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# ENVIRONMENTAL CONSERVATION AND PROTECTED AREAS IN PALESTINE

## CHALLENGES AND OPPORTUNITIES

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Report submitted to  
The Hanns Seidel Foundation



# Foreword

This publication bases on the report “Environmental conservation and protected areas in Palestine: Challenges and Opportunities” by Dr. Mazin Qumsieh, Betlehem University and Dr. Zuhair Amr, Jordan University of Science and Technology, which have been contracted by Hanns Seidel Foundation for this task. The report has been written in the framework of a project funded by the European Union’s Partnership for Peace initiative. The aim of the report is to portray the current state of nature protection in Palestine, to fathom the potential for improved environmental conservation and nature reserve management, and to suggest priorities for future environmental protection efforts.

The current version is the result of an intense review process, which involved Palestinian Experts, the Environment Quality Authority as well as the team of Hanns Seidel Foundation. In addition to that, it has been edited to improve the reading. Hence, the original report written by the contracted authors has been considerably altered and shortened.

Such a review always requires compromises between the original text and all the studied opinions. Often, such a compromise will not entirely please neither the authors, nor the reviewers and the contracting party. Nevertheless, we have carried out a lot of effort to harmonize all positions and to include the very many recommendations and comments, while keeping to the original. All mistakes and inaccuracies, naturally, can be entirely attributed to the contracting authority, which is the Hanns Seidel Foundation.

Our foundation would like to thank the authors of the report and all other contributors for their insight and effort. We hope that the report will help to intensify the incumbent discussion on nature protection in Palestine. The first seven chapters of the publication focus on the current setting and the Palestinian stakeholders of environmental conservation. It hereby discusses, among other topics, environmental education and challenges, especially regarding nature reserves managed by the Palestinian Authority. The eighth chapter provides a list of priorities and recommendations that could represent a yardstick for future efforts of Palestinian environmental stakeholders and the international donor community.

Richard Asbeck  
Representative of Hanns Seidel Foundation in Jerusalem

# **ENVIRONMENTAL CONSERVATION AND PROTECTED AREAS IN PALESTINE**

## **CHALLENGES AND OPPORTUNITIES**

Version has been reviewed and shortened  
by the Hanns Seidel Foundation

### **Disclaimer**

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# ABBREVIATIONS

<b>AAUJ</b>	Arab American University of Jenin
<b>ANU</b>	An-Najah National University
<b>ARIJ</b>	Applied Research Institute of Jerusalem
<b>ATG</b>	Alternative Tourism Group
<b>BERC</b>	Biodiversity and Environmental Research Center
<b>BI</b>	Birdlife International
<b>BRC</b>	Biotechnology Research Center
<b>BSAPP</b>	Biodiversity Strategy and Action Plan
<b>BU</b>	Bethlehem University
<b>BZU</b>	Birzeit University
<b>CAM</b>	Complementary and alternative medicine
<b>CBD</b>	Convention on Biodiversity
<b>CCC</b>	Convention on Climate Change
<b>CCD</b>	Convention to Combat Desertification
<b>CEPA</b>	Communication, Education and Public Awareness Strategy
<b>CITES</b>	Convention of International Trade in Endangered Species
<b>EE</b>	Environmental Education
<b>EEC</b>	Environmental Education Center
<b>EIA</b>	Environmental Impact Assessment
<b>EQA</b>	Environmental Quality Authority
<b>EU</b>	European Union
<b>GBIF</b>	Global Biodiversity Information Facility
<b>GEF</b>	Global Environment Facility
<b>HSS</b>	Hanns Seidel Stiftung
<b>KBAs</b>	Key Biodiversity Areas
<b>MEnA</b>	Ministry of Environmental Affairs
<b>MOA</b>	Ministry of Agriculture
<b>MOE</b>	Ministry of Education
<b>MOH</b>	Ministry of Health
<b>MOPAD</b>	Ministry of Planning and Administrative Development (newer name)
<b>MOPIC</b>	Ministry of Planning and International Cooperation (older)
<b>MOTA</b>	Ministry of Tourism and Antiquities
<b>MOU</b>	Memorandum/Memoranda of Understanding
<b>NBSAP</b>	National Biodiversity Strategy and Action Plan
<b>NGOs</b>	Non-Governmental Organizations
<b>NRs</b>	Nature Reserves
<b>NSP</b>	National Spatial Plan
<b>PARC</b>	Palestinian Agricultural Relief Committee
<b>PCBS</b>	Palestinian Central Bureau of Statistics
<b>PIALES</b>	Palestinian Institute for Arid Land and Environmental Studies
<b>PNARC</b>	Palestinian National Agricultural Research Center
<b>PMNH</b>	Palestine Museum of Natural History, Bethlehem University
<b>PNA</b>	Palestinian National Authority (now State of Palestine)
<b>PWA</b>	Palestinian Water Authority
<b>PWLS</b>	Palestine Wildlife Society
<b>RSCN</b>	Royal Society for Conservation of Nature (Jordan)
<b>SP</b>	State of Palestine
<b>SWOT</b>	Strengths, Weaknesses, Opportunities, and Threats

During the stages of preparing this report, many persons as individuals or representing their organizations contributed in enriching the report. The affiliation is given for identification purposes only and listing those individuals in no way signifies that they do or do not agree with the contents of this report which remains the responsibility of the authors.

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# Section 1

## INTRODUCTION

### Definitions and Scope of Work

Biodiversity, or biological diversity, is defined by the Convention on Biological Diversity (CBD), as “the variability among living organisms [flora, fauna, and microorganisms] from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.” The outcome of evolutionary diversification, biodiversity is now considered integral to continuing life on earth as we know it (Wilson and Peter, 1988). In the late 20<sup>th</sup> century the conservation of biological diversity became recognized as an urgent issue for humanity. This was largely due to scientific observations of significant declines in biodiversity that accompanied industrialization during the 19<sup>th</sup> and 20<sup>th</sup> centuries. A number of preparatory meetings resulted in two key documents that rang the danger bell on the global level: the publication of Global Biodiversity Strategy and the adoption of the Convention on Biological Diversity (CBD), signed at the Earth Summit in Rio de Janeiro (both in 1992). From that point on, “biodiversity conservation” predominantly replaced the term “wildlife conservation.”

Palestine began engaging in biodiversity and biological issues on the diplomatic level only after the Oslo Accords were signed. Hence, Palestine was represented at the 7<sup>th</sup> Special Session of the Governing Council/Global Ministerial Environment Forum in Cartagena, Colombia, 13-15 February 2002. At that time, a resolution was adopted concerning the situation of the environment in the State of Palestine. The Governing Council requested that the United Nations Environment Program (UNEP) carry out a desk study to support and advance environmental conservation in the SP. The study broadly identified major areas of environmental threats (UNEP, 2003). This seminal report’s impact was further bolstered by an expanded desk study by SP’s Environmental Quality Authority, which compiled expert material with the Convention on Biological Diversity (EQA, 2015). This report estimated over 50,000 species living in Palestine.

Besides this high number of species, Palestine’s geography is of highest importance for biodiversity conservation. Palestine connects Africa with Eurasia and is at the western edge of the Fertile Crescent, where the first humans migrated out of Africa and developed the earliest forms of agriculture. Geologic activity over the past 100 million years, especially the formation of the Great Rift Valley, created varied, rich topography which resulted in a burst of speciation, giving rise to many endemic plant and animal species. The diverse habitats cover five eco zones (central highlands, semi-coastal region, eastern slopes, Jordan Rift Valley, and coastal regions) and four biogeographical regions (Mediterranean, Irano-Turanian, Saharo-Arabian, and Sudanese/Ethiopian) (Por, 1975; Qumsiyeh, 1985). Thus, it should come as no surprise that this small country is more biologically diverse than some countries ten times its size (Qumsiyeh, 1996). The mild climate, diverse fauna and flora, rich soils, and presence of wild seed species and certain animals in the Fertile Crescent – stretching from Palestine to Iraq – enabled humans to transform from hunter-gatherers to agricultural and nomadic shepherds (McCorriston and Hole, 1991; Eshed et al., 2004). The Fertile Crescent is the earliest site with evidence of domesticated animals and plants (wheat, barley, lentils, goats, donkeys). This settlement enabled human populations

to increase, along with the development of civilization and religious beliefs among the local Natufian and Canaanitic people (Bar-Yosef, 1998).

We conducted this study, commissioned by the Hanns Seidel Foundation, as a consultancy on the state of environmental education and conservation, focusing especially on protected areas and areas with high biodiversity. We concentrated on reviewing existing literature (published work, reports, brochures, and pamphlets) and on interviewing stakeholders in governmental agencies, NGOs, and academia. Our objective was to highlight the importance of biodiversity conservation in Palestine and the need for scientific research on biodiversity and conservation issues. The report utilizes a SWOT analysis (strengths, weaknesses, opportunities, and threats) of the key elements that may contribute to a successful collective strategy of education and conservation: governmental actors, NGOs, academics, human and financial resources, and addresses environmental pressures (e.g. occupation, climate change). Additionally, we undertook an overall analysis of the current state of protected areas in Palestine, highlighting the main gaps in the management of protected areas. Furthermore, this report discusses funding (current and future) and opportunities for collective work that could improve outcomes.



## Section 2

# DATA COLLECTION (INCLUDING DATABASES)

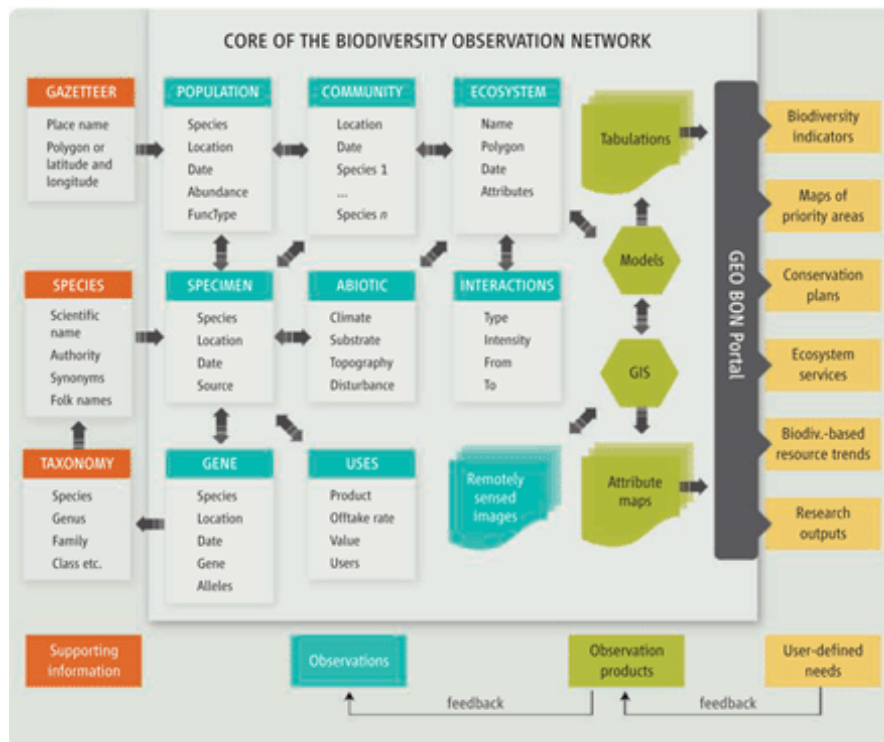
### 2.1. Scientific Research

The Earth Summit conference in Rio de Janeiro (1992) adopted the Convention on Biological Diversity, highlighting three key principles: conservation of biological diversity, sustainable use of nature, and fair and equitable sharing of benefits. This aligned with the Universal Declaration of Human Rights which declared that “Everyone has the right freely to ... share in scientific advancement and its benefits” (UN, 1948). Concurrently, we must remain aware that genetic resources and genetic biodiversity may benefit all of humanity, and thus be protected by the international community. Many wild plants have been domesticated into varieties such as wheat, barley, lentils, and chickpeas. Yet scientific advancement, conservation research, and the protection of biodiversity are usually not high priorities for underdeveloped countries. This also applies to Palestine, where there is a shortage of human resources in these disciplines.

Proper scientific research is necessary to conserving our environment, yet this is still lacking in many aspects. At the same time, conservation assessment is a rapidly evolving discipline, aimed at designing networks of protected areas that represent and ensure the survival of nature (i.e. species, habitats, and environmental processes) by isolating priority areas from the activities that degrade or destroy them (Knight et al., 2008).

### 2.2 Observing Biodiversity and Recording Global Data

Biodiversity observations must be rooted in scientific principles and must include all components of biodiversity (Scholes et al., 2008) (Figure 2.1). Computerized data software and hardware have been used by systematic biologists (taxonomists) to compile data since their invention, with the field of biodiversity informatics taking off in the 1970s. Scientists now deposit biodiversity data in scientific portals that facilitate communication between scientists. The collection of data, however, requires proper identification and standardized taxonomic identification and naming (Sarkar, 2007).



**Figure 2.1** An integrated biodiversity observation system, from Scholes et al. (2008).

Three main portals combine governmental and other sources of information:

1. Group on Earth Observation (GEO): “Established in 2005, GEO is a voluntary partnership of governments and organizations that envisions ‘a future wherein decisions and actions for the benefit of humankind are informed by coordinated, comprehensive and sustained Earth observations and information.’ GEO Member governments include 101 nations and the European Commission, and 95 Participating Organizations comprised of international bodies with a mandate in Earth observations. Together, the GEO community is creating a Global Earth Observation System of Systems (GEOSS) that will link Earth observation resources world-wide across multiple Societal Benefit Areas - Biodiversity and Ecosystem Sustainability, Disaster Resilience, Energy and Mineral Resources Management, Food Security and Sustainable Agriculture, Infrastructure & Transportation Management, Public Health Surveillance, Sustainable Urban Development, Water Resources Management - and make those resources available for better informed decision-making.” (<https://www.earthobservations.org> , <http://www.geoportal.org/>)

2. Global Biodiversity Information Facility (GBIF, established 2001): “GBIF is an Intergovernmental organization which includes over 50 countries and more than 40 international organizations. It was created in 2001 to deal with the tasks which enable politicians, researchers and the general public worldwide online access to the world stock of primary data on biodiversity. This data is a basic tool for scientific development in countries and contributes significantly towards a greater protection and use of biodiversity on the planet.

GBIF is the result of the working group on biological data processing in the OECD Forum on megascience which took place in January 1996. The working group concluded that:

- Information on biodiversity was very complex and wide-ranging but of great importance for society.
- Up until then, the information was neither available nor used adequately.
- Recent technological and political advances offered member countries of the OECD the opportunity to become leaders in biological data processing (biomolecular data processing

as well as for health, neurology and biodiversity). Member countries of the OECD were advised to set up a worldwide information system on biodiversity.”  
 (<http://www.gbif.ad/index.php?lang=en>). Capacity building in GBIF is also available <http://www.gbif.org/capacity-enhancement/summary>

3. Symbiota (Promoting bio-collaboration): “... Web tools [that] strive to integrate biological community knowledge and data in order to synthesize a network of databases and tools that will aid in increasing our overall environmental comprehension.” (<http://symbiota.org/docs/>)

Specialized data portals also exist:

- Species+, developed by UNEP-WCMC and the CITES Secretariat, is a website designed to assist parties with implementing CITES, CMS and other multilateral environmental agreements (MEAs). Species+ provides a centralized portal for accessing key information on species of global concern. (<http://speciesplus.net/>)
- Comprehensive database on ichthyology (<http://www.fishbase.org/>)
- Comprehensive database on herpetology (<http://www.herpnet.org/>)

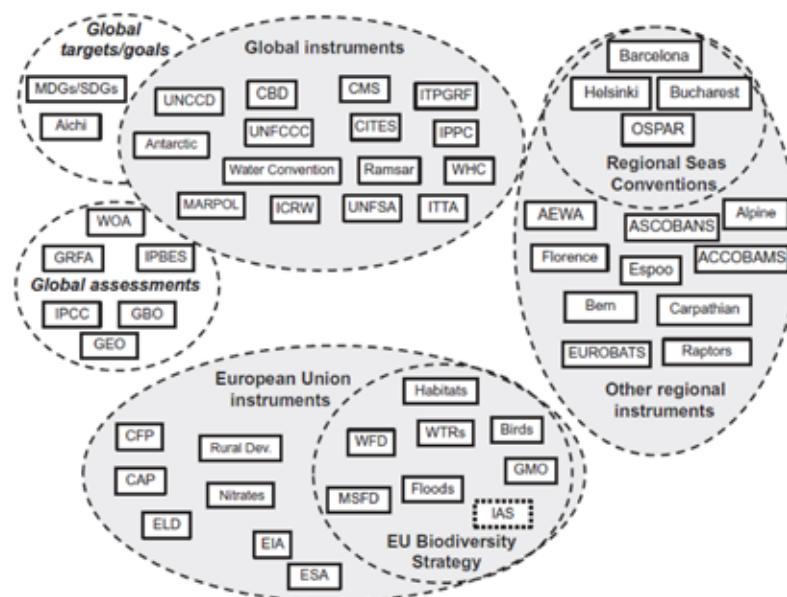
There are also informal citizen-science portals that gather non-scientific observations from nature-oriented people with access to the internet:

- <http://www.inaturalist.org/> with over 2.7 million observations
- <http://www.observations.org>

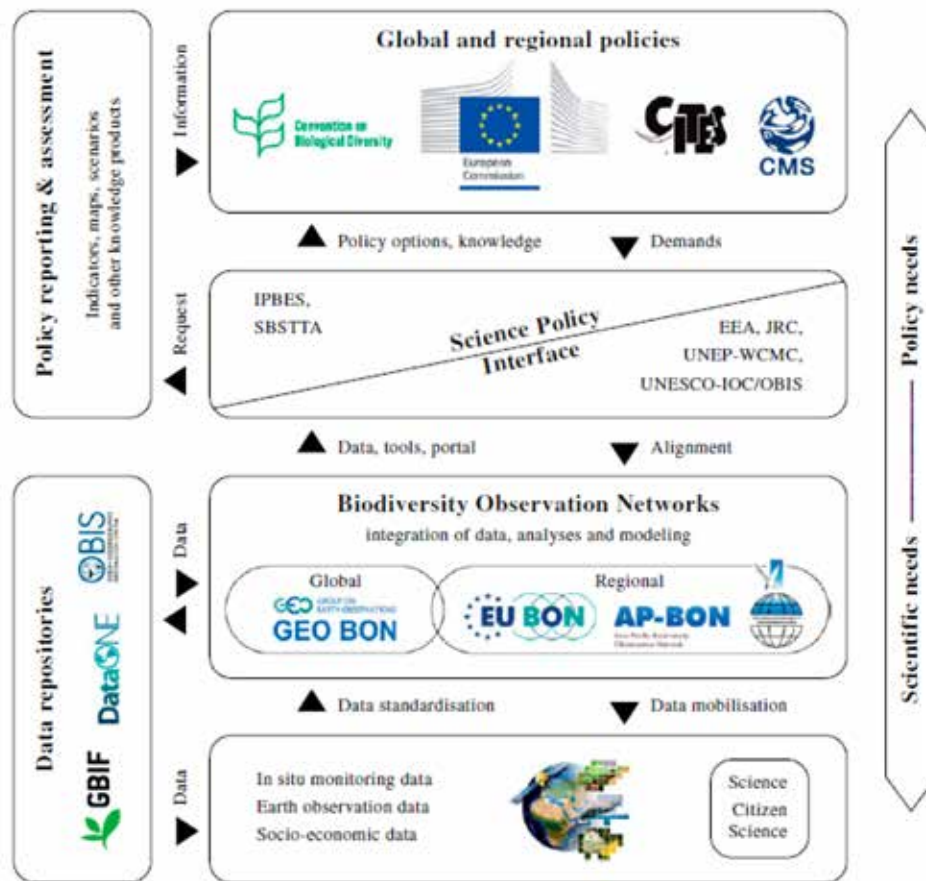
There are also platforms for user-generated data, such as Wikipedia and the more specialized Wiki Species [https://species.wikimedia.org/wiki/Main\\_Page](https://species.wikimedia.org/wiki/Main_Page)

There are dozens of other projects and non-profit organizations that aim to standardize the information in these databases. The Biodiversity Information Standards, also known as the Taxonomic Databases Working Group (TDWG), for instance “is a not for profit scientific and educational association that is affiliated with the International Union of Biological Sciences.” (see <http://www.tdwg.org>)

European countries are subject to regional and international instruments and must supply data via the many available networks for biodiversity (Wetzel et al., 2015) (Figure 2.2).



**Figure 2.2** The European complex biodiversity policy landscape. National governments may be parties to any number of regional and/or global instruments (e.g. CBD, CMS), and are committed to taking part in global processes such as the Intergovernmental Platform on Biodiversity & Ecosystem Services (IPBES). See Wetzel et al. (2015) in appendix for full names.



**Figure 2.3** In developed countries with the necessary resources, biodiversity data is processed using recognized data systems (Wetzel et al., 2015).

