragmentation persist, and efforts are made to minimize damages]		
<ul style="list-style-type: none"> Preliminary MoEP 2008 policy paper on Israel's preparation for climate change includes recommendation to protect biodiversity components. 			

CONCLUSIONS: PROGRESS TOWARDS THE 2010 TARGET AND IMPLEMENTATION OF THE STRATEGIC PLAN

Goals and targets Action taken/ progress made	Comments Relevant indicators [c], obstacles [d]	[a]	[b]
<ul style="list-style-type: none"> Afforestation program tested in arid areas for enhancing biodiversity resilience to climate change 	[d= the ecosystem itself is not native, yet may somehow support adjacent naturally occurring biodiversity components]		
<ul style="list-style-type: none"> Afforestation activities increase the share of mixed species forest, grazing policy aimed to increase biodiversity and resilience of grazing systems 			
Target 7.2. Reduce pollution and its impacts on biodiversity.		3	3
<ul style="list-style-type: none"> Decrease pollutant levels (in air, soil and water) and other hazards impairing the resilience of biodiversity components, as part of the MoEP responsibility and authority. Implementation of laws, regulations, enforcement and punishment. 	[c1= aquifer pollutant levels increasing, also reflecting pollution from previous years]; [d= implemented as general environmental and conservation policy, not solely related to climate change impacts]		
<ul style="list-style-type: none"> Efforts to improve water quality in aquatic ecosystems, mainly through river restoration program, increased water allocation to nature, wastewater treatment improved (higher quality effluent standard is to be implemented as soon as treatment facilities are upgraded) 	River restoration is one of the main conservation priorities.		
<ul style="list-style-type: none"> Direct efforts to remove pollutants from marine ecosystems (§1.3.5). 	Monitored indicators show a decrease in pollutant levels. [d= in Mediterranean – this trend has levelled off in the last couple of years, in Red Sea – decrease in pollutant levels not immediately followed by coral recovery]		
MAINTAIN GOODS AND SERVICES FROM BIODIVERSITY TO SUPPORT HUMAN WELL-BEING			
<i>Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods</i>			
Target 8.1. Capacity of ecosystems to deliver goods and services maintained.		2	2,3
<ul style="list-style-type: none"> Pollution prevention efforts promote ecosystems' capacity to deliver the various types of goods and services. 	[c1]; [d= activities not explicitly directed towards the maintenance of ecosystem services]		
<ul style="list-style-type: none"> A policy paper on biodiversity and ecosystem services prepared within the framework of working groups towards SD strategy 	A first discussion of ecosystem services, listing numerous local examples		
<ul style="list-style-type: none"> NBS incorporates this target in its consideration, a marked shift in conservation and management orientation 	[d= yet to be expressed in derived action plans]		
<ul style="list-style-type: none"> Direct provisioning services protected through prevention of over-use through enforcement 	[d= activities not explicitly directed towards the maintenance of ecosystem services]		
<ul style="list-style-type: none"> Control and support services protected through protection of open landscape and protected areas, through river restoration and afforestation activities. 	[d= activities not explicitly directed towards the maintenance of ecosystem services]		
<ul style="list-style-type: none"> Inspiration services protected through regional planning 	[d= activities not explicitly directed towards the maintenance of ecosystem services]		
<ul style="list-style-type: none"> The Dead Sea ecosystem is continuously deteriorating due to over exploitation of its water sources. Various scenarios do not foresee improvement within the next 30 years. 			

CONCLUSIONS: PROGRESS TOWARDS THE 2010 TARGET AND IMPLEMENTATION OF THE STRATEGIC PLAN

Goals and targets Action taken/ progress made	Comments Relevant indicators [c], obstacles [d]	[a]	[b]
Target 8.2. Biological resources that support sustainable livelihoods, local food security and health care, especially of poor people maintained.		1	1
Not relevant in Israel	[d= activities not explicitly directed towards the maintenance of ecosystem services]		
PROTECT TRADITIONAL KNOWLEDGE, INNOVATIONS AND PRACTICES			
<i>Goal 9 Maintain socio-cultural diversity of indigenous and local communities</i>			
Target 9.1. Protect traditional knowledge, innovations and practices.		1	1
<ul style="list-style-type: none"> Multi-cultural and traditional knowledge of numerous groups maintained through NGOs, cultural activities and ethnic or XX activities and awareness. Academic and agricultural research and experimental farming used to maintain and apply traditional knowledge. 			
<ul style="list-style-type: none"> Research on plants used in traditional medicine (see Frankenberg 2005). 			
Target 9.2. Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit-sharing.		1	1
Not relevant to Israel			
ENSURE THE FAIR AND EQUITABLE SHARING OF BENEFITS ARISING OUT OF THE USE OF GENETIC RESOURCES			
<i>Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources</i>			
Target 10.1. All access to genetic resources is in line with the Convention on Biological Diversity and its relevant provisions.		2	1
<ul style="list-style-type: none"> The Israel Gene Bank operates in accordance with these agreements 			
Target 10.2. Benefits arising from the commercial and other utilization of genetic resources shared in a fair and equitable way with the countries providing such resources in line with the Convention on Biological Diversity and its relevant provisions		2	1
<ul style="list-style-type: none"> The Israel Gene Bank for Agricultural Crops works in accordance with a Letter of Commitment to this effect 			
ENSURE PROVISION OF ADEQUATE RESOURCES			
<i>Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention</i>			
Target 11.1. New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20.		1	1
Financial resources are very limited.			
Target 11.2. Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4.		2	2
<ul style="list-style-type: none"> International assistance project to developing countries is held by MASHAV (§3.8) 			

4.2 Progress towards the Goals and Objectives of the Strategic Plan of the Convention

Israel's progress with the NBS and national goals was described in chapters 2 and 3, and in table 9 above. Further details are given in table 10 below. As stated above, the main obstacles to progress towards the goals and objectives of the strategic plan of the convention are: lack of adequate financial resources, a lower priority on the national agenda and a lack of appropriate administrative framework, organizing existing activities within action plans with measurable goals, targets and indicators to assess progress.

