CITY OF JERUSALEM
BIODIVERSITY REPORT | 2013

ENHANCING URBAN NATURE THROUGH A GLOBAL NETWORK OF LOCAL GOVERNMENTS
The Local Action for Biodiversity (LAB) Project is a 3 year project which was initiated by the City of Cape Town, supported by the eThekwini Municipality (Durban), and developed in conjunction with ICLEI – Local Governments for Sustainability and partners. ICLEI is an international association of local governments and national and regional local government organisations that have made a commitment to sustainable development. LAB is a project within ICLEI’s biodiversity programme, which aims to assist local governments in their efforts to conserve and sustainably manage biodiversity.

Local Action for Biodiversity involves a select number of cities worldwide and focuses on exploring the best ways for local governments to engage in urban biodiversity conservation, enhancement, utilisation and management. The Project aims to facilitate understanding, communication and support among decision-makers, citizens and other stakeholders regarding urban biodiversity issues and the need for local action. It emphasises integration of biodiversity considerations into planning and decision-making processes. Some of the specific goals of the Project include demonstrating best practice urban biodiversity management; provision of documentation and development of biodiversity management and implementation tools; sourcing funding from national and international agencies for biodiversity-related development projects; and increasing global awareness of the importance of biodiversity at the local level.

The Local Action for Biodiversity Project is hosted within the ICLEI Africa Secretariat at the City of Cape Town, South Africa and partners with ICLEI, IUCN, Countdown 2010, the South African National Biodiversity Institute (SANBI), and RomaNatura. For more information, please visit www.iclei.org/lab
Dear Readers,

The City of Jerusalem is proud to present The Biodiversity Report, prepared and coordinated by Ms. Helene Roumani, the Jerusalem LAB Program Manager, in collaboration with the Society for the Protection of Nature in Israel (SPNI) and the LAB-ICLEI Secretariat in Cape Town, South Africa.

When the Jerusalem Municipality entered into the three-year LAB process, a comprehensive urban nature database was in the final stages of completion. This valuable work laid the foundation for the assessment of 150 significant urban nature sites and biodiversity hot spots in the City.

Since then additional research has been undertaken. A survey of Jerusalem's most veteran native trees, which documented more than 4,500 ancient trees, and a biodiversity analysis of the Kidron Basin, conducted in close cooperation with neighborhood communities of the area, will provide essential data for the restoration process of the entire region.

As our work proceeds and expands, we achieve a greater appreciation of the contribution of urban nature to the quality of life in Jerusalem, while aspiring to a better understanding of the role urban ecosystems play in the wider national and global frameworks. Our involvement with LAB has influenced the successful incorporation of urban nature as one of the themes in the City’s annual report, based on a wide range of urban sustainability indicators.

The work that led to the publication of this report has inspired many exciting initiatives, both within Jerusalem and in engagement with diverse national and global partners. Our LBSAP (Local Biodiversity Strategy and Action Plan), well underway, lays the ground for statutory recognition of nature in our city as an important infrastructure layer, to be integrated on all municipal planning levels. Our work with partners in the URBIS (Urban Biospheres) initiative has enabled us to begin engaging political, academic and NGO stakeholders throughout our bioregion. And, we are in the process of establishing a regional center for biodiversity and ecosystem management.

The City of Jerusalem is a meeting place not only of world faiths and cultures, but also of micro-climates, with rolling green hills on the West, and a magnificent desert landscape on the East. Encompassing both Mediterranean and semi-arid areas attributes the City with a uniquely rich variety of natural species. Jerusalem is also a global station on one of the most important international bird migration routes.

As we move into the urban century, we look forward to being part of a world in which cities are taking center stage. We appreciate the platform that ICLEI-LAB provides for us to navigate these new global challenges in dialogue with our peers, the many and diverse cities that have realized the pivotal role of nature in the urban arena.

Naomi Tsur | Deputy Mayor, City of Jerusalem
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TRANSLATION
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EXECUTIVE SUMMARY

Jerusalem is a pioneer in the field of urban nature protection in Israel, specifically with regard to local biodiversity planning and management. In recent years, awareness about the significance of urban nature and biodiversity in preserving global ecosystem continuity has become more and more prevalent, and the role of local governments in addressing this challenge is now clearly confirmed. While Jerusalem faces unique challenges and opportunities, including urban revitalization, accelerated growth, and economic development, conservation of its natural and built heritage is a solemn commitment.

THE ECOLOGY OF JERUSALEM

The Jerusalem region is rich in species, some of which are unique to the area and cannot be found anywhere else in the country. Approximately 1000 different species have been observed in Jerusalem, making it one of the cities with the greatest variety of species in the world. Its great number and diversity of species is primarily a result of Jerusalem’s location at the meeting point of different climatic and vegetation zones, and its altitude. Jerusalem is home to plants typical of the dry mountainous regions of the Middle East, and has a unique combination of Mediterranean, mountain and desert flora.

Over the years, the multitude of species found in Jerusalem have adapted to and integrated with the urban environment and infrastructure. Thousands of years of Jerusalem’s history have influenced the urban texture; stone walls, reservoirs and roof tops have been transformed into natural ecosystems. Impressive examples of this transformation can be found throughout the historic areas of the city. The Temple Mount is an ancient living roof, the Western Wall is home to the swifts, the Old City walls sports cliff vegetation and the Beit HaKerem neighborhood is known for its porcupine dens.

The data that laid the basis for this report was an in-depth survey of 150 sites throughout the city. It is important to note that since then additional research has been undertaken; a survey of Jerusalem’s ancient trees, carried out by SPNI (the Society for the Protection of Nature in Israel), and a biodiversity analysis of the Kidron Basin. The survey of trees goes beyond the sites that were previously examined, and incorporates more than 4,500 of Jerusalem’s most veteran native trees. The ecological survey of the Kidron Basin will provide an essential database for the restoration process of the entire region, and is being conducted in close cooperation with the neighboring communities in the area.

SUSTAINABLE URBAN PLANNING GUIDELINES

The City of Jerusalem is a unique capital comprised of a multitude of different communities, ethnic groups and religions, spread over a myriad of neighborhoods, old and new, ancient and modern, reflecting both eastern and western cultures, all weaving together an intricately complex human and urban tapestry. Few cities in the world can boast the multi-faceted and sensitive cultural fabric that is Jerusalem.

Planning for the future of this distinctive city is an extremely complicated task. The following principles, adopted by the Municipality, set guidelines for sustainable urban planning in Jerusalem:

- Provisions to prevent urban sprawl with regulated standards for densification
- New sustainability measures stipulating standards for green building construction
- Regulations for the reduction of carbon emissions, including the removal of private cars from the city center.
- Development of ecologically sound facilities for waste management and water recycling

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- Development of ecologically sound facilities for waste management and water recycling
• Establishment of a sustainable, efficient public transit system (the Jerusalem Light Rail, first of its kind in the country, began operation in 2011)
• Protection of significant urban nature sites

BIODIVERSITY INITIATIVES

• In cooperation with the Ministry of Environment, Ministry of Interior, the Jerusalem Development Authority, the Society for the Protection of Nature in Israel, a variety of non-governmental organizations and active civil society participation, Jerusalem has successfully implemented a series of local biodiversity initiatives in recent years for the benefit of the public at large and for the sustainable development of the city. Of particular note are these major accomplishments:
• Publication of the Jerusalem Urban Nature Survey, first of its kind in Israel, which documents 150 significant local urban nature sites and constitutes an invaluable tool for the effective daily management of urban nature on the municipal level
• Official designation of 40 of these sites for preservation and restoration in accordance with the new City Master Plan.
• Preservation of the Gazelle Valley, where Jerusalem’s flagship species, the Israeli Mountain Gazelle, roam freely. Establishment of Israel’s first Urban Nature Wildlife Park at the site has been approved, representing the city’s attempt to develop methods for sustaining and increasing the captive urban Gazelle population. The Gazelle Valley Conservation Program is Jerusalem’s LAB Legacy Project for the International Decade of Biodiversity.

PUBLIC PARTICIPATION

• Engaging with people and gaining their support for biodiversity is critical for its success. Urban nature sites, community gardens, parks and forests in Jerusalem all invite residents to participate actively as stewards of nature. The Municipality fosters this engagement through support of community initiatives. In these projects, community based organizations are the city’s natural partners. Key channels for public participation in biodiversity and urban nature protection in Jerusalem are:
  • Community gardens
  • Environmental education
  • Open access to municipal planning committees
  • NGO activity

LOCAL BIODIVERSITY PARTNERSHIPS

The Dead Sea Drainage Authority and the Jerusalem Municipality, together with local residents and a significant group of stakeholders, have joined in an effort to regulate the environmental hazards in the Kidron Valley and rehabilitate the area. The rehabilitation plan will include a comprehensive nature survey providing up-to-date and in-depth biodiversity information about important urban nature sites in the area.

Results of the survey will be compiled in a data base and linked with the city GIS program, to form a comprehensive resource for sustainable city planning and development. In addition, the plan will promote cooperation for local agricultural and other entrepreneurial initiatives, enhancing employment opportunities while advancing awareness about the Valley’s unique ecological features and their potential for economic and social development. It is believed that participation on this level will also encourage local residents to protect the natural habitats indigenous to the area.

RESPONSES TO NATIONAL ISSUES

The greatest danger to Israel’s biodiversity lies in the development and urbanization of the country’s already limited open spaces, causing habitat destruction and fragmentation. Since its establishment in 1948, Israel’s
population has increased more than eightfold. In the thirty-year period between 1960 and 1990, the population more than doubled and the built-up area quadrupled. Between 1989 and 2001, the population grew by over 40% with an addition of one million immigrants within a little more than a decade. Average population growth in recent years has been about 3%. With a current population of 7.9 million, Israel’s long-range master plan (Israel 2020) predicts the country’s population will reach around 8.5 million in 2020 and its built-up areas will more than double. At the present time, over 90% of Israel’s population lives in urban centers.

The acute urbanization that Israel has undergone necessitates the establishment of guidelines for biodiversity management on the local level. Jerusalem has undertaken the production of an Urban Nature Master Plan (the LBSAP - Local Biodiversity Strategy and Action Plan) whose primary goals are integration of urban open spaces into the city fabric through connectivity, accessibility, rehabilitation and restoration of ecological corridors and the formulation of an efficient management system. Once completed and approved, the plan will encompass all of the city’s identified nature sites and serve as an official statutory tool empowering the Municipality to enact local biodiversity conservation measures.

**MAINSTREAMING BIODIVERSITY INTO CITY GOVERNANCE**

The 3-year Jerusalem LAB program, now coming to completion, has created an opportunity, locally, nationally and internationally, for the City of Jerusalem to play a lead role in the development of frameworks for the sustainable management of ecosystems at the metropolis level. At this critical point in time, it is especially important that the city capture this momentum and harness the dynamics that have evolved within the local stakeholder forum to continue advancing collaborative efforts for comprehensive and effective local biodiversity protection and policy making.

To this effect, Jerusalem is planning the establishment of the Jerusalem Bioregion Center for Ecosystem Management to foster partnerships and become a resource center for local and regional biodiversity initiatives. The main goals of the center are to:

- Maintain and facilitate access to database information on biodiversity
- Conduct outreach activities and training for local and regional stakeholders, providing professional support and guidance in program development
- Promote research on sustainable biodiversity protection and wield opportunities for local, national and international collaboration

The international URBIS Workshop, hosted by the City of Jerusalem in March, 2012, took the first step in realizing these important objectives by looking beyond the LAB framework and setting the stage for conceptualizing Jerusalem as an urban biosphere.

With the establishment of the Jerusalem Bioregion Center for Ecosystem Management, we anticipate the opportunity to address many significant issues that were raised in the LAB stakeholder forum but, for limitations of program requirements, manpower and resources could not be advanced sufficiently. These include:

- Fostering the stewardship of local biodiversity and urban nature
- Addressing local agriculture and food security issues
- Safeguarding the protection of mature and unique trees in the city
- Addressing the issues of invasive as well as endangered species
- Promoting the use of sustainable pesticides in local gardening programs

__Tzurim Valley panorama with wild anemone in foreground | Amir Balaban__
1.1 INTRODUCTION: ABOUT JERUSALEM

1.1.1 LOCATION AND SIZE
Jerusalem, the capital of the state of Israel, is the largest city in the country. With a population of 840,000, Jerusalem is nestled on a mountain ridge between the Samarian and the Judean anticline and lies on the national watershed line between the Mediterranean and the Dead Seas, at an altitude of between 650 to 850 meters above sea level. Located in the center of the country on the southern spur of a plateau in the Judean Hills, Jerusalem is approximately 60 km east of Tel Aviv and the Mediterranean Sea and 35 km west of the Dead Sea with a total land area of 31,135 acres (126 km²). Approximately 43 percent of the city’s land (54 km²) is comprised of non-built up areas of open and natural spaces, both within the urban framework and on its outskirts.

1.1.2 THE PEOPLE
Jerusalem is home to a varied mix of residents. At the end of 2010, the “Jewish and Other” population totaled 504,179, while the Arab population numbered 283,873 (35%). The Arab population includes a large Muslim majority (96%) and a Christian minority. Jerusalem’s population constitutes some 10% of the population of Israel. In 2009, the Jewish population accounted for approximately 8% of the total Jewish population of the country, while the Arab population constituted 18% of the total Arab population. Jerusalem is also home to large communities of immigrants and is characterized by a young age structure, with a relatively high proportion of children (0-14) and low proportion of senior citizens.

1.1.3 THE ECONOMY
The majority of Jerusalem residents are employed in public and community services; as wage earners their average income is well below the national average, including other major cities such as Tel Aviv and Haifa, while its poverty level and population density are significantly higher. Jerusalem serves mainly as an employment center for its own residents. As capital of the State of Israel, Jerusalem is home to most
government offices, the Knesset (Parliament), the President’s and Prime Minister’s offices, the Hebrew University, the Supreme Court and the Jerusalem Municipality. A high percentage of the population is employed in public, community and personal services including public administration, education, health, welfare and social services with a relatively low percentage in manufacturing, banking, insurance and business activities, trade and in accommodation services. Although the proportion of professional and scientific manpower is high in Jerusalem, the rate of participation in the workforce is low - 45% as compared to Haifa (56%) and Tel Aviv (66%).

1.1.4 EDUCATION
Jerusalem’s education system is the largest, most diverse, and most complex municipal education system in Israel. It must address the needs of populations with distinctly different characteristics. The four main educational sectors are: state, state-religious, ultra-orthodox and Arab. The city’s education system, in all these sectors, is marked by a high level of variance among schools, and includes public schools (official and recognized unofficial), municipal and non-municipal, as well as private schools.

1.1.5 THE LOCAL AUTHORITY
The Jerusalem Municipality is headed by a council of 31 members and a democratically elected mayor. Elections are held every 5 years. No single party controls the majority of seats on the council and the mayor leads a coalition to achieve a working majority. With seven administrations (see Item 3.3), the local authority provides residents, commercial firms, and other institutions within its area of jurisdiction with a wide range of services. It is responsible for development and maintenance of the city’s physical infrastructure, road system, water supply, refuse collection and disposal system, sewage system and parks. It is responsible for social welfare services, environmental protection and, with the Ministry of Education, supervises the education system. There are approximately 7000 municipal workers in the city.

The Local Planning Commission, part of the Municipal Infrastructure and Planning Administration, plays an important role in the city’s urban development processes. In addition, the Jerusalem District Planning Commission, a joint state-local authority comprised of representatives of government ministries and local authorities in the region, approves detailed local plans and also acts as a forum for handling appeals on decisions made by local commissions. The Local Council is authorized to issue by-laws in every area in which it has jurisdiction. The Ministry of Interior supervises the activities of all local authorities.
1.2 BIODIVERSITY IN ISRAEL

Despite its small land area, a wide range of physical conditions and a rich variety of flora and fauna can be found in Israel. The country’s geographic location at the junction of three continents and at the crossroads of climatic and botanical regions endows the country with a wealth of plant and animal life. Israel’s biological diversity includes 2800 species of wild plants, more than 500 species of birds, approximately 100 species of mammals, 100 species of reptiles and arthropods, as well as many microbes, viruses, algae and fungi, the majority of which have yet to be identified. These species account for about 3.5% of the globally known species.

Two different climatic regimes are found within the small land area of Israel. The northern part of the country has a Mediterranean climate and the southern part of the country has a typical desert climate. The central part of the country is a transition area in which desert biota is gradually replaced by Mediterranean. Jerusalem, situated in the center of the country, encompasses both Mediterranean and desert climates, attributing the city with a uniquely rich variety of natural species (see Item 1.4).
one of the world’s richest areas in terms of progenitors (ancestral form of a species) and relatives of major agricultural crops and other domesticated species. The variety of bird species in Israel is also very impressive, with year-round residents, summer breeders and winter visitors. More than 500 million birds cross the country twice a year as they migrate between their breeding grounds in Europe and winter homes in Africa. A case in point are the swifts who nest annually at the Western Wall in Jerusalem between February and June (see Item 1.9.2).

In Israel, as in the world at large, the decline of biodiversity is largely a result of accelerated development, population increase and the resulting destruction of habitats. Jerusalem is no less affected by this trend than other major cities in the country. While about 20% of Israel’s land area is located within declared nature reserves, most of these reserves are in desert areas and a large number overlap military training sites. Only about 3% of the land in areas characterized by a Mediterranean climate is protected in nature reserves.
1.2.1 URBAN ECOSYSTEMS IN ISRAEL

The transformation to urban ecosystems has occurred in many of Israel’s Mediterranean habitats. Urban ecosystems include built-up areas, mainly in cities, but also in localities not categorized as cities, as well as built-up centers in rural areas. These ecosystems are an integral component of biodiversity in Israel today. More than 90% of the population in Israel currently resides in urban ecosystems.

The negative effects of urban systems include pollution that infiltrates adjacent ecosystems, domestic animals that are hazardous to non-urban biodiversity and cultivated garden plants that often become invasive species. However, urban ecosystems also provide supporting services for some components of biodiversity, thereby reducing the risk of their disappearance on the national scale. City buildings and gardens often become biodiversity habitats that somewhat compensate for the loss of habitats in other ecosystems.

Furthermore, some components of the nation’s endangered biodiversity find refuge in urban ecosystems, where they benefit from public sympathy and the support of local authorities, often leading to local biodiversity protection initiatives that increase awareness and public support for the conservation of biodiversity throughout the country. Of particular note are the swifts who nest in ancient walls and rooftops in the country’s major urban centers, where an award winning educational program supervised by the Israel Ornithological Association, is being conducted for their conservation.
1.2.2 ISRAEL’S NATIONAL BIODIVERSITY PLAN

Israel’s National Biodiversity Plan, published in January 2010, implements Israel’s commitment under the Convention on Biological Diversity and complements the 2003 government decision on sustainable development, which resolved that the country’s policies in this area shall be “based on the principles of sustainable development practice in Israel that combine a dynamic economy, wise use of natural resources and protection of ecosystems.” The plan identifies the dangers and threats facing Israel’s biodiversity and outlines alternative measures for confronting them. It identifies the legal instruments still missing for enforcement; it evaluates economic incentives for implementation and encourages education and increased public awareness. The plan also identifies gaps in the research required for appropriate biodiversity and ecosystem management and it highlights the benefits derived from linking biodiversity conservation in Israel with relevant professional and political activities in the international arena. Above all, the plan seeks to identify

![Mediterranean grove in Nahal Kos, Jerusalem](image)

**MAJOR MOTIVATIONS FOR URBAN BIODIVERSITY CONSERVATION**

- Preserve local biodiversity in an urbanizing environment and protect important populations and rare species
- Create stepping stones or corridors for natural populations
- Understand and facilitate responses to environmental changes
- Connect people with nature and provide environmental education
- Provide ecosystem services
- Fulfill ethical responsibilities
- Improve human well-being


The plan also identifies gaps in the research required for appropriate biodiversity and ecosystem management and it highlights the benefits derived from linking biodiversity conservation in Israel with relevant professional and political activities in the international arena. Above all, the plan seeks to identify the appropriate management tools to conserve the maximum number of Israeli species and maintain each of these species in populations whose sizes are compatible with the optimal provision of ecosystem services. (see Item 2.1.3 for further details).

1.3 DEFINITION OF BIODIVERSITY IN JERUSALEM

Biodiversity in Jerusalem is the entirety of all of the plant and animal species that live and function in the city’s landscape and environment, in the context of the unique morphology of a city situated between the desert and the coastal plane and surrounded by open spaces.
1.4 INTRODUCTION TO JERUSALEM’S NATURAL ENVIRONMENT AND BIODIVERSITY

Jerusalem’s Old City in the 19th century by David Roberts

The Jerusalem region is rich in species, some of which are unique to the area and cannot be found anywhere else in the country. Approximately 1000 different species have been observed in Jerusalem, making it one of the cities with the greatest number of different species in the world. The natural habitats within the city boundaries also provide a range of services for wild animals. They serve as refuge, food sources, and mating sites for species such as the gazelle and striped hyena.

Thousands of years of history in Jerusalem have influenced the urban texture. Over time, stone walls, reservoirs and roof tops have been transformed into natural ecosystems. Impressive examples of this transformation can be found throughout the historic areas of the city. The Temple Mount is an ancient living roof, the Western Wall is home to swifts, the walls of the Old City sport cliff vegetation and the Beit HaKerem neighborhood is known for its porcupine dens.

Jerusalem is a unique example of nature’s adaptation to man-made structures, some over a thousand years old. The stone walls and structures of Jerusalem mimic the natural forms in the valleys, mountains and desert region around the city and thus have enabled adaptation over time.