### 2.2.1 BIODIVERSITY DATA COLLECTION LOCALLY

The GBIF portal includes numerous entries on Palestinian biodiversity. A search for the term “Palestinian” and “Palestine” yields 13,545 and 33,837 records, respectively. However, most of these were not registered by local actors, but rather rely on older records from museums and foreign academia. Currently, some observations and photos are being collected and added to <http://Observation.org> with the support of the Hanns Seidel Foundation and the Palestine Wildlife Society. Established in 2005 with only 11 observations, this portal has expanded to 2-3 million new global observations annually. It has also been used as an organizing tool for some national biodiversity data gathering efforts. The site defines its purpose as follows:

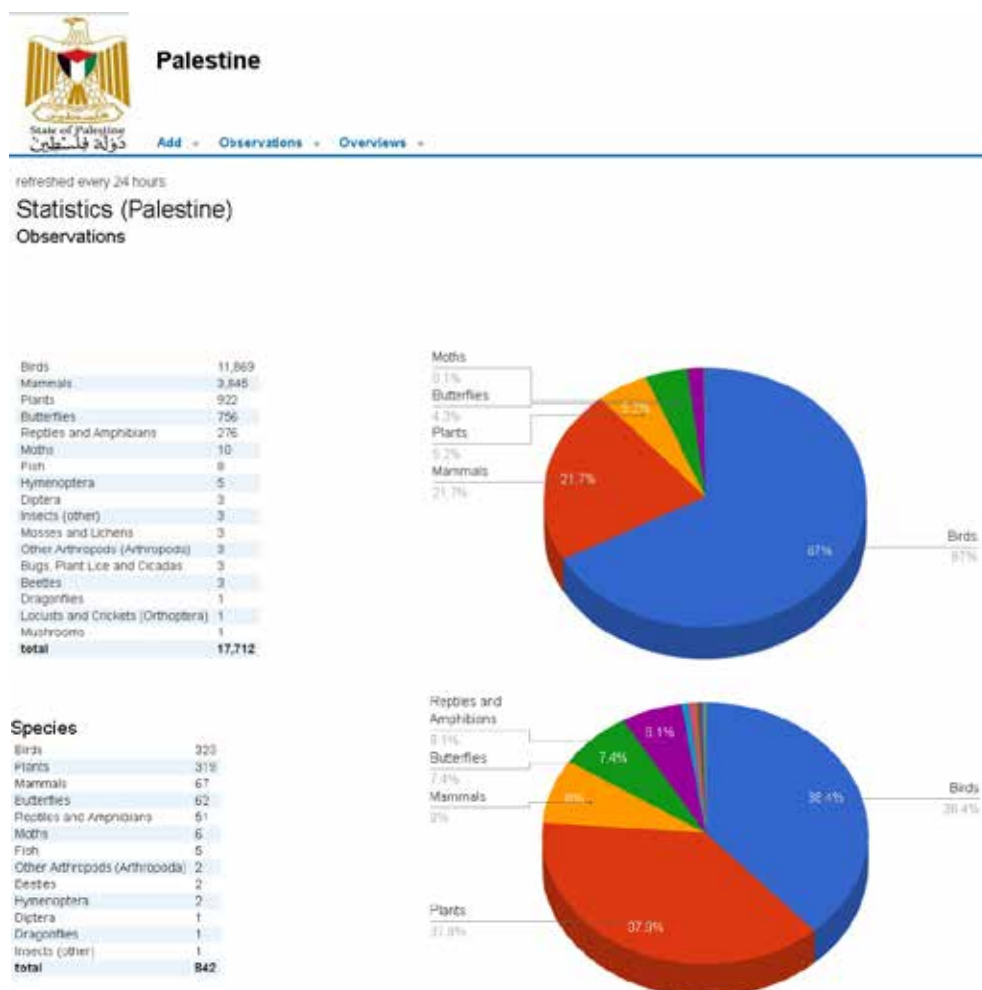
“Observation International provides the site [Observation.org](http://Observation.org) with many regional aliases and apps for mobile devices: ObsMapp (Android), iObs (iOS) and WinObs (Windows). Volunteers, researchers and scientists do a lot of field observations. Including these data into a global digital system creates a powerful tool for conservation, research, policy, experience and education. **With Observation.org we want to offer a practical and useful, free tool for all field observers around the world to record and share their plant and animal sightings.** Observation International focuses specifically on observers who attach importance to registering their observations in a politically independent manner. Observation International is a non-profit organization without lucrative purpose. The main



objective of International Observation is the optimum facilitation of observers in order to make their nature experience even more valuable. As a foundation, Observation International wishes to involve as many local communities as possible in its activities. Doing so, we respect the rights and achievements of these communities, observers and researchers.”

Currently, the three largest contributors to this portal are the Lepidopterological Society of Denmark, Swiss National Butterflies Databank, and the National Biodiversity Data Centre Ireland ([http://observation.org/ranks\\_abs.php](http://observation.org/ranks_abs.php)).

Statistical data show that until 10 July 2016, a total of 17,712 observations were entered under the State of Palestine, with the majority (11,869, or 67%) being birds (Figure 2.4). This is similar to the portal’s other entries, 73% of which are birds. Israel has 247,900 observations recorded (14 times more than Palestine).



**Figure 2.4** Statistical data from Palestine.observation.org [Accessed July 10, 2016, for most recent data see <https://palestine.observation.org/statistiek.php>].

This site was not intended for exact scientific use or observations. In fact, without sufficient taxonomists in Palestine, the precise species documented (especially non-birds) remain unverified.

Despite this, some observers utilize the platform to compile and publish their observations, including geographical and other, related data. Needless to say, users hope that their observations will assist others who are interested in the same fields. But this raises questions regarding the protection of biodiversity. When many individuals come into physical contact with rare species, they likely disturb habitats and further stress the ecosystem. Thus, a strategy to balance in situ observations with nature protection is necessary, if we are to protect an already fragile system.

In our opinion, the first step is to map current biodiversity (fauna and flora). At the same time, raise public awareness and train professional nature observers, focused on two or three well-studied yet resilient areas. A few academic projects should spearhead a comprehensive, national attempt to collect scientifically accurate observations. When interest in, and knowledge of, nature reaches the level of European countries, portals such as [observations.org](https://www.observations.org) will become useful. Thus, the current strategy should be spreading awareness and nurturing a new generation of bird-watchers over the coming years.

ARIJ and PMNH maintain separate biodiversity databases for plants and animals, respectively. The latter has published research articles on insects, scorpions, amphibians, reptiles, birds, and mammals. It also maintains extensive data associated with verified records (specimens, photos, etc.), and has the ambitious goal of conducting and mapping original research into biodiversity in all accessible areas of Palestine. Over time, accessibility is decreasing, due to occupation and mobility issues. It is a race against time to map at least the key regions in area C that may potentially be protected.



## Section 5

# **GOVERNMENTAL STRUCTURES AND COMPLIANCE WITH CONVENTIONS AND TREATIES**

### **3.1 Introduction**

The Palestinian environment suffers from loss of natural resources, neglect of the environment, environmental pollution, low water quality, depletion of water sources, and other human impacts leading to habitat loss and a decline in biodiversity. The Israeli occupation has made addressing these issues more difficult and has posed more challenges to the Palestinian environment. After the Oslo Accords (1993-1994), the newly established Palestinian National Authority attempted to deal with environmental problems and identify stakeholders authorized to manage environmental matters. In October 1994, the PNA established the Department of Environmental Planning, a branch of the Ministry of Planning and International Cooperation, which was assigned to track environmental management in the National Authority's territories. At the same time, each of the Ministry of Health, the Ministry of Agriculture, and the Ministry of Local Government formed departments for environmental affairs, resulting in duplicate authorities and overlapping responsibilities for decision-making. On 18 December 1996, a Presidential Decree established an environmental body within the Ministry of Planning, entrusted with all administrative tasks relating to the environment. However, the various ministry departments continued to follow their plans and programs. In 1998, in an attempt to eliminate redundancy, the Ministry of Environmental Affairs (MEnA) was established to oversee all environmental affairs. In 2002, a Presidential Decree transformed the MEnA into the Environmental Quality Authority (EQA), with the same duties and powers.

### **3.2 Governmental Structures Related to Biodiversity and Conservation**

Today, the Environmental Quality Authority (formerly the Ministry of Environmental Affairs) and the Ministry of Agriculture are the main governmental and legal bodies tasked with managing nature protection, protected areas, and national parks. The Environmental Law determines how the EQA should act towards biodiversity and conservation, while the Ministry of Agriculture bears responsibilities related to protected areas and agrobiodiversity.

Nevertheless, it seems that the EQA assumes a leading position through its current activities, serving as the national representative at international conventions and initiatives.

#### **3.2.1 THE ENVIRONMENTAL QUALITY AUTHORITY (EQA)**

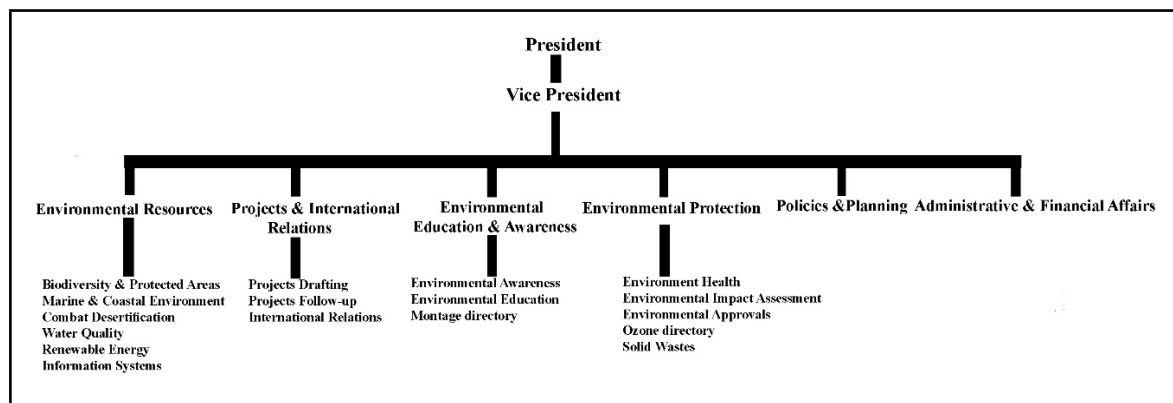
The EQA (<http://environment.pna.ps/ar/>) is responsible for the development of legislation, strategies, and policies for the Palestinian Authority, in the context of overall environmental policy development in the West Bank. It is linked directly with the Ministerial Council (Figure 3.1). The EQA is responsible for implementing all articles in the Environmental Law, as passed in 1999.

In 2010, the EQA developed a three-year strategy for 2011-2013 that identified and prioritized objectives for itself and the Palestinian environment as a whole (EQA, 2010). EQA listed 48 specific objectives, among them:

- Issuing legal and other directives
- Issuing informational bulletins, along with statistical and other data
- Building human capacity at the EQA
- Documenting Israeli violations of the Palestinian environment
- Founding an environmental information center that issues regular reports
- Reviewing and modernizing Palestinian environmental laws
- Reviewing and evaluating institutional structures related to the environment

In general, the EQA suffers from a lack of human and financial resources, which, in addition to the current political situation, makes performing these duties overwhelming. Furthermore, the EQA is not a ministry, and thus cannot attend cabinet sessions.

The structure of the EQA comprises a President, Vice President, and six main administrative departments, each with a set of directorates.



**Figure 3.1** Structure of the EQA (visualization by Qumsiyeh and Amr).

The General Directorate of Environmental Resources is the main body responsible for preparing biodiversity studies (fauna and flora), and is involved in the protection of designated areas. One important function of the EQA is to monitor non-governmental organizations related to environmental issues, as outlined in the Law of Charitable Organizations and National Authorities (passed in 2000). As outlined in the Biodiversity & Protected Areas section of the law, a number of environmental inspectors are responsible for visiting and documenting sites with environmental problems such as pollution, water resources, etc. These inspectors are authorized to enforce the Environmental Law. Other sections, such as Marine & Coastal Environment and Water Quality, are involved in monitoring their designated resources.

The General Directorate for Environmental Awareness and Education consists of four divisions:

- **Environmental Education:** Responsible for integrating environmental concepts into Palestinian curricula. The matrix including nature protection and environmental education has not yet been implemented.
- **Design and Montage:** Design publications published by EQA, along with other educational materials such as videos, booklets, and pamphlets.
- **Environmental Media:** Responsible for updating the EQA webpage, uploading EQA reports,

press releases for local newspapers, and publicizing activities on the agency's Facebook page.

- **Environmental Awareness:** This active division has offices in Hebron, Bethlehem, Jenin, Nablus, Tulkarm, and small offices in Tubas and Salfit. In total, eight persons are employed. Across the West Bank, 400 Environmental Clubs operate. One student per school is appointed coordinator, and they communicate with the other students and clubs through social media. These school clubs are supported and encouraged to develop small, environmentally friendly projects such as biogas, gardens, water reuse, etc. Staff of the environmental education division deliver lectures at schools, universities, and women's societies. Nine videos were prepared on various subjects such as biodiversity, water issues, desertification, the environment, and pollution (Figure 3.2).



**Figure 3.2** Products of the environmental awareness division at EQA.

Other activities include summer camps for children and nature walks. A number of other publications were issued, such as "Garden is a Friend of the Environment," stories for school children that emphasize environmental concepts and the national strategy for environmental education (Figure 3.3).



**Figure 3.3** The EQA aims to educate and raise public awareness through a children's story emphasizing environmental concepts.

The Environmental Awareness Division established the initiative, An Environmental Library in Each School. Books, videos, and publications were collected and placed in school libraries across Palestine. Teachers were also trained to produce learning tools derived from recycled materials. In 2014, the EQA released the National Strategy for Environmental Awareness and Education (2014-2020), which identified three main objectives: 1) The creation of active and successful environmental media capable of raising the level of environmental awareness; 2) Introducing integrated and creative educational curricula and activities; and 3) Enhancing modern concepts of environmental values and practices.

### 3.2.2 THE MINISTRY OF AGRICULTURE

According to the Agriculture Law (passed in 2003), the Ministry is responsible for implementing article 9, section 1 of this Law: "The Ministry, in cooperation with other competent authorities, shall develop a nature reserves management plan and conserve all plants and living organisms living in protected areas."

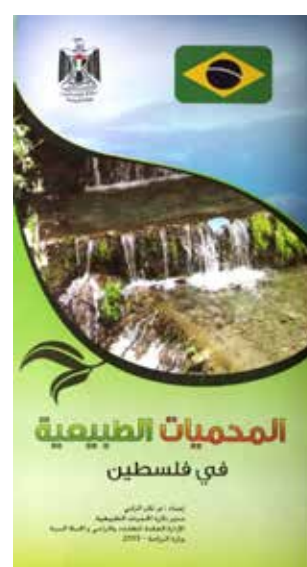
Two additional relevant laws are the Forest and Afforestation and the Rangelands Bylaws. A draft law for protected areas was prepared in 2005, however, it has yet to pass. It called to form a national committee for nature protection, including the MOA, EQA, MOLG, MOT, MOL, MOW, universities, local NGOs, and persons with experience. In addition, this national committee would be authorized to mandate that national organizations or authorities protect designated areas. The draft law also states: "The EQA, in cooperation with the Ministry of Agriculture, is the authorized body for protecting targeted areas, for the purpose of protection, and includes nature reserves, protected areas, and national parks, while the EQA prescribes bases and standards for the protection of natural reserves."

The MOA's Deputy Minister of Natural Resources is responsible for three administrative units: General Directorate of Irrigation and Agricultural Water, General Directorate of Agricultural Land, and General Directorate of Forests, Rangelands, and Wildlife. The latter Directorate is the main body, at the Ministry level, tasked with managing nature reserves and protected areas. It includes four divisions or departments: Forestry, Nature Reserves, Rangelands, and Nurseries (data from MOA interviews).

The Directorate of Forests, Rangelands, and Wildlife has offices in all governorates of the West Bank. Forty rangers are responsible for inspecting and patrolling the protected areas and the natural forests within the areas under the jurisdiction of the MOA. Out of the 18 protected areas that were handed over to the Palestinian Authority as part of the Oslo Accords (see Section 6), the MOA controls only eight of them, less than 15<sup>2</sup> km (Table 3.1). The remaining ten protected areas are within, or overlap with, area C. A pamphlet released by the MOA's Department of Nature Reserves listed 48 protected areas (Figure 3.4) and those are discussed in the section on protected areas.

**Table 3.1** Protected areas under the auspices of the MOA.

Nature Reserve	Governorate	Area in Dunums
Tayasir	Tubas	1200
Siris	Jenin	1118
Umm at Tut	Jenin	320
(Shubash (Al Mughayyir	Jenin	5000
Tammun	Tubas	4300
Al Hashmee	Ramallah	200
Al Qarin	Hebron	50
Wadi Al Quff	Hebron	2500
Total		<b>14688</b>



**Figure 3.4** MOA pamphlet on natural resources in Palestine.

### 3.3 Legal Framework

After 1949 and until 1967, Jordanian environmental laws applied to the West Bank and Egyptian laws applied to Gaza. Immediately after the occupation in 1967, the Second Israeli Military Order designated all water resources in the newly occupied Palestinian territories to be “state owned by Israel” (UNEP, 2003). A new law, passed in 2014, made the SP’s water resources public property, under the management of the Palestinian Authority.

The authority to issue laws was derived from the Oslo Accords, signed between the PLO and Israel (1993 and 1995). These were to be interim arrangements, pending the resolution of final status issues, including statehood, borders, security, refugees, and Jerusalem. As part of the accords, the parties agreed to comply with international standards of environmental protection. The sides agreed to conduct environment impact analyses and to protect the soil and other natural resources. (UNEP, 2003). As early as January 1995, ARIJ and the Environmental Law Institute in Washington, DC drafted an environmental law for consideration by the nascent PNA (Amra, 1998). In 1995, the Environmental Planning Directorate (EPD) was established within the Ministry of Planning and International Cooperation (MOPIC). In December 1996, the Palestinian Environment Authority was created, transforming into the Ministry of Environmental Affairs in 1998. A presidential decree in June 2002 created the Environmental Quality Authority (EQA) as a successor to the MEnA. Its mandate derives from the aforementioned law, in addition to the national environment strategy (Amra, 1998).

In 1995-1996, MOPIC developed an Emergency Natural Resources Protection Plan to address environmental concerns resulting from the development of the newly established State. Regions in Gaza and the West Bank were classified according to their environmental sensitivity (high, medium, and low). These categories were based on field studies that measured the respective importance of local biodiversity, protected areas, water resources, agricultural land, and landscape preservation (Amra, 1998). The goal was to divert all forms of development from environmentally sensitive areas to less sensitive ones.

Besides the Environmental Law, additional laws indirectly impacted biodiversity conservation: the Palestinian Local Government Law No. 1 of 1997, the Industrial Estates and Free Industrial Zones Law No. 10 of 1998, the Natural Resources Law No. 1 of 1999, the Palestinian Water Law No. 3 of 2002, and the Protection of Animal Wealth Law No. 8 of 1998.

#### 3.3.1 PALESTINIAN ENVIRONMENTAL LAW

The Palestinian Environmental Law was approved by the PLC on 6 June 1999 and signed by the President on 28 December 1999. It consists of 82 articles and states that the Palestinian National Authority (PNA) has the right and responsibility to study and assess any project’s environmental impact and to protect the environment.

Article 2 of the Environmental Law outlines the law’s objectives, such as the protection of the environment against all forms and types of pollution, and the protection of the public’s health and well-being. It inserts “bases of environmental protection in social and economic development plans” and encourages “sustainable development of vital resources in a manner that preserves the rights of future generations.” More specific to this report, it aims to protect biodiversity and environmentally sensitive areas, and calls to reverse environmental damage. Moreover, it encourages the “collection



and publication of environment-related information to raise public awareness of environmental problems.”

Many articles of the law define goals, competencies, interdictions, and even penalties for violations. A number of the articles appear below:

**Article 5:** This law shall guarantee protection of the country’s natural fortunes and economic resources, the preservation of its historical and cultural heritage without any harms or side effects that are likely to occur sooner or later as a result of the variant industrial, agricultural or constructional activities, with an impact on the quality of life and basic ecosystems such as air, water, soil; marine resources, animals and plants.

**Article 6:** The specialized agencies, in coordination with The Ministry, shall devise the public policy for land uses taking into account the best use thereof and the protection of natural resources and areas with special natural characteristics as well as the conservation of the environment.

**Article 32:** It shall be forbidden, for every one, to perform any action which may cause pollution of sea water in a manner that contradicts with the standards, directives, or conditions prescribed for the purposes of marine environment protection against pollution.

**Article 40:** The Ministry, in coordination with specialized agencies, shall prescribe bases and standards for the protection of natural reserves and national parks, additionally tell about and supervise them, and establish, designate the national parks and supervise them.

**Article 41:** It is prohibited to hunt, shoot, or catch the birds, marine and wild animals, and the fish specified in the regulations of this law. Moreover, it is prohibited to possess, transport, walk with, sell or offer them neither dead nor alive, as well as it is forbidden to damage the nests or the eggs of these birds.

**Article 42:** The Ministry, in coordination with the specialized agencies, shall specify the conditions are necessary to guarantee the preservation of bio-diversity in Palestine.

**Article 44:** It shall be forbidden for any person to conduct activities or perform any action that may cause damage to the natural reserves, forests, public parks or archaeological sites, or affect the esthetical aspects of such areas.