Table 10: Goals and objectives of the Strategic Plan and provisional indicators for assessing progress.

Strategic goals and objectives
Goal 1: The Convention is fulfilling its leadership role in international biodiversity issues.
1.1 The Convention is setting the global biodiversity agenda.
We fully agree to this
1.2 The Convention is promoting cooperation between all relevant international instruments and processes to enhance policy coherence.
Israel's commitment to the CBD is taken into account when involved in other international cooperation processes, particularly those relevant to BdC
1.3 Other international processes are actively supporting implementation of the Convention, in a manner consistent with their respective frameworks.
Same as above
1.4 The Cartagena Protocol on Biosafety is widely implemented.
Israel has not signed this protocol: Not relevant to Israel. Integration of biodiversity concerns into relevant sectoral or cross-sectoral plans etc. – as described in chapter 3.
1.5 Biodiversity concerns are being integrated into relevant sectoral or cross-sectoral plans, programmes and policies at the regional and global levels.
Israel is participating in international cooperation projects relevant to conservation of genetic resources, of monitoring biodiversity and of nature conservation.
1.6 Parties are collaborating at the regional and sub-regional levels to implement the Convention.
See above. Also , as much as the political situation allows, cooperation with neighbouring countries on specific issues regarding the gulf of Eilat/Aqaba, cross-border cooperation with Jordan, cooperation at the Mediterranean level and with EU countries.
Goal 2: Parties have improved financial, human, scientific, technical, and technological capacity to implement the Convention.
2.1 All Parties have adequate capacity for implementation of priority actions in national biodiversity strategy and action plans.
Professional capacity is adequate: yet, multiple tasks with limited allocated manpower and rather limited budget, not being at the top of the state's priority list due to political and security concerns, all make their task and objectives rather difficult to achieve. International assistance for capacity building in developing countries is held by MASHAV (\$3.8)

Strategic goals and objectives
2.2 Developing country Parties, in particular the least developed and the small island developing States amongst them, and other Parties with economies in transition, have sufficient resources available to implement the three objectives of the Convention.
Not applicable to Israel; yet, financial resources for CBD implementation are usually on the low side
2.3 Developing country Parties and other Parties with economies in transition, have increased resources and technology transfer available to implement the Cartagena Protocol on Biosafety.
Not applicable
2.4 All Parties have adequate capacity to implement the Cartagena Protocol on Biosafety.
Not relevant to Israel
2.5 Technical and scientific cooperation is making a significant contribution to building capacity.
Definitely, we fully agree. Both in the scientific-theoretic aspects, the technical aspects and the administrative-implementation side.
Goal 3: National biodiversity strategies and action plans and the integration of biodiversity concerns into relevant sectors serve as an effective framework for the implementation of the objectives of the Convention.
3.1 Every Party has effective national strategies, plans and programmes in place to provide a national framework for implementing the three objectives of the Convention and to set clear national priorities.
Israel's NBS is about to be officially adopted, followed by development of relevant action plans (see chapters 2 and 3).
3.2 Every Party to the Cartagena Protocol on Biosafety has a regulatory framework in place and functioning to implement the Protocol.
Not relevant to Israel
3.3 Biodiversity concerns are being integrated into relevant national sectoral and cross-sectoral plans, programmes and policies.
Israel's NBS is to be officially adopted, followed by development of relevant action plans; that will enhance the degree to which BdC is integrated in sectoral and cross-sectoral planning (see chapter 3).
3.4 The priorities in national biodiversity strategies and action plans are being actively implemented, as a means to achieve national implementation of the Convention, and as a significant contribution towards the global biodiversity agenda.
As above
Goal 4: There is a better understanding of the importance of biodiversity and of the Convention, and this has led to broader engagement across society in implementation.
4.1 All Parties are implementing a communication, education, and public awareness strategy and promoting public participation in support of the Convention.
Education towards BdC is slowly growing (see §3.6) with special programs on biodiversity education having been prepared and implemented; the preparation of a specific action plan is expected to enhance activities in this direction. Public participation is mainly through NGOs involved in nature conservation. There are no surveys, follow-up or indicators implemented to track the changes in public awareness and its impacts on policies or decision-making.
4.2 Every Party to the Cartagena Protocol on Biosafety is promoting and facilitating public awareness, education and participation in support of the Protocol.
Not relevant to Israel

Strategic goals and objectives
4.3 Indigenous and local communities are effectively involved in implementation and in the processes of the Convention, at national, regional and international levels.
Involvement of local communities - only in the local or national level, as part of nature conservation efforts.
4.4 Key actors and stakeholders, including the private sector, are engaged in partnership to implement the Convention and are integrating biodiversity concerns into their relevant sectoral and cross-sectoral plans, programmes and policies.
The awareness to biodiversity conservation issues is only emerging, and is mainly at the governmental-administrative levels. Stakeholder involvement in partnerships, if at all, is towards nature conservation <i>per se</i> , and on a rather limited scale.