Jerusalem is a trailblazer in the field of urban nature in Israel. The city integrated urban nature sites into its municipal outline plan and several statutory plans for the conservation of urban nature sites are in development.

In 2010, the city published the Jerusalem Urban Nature Infrastructure Survey. The first of its kind in the country, the survey is intended to aid efforts to integrate the urban environment according to the international effort towards safeguarding biodiversity. The city’s unique biodiversity is determined in large part by its geology, climate, topography and drainage system, as described in the following section.
In 2010, the Society for the Protection of Nature in Israel (SPNI), in conjunction with the Jerusalem Municipality and the Israel Ministry of Environmental Protection, published the Jerusalem Urban Nature Infrastructure Survey. The first of its kind in the country, the survey was designed to help integrate international recommendations for safeguarding biodiversity in Jerusalem. Its primary goal was to create a city-wide picture of natural infrastructure by providing an up-to-date database, integrated with other municipal data systems for the overall mainstreaming of local biodiversity protection. The survey constituted a first step towards creation of a sustainable urban nature master plan for the City of Jerusalem.

The survey process was based on a cooperative effort involving a steering committee, a professional working group and a team of surveyors. A complex database was devised to contain and classify the wide variety of information that was collected, including both written descriptions and visual information, such as photographs of sites in their geographic context during different seasons of the year. The survey constitutes a significant turning point for biodiversity and nature protection in the city as its results are already mapped on the city’s GIS system and in use with regard to planning open spaces and urban development. In addition, results of the survey are accessible to the public on the interactive Jerusalem Green Map application (www.greenmap.org.il).

1.5 REGIONAL SETTING AND CONDITIONS

1.5.1 TOPOGRAPHY AND DRAINAGE

The physical infrastructure of Jerusalem is determined geographically by its topography and drainage. Jerusalem is characterized by mountainous regions with valleys and ridges on both sides of the national watershed line, which runs from north to south along the length of the city, touching upon the semi-arid rim of the Judean Desert on one side and the fertile Mediterranean zone on the other. The eastern topographic line of Tel El-Ful, Mount Scopus, the Mount of Olives, Armon HaNatziv and Ramat Rahel constitutes a clear and important biogeographic border between Mediterranean and desert vegetation in the city. The area around the watershed line forms a relatively narrow strip around which the ancient city of Jerusalem developed. Modern Jerusalem grew from there, spreading across an area of moderate hills and ridges, drained by valleys along the city’s north-south axis (the Nahal Kidron Valley, the Nahal Rehavia Valley and others).
Sites Surveyed in the Jerusalem Urban Nature Infrastructure Survey | Source: Jerusalem Urban Nature Infrastructure Survey

Urban Nature Sites superimposed on elevation levels | Source: Jerusalem Urban Nature Infrastructure Survey

Urban Nature Sites superimposed Open Space Addendum to the Jerusalem Outline Plan (June 2009) | Source: Jerusalem Urban Nature Infrastructure Survey

Elevation Jerusalem | Source: Jerusalem Urban Nature Infrastructure Survey
The slopes east of the watershed line are traversed by streams that spill into the Dead Sea and are characterized by desert flora and fauna, extensive rocky ground and less precipitation than on the western slopes. The streams in this area are Nahal Kidron and its tributaries and Nahal Prat (Wadi Kelt) and its tributaries, which descend from the area of the Pisgat Ze-’ev neighborhood. On the western side, slopes are characterized by Mediterranean flora and fauna, streams and mountain ridges. The Har Nof and Ein Kerem neighborhoods, among others, were built upon these ridges, while the streams remain open natural areas. Desert areas within the city are fewer in number than Mediterranean areas. The city itself forms a distinct dividing border between the two regions.

1.5.2 CLIMATE

The Jerusalem hills in the Mediterranean region have an average precipitation of 554 millimeters a year. The level of precipitation on the western side of the watershed line is significantly higher than on the eastern side, while the northern part of the city has heavier rainfall than the southern part. The difference in precipitation between the northwest and the southeast corners of the city can reach several hundred millimeters, creating a distinct variation between the different regions, particularly with regard to the character of vegetation and animal life found in the two climatic zones (desert and Mediterranean).

In addition to rainfall, other important climatic factors that shape the natural landscape in Jerusalem are sun exposure and orientation. The level of sun exposure differs greatly among hillsides with different slopes and orientations. The slopes facing south receive the highest levels of exposure, followed by those facing southwest and southeast. Slopes facing north, northwest or northeast receive significantly less sunlight. This is very significant in Jerusalem as there are many valleys in the city that run from east to west (exposure from the north and south).

The city’s proximity to the desert is also significant as the vegetation on one slope can differ greatly from the slope opposite it. Slopes oriented southward are drier than slopes facing north and the vegetative cover on these drier slopes is much sparser. These southward-facing slopes are home to more desert plant life, including species typically found in the Arava.
Desert edge flora in Har Homa, Jerusalem | Jerusalem Urban Nature Infrastructure Survey

formations in the area can be divided into three main categories: i) chalk and marl formations ii) layered rock formations and iii) outcroppings of hard rock. 29

i. Chalk and marl formations:

These formations generally consist of chalk and marlstone and form a moderate and graduated landscape. These formations tend to lend themselves to the natural development of steps, which are convenient for quarrying.

ii. Layered rock formations:

This group of formations is named for the natural stone steps that are formed upon them. Although natural stone steps are formed, there is minimal rocky ground. Ancient agricultural terraces were commonly developed on these formations.

iii. Outcroppings of hard rock:

This group consists of hard and massive limestone and dolomite formations that form a landscape of outcroppings and cliffs.

B. Landscape Configurations

Jerusalem’s eastern peaks are characterized by the soft chalk of the Mt. Scopus configuration (Mount of Olives, Armon HaNetziv, Ramat Rachel, Har Homa). These domes were previously coated with a layer of flint (mashash) which can still be seen today south of Armon HaNetziv and east of Har Homa. The central mountain ridge upon which the new city of Jerusalem was built is characterized by harder rock formations and dolomite terraces. These formations have all but disappeared from the urban landscape, but a final few remnants can still be seen in the “rock reserve” in Ramat Beit HaKerem and in Givat Ram.

On the western slopes of the Jerusalem Hills, parts of which are within the city limits, most of the Judean desert. 27 These factors have also affected traditional agricultural practices in the Jerusalem hills over the ages. The distribution of ancient agricultural terraces in the Jerusalem area shows a clear preference for north-facing slopes. 28

1.5.3 ROCK TYPES AND LANDSCAPE CONFIGURATIONS

A. Geologic Profile

The geological cross-section of the Jerusalem Hills is around 1000 meters thick. The rock type in the area affects the morphology on the surface. The rock
geological continuum has been exposed as a result of undermining by streams. Nice examples of this can be seen in Nahal Gilo and Nahal Refaim, as well as on Har Heret.

1.6 CLASSIFICATION AND MAPPING OF JERUSALEM’S NATURAL AREAS

1.6.1 NATURAL OPEN ENSEMBLE SITES

Jerusalem has a wide variety of open spaces that include multiple habitats and natural systems. These sites, which are more characteristic of non-urban open spaces, are defined as natural open ensembles. They are large ensemble sites comprised of numerous habitats, each of which could be counted as a site of its own. The Jerusalem Urban Nature Survey groups these ensemble sites into four main categories: open natural, agricultural, parkland and built-up ensemble sites. They form the backbone of the city’s natural infrastructure.

A. Open Natural Ensembles

The urban nature ensemble sites are mostly found on the eastern and western outskirts of the city and generally form a connection between the built-up areas within the city and the open areas outside the city. These sites preserve rich ecological systems and are home to varied habitats typical of the Jerusalem Hills, such as batha (Mediterranean scrubland - dwarf shrub formations, see Item 1.7.1B). planted forests, groves and remnants of traditional agriculture (orchards and vineyards). They also support a variety of wildlife including large mammals, such as gazelles and striped hyenas, and predatory birds, such as short-toed eagle and Eurasian eagle-owl (Bubo bubo). There are also a number of open natural ensemble sites within the city, similar in nature to those on the outskirts albeit smaller. Despite their size and urban surroundings, they also support diverse and rich habitats.

B. Open Agricultural Ensembles

These sites are rural in nature and are rich in olive groves, orchards and other traditional crops. The vegetation is typical of a rural Mediterranean environment. At times, it is difficult to clearly classify these areas as either part of the built-up environment of the city or as part of its open natural period.

Rural structures and stone walls are integrated into the agricultural open areas.
C. Parkland Ensembles

These sites are found in open natural areas and parks within the city and include natural habitats alongside urban gardening. Despite high levels of development, open access to the public and gardening, these sites have diverse natural assets, such as concentrations of flowering plants, mature trees, birds and even mammals.

D. Natural Ensembles in Built-up Areas

These sites in the dense urban environment include limited areas of natural phenomena and habitats. One example unique to Jerusalem is the Old City, in which a very dense area of structures and walls is integrated with wet habitats, wall flora, mature trees and nesting sites.
THREATS TO BIODIVERSITY

The most significant biological diversity in the city can be found in the natural ensemble sites, including the highest concentration of endangered species. Most of the ecological and environmental services for the city depend on these areas, including: air quality, water infiltration, runoff management and recreational and educational services. While the critical importance and value of these sites are apparent, the sites are influenced by a variety of factors which contribute to a constant state of deterioration due to the following phenomena:

1. Decreased numbers of large mammals, such as gazelles and hyenas, and decreased nesting of large birds of prey, such as the short-toed eagle and long-legged buzzard, largely due to development and the subsequent loss of habitats.
2. Fragmentation of the ensembles as a result of urban construction and infrastructure and the blocking of animal passages.
3. Environmental hazards such as contamination of water sources with sewage and waste materials dumped illegally.
4. Lack of coordination between the many different bodies and organizations responsible for administering the areas (Municipality, Water Authority, Nature and Parks Authority, etc.).

1.6.2 ADDITIONAL SITES

There are also many smaller sites situated within the urban environment that are classified according to the main forms of plant and animal life they are home to. Detailed descriptions of the plants and animals typically found at these sites are described in sections 1.7.1 and 1.7.2.

- **Blossom sites**: Unique sites with flowers that bloom in the fall and spring, including geophytes and grasses.
- **Mature tree sites**
- **Mediterranean groves**
- **Orchards, vineyards, and olive groves**
- **Green (living) roofs**: Roofs with natural vegetation systems, cultivated and wild. Green roofs are often covered with gardens planted with perennials or orchards.
- **Other groves**
- **Planted forests**
- **Additional flora sites**: These represent sub-classes of sites and ensembles with groups of plant life characteristic of the Jerusalem Hills such as:
  - Semi-steppe batha
  - Wet habitats
  - Sites with concentrations of insects
  - Sites with concentrations of reptiles
  - Bird sites: rich in bird activity, rare species of birds or nesting sites.
  - Sites with concentrations of mammals
  - Unique landscape formations: These sites are characterized by their contributions to the unique landscape of Jerusalem. They include cliffs, caves and exposed rock formations.
Arbutus andrachne in the British Military Cemetery, Mt. Scopus
Jerusalem Urban Nature Infrastructure Survey

Winter pool at IMI Site
Jerusalem Urban Nature Infrastructure Survey

Olive grove in Katmon Tet
Jerusalem Urban Nature Infrastructure Survey

Sanhedrin Park grove
Jerusalem Urban Nature Infrastructure Survey

Traditional agricultural terraces in the Fields of Shuafat
Jerusalem Urban Nature Infrastructure Survey

Porpucine at mammal site in Ramat Denia
Jerusalem Urban Nature Infrastructure Survey
Unique landscape formation at Har Heret | Jerusalem Urban Nature Infrastructure Survey

Whol Rose Park near the Knesset (Israel's Parliament) | Jerusalem Urban Nature Infrastructure Survey

Bulbul on California Holly in Beit Hakerem Park | Jerusalem Urban Nature Infrastructure Survey

Mediterranean grove at the Israel Museum | Jerusalem Urban Nature Infrastructure Survey

Blossom Sites in the City | Source: Jerusalem Urban Nature Infrastructure Survey
In addition to the natural sites classified in the Urban Nature Survey, the city’s open spaces include a network of urban parks and community gardens. The main public parks include Sacher Park, Independence Park and Liberty Bell Park. Recently, the Railway Park, a corridor park, celebrating the historic preservation of the old Turkish railway line was added to this list (see Item 2.5.4).

1.7 DESCRIPTION OF BIODIVERSITY IN JERUSALEM

1.7.1 NATURAL VEGETATION

The Jerusalem region is rich in species, some of which are unique to the area and cannot be found anywhere else in the country.31 Approximately 1000 different species have been observed in Jerusalem, making it one of the cities with the greatest variety of species in the world.32

This great number and diversity of species is primarily a result of Jerusalem’s location at the meeting point of different climatic and vegetation zones. Although within the Mediterranean region, Jerusalem borders the transition zone, an area with many Irano-Turanian and desert plants. Therefore, the Judean Desert flora finds its way into the city. Another factor affecting the local flora is the city’s altitude. Jerusalem is home to plants typical of the dry mountainous regions of the Middle East, and has a unique combination of Mediterranean, mountain and desert flora.33

The presence of many species within Jerusalem may be related to a special type of ecological harmony, created over the years by human interference with the rich and diverse local flora, including different degrees of grazing pressure, traditional agriculture, the construction of roads and more. It is possible that human interference over time in many of the natural habitats within the city is what has enabled the coexistence of so many species. In fact, plants that can only be found growing on the Old City Walls and on the walls of its buildings persist precisely due to human activity.34

Jerusalem is characterized by a number of primary natural habitats, which form the basis for the city’s unique natural infrastructure. These include:

A. Rocky Ground

These habitats are typically found on Aminadav, Ba’ana and Veradim formations and have a large amount of exposed rock and minimal soil. They have sparse batha vegetation, but many reptiles and birds, such as partridge, wheatear species and rock thrushes.

B. Batha (scrubland)

Batha is a typical Mediterranean vegetation commonly found throughout the city, comprised mostly of evergreen dwarf shrubs, dominated by poterium (Sacropoterium spinosum) and thyme (Coridothymus capitatus). Different types of batha are found in areas with different types of underlying rock. Rockroses (Cistus salviifolius and Cistus creticus) grow on marl or limestone formations, while poterium (Sarcopoterium spinosum) is commonly found on hard limestone.

C. Semi-steppe Batha

This type of batha has been preserved only minimally as the city developed. The shrubs in these systems are short and thorny. Spiny hawthorn (Crataegus aronia) and buckthorn (Rhamnus lycioides) can be found in these areas, along with other species.

D. Mediterranean Groves

Mediterranean groves are not common to the Jerusalem area. Those that are present are mostly found on the western outskirts of the city. Within the city itself, few groves remain. Two examples of groves inside the city can be found in the Valley of the Cross and near the Israel Museum. The groves, traditionally managed, are dominated mainly by olives and almonds, both planted in the area since biblical times.

Semi-steppe batha | Jerusalem Urban Nature Infrastructure Survey
E. Pistacia Atlantica Forest

This is unique forest area that has survived along the mountain backbone within the urban area of Jerusalem. According to some, in ancient times, these forests were common to the whole Judean Mountains and Samaria areas, east of the watershed line. Parts of the forest that survived within the city are found in the Zurim Valley, Mt. Scopus Park, near the Mamilla Pool and near the eastern walls of the Old City.35

F. Wet Habitat

Wet habitats in Jerusalem are rare. They include springs, winter pools, river beds and dams. These habitats are home to specific species, including amphibians, water insects, crustaceans and characteristic vegetation. These sites also provide a source of water for birds to drink and bathe.

G. Rock and Wall Flora

This type of flora is common to Jerusalem’s Old City and its historic neighborhoods and is also found on local cliffs and caves. The variety of flora found in these areas is limited and is mostly aesthetic in value. Rock and wall flora include golden henbane (Hyoscyamus aureus), Sicilian snapdragon (Antirrhinum siculum) that was brought to the region by the crusaders, golden drop (Podonosma orientalis), common cyclamen (Cyclamen persicum), fig (Ficus carica), caper (Capparis zoharyi) and common pennywort (Umbilicus intermedius).

H. Traditional Agricultural Fields, Orchards and Vineyards

Much of modern Jerusalem is built on land that, until the 19th century, was used for agriculture. These rural areas, owned partly by local monasteries, were used for vineyards, orchards and olive groves that require almost no watering. The ancient trees and vines can still be found in private yards and monasteries, and sometimes even in urban parks. They are common in natural open spaces around the city. In these habitats one can find mainly herbaceous vegetation with batha (scrubland) remnants in rocky edges.
I. Groves

Jerusalem Pine groves (commonly known as Aleppo Pine, Pinus halepensis) were planted throughout the city during the British Mandate period (1920-1947), including in the French Hill neighborhood, on Mt. Scopus and around the Augusta Victoria Church on the Mount of Olives. The Jerusalem pine species does not require heavy watering. These and additional groves have left their imprint on the city’s skyline. Other groves were planted by the municipality after the War of Independence. The groves have added to the biological diversity in the city as they created habitats for insects, birds, and other forest species such as the Syrian woodpecker (Dendrocopos syriacus), the hobby (Falco subbuteo), and the long-eared owl (Asio otus).

J. Planted Forest

Planted forests are defined as forests that were intentionally and systematically planted. They usually include a limited number of species and trees that are similar in age. Such forests were planted in an orderly fashion around the city starting from the British Mandate period (1920-1947). These plantings continued until only a few years ago. The planted forests are primarily made up of Jerusalem pine (Pinus halepensis) mixed with cypress (Cupressus sempervirens). In the 1950s, the Jerusalem Forest was planted on over 3000 dunams (300,000 sqm, 741 acres) of land in the northwest of the city, between the Yefe Nof, Har HaZikaron and Beit Zayit neighborhoods. This forest is comprised mostly of pine trees and it is the largest recreational natural area in the city. The planted forest’s flora is rather limited, mainly due to the shade of the trees, but one cannot ignore carpets of cyclamen (Cyclamen persicum) that thrive here as well as several fungi species. The Jerusalem Forest edges and open terraces are home to rich herbaceous and woody floras, including hawthorn (Crataegus aronia), anemones (Anemone coronaria) and several special and rare plants such as: Gladiolus atrovianceus, Silene swertiifolia, Ophrys holosericea and other common and rare orchids.

K. Contemporary Agriculture

These sites include agricultural fields, orchards and groves that have been planted and are tended using modern techniques and practices. Examples
include the cherry orchards of Kibbutz Ramat Rahel and the olive groves in the Beit Zayit Valley. In addition, during the 1950s, the Jerusalem Municipality initiated and encouraged a different form of agriculture in the city. The Israel Lands Administration leased land in the stream channels that traverse the city, such as Nahal Rehavia and the Valley of the Cross, to nearby kibbutzim (plural of kibbutz). The kibbutzim planted deciduous trees in these valleys and streambeds.