**Article 72:** Any person violates the provisions of Article (44) of this law shall be penalized by paying a fine of not less than 20 and not more than 200 Jordanian Dinars, or the equivalent thereof in the legally circulated currency, and the imprisonment for a period not less than three days and not more than one month, or one of the two penalties. [See recommendations in Section 8 regarding this topic.]

The EQA is also responsible to “... Prescribe bases and standards for the protection of natural reserves and national parks, monitor and declare them, and establish and designate the national parks and supervise them.” According to the law, violators should face penalties, fines, and even imprisonment. Yet violations are common and we were unable to find examples of successful court cases brought against violators. Another example is the designation of protected areas. In June 2000, the Palestinian Authority designated Wadi Gaza as a protected area containing 1.25 km<sup>2</sup> of costal wetland. Yet little has changed and this area continues to undergo deterioration (Auda et al., 2009).



### 3.3.2 AGRICULTURE LAW NO. 2 (2003)

This agricultural law also addresses the protection of nature and biodiversity. Article 1 provides the legal reference for some aspects of protected areas, which are defined as: "A geographically delineated area that is organized and managed for the purpose of its protection and to conserve its biodiversity." Article 9 states: "The Ministry, in cooperation with other competent authorities, shall develop a nature reserves management plan and conserve all plants and living organisms living in protected areas." In theory, these other "authorities" may include the EQA. However, the law does not explicitly identify the EQA or MOA, nor assign definite roles.

Wadi Al Quff is the first Palestinian protected area for which a management plan has been drafted, and, recently, both competent authorities have transferred responsibility for its protection to the Hebron municipality. This transfer created further confusion in terms of the competencies and legal authority over Palestinian protected areas (for Wadi Al Quff, see below).

The EQA has highlighted the importance of increasing participation in PA decision-making processes aimed at implementing conservation strategies. This approach is widely used worldwide. Meaningful participation of local communities and authorities in establishing protected areas and in developing and implementing management plans ensures that the priorities and needs of these different groups are addressed.

Furthermore, IUCN defines governance type D as: "protected areas where the management authority and responsibility rest with indigenous peoples and/or local communities through various forms of customary or legal, formal or informal, institutions and rules." This definition includes two main subsets:

- Territories and areas conserved by indigenous peoples
- Territories and areas conserved by local communities

According to the EQA, effective Type D governance implies that the indigenous peoples or local communities enjoy institutional arrangements for making decisions and developing rules that apply to the land, water, and natural resources. Different groups may be in charge of a given area at different times of the year, or be responsible for different resources within the same area. Moreover, whichever institution is recognized by the government as the legal, community administrator may not actually oversee the cultural and/or spiritual tasks involved in managing the site. Despite real or perceived complexity, traditional community institutions function effectively and make important contributions to conservation. Despite this, many have no legal recognition. More so, the government may not recognize the indigenous peoples and local communities themselves as legal entities.

The Palestinian government, represented by the MOA and EQA, decided to introduce a new management model for protected areas. Responsibilities will be delegated to the local level and new management bodies will be established, with representation from relevant municipalities or conservation-oriented NGOs. Each body will also include government-appointed members from the relevant institutions/bodies responsible for land and nature conservation. These representatives will also function as the secretary, ensuring the implementation of the approved management plan for each protected area.

### 3.3.3 WATER LAWS

A Presidential Decree on water was issued in 2014, which also contributed to the legal provisions protecting water from contamination and pollution. Chapter 9, article 50 addresses the protection of aquatic environments. It states:

**Article (50)** Taking into account the provisions contained in the Law of the Environment, and in coordination and cooperation with the competent authorities for the protection of water resources, and to prevent contamination, the Authority shall:

1. Participate in regulating the use of industrial and agricultural resources that may cause the contamination of water sources or supply systems.
2. Participate in the environmental impact assessment for any activity related to water sources or supply systems by the committees.
3. Participate in the preparation of crisis management mechanisms in the event of drought, floods, water-borne epidemics, or general pollution.
4. Participate in the preparation of a list of contaminants that require a license, and compensation for damage resulting therefrom.
5. Be part of the Ministerial Cabinet, to issue regulations to protect water resources and water installations.

### 3.4 Conventions and Treaties Related to Conservation

Since 2012, Palestine has been recognized as a permanent, non-member observer state at the United Nations. De facto, this amounts to international recognition of statehood. Therefore, the Palestinian Authority has begun perceiving and presenting itself internationally as the State of Palestine. As such, the PA has signed international conventions on basic human rights, international humanitarian law, and international criminal law, among others, as well as environmental agreements and treaties related to natural resources. The State of Palestine has also signed agreements with UN agencies such as UNESCO, of which it has been a member since 2011.

In 2015 Jaradat and Awad Allah published a review titled, "Legal Implications of Accession of the State of Palestine to International Conventions on Resources and Protection of Natural Resources." They argued that by joining international agreements, the legal, political, and international aspects of the newly formed State of Palestine are consolidated. In addition, not only does this garner international solidarity, but also helps solidify Palestine's sovereignty over its natural resources and geographic boundaries. These conventions and treaties are therefore excellent platforms for addressing violations committed by the Israeli occupation against limited Palestinian sovereignty. Listed below are environmentally relevant agreements signed by the State of Palestine:

**Convention on Biological Diversity (CBD):** The CBD is an international legal instrument for the conservation and sustainable use of biological diversity that came into effect in December 1993. It has been instrumental in setting goals and establishing priorities to preserve biodiversity. Moreover, the CBD helps strengthen friendly relations among states and contributes to peace for humankind. For developing countries, the convention may provide access to new and additional financial resources and relevant technologies. Among other clauses, the contracting parties approved the need to maintain and recover viable populations of species in their natural surroundings and they affirmed the need for the full participation of women at all levels of policy-making. The State of Palestine signed the agreement on 2 April 2015. However, the agreement has not yet been ratified and remains in the stage of accession. To comply with the convention, the EQA is looking to update the national biodiversity strategy and action plan. This includes preparing lists of endangered species and building its capacities, along with those of national stakeholders, in the field of biodiversity. The Palestinian Authority submitted its fifth report in 2015 (EQA, 2015). In 2012, the EQA published "The National Strategy, Action Programme and Integrated Financial Strategy to Combat Desertification in

the Occupied Palestinian Territories,” which outlined plans and sought funding for many projects to educate about and combat desertification. However, lack of funding and other challenges impeded compliance and implementation (see Sections 3.7.3). (<https://www.cbd.int/convention/text/default.shtml>)

**The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal:** This was adopted on 22 March 1989 by the Conference of Plenipotentiaries in Basel, Switzerland, following public outcry in the 1980s following the discovery of deposits of toxic waste in Africa and other parts of the developing world imported from abroad. The State of Palestine accessed to this agreement on 2 January 2015 and it was ratified three month later, on 2 April 2015. Since Palestine participated in Arab League meetings related to this convention prior to its accession, Articles 12 and 13 of the Palestinian Environment Law are largely influenced by the convention. These articles form the legislative basis for preventing the entry of waste and hazardous substances into Palestine. The convention also provides for cooperation between the parties, ranging from exchange of information to technical assistance, particularly for developing countries. Ratifying states are obliged to adhere to the fundamental principles of environmentally sound waste management. On these bases, the EQA has prepared a master plan for the management of hazardous materials and wastes and prepared a draft list of hazardous substances and wastes. Accession to the Basel Convention constituted a fulcrum in preventing waste and hazardous materials from being dumped locally or smuggled from Israel. Yet largely due to illicit cross-border cooperation by organized crime, waste continues to flow into the Palestinian areas from Israel (Khlaif and Qumsiyeh, 2016). (<http://www.basel.int/TheConvention/Overview/tabid/1271/Default.aspx>)

**The Cartagena Protocol on Biosafety:** The Cartagena Protocol is an international treaty governing the movement of living modified organisms (LMOs) resulting from modern biotechnology from one country to another. It establishes procedures for ensuring that countries are provided with the necessary information before agreeing to the import of such organisms into their territory. It was adopted on 29 January 2000 as a supplementary agreement to the Convention on Biological Diversity and entered into force on 11 September 2003. Palestine’s ratification of the Basel Convention on 2 April 2015 also entailed accessing to the Cartagena Protocol. For the time being, a lack of data and research on LMOs limits the legal influence of this protocol in Palestine. (<https://bch.cbd.int/protocol/text/>)

**United Nations Framework Convention on Climate Change (UNFCCC):** This treaty was negotiated at the 1992 Earth Summit in Rio de Janeiro, and aims to address climate-change related threats to human life and life on earth. The ratifying parties recognized the need for developed countries to take immediate action as a first step towards comprehensive response strategies regarding greenhouse gases. They also recognized developing countries’ need for resources towards achieving sustainable social and economic development. Palestine accessed the UNFCC on 18 December 2015. The EQA prepared a national strategy for adapting to climate change, which included the formation of a national committee on climate change and a designated climate change unit within the EQA. Until now, the accession to the UNFCC has not been reflected in the domestic Environmental Law, and little is being done, for example, to curb the amount of hydrocarbon energy used in Palestine. ([http://unfccc.int/files/essential\\_background/background\\_publications\\_htmlpdf/application/pdf/conveng.pdf](http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf))

The State of Palestine, without being a signatory, is active in a number of other international treaties that are not directly concerned with conservation and biodiversity, but relate to other environmental issues.

**The United Nations Convention to Combat Desertification:** This international environmental agreement addresses sustainable land management for combatting desertification. The parties work to mitigate the effects of drought in countries experiencing serious drought and/or desertification through effective action at all levels, supported by international cooperation and partnerships. The State of Palestine is not a party to this agreement, yet has been involved. The EQA was the national focal point, but this role was transferred to the Ministry of Agriculture. Nevertheless, the EQA initiated the formation of a National Committee to Combat Desertification and made efforts to prepare a national strategy for combatting desertification. To this end, the EQA hosted international experts to assist Palestinian scientists, primarily to support the drafting of a project proposal for sustainable management of arid land. It is worth noting that articles 16 and 18 of the Environment Law form the legislative basis for this endeavor. ([http://www2.unccd.int/sites/default/files/relevant-links/2017-01/UNCCD\\_Convention\\_ENG\\_0.pdf](http://www2.unccd.int/sites/default/files/relevant-links/2017-01/UNCCD_Convention_ENG_0.pdf))

**The Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution (1976)** includes legal protocols on dumping waste from ships and aircraft, emergency situations, pollution from exploration and exploitation, hazardous wastes, and integrated management of coastal zones. Even though Palestine is not a member of this convention, the EQA is involved in some related meetings and programs. Thus, the EQA has prepared a national plan for the protection of Palestine's marine environment and coastal areas. Some articles in the Environmental Law relating to the marine environment constitute a national legislative basis for this agreement.

Two other important international treaties are the **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)** and the **Convention on Migratory Species (CMS)**. CITES aims to ensure that international trade in wild animals and plants does not threaten their survival. Curbing trade of endangered species is highly beneficial, although Palestine does not currently control its ports of entry. Imminent independence makes it extremely urgent to prepare to implement this convention. (<https://www.cites.org/eng/disc/what.php>) CMS lays the legal foundation for internationally coordinated conservation measures throughout migratory ranges. This convention should likewise be joined, since 500 million birds migrate through Palestine annually, en route between Eurasia and Africa. This convention would ensure protection of this important migratory route. (<http://www.cms.int/en/legalinstrument/cms>)

### 3.5 Memoranda of Understanding (MOUs)

The EQA has signed several MOUs on the regional and national levels. Yet this alone does not attest to actual achievements, only to what has been postponed. Therefore, further studies should be conducted to illuminate this subject.

#### 3.5.1 REGIONAL LEVEL MOUs

Five MOUs were signed between the EQA and other countries to promote environmental issues. Table 3.2 summarizes these, including partners and objectives.

**Table 3.2** MOUs signed by the EQA on the regional level.

Partner	Country	Objectives	Year
Royal Society for the Protection of Nature	Jordan	Training and exchange of experience	2000
Ministry of Equipment and Environment	Tunisia	Enhance and consolidate cooperation in protecting the environment through exchange of experience, information, documents, and implementing joint projects on different environmental themes.	2013
European Union	EU	Ensure the implementation and monitoring progress of the plan by a Joint EU-PA committee chaired by the Ministry of Foreign Affairs.	2012
Council of Arab Ministers Responsible for Environment	Arab League	Protect the environment in Arab countries	?
Council of Islamic Countries Ministers Responsible for Environment	?	Protect the environment in Islamic countries	?

Palestine has also signed MOUs with other regional programs related to conservation, such as the Regional Program on the Conservation of Wetlands and Coastal Ecosystem in the Mediterranean Region and the Regional Program for the Conservation and Sustainable Use of Dryland Agro-Biodiversity of the Fertile Crescent.

#### 3.5.2 NATIONAL LEVEL MOUs

The EQA has signed various MOUs with local agencies and authorities to enhance cooperation and networking between the different stakeholders in nature conservation. Table 3.3 summarizes these memoranda.

**Table 3.3** MOUs signed by the EQA on the national level.

Agency/Authority	Year	Objectives
Palestinian Central Bureau of Statistics	2013	<ul style="list-style-type: none"> <li>Enhance and consolidate cooperation and the exchange of data and information</li> <li>Implement specialized environmental surveys</li> <li>Build central administrative records.</li> <li>Update, develop, and computerize common interest statistics</li> </ul>
Customs Authority	2014	<ul style="list-style-type: none"> <li>Enhance cooperation in controlling the smuggling of solid and hazardous waste</li> </ul>
Political and Moral Guidance Commission	2014	<ul style="list-style-type: none"> <li>Enhance cooperation in environmental awareness of the youth</li> <li>Conduct studies, reports, and reinforce concepts of environmental protection</li> </ul>
Ministry of Women's Affairs	2013	<ul style="list-style-type: none"> <li>Ensure the centrality of gender in environment issues (Focusing on water and solid waste management)</li> </ul>

### 3.6 Key Governmental Entities Concerned with Nature Protection

Table 3.4 lists governmental institutions that have assumed legal competency over protected areas and nature conservation. The development of national strategies requires their involvement in terms of policy formulation.

**Table 3.4** Key governmental entities concerned with nature protection.

Ministry/Authority	Relevancy to environmental issues
Environmental Quality Authority	Planning and drafting policies for environmental protection; approving projects basing on environment (impact assessments (EIA
Ministry of Agriculture, in cooperation with the EQA	Management of national parks, protected areas, and forested areas
Ministry of Local Government	Involvement of local communities in projects and initiatives related to protected areas; control of feral dogs and cats
Ministry of Health	Address and monitor environmental issues related to public health
Ministry of Tourism and Antiquities	Marketing ecotourism locally and internationally; management of areas with archeological value
Ministry of Education	Environmental education in schools (curricular and (extracurricular
Ministry of Culture	Promoting environmental awareness via cultural activities and cultural heritage
Ministry of Interior	Enforcement of environmental and agricultural laws

## 3.7 National Priorities

### 3.7.1 NATIONAL ENVIRONMENTAL STRATEGY

There are many challenges to enforcing environmental laws in Palestine. These are not limited to obvious breaches, such as disregard for Article 41, which prevents illicit hunting. One of the main obstacles is the PA's limited authority over regions outside of Area A and B. Another general challenge is the low priority of nature conservation, both among Palestinian society and decision makers, since significant poverty and reliance on international aid makes nature protection seem like a luxury. Finally, excessive bureaucracy and corruption, both in government and the private sector, hinders effective governance (Nakhleh, 2012).

Prior to the Oslo Accords, it was impossible to develop a national Palestinian environmental strategy. As noted above, between 1948 and 1967 Jordanian laws and policies applied to the West Bank, while Egyptian laws and policies applied to Gaza. The second Israeli Military Order, issued immediately after the occupation on 7 June 1967, designated all water resources in the newly occupied Palestinian territories to be "state owned by Israel" (UNEP, 2003). After the Oslo Accords, the PNA attempted to legislate on issues of water and other natural resources. President Arafat, for example, signed a water law on 17 July 2002. But, in the context of ongoing occupation, changes remained largely theoretical. Similarly, the PNA and Israel never reached an agreement on waste water treatment and solid waste facilities, which Israel refuses to authorize unless, in some cases, Palestinians agree to treat waste from Israeli settlements in the occupied Palestinian territories (Amnesty International, 2009; Tal, 2002).

Only since the turn of the century, the PNA has begun formulating long-term strategies and plans for nature conservation. In August 2000, the PNA developed a ten-year environmental strategy for the years 2000-2010 and a National Environmental Action Plan (NEAP) for the three-year period of 2000-2002 (Table 3.5). In 2010, an Environment Sector Strategy was drafted by a commission led by Zaghoul Samhan, which included a SWOT analysis (EQA, 2010). It prioritized the EQA's list of 48 specific interventions and 19 recommendations to be implemented at the level of the general environmental sector.

**Table 3.5** Priorities of the environmental strategy (UNEP, 2003).

Priority	Gaza	West Bank
High	Depletion of water resources Deterioration of water quality Shoreline and marine pollution	Depletion of water resources Deterioration of water quality Land degradation
Medium	Depletion of natural resources Land degradation Deterioration of nature and biodiversity	Depletion of natural resources Air and noise pollution Deterioration of nature and biodiversity
Low	Air and noise pollution Landscape and aesthetic distortion Threats to cultural heritage	Landscape and aesthetic distortion Threats to cultural heritage

In 2005, the Palestinian National Millennium Development Goal (MDG) Steering Committee, led by the Ministry of Planning, published their goals, which candidly state that the 2015 targets for sustainability and environmental issues will not be reached because of "lack of control over natural resources, particularly water and land, due to occupation, and early stage of environmental protection."

### 3.7.2 NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN (NBSAP)

The National Biodiversity Strategy and Action Plan (NBSAP, 1999) specifically covers biodiversity conservation and protected areas. Its objectives can be summarized as follows:

- Conservation of Palestinian biodiversity. The development and establishment of a representative system of protected areas is listed as an immediate priority. The NBSAP also includes conceptual projects on the “development and management of a Palestinian protected areas system” and the “development of management plans/ structures in designated protected areas based on biodiversity surveys and inventories.”
- Ensure the involvement of local communities in establishing and managing protected areas.
- Assess capacity building needs and Palestinian priorities in terms of biodiversity.

The plan also addresses gaps that affect biodiversity and conservation in protected areas, including the lack of primary scientific data, information and documentation of biodiversity in Palestine, and lacking/limited human resources. There are very few Palestinian biologists, especially marine and wildlife biologists, taxonomists, oceanographers, conservation managers, etc. Moreover, Palestine suffers from a lack of funding and support, as well as the absence of a national strategy and weak awareness of the NBSAP itself. According to the national plan, Palestine lacks adequate legal frameworks and environmental policies for effective conservation and sustainable use of biodiversity. Similarly, the plan states a lack of coordination among national agencies and local stakeholders involved in protecting biodiversity in Palestine. The plan was addressed in the Palestinian fifth national report for the CBD, which is discussed below.

### 3.7.3 CONVENTION ON BIOLOGICAL DIVERSITY (2015 EQA REPORT)

The most recent report on the conservation of biodiversity was issued by the Environment Quality Authority in compliance with the Convention on Biological Diversity (EQA, 2015). It lists a conclusive range of future objectives:

- Understand basic fauna and flora by conducting studies and mapping them at specialized centers, and decide how best to manage them.
- Develop and manage a Palestinian Protected Areas System.
- Develop management plans/structures in designated protected areas, based on biodiversity surveys and inventories.
- Protect and use traditional, indigenous knowledge and property rights for biological diversity.
- Implement biosafety measures in the field of biotechnology.
- Habitat restoration (including rangelands, forests, wetlands, sacred groves, and integrated agro-ecosystems).
- Collaborate in managing biodiversity.
- Combat desertification and cope with the adverse effects of climate change.
- Expand and enforce national legislation/legal frameworks on biodiversity.
- Establish a biodiversity information and social education center.
- Promote eco-tourism/economical aspects of biodiversity.
- Coastal zone management in the Gaza Strip and Dead Sea.
- Establish a gene bank.

The report’s executive summary also includes 11 recommendations, grouped and elaborated upon below. These will also be addressed in Section 8.



## Science and research

Conduct comprehensive field studies of protected areas, species populations, distribution, and biodiversity dynamics. Expand the collection of flora and fauna data, and resolve contradictions in existing data, to maximize accuracy.

Focus national studies on genetic diversity and products from genetic modified organisms (GMOs). Conduct studies to prepare the National Framework on Biosafety, minimize potential threats from GMOs to biodiversity, and plan for future scenarios that may significantly threaten biodiversity. Develop models for temperature and rainfall changes, as well as potential changes due to desertification and other aspects of climate change.

Lastly, identify invasive species, especially among plants and birds, and support a national strategy for combating and eradicating these species.

## Legislation and policy formulation

Revise, update, and synchronize existing national legislation on biodiversity, protected areas, biosafety, and intellectual property rights. Update the NBSAP to meet international standards, such as the Aichi Biodiversity Targets.

## Advocacy

Bring biodiversity into the mainstream, including outreach programs. Involve the private sector and local communities. Advocate for the valuable services provided by the ecosystem and their link to human livelihoods. Use this to support decision-making and the implementation of conservation policies. This has the potential to combat illegal hunting and wildlife trade.