4.3 Conclusions

Generally, the numerous activities applied for the implementation of the CBD seem to have a positive impact towards improving the conservation and sustainable use of biodiversity. It should be stressed, though, that most of these activities were held under the national framework of "nature conservation" rather than "biodiversity conservation". The progress in the promotion of the NBS and its derived action plans should boost a new dimension in BdC. So far, the discussions involved in the preparation of the NBS have already introduced some changes in conservation and management policies, even before it has been officially adopted.

The most significant success is with conservation efforts of freshwater habitats, mainly streams and rivers using an array of legal, conservation, management, administrative, financial and educational tools. These include combined efforts to: keep pollutants away from waterways; incorporate more of them in designated nature reserves and within river restoration project; set up designated authorities to handle specific streams and rivers; allocate water quotas for nature within water administration programs for specific watersheds; change water extraction practices from upstream to downstream in few streams and rivers; facilitate river restoration through physical riverbed restoration; combat invasive species and reinforce or reintroduce original fauna and flora components; implement management programs and link to other conservation programs, such as for coastal and marine habitats; increase public education and awareness.

This has a particularly important role in a water-scarce country, where these habitats are particularly fragile and produce multiple ecosystem services (relevant to equitable sharing of benefits of goods and of provisioning, control, support and inspiration services, with these landscapes being most favourable also for leisure and recreation).

The efforts put into nature conservation are often restricted by several obstacles:

- The budget allocated for nature conservation and for biodiversity conservation is limited, both for activities and for employment of sufficient professionals to perform the required tasks;
- BdC is not located high on the national agenda - with national defence issues always higher on the priority list; and with human well-being more impaired by the polarization of social structure and decrease in welfare policies rather than the deteriorating status of biodiversity,

so that access to biodiversity and ecosystem services is not perceived as an immediate human well-being issue;

- A general lack of suitable administrative procedures makes it difficult to assess the effects of activities and progress made, as most programmes and action plans do not delineate goals, target and measurable indicators to assess their progress. Thus, it is difficult to consider and assess more accurately if the efforts invested in certain activities are worthwhile and where modifications or a conceptual revisions are required, particularly with continuing pressures of accelerated development and urbanization, habitat loss and fragmentation.

Future priorities and capacity-building needs are linked to the official adoption and promotion of NBS and its linked activities. Some of its recommendation either relate to or suggest to modify current activities, or have been promoted before the formal adoption of the NBS itself; therefore, it is crucial to put all activities under the framework of the NBS to coordinate and concert efforts at various administrative levels and with different stakeholders.

International activities that seemed to be instrumental to further enhance implementation of the CBD at the national level are where professionals participate in international workgroups, discuss problems, share solutions and know-how, and build together action plans and work procedures. These are to be later adopted and implemented at the national level, benefiting from the professional supporting forum, sharing both the ecological, environmental and administrative knowledge. Such are, for example, Israel's participation at forums such as BIOHAB, EBONE, ILTER and similar activities, which seem to enhance and contribute to national related projects. The participation of educationally-oriented organizations in international forums promoting biodiversity education enhances and promotes the gradual introduction of these issues to the national arena; the declaration of 2010 as the international biodiversity year has driven the Ministry of Education to proclaim 2010 as "The Year of Biodiversity" in the formal education system, which should promote the awareness to biodiversity conservation within the general public and the younger generation.

APPENDICES

Appendix I - Information concerning reporting Party and preparation of national report

A. Reporting Party

Contracting Party	State of Israel
NATIONAL FOCAL POINT	
Full name of the institution	
Name and title of contact officer	
Mailing address	
Telephone	
Fax	
E-mail	
CONTACT OFFICER FOR NATIONAL REPORT (IF DIFFERENT FROM ABOVE)	
Full name of the institution	
Name and title of contact officer	
Mailing address	
Telephone	
Fax	
E-mail	
SUBMISSION	
Signature of officer responsible for submitting national report	
Date of submission	

B. Process of preparation of national report

Information from different stakeholders was compiled during the process of preparing this report. These included written reports and data as well as interviews with professionals from:

- a) governmental ministries and authorities - the Israel Nature Reserves and Parks Authority, the Ministry of Environmental Protection, the Ministry of Science, the Ministry of Agriculture, the Ministry of Interior, and the Israel Gene Bank for Agricultural Crops, under the responsibility of the Ministry of Science and the Ministry of Agriculture (on conservation of genetic diversity);
- b) various academic institutions in Israel, most specifically the Israel LTER (on research and monitoring), Tel Aviv University (on biodiversity related research and education) and the Hebrew University of Jerusalem (on botanic gardens);
- c) JNF-KKL (on afforestation and forest management). Further information was derived from various reports of INPA, the Society for the Protection of Nature in Israel, Israel Oceanographic & Limnological Research, the Inter-University Research Station in Eilat, the Environmental department at the Jerusalem Institute for Israel Studies and others listed in appendix II. Careful examination was also made of the final draft of Israel's National Biodiversity Strategic Action Plan.

Following collection and compilation of all the material (written and oral), the report was written and reviewed prior to submission to the secretariat of the Convention on Biological Diversity.