L. Roadside Vegetation

This is obviously a common habitat in the city. It includes many common native plants such as clammy inula (*Dittrichia viscosa*) and maritime squill (*Urginea maritima*); and some of the special and rare native plants such as Sinai mullein (*Verbascum sinaiticum*). On the other hand, in this habitat thrive some of the most noxious invasive species such as *Ailanthus altissima*, datura species and many more.
<table>
<thead>
<tr>
<th>Type of Habitat</th>
<th>Location</th>
<th>Common Species</th>
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<tbody>
<tr>
<td>Rock Ground</td>
<td>Throughout the city</td>
<td>Sparse batha vegetation, reptiles, birds (such as partridge), wheatear species, rock thrushes</td>
</tr>
<tr>
<td>Batha (scrubland)</td>
<td>Throughout the city</td>
<td>Evergreen dwarf shrubs, dominated by poterium <em>(Sarcopoterium spinosum)</em> and thyme <em>(Coridothymus capitatus)</em>, rockroses <em>(Cistus salviifolius</em> and <em>Cistus creticus)</em>, poterium <em>(Sarcopoterium spinosum)</em></td>
</tr>
<tr>
<td>Semi-steppe Batha</td>
<td>Throughout the city</td>
<td>Spiny hawthorn <em>(Crataegus aronia)</em>, buckthorn <em>(Rhamnus lycioides)</em></td>
</tr>
<tr>
<td>Mediterranean Groves</td>
<td>Valley of the Cross, Mt. Zion</td>
<td>Olives, almonds, planted in the area since biblical times</td>
</tr>
<tr>
<td>Pistacia Atlantica Forest</td>
<td>Zurim Valley, Mt. Scopus Park, Mamilla Pool, Old City</td>
<td><em>Pistacia atlantica</em></td>
</tr>
<tr>
<td>Wet Habitat</td>
<td>Rare</td>
<td>Amphibians, water insects, crustaceans, birds, characteristic vegetation</td>
</tr>
<tr>
<td>Rock and Wall Flora</td>
<td>Old City, local cliffs and caves</td>
<td>Golden henbane <em>(Hyoscyamus aureus)</em>, Sicilian snapdragon <em>(Antirrhinum siculum)</em> (brought to the region by the crusaders), golden drop <em>(Podosma orientalis)</em>, common cyclamen <em>(Cyclamen persicum)</em>, fig <em>(Ficus carica)</em>, caper <em>(Capparis zoharyi)</em> and common pennywort <em>(Umbilicus intermedius)</em></td>
</tr>
<tr>
<td>Traditional Agricultural Fields</td>
<td>Orchards and vineyards</td>
<td>Herbaceous vegetation with batha (scrubland) remnants in rocky edges</td>
</tr>
<tr>
<td>Groves</td>
<td>French Hill, Mt. Scopus, Mt. of Olives</td>
<td>Jerusalem Pine (commonly known as <em>Aleppo Pine</em>, <em>Pinus halepensis</em>) insects, birds, Syrian Woodpecker <em>(Dendrocopos syriacus)</em>, the hobby <em>(Falco subbuteo)</em>, and the long-eared owl <em>(Asio otus)</em></td>
</tr>
<tr>
<td>Planted Forest</td>
<td>Yefe Nof, Herzl Military Cemetery, Beit Zayit</td>
<td>Jerusalem Pine <em>(Pinus haleppensis)</em> mixed with cypress <em>(Cupressus sempervirens)</em>, cyclamen <em>(Cyclamen persicum)</em>, hawthorn <em>(Crataegus aronia)</em>, anemones <em>(Anemone coronaria)</em>, <em>(Gladiolus atroviolaceus)</em>, <em>(Silene swertii)</em>, <em>(Ophrys holosericea)</em></td>
</tr>
<tr>
<td>Contemporary Agricultural Fields and Orchards</td>
<td>Kibbutz Ramat Rahel, Beit Zayit, Nahal Rehavia, Valley of the Cross</td>
<td>Cherry, olive, apple</td>
</tr>
<tr>
<td>Roadside Vegetation</td>
<td>Throughout the city</td>
<td>Clammy inula <em>(Dittrichia viscosa)</em>, maritime squill <em>(Urginea maritime)</em>; rare native plants such as Sinai mullein <em>(Verbascum sinaiticum)</em> and some of the most noxious invasive species such as <em>Ailanthus altissima</em>, datura species and many more</td>
</tr>
</tbody>
</table>

Based on Jerusalem Urban Nature Infrastructure Survey, 2010
### Sample Site Card Cover Page from the Jerusalem Urban Nature Infrastructure Survey

<table>
<thead>
<tr>
<th>Site No.</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jerusalem Urban Nature Survey – Site Catalogue</td>
</tr>
<tr>
<td></td>
<td><strong>Bible Hill</strong></td>
</tr>
<tr>
<td>Site Classification:</td>
<td>Blossom Site</td>
</tr>
</tbody>
</table>

#### Location:
Near the Cinematheque, the Begin Heritage Center, and the Mishkenot Sha'ananim Garden

#### Streets:
Derekh Hevron, David Remez St.

#### Size:
17 Dunam

#### Borders:
The site is bordered on all sides by roads.

#### Accessibility:
The site is accessible by foot, by car, and by public transportation. There is parking at the site.

**Coordinates:** 221438 / 630606

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**Site Character:** A spectacular blossom site in the heart of the city. The last uncultivated exposed hillock in the center of town. Covered in remnants of semi-steppes shrublands. The site is small in size, but impressive in terms of the large variety of wildlife and flora.

**Connection to Other Sites:** Bible Hill is not adjoined to other urban nature sites.

**Capability to Receive Visitors:** Walking Paths

**Nuisances and hazards:** Invasive Flora

**Flora** *(A complete list of flora appears at the end of the card)*

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**General Description:**
Sparse shrublands on rocky ground and exposed rock. The hill has impressive concentrations of geophytes in the fall, winter and spring, which make it one of the most unique blossom sites in the city.

**Plant systems and location:**
Concentrations of flowering are found dispersed throughout the site.
1.7.2 CULTIVATED PLANTS AND GARDENING

The cultivated plants of Jerusalem are an integral part of the city’s biodiversity. Landscaped areas cover thousands of dunams in the city, including both public and private land. Public parks, traffic islands, gardens, landscaped pathways and playgrounds all affect the biodiversity of the city. The largest factor determining the type of plant life cultivated is local climate. The Mediterranean mountain climate found in parts of the city is characterized by cold, rainy winters with temperatures that might fall below zero (although this is becoming rare) and hot, dry summers with levels of solar radiation that are among the highest in the country. This climatic situation is unique, and suitable for both plants of colder and hotter origins. This is why the ornamental flora of Jerusalem is thriving and expanding species-wise each year.

The cultivated plants chosen by the Municipality for planting in these areas are those that can integrate most successfully with native, wild vegetation and others that provide additional benefits. These include Mediterranean trees that provide shade and relief from the strong sun, bushes, shrubs and climbing plants that can withstand the temperature range and are a good fit ecologically and in terms of design. Some of these plants attract insects and birds, which are important for pollination. Other bushes, shrubs and perennials are chosen for the blossoms they produce in different seasons or their year-round green appearance. The largest and most important group of cultivated plants in the city is made up of water-saving plants.

Examples of cultivated plants in the city:

- Plants from Mediterranean type regions, both local and alien. Pines (Pinus halepensis, P. brutia and P. pinea), olive (Olea europaea) and cypress (Cupressus sempervirens) from the Mediterranean region, the yellow daisy bush (Euryops pectinatus) from South Africa, red river gum (Eucalyptus camaldulensis) from Mediterranean-like regions of Australia and Lindheimer’s bee blossom (Gaura lindheimeri) from North America.

- Hardy shrubs that prevent erosion on slopes (Rhus crenata, Pistacia lentiscus, Myrtus communis) and also respond well to pruning and trimming, can withstand the local lighting conditions and grow at a moderate to fast pace.

- Plants of northern origin: Quercus pedunculiflora (planted in many streets and along the Light Rail route), Ulmus spp and Ailanthus altissima, a Chinese tree that was planted some decades ago and has become invasive and problematic in many parts of the city.

- Plants that are attractive, in that they have noticeable blossoms, colorful fruit and/or provide shade, fit into the urban landscape and provide uniform ground coverage. Many of these are of sub-tropical origin, e.g., Hibiscus rosa-chinensis, Pelargonium varieties.

- Arid desert plants that thrive with little or no irrigation: Agave americana, Leucophyllum varieties, Opuntia ficus-indica.

COMMUNITY GARDENS IN JERUSALEM

Jerusalem’s first community garden was established in 1999 by local residents working together with the Society for the Protection of Nature (SPNI). Since that time, 40 previously neglected plots of land in Jerusalem have been transformed into community gardens. SPNI, together with the Jerusalem Municipality and local community centers, supports residents in their efforts to foster community spirit and turn neighborhood eyesores into green, productive and sustainable assets. With the help of trained guides, each garden is planned, established and cared for by residents to meet the specific needs of its community. Residents acquire skills in soil improvement and composting, methods of saving and recycling water, growing vegetables and complementary planting.
1.7.3 ANIMAL LIFE

There is an abundance of wildlife in Jerusalem’s built-up and open environments. Some of these species are in the process of becoming extinct, particularly large species such as the gazelle, while others abound, such as the common swift, who adapt well to the urban environment. The city faces a great challenge in preserving its natural systems, particularly its wildlife. Limited habitat area, competition from more adaptable and invasive species and the danger of falling prey to feral cats and dogs all threaten the survival of wildlife in the city.

The main groups of wildlife in Jerusalem are discussed below.

A. Insects

Insect habitats are dependent to a large extent on the diversity of flora. Large natural open spaces with rich flora are also rich in insects. Particularly noteworthy among these are hilltops, which attract particular species in the spring for mating and reproduction.

**BUTTERFLIES**

Jerusalem is home to one of the highest concentrations of butterflies in Israel. This is a result of Jerusalem’s location on the watershed line, between Mediterranean scrubland on the west and semi-steppe scrubland on the east. Jerusalem’s relative proximity to the coastal area (only tens of kilometers) attracts heat-loving species that arrive after the winter months, such as the Lang’s short-tailed blue butterfly (*Leptotes pirithous*), pygmy skipper (*Gegenes pumilio*) and millet skipper (*Pelopidas thrax*). On the eastern side of the city, Jerusalem’s proximity to the Jordan Valley and the Dead Sea draws desert butterflies from the east starting in the spring, including *Madais fausta*, *Anaphaeis aurota*, *Danaus chrysippus* and *Ypthima asterope*. Extensive development in and around the city along with other land uses (agriculture, particularly grazing) have negatively affected the city’s butterfly population to the extent that several species that were once prevalent in the area are now nearly extinct. These include Grüner’s orange tip (*Anthocharis gruneri*), the black veined white (*Aporia crataegi*), Chazara persephone, and possibly also *Tomares nesimachus*. These species are all examples of European cold-loving butterflies whose travel to Jerusalem represents the southernmost limits of their flight. Other species that until only a few years ago were found throughout the city are now only found in natural open spaces far from the urban center. These include the two-tailed pasha (*Charaxes jasius*), the Oriental meadow brown (*Hyponephele lupinus*) and the ilex hairstreak (*Satyrium ilicis*), among others.

![Zygaena graslini on Spring groundsel (Senecio vernalis)](Image1)

![Melanargia titea](Image2)

*Zygaena graslini on Spring groundsel (Senecio vernalis) | Jerusalem Urban Nature Infrastructure Survey*

*Melanargia titea | Jerusalem Urban Nature Infrastructure Survey*
B. Reptiles

The urban and natural conditions present in Jerusalem affect the composition of the reptile population in the city. A variety of reptiles that inhabit stone walls are commonly found in the built-up areas of the city. In particular, the Old City, with its many stone walls with cracks and crevices is home to many different lizard species, such as the star lizard (Laudakia stellio), geckos and the Lebanon lizard (Lacerta laevis). Some notable reptile habitats are found at sites within the city that have been cut off from other parts of the species’ natural habitat by development. A survey in the city revealed the presence of a wide variety of reptile species, including the spur-thighed tortoise (Testudo graeca), fan-fingered gecko (Ptodactylus guttatus), snake-eyed lizard (Ophisops elegans), bridled skink (Trachylepis vittata), coin snake (Coluber nummifer) and whipsnake (Coluber najadum), along with Roth’s dwarf snake (Eirenis rothi), Rüppell’s snake-eyed skink (Ablepharus rueppellii), the European blind snake (Typhlops vermicularis) and the common chameleon (Chamaeleo chamaeleon). All of these species are protected under Israeli law.
C. Amphibians

Four types of amphibians can be found at a small number of sites within the city. These are the European green toad (Bufo viridis), marsh frog (Rana ridibunda), common tree frog (Hyla arborea) and a new species of tree frog whose distribution is limited to the Mamilla Pool and several springs around the city. Recent studies indicate that the numbers of amphibians in Israel and around the world are declining, mainly due to the destruction of their habitats. Two of the species found in Jerusalem, the green toad and tree frog, are in fact in danger of extinction worldwide. These species have survived in a number of small springs on the outskirts of the city and in winter pools and puddles within the built-up environment. Two of the most impressive winter pool habitats are the Mamilla Pool and Hezekiah’s Pool in the Old City.

D. Birds

There is a noticeable bird presence in Jerusalem. The bird population in the city is stable and present year-round. In Jerusalem, species typical of the Mediterranean region are found alongside desert species, such as the bulbul (Pycnonotus) and the Palestine sunbird (Nectarinia osea). East of the watershed line, there are a number of important sites that are home to species characteristic of the desert fringe, such as the blackstart (Cercomela melanura), mourning wheatear (Oenanthe lugens), rock sparrow (Petronia petronia) and long-billed pipit (Anthus similes). West of the watershed line, a number of Mediterranean species can be found, including the jay (Garrulus), common blackbird (Turdus merula) and Sardinian warbler (Sylvia melanocephala). Among the birds that spend summers in the region there is a wide variety of species that nest in the open and built-up spaces of the city. The common swift (Apus apus) nests in buildings throughout the city. The oldest community of swifts in Jerusalem is found in the Western Wall (see Item 1.9.2). The city’s groves also serve as nesting areas for many species of birds, including the Eurasian hobby (Falco subbuteo), long-eared owl (Asio otus) and turtledove (Streptopelia turtur).
A few pairs of eagles and Eurasian eagle-owls can still be found nesting in the open areas around the city. Many migrating birds make their way to Jerusalem for the winter. These include populations of robins (Erithacus rubecula), thrushes (Turdidae) and even the rare hawfinch (Coccothraustes coccothraustes). Small and rare populations of yellowhammer (Emberiza citrinella) and pine bunting (Emberiza leucocephalos) winter regularly in Emek Zurim National Park. They are remnants of much larger populations whose numbers declined significantly as new neighborhoods were built on agricultural land in the city in the 1980s.

During the migration season, many open spaces in the city serve as rest and refueling stations for hundreds of thousands of migrating birds. In particular, many song birds enjoy refuge, sustenance and rest in these areas before and after crossing the desert.

**BIRD MIGRATION OVER ISRAEL**

The unique location of Israel at the junction of three continents has made it a crossroad for bird migration, second to almost no other site in the world. Research over the past decade has shown that more than 500 million migrating birds, comprising over 200 different species, fly over Israel’s narrow airspace twice every year. These birds migrate over Lebanon, Jordan, Israel and through Egypt to Africa. Per square kilometer, the country has one of the highest levels of bird traffic in the world.

“Israel sits on the junction of three continents,” says Dr Yossi Leshem, director of Israel’s International Centre for the Study of Bird Migration. “Politically, it’s a disaster, but for bird migration, it’s heaven. We have a huge bird bottleneck, a superhighway.” Dr Leshem explains that most birds prefer to fly over land when migrating. It allows them to save energy by flying using warm thermal air rising off the land below. Many birds flying south from Northern Europe and Asia to Africa want to avoid the Mediterranean and Caspian seas and are therefore funneled down over Israel.

The migration route crosses Jerusalem, although, the city is not an important stop in the process, except for the swifts who have been visiting Jerusalem since biblical times, where they nest annually in the Old City walls between February and June.

The Jerusalem Bird Observatory (JBO) studies this unique natural phenomenon as part of its regular program of bird monitoring research, education and recreation. It enables thousands of school children and visitors from all across the city to visit the center and experience a unique encounter with local as well as migrating bird species.
Hoopoe (*Upupa epops*), the national bird | Jerusalem Urban Nature Infrastructure Survey

Long-eared owl in Armon HaNetziv | Jerusalem Urban Nature Infrastructure Survey

Common blackbird (**Turdus merula**) on Kiryat Menachem hillside | Jerusalem Urban Nature Infrastructure Survey

Common kestrel (**Falco tinnunculus**) | Jerusalem Urban Nature Infrastructure Survey

Little owl (**Athene noctua**) in Nahal Shmuel | Jerusalem Urban Nature Infrastructure Survey

Jay (**Garrulus**) in Nayot Park | Jerusalem Urban Nature Infrastructure Survey
E. Mammals

The most prominent (non-human) mammalian populations in Jerusalem are found in the natural open spaces within the urban built-up environment and in adjacent open spaces on the city’s outskirts. Within the city, there are several open spaces that have been closed in by development, in which impressive groups of mammals continue to exist. In fact, proximity to the city has contributed to a well-developed mammal population particularly in areas in which there is widespread human activity, such as in the Jerusalem and Aminadav forests. In these areas, you can observe mammals not commonly found in cities, such as the striped hyena (*Hyaena hyaena*) and the caracal (*Caracal caracal*).

One of Jerusalem’s flagship species is the Israeli gazelle (*Gazella gazella gazella*). According to a rough estimate, there are about 3000 of these gazelles in Israel. Since this species of gazelle has only survived in Israel, that number represents the worldwide population and it is considered a vulnerable species nationally and endangered within the city. Within the boundaries of the city, the number of gazelles fluctuates between 100 and 200. This population represents about 5% of the country’s gazelle population. In areas such as the Gazelle Valley, Nahal Tzufim, Nahal Zimri and Har Homa, the gazelles are closed in by urban infrastructure such as roads and buildings. These gazelles are at risk of falling prey to wild dogs and golden jackals and to being run over by cars. The conservation and proper management of open spaces in the city are particularly important for preserving the Israeli Gazelle. The establishment of Jerusalem’s
stage), represents the city’s attempt to develop methods to sustain and increase the captive urban Gazelle population.

Another mammal found within the city and on its outskirts is the porcupine (*Hystrix indica*). Widespread porcupine activity can be observed in many of the city’s natural areas, including local parks and residential neighborhoods. Most of the porcupine activity seems to take place in the Kiryat HaYovel and Ramat Denia neighborhoods. They often damage gardens and feast on ornamental bulbs and other plants. To mitigate the damage, local organizations and the municipality encourage fencing private gardens. With new building plans, developers can work together with the Israel Nature and Parks Authority to create artificial dens to protect the porcupines and the surrounding environment.

The Eastern hedgehog (*Erinaceus concolor*) is also commonly found in the Jerusalem area, along with the rock hyrax (*Procavia capensis*). The rock hyrax is only found in the northeastern part of the city, between the eastern slopes of the Pisgat Ze’ev neighborhood, Nahal Zofim and the upper part of Nahal Sorek near the Ramot neighborhood.

Jerusalem is home to nine bat species, including the common pipistrelle (*Pipistrellus pipistrellus*), a rare species that is usually found only in northern Israel.44 There is relatively little bat activity in the built-up areas of the city, particularly areas in which more than 70% of the land is developed, with more activity in areas closer to the city outskirts.45
## WILDLIFE HABITATS AND SPECIES IN JERUSALEM

<table>
<thead>
<tr>
<th>Type</th>
<th>Habitat</th>
<th>Common Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insects</td>
<td>Throughout the city</td>
<td>Butterflies, Lang’s short-tailed blue (<em>Leptotes piritheos</em>), pygmy skipper (<em>Gegenes pumilio</em>); millet skipper (<em>Pelopidas thrax</em>; <em>Madais fausta</em>, <em>Anaphaeis aurata</em>, <em>Danaus chrysippus</em>; <em>Ypthima asterope</em>; Grüner’s orange tip (<em>Anthocharis gruneri</em>), black veined white (<em>Aporia crataegi</em>), <em>Chazara persephone</em>, <em>Tomes nesimachus</em>; two-tailed pasha (<em>Charaxes jasius</em>), Oriental meadow brown (<em>Hyponephele lupinus</em>); ilex hairstreak (<em>Satyrium ilicis</em>)</td>
</tr>
<tr>
<td>Reptiles</td>
<td>Stone walls, Valley of the Cross, the Old City</td>
<td>Star lizard (<em>Laudakia stellio</em>), geckos and the Lebanon lizard (<em>Lacerta laevis</em>), spur-thighed tortoise (<em>Testudo graeca</em>), fan-fingered gecko (<em>Ptodactylus guttatus</em>), snake-eyed lizard (<em>Ophisops elegans</em>), bridled skink (<em>Trachylepis vittata</em>), coin snake (<em>Coluber nummifer</em>), and whipsnake (<em>Coluber najadum</em>), along with Roth’s dwarf snake (<em>Eirenis rothi</em>), Rüppell’s snake-eyed skink (<em>Ablepharus rueppellii</em>), the European blind snake (<em>Typhlops vermicularis</em>) and the common chameleon (<em>Chamaeleo chamaeleon</em>) - all protected species.</td>
</tr>
<tr>
<td>Amphibians</td>
<td>Winter pools and puddles throughout the city; Mamilla Pool and Hezekiah’s Pool in the Old City</td>
<td>European green toad (<em>Bufo viridis</em>), marsh frog (<em>Rana ridibunda</em>), common tree frog (<em>Hyla arborea</em>) and a new species of tree frog (both in danger of extinction worldwide)</td>
</tr>
<tr>
<td>Birds</td>
<td>Throughout the city</td>
<td>Bulbul (<em>Pycnonotus</em>) and the Palestine sunbird (<em>Nectarinia osea</em>); blackstart (<em>Cercomela melanura</em>), mourning wheatear (<em>Oenanthe lugens</em>), rock sparrow (<em>Petronia petronia</em>) and long-billed pipit (<em>Anthus similis</em>); jay (<em>Garrulus</em>), common blackbird (<em>Turdus merula</em>), Sardinian warbler (<em>Sylvia melanocephala</em>); common swift (<em>Apus apus</em>); Eurasian hobby (<em>Falco subbuteo</em>), long-eared owl (<em>Asio otus</em>) and turtledove (<em>Streptopelia turtur</em>); populations of robins (<em>Erithacus rubecula</em>), thrushes (<em>Turdidae</em>) and the rare hawfinch (<em>Coccothraustes coccothraustes</em>); yellowhammer (<em>Emberiza citronella</em>) and pine bunting (<em>Emberiza leucocephalos</em>)</td>
</tr>
<tr>
<td>Mammals</td>
<td>Some built up areas; forests and open spaces on the outskirts of the city</td>
<td>Striped hyena (<em>Hyaena hyaena</em>), caracal (<em>Caracal caracal</em>), Israeli gazelle (<em>Gazella gazella gazella</em>), porcupine (<em>Hystrix indica</em>), Eastern hedgehog (<em>Erinaceus concolor</em>), rock hyrax (<em>Procavia capensis</em>), bat species, including the common pipistrelle (<em>Pipistrellus pipistrellus</em>), eagles and Eurasian eagle-owls, migrating birds including populations of robins (<em>Erithacus rubecula</em>), thrushes (<em>Turdidae</em>) and the rare hawfinch (<em>Coccothraustes coccothraustes</em>), rare populations of yellowhammer (<em>Emberiza citronella</em>) and pine bunting (<em>Emberiza leucocephalos</em>)</td>
</tr>
</tbody>
</table>

Based on Jerusalem Urban Nature Infrastructure Survey, 2010
SAVING THE GAZELLE VALLEY

A 60-acre undeveloped tract of land in southwestern Jerusalem, the Gazelle Valley is adjacent to two residential neighborhoods and is surrounded by two major highways. Approximately 70,000 residents live in the area, the majority in middle to lower socio-economic brackets.