Encourage collaboration, communication, and coordination between relevant independent organizations and stakeholders involved with nature conservation. Conduct a comprehensive mapping of activities, to help prioritize causes and threats to nature conservation.

Five NBSAP objectives were identified, but very limited progress has been achieved since the fifth national report (Table 3.6).

**Table 3.6** National biodiversity objectives, fifth national report, (EQA, 2015, p.93).

NBSAP Objectives	Global Strategic Plan Objectives (Aichi Targets)	Related Aichi Targets	Percent of Progress
Conservation of biodiversity	Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society	T1, T2, T3, T4	13%
Sustainable use of biodiversity	Strategic Goal B: Reduce direct pressures on biodiversity and promote sustainable use	T5, T6, T7, T8, T9, T10	22%
Enhancement of local skills, knowledge, attitudes, and practices for biodiversity conservation and sustainability	Strategic Goal C: Improve biodiversity by safeguarding species, ecosystems, and genetic diversity	T11, T12, T13	10%
Equitable sharing of biodiversity benefits	Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services	T14, T15, T16	5%
Develop institutional and human resource capacity in the field of biodiversity	Strategic Goal E: Enhance implementation through participatory planning, knowledge management, and capacity building	T17, T18, T19, T20	5%

Two main goals were identified by the EQA (PNA) for compliance with CBD (EQA, 2015) For more information, see Section 8:

**Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society:**

By 2020, the government, private sector, and other stakeholders should have taken steps/ implemented plans for sustainable production and consumption to prevent the overuse of natural resources and subsequent negative impacts. The implementation of the National Biodiversity Strategy requires a multidisciplinary approach and collaboration between different ministries, academia, NGOs, policy and decision makers, and the central and regional administrations. Additionally, the education system should promote the protection of biodiversity as a value alongside protecting national identity and cultural heritage.

Improve biodiversity by safeguarding ecosystems, species, and genetic diversity:

By 2020, protective measures for threatened species, including wild, edible plants, should be introduced on a national level. Human activities threatening these plants and their habitats should be addressed and curbed, along with the overuse of insecticides, extensive expansion of agricultural land, illicit logging, overgrazing, overharvesting, and uncontrolled fires. Nature reserves and accessible nature areas should be expanded. A national advocacy strategy promoting daily, direct contact with nature may help achieve this goal.

#### 3.7.4 NATIONAL SPATIAL PLAN (NSP)

In October 2011, a PNA-appointed committee presented the National Spatial Plan (NSP) in Nablus, Ramallah, and Bethlehem. It was finally adopted in June 2012 (<http://www.nsp.pna.ps/en/>). The government conceived this plan as a tool for mainstreaming the protection of natural resources. The Ministerial Cabinet delicately balanced development needs with the protection of natural resources needed to sustain future generations.

The National Spatial Plan provides a framework for local and regional spatial plans. It limits land use and designates high- and medium-sensitivity areas for agriculture, open spaces, forests, biodiversity, and natural conservation, as well as cultural and historical areas and archeological sites. The plan and its regular updates were supposed to be gradually implemented through 2025, however this process is currently lagging.

One way to accelerate the implementation of the NSP would be to merge with the Palestinian National Development Plan (NDP), one of whose key priorities is to establish state sovereignty and assert control over natural resources. Special attention is devoted to area C, particularly the Jordan Valley and Dead Sea regions, as well as East Jerusalem and Gaza Strip (MOPAD, 2014). The different agencies, i.e. MOPAD, EQA, MOA, and other government institutions, shall focus on the implementation of adopted plans.



# Section 4

## NON-GOVERNMENTAL ORGANIZATIONS

### 4.1 Introduction

Non-governmental organizations (NGOs) proliferated in Palestine after 1967, in the aftermath of the defeat of the Arab regimes, forcing Palestinians to develop self-reliance mechanisms to cope with the Israeli occupation (Qumsiyeh and Isaac, 2012). Initially few NGOs dealt with the environment or sustainability. Yet globally, such NGOs made significant contributions to international environmental laws and treaties (Tarlock, 1992).

These include the World Wildlife Fund, International Union of Conservation of Nature, Greenpeace, etc.

Majdalani Azzeh (2012) mapped Palestinian civil society organizations dealing with environmental issues via a desk review and focused interviews. He surveyed organizations registered with the Ministry of Interior (MOI), the Ministry of Environmental Affairs (MEnA), and members of the Palestinian NGOs Network (PNGO). He concluded that the environmental sector suffered from a lack of attention, structure, and a clear, joint strategic vision. This was mainly due to the very ambitious national plans and a lack of communication among NGOs (see Section 4.3).

Since then, the NGO Development Center (NDC) has updated its NGO sector strategy, creating a framework to encourage NGOs to align their programs and projects with common strategic objectives (NDC, 2013). Five strategic objectives were identified through a SWOT analysis; these appear in Table 4.1 (NDC, 2013).

**Table 4.1** Strategic objectives for Palestinian NGOs (NDC, 2013).

More effective engagement of NGOs in the process of national liberation and democratization based on internationally recognized legal frameworks.
Streamlined and effective relationships between NGOs and Palestinian development partners.
Improved access to quality services provided by the government and NGOs.
More effective, accountable, and transparent NGOs.
Secured and adequate financial resources for NGOs.

Manage an NGO in a developing country can be challenging in terms of structure and governance, and, especially, reliance on foreign aid (Lewis, 2006). Both governmental structures and NGOs tend to be corrupt when foreign money flows into a country (Hellinger et al., 1988). In Palestine, these issues were compounded by the Oslo Accords. While a Palestinian state did not materialize, foreign donors continued providing financial support, often aimed at normalizing Israeli-Palestinian relations (Nakhleh, 2012).

In 2012, the Palestinian Authority’s Ministry of Interior registered 2,245 NGOs in the occupied Palestinian territories. Few focused on the environment, agriculture, water resources, or conservation. An initial list of environmental NOGs was compiled, including 104 NGOs in the West Bank, Gaza Strip, and East Jerusalem. Oberender and Manz (2012) however, found only 56 of them to be active. Another study estimated the number of active environmental NGOs at 64 (Majdalani Azzeh, 2012). The difference between these studies is likely the result of how investigators defined “active.”

This section examines the activity of active NGOs directly involved in biodiversity and conservation issues. Thus, other active NGOs, such as the Palestinian Hydrology Group, the Palestinian Agricultural Relief Committees, and the Land Research Centre are not discussed. Methodologically, this desk review surveyed existing resources and web pages, along with a list of NGOs registered with the EQA. Each NGOs was contacted by phone or e-mail. Key NGOs were interviewed about their current projects and activities.

### 4.2 Non-Governmental Organizations Related to Conservation and Biodiversity

At present, 11 NGOs are involved in conservation, education, ecotourism, training, and research related to biodiversity and environmental issues in Palestine. Table 4.2 summarizes their activity (self-reported).

**Table 4.2** Summary of key NGOs’ conservation and environmental activity in Palestine (self-reported).

NGO	Capacity building	Public awareness	Education	Ecotourism	Research	Conservation
The Applied Research Institute Jerusalem	●	●	●	●	●	●
Arab Youth Climate Movement		●	●			
The Biodiversity & Environmental Research Center		●	●		●	●
Center of Environment in Palestine	●	●		●		
Environmental Education Center		●	●	●	●	●
Environmental Field Research Center	●	●	●	●	●	●
Green Life		●		●		●
MA’AN Development Center	●	●	●			
Palestine Association for Education & Environmental Protection	●	●				
Palestine Museum of Natural History	●	●	●	●	●	●
Palestine Wildlife Society		●	●	●		●

These NGOs’ missions range from public awareness, education, multiple tasks related to biodiversity, and conservation. All also focus on public awareness. On the other hand, training and capacity-building was the category of least activity. Some of their missions and objectives included tasks that were not reflected in their annual reports.

### 4.3 NGO Analysis and NGO Cooperation

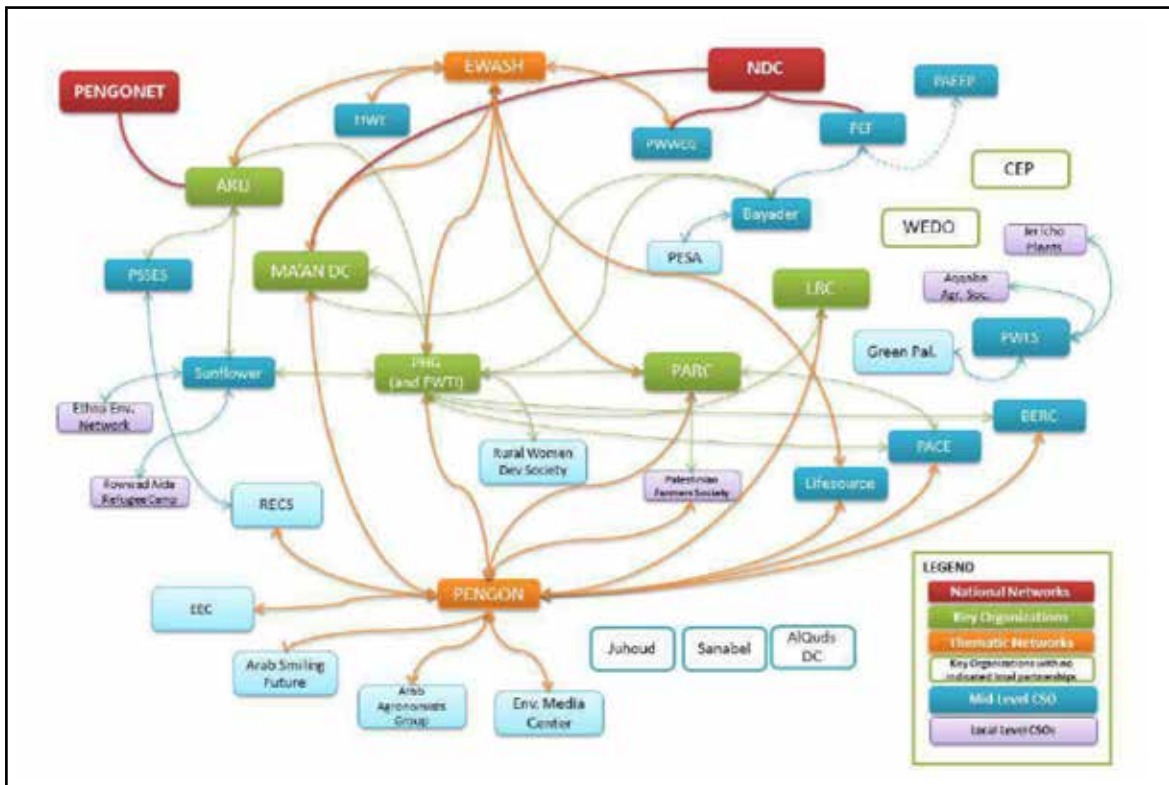
As noted above, the number of Palestinian NGOs pursuing environmental issues ranges between 56 and 64 organizations (Oberender and Manz, 2012 and Majdalani Azzeh, 2012, respectively). Of these, many are located in the Bethlehem District. In Gaza, which suffers from isolation and neglect, NGOs have a significant presence. Every environmental NGO displays a gender imbalance.

Organizations with proactive agendas tend to better understand different environmental issues, compared to reactive, defensive, and accommodative groups (Henriques and Sadorsky, 1999). In Palestine, most NGOs operate within a difficult economic situation, and their agendas are often driven by donors, rather than any national conservation agenda.

Another issue is the lack of cooperation between NGOs working in similar fields. An attempt to rectify this was the establishment of the Palestinian Environmental NGOs Network (PENGON), which has partnered with Friends of the Earth Palestine. The aim is to “serve Palestinian environmental issues by coordinating endeavors between the member organizations, strengthening and building the efficiency within each organization, and enhancing relations within the Network as well as with other organizations domestically and abroad, such as local government agencies and international environmental organizations and advocacy groups.” (<http://www.pengon.org/>)

As of this year, the member groups are:

- Al-Ard Society for Environmental Awareness and Protection
- Applied Research Institute - Jerusalem (ARIJ)
- Center for Agricultural Services (TCAS)
- Center for Development in Primary Health Care (CDPHC)- Al-Quds University
- Institute of Water Studies, Birzeit University
- Development and Environment Association—Baladna Cultural Center
- Land Research Center (LRC)
- LAW-The Palestinian Society for the Protection of Human Rights and the Environment
- The Local Committee for the Protection of the Environment, Nablus
- MA'AN Development Center
- Palestinian Agricultural Relief Committees (PARC)
- Palestinian Association for Cultural Exchange (PACE)
- Palestinian Hydrology Group (PHG)
- Roads and Environmental Safety Center (RESC)
- The Society for Environmental Protection, Jenin
- Union of Agricultural Work Committees (UAWC)
- Union of Palestinian Medical Relief Committees (UPMRC)
- Water and Environment Department-Ramallah Municipality
- Water and Soil Environmental Research Unit (WSERU), Bethlehem University
- Water and Environmental Studies Center (WESC), An-Najah National University
- Palestine Wildlife Society (PWLS)



**Figure 4.1** Network of environmental NGOs in Palestine (Majdalani Azzeh, 2012).

While these NGOs communicate and sometimes coordinate their efforts, there is far too much division. Many NGOs pursue similar agendas, verging upon duplication. Coordination could reduce inefficiencies; the EQA could lead prioritization efforts, alongside incentivization by donors. Donors often feel rivalry or jealousy, and end up duplicating each other's efforts.

Foreign aid pumps significant amounts of money into infrastructure and other areas, including the environment. It has been argued that this primarily improves life under occupation without addressing root problems or focusing on long-term sustainability (Lagerquist, 2003; Turner, 2012; Associated Press, 2016). In Section 8, there are specific recommendations for addressing this issue.

Palestine has the highest number of NGOs per capita in the world, and most of the NGOs operating today have had the same leadership for over 15-20 years. This is similar to academia, where administrators often remain in their positions for up to three decades. This begs the question, whether this situation is healthy and invites new ideas and creative approaches. As for the NGOs, one must ask whether term limits increase (or decrease) corruption. Throughout the interviews conducted for this consultancy, we noted that many leaders are happy to critique the heads of other NGOs, without holding themselves to the same standards. Perhaps this is understandable and reflects Palestinian governance as such, but it certainly affects the degree of potential cooperation among NGOs.



# Section 5

# EDUCATION

## 5.1 Introduction

Modern educational philosophy has evolved from teacher-centered to student-centered learning, from memorization to critical thinking. As humanity faces colossal, man-made environmental challenges, education must be our weapon of choice. Evidence has shown that environmental awareness and education indirectly correlates to nations' economic development (Franzen and Meyer, 2010).

Kassas (2002) provided a comprehensive review of education and biodiversity. He summarized the modern approach to education in five points: scale of boundaries (from local to worldwide), perspectives, goals, themes, and assimilation (evaluation). Also, he defined the means and directions for maximizing community outreach via awareness, school education, education, professional training at the tertiary level, and the roles of communication and media outlets. Without doubt, this approach could be tailored to Palestine.

One obstacle towards environmental conservation and awareness is the hegemony of political, religious, and social discourses surrounding the Israeli-Palestinian conflict. For example, Israeli environmental work avoids dealing with the main issue of population growth and population pressure on the environment because of dominance of the Zionist discourse (Orenstein, 2004).

In Palestine, the GDP per capita is low (ca. \$1,700 as of 2016) and economic pressures are high. The efficacy of environmental policies not only correlates with GDP but also to "the sophistication of a nation's regulatory regime and, perhaps more notably, its broader economic and social context" (Esty and Porter, 2005).

Teaching and instilling environmental stewardship (or any other scientific field) in Palestine faces two additional major challenges: occupation and a traditional society whose culture emphasizes religion and traditions. The latter greatly impacts environmental education, e.g. obstacles to teaching evolution and biological Darwinism, which are the basis for biodiversity studies. This holds true both in schools and institutions of higher education (Nelson, 2008). Significant efforts have been made by the EQA, MOA, universities, schools, and many NGOs, but these efforts are uncoordinated and their impact has not been evaluated in terms of efficiency or effectiveness (EQA, 2015). In terms of the occupation, the school curriculum and structure is impacted by economic deprivation and lack of freedom of movement (EAPPI, 2013). Yet Palestinian can do much more in this area, even under occupation (see Section 8).

We must mainstream the idea that biodiversity, protected areas, and natural landscapes are part and parcel of Palestine's heritage, and are thus worthy of national protection akin to the preservation of our cultural heritage. Mainstreaming environmental conservation must be done at all levels of society and in all sectors. To do this, we suggest strengthening the EQA's mandate (perhaps through an agreement with MOA) and building more effective partnerships between the EQA and schools,



universities, NGOs, and foreign donors. This will assist the implementation of a more coherent strategy of conservation.

## 5.2. Elementary Education

UNESCO has suggested methods of integrating environmental education into schools via project-based approaches and student-centered learning methods (Fauville et al., 2014). Environmental education in schools must also incorporate key, agreed-upon scientific principles in a systematic way (Hale, 1995).

Environmental education and awareness are national obligations and should be a joint effort by governmental agencies and NGOs alike. Within the EQA, there are two relevant divisions: the Division of Awareness and the Division of Education. School children across the West Bank are the main target for most of the educational programs. The EQA produced a Communication, Education and Public Awareness Strategy (CEPA) in 2014, directing its efforts at: 1) Effective and active media to raise environmental awareness; 2) Integrated and innovative educational activities, methodologies, and curricula; 3) Environmental upscale values practiced by community groups.

In addition to the EQA, the MOA published some awareness-raising pamphlets and has occasionally worked with schools on educational issues. Some universities also integrated environmental education into science festivals and through direct school involvement. In 2014 Bethlehem University, via its Museum of Natural History, worked with the Qattan Foundation to bring hundreds of school students to a science festival that focused on our responsibility towards the environment.

Efforts were made in collaboration with NGOs (e.g. ARIJ, BERC, MA'AN DC, and PWLS) and educational centers (e.g. EEC) to reach out to schools and integrate some concepts of environmental education, both in the classrooms and via extracurricular activities. Those groups' efforts helped the Ministry of Education to change its curriculum, but the success was limited. For example, the syllabus for 9<sup>th</sup> grade class, Health and Environment in our Life, included some good suggestions for better managing water resources and reducing waste (see Figure 5.1).



**Figure 5.1** Textbook, made possible through a collaborative effort involving NGOs (e.g. PWLS), academics, and MOE professionals. Such efforts are much needed.



Extracurricular activities have been more successful. Many NGOs told us they are proud to have supported environmental clubs and other environmental initiatives at schools (see Section 4). Many Palestinian schools now have environmental clubs, more so in private schools than in public schools (e.g. in Bethlehem all private schools have an environmental club while only a small fraction of public schools have them). This is largely due to lack of support and encouragement. Some schools started environmental magazines and/or newsletters, such as the Evangelical Lutheran Schools (see Chapter 4). Many of these initiatives were discontinued for lack of funds, but financial supporting could increase outreach and instill conservation and environmental awareness among school children. EQA's Department of Environmental Education and Awareness and its responsibilities are discussed in Section 3.

### 5.3 University Education

There are nearly 50 institutions of higher education (including vocational centers) in the occupied Palestinian territories, two of which are governmental (Kadoorie in Tulkarm and Al-Aqsa in Gaza). They face many challenges, including access, quality, funding, and human resources (Tempus, 2012). Globally, Palestinian universities rank rather poorly. Some of these challenges may be overcome with help from the government and by the universities themselves, as well as capacity building projects such as the EU Erasmus Mundus projects, DAAD, etc.

#### 5.3.1 UNDERGRADUATE LEVEL

Palestinian universities offer many undergraduate programs related to environmental science. For example, some universities like An-Najah have established undergraduate programs related to nature conservation and protection of biodiversity (Energy and Environmental Engineering, Plant Production and Protection). Hebron University offers a B.Sc. program in Environmental Science and Technology, while Al-Quds University has a program in Earth & Environmental Sciences, including courses on biodiversity.