Appendix II - Further sources of information

List of references used in above chapters. In bold – previous official reports to CBD or other conventions (most publications are in Hebrew, unless marked with #, where relevant - a web address was given, last visited August 2009):

Achiron-Frumkin, T. & Frumkin, R. 2002. Biodiversity and sustainable development. The report of the biodiversity team within the framework of the Strategy for Sustainable Development in Israel. MoEP.

Alon, D. & Perlmann, Y. 2008. Endangered bird in Israel: 2008. SPNI.

Avnon, A. (ed.) 2008. Guidelines for landscape and environmental planning. Israel National Road Company.

Barazani, O., Perevolotsky, A. Hadas, R. 2008. A problem of the rich: Prioritizing local plant genetic resources for ex situ conservation in Israel. *Biological Conservation* 141:596-600. #

Dolev, A. & Perevolotsky, A. 2002. Endangered species in Israel. Red list of threatened species. Vertebrates. INPA and SPNI.

Dufour-Dror, J-M. 2005. Invasive Plant Species in Protected and Open Areas in the Central District. MoEP and Jerusalem Institute for Israel Studies.

Dufour-Dror, J-M. 2008. Protecting the landscape heritage in Israel: building a policy paper to planners and local authorities on the use of non-native plant species. MoEP.

Eidelman, A. & Cohen, G. (eds) 2004. Setting the policy agenda for the future of the Dead Sea: interim report examining the "business as usual" scenario. Ministry of the Environment, Ministry of National Infrastructure (The Geological Survey), Jerusalem Institute for Israel Studies.

Feitelson, E. (ed.) 2004. Sustainable Development Indicators in Israel. Summary Report Phase I. The Jerusalem Institute for Israel Studies, The Center for Environmental Policy. #

Frankenberg, E. 1999. Israel Second National Report to the Biodiversity Convention, 1999. http://www.sviva.gov.il/Environment/Static/Binaries/index_pirsumim/p0398_1.pdf. #

Frankenberg, E. 2002. Strategic Action Plan for the Conservation of the Biological Diversity (SAP BIO) in the Mediterranean Region. National Report of ISRAEL. Ministry of the Environment. http://www.sviva.gov.il/Environment/Static/Binaries/index_pirsumim/p0378_1.pdf. #

Frankenberg, E. 2005. Israel Third National Report to the Biodiversity Convention, 2005. Ministry of Environmental Defence. http://www.sviva.gov.il/Environment/Static/Binaries/index_pirsumim/p0399_1.pdf. #

Gabbay, S. (ed). 1997. Conservation and sustainable use of biological diversity in Israel. Report of the State of Israel on the implementation of article 6 of the Convention on Biological Diversity. State of Israel, Ministry of the Environment, December 1997. http://www.sviva.gov.il/Environment/Static/Binaries/index_pirsumim/p0265_1.pdf. #

Gabbay, S. & Barzilay I. 2008. Environmental policy and institutional framework of Israel. Brief note to the environment policy committee (OECD). Ministry of Environmental Protection. http://www.sviva.gov.il/Environment/Static/Binaries/ModulKvatzim/BACKGROUND_NOTES_TO_THE_ENVIRONMENT_POLICY_COMMITTEE_1.pdf. #

Feitelson, E. 2004. Sustainable Development Indicators in Israel. Summary Report Phase I. The Jerusalem Institute for Israel Studies, The Center for Environmental Policy. #

APPENDICES

Hatzofe, O. and Nemtsov, S. 2004. Exotic (invasive) terrestrial vertebrate species that have established wild populations in Israel. INPA.

<http://www.parks.org.il/BuildaGate5//portals/parks/imagesFILES/Advanced1151479052.pdf>

Herut, B., Shefer, E., Gordon, N., Galil, B., Tibor, G. and Tom, M. 2008. Environmental quality of Israel's Mediterranean coastal waters in 2007, IOLR Report H52/ 2008.).

Kaplan, M. Eidelman, A. & Cohen, G. (eds.) 2009. Indicators for sustainable development in Israel. Part II. Ministry for Environmental Protection, National Bureau of Statistics and Jerusalem Institute for Israel Research..

Kinneret Data Center. 2009. Graphical presentation of seasonal and multi-annual limnological data. Israel Oceanographic & Limnological Research. The Yigal Allon Kinneret Limnological Laboratory. http://kinneret.ocean.org.il/Images/multi_Eng.ppt 1 #

Levin, N., Elron, E. & Gasith, A. 2009. Decline of wetland ecosystems in the coastal plain of Israel during the 20th century: Implications for wetland conservation and management. Landscape and Urban Planning (in press) #

Open Landscape Institute. 2008. Annual report.

http://www.deshe.org.il/_Uploads/dbsAttachedFiles/OLI_EngReport_2008_LR.pdf

Ortal, R & Gabbay, S. 2005. Israel Third National Report to the Ramsar Convention, 2005.

http://www.sviva.gov.il/Environment/Static/Binaries/index_pirsumim/p0365_1.pdf. #

Perlberg, A et al. 2006. A survey of mammals and reptiles in the coastal sands as a tool to assess the status of sandy habitat, define the importance of their conservation and establish management tools to implement them. SPNY and MoEP.

Safriel, U. (ed). 2009. National Plan for Biodiversity in Israel. MoEP, in press.

Sapir Y., Shmida A., Fragman O. 2003. Constructing Red Numbers for setting conservation priorities of endangered plant species: Israeli flora as a test case Journal for Nature Conservation, 2003: 91-107. #

Stern, E. (ed.) 2003. Policy and tools for conservation of open landscape: operational tools, principles and recommendations. MoEP, INPA, JNF-KKL, SPNI.