BACKGROUND AND HISTORY

In the 1950s, soon after the establishment of the State, Israel adopted the British planning approach of refraining from any form of development and construction in valleys in Jerusalem. In order to encourage agriculture and increase the food supply for its residents, the city offered two kibbutzim (plural of kibbutz) use of the valley for agriculture.

In the 1980s, the kibbutzim decided to stop working this land and their short-term lease was not renewed. With the continued development of the bordering neighborhoods and the construction of the nearby Begin Highway, the valley became a remnant open space within a dense urban area. Plants and wildlife found refuge there and gazelles from nearby natural areas made their way down to the valley for habitation. Jerusalem residents and passers by would often watch the gazelles from the roadside in awe, spotting five to seven at a time.

In the late 1990s, a building plan for the valley was developed, calling for the construction of 1000 housing units and a commercial strip. The Jerusalem Branch of the Society for the Protection of Nature in Israel (SPNI) registered its opposition in the Municipal and District Planning Committees, pointing to the plan’s reversal of traditional planning principals, as well as to the significant value of the valley as an open space. At that time, a herd of around 30 gazelles roamed the valley. Joining forces with local residents and activists, a massive campaign to save the valley was launched, bringing together residents, activists and planning professionals who organized protests at City Hall, tours of the valley, meetings to raise awareness among neighbors, petitions and more. The Gazelle Valley Citizen Action Committee was formed and the campaign attracted the attention of the local and national media.

THE FIRST VICTORY

After several years of debate and struggle, the Jerusalem District Planning Committee canceled the building plan in favor of conserving the valley’s natural resources. As pleased as everyone was with the results of the campaign, it was understood that the land would not remain untouched for long. With public participation as a guiding principle, SPNI, the Gazelle Valley Committee, planners and local residents worked together to develop a vision and plan for a park at the site.

While a fierce public campaign was being waged on the one hand, and developers sued for their building rights on the other, urban development in the surrounding area put the gazelle herd at risk. With their numbers slowly decreasing, residents set up a volunteer Valley Watch to report threats and the Citizen Action Committee took the unprecedented step of turning their master plan into a statutory open-space development plan. At the end of 2009, the Jerusalem District Planning Committee approved the Gazelle Valley Urban Nature Park Plan, the first time in Israeli history that a group of residents and civic organizations submitted a statutory plan and received approval. Shortly afterwards, the city declared the site a natural heritage area, designated for conservation.

The Gazelle Valley has become a symbol in Jerusalem and throughout the country of what civic organizations can accomplish in determining the fate of neighborhoods and cities. The gazelle is the icon of the park, but not its essence. Gazelle Valley represents a victory for social and environmental justice. It represents the right of all residents to public parks and open spaces close to their homes. Were it not for the cooperation and partnership between many groups and residents, it is unlikely that such a daring initiative would have succeeded.

THE FINAL STAGE

At this time detailed plans for the development of the valley as a nature park are being advanced. The Gazelle Valley Urban Nature Park will be the first urban nature wildlife park in Israel, and as such its success is critical to pave the way for numerous initiatives throughout the country, promoting urban nature as a resource for leisure, education, tourism, research and culture.
1.8 EFFECTS OF URBANIZATION ON BIODIVERSITY IN JERUSALEM

Over the years, the multitude of species found in Jerusalem have adapted to and integrated with the urban environment and infrastructure to different extents. Thousands of years of Jerusalem’s history have influenced the urban texture; stone walls, reservoirs and roof tops have been transformed into natural ecosystems. Impressive examples of this transformation can be found throughout the historic areas of the city.

The Temple Mount is an ancient living roof, the Western Wall is home to the swifts, the Old City walls sports cliff vegetation and the Beit HaKerem neighborhood is known for its porcupine dens.46

Urban development outside of the walls of the Old City, beginning in the 19th century, has transformed the face of the city. Development and construction have displaced natural habitats and agricultural land and created a new mosaic of neighborhoods and public and private green spaces. Today, natural environments in the city include orchards, groves, public and private parks, and gardens. New habitats have developed within the built-up environment and wildlife has flourished, including large wild animals.

One prime example of wildlife in the city is the lesser kestrel (Falco naumanni), an endangered species regionally according to The Red Book of Vertebrates in Israel.47 This bird chose to nest on the rooftops of dense urban neighborhoods such as Musrara, Nahlaot and Rehavia, and could be found in those locations until the late 1990s. During the fall and spring migration, many species of songbirds stop in Jerusalem’s neighborhoods for refuge, rest and nourishment. Among other birds of prey, the Eurasian hobby (Falco subbuteo) regularly nests in the large groves within the city.

Insects can also be found in abundance in the neighborhoods outside the Old City walls. Within and between neighborhoods, there is a wide variety of habitats, including remnants of orchards, active agricultural areas, gardens and open spaces enclosed by development. These sites are home to a very rich diversity of plant and animal life. Reptile species found in these areas include the common chameleon (Chamaeleo chamaeleon) and Lebanon lizard (Lacerta laevis), among others. The Valley of the Cross, one of the richest reptile habitats, is home to the spur-thighed tortoise (Testudo graeca), coin snake (Coluber nummifer) and whipsnake (Coluber najadum).48

A wide variety of mammals can be found in city neighborhoods and in the open spaces and agricultural sites between them. These include the Eastern hedgehog (Erinaceus concolor), the golden jackal (Canis aureus), the Palestine mole rat (Spalax ehrenbergi or Nannospalax ehrenbergii) and the porcupine (Hystrix).49

The rapid development of the city following the establishment of the State increased its land area significantly. The neighborhoods that were built in the western part of the city created a new reality of dense urban habitats combined with natural and agricultural
open spaces. In the forests and wadis (valleys) around those neighborhoods, one can regularly find Israeli gazelles (Gazella gazella gazella), golden jackals (*Canis aureus*), red foxes (*Vulpes vulpes*) and striped hyenas (*Hyaena hyaena*). The city’s eastward expansion during the 1980s and 1990s created a new encounter between the urban environment and the desert fringe habitat. Throughout the city, many natural open spaces adjacent to neighborhoods have been cut off by roads. One prominent example of this phenomenon involves the Israeli gazelle habitat, causing a significant decrease in its population. For example, the gazelle population in Beit HaKerem has completely disappeared, as they were forced toward Nahal Rakefet and later to the Gazelle Valley\(^5\) (see Item 1.7.3E).

Development and construction to the north and south, in the neighborhoods of Ramot, Gilo and Neve Yaakov, has eliminated several ecological corridors that existed between the two sides of the watershed line, permanently severing the link that connected these two main ecological systems in the city. However, also resulting from this construction boom, new habitats were created that have attracted new species to the city. For example, the artificial rock barriers that were built around the neighborhoods of Pisgat Ze’ev and Neve Ya’akov have become home to a large, new population of rock hyraxes.\(^5\)

From the 1990s through the present, additional factors have significantly influenced plant and animal life in the city. The Separation Fence to the north, east and south of the city, affects the functioning of ecosystems in the eastern basin. The resulting enclosure of habitats of large mammal populations reduces the chance of their survival. In addition, the presence of increased numbers of predators, such as feral dogs, golden jackals, and foxes, threaten the continued existence of the gazelle population in different areas of the city.\(^5\) Recent studies have demonstrated the negative impact that these animals have on local biodiversity, in particular in preying on young gazelles.\(^5\) In one recent experiment that involved releasing Persian fallow deer (*Dama dama*) into the Jerusalem Hills, there were numerous incidents of feral dogs preying on the deer and the dogs were seen as posing a serious threat to their survival.\(^5\) At this time, there is no government program in place to deal with this hazard.
THE KIDRON VALLEY SEWAGE PROBLEM

The 35-km-long Kidron Valley extends from Jerusalem to the Dead Sea and covers a watershed area of 120,000 dunams (120 km²). It has expansive views and natural ecosystems with distinctive plant and animal species and encompasses natural, rural and urban settings. For centuries, the Kidron Valley Basin, from the Old City of Jerusalem to the Dead Sea, has served as an important pilgrim route for the three monotheistic faiths. Yet, despite its historic significance, and the fact that more than 200,000 residents of different neighborhoods in East Jerusalem live in the area, the Kidron Valley Basin suffers from serious environmental neglect. Forty thousand cubic meters of raw sewage flow through the Valley and into the Dead Sea every day!

The Dead Sea Drainage Authority and the Jerusalem Municipality, together with local residents and a significant group of stakeholders, have joined in an effort to regulate the environmental hazards in the Kidron Valley and rehabilitate the area. Prominent among the different international organizations concerned about the preservation and development plans is the United Nations Development Programme (UNDP) which recognizes these efforts as an opportunity to solve the local sewage problem and utilize local assets for the benefit of the community. The religious and cultural significance of the area, along with its biodiversity, could serve as the basis for sustainable development and future prosperity. The stakeholder forum has decided to invest in a comprehensive plan for the Kidron Valley based on a survey of critical parameters and issues.

The rehabilitation plan will include a comprehensive nature survey providing up-to-date and in-depth biodiversity information about important urban nature sites in the area. Results of the survey will be compiled in a data base and linked with the city GIS program, to form a comprehensive resource for sustainable city planning and development. In addition, the plan will promote cooperation for local agricultural and other entrepreneurial initiatives, enhancing employment opportunities while advancing awareness about the Valley’s unique ecological features and their potential for economic and social development. It is believed that participation on this level will also encourage local residents to protect the natural habitats indigenous to the area.

1.9 SPECIAL FEATURES AND CHARACTERISTICS OF BIODIVERSITY IN JERUSALEM

1.9.1 ENDANGERED AND RARE SPECIES IN JERUSALEM

Over the past 50 years, approximately 10% of the plant species (103 species) in the Jerusalem area have become extinct and many others are currently in danger of immediate extinction (these are known as “red species”). During this period, many unique natural habitats and open spaces have disappeared. Red species, rare species, and endemic species were all carefully noted in the Jerusalem Urban Nature Infrastructure Survey.
The Red Book of Vertebrates in Israel was published in 2002 by the Society for the Protection of Nature in Israel in conjunction with the Israel Nature and Parks Authority. It defines the current condition of vertebrate species in Israel and identifies the “red” species that are under immediate threat, classifying them by global and regional threat levels. It notes the distribution of these species throughout Israel and the world, and it highlights the species that are in danger and those that require immediate tangible action to prevent their local or global extinction. The list of species included in the Israeli Red Book was based on the International Union for Conservation of Nature Red List criteria.

Like other environmental organizations worldwide, SPNI recently made the Red Book available online and entered its data into the Google Earth system, which provides a user-friendly platform for the presentation of local biodiversity status and loss. The Red Book includes information concerning the distribution of 130 vertebrate species. When a user clicks on a species name or region, a window opens showing a photo of the species, its Hebrew, Arabic and Latin names, its series, and the levels of local and global threat it faces. This creative system enables both researchers and laymen to view the distribution of endangered species on a dynamic map, to focus on certain geographic areas and note connections between species. View at www.natureisrael.org.
## SELECTED LIST OF LOCALLY ENDANGERED AND RARE PLANTS IN JERUSALEM

<table>
<thead>
<tr>
<th>Hebrew Name</th>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Vulnerability</th>
<th>Range</th>
<th>Protected</th>
</tr>
</thead>
<tbody>
<tr>
<td>אורטום הסדרין</td>
<td>Iris vartanii</td>
<td>Vartan’s Iris</td>
<td>Red - Endangered</td>
<td>Endemic to Israel</td>
<td>Protected</td>
</tr>
<tr>
<td>אכלה הסלעוט</td>
<td>Achillea arabica</td>
<td>Yellow Milfoil</td>
<td>locally endangered</td>
<td>Middle East and Caucasus</td>
<td></td>
</tr>
<tr>
<td>אצובית ירד</td>
<td>Pistacia atlantica</td>
<td>Atlantic Pistachio</td>
<td>locally endangered</td>
<td>North Africa to the Himalayas</td>
<td>Protected</td>
</tr>
<tr>
<td>אצובית ירד</td>
<td>Caralluma europaea var. judaica</td>
<td>locally endangered</td>
<td></td>
<td>Israel and surroundings</td>
<td></td>
</tr>
<tr>
<td>בוגת פני</td>
<td>Verbascum sinaiticum</td>
<td>Sinai Mullein</td>
<td>rather rare</td>
<td>NE Africa to Turkey</td>
<td>Protected</td>
</tr>
<tr>
<td>נרחבית הצהוב</td>
<td>Teucrium lamiifolium</td>
<td></td>
<td>rather rare</td>
<td>E. Med</td>
<td></td>
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<tr>
<td>נרחבית הרובע</td>
<td>Trigonella astroites</td>
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<tr>
<td>ווליןית הצהוב</td>
<td>Valerianella echinata</td>
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<td></td>
</tr>
<tr>
<td>ברוקן היית</td>
<td>Viscum cruciatum</td>
<td></td>
<td>rather rare</td>
<td>Protected</td>
<td>E. Med</td>
</tr>
<tr>
<td>חרובית התבור</td>
<td>Delphinium ithaburense</td>
<td></td>
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<td>Europe and Med.</td>
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<td>Origanum vulgare</td>
<td>Field Scabious</td>
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<td>E. Med</td>
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<td>חרובית אירן-שטרליא</td>
<td>Onopordum palaestinum</td>
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<td>Sub-endemic</td>
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<td>Middle East</td>
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<tr>
<td>ברוקן היית</td>
<td>Viscum cruciatum</td>
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<td>Protected</td>
<td>Israel to Turkey and Iran</td>
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<td>חרובית القرن</td>
<td>Euphorbia phymatosperma</td>
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<td>Red - Endangered in Israel</td>
<td>Renderable</td>
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<td>Sclerochloa dura</td>
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<td>חלמונית אפורת</td>
<td>Calamintha incana</td>
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<td>Med.</td>
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<td>כריר מנין</td>
<td>Carex hallerana</td>
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<td>locally endangered</td>
<td>Med.</td>
<td></td>
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<tr>
<td>נרחבית משובלת</td>
<td>Trigonella spicata</td>
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</tr>
<tr>
<td>Protected</td>
<td>Israel to Iran</td>
<td>locally endangered</td>
<td>Palestine Sage</td>
<td>Salvia palaestina</td>
<td>מורוות ארצות-ישראל</td>
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<tr>
<td>Protected</td>
<td>E. Med.</td>
<td>locally endangered</td>
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Sources:
1.9.2 URBAN NATURE IN JERUSALEM’S OLD CITY

The Old City of Jerusalem, the historic core of the city barely one-square-kilometer in size, represents a unique and varied setting for urban nature. In 2007, SPNI published a survey of the natural infrastructure present in and around the Old City walls. The Jerusalem Urban Nature Infrastructure Survey, published in 2010, included even more data on systems and species throughout the Old City, including the Western Wall. The walls surrounding the Old City were built during the time of the Ottoman Empire, by Sultan Suleiman I between 1535 and 1538. They are approximately 4000 meters in circumference, with an average height of 12 meters and average thickness of 2.5 meters. There are seven entry gates to the Old City that date from the time of the Ottoman Empire and three additional gates that were built at later times. The walls of the Old City visible today are the last in a long series of walls built during different periods. These walls have become a symbol of Jerusalem.

Since the walls encircle the Old City, they form a barrier between the Old City and the new. From an ecological perspective, the walls break the natural continuity and passage of wildlife and vegetation in and out of the Old City. The walls also determine the level and character of construction in the Old City, as well as transportation options, accessibility, drainage and even everyday services such as garbage collection. All of these affect the Old City’s functioning as an ecological system.

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Before the expansion of the city beyond the Old City, the walls constituted the point of encounter between nature and the city. The walls of the Old City represent a natural open laboratory in which animals and plants attempt to integrate into the urban fabric. Those species that have succeeded in adjusting to the urban environment have remained within and on the walls, established habitats, adapted themselves to co-existence with human activity and penetrated beyond the walls into the Old City itself. Using different methods of travel and distribution, these species have also spread to nearby areas and other cities in the region. 60

The survey of natural infrastructure on the Old City walls revealed the presence of 79 plant species, 7 arthropods, 1 species of mollusk, 3 species of mammals, 29 bird species and 4 reptile species.61 Prominent among the fauna of the Old City are a variety of nectar and pollen-feeding insects, such as the honey bee, as well as many species of reptiles, such as the Lebanon lizard (*Lacerta laevis*), geckos, the star lizard (*Laudakia stellio*) and snakes such as the coin snake (*Coluber nummifer*). The nooks and crannies of the Old City walls make ideal nesting spaces for a variety of birds and serve as a refuge for mollusks, reptiles and rodents. Bird species found in the Old City include the common kestrel (*Falco tinnunculus*), common swift (*Apus apus*), hoopoe (*Upupa epops*) and Tristram’s starling (*Onychognathus tristramii*). The many food sources available throughout the Old City enable versatile and at times non-native species to flourish in the area and its surroundings. These include the house mouse (*Mus musculus*), black rat (*Rattus rattus*), rock dove, palm dove and house sparrow (*Passer domesticus*).62 The ancient Hezekiah’s Pool is the largest seasonal body of water within the borders of the Old City. The common toad (*Bufo bufo*) completes its entire life cycle within the pool area. This pool is also one of the important sources of drinking water for birds in the center of the city.

The Old City is also home to carnivores, despite difficult habitat conditions. The common kestrel (*Falco tinnunculus*) nests in the Old City and hunts at its edges. The marten, a mammal which feeds on doves and rats, lives in the walls and on the rooftops of the Old City. The oldest community of common swifts flourishes in the Western Wall.63
The oldest nesting community of common swifts in the world finds its home among the stones of the Western Wall in Jerusalem’s Old City. Every year, precisely and spectacularly, the swifts return to the Western Wall to nest and reproduce. They appear in mid-February and stay for around three and half months, until June. Unlike other birds, the swifts do not nest in trees, but rather in cracks and crevices of walls and buildings. The prophet Jeremiah referred to the swift as a bird that naturally knows to return to its place at the appropriate time. “Yea, the stork in the heaven knoweth her appointed times; and the turtle and the swift and the crane observe the time of their coming; but My people know not the ordinance of the Lord.” (Jeremiah 8:7)

The swift is a unique bird. Although it looks like a swallow, it is a different species. Compared to other birds of similar size, it lives to an advanced age, with records reaching 21 years. The common swift adapts to difficult weather conditions by entering a coma-like state and one of its defining characteristics is its ability to exist almost completely in flight. It eats, drinks, sleeps, mates, plays and even gathers materials for its nest while flying and lands only to lay eggs and care for its offspring. Swifts are monogamous and faithful to their mates and return each year to the same nest.

Many research studies have attempted to understand why the common swift returns specifically to the Western Wall to nest. One theory is that the Western Wall is an ancient, relatively high, vertical structure that draws very large crowds of people, which causes streams of warm air to rise along the wall. The swift does not fear people and, therefore, finds the Western Wall an optimal place to nest and raise offspring. The Western Wall serves as one of the oldest common swift nesting sites in the world. In a study conducted in 2002, 88 nests were documented.

1.9.3 THE SEVEN BIBLICAL SPECIES IN JERUSALEM

The seven biblical species are first referenced in Deuteronomy (8:8), as part of a description of the fertile land of Israel. These seven species are wheat, barley, grapevine, fig, pomegranate, olive and date. All of these culturally significant species can be found today within the city of Jerusalem. Wheat, barley and flax are native to the region which still holds significant genetic resources related to these species. In Jerusalem, wild wheat can still be found in the Old City and in a public park in the Ramat Beit HaKerem neighborhood. Sites with barley are even more widespread; the grain can be found on Mount Scopus, as well as at over 80 other sites in the city. Archaeological evidence has linked the origin of figs and olives to the region and olive trees are widespread throughout the city. The Jerusalem Urban Nature Survey recorded over 100 olive tree sites, from urban forested areas such as the Anata Forest on the eastern border of the city, to select trees in the historic city-center neighborhood of Nahlaot. Fig trees are similarly distributed and are found at over 70 sites, in public open spaces and national parks. Species such as pomegranate and date did not originate in the region, but do currently grow in the city. Pomegranate and grapevine are also prevalent throughout the city, at sites such as the Hebrew University Botanical Garden at Givat Ram and the Gazelle Valley Urban Nature Park, as well as in public and private gardens.
ISRAEL’S SEVEN SPECIES

Pomegranate

Olive

Date

Grapevine

Barley

Wheat

Fig
1.10. THE VALUE OF BIODIVERSITY

It is not easy to determine the value of biodiversity in a city. The value of nature varies locally according to its physical, ecological, social and cultural context. However, hard-to-measure values such as citizen enjoyment and well-being need to be considered alongside more tangible values such as natural resources and services like food, fresh water, plant-based medicine, flood control and pollution mitigation.

THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY (TEEB)

The international Economics of Ecosystems and Biodiversity (TEEB) Study analyzes the global economic benefits of biological diversity, as well as the costs of loss of biodiversity and the failure to take protective measures versus the cost of effective conservation. The following is an adapted excerpt from their report "Mainstreaming the Economics of Nature".

In recent literature, the links between nature and the economy are often described using the concept of ecosystem services or flows of value to human societies as a result of the state and quantity of natural capital. The Millennium Ecosystem Assessment defined four categories of ecosystem services that contribute to human well-being, each underpinned by biodiversity:

- **Provisioning services** – for example, wild foods, crops, fresh water and plant-derived medicines;
- **Regulating services** – for example, filtration of pollutants by wetlands, climate regulation through carbon storage and water cycling, pollination and protection from disasters;
- **Cultural services** – for example, recreation, spiritual and aesthetic values and education;
- **Supporting services** – for example, soil formation, photosynthesis and nutrient cycling.