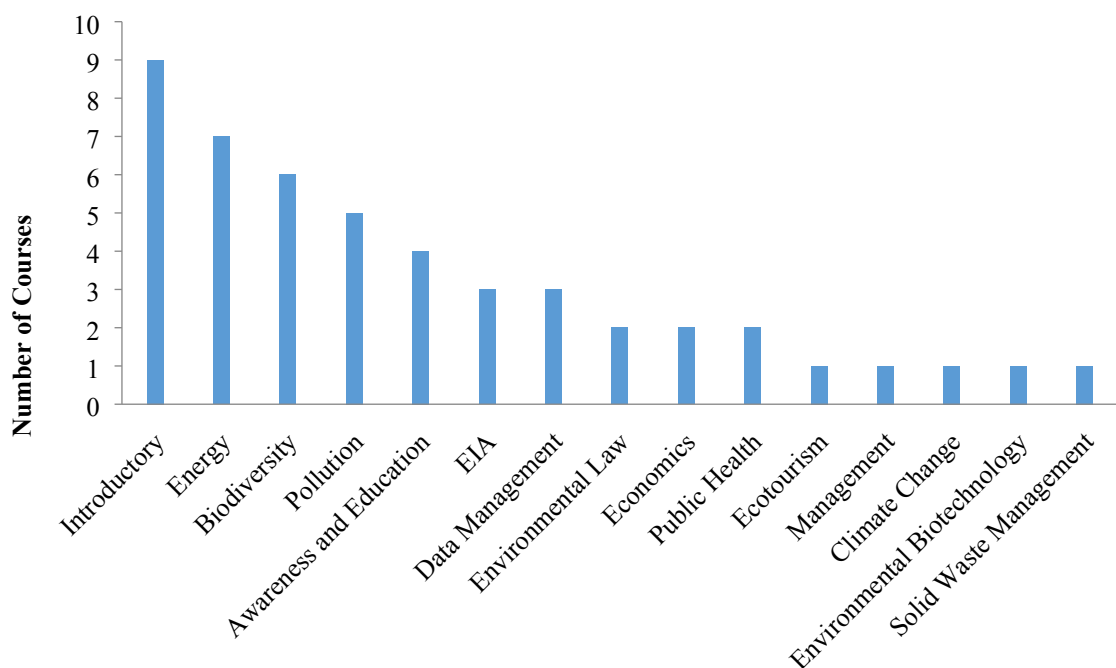
Table 5.1 surveys the available programs, along with their courses. Departments also offer electives, including Environment in Palestine, Palestine: Nature & Environment, and Introduction to Environmental Sciences for non-major students. Other advanced courses (electives or core) are offered for students majoring in Biology, Environmental Science and Technology, Environment & Sustainable Agriculture, and Earth & Environmental Sciences. Certainly, there must be better coordination among the science faculties, especially in areas like biology and agriculture.

Both at Bethlehem University and An-Najah University, the Faculty of Education offers courses in environmental education for children. This indicates awareness among the academic community of the importance of introducing these challenges to the younger generation.

**Table 5.1** Examples of undergraduate environmental programs offered at Palestinian universities.

University	Program	Relevant courses
Hebron	Environmental Science and Technology	55100 Environmental Awareness 46221 Environmental Science 46222 Environmental Problems 46361 Air Pollution 46371 Natural Resources Management 46451 Renewable Energy Technology 46461 Environmental Industrial Pollution 46471 Management and Evaluation of Env. Problems 46281 Environmental Health 46281 The Water Sources 46322 Environmental Law 46323 Environment and Energy 46324 Computer Applications in the Environment 24635 Biodiversity 46372 Environmental Economics
	Biology	44241 Ecology 44343 Biodiversity
An-Najah	Department of Biology and Biotechnology	
	Energy & Environmental Engineering	10162 Environment in Palestine 63425 Renewable Energy Systems 64235 Energy & Environment 64587 Environmental Impact Assessment 64590 Special Topics in Energy & Environment 64539 Special Topics in Renewable Energy 64580 Climate Change & Adaptation
	Kindergarten programs	10506215 Environmental Education for Children
Palestine Polytechnic	Applied Biology	AB 002 Molecular Biodiversity AB 010 Environmental Biotechnology
Palestine Technical – Kadoorie	Environment & Sustainable Agriculture	16010201 Introduction to Ecology 16010302 Environmental Impact Assessment 16010412 Evolution & Biodiversity 16010416 Environmental Data Management 16010417 Economics of Natural Resources 16010424 Energy & Environment
Bethlehem	Department of Biology Department of Chemistry Faculty of Education	BIOL 333 Ecology with field excursions CHEM 497 Environmental Chemistry EDUC 354 Teaching Children Environment & Social Studies

Al-Quds	Faculty of Science and Technology  Department of Biology  Earth & Environmental Sciences Department	0306101 Introduction to Environmental Sciences 0305341 Ecology 1 0305342 Ecology 2 0305401 Biodiversity 0400121 Palestine: Nature & Environment 0316252 Ecology and Biodiversity 0316351 Environmental Education and Awareness 0316355 Environment and Public health 0316357 Environmental Policy and Legislation 0316451 Computer Applications in Environmental Sciences 0316452 Environmental Pollution and Protection 0316453 Environmental Microbiology 0316454 Environmental Field work 0316455 Solid Waste Management 0316456 Environmental Impact Assessment 0316457 Marine Environment
Birzeit	Palestinian Archeology	TOUR332 Ecotourism



**Figure 5.2** Undergraduate courses taught at Palestinian universities.

Figure 5.2 shows the number of undergraduate courses offered at the various Palestinian universities. Of these, introductory ecology and environmental sciences were the most common. Biodiversity and public awareness courses were less so, with a total of 6 and 4 courses, respectively. Ecotourism is taught at Birzeit University only.

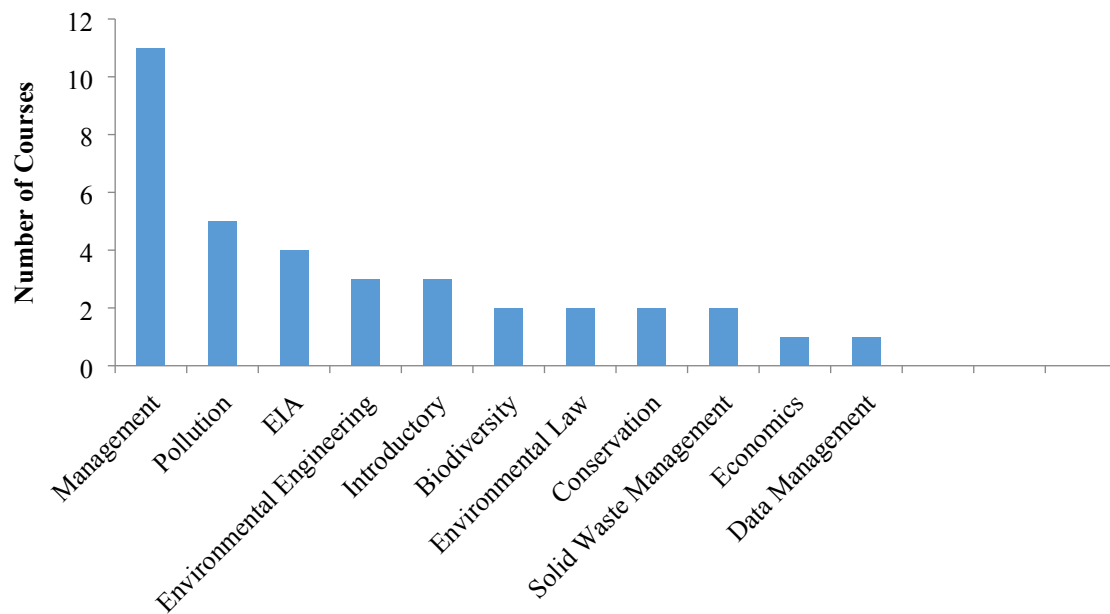
### 5.3.2 GRADUATE LEVEL

Birzeit University offers three graduate programs; Environmental Biology; Water and Environmental Sciences; and Water and Environmental Engineering. The first program is of concern here, since it

includes courses in Conservation Biology and Environmental Legislation & Ethics (Table 5.2). Similarly, the graduate program at Hebron University offers several courses of interest, including Wildlife Management, Conservation & Monitoring of Natural Resources, Economic of Environmental Resources, and Forest Improvement & Development. Efforts should be invested in upgrading these courses, by training, inviting visiting professor with appropriate experience, academic exchange programs for students, etc.

**Table 5.2** Examples of graduate environmental programs offered at Palestinian universities.

University	Program	Relevant courses
Hebron	Sustainable Natural Resources & their Management	56731 Wildlife Management 56713 Forest Improvement & Development 56706 Conservation & Monitoring of Natural Resources 56704 Applied Ecology 56703 Economic of Environmental Resources 56702 Managing, Monitoring & Evaluation of Agriculture Projects 56701 Studies in Natural Agricultural Resources & Sustainable Management
An-Najah	Environmental Sciences  Water & Environmental Engineering	400511 Environmental Science 400512 Natural Resources Management 400513 Environmental Legislation 400515 Assessment of Social Practices on the Environment 400552 Wildlife Management and Protection 400553 Management and Protection of Coastal Environments 400564 Petrochemical Pollution 400570 Environmental Engineering 400571 Water Resources Management 400576 Environmental Planning and Assessment 400577 Controlling Air Pollution 400578 Civil and Regional Planning 400579 Waste Management 400580 Selected Topics in Environmental Engineering  461654 Solid Waste Management 461658 Environmental Impact Assessment 461685 Special Topics in Environmental Engineering
Birzeit	Environmental Biology	BIOL630 Advanced Ecology BIOL634 Biodiversity BIOL636 Environmental Pollution BIOL637 Biological Monitoring for the Environment BIOL638 Experimental Design and Environmental Data Analysis BIOL733 Conservation Biology BIOL734 Environmental Legislation & Ethics
Al-Quds		8036535 Environmental Pollution 8036735 Biodiversity 8036734 Environmental Impact Assessment 8036723 Water Pollution



**Figure 5.3** Graduate courses taught at Palestinian universities.

Figure 5.3 shows the number of graduate courses offered at the various Palestinian universities. Environmental management courses were the most common, while economics and data management were the least so. No courses in public awareness or education are offered at an advanced level.

These data indicate that while courses and material are available, much more work needs to be done. Many courses are taught by unqualified individuals (because salaries are low and many qualified people leave the country, i.e. brain drain). Furthermore, even existing programs/specialties seem to lack a strategy for environmental education. At the university level, there are hardly any programs that mainstream environmental issues to students, other than specialized courses. The only exceptions we found are a few student-led initiatives at Birzeit and An Najah University, which serve as self-organized environmental clubs. But the universities are unable to provide financial backing for these activities. Revitalizing undergraduate education in the sciences, including the environment, will not be easy, but can be done with special attention to detail, structure, and outcomes (Tobias, 1992; Seymour, 2002).

## 5.4. Educating Citizens for Action

### 5.4.1 USE OF TRADITIONAL AND SOCIAL MEDIA

For decades, environmental education in Palestine used traditional media. According to George Kurzum, “the environmental media work started in 1988 with the foundation of the MA’AN Development Center (MDC). By 1995, there was a dedicated page in the most widely read newspaper Al-Quds [but] we were forced to stop this page due to pressures from high-level people.” This refers to PNA pressure, in response to articles critiquing some of the policies and work with Israel as environmentally harmful. After the page was stopped in 1999, MDC worked with Al Ayyam Newspaper, but was again forced to stop after one year, for the same political reasons. Now, MDC publishes a monthly online journal, Akhbar Al-biya Wa-t Tanmya (Horizons, literally: environment and development news). In 2008 it began as both an online and hardcopy publication, but financial hardships shut down the hardcopy version. It has been an online publication only since 2009. (<http://www.maan-ctr.org/magazine>)

The journal's website is a valuable archive for surveying the status of the Palestinian environment and biodiversity, as it contains all articles published 2008-present, including the pages published in the Al-Quds and Al-Ayyam newspapers by Mr. Kurzum's office.

This Week in Palestine has published a few issues dealing with the environment. The August 2016 issue focused on animals, with articles covering species from invertebrates to mammals and birds. (<http://thisweekinpalestine.com/issue-archive/>)

Compared with Palestine, public opinion worldwide has always impacted environmental issues. Modern societies respect public opinion, and this can lead to changes in environmental policies and legislation. Several media can be used to disseminate ideas, problems, or themes related to biodiversity, conservation, and other environmental issues.

As proposed by Kassas (2002), public outreach is judged successful if it cultivates public awareness and motivates active participation.

In this context, the environmental media will be grouped according to their mode of publication, such as audio, videos, newsletters, journals, and the internet (Tables 5.3 and 5.4 Figure 5.4).



**Figure 5.4** Two important internet shows (Environmental Discussions and Eye on the Environment) broadcasted on the Wattan site.

**Table 5.3** Main sites for environmental education and public awareness in Palestine.

Media Type		Host	Status
Audio	Shaq'eq Al No'man	An-Najah University & EEC	suspended 2013
	Afaq Khadra' (Green Horizons)	Raya Media Network	Active
Internet shows	Environmental Discussions	MA'AN Development Center	Active
	Eye on the Environment	Wattan TV & MA'AN Development Center	??
Online journals and newsletters	Afaq Al Be'a wa Al Tanmia	MA'AN Development Center	Active
	Biodiversity and Environmental Sciences Studies Series BERC Til Botanic Gardens Newsletter	Biodiversity & Environmental Research Center	Inactive
	The Palestinian Environmental NGOs Network	The Palestinian Environmental NGOs Network	Active
	Palestine-Israel Journal of Politics, Economics and Culture	Middle East Publications	Active
	This Week in Palestine*	Turbo Design	1998-Active
	Alternative Tourism Journal	Alternative Tourism Group Study Center	Active
	Network for Experiential Palestine Tourism Group	group of independent non-profit organizations	Last in 2012
	Auja Encounter	Auja Eco Center	Active
YouTube	Protected Areas in Palestine (Mahmiyat)	See earlier section	Active
	Law and Environment	Center for Environment-Palestine	
	Environmental Education in Palestine	EEC	
	Report on Biodiversity in Palestine	ARIJ	2013
	Eye on the Environment	Center for Environment-Palestine	
	Natural and Cultural Heritage in the Palestinian Environment	Palestine TV	

\*Their August 2016 issue was dedicated to Animals in Palestine. It included four articles from PMNH and one from EEC, among others.

**Table 5.4** Select webpages of environmental media aimed at raising public awareness and education.

Akhbar Al Be'a wa Al Tanmia	<a href="http://www.maan-ctr.org/magazine/">http://www.maan-ctr.org/magazine/</a>
Afaq Khadra'	<a href="http://www.raya.ps/ar/raya-programs/924607.html?episode=4401">http://www.raya.ps/ar/raya-programs/924607.html?episode=4401</a>
Alternative Tourism Journal	<a href="http://atg.ps/">http://atg.ps/</a>
Auja Eco Center	<a href="http://www.aujaecocenter.org/">http://www.aujaecocenter.org/</a>
Biodiversity and Environmental Sciences Studies Series	<a href="http://www.berc.ps/pub.html">http://www.berc.ps/pub.html</a>
Environmental Discussions	<a href="http://www.wattan.tv/wattan-tv/81324.html">http://www.wattan.tv/wattan-tv/81324.html</a>
Eye on the Environment	<a href="http://www.wattan.tv/wattan-tv/87218.html">http://www.wattan.tv/wattan-tv/87218.html</a>
Law and Environment	Center for Environment-Palestine
Nature reserves in Palestine	<a href="https://www.youtube.com/watch?v=rcach-xMB_Q">https://www.youtube.com/watch?v=rcach-xMB_Q</a>
Network for Experiential Palestine Tourism Group (NEPTO)	<a href="http://www.nepto.ps/">http://www.nepto.ps/</a>
Palestine-Israel Journal of Politics, Economics and Culture	<a href="http://www.pij.org/search.php">http://www.pij.org/search.php</a>
PENGON	<a href="http://www.pengon.org/en/environmental-unit/enviroment-database">http://www.pengon.org/en/environmental-unit/enviroment-database</a>
Palestine Museum of Natural History	<a href="http://www.palestinature.org">http://www.palestinature.org</a>
Shaq'eq Al No'man	<a href="http://www.maanctr.org/magazine/Archive/Issue52/Friends.php">http://www.maanctr.org/magazine/Archive/Issue52/Friends.php</a>
This Week in Palestine	<a href="http://thisweekinpalestine.com/">http://thisweekinpalestine.com/</a>

Declared environmental days also enjoy some leverage, such as Land Day on 30 March, and World Environment Day on 5 June.

[Http://Observation.org](http://Observation.org) is a web portal founded by Holland's Observation International Foundation, aimed at helping volunteers, researchers, and scientists use information technology (IT) to digitize field observations. The hope is that such data collection can help "conservation, research, policy, experience and education." The founders aim to collect data directly from registered, autonomous participants (citizen scientists), and encourage their activism. While this may contribute to increasing awareness in Palestine, only a small percentage of the recorded observations have been verified by experts. Nevertheless, this site has the potential to deepen people's connection to nature and fellow observers.

Another useful educational website was launched recently (2016), focusing on Palestinian nature reserves (<http://www.mahmiyat.ps>). It promotes the rich natural history of Palestine while focusing on protected areas (hence the name *mahmiyat*). This web portal hopes to eventually include information on hotels, nature parks, paths, nature attractions, and other issues related to ecotourism and nature parks in Palestine. The responsible official from EQA informed us that this site was to be a national site, not promoted by any particular NGO, and include only verified information.

Some species' webpages have a link to sightings, which direct to [observations.org](http://observations.org). While this includes the most recent local sightings of species and may be useful for environmental protection, we need more scientifically trained and qualified people involved.





## Section 6

# PROTECTED AREAS AND RICH BIODIVERSITY AREAS IN PALESTINE

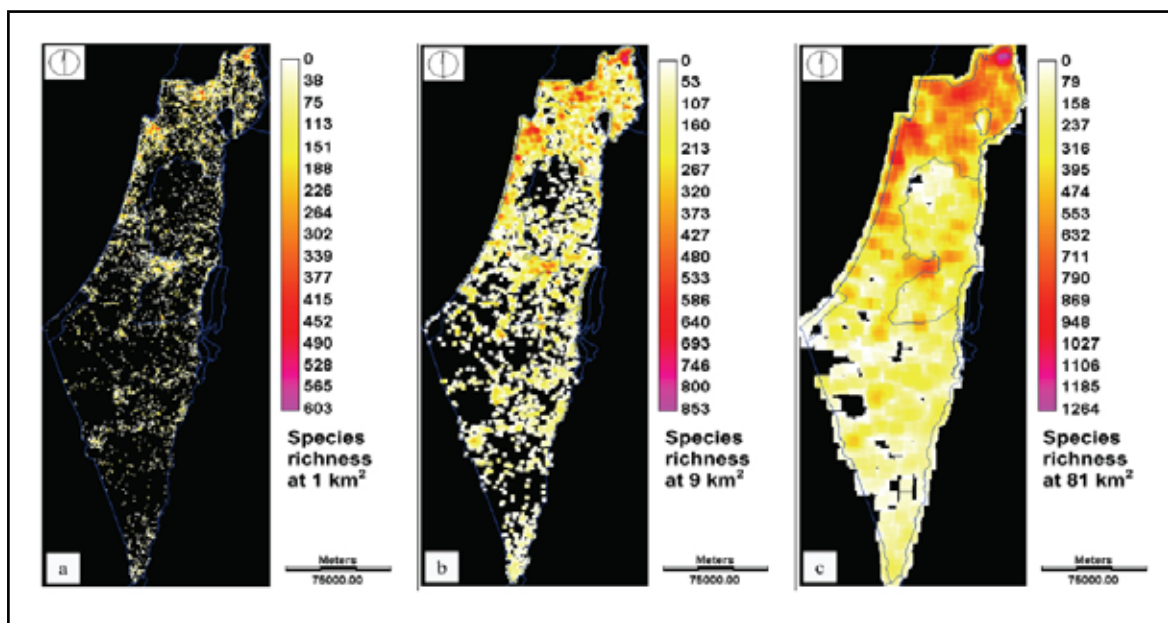
### 6.1. Introduction

In absolute terms, the world's protected areas have grown, yet many obstacles remain to safeguarding nature and biodiversity against habitat loss and human activity (Chape et al., 2008). In this section, we will review Palestine's areas of rich biodiversity, including Important Plant Areas (IPAs), Important Bird Areas (IBAs), wetlands, and natural forests. Another issue is protected areas within the State of Palestine. Existing protected areas and proposed reserves are discussed in the section about potentially protected areas.

Data were obtained from several sources, including BirdLife International (for further information, see the EEC's Checklist of the Birds of Palestine, with more than 370 bird species recorded), Radford et al. (2011) for the plant areas, Ghattas et al. (2006) for the natural forests, and Garstecki et al. (2010) and the Palestinian Ministerial Cabinet (2015) for the protected areas. Detailed information on the latter was obtained from the EQA.

Before delving in, we must reiterate the lack of knowledge regarding biodiversity in Palestine. In Section 2 we highlighted some of the published work, while emphasizing how little we know in many areas. In fact, species richness maps clearly indicate that, especially in the West Bank, such gaps are directly related to lack of information about this contentious area (Levin and Shmida, 2007; see Figure 6.1). Thus, we can merely describe what we know and highlight the gaps in Section 8.

"According to the National Spatial Plan (NSP), set forth by Palestinian partner ministries, [which takes into consideration spatial dimension in directing development and geographical distribution for economic and social activities; it was set up by Palestinian ministries in 2012] approximately 9% of the West Bank region is designated as nature reserves, forming 511,578 dunums (51,158 hectares). Most of these reserves are situated in the Eastern Slopes region (52.9% of the total NR area), followed by the Central Highlands (34.5%), the Jordan Valley (11.9%) and the Semi-Coastal Region (0.7%)." (Ghattas, 2015)



**Figure 6.1** Species richness data for Palestine (Levin and Shmida, 2007).

## 6.2 Rich Biodiversity Areas

“There is only a national list of threatened species available for Palestinian flora and there is no national list for Palestinian threatened fauna due to lack of comprehensive surveys of fauna species. There are two published lists of threatened plants: one Israeli and one Palestinian. Based on IUCN global guidelines and criteria and Red List publications there are only 24 species were [sic] listed as globally threatened as published on the official website of IUCN Red List. From these 24 species there are: 10 birds, 4 reptiles, 3 mammals, 2 fishes, 2 molluscs, 1 amphibian, 2 other invertebrates, and there is no plant recorded in the IUCN Red List website although there are two published lists of threatened plants as indicated earlier.” **EQA report to CBD (2015)**

### 6.2.1 IMPORTANT PLANT AREAS

Al-Sheikh (2011)<sup>1</sup> identified six Important Plant Areas (IPAs) in the West Bank (Table 6.1, Figure 6.2). These host a variety of plant species, many of which are considered endemic to Palestine. In general, the Palestinian IPAs are dominated by maquis vegetation, with trees such as the Palestinian Pistachio (*Pistacia palaestina*), Palestine Buckthorn (*Rhamnus palaestinus*), Palestine Oak (*Quercus calliprinos*), and Boissier Oak (*Q. boissieri*). Each IPA was selected for having unique phytogeographical flora, endemic plants, and vulnerable plants. Al-Sheikh believes that more studies are needed to evaluate these areas. In addition, specialized plant taxonomists and quality herbaria are also needed to investigate the largely ignored field of plant biodiversity in Palestine.