Shaked, Y. & Genin, A. 2009. The Israel National Monitoring Program at the Northern Gulf of Aqaba. Scientific report 2008. The Institute for Marine Sciences in Eilat and the Ministry of Environmental Protection (plus previous reports from 2003-2007).

Shkedi, Y. & Sadot, E. 2000. Ecological Corridors in open landscape: a tool for conservation. Nature and Parks Authority.

Shkedi, Y. & Sadot, E. 2004. Animal passage on roads: policy and recommendations. Nature and Parks Authority, National Road Company and the Ministry of Environmental Protection.

Shmida, A. & Pollak, G. 2007. Red Data Book: Endangered Plants of Israel. Volume I. INPA.

Tal, A. 2008. Desertification: Israel's National Report to the CSD (CSD-16/17). <http://israel-un.mfa.gov.il/mfm/Data/134463.pdf> #

Yom-Tov, Y. & Tchernov, E. 1988. The zoogeography of Israel. The distribution and abundance at a zoogeographic crossroad. Dr W Junk Publishers, Dordrecht, The Netherlands.#

Examples of educational web sites:

Ministry of Education web site for teachers: <http://cms.education.gov.il/EducationCMS/UNITS/BarKayma>

Tel Aviv University Campus-Nature educational program: <http://www.earthweb.tau.ac.il/>

Yad Hanadiv educational program: http://www.ramathanadiv-edu.org.il/program-field_lab.asp

Appendix III - Progress towards Targets of the Global Strategy for Plant Conservation and Programme of Work on Protected Areas

A. Progress towards Targets of the Global Strategy for Plant Conservation

Israel's NBS took a strategic decision to avoid from defining any specific national targets, and allow such targets to be defined and determined by special teams that will develop specific action plans. This step is aimed to gain wide governmental and other stakeholder support and cooperation, thus giving these programs a better chance to be promoted and implemented. Therefore, the following tables will present how the GSPC targets are incorporated into relevant NBS recommended means of implementation and present on-going activities towards the same target.

Table 11 presents recommendations for specific action plans made by the NBS and their relevance to the GSPC targets. Within each of the major 7 action plans, there are recommendations for more specific action plans, which are listed in chapter 2 above.

Table11: Recommendations in Israel's NBS and their relevance to the GSPC targets. For further details on the associated action plans that are included in each major action plan see table 7 in chapter 2.

Action plans recommended by the NBS	GSPC Target no:															
	1	2	3	4	5	6	7	8	9	10	11	14	15	16		
1 Action plan to update and adapt national master plans in biodiversity conservation aspects		+	+	+	+	+	+			+						
2 Action plan for <i>in-situ</i> conservation and management			+	+	+	+	+	+	+	+			+	+		
3 Action plan to monitor biodiversity	+	+	+	+	+		+			+			+	+		
4 Action plan for bridging knowledge gaps	+	+	+		+		+	+	+	+			+	+		
5 Action plans to increase public awareness, support and involvement in biodiversity conservation and management		+				+	+			+	+	+	+	+		
6 Action plan for economic incentives to the promotion of biodiversity conservation			+			+					+	+	+	+		
7 Action plan to promote legal and institutional tools for biodiversity conservation and management											+					
8 Action plan for the international commitment				+	+		+				+			+		
	1	2	3	4	5	6	7	8	9	10	11	14	15	16		

Table 12 presents means of implementation in Israel and progress towards the targets of the Global Strategy for Plant Conservation. A main obstacle encountered is the lack of sufficient resources for the full spectrum of activities requested, for repeated surveys and monitoring.

Table 12: Means of Implementation of the GSPC in Israel.

[A= Incorporation of targets into relevant strategies, plans and programmes; B= Actions taken to achieve the target; C= Obstacles encountered; D= Needs and future priorities identified]