The concepts of ecosystem services and natural capital can help us recognize the many benefits that nature provides. From an economic point of view, the flow of ecosystem services can be seen as the ‘dividend’ that society receives from natural capital. The maintenance of stocks of natural capital allows the sustained provision of future flows of ecosystem services, thereby helping to ensure human well-being over time.

Few ecosystem services have explicit prices or are traded in an open market. Those ecosystem services most likely to be priced by markets are the consumptive, direct-use values of ‘provisioning services,’ such as crops or livestock, fish or water, which are directly consumed by people. Non-consumptive use values, such as recreation, or non-use values, which may include the spiritual or cultural importance of a landscape or species, have often been influential in decision-making, but are rarely valued in monetary terms.

Some other ecosystem benefits, especially regulating services such as water purification, climate regulation (e.g., carbon sequestration) and pollination, have only recently begun to be assigned economic values, referred to as indirect-use values. The failure to account for the full economic value of ecosystems and biodiversity has been a significant factor in their continuing loss and degradation.

Although no studies have been conducted to measure the economic value of biodiversity in Jerusalem, there is clear value in the city’s green spaces, eco-tourism projects and natural infrastructure. The social, psychological and environmental benefits of a city’s natural assets have been well documented. According to a study conducted in the UK, the psychological benefits of exposure to green space increases with greater biodiversity.68 Eighty percent of tourists in Israel visit Jerusalem which boasts several biodiversity and nature attractions including the Jerusalem Bird Observatory and the Gazelle Valley, in addition to the city’s network of parks and gardens.
The City of Jerusalem, together with national and regional authorities, is currently working to link the metropolitan parks that surround the city to create an encompassing natural green belt. The planned ring park will include walking trails, 42 km of bike paths and a visitor center. Once the ring park is developed, it is expected to draw large numbers of local, national, and international tourists. Large parts of the bike trail have already been paved.

The Jerusalem Urban Nature Infrastructure Survey (see Item 1.4), which surveyed and documented significant biodiversity at 150 natural sites in the city, is an important first step toward determining the value of these sites to the city.

ECO TOURISM IN JERUSALEM: JERUSALEM’S BRANCH OF THE NATIONAL OLIVE TREE ROUTE

In October 2008, the Israeli government and the Jewish National Fund inaugurated Israel’s first Olive Tree Route. The culture of olive production has been a feature of the Mediterranean region for thousands of years. Israel’s Olive Tree Route is part of a larger network of routes in the Mediterranean region and its founding charter is part of a UNESCO and Council of Europe initiative to establish an Olive Tree Route around the entire Mediterranean basin. The primary goal of the route is to promote cultural dialogue and peace in the region while simultaneously encouraging sustainable development and agricultural tourism.

The Israel Olive Tree Route traverses the length of the country, from ancient olive groves in the Galilee to new commercial olive plantations in the Negev desert. There are currently four primary routes in the country, in the Upper Galilee, Lower Galilee, central plains and coastal region and the Negev. Along the olive tree routes, there are olive groves, oil presses, archaeological sites related to the use of olives and shops offering products derived from olives.

The city of Jerusalem is an important urban extension of the Olive Tree Route. There are many olive tree sites in the city, most notably the Mount of Olives, named for the many olive groves it once boasted. Ancient olive trees can still be found there, as well as in the nearby garden of the Gat Shemanim (Gethsemane) Church. A bit further along is the Zurim Valley National Park, which has a spectacular olive grove that has been preserved for thousands of years. An ancient olive tree, Zeitonat a-Nabi (the Prophet’s Olive Tree), grows on the Temple Mount. According to Muslim tradition, this tree sprung up in the place of a palm tree that withered away in despair after Mohammed left the Temple Mount. In the Valley of the Cross not far from the CBD, there are groves of olive trees and remains of an ancient olive press.

The Olive Park at Kibbutz Ramat Rahel is a striking example of environmental sculpture. At the entrance to this park, two olive trees grow out of stone pyramids and paths running through 27 rows of olive trees lead to three olive trees growing out of three 15-meter high columns – all facing the panoramic landscape of Jerusalem, Bethlehem and the Judean Desert.

The olive trees growing in the garden of the President’s Residence play a role in bringing together the different populations of the city; Jewish and Arab children harvest the fruit together.

The city has recently begun to promote Jerusalem’s Olive Tree Route as a major eco-tourism attraction. The Jerusalem Olive Tree Route can be found on the National Olive Tree Route map.
1.11 THREATS TO BIODIVERSITY\textsuperscript{70}

The challenge of conserving biodiversity in a country such as Israel is daunting. On the one hand, Israel’s small heterogeneous landscape and diverse climatic conditions are characterized by rich biodiversity on all levels - genetic, species, ecosystem and landscape. On the other hand, accelerated development and population growth, together with the effects of climate change, threaten this unique collection of ecosystems through the loss, fragmentation and degradation of habitats, increased populations of invasive species, pollution and overexploitation of resources.\textsuperscript{71} Threats to biodiversity in Jerusalem are outlined below.

1.11.1 LACK OF INFORMATION ABOUT NATURAL SYSTEMS IN THE PLANNING PROCESS

A planning system that does not recognize and relate to the city’s natural infrastructure threatens its very existence and the biodiversity it supports. Including and addressing information about the natural open spaces at the early stages of the planning process can mitigate harm to these sites and encourage the establishment of integrative solutions during development. Sustainable development of natural infrastructure encourages the integration of unique natural sites within the public open-space system and helps provide solutions for ecological corridors, drainage, light pollution and other related issues from the earliest phases of the planning process. In the past few years, awareness has been strongly promoted, but there is still a long way to go.

1.11.2 MANAGEMENT OF OPEN SPACES

Managing natural open spaces in the same manner as developed open spaces damages the biodiversity of these sites. For example, the use of chemical pesticides in natural open spaces destroys the balance of the food chain in these areas. While the different organizations responsible for local biodiversity management support the protection of natural open spaces, the lack of clear designation contributes to faulty upkeep (see Item 3.3.1).

1.11.3 POLLUTION OF WATER SOURCES

The natural water sources in the city are subject to pollution from several sources, including contaminated run-off and sewage. These habitats and the aquatic organisms that call them home are particularly sensitive to pollution. City residents are also directly affected since the pollution of water sources endangers their own drinking water.

1.11.4 HUNTING

Although not common in Jerusalem, there have been various incidents of illegal hunting in the city. The Jerusalem Urban Nature Infrastructure Survey recorded the capture of porcupines for food with traps or by chase in open natural ensembles, the capture of song birds to be sold in the souk and in East Jerusalem and the hunting of animals, particularly reptiles, for commercial purposes or by collectors. All forms of capture and hunting harm the animal populations in the city and its surrounding areas, particularly populations of species that are at risk of extinction.

1.11.5 ROADWAY ACCIDENTS

Animals are regularly run over on the city’s roads. Most of the road system is not fenced in and does not have appropriate animal crossings. This presents a danger to both animals and drivers. Other than near the Gazelle Valley, there are few road signs indicating areas prone to animal crossings.

1.11.6 FERAL ANIMALS

Feral domesticated animals present a severe threat to the wild animals of Jerusalem. The now locally extinct Levant green lizard (\textit{Lacerta media israelica}), for example, was likely wiped out by feral cats on Mt. Herzl. The gazelle population at a number of sites has been significantly reduced as a result of attacks by feral dogs, particularly in the Gazelle Valley, Nahal Zimri and on the slopes of Har Homa.

1.11.7 ALIEN AND INVASIVE SPECIES

Since the establishment of the state, alien species have commonly been included in urban forests and gardens. A number of foreign species have spread over large areas in Jerusalem, including the tree species, Tree of Heaven (\textit{Ailanthus altissima}) and the Golden Wattle (\textit{Acacia saligna}). The wide distribution and durability
of these species enables them to overtake natural open spaces and significantly affect the composition of the local vegetation. These changes harm local flora and the food chain; they affect the ability of local plants to survive within the city.\textsuperscript{72} The extensive planting of foreign plant species upsets the balance and function of natural systems and threatens biodiversity in the city. Several groups of non-local animals have also noticeably affected the city’s ecosystems. Feral birds such as the ring-necked parakeet and Indian myna are gradually settling in all areas of the city.\textsuperscript{73}

\textbf{RING-NECKED PARAKEETS THREATEN BIODIVERSITY IN JERUSALEM}\textsuperscript{74}

(Adapted from: Ilana Teitelbaum. \url{www.greenprophet.com})

In Jerusalem’s trendy German Colony neighborhood, flocks of beautiful green-winged birds, officially known as ring-necked parakeets, have become increasingly common in recent years. People like to theorize about the birds’ origins, speculating that they are all the progeny of an intrepid pair of pets that escaped years ago, or that they were imported to Israel to be sold and were accidentally released into the wild. The outcome is the same: A bird species that was once alien to the region is now right at home in the holy city, squawking and snacking on local plants.

The problem, explains Dr. Salit Kark of the Hebrew University, is their despoiling of the city’s ecosystem. Kark’s research focuses on biodiversity and biological invasions and, unfortunately, the ring-necked parakeets are endangering the former and qualify as the latter. They compete with indigenous Jerusalem birds, as well as birds migrating from Europe and Africa that pass through Israel twice a year.

Although some exotic birds die from the slightest temperature change, the ring-necked parakeet, which most likely originated in India, has acclimated happily to Jerusalem winters. According to Kark, they can even thrive in cities as far north as London and Berlin. These parakeets nest in cavities of trees that were created by Syrian woodpeckers, which drives the woodpeckers out of their habitats, thus endangering that species and, with it, biodiversity in the region. For now, the ring-necked parakeet is viewed as a beautiful nuisance at best.
1.11.8 MANAGEMENT OF THE CITY’S NATURAL INFRASTRUCTURE

To date, there is no one department in the Jerusalem Municipality that is responsible for the management of the city’s natural infrastructure. Different government bodies manage and maintain the different areas and aspects of these systems, including the Municipality, the Jewish National Fund, the Israel Nature and Parks Authority (see Item 3.3.1) and other agencies. As a result of this non-centralized approach, natural open spaces in the city are not always properly managed and maintained. There is often a lack of coordination between various initiatives and projects in the city’s many open spaces, and there is insufficient upkeep, supervision or enforcement at these sites.

1.11.9 ADDRESSING THREATS TO BIODIVERSITY

While the Municipal Veterinary Service works closely with the Society for the Protection of Nature in Jerusalem and the Biblical Zoo in addressing local issues of wildlife and endangered species, there is yet a great deal to be done on the policy level.

The City of Jerusalem established a sustainable planning department in 2009. Since then efforts have been made to include biodiversity in overall planning efforts. The Jerusalem Urban Nature Infrastructure Survey, published in 2010, now integrated within the City GIS System, has made access to biodiversity data available to municipal officials and is expected to form the basis of sustainable policy making for local biodiversity management. In addition, the city is now formulating biodiversity protection criteria for planning construction site development.

The city is also investigating methods of augmenting and enhancing its enforcement department to improve monitoring and the ability to exercise deterrence when necessary. In addition, since joining LAB in 2010, a forum of stakeholders representing different municipal departments, government ministries, park authorities, and public interest groups, conducts round-table discussions to promote a dialogue to promote a dialogue on biodiversity protection.

This framework has already helped foster cooperation and we believe it will eventually contribute to improving the city’s biodiversity management capabilities. In addition, a professional team has been working for the past year on the establishment of an LBSAP (Local Biodiversity Strategy and Action Plan), the goal of which is to develop a comprehensive master plan for the efficient management of local urban nature infrastructure (see Item 3.4 on Mainstreaming Biodiversity into City Governance).
2.1 NATIONAL BIODIVERSITY PROFILE

In juxtaposition to its small land area, a wide range of physical conditions and a rich variety of flora and fauna characterize Israel, including some 2,500 plant species, 7 amphibian, 100 reptile, 510 bird, over 100 mammal species and 32 fish species in rivers and lakes.\(^1\)

Yet Israel’s biological diversity - of genes, species and ecosystems - is endangered largely as a result of accelerated urban development and population growth. While about 20 percent of Israel’s land area is preserved within declared nature reserves, most of them are located in the desert area. Only about three percent of the Mediterranean region is protected in nature reserves.

Ministry of Environment poster on biodiversity

The main problem facing nature conservation in the Mediterranean region is habitat fragmentation. Protection of many populations is impossible to achieve within the reserve system, while outside the reserves, development, habitat degradation and conflicts with agriculture and other human activities make it difficult to preserve genetic populations. In recent years, renewed efforts have been made to introduce ecosystem management approaches in order to protect Israel’s rich biodiversity.\(^2\)

2.1.1 THREATS TO BIODIVERSITY IN ISRAEL

Since its establishment in 1948, Israel’s population has increased more than eightfold. In the thirty-year period between 1960 and 1990, the population more than doubled and the built-up area quadrupled. Between 1989 and 2001, the population grew by over 40% with an addition of one million immigrants within a little more than a decade. Average population growth in recent years has been about 3%. With a current population of 7.9 million, Israel’s long-range master plan (Israel 2020) predicts the country’s population will reach around 8.5 million in 2020 and its built-up areas will more than double. At the present time, more than 90% of Israel’s population lives in urban centers.\(^3\)

Since the 1960s, the encroachment of building and development into open spaces and the transformation of rivers into sewage conduits have been the dominant factors in biodiversity loss. Road construction, fences and afforestation have led to habitat fragmentation, which blocks the passage of plants and animals and reduces the exchange of genetic material between neighboring populations. These factors - housing and development, road construction and urbanization - as well as pollution, and pesticides and poisons used in the agricultural sector, have led to the disappearances or loss of species in the second half of the 20th century.\(^4\)

2.1.2 NATIONAL BIODIVERSITY GOALS AND LEGISLATION

Israel’s biodiversity policy has traditionally been based on nature conservation - 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. It was largely based on passive management, whereby ecosystems are protected from human interference.

Israel’s new biodiversity plan is to move toward active biodiversity management. This aims at the...
optimal conservation and management of biodiversity components and their ecosystem services throughout the country using a range of tools including: education and information, spatial planning and management, legislation, economic instruments, scientific development and more.\(^5\)

The National Biodiversity Plan grew out of the country’s commitment under the Convention on Biological Diversity (CBD) and out of a government decision on a “Strategic Plan for Sustainable Development in Israel” (Decision No. 246, May 13, 2003, Appendix 1). In its decision, the government resolved that its policy should be “based on the principles of sustainable development practices that combine a dynamic economy, wise use of natural resources, and protection of ecosystems.”\(^6\)

Important past legislation which laid the groundwork for this approach includes:


- **1981**: Government approval of the *National Outline Plan for National Parks and Nature Reserves (NOP 8)*, which set aside more than 20% of the land area of the country for conservation.

- **1990 - 1997**: Preparation of *Israel 2020* – Israel’s non-statutory master plan for the 21st century, which placed the issue of open space depletion on the national agenda.

- **1996**: Enactment of the *National Forestry and Afforestation Outline Plan (NOP 22)*, which protects 1,600 square kilometers of planted forests and natural woodlands.

- **1990s**: Preparation and approval of *regional master plans*, giving greater priority to conservation-worthy areas including rivers and their environs, and metropolitan parks.

- **2004**: Ratification of the *Protection of the Coastal Environment Law*, protecting and preserving the Mediterranean coastal environment and its natural assets.

- **2004**: Initiation of a *National Outline Plan for Rivers and Drainage*, highlighting the preservation and restoration of rivers and their vicinity for both ecological and recreational purposes.

- **2005**: Approval of the *Comprehensive National Master Plan for Construction, Development and Conservation (NOP 35)* by the Ministry of Interior and the National Planning and Building Council, which stipulates measures for the preservation of...
open spaces in the process of development, and identifies significant conservation areas.

### 2.1.3 THE NATIONAL BIODIVERSITY PLAN

Israel’s National Biodiversity Plan, published in 2010 in conjunction with the International Year of Biodiversity, includes guidelines for biodiversity management at both local and national levels and calls for the institution of a package of measures to advance conservation and secure the functionality and sustainability of Israel’s biodiversity in providing natural and cultural services to the people of Israel.

The measures proposed by the National Plan for the Protection and Conservation of Biodiversity include:

- **Integration in planning** - considering biodiversity and the efficient provision of ecosystem services in planning processes, on the national as well as local levels. Reviewing existing and proposed master plans to ensure that they take account of the threats to biodiversity posed by demographic and climate change trends.

- **Monitoring** - developing systems for monitoring changes in biodiversity and in the provision of ecosystem services, aimed at tracking causes and effects. Such networks will provide early warning and aid in catalyzing new, improved conservation and management tools, ultimately contributing to an “adaptive management” approach.

- **Legislation** - promoting legislative changes, including economic incentives for the protection of biodiversity. Current legislation in Israel provides protection to a large number of species, although it does not explicitly address biodiversity ecosystems and their services.

- **Awareness** - increasing the awareness of each and every citizen of Israel, including public representatives and government officials, about the importance of biodiversity. Cultivating biodiversity literacy and promoting public involvement and participation to help facilitate the implementation of measures instrumental for biodiversity conservation.

- **International cooperation** - participating in the international arena to increase the local knowledge base on the functioning of biodiversity and on best practices for protecting it. This step aims to position Israel among countries for which biodiversity conservation is a foremost concern.  

### 2.2 BIODIVERSITY IN JERUSALEM CITY PLANNING

Jerusalem is a pioneer in the field of urban nature protection in Israel, specifically with regard to local biodiversity planning and management. In recent years, awareness about the significance of urban nature and biodiversity in preserving global ecosystem continuity has become more and more prevalent, and the role of local governments in addressing this challenge is now clearly confirmed. While Jerusalem faces unique challenges and opportunities, including urban revitalization, accelerated growth, and economic development, conservation of its natural and built heritage is a solemn commitment.
PLANNING FOR A SUSTAINABLE FUTURE - THE JERUSALEM NEW CITY MASTER PLAN

The City of Jerusalem is a unique capital comprised of a multitude of different communities, ethnic groups and religions, spread over a myriad of neighborhoods, old and new, ancient and modern, reflecting both eastern and western cultures, all weaving together an intricately complex human and urban tapestry. Few cities in the world can boast the multi-faceted and sensitive cultural fabric that is Jerusalem. Sustainable development in Jerusalem must respect this mosaic of life, and act to improve the ties between different groups, in an effort to foster social justice through the provision of equal opportunities for communal and economic growth in all sectors of the population.

Planning for the future of this distinctive city is an extremely complicated task. Jerusalem has invested more than a decade of work on a new master plan. Based on principles of sustainable urban development, with the input of numerous stakeholders, the New City Master Plan includes:

- Provisions to prevent urban sprawl with regulated guidelines for densification
- New sustainability measures which stipulate standards for green building construction
- Regulations for the reduction of carbon emissions, including the removal of private cars from the city center
- Guidelines for the development of ecologically sound facilities for waste management and water recycling
- Establishment of a sustainable public transit system
- Protection of significant urban nature sites

The construction of the Jerusalem Light Rail, which began operating in August 2011, firmly positions the city ahead of other Israeli cities in the development of a state-of-the-art, efficient, mass transport system.

These principles, along with the plan’s emphasis on securing the status of open spaces and planning for the provision of affordable housing for young families, will help to assure a resilient and viable future for all of Jerusalem’s residents. Although the plan has not reached final approval yet, it provides sustainable urban planning guidelines at both the local and regional levels.
In cooperation with the Ministry of Environment, Ministry of Interior, the Jerusalem Development Authority, the Society for the Protection of Nature in Israel, a variety of non-governmental organizations and active civil society participation, Jerusalem has successfully implemented a series of local biodiversity initiatives in recent years for the benefit of the public at large and for the sustainable development of the city. Of particular note are two major accomplishments:

- The publication of the *Jerusalem Urban Nature Survey*, first of its kind in Israel, which documents 150 significant local urban nature sites and constitutes an invaluable tool for the effective daily management of urban nature on the municipal level (see Item 1.4)
- The official designation of 40 of these sites for preservation and restoration in accordance with the *New City Master Plan*.

### 2.2.1 INTEGRATING NATIONAL BIODIVERSITY GOALS

In 2007, a policy document was initiated by the Society for the Protection of Nature in Israel, together with a steering committee appointed for this purpose which included representatives of government ministries, environmental and social organizations and professionals in the field. The document, entitled *Public Open Spaces in Cities Planning Guide*, was based on a comprehensive survey that identified 14 different kinds of open spaces in cities in Israel, including urban nature sites, public gardens, squares, landscaped spaces, orchards, forests, and natural open areas.

Published jointly in 2008 by the Ministry of Environment, the Ministry of Interior, and the Ministry of Housing and Construction, this important guide issued instructions and recommendations regarding policy for designing, developing, and managing open spaces on all city levels, from metropolitan parks surrounding the city, to urban parks, neighborhood parks, down to the smallest “spot parks” and “pocket gardens”. In addition, the plan differentiated between “normative open spaces” such as parks and gardens which have distinct criteria for development and maintenance, and “functional open spaces” such as public paths, squares, roadside lanes, and natural open spaces located between developed areas.