<sup>1</sup> The reviewer criticized the validity of the study, due to the quality of the data. Unfortunately, no other study was available on this topic.



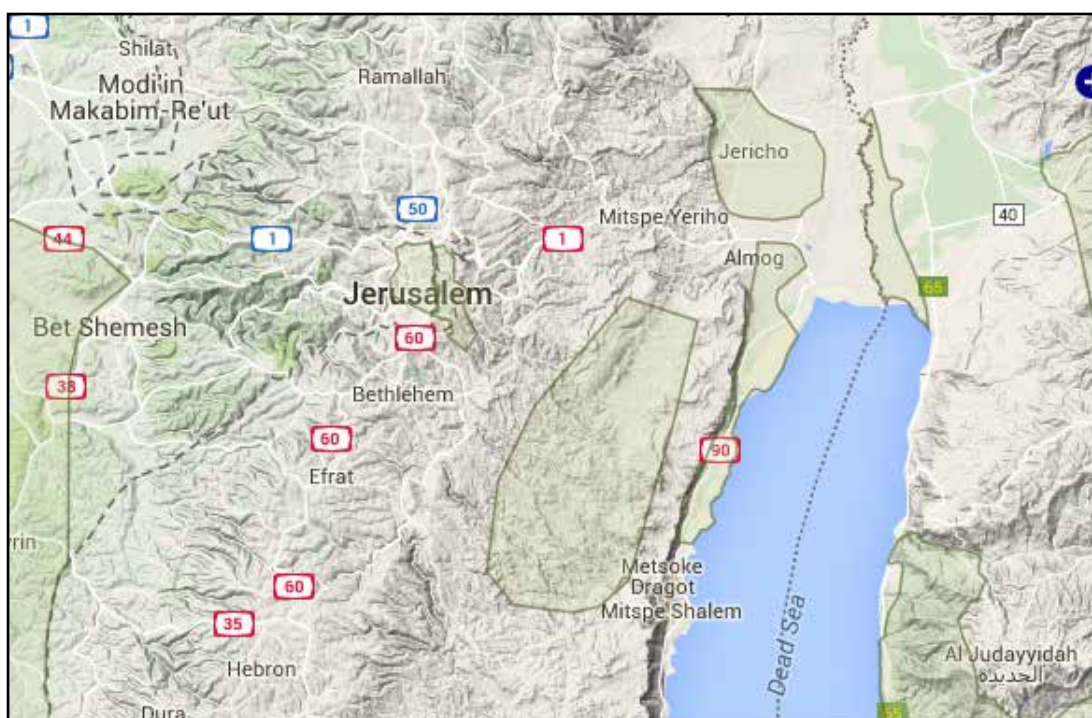
**Figure 6.2** Important Plant Areas in Palestine. 1. Faqoua` Jalaboun. 2. Wadi Alhrameyah. 3. Wadi Qana. 4. Yaseed-Ibzeik. 5. Dead Sea Coast. 6. Hebron.

**Table 6.1** Designated IPAs in the Palestinian territories (Al-Sheikh, 2011).

Location	Endemic or Protected Species	Governorate
Faqoua` - Jalaboun	<i>Delphinium ithaburense</i>	Jenin
Wadi Al Haramiya - Wadi Elbalat - Umm Safa - Beit Illu - Ein Samya	NI	Ramallah
Wadi Qana- Wadi Eshai`r	<i>Ophrys</i> sp. and <i>Tulipa agenensis</i> DC.	Salfit
Yaseed-Ibzeik	<i>Ferula orientalis</i> , <i>Iris atrofusca</i> , <i>Iris lortetii</i> , <i>Biarum pyrami</i> , <i>Teucrium montbretii</i> , and <i>Phyllitis sagittata</i> .	Nablus
Dead Sea Coast	<i>Grewia villosa</i> (Malvaceae family) according to ARIJ ( <a href="http://flora.org.il/en/plants/GREVL/#moreinfo">http://flora.org.il/en/ plants/GREVL/#moreinfo</a> )	Bethlehem, Jericho
Khalil (Hebron) Gradient	<i>Iris atrofusca</i> , <i>I. vartanii</i> , <i>Petrorhagia arabica</i> and <i>Suaeda palaestina</i> .	Hebron

## 6.2.2 IMPORTANT BIRD AREAS

Four IBA's are recognized by Birdlife International (BI) with a total area of about 21,500 ha (Table 6.2, Figure 6.3) <http://www.birdlife.org/datazone/country/palestinian-authority-territories/ibas>).



**Figure 6.3** Important Bird Areas in Palestine (Source: Birdlife International).

**Table 6.2** Designated IBAs in the Palestinian territories (Source: Birdlife International).

IBA	Area (ha)	Key Species	IBA Criteria
Ein Fash'ha (Al Fash-kha)	2500	Dead Sea Sparrow	A4iv, B1iv, B2, B3
Jericho	3500	Lesser Kestrel, Honey Buzzer, White Stork, Black Stork, Sand Partridge, Tawny Owl, Lapwing, Barbary Falcon.	A1, A4iv, B1iv, B2, B3
Jerusalem (east)	500	Lesser Kestrel	A1, B2
Jerusalem wilderness	15,000	Sand Partridge, Lanner Falcon, Lesser Spotted Eagle, Griffon Vulture, Egyptian Vulture, Common Crane, Hume's Owl, Arabian Babbler, and Tristram's Starling.	A4i, B1i, B1iv, B2, B3

Imad Atrash (PWLS) has suggested an additional nine IBAs: Wadi Al Qilt, Wadi Qadron, Wadi Al Makhrou, Ein Al 'Auja, Wadi Gaza, Wadi Al Quff, Umm Safa, Ein Qinia, and Umm Ar Rihan, but these were not approved by BI. According to consulted experts, more work needs to be done in order to understand the bird distribution and threats to habitats before designating any additional IBAs. Data are outdated and based on weak observations from the 1990s. Expert ornithologists need to update the data and examine the addition of other sites. The BI-approved IBAs are clearly important to the hundreds of migratory species on their annual journey between Eurasia and Africa.

## 6.2.3 WETLANDS

Through the regional pilot project, GlobWetland II, five major wetlands have been identified in Palestine (Table 6.3, Figure 6.4) and one more has been identified as a potential site. As of now, Palestine is not a member in the RAMSAR Convention. The EQA signed a MOU with Observatory of Mediterranean Wetlands in 2010 and is a member of the MedWet Initiative and participates in its activities. The EQA informed us that the lack of sovereignty and limited budgets and resources (especially human resources) preclude more active participation and effectively dealing with important wetland areas. For most of sites listed in Table 6.3, Israeli authorities ban Palestinians (let alone officials) from assuming projects and tasks in those regions.



**Figure 6.4** Main wetlands in Palestine. 1. Wadi Gaza. 2. Al Fashkha (Ein Fash'ha). 3. Area south of the Jordan River. 4. Wadi Al Badhan. 5. Marj Sanour (Source: GlobWetland II: <http://webgis.jena-optronik.de/>).

**Table 6.3** Wetlands identified within the Palestinian territories and their characteristics.

Wetland	Governorate	Characters
1. Wadi Gaza	Gaza	<ul style="list-style-type: none"> <li>• A station point for migratory birds.</li> <li>• Most important coastal wetland in the Eastern Mediterranean Basin.</li> </ul>
2. Al Fashkha (Ein Fash'ha)	Jericho	<ul style="list-style-type: none"> <li>• 380-400m below sea level.</li> <li>• Very rich in biodiversity of fauna and flora.</li> <li>• Springs hold great ecotourism potential.</li> </ul>
3. Southern area of Jordan River	Jericho	<ul style="list-style-type: none"> <li>• Has more than 25 endemic plants species.</li> <li>• Majority of wild mammals inhabit this important area.</li> </ul>
4. Wadi Al Badhan	Nablus	<ul style="list-style-type: none"> <li>• Considered an IBA.</li> <li>• Most fauna frequents this area for food and water.</li> <li>• High biodiversity of birds.</li> </ul>
5. Marj Sanour	Jenin	<ul style="list-style-type: none"> <li>• Migratory birds land in the area.</li> <li>• Mediterranean plant communities.</li> <li>• Desert, subtropical plant communities are present.</li> <li>• High biodiversity of birds.</li> </ul>
Wadi Al Muquatta (should be treated as wetland in the near future)	Jenin	<ul style="list-style-type: none"> <li>• Hosts many animals such as the coypu, otter, and Caspian turtle.</li> <li>• Variety of bird species: the glossy ibis, plovers, sandpipers, snipe, black wing stilt, moorhen, spur-winged lapwing.</li> </ul>

## 6.2.4 NATURAL FORESTS

The West Bank has about 26,000 hectares assigned as forested area (Abed Rabboh, 1995; Albaba, 2014). Of these, more than 19,500 hectares are natural and 3,710 hectares are man-made (numbers vary by authors, but the proportions are consistent). As part of a comprehensive study on the forests of Palestine (Ghattas et al., 2006), the natural forests were classified into six main categories (Table 6.4).

**Table 6.4** Types of forests in the Palestinian territories.

Forest Category	Main Trees
Carob-lentisk maquis	<i>Pistacia lentiscus</i> , <i>Ceratonia siliqua</i>
The pine forest	<i>Pinus halepensis</i> , <i>Quercus calliprinos</i> , <i>Arbutus andrachne</i> , <i>Juniperus oxycedrus</i> , <i>Pistacia lentiscus</i> , <i>Pistacia palaestina</i>
Evergreen oak maquis	<i>Quercus calliprinos</i> , <i>Pistacia palaestina</i> , <i>Laurus nobilis</i> , <i>Rhamnus palaestina</i> , <i>Arbutus andrachne</i>
Deciduous oak forest	<i>Crataegus azarolus</i> , <i>Pistacia palaestina</i> , <i>Quercus calliprinos</i>
Savannah forests	<i>Acacia raddiana</i> , <i>Ziziphus spina-christi</i> , <i>Salvadora persica</i>
Riparian forests	<i>Salix acmophylla</i> , <i>Tamarix jordani</i> , <i>Populus euphratica</i> , <i>Populus orientalis</i> , <i>Fraxinus Angustifolia subsp. sSyriaca</i> , <i>Ulmus anescens</i>

In 2013, ARIJ was selected to lead a learning project titled, "Palestinian Forests Sustainability and Rehabilitation: Al Qarin Protected Area in the Southern West Bank and Umm at Tut Protected Area in the Northern West Bank within the Mediterranean Eco-system." Outputs were defined as follows: capacity building of local NGOs, inventory of forested areas, GIS and remote sensing, identification of endangered species according to the IUCN's Red List, establishing green corridors, best practices and ecosystem services, and setting guidelines for the PA's management plans. Although the Agriculture Law (passed in 2003) included many articles pertaining to the conservation of forests (Box 6.1), it does not comply with international standards (EQA, 2015).



## Forests and Afforestation Articles in the Palestinian Agricultural Law

### Article 13:

1. No activity may be commenced on governmental forest land, whether by means of cultivation, digging of wells and caves thereon, construction of buildings or disposition thereof in any form of other uses except in pursuance of the Law.
2. The boundary marks or fences surrounding governmental forest land may not be moved, removed, encroached or otherwise.

### Article 14 .... any of the following acts may not be performed without a licence:

1. The cutting down of any tree, shrub, forest plant, or a plant from the governmental or private forests in regard of which contracts are signed.
2. Grazing on forests.
3. Holding of any forest product without a licence being given or transferring it from its place.
4. Setting of fire or performance of acts that may set forests on fire.

### Article 15:

In cooperation with the competent authorities, the Ministry must provide protection for forests from fires. It shall be entitled to utilise the machines, material, wells and transportation means that are necessary for the fighting of fires along with compensating their owners for such utilisation as well as for any impairment or damage caused thereto.

### Article 16:

In cooperation with the Ministry of Environment, the Ministry of Agriculture shall issue forth the instructions on the regulation of the felling of trees, forest plants and protected trees which are threatened of extinction as well as define the periods, during which felling is allowable.

The MOA published two pamphlets on the forests of Palestine; one on the importance of forests and the second on forest fires and their prevention (Figure 6.5). For details on the role of MOA in protected areas, refer to section 3 above.



Figure 6.5 MOA pamphlets on forests.

## 6.3 Protected Areas

### 6.3.1 INTRODUCTION

Continuous growth of human populations, as well as the demand for economic development, severely affect natural and semi-natural landscapes. Political conflict can also place significant pressures upon natural resources (UNEP, 2003), increasing the importance of protected areas. This, however, also increases the risk of creating ecological 'islands' or 'museums,' i.e. isolated, fragmented areas among other degraded areas.

Since the Israeli occupation in 1967, a total of 48 natural reserves spanning 69,939 hectares were declared in the West Bank; these reserves comprise 12.35% of the area of the West Bank. Nevertheless, the National Spatial Plan indicates that the total area of natural reserves in the West Bank is only 51,158

hectares, equaling 9% of the Palestinian territories (Isaac and Hilal, 2011). More recently, detailed studies by ARIJ show that Israel designated a total of 57,649 hectares of protected area, equaling 10.2% of the West Bank (ARIJ, 2015). The Palestinian Authority has expressed concern that some of these protected areas have been established mainly for Israeli security, military use, and settlements, rather than for conservation (UNEP, 2003). Israel has not designated any protected areas in Gaza, but in June 2000, the Palestinian Authority established the Wadi Gaza protected area there.

### 6.3.2 CURRENTLY PROTECTED AREAS

Under the Oslo Accords, Israeli authorities gave the Palestinian Authority 19 distinct protected areas. Fifteen of these areas were studied in detail, including a SWOT analysis, by IUCN, in collaboration with EQA and other key stakeholders (Table 6.5; Garstecki et al., 2010). The latter study also analyzed seven additional areas suggested by the EQA (Table 6.6). Only 13 reserves are within Areas A and B, placing 1.3% of the total reserves under Palestinian control (5<sup>th</sup> National Report to CBD, EQA, 2015).

**Table 6.5** List and size (in dunums/0.1 hectare) of protected areas given to the Palestinian Authority under the Oslo Accords (Garstecki et al., 2010).

Nature Reserve	Governorate	Area	Habitat type
Al Hashmee	Ramallah	200	<i>Pinus halepensis</i> and <i>Arbutus andrachnae</i> woodland
Deir Ammar	Ramallah	120	<i>Pinus halepensis</i> woodland
Ein Dara	Ramallah	250	<i>Quercus calliprinos</i> woodland on limestone
Fahmeh	Jenin	400	Semi-steppe batha
Jebel Al Kabeer	Nablus	9,500	Semi-steppe batha
Jerusalem Wilderness	Hebron and Bethlehem	172500	Steppe vegetation
Sheikh Katrawny	Ramallah	11	<i>Quercus calliprinos</i> woodland on limestone
Sheikh Zeyd	Nablus	52	<i>Quercus calliprinos</i> woodland on limestone
Shubash	Jenin	5,000	<i>Ceratonia siliqua</i> and <i>Pistacia lentiscus</i> forest
Siris	Jenin	1,118	<i>Quercus calliprinos</i> woodland on limestone
Tammun	Tubas	4,300	Semi-steppe batha
Tayasir	Jenin/Tubas	1,200	<i>Ceratonia siliqua</i> and <i>Pistacia lentiscus</i> forest
Umm at Tut	Jenin	320	<i>Quercus calliprinos</i> woodland on limestone
Wadi Al Dilb	Ramallah	800	<i>Quercus calliprinos</i> woodland on limestone
Wadi Zarqa Al Elwey	Salfeet	2,700	<i>Quercus calliprinos</i> woodland on limestone

**Table 6.6** EQA suggestions for additional protected areas (Garstecki et al. 2010).

Protected area	Governorate	Area	Habitat type
Al Qarin	Hebron	50	<i>Quercus calliprinos</i> woodland on limestone
Deir Razeh	Hebron	350	<i>Quercus calliprinos</i> woodland on limestone
Ein Al'Auja	Jericho	0	Savannoid Mediterranean vegetation
Suba	Hebron	200	<i>Quercus calliprinos</i> woodland on limestone
Umm Safa	Ramallah	300	<i>Pinus halepensis</i> and <i>Arbutus andrachnae</i> woodland
Wadi Al Quff	Hebron	2,500	<i>Quercus calliprinos</i> woodland on limestone
Wadi Al Qilt	Jericho	0	Savannoid Mediterranean vegetation



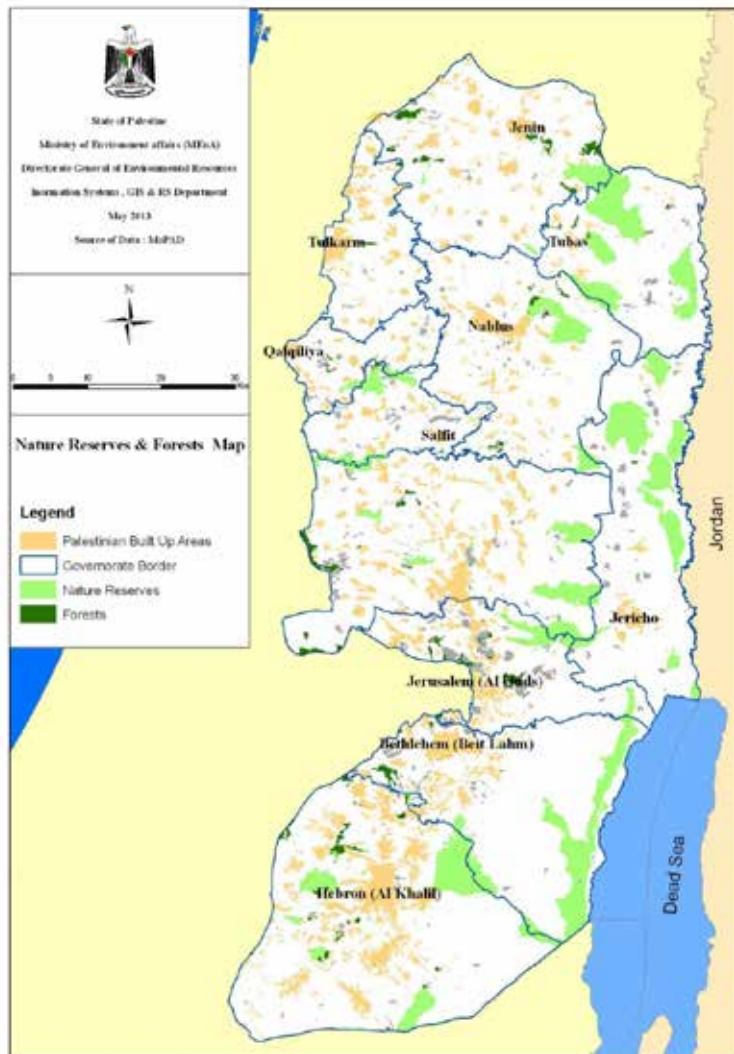
### 6.3.3 POTENTIAL PROTECTED AREAS, DEVELOPMENT, AND CONSERVATION

Most of the potential reserves are currently within Area C, which are controlled by the Israeli civil administration (Figure 6.6; Görlach et al., 2011). The Um Ar Rihan Forest, situated in the Jenin District and spanning 11 km<sup>2</sup>, is an important protected area, as well as a natural and cultural heritage area. Marj Sanour and Wadi Al Muquatta are also critical regions for Jenin. Wadi Al Qilt, a desert oasis, is another important region in terms of biodiversity; it is located near Jerusalem and spans 1.5 km<sup>2</sup>. The walls of Jerusalem shelter a variety of birds, including the threatened lesser kestrel. The Jerusalem wilderness region is a semi-desert area (Khalilieh, 2016). Wadi Al Badhan, situated in Bethlehem-Hebron and spanning 150 km<sup>2</sup>, is also of biodiversity importance. Other important areas include Wadi Qidron (Mar Saba), Wadi Al Makhroun in Bethlehem, Ein Fash'ha in the Jericho region, and the Qenya springs in Ramallah (EQA, 2006, 2015).

The Al Qarin Protected Area in the southern West Bank and the Umm at Tut Protected Area in the northern West Bank are important forests that require sustainable conservation management (ARIJ, 2015). The protected area of Wadi Al Quff, near Hebron, is the first site with a management plan and is considered a keystone in the management system of the national protected areas (Albaradeiya, 2014).