A. Understanding and documenting plant diversity	
Target 1: A widely accessible working list of known plant species, as a step towards a complete world flora	
[A]	▪ Target incorporated into NBS recommendations
[B]	<ul style="list-style-type: none"> ▪ Checklist and Ecological Data-Base of the Flora of Israel and its Surroundings – published in 1999 and covers higher plant species. ▪ A comprehensive database of observations of wild plants developed; Access to listings of 2,383 plant species, including endemic, rare and endangered species, is available on Flora of Israel website: http://flora.huji.ac.il/browse.asp?lang=en; Another database available on the MoEP's website. ▪ Research on the geographic distribution, biology and phenology of wild plants in Israel is carried out by several groups of botanists.
[C]	<ul style="list-style-type: none"> • More data exists for higher plants. Diminishing taxonomic knowledge, few capable professionals and low budgets restrict updating lists for lower plants.
[D]	<ul style="list-style-type: none"> • Provide sufficient reliable funding for on-going data collection and database maintenance. • Promote ongoing researches related to the Flora of Israel. • Promote cooperation and data sharing between botanist groups collecting observations' data.
Target 2: A preliminary assessment of the conservation status of all known plant species, at national, regional and international levels	
[A]	▪ Target incorporated into NBS recommendations.
[B]	<ul style="list-style-type: none"> • The conservation status of each plant species was evaluated and a list of endangered species was established: Israel Red Data Book for plants lists 413 Red Species out of a total of 2,388 listed species: Part1 was published in 2007 and part2 is due in 2010. • A new methodology was developed to construct the "red number" for setting conservation priorities of endangered plant species. • A map of Israel's botanic "Hot Spots" prepared for setting priorities for plant conservation and development policies embedded in regional planning.
[D]	<ul style="list-style-type: none"> • Encourage research and monitoring on the conservation status of species or for indicators of species' conservation status. • Repeat field survey on Red Species every 3-5 years to monitor changes. • Better cooperate between botanist groups to more accurately update data on rare species.
Target 3: Development of models with protocols for plant conservation and sustainable use, based on research and practical experience	
[A]	▪ Target incorporated into NBS recommendations.
[B]	<ul style="list-style-type: none"> • Nature reserve management protocols include protocols for plant conservation based on research and practical experience. • Grazing policies of the Ministry of Agriculture are adapted according to research and practical use to enhance sustainable use and biodiversity values in graze lands. • JNF-KKL are developing their own protocols for BdC and sustainable use in afforested areas.
[C]	<ul style="list-style-type: none"> • Lack of satisfying indicators for biodiversity conservation and sustainable use in afforested areas.
[D]	<ul style="list-style-type: none"> • Promote the integration between <i>in-situ</i> and <i>ex-situ</i> conservation. • Develop protocols for identifying conservation priorities. • Better coordinate between agriculture, forestry and nature conservation protocols.
B. Conserving plant diversity	
Target 4: At least 10% of each of the world's ecological regions effectively conserved	
[B]	<ul style="list-style-type: none"> • Continuous efforts are made to fully represent Israel's diverse ecosystems and habitats within the protected areas in Israel.

APPENDICES

[D]	<ul style="list-style-type: none"> • Accurately map Israel's ecological regions and the share of each in protected areas. • Use results to better represent ecosystems in protected areas. • Prepare additional management plans for protected areas in regions that are lacking such programs.
Target 5: Protection of 50% of the most important areas for plant diversity assured	
[B]	<ul style="list-style-type: none"> • A map of Israel's botanic "Hot Spots" prepared for setting priorities for plant conservation and development policies embedded in regional planning. • No further quantitative targets have been set.
[D]	<ul style="list-style-type: none"> • Update "Hot Spot" map at local and national level. • Set priorities for important areas to conservation in each ecosystem. • Embed results in policies and plans. • Develop procedures for shorter statutory procedures for nature reserve declaration.
Target 6: At least 30% of production lands managed consistent with the conservation of plant diversity	
[A]	<ul style="list-style-type: none"> • Target incorporated into NBS recommendations, in policy papers to promote sustainable agriculture and in the draft for the emerging SD strategy of the Ministry of Agriculture (without a set numeric target).
[B]	<ul style="list-style-type: none"> • The present development of SD strategies for agriculture and forestry can enhance the conservation of plant diversity in mixed forests, in graze lands, in organic farms and for rare plants having survived on the verges of agricultural plots.
[D]	<ul style="list-style-type: none"> • Promote the implementation of biosphere planning and management, encouraging cooperation between farmers and ecologists. • Promote the development and implementation of economic incentives for farmers who practice in accordance with the conservation principles.
Target 7: 60% of the world's threatened species conserved <i>in situ</i>	
[B]	<ul style="list-style-type: none"> • The list of plants protected under new regulations on protected natural assets was amended in 2005 to include additional species. • Conservation plans are aimed at protecting most plant species of Israel. • Israel's Gene Bank for Agricultural Crops implements <i>in-situ</i> conservation methods, in which wild species and relatives of domesticated crops are preserved in their natural habitat. • Botanic gardens breed rare species which are later used in reinforcement activities.
[D]	<ul style="list-style-type: none"> • Complete and implement the program for the conservation of rare and endangered plant species (§2.4.2)
Target 8: 60% of threatened plant species in accessible <i>ex situ</i> collections, preferably in the country of origin, and 10% of them included in recovery and restoration programmes	
[A]	<ul style="list-style-type: none"> • Target incorporated into NBS recommendations and in the Israel Gene Bank revised work plan.
[B]	<ul style="list-style-type: none"> • The Israel Gene Bank has upgraded its activities, prepared a plan for collection of a specific list out of the 413 endangered wild plant species listed in the Red Book, and is in advanced stages of implementation. • Botanic gardens serve as refuges for endangered species. • A comprehensive program to combine refuges and <i>in-situ</i> conservation is being developed by INPA.
[D]	<ul style="list-style-type: none"> • Complete and implement the program for the conservation of rare and endangered plant species (§2.4.2), and encourage the creation of refuges in botanic gardens. • Create a working group to coordinate the efforts held by various organisations.
Target 9: 70% of the genetic diversity of crops and other major socio-economically valuable plant species conserved, and associated indigenous and local knowledge maintained	
[B]	<ul style="list-style-type: none"> • The activities of the Israel Gene Bank were upgraded, with a new collection protocol and new physical facilities and infrastructure. There are large collections in the IGB and in associated university collections. • Special projects to collect land races of agricultural crops were held. • Several research projects documenting traditional knowledge on medicinal plants and spices were held
[D]	<ul style="list-style-type: none"> • Proceed with planned collection of multiple populations of a species to better represent within-species genetic variation • Support and increase the efforts to preserve land races. • Support research towards geographic mapping of genetic variation of wild relatives of crops.