Recommendations included surveying all local open spaces to determine where significant biodiversity exists in order to preserve and restore natural heritage sites in urban areas, making them accessible to the public and integrating them into the local nature infrastructure system. In addition, the guide recommended the restoration of lost ecosystems and the incorporation of significant biodiversity sites within other forms of urban open spaces such as parks and gardens.8

This national policy document was presented to the Jerusalem Municipal Urban Planning Committee in 2009, and its recommendations for the protection of urban nature and biodiversity were approved.
2.2.2 PROPOSED OPEN SPACES ADMINISTRATION

Following presentation of the *Public Open Spaces in Cities Planning Guide* to the Municipal Urban Planning Committee in 2009, the Committee recommended establishing a new municipal administration for the management of the city’s different types of open spaces that would have its own budget and be responsible for planning, developing, maintaining, and monitoring local open spaces. The goals of the administration were listed as follows:

- Establishing a comprehensive master plan for the management of open spaces, urban nature, and biodiversity in the city
- Budgeting projects for conservation and urban nature development according to clear priorities and long-term maintenance plans
- Consolidating all available urban nature resources in order to achieve the set goals

The Committee envisioned the *Open Spaces Administration* as providing many benefits and advantages, including: conducting a comprehensive survey of the entire spectrum of open spaces in the city; documenting the city’s urban nature infrastructure and interfaces; promoting the establishment of a shared

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**METROPOLITAN PARKS**

The Municipality of Jerusalem, together with the Jerusalem Development Authority, the National Parks Administration, and the JNF (Jewish National Fund), is developing a ring of parks around the city which will incorporate 1,500 hectares of existing parkland, nature reserves, forests and open spaces. Included in the restoration area are the rolling hills that surround Jerusalem, encompassing the Arazim, Motza, Refaim and Tzofim valleys.

Committed to promoting the values of conservation and sustainable development, Jerusalem is working to formulate a plan in cooperation with public and other government institutions to determine the right vision and strategy for implementing this invaluable project. Existing natural and historical sites will be upgraded making them useable, accessible and welcome to the general public. Dry streambeds will be rehabilitated so that they can once again support flora and fauna. The numerous springs in the area will be cleaned and restored. Existing forests will be tended and orchards consisting of native Israeli fruit trees will be planted, developed and expanded.

The plan includes 42 km of bike routes encompassing Jerusalem, hiking trails, recreational and sports facilities, picnic areas, and coffee shops, designed to provide much needed relief for residents of the city’s densely populated neighborhoods. The current road that winds through the parklands will become a promenade closed to traffic and the entire area will be made accessible to the disabled. Water for irrigation will be provided by sewage purification plants currently under construction. The goal of the **Metropolitan Parks Project** is to conserve and capture the breathtaking natural landscape that surrounds the city while offering quality recreational opportunities to residents and visitors alike, and promoting urban eco-tourism.
platform for decision-making regarding management, development, and conservation of urban nature, with the ultimate goal of upgrading the status of open spaces and placing them on a par with other local land uses. The condition and quality of open spaces would thus be improved, with benefit to local ecosystem preservation and of course, the public at large.

Since making these recommendations, the Jerusalem Municipality joined the International LAB - Local Action for Biodiversity Network which, among other requirements, obligated the city to produce an LBSAP - Local Biodiversity Strategy and Action Plan (see Item 2.3.3). As a result, the establishment of an Open Spaces Administration was temporarily suspended until the team of professionals hired to develop the LBSAP complete their work. City planning officials realized that conducting a comprehensive survey would provide a significant base-line analysis and would contribute to a better understanding of how the Open Spaces Administration should be set up. Now in its second year of work, the team will present its recommendations in the form of a Comprehensive Master Plan for Urban Nature Management in Jerusalem by the end of 2013, at which time plans for the Open Spaces Administration will be formulated (see Item 2.2.4).

2.2.3 LOCAL POLICY GUIDELINES FOR BIODIVERSITY PROTECTION

A prerequisite for securing the provision of ecosystem services in the face of projected threats is the recognition that biodiversity conservation supports rather than conflicts with development. In accordance with the recently formulated National Biodiversity Plan (published in January, 2010), legislation stipulated in the National Forestry and Afforestation Outline Plan (NOP 22), the Comprehensive National Outline Plan for Construction, Development and Conservation (NOP 35), local objectives for open space and biodiversity management must be based on principles of sustainable urban development. “With increasing urbanization our commitment is to preserve multiple heritages and provide for ample open space for the sake of present and future generations... providing maximum protection to landscape and environmental values.”

These objectives are detailed and codified in the New Jerusalem City Master Plan, and monitored by the Municipal Urban Planning and Environmental Protection Committees which review planning goals and determine policy on a regular basis. In addition, the Sustainable Planning Department, established in 2009, follows up on the decision making process to assure policy implementation.

2.2.4 URBAN NATURE MASTER PLAN (LBSAP)

Biodiversity in Jerusalem is characterized by a unique pattern of open spaces strictly protected since the early stages of urban planning in the city. The development model, which distinguishes between hills and valleys, follows the natural morphological shape of the city’s geographic space.

Jerusalem recognizes that open spaces carry significant potential for integration in the urban fabric, thus improving residents’ quality of life, as well as the environment. Very much like other infrastructure such as roads, water systems, sewage, and the like, open spaces are invaluable to the local population as well as to tourists for leisure, recreational and cultural services in addition to their significance for ecosystem preservation and continuity. In the current municipal administration, which strongly promotes sustainable development, efforts have been made to identify urban nature as a distinct local infrastructure system, deserving a master plan of its own.
The Jerusalem Municipality has approved going forward with the establishment of a strategic master plan for urban nature (LBSAP - Local Biodiversity Strategy and Action Plan). Already in its second year of work, the planning team meets regularly with an interdisciplinary advisory committee, chaired by the Deputy Mayor for Planning and the Environment, and headed by the director of the Municipal Sustainable Planning Department. The committee includes representatives of the Parks and Gardening Department, the City Engineer’s Department, the Strategic Planning Department, the Environmental Department, as well as representatives of the local Botanic Gardens, the Jerusalem Biblical Zoo, the Ministry of Environment and the Society for the Protection Nature.

The primary goals of the Urban Nature Master Plan, as specified in the tender guidelines, include integration of urban open spaces into the city fabric through connectivity and accessibility, rehabilitation and restoration of ecological corridors which pass through the city including the restoration of rare and threatened habitats, and formulation of an efficient management system for the city’s natural infrastructure. Once completed and approved, the plan will encompass all of the city’s identified nature sites (150 sites documented in the Urban Nature Survey) and serve as an official statutory tool empowering the Municipality to enact local biodiversity conservation measures.

2.3 LOCAL AND INTERNATIONAL PARTNERSHIPS

2.3.1 LOCAL COMMITMENTS

The Sustainable Jerusalem Charter, initiated by SPNI and local civil society groups nearly two decades ago, set a course of action for democratic participation on both the local and national levels. This important initiative presented a vision for sustainable development and improving the quality of life for future generations. Civil society, mobilized around different environmental issues such as thwarting massive housing construction west of the city in the Jerusalem Hills, and the campaign to conserve the natural biodiversity in the Gazelle Valley, has succeeded in establishing a sustainable planning concept that is now being integrated and adopted by the municipality.

Following these achievements on the local level, the Ministry of Environment coordinated an inter-ministerial committee to which each ministry in turn was required to submit its own plan for sustainable development. This has strengthened promotion of the guidelines proposed by Comprehensive National Outline Plan for Construction, Development and Conservation (NOP 35), which states that urban sprawl must be prevented by promoting densification and smart growth, to protect open spaces and urban nature.11
It is now generally understood that open space protection at a national level will not succeed unless local governments address urban sprawl in their planning. It is similarly understood, that national goals for environmental protection have slim chances for success unless local governments are committed to implementing regulations and sustainable development plans. At a national level, Jerusalem is working together with the Forum of Fifteen Cities who have undertaken to reduce carbon emissions by 20% before the year 2020. This is in keeping with the national target, in which cities in Israel will play a major role in the future, in view of the fact that over 90% of the nation’s population is comprised of city-dwellers.

2.3.2 GLOBAL PARTNERSHIPS

To strengthen sustainable planning goals, emulate best practices, and benefit from lessons learned, Jerusalem is engaged in important partnerships with several global environmental networks:

- **ICLEI** - Local Governments for Sustainability
- **IUCN** - International Union for the Conservation of Nature. Israel’s Bird Migration Route, which passes over Jerusalem, is a World Heritage Nature Site acknowledged by IUCN.
- **LAB** - ICLEI’s Local Action for Biodiversity Program
- **WHO** - The World Health Organization’s Healthy Cities’ Program
- **GPN** - The Green Pilgrimage Network coordinated by ARC - Alliance for Religions and Conservation, and ICLEI. Jerusalem is a founding member of the GPN Network and launched the GPJ - Green Pilgrim Jerusalem program at the 1st International Green and Accessible Pilgrim Symposium held in Jerusalem in April 2013.
- **URBIS** – Evolving from the LAB Program, Jerusalem is a pioneer in this initiative to address ecosystem management in the bioregion.
- **UNESCO** - United Nations Education Scientific and Cultural Organization. The Old City of Jerusalem is a UNESCO World Heritage Site.

In addition, Jerusalem is committed to a number of important international agreements, emphasizing its pledge to environmental protection, reducing carbon emissions in the air and improving its ecological footprint:

- The **Earth Summit** (World Summit on Sustainable Development - Rio + 10, 2002 Johannesburg) which influenced the emergence of thousands of Local Agenda 21 initiatives and enhanced the political profile of environmental issues world over.
- The **Nagoya Protocol**, for the “Fair and Equitable Utilization of Genetic Resources”, an international agreement signed by the Parties to the Convention on Biological Diversity (CBD) in October, 2010, in Japan.
- In 2009, Israel signed an agreement with the **OECD** (Organization for European Economic Cooperation) on energy efficiency. As a result, In October, 2010, the Jerusalem Municipality was asked to present a status report to a visiting delegation of the organization, in the context of a local environmental performance review.
- In 2009, Jerusalem signed the **Durban Commitment to Biodiversity Protection**. Shortly afterwards, in 2010, it became a member in the international **ICLEI/LAB** (Local Action for Biodiversity) Program.
- Along with the City of Montreal, UNESCO, ICLEI, IUCN, the SCBD (Secretariat of the Convention on Biological Diversity), Cornell University and the UN University, Jerusalem became a founding member of the **Urban Biosphere (URBIS) Initiative**, and signed the **URBIS Declaration** in 2011, to promote a social-ecological approach to urban planning based on UNESCO’s Man and the Biosphere concept.
We are proud to report that during its three years of activity, Jerusalem LAB has succeeded in:

- Establishing a forum of local stakeholders with more than 25 active members representing municipal and government institutions, local nature protection organizations as well as public interest groups. The Steering Committee has met on a regular basis to coordinate objectives and designate local urban nature project goals.

- Promoting awareness about the significance of efficient biodiversity management and legislation in the city through presentations at municipal committee meetings, seminars, workshops, and training sessions conducted with the participation of municipal employees, members of stakeholder organizations, as well as the public at large (see Chapter 4).

- Launching its Legacy Project - the Gazelle Valley Park Conservation and Development Program (See Items 1.7.3E and 2.5.2) for the establishment of Israel’s first urban nature wildlife park in one of Jerusalem’s most distinctive, biodiversity rich, natural heritage sites. The proposed program will insure the protection and restoration of the site’s unique ecosystems.

- Acquiring approval for the establishment of a Municipal Urban Nature Master Plan - for the comprehensive management of local urban nature sites and ecosystems which is expected to act as a springboard for social and economic development through increased employment and business
opportunities centering on tourism, education, research, ecology and leisure pursuits. The plan, currently being developed, will be completed by the end of 2013 (see Item 2.2.4).

- **Advancing CEPA (Communications, Education and Public Awareness) Programs** - More than 15 different organizations including the local botanic gardens, the zoo, museums, educational institutions and volunteer organizations are involved in promoting biodiversity awareness and protection in numerous ongoing programs throughout the city (see Chapter 4).

- **Publishing a Biodiversity Report** - providing a concise documentation of the city’s ecology, commitments to biodiversity protection, and ecosystem management policy for reference and promotion of sound and comprehensive decision making.

### LAB STAKEHOLDER FORUM

With the launch of Jerusalem LAB in 2010, a Forum of Stakeholders was established with representatives from municipal departments, government ministries, park authorities, local academic institutions, environmental NGO’s and CBO’s. The forum, which comprises more than 25 regular participants, meets every few months to discuss priority issues, coordinate objectives and designate local project goals. The Stakeholder Forum acts as a specialized task force, headed by the Deputy Mayor for Planning and the Environment. It provides Jerusalem LAB with an organizational structure for promoting strategic policy and stakeholder impact aimed at safeguarding the preservation of open spaces and precious urban nature sites in the city.

### 2.4 LEVERAGING BIODIVERSITY FOR SOCIAL AND ECONOMIC DEVELOPMENT

The Jerusalem Municipality acknowledges the significance of protecting biodiversity, and is committed to investing in the conservation and restoration of its natural heritage. In order to accomplish these goals, a centrally based structure is needed to establish the necessary partnerships and create a common agenda for the entire network of institutions that manage open spaces in Jerusalem. The approval to establish **a Municipal Urban Nature Master Plan** will facilitate achieving these goals and ultimately help develop a comprehensive master plan for biodiversity as well, encompassing metropolitan parks, identified urban nature sites (such as, the Gazelle Valley, the Jerusalem Bird Observatory, the Wildflower Sanctuary, Bible Hill, the Jerusalem Railway Park, etc.), as well as local community gardens.

Jerusalem’s strategic biodiversity program will target its efforts for the benefit of all sectors of the population throughout the city, for residents of all ages, and all income groups. Many of the city’s urban nature sites with potential for development are located in the midst of lower income neighborhoods. The program will provide opportunities to support capacity building among marginalized populations, new immigrants, as well as residents in the Arab sector through engagement, dialogue, and joint planning for priority needs. By emphasizing education, communications and public awareness, programs will be established for school children, senior citizens and the public at large. It will also leverage economic opportunities by promoting and developing Jerusalem’s natural heritage for sustainable leisure and recreational activities. Additional groups to benefit will include tourists, local as well as visitors from abroad, thus increasing the target population to much more than Jerusalem’s current 840,000 residents.
**KIDRON/WADI EL NAR BASIN RESTORATION PLAN**

The City of Jerusalem is divided between two distinct water sheds. Two thirds of the sewage from Jerusalem and surrounding areas falls within the Western Watershed and is directed to a purification plant in the Soreq Valley. The remaining third (15 million cubic meters per year) runs down through the Kidron/Wadi El Nar Basin and out to the Dead Sea, constituting a major environmental and public health problem. Once an important pilgrimage route, the Kidron/Wadi El Nar Basin is dotted with religious sites, tombs and monasteries. Today, raw sewage makes the area unattractive for pilgrims and hazardous to the health of the area’s more than 200,000 residents.

Because the basin spans an area that traverses several geopolitical boundaries and falls under different jurisdictions, any solution to the problem must be undertaken jointly by the affected parties. Currently, the City of Jerusalem is working with Palestinian partners in the Kidron/Wadi El Nar Basin, and the Dead Sea Drainage Authority, collaborating on a project to treat the sewage and provide a reliable source of water and energy for those living in the valley. Together, they hope to revitalize the ancient area, turning it from the region’s backyard into an economically and ecologically vibrant example of cross-boundary cooperation. The aim is to promote ecosystem conservation and management, along with local community development through improved employment opportunities and tourism.

Several community initiatives are already underway. In 2012, 13 schools in the Kidron Basin launched educational programs with the support of the Dead Sea Drainage Authority. Several community centers have initiated community gardens and training programs for residents. The Dead Sea Drainage Authority has asked SPNI to undertake an ecological survey of the entire basin (see Item 1.8).
GREEN PILGRIMAGE CITY

Green Pilgrim Jerusalem (GPJ) is one of the city’s most recent green initiatives. Based on the idea of bringing environmental awareness into the pilgrim experience, GPJ links Jerusalem’s ancient identity as a holy city for Jews, Christians and Muslims with its most recent aspiration - to become identified as a green metropolis. Coordinated by ARC (Alliance of Religions and Conservation) and ICLEI, the International Green Pilgrimage Network, of which Jerusalem is a founding member, was officially launched in Assisi, Italy at a November 2011 meeting of representatives from pilgrimage cities in Europe, Asia, Africa and the Middle East. This event was a follow-up to an interfaith commitment for environmental action made by representatives of nine major world religions at Windsor Castle in 2009.

Greening pilgrimage entails promoting more sustainable tourism practices, identifying and developing eco-tourism attractions and providing an opportunity for pilgrims to “leave a more positive footprint” at the places they visit. This initiative aims to redirect existing tourism to include a focus on environmental awareness and protection, and to generate investment in sustainable urban infrastructure including nature and biodiversity protection. Jerusalem as a Green Pilgrimage City hopes to create a platform for those of different faiths to draw from experience within both their religious traditions and their local communities to work towards shared environmental goals.
2.5 CITY BIODIVERSITY HOTSPOTS AND PROJECTS

2.5.1 THE JERUSALEM BIRD OBSERVATORY (JBO)

Israel serves as a habitat for millions of migratory birds. Twice a year, more than 500 million migrating birds cross Israel’s skies. The country is situated at the convergence of three continents, Europe, Asia and Africa, making it an ideal spot for birding enthusiasts. The migrating seasons during which birds can be seen in Israel, are March-May and August-November.\(^1\)

The Jerusalem Bird Observatory (JBO), founded in 1994 as the first community-based urban wildlife site in Jerusalem, studies this unique natural phenomenon. The site, currently operated and maintained by a staff of Society for the Protection of Nature (SPNI) researchers, educators and volunteers, was established by community activists. Activities focus on bird monitoring research, education and recreation, with the goal of involving as many residents as possible in a variety of urban nature topics.

The JBO site is rich in natural resources typical to the Jerusalem Hills area. Its location adjacent to the Knesset (Israel’s Parliament) and Supreme Court, within walking distance from the center of town, enables thousands of school children and visitors from all across the city to visit the center and experience a unique encounter with wildlife activities. The Observatory staff has developed an exceptional educational program that combines observing bird tracking and meeting with researchers and experienced guides. With the help of many volunteers, this invaluable urban nature site serves thousands of visitors each year, and has ringed more than 2000 birds.

Jerusalem Bird Observatory | Amir Balaban

The JBO sate-of-the-art bird hide allows visitors to watch the birds and wildlife freely throughout the day and all through the year, at no cost. The structure itself is an example of a “living building” designed with nesting holes fitted into the exterior walls, and a green roof. A visit to the JBO is a truly delightful “eco” experience.

2.5.2 THE GAZELLE VALLEY CONSERVATION PROGRAM - JERUSALEM LAB’S LEGACY PROJECT

Jerusalem residents enjoy the presence of a unique natural phenomenon right in the midst of the urban heartland. Trapped between busy roads, housing developments and a modern super-highway, a rich wildlife habitat flourishes with orchards planted on ancient terraces that still bear fruit. This 50 acre tract
of undeveloped land in Southern Jerusalem is home to a small population of gazelles that sustain on the local natural resources. Threatened in the past by massive housing development plans, grassroots opposition initiated by residents of adjoining neighborhoods defeated these plans (see Item 1.7.3E).

In cooperation with SPNI (the Society for the Protection of Nature in Israel), the Jerusalem Foundation and the Soreq Valley Drainage Authority, the City of Jerusalem is planning the establishment of the **Gazelle Valley Urban Nature Park**, which will assure the protection and restoration of the site’s unique biodiversity and ecosystems. Recently, final approval was given for the statutory plan to preserve the valley as a natural heritage site, protecting it from any future construction.

At this time detailed plans for the development of the valley as a nature park are being advanced. **The Gazelle Valley Urban Nature Park** will be the first urban nature wildlife park in Israel, and as such its success is critical to pave the way for numerous initiatives throughout the country, promoting urban nature as a resource for leisure, education, tourism, research and culture.

### 2.5.3 THE WILDFLOWER SANCTUARY

Once used as an illegal dumping ground, residents of this 5-acre nature reserve have transformed the area with over 55 native trees and plants rescued from different construction sites around the city. Bursting with beautiful indigenous flowering plants (such as wild orchids, protected by law), this site at the edge of a low-income immigrant neighborhood is quickly being transformed into a popular recreational and educational attraction. Scientific research is being conducted jointly by the Jerusalem Botanical Gardens and the Hebrew University on urban greenery and wild flora salvation. A unique seedling nursery has been created with samples of indigenous wildflowers and plants mentioned in the Bible, representing a sustainable approach to landscaping in this region.
The Jerusalem *Wildflower Sanctuary* has become a destination for school outings dealing with biblical plants and agricultural methods, as well as environmental and wildlife conservation. Residents together with the city have developed a rainwater harvesting facility for irrigating the site. The city is currently completing plans for an Ecological Center for youth adjoining the sanctuary. Educational and recreational activities for young people will be planned using the sanctuary both as a resource and as a site to be nurtured and preserved.

2.5.4 THE RAILWAY PARK

A grass roots movement working together with SPNI has won the battle to restore the abandoned railway line and develop a corridor park serving neighborhoods in the southern part of the city. The Jerusalem Development Authority and the Jerusalem Municipality, with the support of the Gottesman Family Foundation, have been actively involved in the conservation, planning and development of this neglected open space. Together, they have turned the area into a charming cultural and recreational nature spot for residents and visitors to enjoy in the midst of the hustle and bustle of the urban landscape.