**Figure 6.6** Map showing current and potential nature reserves (Source: ARIJ)



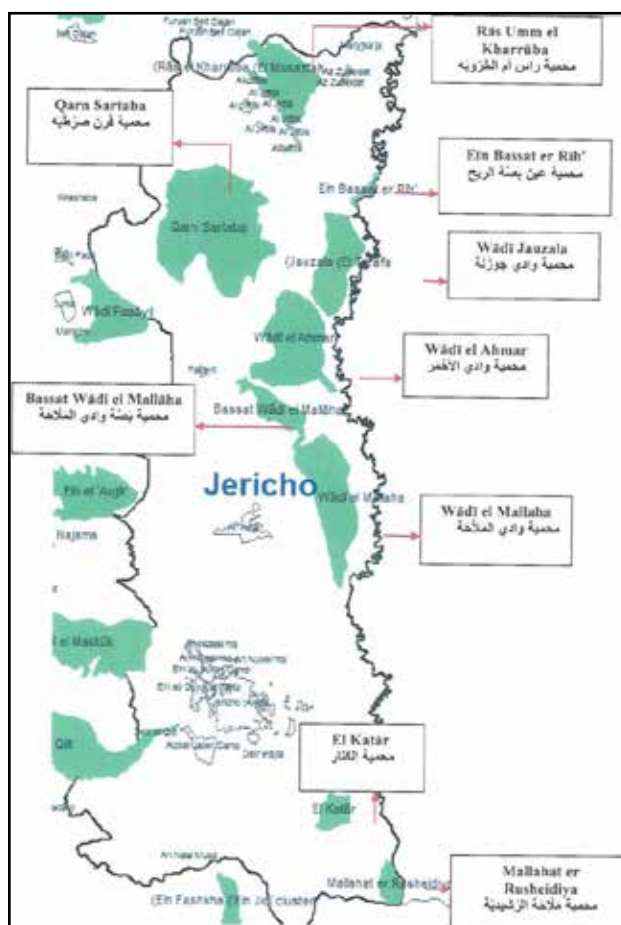
**Figure 6.7** Nature reserves and forests in Palestine within their administrative areas (EQA).

#### 6.3.4 THE PALESTINIAN MINISTERIAL CABINET'S PROPOSED PROTECTED AREAS

On 3 February 2015, the Palestinian Ministerial Cabinet approved the recommendations of the National Committee for the Geographical Names in Palestine (consisting of members from the EQA, MOA, and MOPAD). This document listed 49 protected areas with their approved, official names and their locations. All governmental institutions are now obliged to use these names.

##### **Jericho Governorate**

This region includes nine protected areas (Table 6.7, Figure 6.8). Wadi Al Qilt is shared by the Jericho and Jerusalem Governorates. All these proposed protected areas should be surveyed for baseline data on their flora and fauna, as well as for descriptions of the ecosystems (see detailed recommendations in Section 8).



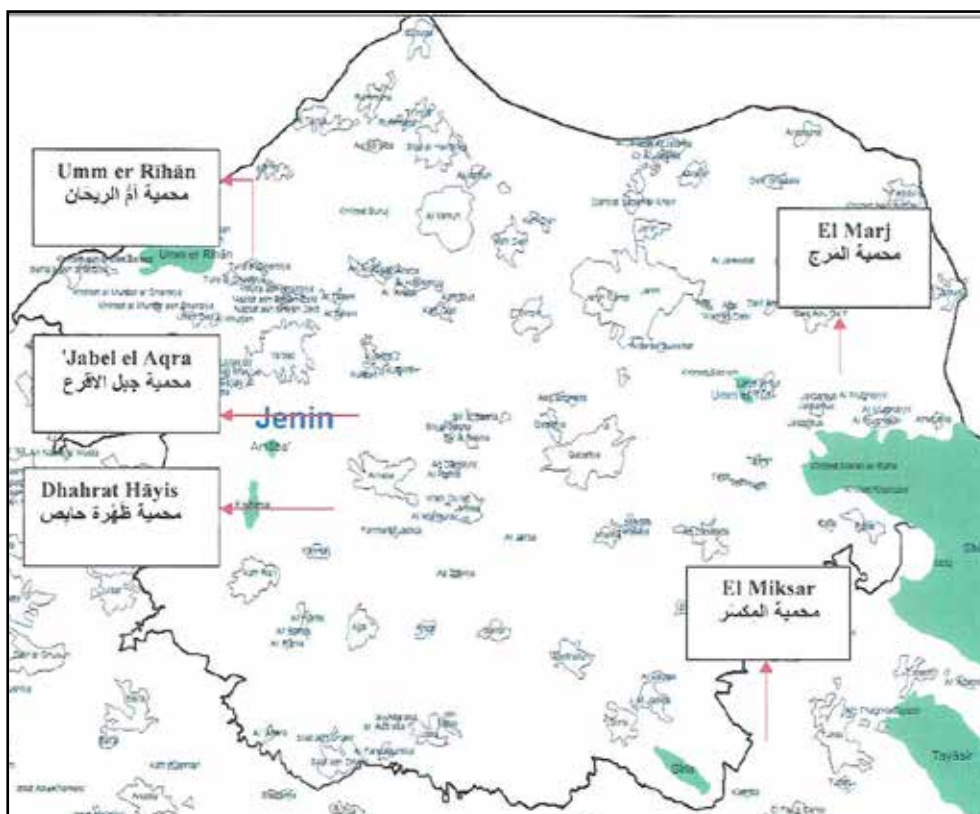
**Figure 6.8** Proposed protected areas in the Jericho Governorate (Council of Ministers, 2015).

**Table 6.7** Proposed protected areas in the Jericho Governorate (Council of Ministers, 2015).

Governorate	Proposed name in English	Proposed name in Arabic	Name on original documents
Jericho	Ras Umm el Kharrub	محمية رأس أم الخروب	No name assigned
	Ein Bassat er Rih	محمية عين بصة الريح	No name assigned
	Qarn Sartaba	محمية قرن صرطبه	No name assigned
	Wadi Jauzala	محمية وادي جوزلة	No name assigned
	Wadi el Ahmar	محمية وادي الاحمر	No name assigned
	Bassat Wadi el Mallaha	محمية بصة وادي الملاحه	No name assigned
	Wadi el Mallaha	محمية وادي الملاحه	No name assigned
	El Katar	محمية الكتار	No name assigned
	Tell er Rusheidiya	محمية الرشيدية	No name assigned

### Jenin Governorate

Out of five proposed reserves, three were handed over to the PA after the Oslo Accords: Umm at Tut (El Marj protected area), Siris (El Miksar protected area) and Fahmeh (Dhahrat Hayis protected area), (Table 6.7, Figure 6.9). The remaining two protected areas are new additions to the protection network. For classification purposes, more data is needed on the protected areas and their biological and ecological characteristics.



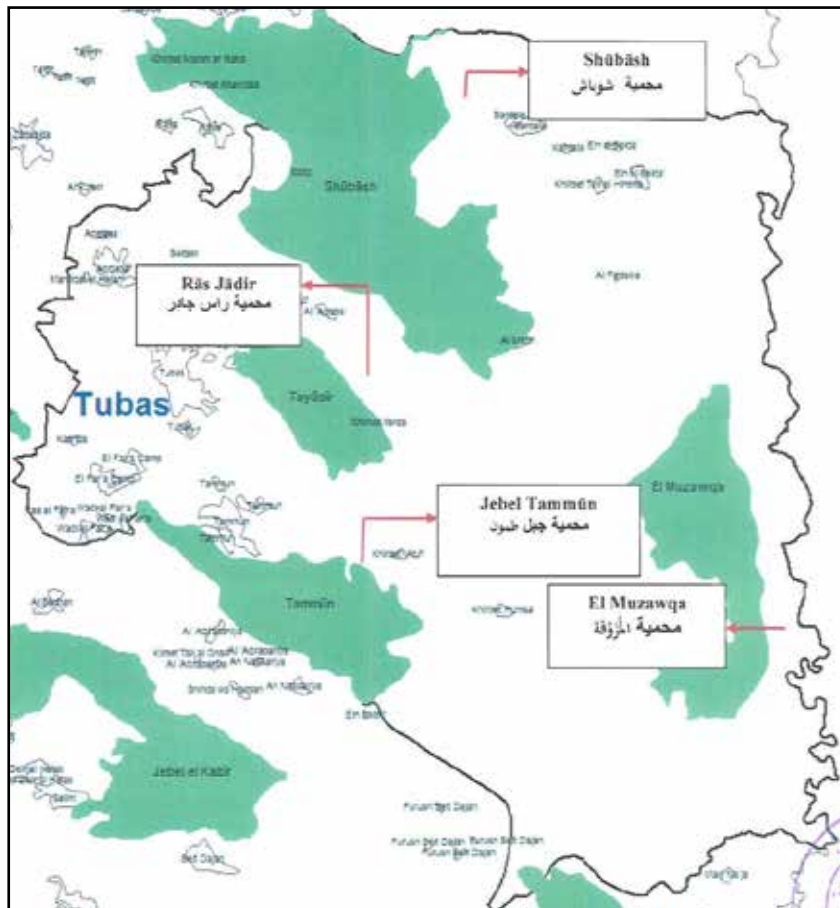
**Figure 6.9** Proposed protected areas in the Jenin Governorate (Council of Ministers, 2015).

**Table 6.8** Proposed protected areas in the Jenin Governorate (Council of Ministers, 2015).

Governorate	Proposed name in English	Proposed name in Arabic	Name on original documents
Jenin	Umm er Rihan (Umm Ar Rihan)	محمية أم الريحان	أم الريحان
	Jebel el Aqra	محمية جبل الاقرع	عرابة
	Dhahrat Hayis (Fahmeh)	محمية ظهرة حايس	فحمة
	El Marj (Umm at Tut)	محمية المرج	أم التوت
	El Miksar (Sirirs)	محمية المكسر	سيريس

### Tubas Governorate

Garstecki et al. (2010) lists both Shoubash (Shubash) and Tayasir (Ras Jadir) as protected areas in the Jenin Governorate, while Tubas lists only the Jebel Tammun as a protected area. The PA received these areas in the aftermath of the Oslo Accords. Currently, all three are listed under the Tubas Governorate (Council of Ministers, 2015). (Table 6.9, Figure 6.10). Additionally, El Muzawqa has been proposed as a protected area. More data on the area and its biological and ecological characteristics are required for classification.



**Figure 6.10** Proposed protected areas in the Tubas Governorate (Council of Ministers, 2015).

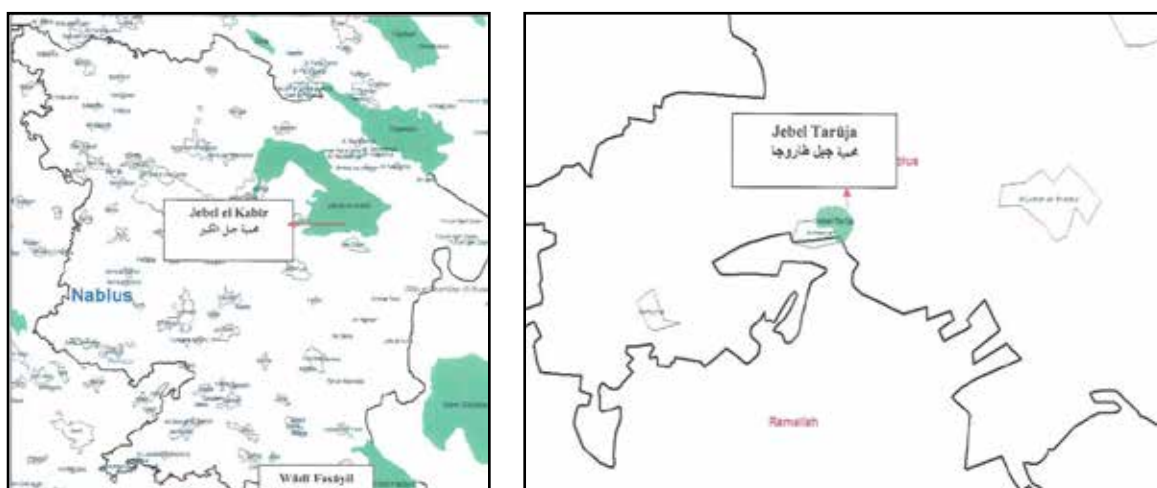
**Table 6.9** Proposed protected areas in the Tubas Governorate (Council of Ministers, 2015).

Governorate	Proposed name in English	Proposed name in Arabic	Name on original documents
Tubas	Shubash	محمية شوباش	المخير - شوباش
	Ras Jadir (Tayasir)	محمية راس جادر	تياسير (Har Gadir)
	El Muzawqa	محمية المزوقة	امزوقة (Um Zawqa)
	Jebel Tammun	محمية جبل الطمون	طمون

### Nablus Governorate

Three protected areas are listed (Table 6.10, Figure 6.11). Jebel el Kabir (Jebel Al Kabeer) is was delivered to the PA after the Oslo Accords. The Jebel Taruja and Wadi er Rashshash protected areas are two new proposed areas. Both require additional surveys to identify their biological and ecological characteristics. The status of Sheikh Zeyd remains to be verified from the list proposed by Garstecki et al. (2010).





**Figure 6.11** Proposed protected areas in the Nablus Governorate (Council of Ministers, 2015).

**Table 6.10** Proposed protected areas in the Nablus Governorate (Council of Ministers, 2015).

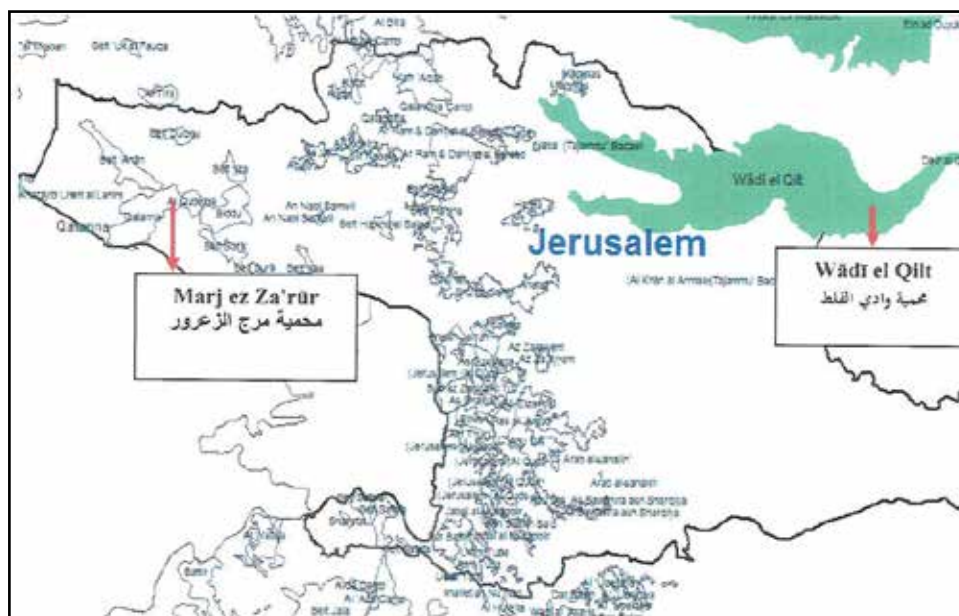
Governorate	Proposed name in English	Proposed name in Arabic	Name on original documents
Nablus	Wadi er Rashshash	محمية وادي فصايل	No name assigned
	Jebel Taruja	محمية جبل طاروجا	No name assigned
	Jebel el Kabir (Jebel Al Kabeer)	محمية جبل الكبير	الجبل الكبير (Har Kabeir)

### Jerusalem Governorate

The Palestinian Ministerial Cabinet list included two protected areas (Table 6.11, Figure 6.12). The Wadi Al Qilt protected area is shared by the Jericho and Jerusalem Governorates, and was listed by Garstecki et al. (2010) as a potential protected area. The Palestinian Ministerial Cabinet proposed Marj ez Za'rur as a new protected area.

**Table 6.11** Proposed protected areas in the Jerusalem Governorate (Council of Ministers, 2015).

Governorate	Proposed name in English	Proposed name in Arabic	Name on original documents
Jerusalem	Wadi el Qilt (Wadi Al Qilt)	وادي القلط	حزما (ناحال برات) وادي القلط
	Marj ez Za'rur	مرج الزعرور	بدون اسم



**Figure 6.12** Proposed protected areas in the Jerusalem Governorate (Council of Ministers, 2015).

### Ramallah and Al Bireh Governorate

In total, the Palestinian Ministerial Cabinet list included 13 protected areas (Table 6.12, Figures 6.13-14). Garstecki et al. (2010) lists Wadi Ein ez Zarqa el Elwi (Wadi Zarqa Al Elwey) under the Salfit Governorate, and Al Hashmee under the Ramallah Governorate. Furthermore, they wrote that Ein Dara (Ein el Maghara), Deir Ammar (Wadi Jannata), Wadi el Dilb (Wadi Al Dilb) and Esh Sh. Qatrawani (Sheikh Katrawany) were designated as reserves (protected areas) after the Oslo Accords. Lastly, they propose Ein Al 'Auja be protected under the Jericho Governorate.

The area of Umm Safa, which Garstecki et al. (2010) proposed as a potential protected area, was subdivided by the Palestinian Ministerial Cabinet (2015) into three new protected areas: Ein Dara, Ein et Tuleib, and Ein Qawabish. Additional proposed reserves include Qubbat en Najama, Wadi el Makkuk, Latur, and En Nabi Gheit. The size of these proposed protected areas must be verified, as well as baseline surveys of their biological and ecological characteristics (see detailed recommendations in Section 8).

**Table 6.12** Proposed protected areas in the Ramallah and Al Bireh Governorate (Council of Ministers, 2015).

Governorate	Proposed name in English	Proposed name in Arabic	Name on original documents
Ramallah and Al Bireh	Wadi Ein ez Zarqa el Elwi (Wadi Zarqa Al Elwey)	محمية وادي عين الزرقا العلوي	وادي الزرقا العلوي
	Ein Dara	محمية عين دارة	غابة ام الصفا
	Ein et Tuleib	محمية عين الطليب	غابة ام الصفا
	Ein Qawabish	محمية عين قوابيش	غابة ام الصفا
	Wadi Jannata	محمية وادي جناتا	دبر ابو مشعل - دبر عمار - زرقا
	Ein el Maghara	محمية عين المغارة	عين دارا
	Wadi el Dilb (Wadi Al Dilb)	محمية وادي الدلب	مزارع النوباني (الدلب)
	Ein el Auja (Ein Al 'Auja)	محمية عين العوجا	كفر مالك (ناحال بيتاف)
	Qubbat en Najama	محمية قبة النجمة	No name assigned
	Wadi el Makkuk	محمية وادي المكوك	ناحال مكوك
	Latur	محمية اللطرون	No name assigned
	Esh Sh. Qatrawani (Sheikh Katrawany)	محمية الشيخ القطرواني	No name assigned
	En Nabi Gheit	النبي غيث	No name assigned

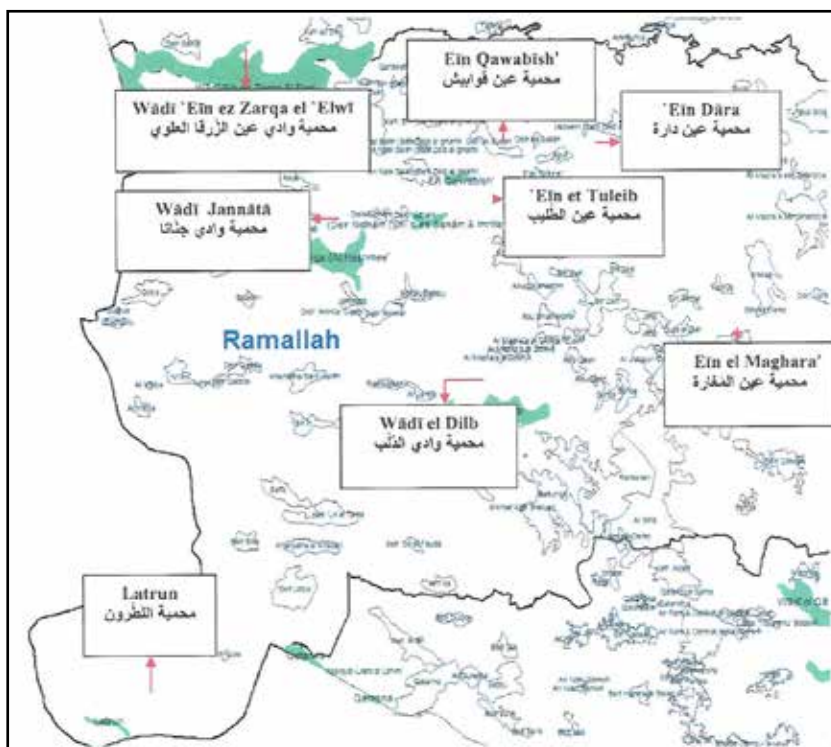


Figure 6.13 Proposed protected areas in the Ramallah and Al Bireh Governorate (Council of Ministers, 2015).