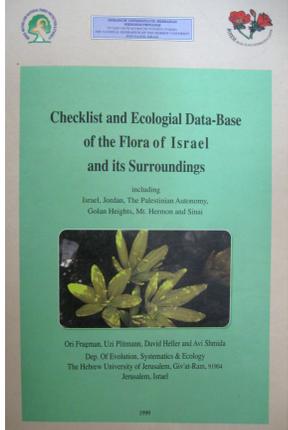
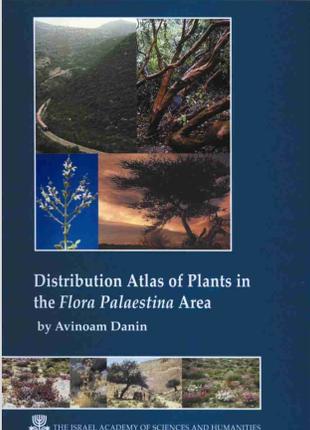
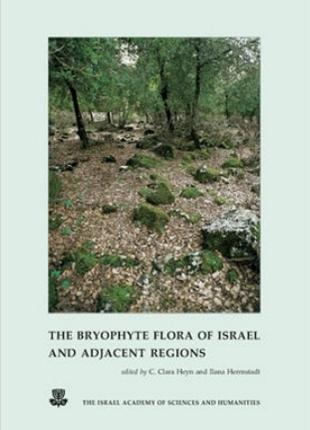
APPENDICES

Target 10: Management plans in place for at least 100 major alien species that threaten plants, plant communities and associated habitats and ecosystems	
[B]	<ul style="list-style-type: none"> • Management of invasive species is part of nature reserve management plans. • A national program to combat invasive species is to be prepared as one of the derivatives of the NBS • An inventory of invasive plant species was prepared. • Further research to formulate appropriate ways to handle two of the more hazardous invasive tree species is held and its recommendations implemented and tested. • Instructions intended to minimize possible hazards from invasive species are incorporated in planning guidelines and programmes
[O]	<ul style="list-style-type: none"> • Resources are limited and the result is usually minimization of the occurrence of invasive species rather than eradication.
[D]	<ul style="list-style-type: none"> • Increase the extent of implementation of existing plans, including allocation of more resources. • Better coordinate between relevant stakeholders affecting the spread or restriction of invasive species. • Further develop management plans for major invasive alien species • Support further research on various methods to combat infestations of specific invasive species.
C. Using plant diversity sustainably	
Target 11: No species of wild flora endangered by international trade	
[B]	<ul style="list-style-type: none"> • All CITES species are protected by law in Israel
[D]	<ul style="list-style-type: none"> • Increase enforcement to enhance CITES implementation • Increase cooperation between INPA and the Ministry of Agriculture
Target 12: 30% of plant-based products derived from sources that are sustainably managed	
[B]	<ul style="list-style-type: none"> • Not particularly relevant to Israel
[D]	<ul style="list-style-type: none"> • Improving National Forest Reserves Act and National Forest Act , according to scientifically regulate forest products harvesting • Develop standards for plant-based products which came from sustainably managed sources, certify and tag them, similar to tagging of organic products, to guarantee their sustainable source.
Target 13: The decline of plant resources, and associated indigenous and local knowledge, innovations and practices that support sustainable livelihoods, local food security and health care, halted	
[B]	<ul style="list-style-type: none"> • Not relevant
[D]	<ul style="list-style-type: none"> • Conduct researches on the sustainable use of plant resources • Compile knowledge on the sustainable use of plant resources and publicize to relevant communities
D. Promoting education and awareness about plant diversity	
Target 14: The importance of plant diversity and the need for its conservation incorporated into communication, educational and public-awareness programmes	
[B]	<ul style="list-style-type: none"> • Special emphasis is put on communication, education and public awareness programs on plant diversity. • New programs and publications are being developed in addition to websites on the subject . Special activities include publications, websites, tours, organization of nature protection week
[D]	<ul style="list-style-type: none"> • Develop curriculum for every level, to raise awareness on the importance of plant conservation. • Develop training plans to raise public awareness on plant conservation • Increase financial supports to researches on plant resources
E. Building capacity for the conservation of plant diversity	
Target 15: The number of trained people working with appropriate facilities in plant conservation increased, according to national needs, to achieve the targets of this Strategy	
[B]	<ul style="list-style-type: none"> • No resources or facilities. • Upgraded activity at the Israel Gene Bank. • The Israel Taxonomic Initiative aims to finance and increase research and technical taxonomic knowledge.

APPENDICES

[D]	<ul style="list-style-type: none"> • Develop curriculum, training courses and study trip for relevant actors at every level • Develop training plans for decision makers and high-level officials to raise their awareness on the importance of plant resources • Develop national plans for building capacity and mobilize grants for graduate studies • Establish funds to support studies and researches on plant resources
Target 16: Networks for plant conservation activities established or strengthened at national, regional and international levels	
[B]	<ul style="list-style-type: none"> • Observational databases developed and available. • Partnerships exist with BioCASE, a biodiversity collection access service for Europe, BIOHAB, a biodiversity mapping procedure. • Internet-based biodiversity information system is active on few sites
[D]	<ul style="list-style-type: none"> • Develop networks of researches on plant diversity • Develop community networks for plant resources conservation

Presented below are examples of publications from the last decade promoting the knowledge and protection of Israeli flora. More specific action plans are to be developed following the approval of the NBS and the development of the relevant action plans. Generally, a main obstacle is lack of adequate resources.