The Railway Park runs upstream through the Refaim Valley along the abandoned Turkish railroad track, from the new train station in the Malcha business district to Bible Hill, near the City Center. An integral part of the city’s urban nature and open spaces infrastructure, the park offers pedestrians easy access to a walking path and provides cyclists with a convenient transportation route, connecting between different neighborhoods and attractions in the city. It also provides recreational spaces to local residents and acts as a meeting place for sports and leisure activity, creating community pride, unity and identification through connectivity with nature and the environment.

Once completed, the park will include eight kilometers of landscaped walking and cycling paths within the city as well as sports and fitness facilities, and it will connect with the ring of Metropolitan Parks now being developed around Jerusalem (see Item 2.2.1). The Railway Park exemplifies the city’s sustainable planning philosophy which aims to promote healthy living, historic preservation and nature conservation, while leveraging the urban infrastructure for social and economic development to benefit all of the city’s populations.

2.6 AWARDS AND OTHER RECOGNITIONS

Jerusalem is recipient of several prestigious national and international awards for urban nature protection and related sustainable development programs. The following are some of the honors received in recent years:

- The *SPNI Annual Citation* for outstanding contribution to nature conservation and the protection of urban biodiversity, 2012
- The *Annual Green Globe Award* conferred by the country-wide coalition of environmental organizations, *Life and the Environment*, for the promotion of local community gardens, 2010
- The US National Academies Transportation Research Board Annual Award for outstanding research in transportation innovation conferred on the Jerusalem Transportation Master Plan Team - JTMT, 2011.
- The Israel Design Award for accessibility planning of the Old City, 2013
3. BIODIVERSITY IN CITY MANAGEMENT

3.1 OPEN SPACES OVERVIEW

Open spaces inside and outside the city are an important factor in the urban fabric, facilitating leisure time activities, recreation and sports, as well as ecosystem preservation, thus making a significant contribution to the quality of life and the environment.

The New Jerusalem City Master Plan designates a clear hierarchy of open spaces and determines the uses and development options of each area. These include metropolitan parks, urban parks, borough parks, suburban parks and neighborhood gardens. In addition, of the 150 nature sites that were documented in the Urban Nature Survey, the plan designates 40 protected urban nature sites for conservation and restoration.

Jerusalem’s total area comprises approximately 125,000 dunam or 125 sq km. Of this, more than 30% is open space. However, less than 5% is public open space maintained by the municipal Parks and Gardening Department (see Item 3.3.1). Most of the city’s open spaces are concentrated around the periphery of the city, forming a significant green belt which goes beyond municipal borders. These include open landscape ensembles comprised of forests and groves, tilled agricultural land, and fallow areas, many of which contain rich natural biodiversity. They form ecological corridors with natural resources that penetrate the city and link up with a network of designated local parks and gardens. At the present time an urban nature master plan is being developed which will provide important recommendations for the management of Jerusalem’s natural infrastructure including both designated municipal parks as well as metropolitan open areas (see Item 3.4.5).

### MUNICIPAL AREA AND LAND USE

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Dunam*</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Area of Jurisdiction</td>
<td>125,156</td>
<td>100</td>
</tr>
<tr>
<td>Residential Area</td>
<td>31,099</td>
<td>24.8</td>
</tr>
<tr>
<td>Education and Higher Learning</td>
<td>2,503</td>
<td>2.0</td>
</tr>
<tr>
<td>Health, Welfare and Public Services</td>
<td>3,178</td>
<td>2.5</td>
</tr>
<tr>
<td>Culture, Leisure Activities and Sport</td>
<td>776</td>
<td>0.6</td>
</tr>
<tr>
<td>Industry, Infrastructure Transportation and Commerce</td>
<td>5,437</td>
<td>4.3</td>
</tr>
<tr>
<td>Open Public Space</td>
<td>4,080</td>
<td>3.3</td>
</tr>
<tr>
<td>Forests and Groves</td>
<td>25,195</td>
<td>20.1</td>
</tr>
<tr>
<td>Tilled Agricultural Land</td>
<td>17,774</td>
<td>14.2</td>
</tr>
<tr>
<td>Other Open Space</td>
<td>35,115</td>
<td>28.1</td>
</tr>
<tr>
<td>Population Density (residents per built residential dunam)</td>
<td>22.3</td>
<td>..</td>
</tr>
</tbody>
</table>

1 dunam = 1,000 sq.m | The Jerusalem Statistical Yearbook, Jerusalem Institute for Israel Studies, 2002
## PUBLIC OPEN SPACES IN JERUSALEM 2013

<table>
<thead>
<tr>
<th>Site Classification</th>
<th>Area in Sq Meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Wide Parks</td>
<td>6,903,650</td>
</tr>
<tr>
<td>Large Neighborhood Parks</td>
<td>1,060,669</td>
</tr>
<tr>
<td>Small Neighborhood Parks</td>
<td>216,553</td>
</tr>
<tr>
<td>Open Landscape Ensembles</td>
<td>(49,761,891)</td>
</tr>
<tr>
<td>Surveyed Urban Nature Sites</td>
<td>58,125,204</td>
</tr>
<tr>
<td><strong>Total Open Spaces</strong>*</td>
<td><strong>66,302,076</strong></td>
</tr>
</tbody>
</table>

* Open Landscape Ensembles are included in Surveyed Urban Nature Sites and are thus not counted in the total.

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Source: Charles Cohn, Head, City Engineer’s Strategic Planning Unit, 2013
3.2 CHALLENGES AND CONSTRAINTS

Management of open spaces in Jerusalem is characterized by a serious gap between potential and its realization. The “Public Open Spaces in Cities Planning Guide” policy document pertaining to open spaces in Jerusalem (see Item 2.2.1) states that - contrary to other cities suffering from an acute shortage of open space per capita - Jerusalem is not short of open space; however, there is a severe shortage of developed open space.¹ The undeveloped and unused open spaces suffer from neglect and an acute sense of lacking management capacity.

There are several reasons for this neglect, including a lack of financial resources. However, one of the most significant reasons is the existence of different types of open areas (a combination of municipal urban open spaces, JNF - Jewish National Fund forests, national parks, nature reserves, and private property), managed by a variety of public and private entities, without central municipal control. Ultimately, residents and visitors to the city, being unaware (as indeed they should be) of the different bodies responsible for management and ownerships of the land, end up blaming the municipality for neglect.

At present, the various institutions that deal with open spaces, both inside and outside the municipality find it hard to cooperate and synchronize their activities, due to different goals and operational methods. There is also a lack of budgetary prioritization for the establishment and operation of a proposed and much needed central open spaces management authority (see Item 2.2.2). However, the upside of these constraints is that due to neglect, many open areas have developed and preserved natural biodiversity over the years.

¹ Source: Charles Cohn, Head, City Engineer’s Strategic Planning Unit, 2013
WHEN NATURE IS LEFT ALONE: REMNANTS OF ANCIENT BIODIVERSITY IN THE URBAN LANDSCAPE - EXCERPTS FROM THE JERUSALEM URBAN NATURE SURVEY

Bible Hill - Urban Nature Survey Site No. 50, close to the Jerusalem Cinematheque, the Menachem Begin Heritage Center and Mishkeno Sha’ananim Park. Adjacent streets include Hebron Road and David Remez St. A spectacular botanical site in the heart of the city. The last uncultivated exposed hillock in the Center of Town. The site is small in size, but impressive in terms of its variety of wildlife and flora. Sparse shrublands on rocky ground and exposed rock. The hill has impressive concentrations of geophytes in fall, winter and spring that render it one of the most unique blossom sites in the city. Due to its position on the National Watershed Line, and despite its relatively small size and central location, the site attracts a wide variety of bird species.

Valley of the Cross - Urban Nature Survey Site No. 62. Situated between the Rehavia and Neve Sha’ananim neighborhoods. Adjacent streets include Ruppin, Haim Hazaz and Herzog. Natural ensemble close to the Center of Town and Jerusalem’s Government Hill monuments such as the Knesset (Parliament), the Israel Museum and the Hebrew University Campus. Wide open valley with pastoral landscape including olive groves, Mediterranean shrubs, pine trees, and a variety of geophytes and rock climbers. The site is home to migratory and wintering birds, as well as reptiles, hedgehogs and porcupines. Kestrels, crows and house sparrows nest in the walls of the nearby medieval Monastery of the Cross, and tree owls nest in the pine grove.

The Old City - Urban Nature Survey Site No 41, situated near the Center of Town, close to Hativat Yerushalayim, The Ophel, Sultan Suleiman and Cheil Hahandasa Streets. Characterized by dense construction, dating back to ancient times, the Old City has managed to preserve and even develop a variety of natural systems such as living roofs, wet areas, nesting sites and more. Despite the density, it is doted with a variety of plant formations such as old trees in churchyards and tomb complexes, orchards, cultivated gardens, olive groves, rich cliff vegetation and natural wild flowers. A variety of birds are common to the area, some stable and some migratory or wintering, as well as different populations of reptiles and amphibians. The Western Wall serves as one of the oldest common swift nesting sites in the world. In a study conducted in 2002, 88 nests were documented.

Wild cyclamen on rock boulders at Bible Hill in Jerusalem

Documentation of swift nests in the Western Wall | Jerusalem Urban Nature Survey
3.3 CURRENT BIODIVERSITY MANAGEMENT STRUCTURE

Open spaces in Jerusalem are managed by a number of different organizations based on the type of area and their defined functions. The City of Jerusalem does not have a designated budget for park development, because more than half of the population is unable to pay their taxes, especially the Arab and Ultra Orthodox Jewish sectors. Considering these limitations, and being a welfare state, the national government supports the ring of parks that surrounds the city. Within the city, the Municipality is responsible for public open spaces; however, the defining criteria is such that more than 50% of the city’s open spaces do not officially fall into the category of “public open spaces” and are thus not maintained. For example, much of Jerusalem’s undeveloped, natural open areas are privately owned, and therefore not maintained by the city. Furthermore, there is no single authority responsible for biodiversity management.

CLASSIFICATION OF NATURAL OPEN SPACES BY RESPONSIBLE AUTHORITY

<table>
<thead>
<tr>
<th>Type of Open Space</th>
<th>Responsible Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Parks</td>
<td>INPA - Israel Nature and Parks Authority</td>
</tr>
<tr>
<td>Nature Reserves</td>
<td>INPA - Israel Nature and Parks Authority</td>
</tr>
<tr>
<td>JNF Parks &amp; Forests</td>
<td>JNF - Jewish National Fund</td>
</tr>
<tr>
<td>Metropolitan Parks</td>
<td>JDA - Jerusalem Development Authority</td>
</tr>
<tr>
<td>Public Open Spaces</td>
<td>Jerusalem Municipality</td>
</tr>
<tr>
<td>Open Landscape Areas</td>
<td>No Responsible Authority</td>
</tr>
<tr>
<td>Private Open Spaces</td>
<td>Privately Managed (or not)</td>
</tr>
</tbody>
</table>

Gazelle Valley panorama | Amir Balaban
JERUSALEM MUNICIPALITY ORGANIZATIONAL MAP*

MAYOR’S OFFICE

Legal Department
Audit

Public Relations
Foreign Relations

Deputy Mayor – Construction and Permits

Deputy Mayor – Sustainable Planning and Conservation

Treasure Administration

Planning and infrastructure Administration

Maintenance Administration

Community Services Administration

Education Administration

Culture and Leisure Administration

Human Resources and Municipal Administration

City Planning

Traffic and Infrastructure

Environment

Sustainable Planning and Development

Building Permits and Supervision

Sanitation

Public Space Improvement

Hotline Response (no. 106)

Business Development

Community

Employment

Public Health

* From Jerusalem Annual Report, 2013
(expanded only partially)
3.3.1 INTERACTION WITH OTHER AGENCIES

The following is a list of organizations and agencies that manage the different types of open spaces, natural areas and biodiversity in Jerusalem and the responsibilities they undertake:

A. Municipal Parks and Gardening Department

Under the Municipal Operations Administration, the City Parks and Gardening Department is responsible for all developed open spaces that are officially designated as public green spaces in the City Master Plan. These include public parks and gardens, open land strips and circles defining roads and traffic lanes, green open areas leading to national parks and forests, some agricultural spaces, a few green roofs, and some parts of national park and forest lands that border the city. The department staff is composed of landscape architects, civil engineers, environmental engineers and agronomists. There is no set policy for biodiversity management; however, cultivated plants and trees of Jerusalem are considered to be integral parts of the city’s biodiversity. The department advocates the protection of endangered species and provides professional advice for rescuing and relocating significant plants from potential loss at construction sites. Likewise, it assists community garden activists with professional consultation in their efforts to maintain and preserve natural open spaces in and around the city. However, due to the lack of clarity about what exactly constitutes a “public green space”, it turns out that more than half of the city’s open spaces are not regularly maintained (See Item 3.2).

B. JNF - The Jewish National Fund

Most of the forest area in Israel is managed by JNF (the Jewish National Fund) Forestry Department, a national organization that acts under the inspection of the Ministry of Agriculture. Founded more than 100 years ago, JNF plants trees and manages forest land and natural open spaces in peripheral areas throughout Israel. Since it was established in 1901, JNF has planted more than 240 million trees all over the State of Israel, providing important green belts that cover more than 250,000 acres of land. Management goals are mainly for recreation, landscape improvement, soil conservation and ecological services. Today, most of these areas are protected by regulations stipulated in the National Forestry and Afforestation Outline Plan (NOP 22) and the National Outline Plan for National Parks and Nature Reserves (NOP 8). With regard to Jerusalem, JNF manages forest land that it owns and has developed around the city - promoting a green urban interface - as well as some of the city’s special natural heritage sites that are also national landmarks. Sites around Jerusalem include the Arazim and Mir Forests, within Jerusalem they include maintenance of the President’s Residential Park, some of the parks in the Old City, as well as support for the planned Gazelle Valley Park and the Wildflower Sanctuary. In addition, the JNF sponsors nature tours, and is involved in educational outreach activities with local community centers.

C. INPA - The Israel Nature and Parks Authority

The INPA - Israel Nature and Parks Authority, is a legally incorporated body under the supervision of the Ministry of Environment charged with the protection of biodiversity, ecosystems, landscapes, and heritage sites in national parks, nature reserves and other open spaces in Israel. It also serves an educational function to instill the values of nature appreciation and increase public awareness about nature protection. Most of its budgets are self-generated, mainly through entrance fees to nature reserves and national parks. The INPA’s activities cover five regions, each in charge of its particular nature reserves and national parks, with their diverse natural assets. In Jerusalem, INPA is responsible for the Holy Basin National Park around the Old City, and the Ein Kerem National Park. It is also involved in promoting the Jerusalem Metropolitan Parks Project, and will be responsible for the maintenance of the parks for a period of two years, until an independent authority is established for this purpose. INPA is fully responsible for biodiversity management, protection and restoration within its areas of jurisdiction, including the reintroduction of extinct wildlife species (See Item 1.8).

D. JDA - The Jerusalem Development Authority

The JDA is a statutory authority defined as a joint government/municipal corporation. It is under the
authority of the Minister of Finance, the Minister for Jerusalem Affairs and the Mayor. In the 20 years of its existence, JDA’s activities have been instrumental in accelerating the development of the city. Within the framework of its activities, major urban complexes and model residential neighborhoods have been built. The city’s appearance has been improved, modern industrial and hi-tech areas have been developed, and an infrastructure and road system has been set up that has changed patterns of life in the city. While in the past, a good part of the JDA’s activities involved promoting economic development initiatives, in recent years the emphasis has shifted towards enhancing cultural life, promoting tourism, and most recently, planning parks and recreational facilities. The Jerusalem Metropolitan Parks Project, spearheaded by the JDA, is an innovative plan for the development of 5 parks around the city, including providing connectivity and accessibility that will link existing parks, nature reserves, and green open spaces. These ecological corridors, situated not far from residential areas, include precious wildlife, water tributaries, archaeological sites and ancient agricultural terraces that will be preserved and restored under the proposed plan, alongside the provision of recreational facilities for visitors, where possible.

E. The Jerusalem Foundation

The Jerusalem Foundation works toward creating an open, equitable and modern society by responding to the needs of residents and improving their quality of life through a comprehensive approach centered on community vitality, cultural life, and coexistence for all Jerusalem’s residents. During its 40 years of philanthropic activity in Jerusalem, it has built community centers, sports complexes, parks, children’s playgrounds, libraries, theaters, museums, art schools, science labs, and daycare centers for the elderly. The landscape of Jerusalem is enriched by Foundation-led projects such as the Biblical Zoo, the Cinematheque, and the Science Museum. Founded by Jerusalem’s former mayor, the legendary Teddy Kollek, the Jerusalem Foundation has pioneered much of the archaeological discovery and historic preservation projects including the City of David excavations, the restoration of the historic Old City Wall gates, the Tower of David Museum and much more. It is also involved in greening Jerusalem by supporting community gardens, sponsoring rainwater harvesting programs in schools, supporting the Jerusalem Botanical Gardens, the Tisch Family Zoological Gardens, the Haas Promenade, and other distinctive parks and gardens in the city.

F. The Society for the Protection of Nature in Israel

SPNI was established 60 years ago for the preservation of nature, flora and fauna, and heritage sites in Israel. SPNI is the oldest and largest non-profit organization in the country, with the widest range of activities. It endeavors to promote nature protection and conservation efforts, environmental education and awareness, advocacy for environmental justice and sustainable planning. Its efforts are geared not only to the natural hinterland, but also for the protection of urban ecology. Its five “urban communities” - Tel Aviv, Haifa, Modiin, Beer Sheba and Jerusalem, are actively engaged in nature protection and conservation close to home. With emphasis on promoting healthy cities, community gardens, bike paths, clean air, clean water, accessibility to open spaces and green lungs, SPNI wields public participation and coalition efforts to assure the quality of life for city residents all over the country. Each community also conducts environmental
education activities and natural heritage tours. The Jerusalem branch of SPNI works closely with LAB (Local Action for Biodiversity), the Municipality and the local stakeholder forum in gearing the decision making process towards sustainable development and efficient management of the city's natural infrastructure.

G. The Jerusalem Botanical Gardens

The Jerusalem Botanical Gardens at the Givat Ram University Campus, provides 30 acres of tranquil green space and natural beauty in the heart of the city, close to the Knesset, Supreme Court, and the Hebrew University. It boasts the biggest living plant collection in Israel. The Gardens are a recreational site and an attraction for Israelis and tourists alike. Acting as an open classroom and outdoor laboratory, the Botanical Gardens conducts major research on Mediterranean native plant diversity and drought-resistant plants. Israel's principal plant gene bank and research center are also located in the Gardens. The Jerusalem Botanical Gardens is a place that reaches out to all segments of the population. Unique programs have been established for new immigrants, special needs youngsters, and youth from every sector of society. The Jerusalem Botanical Gardens at the Hebrew University Mount Scopus Campus, situated at the other end of the city, provides another 11.5 acres of green space, and nature close to the historic University Amphitheatre and Faculty of Law, overlooking the Judean Desert. The Gardens, founded in 1931, boast a unique collection of natural species and the largest assortment of indigenous wild flowers in the country, including rare Jerusalem species. The site also features samples of woodland species from the Upper and Lower Galilee, Mediterranean desert plants, and plants that came from Lake Hula, natural pools, waterfalls and sand and soil specimens from various parts of the country. It acts as an important educational and research center, conducts environmental education training sessions, and is involved in the rescue and restoration of endangered species as well as the study of invasive types and their prevention.

H. The Jerusalem Biblical Zoo

Founded in 1992, the Jerusalem Biblical Zoo’s (the Tisch Family Zoological Gardens) primary goal is to establish a local zoological collection and maintain it under optimal living conditions, in an effort to preserve rare animals and species threatened with extinction. Strongly featured in the collection are
animals from the Land of Israel, with special emphasis on species mentioned in the Bible. It is prominently involved in developing and conducting educational activities and outreach programs that aim to cultivate and nurture the values of nature conservation and wildlife protection among the general public; to enhance public awareness about environmental issues and encourage a love of animals. The Biblical Zoo conducts research that involves the preservation, breeding and return to the wild of various species. It participates in national and international research activities and projects, and conducts both theoretical and practical research work in the fields of zoology, biology, and environmental science. The Zoo encourages community participation, and conducts educational and cultural activities that are geared towards Jerusalem’s unique and diverse population, including distinct programs and opportunities for groups with special needs. It is also a unique and attractive recreational and tourist site that comprises approximately 100 acres of open green space within the city.

I. The Jerusalem Municipal Veterinary Service

The Municipal Veterinary Service is a statutory body under the supervision of the Ministry of Agriculture that is responsible for maintaining public health and protecting local residents against diseases and hazards that originate in animals. It provides inspection and supervision of all animal food products - meat, fish, dairy products, poultry and eggs, to avoid the spreading of diseases and food poisoning; it manages registration and vaccination of animals and animal quarantine. It operates a clinic and conducts surgical procedures, and the spaying of cats and dogs. Its functions include concern for the welfare of animals, collecting and treating abandoned and injured animals, running a kennel with animals for adoption; alongside prevention of nuisances caused by animals, and together with the Department of Sanitation, it handles citizens’ complaints. The Veterinary Service operates round the clock, 24/7, with a staff of 40 employees that include 9 veterinarians and 15 inspectors. It licenses and supervises pet corners in schools and institutions and conducts educational programs about animals, civic health and nutrition. The Service works closely with the Society for the Protection of Nature, and the Biblical Zoo in addressing local issues of wildlife and endangered species.

J. The Ministry of Agriculture

In line with its commitment to the UN Decade on Biodiversity GSPC (Global Strategy for Plant Conservation) Aichi Biodiversity Targets for the Year 2020, the Ministry of Agriculture, through its Plant Engineering and Botanical Gardens Extension Services and Forestry Officer, is involved with the City of Jerusalem in disseminating information on safeguarding ecosystems, species and genetic diversity. Its senior consultant provides advice and professional support to local community gardens and urban agricultural initiatives. In addition, the Ministry offers guidance to the two botanical gardens and disseminates resource materials for nature education programming. The Ministry of Agriculture is in charge of enforcement of the protection of trees in the city and has been involved in the relocation of indigenous species from building sites. A pilot program in conjunction with the Ministry of Agriculture and the Ministry of Housing is being conducted at the Jerusalem Wildflower Sanctuary (see Item 2.5.3) in the north of the city.
where endangered and indigenous species are rescued from building sites during the construction phase, and subsequently restored. This project was showcased as an example of good practice at one of the LAB Steering Committee Meetings.

3.4 MAINSTREAMING BIODIVERSITY INTO CITY GOVERNANCE

We have come to the understanding that the secret of preserving urban nature in the city lies not only in the way we plan and invest in our declared urban nature sites but on the interface between the natural status of potential building sites and the policy stipulations we determine that govern urban development in and around those sites. The following is a summary of the measures taken by the Jerusalem Municipality to mainstream biodiversity into city governance.

3.4.1 STRATEGIC PLANNING

Strategic planning milestones for biodiversity protection in Jerusalem in recent years include:

• Establishment of the Sustainable Planning Department in 2009. Since then, recommendations have been made to include biodiversity protection in overall city planning efforts.

• Integration of data from the “Jerusalem Urban Nature Infrastructure Survey” within the City GIS System in 2012, providing municipal officials with access to critical biodiversity information - the basis for sustainable policy making on biodiversity management issues.

• Formulation of biodiversity criteria for site development - currently in process (see Item 3.4.2).

• Preparation of a comprehensive master plan for the efficient management of local urban nature infrastructure, an LBSAP - Local Biodiversity Strategy and Action Plan - to be completed by the end of this year (see Item 3.4.5).

• Investigating methods of augmenting and enhancing its environmental enforcement department to improve monitoring and the ability to exercise deterrence when necessary.

In addition, since joining the LAB - Local Action for Biodiversity Program in 2010, a forum of stakeholders representing different municipal departments, government ministries, park authorities, and public interest groups, has been conducting round-table discussions regularly, considerably contributing to the promotion of awareness about biodiversity protection among local decision makers (see Item 2.3.3). An example is the Gazelle Valley Restoration Program, Jerusalem LAB’s Legacy Project, advanced for approval also through efforts contributed by the LAB Stakeholder Forum (see Item 2.5.2).

We believe these frameworks will help foster cooperation and eventually improve the city’s biodiversity management capabilities.

3.4.2 BIODIVERSITY PROTECTION CRITERIA FOR SITE DEVELOPMENT

The city is now developing regulations to require a survey of flora, fauna and trees on any potential site for development. This is in addition to the archaeological, geological and hydrological surveys required when applying for a building permit. These surveys will have critical impact on the subsequent planning of construction sites, requiring one or more of the following measures to be taken:

• Readjustment of the placement of a building on a plot due to the identification of significant biodiversity at
the site. This will be impacted by additional green planning considerations and guidelines which are now being codified by the city, such as exposure to sun, wind and rain, based on the requirement to maximize the energy efficiency of building construction in all possible ways.

- Removal and relocation of important flora from building sites for the duration of the building process. Bulbs and plants will be relocated to nearby gardens and sites or replanted in the same area on the public space adjoining the new development. This method is now being tried in a pilot project in collaboration with the Ministry of Building and Construction, and the Society for the Protection of Nature in Israel, on a particular site. The development adjoins one of the city’s major urban nature sites, the Wildflower Sanctuary, where the local flora will be restored in the public space once the building is completed. Based on a pilot conducted at the site, it is suggested that Ministry of Agriculture consultant be part of the process once an official mode of operation is determined (see Item 3.3.1J). This procedure is new, both for Jerusalem and for Israel. It is not yet obligated by law, but it is becoming an integral part of the professional planning methodology now being advocated by the municipality.

3.4.3 PROMOTING GREEN ROOFS AND GREEN RETROFITTING GUIDELINES

Similarly, it is expected that the “Green Building and Retrofitting Guidelines”\(^5\); drafted in 2009, will soon become official planning criteria, and all departments in the city will thus be obliged to consider biodiversity in their decision making process.

At the present time, one of Jerusalem’s schools is fully fitted with a green roof, and plans are underway for others as well. The Jerusalem Bird Observatory, a living building structure (see Item 2.5.1) is covered with a green roof, and the city’s new Cinema City complex, at the entrance to town, currently being constructed at the entrance to the city, will also have a green roof garden at its top.

3.4.4 INTEGRATING URBAN NATURE INFRASTRUCTURE DATA WITHIN THE CITY GIS SYSTEM

The integration of a city’s natural systems and habitats into its information, planning and development systems and the encouragement of their preservation and growth, form the foundation for a sustainable urban environment.

In 2010, the City of Jerusalem published the “Jerusalem Urban Nature Infrastructure Survey” to take stock of existing city-wide natural infrastructure and provide an up-to-date database of its natural systems, with the expectation that the findings would be integrated with other municipal data systems (see Section 1.4).

During the past two years, the technical process of absorbing the data into the city’s GIS System has been mastered, and the findings of the survey are now, to a great extent, available on the Municipal website. This important information complements already existing data about open spaces, built spaces, and areas slated for development. Access to the survey and its database constitutes a state-of-the-art planning tool, enabling comprehensive consideration of the natural infrastructure in the planning and development process, the goal of which is to eventually transform biodiversity protection guidelines into urban development policy.

Municipal engineers and planners have already been involved in a pilot workshop about how to use the survey data. Further training will be conducted once the system is fully integrated. This important information is already available to the public through the official Municipal website, the Ministry of Environment website, and the Jerusalem Green Map sites.
3.4.5 ESTABLISHING AN URBAN NATURE INFRASTRUCTURE MASTER PLAN

Municipal employees participate in Biodiversity Survey

The establishment of an Urban Nature Master Plan for local biodiversity protection and management is another example of mainstreaming biodiversity into city governance. Jerusalem is the only city in Israel that has thus far approved going forward with the preparation of an Urban Nature Master Plan, an LBSAP - Local Biodiversity Strategy and Action Plan. A professional team is in its second year of work on developing the plan. Its primary goals are:

- integration of urban open spaces into the city fabric
- connectivity and accessibility of local urban nature sites
- rehabilitation and restoration of ecological corridors
- formulation of an efficient and comprehensive management system for the city’s natural infrastructure and biodiversity

Once completed and approved, the plan will serve as an official statutory tool, empowering the Municipality to enact local biodiversity conservation measures. It is to be hoped that the recommendations of this plan will lead to the establishment of an Open Spaces Administration. These efforts will have significant long term implications for biodiversity management in Jerusalem (see Item 2.2.2).

It is expected that Jerusalem’s pioneering efforts will prepare the grounds for integrating the conclusions of the LBSAP into the National Biodiversity Strategy and Action Plan (NBSAP). The Ministry of Environment has expressed interest in using the experience of Jerusalem to encourage other cities in the country to prepare their own LBSAPs for integration into the National Plan (see Item 2.1.3).
4. BIODIVERSITY AWARENESS AND COMMUNICATION

4.1 PUBLIC PARTICIPATION

Engaging with people and gaining their support for biodiversity is critical for its success. Urban nature sites, community gardens, parks and forests all invite residents to participate actively as stewards of nature. The Municipality fosters this engagement through mechanisms of public participation and through support of community initiatives. In these projects the community based organizations are the city’s natural partners. Key channels for public participation in biodiversity and urban nature protection in Jerusalem are as follows:

- Community Gardens
- Environmental Education
- Open Access to Municipal Committees
- NGO Activity

4.1.1 COMMUNITY GARDENS

Residents tending a community garden

The city, through its Culture, Society and Leisure Administration, together with the Society for the Protection of Nature in Israel (SPNI), the Community Centers in Jerusalem and with the help of the Jerusalem Foundation, has turned 40 derelict plots, many in low-income neighborhoods, into beautiful and productive community gardens. With the support of trained guides, each garden is planned, established and cared for by the residents themselves to meet the needs of their specific community. Residents acquire skills in soil improvement, composting, water conservation, growing vegetables, complementary planting, and how to improve the local environment.

Outdoor festivals and activities are staged during holiday times which inspire additional residents to get involved. Community Gardens have been selected as the optimal sites for locating the city’s new mini-recycling centers, where dry waste from the garden meets with domestic organic waste to produce top-quality compost. In cases where a school adopts a community garden, students have their own “edible gardens” integrated into the annual curriculum.

The recent boom in urban development in Jerusalem has intensified the need for the maintenance of public open spaces as vital amenities for improving the quality of life and assuring the health of local inhabitants. In addition, the project supports and promotes constructive community values, where families and individuals living in the same neighborhood meet and work together to produce positive change. Promoting environmental conservation and sustainability, the Community Gardens Project offers pro-active solutions to the stress of urban living while enhancing the city’s biodiversity and fostering cooperation among Jerusalem’s diverse multi-cultural populations.

Two of the city’s community gardens promote urban ecology with allotments available for individual ownership. Volunteers from the SPNI youth National Service Program, Garin Dvash (literally - the “Honey Corps”), are trained to provide on-site agronomic guidance to local residents tending community gardens. In addition, the Forum for Community Supported Urban Green Spaces (ITEK), conducts a round table in partnership with the Municipality and SPNI for the promotion of community gardens and urban nature awareness.

Recently, the Municipal Strategic Planning Department initiated a survey of Community Gardens aimed at upgrading their status with the potential for establishing public/private stewardships for maintaining and embellishing them. A professional committee was appointed to review the findings and make policy recommendations.
4.1.2 ENVIRONMENTAL EDUCATION

Environmental education in schools plays an important role in preparing citizens to be responsible guardians of nature and the environment. The Jerusalem Education Administration’s Environmental Education Department serves the city’s school systems (general, religious and Arab streams) with specialized curricula and programs to enhance student’s awareness and appreciation of nature and the environment. Main subject areas include recycling, nature (Adopt a Site) and energy efficiency. In addition, the David Yellin College of Education and the Hadassah College offer dedicated nature education curricula as part of their academic training programs.

On the formal as well as informal levels, for both children and adults, the Jerusalem Society for the Protection of Nature in Israel (SPNI) is a key sponsor of educational programming geared towards nature appreciation, staging an important national conference once a year on a major environmental issue. In 2011, the subject was biodiversity and in 2012 it was protecting the country’s oceans and shores. It also conducts courses, publishes a quarterly journal, and sponsors hiking tours and outdoor activities at local nature sites. In addition, SPNI Jerusalem is home to the Jerusalem Sustainable Coalition, which aggregates over 20 voluntary committees and organizations that are actively involved in advocacy for nature and environmental protection.

Also involved in nature and environmental education are the Botanic Gardens, the Biblical Zoo, and the Bloomfield Science Museum. The JNF- Jewish National Fund, INPA - Israel Nature and Parks Authority and the Jerusalem Development Authority all sponsor nature education, as do the major biodiversity conservation projects in the city such as the Gazelle Valley Park Conservation Program, the JBO - Jerusalem Bird Observatory, the Wildflower Sanctuary, the Valley of the Cross Preservation Committee, and many others.

The following highlights two of the exemplary programs conducted in the city:

"Children Make a Difference" is a comprehensive educational curriculum, introduced by the Society for the Protection of Nature in Jerusalem (SPNI), which teaches environmental awareness and principles of community participation to children on the elementary school level. In the framework of this innovative program, precepts of environmental protection such as waste reduction, resource conservation, and sustainable agriculture are taught in conjunction with festivals and seasonal observances. The curricula are tailored to the needs of each school and surrounding area. With hands-on ecological activities, the program incorporates traditional and ethical sources, teaching children the intrinsic value of nature, while promoting a sense of respect and civic responsibility. Already operating in more than a dozen elementary schools in Jerusalem, “Children Make a Difference” offers a six year program that empowers the child with practical knowledge and creative tools aimed at developing a healthy, positive attitude towards the natural environment, and a proactive sense of commitment to community involvement from early on in life.

International Cool Globes educational exhibition, in conjunction with the Jerusalem Green Pilgrimage Symposium, 2013
The School for the Hearing Impaired was founded in 1930. It serves both Jewish and Arab students from age 6 to 21. During the past three years the Society for the Protection of Nature in Israel (SPNI) has helped green the campus by establishing the school’s ecological garden in an effort to teach conservation and promote lifestyle changes while reducing waste and recycling materials. The entire school is trained in the principles of composting. Students and staff alike carry their lunch leftovers to the compost piles daily, which are later tended by the students and used to fertilize the school’s garden. The uniqueness of the program lies in its ability to integrate classroom learning with hands-on, out-door experiential education. Known to have a significant and positive impact on a child’s personal and social development, this method is especially. The program has become a model for special education schools in Jerusalem and around the country.

4.1.3 OPEN ACCESS TO CITY PLANNING COMMITTEES

The Deputy Mayor for Sustainable Development and the Environment, Ms. Naomi Tsur, who has spearheaded environmental protection in the city since her appointment in 2009, heads three important planning committees, open to the public. These are the Environmental Protection Committee, the Urban Planning Committee and the Historic Preservation Committee, where important decisions have been made in recent years for the protection of nature and biodiversity. Prominent among these have been the decision to restore and protect the unique ecosystems in the Gazelle Valley and the decision to appoint a professional team to survey the city’s natural infrastructure and establish a Master Plan (LBSAP – Local Biodiversity Strategy and Action Plan) for the efficient management of urban nature. The committees meet every two weeks on average. All protocols, plans, materials presented and decisions are posted on the official Municipal website. Guest speakers from academia and the business sector are often invited to present their research and innovations. The opportunities afforded in these forums for the public to participate and join in partnerships for environmental protection and urban nature management, are significant.

In addition, a variety of NGOs and environmental committees are actively engaged in local advocacy for nature and biodiversity protection, some independent and some in the context of the Sustainable Jerusalem Coalition, including a vigilant citizens’ tree watch organization.

Pine tree (*Pinus pinea*) at the Jerusalem Botanical Gardens, Givat Ram Campus | Ori Fragman-Sapir

A newborn baby gazelle at the Gazelle Valley in Jerusalem | Amir Balaban
5. OTHER BIODIVERSITY PROJECTS AND PARTNERSHIPS

5.1 THE JERUSALEM GREEN MAP

Green maps illuminate the inter-connections between society, nature and the built environment. The goal of the Jerusalem Green Map is to engage the public and visitors to the city, in the urban environment. A member of the International Green Map Network http://www.greenmap.org, the Jerusalem Green Map is an on-line interactive tool that identifies environmentally friendly accommodations, green spaces, parks, pedestrian trails, walking tours and more in and around the city. It charts the natural and cultural environment and highlights green living resources which may not appear on ordinary maps.

Alternative tourism and eco-tourism are the fastest growing segments in world travel today. Website and map users have the opportunity to tour parks and gardens, shop at green businesses, and learn about the culture and history of Jerusalem. Furthermore, the Jerusalem Green Map allows residents and visitors alike to improve and preserve the city’s environmental quality by becoming aware of how to enjoy its attractions in a sustainable, ecologically correct manner. Using the International Green Map icons and technology, local green map teams can share information, experiences, and monitor the development of green maps around the world. The Jerusalem Green Map was initiated by the Society for the Protection of Nature in Israel (SPNI) and the Ministry of Environment in 2005 and has since become recognized as an important environmental medium for the community.

The Jerusalem Green Map also charts the ecological information gathered in the Jerusalem Urban Nature Survey, published in 2010, and makes its biodiversity data easily available to the general public. Flora and fauna, as well as species identification, including invasive and red flagging information characterizing the 150 sites surveyed, is posted in both Hebrew and English applications.

5.2 SURVEY OF MATURE AND UNIQUE TREES

The Society for the Protection of Nature in Israel, Jerusalem Branch, in conjunction with the Ministry of Agriculture, recently published a Survey of Mature and Unique Trees in the City of Jerusalem, including detailed information and photos about local trees. The survey documented 4,810 mature and unique trees and approximately 600 trees eighty years and older. Over sixty species of trees were covered in the survey, in more than seventy neighborhoods throughout the city. The most popular species documented were Jerusalem Pine (Pinus halepensis), Mediterranean Cypress (Cupressus sempervirens), Olive (Olea europaea), and Red River Gum (Eucalyptus camaldulensis).1

SURVEY OF MATURE AND UNIQUE TREES

At a conference presenting the survey and its findings, high ranking city and regional planning officials agreed to adopt the database of trees surveyed and grant them additional statutory protection within the planning process. The survey is a first step in documenting and preserving an essential and integral part of the city’s important natural resources. It is available (in Hebrew) on the Jerusalem Green Map (www.greenmap.org.il).
5.3 THE JERUSALEM BIODIVERSITY INFORMATION CENTER

The 3-year Jerusalem LAB program, now coming to completion, has created an opportunity, locally, nationally and internationally, for the City of Jerusalem to play a lead role in the development of frameworks for the sustainable management of ecosystems at the metropolitan level. At this critical point in time, it is especially important that the city capture this momentum and harness the dynamics that have evolved within the local stakeholder forum to continue advancing collaborative efforts for comprehensive and effective local biodiversity protection and policy making.

To this effect, Jerusalem is planning the establishment of the “Jerusalem Bioregion Center for Ecosystem Management” to promote opportunities and frameworks for local, national and international collaboration, foster partnerships, and provide information on sustainable ecosystem management. The Center is expected to become a resource for local and regional biodiversity initiatives. Its main objectives are to:

- **Maintain and facilitate access to database information** on biodiversity and sustainable urban nature management tools currently being developed and promoted internationally. Emphasis will be placed on the application of academic research to policy and decision making.
- **Conduct outreach activities and training** for local and regional stakeholders - lectures, round-table discussions, workshops and seminars to promote awareness and advance effective policies, promote cooperation and joint initiatives for ecosystem protection and management.
- **Provide professional support and guidance in program development** for existing projects, while identifying and promoting new initiatives.
- **Build partnerships** - foster cooperative efforts locally and regionally for sustainable biodiversity protection and management, i.e., promote government/community, local/international, public/private and business initiatives (LNPE’s - Local Nature Partnership Enterprises).
The international URBIS Workshop, organized and planned by the Jerusalem LAB team, and hosted by the City of Jerusalem in March, 2012, took the 1st step in realizing these important objectives by looking beyond the LAB framework and setting the stage for conceptualizing Jerusalem as an urban biosphere. This has not only underscored Jerusalem’s commitment to preserving local biodiversity, it has also strengthened Jerusalem’s international role. In June, 2012, the results of the workshop were presented at the ICLEI (Local Governments for Sustainability) Urban Nature Forum in Belo Horizonte, where the Urban Biospheres (URBIS) Initiative was officially unveiled and where more than 30 international cities, academic institutions and environmental organizations signed on to the global partnership.

Establishment of the Jerusalem Bioregion Center for Ecosystem Management will afford the opportunity to address many significant issues that were raised in the LAB stakeholder forum but, for limitations of program requirements, manpower and resources could not be advanced sufficiently. These include:

- Fostering the stewardship of local biodiversity and urban nature
- Addressing local agriculture and food security issues
- Safeguarding the protection of mature and unique trees in the city
- Addressing the issues of invasive as well endangered species and
- Promoting the use of sustainable pesticides in local gardening programs.

In conclusion, with the promotion of awareness among decision makers, provision of enhanced educational and public participation opportunities, and integration of sound and efficient ecosystem management tools into the city’s governance structure, we believe our goals for the preservation of urban nature and local biodiversity will succeed in delivering critical environmental benefits to Jerusalem’s present and future generations.

Ein Heret, Jerusalem Hills | Amir Balaban
CHAPTER 1


3. Ibid.


6. Ibid.


11. Ibid.


15. Israel’s National Biodiversity Plan. p.22

16. See paragraph on feral Domesticated Animals in Threats to Biodiversity section for further details.

17. Ibid

18. Ibid


30. The site classification is excerpted from the “Jerusalem Urban Nature Infrastructure Survey: Goals, Method, Findings, and Conclusions.” April 2010


37. Ibid


39. Two days of surveying by Ilan Nerinski on May 2 and 21, 2009. Sites surveyed include Gazelle Valley, Valley of the Cross, Sacher park, Nahal Zimrim, and Givat Ha’arba’a


42. Ibid, p. 57-58.


49. Ibid


51. Ibid

52. Ibid


58. Ibid

59. Ibid

60. Ibid

61. Ibid


63. Ibid


65. Deuteronomy 8:8


67. SPNI. 2010, Jerusalem Site Survey [Data].


69. Adapted from the Map of the Olive Tree Route Paths in Israel


73. Ibid

END NOTES

CHAPTER 2
1. Ministry of Environmental Protection Website, Biodiversity, 2012
2. Ministry of Environmental Protection Website, Biodiversity, 2012
4. Ministry of Environmental Protection Website, Threats to Open Spaces
9. National Forestry and Forestation Outline Plan (NOP 22)
12. Dr. Yossi Leshem, International Center for the Study of Bird Migration at Latrun, Israel, Website, 2012

CHAPTER 3
2. Based on translation posted on the Jerusalem Green Map Website (English), under Urban Nature Sites
3. JNF Forests Website
4. UN FAO Forestry Department, Global Forest Resources Assessment, Country Report, Israel, 2010, p 5

CHAPTER 5

Israel mountain gazelle | Amir Balaban
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