			
<p>Checklist and Ecological Data-Base of the Flora of Israel and its Surroundings including Israel, Jordan, The Palestinian Autonomy, Golan Heights, Mt. Hermon and Sinai. By: O. Fragman, U. Plitman, David Heller and Avi Shmida. Dep. of Evolution, Systematics & Ecology, The Hebrew University of Jerusalem, Givat-Ram, 9194 Jerusalem, Israel. 1998.</p>	<p>The Red Data Book. Endangered Plants in Israel. By: A. Shmida & G. Polak. Vol.1. 2007.</p>	<p>Distribution Atlas of Plants in the <i>Flora Palaestina</i> Area. By: A. Danin. 2004.</p>	<p>The Bryophyte Flora of Israel and adjacent regions. By: C. Heyn & H. Herrnstadt. 2004.</p>

B. Progress towards Targets of the Programme of Work on Protected Areas

Protected areas are mostly managed by INPA, with internal organizational processes involved in the development and adaptation of management strategies. The process of assessing and evaluating the effectiveness of the policies and programmes is still lacking and also does not involve assessment of functional aspects of biodiversity and ecosystem services; the implementation of the NBS should promote the formalizing of procedures to: a) develop and adopt minimum standards and best practices for the management of protected areas; b) evaluate and improve the effectiveness of their management; c) assess and monitor protected area status and trends.

Table 13: Progress in Israel towards the targets of the Programme of Work on Protected Areas.

Goal
Targets
Element 1: Planning, selecting, establishing, strengthening and managing protected area systems and sites
1.1. To establish and strengthen national and regional systems of protected areas integrated into a global network as a contribution to globally agreed goals.
<ul style="list-style-type: none"> The area of protected areas is gradually increasing, representing more fully Israel's ecosystems. A special effort is made to increase the number of marine and coastal nature reserves. Management plans were prepared for more than 50% of nature reserves and currently implemented, involving more active management.
1.2. To integrate protected areas into broader land- and seascapes and sectors so as to maintain ecological structure and function.
<ul style="list-style-type: none"> Ecological corridors are gradually introduced to regional planning to enhance connectivity. Biosphere planning is promoted in two discrete regions and on a national strategic document, to promote the ecosystem approach. Connectivity across linear infrastructure is promoted through special crossing structures for animals.
1.3. To establish and strengthen regional networks, transboundary protected areas (TBPAs) and collaboration between neighbouring protected areas across national boundaries.
<ul style="list-style-type: none"> Transboundary protected area project initiated with Jordan.
1.4. To substantially improve site-based protected area planning and management.
<ul style="list-style-type: none"> Upgraded management plans were developed for more than half of the nature reserves. Clear biodiversity objectives, targets, management strategies and monitoring programmes in plans - still insufficient Afforested area management upgraded to include SD and BdC considerations.
1.5. To prevent and mitigate the negative impacts of key threats to protected areas.
<ul style="list-style-type: none"> Efforts to mitigate negative impacts of habitat loss and fragmentation and of human activity patterns outside and within protected areas on the ecosystems protected within these areas.
Element 2: Governance, participation, equity and benefits participation
2.1. To promote equity and benefit-sharing.
<ul style="list-style-type: none"> Mainly in context of accessibility to recreational benefits.
2.2. To enhance and secure involvement of indigenous and local communities and relevant stakeholders.
<ul style="list-style-type: none"> INPA holds special educational projects to communities neighbouring nature reserves
Element 3: Enabling activities
3.1. To provide an enabling policy, institutional and socio-economic environment for protected areas.
<ul style="list-style-type: none"> An increasing awareness of the planning community to the need for a balance between development and conservation following the implementation of NMP#35, which allocates discrete land uses for

APPENDICES

Goal
Targets
conservation of open landscape; yet, a more effective establishment and management of protected areas and protected areas systems is still lacking
3.2. To build capacity for the planning, establishment and management of protected areas.
Not relevant to Israeli context
3.3. To develop, apply and transfer appropriate technologies for protected areas.
<ul style="list-style-type: none"> • Management plans show a shift towards a more active management of nature reserves. The implementation of the NBS will further promote this direction.
3.4. To ensure financial sustainability of protected areas and national and regional systems of protected areas.
<ul style="list-style-type: none"> • Protected areas are governmentally-run and funded. Additional income stems from public fees paid for visiting nature reserves.
3.5. To strengthen communication, education and public awareness.
<ul style="list-style-type: none"> • Regular educational activity of INPA, MoEP and NGOs to promote public visits and awareness to the benefits of protected areas. Public visits to protected areas constantly increasing.
Element 4: Standards, assessment and monitoring
4.1. To develop and adopt minimum standards and best practices for national and regional protected area systems.
<ul style="list-style-type: none"> • Still lacking, NBS implementation should promote this process
4.2. To evaluate and improve the effectiveness of protected areas management.
<ul style="list-style-type: none"> • Still lacking, NBS implementation should promote this process
4.3. To assess and monitor protected area status and trends.
<ul style="list-style-type: none"> • Still lacking, under development as part of a more general national biodiversity monitoring scheme; NBS implementation should promote this process
4.4. To ensure that scientific knowledge contributes to the establishment and effectiveness of protected areas and protected area systems.
<ul style="list-style-type: none"> • Scientific knowledge relevant to protected areas is constantly developed as a contribution to their establishment, effectiveness, and management