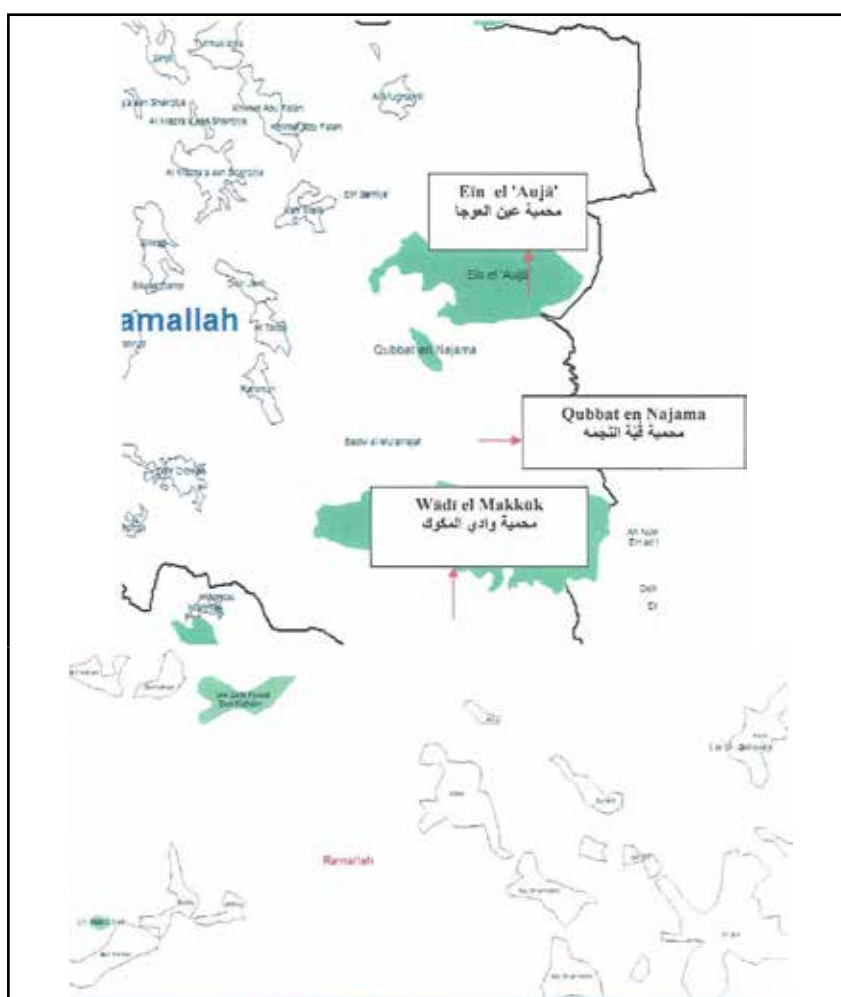
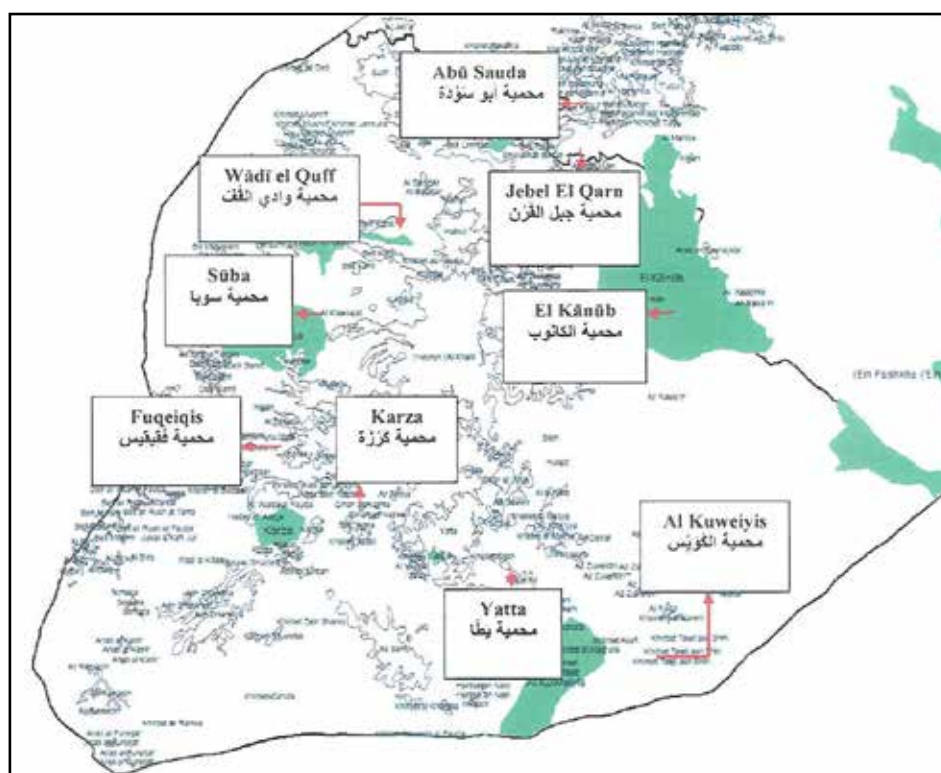


Figure 6.14 Proposed protected areas in the Ramallah and Al Bireh Governorate (Council of Ministers, 2015).



## Hebron Governorate

The Palestinian Ministerial Cabinet list included ten protected areas (Table 6.13, Figure 6.15). These include Al Qarin (Jebel El Qarn), Wadi Al Quff (Wadi el Quff), Suba and Deir Razeh (Deir Razih), which were also proposed as protected areas by Garstecki et al. (2010). The Palestinian Ministerial Cabinet (2015) added another six areas: Abu Sauda (Abu Soda), El Kanub (Al Kanoub), Al Kuweiyis, Fuqeiqis, Karza (Kurza), and Yatta.



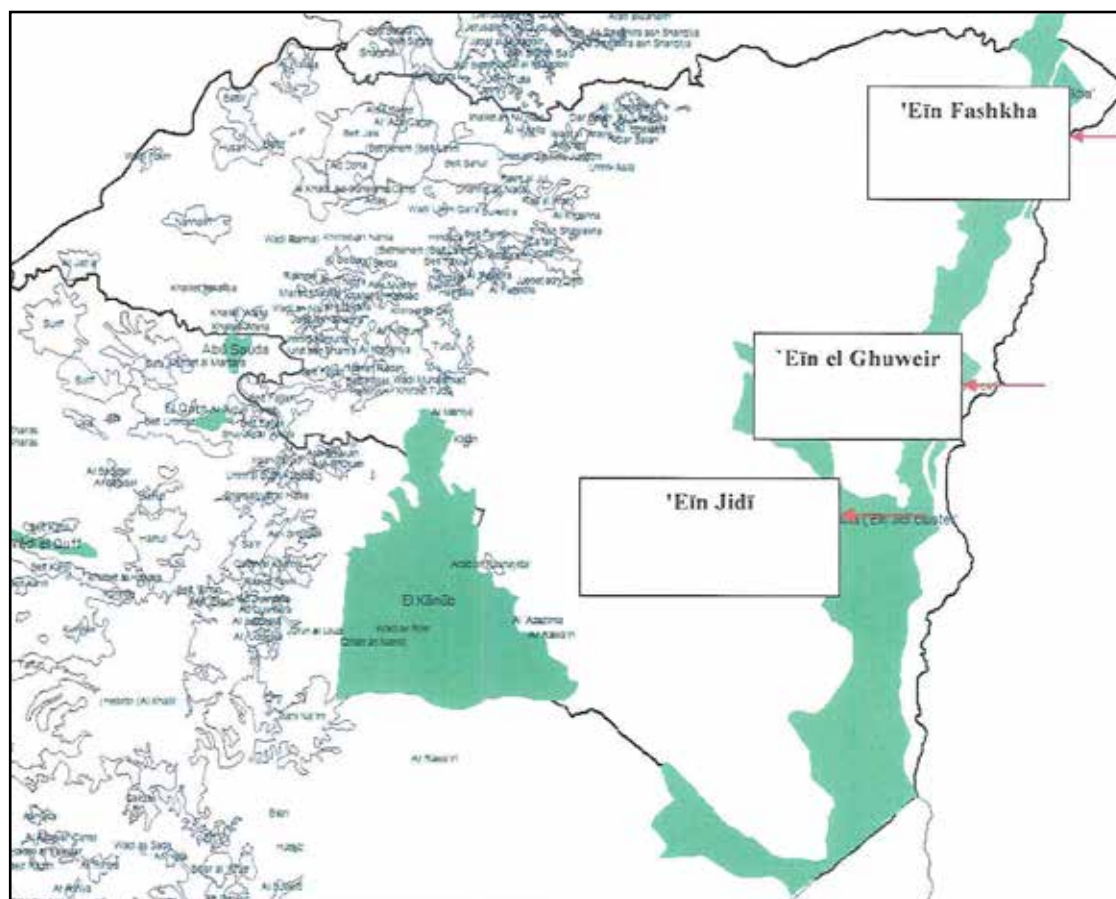
**Figure 6.15** Proposed protected areas in the Hebron Governorate (Council of Ministers, 2015).

**Table 6.13** Proposed protected areas in the Hebron Governorate (Council of Ministers, 2015).

Governorate	Proposed name in English	Proposed name in Arabic	Name on original documents
Hebron	Abu Sauda	محمية أبو سؤدة	أبو سؤدة
	Jebel El Qarn (Al Qarin)	محمية جبل القرن	القرن
	El Kanub (Al Kanoub)	محمية الكانوب	الكانوب
	Wadi el Quff (Wadi Al Quff)	محمية وادي القف	القف
	Suba	محمية سوبا	غابة سوبا
	Al Kuweiyis	محمية الكويس	حربة عين النبي (هار عمسة)
	Fuqeiqis	محمية فقيقيس	No name assigned
	Karza (kurza)	محمية كرزة	No name assigned
	Yatta	محمية يطا	No name assigned
	Deir Razih (Deir Razeh)	محمية دير رازح	No name assigned

## Bethlehem Governorate

Three protected areas were proposed by the Palestinian Ministerial Cabinet (Table 6.14; Figure 6.16). Yet according to Garstecki et al. (2010) none of these areas were transferred to the Palestinians. After the Oslo Accords, the status of what was previously known as the Jerusalem Wilderness remains to be clarified in future negotiations. This is the largest protected area with an estimated area of 172 km<sup>2</sup>.



**Figure 6.16** Proposed protected areas in the Bethlehem Governorate (Council of Ministers, 2015).

**Table 6.14** Proposed protected areas in the Bethlehem Governorate (Council of Ministers, 2015).

Governorate	Proposed name in English	Proposed name in Arabic	Name on original documents
Bethlehem	Ein Jidi (Ein Jedi)	محمية عين جدي	عين الفشخة - تجمع عين جدي
	Ein Fashkha (Ein Fash'ha)	محمية عين فشخة	No name assigned
	Ein el Ghuweir	محمية عين الغوير	No name assigned

## 6.4 Evaluating Rich/Key Biodiverse Areas

In 2015, the EQA received funds from the Belgian Cooperation Program to conduct a study of rich biodiverse areas. In total, 50 proposed sites were evaluated (Figure 6.17, Table 6.15). Several of these were already listed as protected or Important Plant Areas. The detailed report is still under revision at the EQA. The boundaries of 29 areas were modified, three were not modified, and 18 areas were excluded from the proposed list. Two additional sites were suggested: Dura Al Qare'a and Umm Safa.

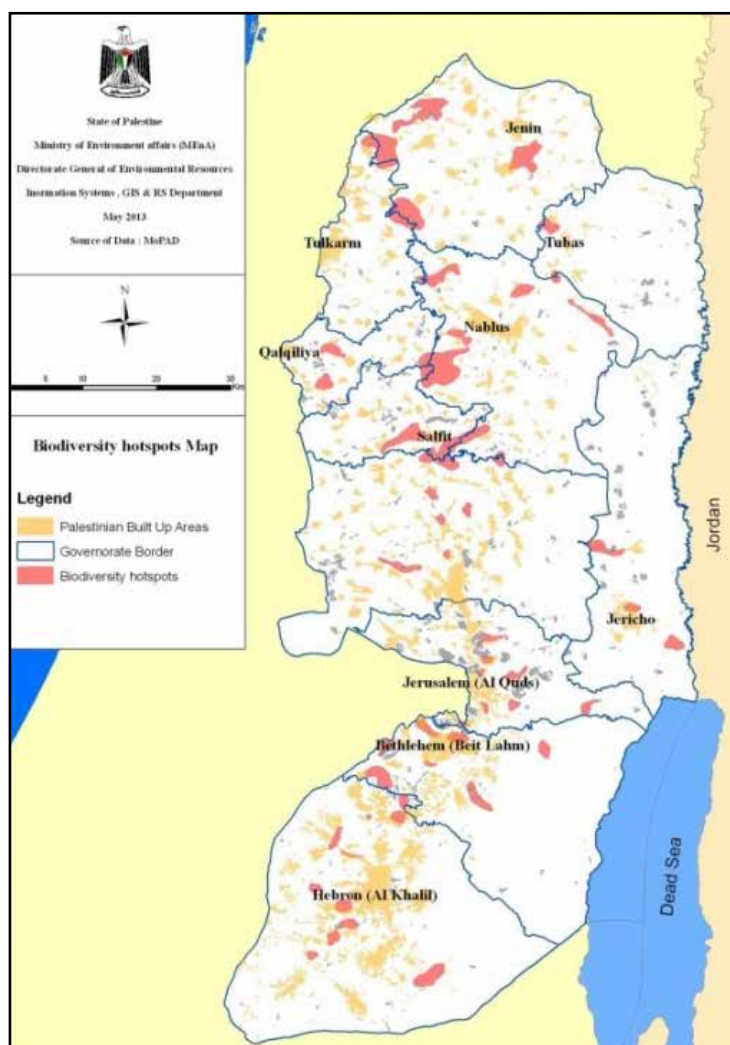
**Table 6.15** Rich/key biodiverse areas evaluated in the Palestinian territories.

Governorate	No.	Area
Bethlehem	7	Al Jaba`h, Jebel Abu Ghunaim, Mar Saba, Suleiman Pools, Wadi Herodian, Wadi Al Makhrou, Wadi Fouqin
Hebron	11	Adderat-Yatta, Al Fawwar, Beit Fajjar, Beit Kahil, Beit Umar, Deir Razeh, Ithnah-Suba, Kanar, Tarqoumia, West Karma
Jenin	5	Aqqaba, Kufer El Rai, Qufien (Tulkarm), Umm Ar Rihan, Umm at Tut
Jericho	3	Ein Esultan, Deir Hajalih, Ein Al'Auja
Jerusalem	8	Abu Dies, Anata, East of Aza`ym, Hizma, Mar Elias, Nabi Musa, North Tuur, Beginning of Wadi Ennar
Nablus	6	Aqrabaniya, El Mizrab, Ein Sabastia, Salman Faresi, Talouza, Wadi Faraa
Qalqilya	2	Azzoun, Jayous
Ramallah	6	Al Jalazon, Ein Qinia, Beir Zeit, Jebel El Nijma, Turmus Ayya, Umm Safa
Salfit	2	Al Matwi, Wadi Esha`ir

Stress factors to the Palestinian environment include, among other factors: rapid population growth, an impoverished economy, and an unstable political situation. Raising the level of qualitative management of protected areas remains a profound challenge. As a first effort, the Palestinian Environmental Law was passed in 1999. The Environmental Authority was responsible to "... prescribe bases and standards for the protection of natural reserves and national parks, monitor and declare them, and establish and designate the national parks and supervise them." Violations of the law could lead to penalties, fines, and even imprisonment. Most of the protected areas were located within Area C, which is entirely under Israeli control. According to the NSP, these areas amount to 81.8% of the protected areas in the West Bank, a total of 418,570 dunums, with the largest being the Ein Fash`ha-Ein Jidi cluster and the Fasayil protected area, comprising 93,035 and 86,750 dunums, respectively (Ghattas, 2015). Given that protected areas are mostly located in Area C, the Palestinian Authority is unable to access them for management and conservation purposes (Garstecki et al, 2010; EQA 2015; <http://www.nsp.pna.ps/en/>). It is also worth noting that 36.2% of the designated protected areas overlap with Israeli settlements and 39.5% overlap with closed military zones and bases. Thus, they do not meet the international definition of a protected area, which calls mainly for biodiversity conservation (Ghattas, 2015).

A big challenge facing the EQA and relevant agencies is the dearth of baseline studies on the exact location of rich and key biodiverse areas in the SP. Ideally, studies and management plans akin to that of Wadi Al Quff's should be drafted, but this depends on future funding.

The Palestinian Authority designated Wadi Gaza as the only protected area in the Gaza Strip, containing 1.25 km<sup>2</sup> of coastal wetland. Wadi el-Far'a is an area with significant biodiversity, stretching from Nablus to the Jordan Valley. It includes ecotourism sites like Badhan, and has significant potential (Abdulfattah and De Vries, 2006).



**Figure 6.17** Biodiversity hotspots, also covering some of the key biodiversity areas (authors' suggestion) in the Palestinian territories, as identified by EQA (15 KBAs).

## 6.5 Categories and Management Types of Protected Areas

The IUCN has outlined definitions, management categories, and governance types for protected areas (Dudley, 2008). Evaluation of protected areas in Palestine should adhere to these guidelines, as part of efforts to standardize concepts and procedures worldwide (Table 6.16).

Garstecki et al. (2010) applied the IUCN categories to protected areas in Palestine. Of the 22 areas evaluated, one was listed under category V as a protected landscape, three under category III as natural monuments, four under category I as strict protected areas, and 14 under category IV as managed reserves (Table 6.16).

**Table 6.16** IUCN definitions, management categories, and governance types for protected areas (Dudley, 2008).

IUCN Criteria	Type	Description
Ia	Strict Nature Reserves	Strictly protected for biodiversity and also possibly geological/geomorphological features, where human visitation, use and impacts are controlled and limited to ensure protection of the conservation values.
Ib	Wilderness area	Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, protected and managed to preserve their natural condition.
II	National park	Large natural or near-natural areas protecting large-scale ecological processes with characteristic species and ecosystems, which also have environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities
III	Natural Monuments	Areas set aside to protect a specific natural monument, which can be a landform, sea mount, marine cavern, geological feature such as a cave, or a living feature such as an ancient grove.
IV	Managed Reserves	Areas to protect particular species or habitats, where management reflects this priority. Many will need regular, active interventions to meet the needs of particular species or habitats, but this is not a requirement of the category.
V	Protected Landscape	Where the interaction of people and nature over time has produced a distinct character with significant ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.
VI	Protected areas with sustainable use of natural resources	Areas which conserve ecosystems, together with associated cultural values and traditional natural resource management systems. Generally large, mainly in a natural condition, with a proportion under sustainable natural resource management and where low-level non-industrial natural resource use compatible with nature conservation is seen as one of the main aims.

Based on these categories, the mosaic of natural and cultural landscapes south-east of Jenin, including Shubash and Umm at Tut, could potentially be designated as a UNESCO Biosphere Reserve (Garstecki et al., 2010).

**Table 6.17** Suggestions for possible classification of protected areas in the Palestinian territories, according to IUCN criteria and governance types, as described in a 2010 study by the EQA and IUCN. Further studies and assessment are needed.

Nature Reserve	IUCN Criteria	Type	Governance Type
Al Qarin	I	Strict Nature Reserve	Managed by MOA
Al Hashmee	I	Strict Nature Reserve	Managed by MOA
Deir Ammar	III or no PA at all	Natural Monument	Managed by Awqaf in collaboration with MOA
Deir Razeh	IV	Managed Reserve	Managed by private land owners in collaboration with MOA
Ein Dara	IV	Managed Reserve	Managed by land owners in collaboration with MOA
Ein Al'Auja	IV	Managed Reserve	Managed by MOA. Core areas could be designated under category I (Strict Nature Reserve)
Fahmeh	IV	Managed Reserve	Managed by local land owners and MOA
Jebel Al Kabeer	IV	Managed Reserve	Managed by MOA
Jerusalem Wilderness	IV	Managed Reserve	Managed by MOA. Core areas could be designated under category I (Strict Nature Reserve)
Sheikh Katrawny	III or no PA at all	Natural Monument	Managed by Awqaf in collaboration with MOA
Sheikh Zeyd	III	Natural Monument	Managed by private land owners in collaboration with MOA and Alobban Alsharkeyeh Village Council
Shubash	IV	Managed Reserve	Managed by MOA. Core areas could be designated under category I (Strict Nature Reserve)
Siris	I	Strict Nature Reserve	Managed by MOA
Suba	I	Strict Nature Reserve	Managed by private land owners in collaboration with MOA
Tammun	IV	Managed Reserve	Managed by MOA
Tayasir	IV	Managed Reserve	Managed by MOA
Umm Safa	IV	Managed Reserve	Managed by MOA. Core areas could be designated under category I (Strict Nature Reserve)
Umm at Tut	IV	Managed Reserve	Managed by MOA. Core areas could be designated under category I (Strict Nature Reserve)
Wadi Al Dilb	IV	Managed Reserve	Managed by land owners and Awqaf, in collaboration with MOA
Wadi Al Quff	V	Protected Landscape	Managed by MOA. Core areas could be designated under category I (Strict Nature Reserve)
Wadi Al Qilt	IV	Managed Reserve	Managed by MOA. Core areas could be designated under category I (Strict Nature Reserve)
Wadi Zarqa Al Elwey	IV	Managed Reserve	Managed by land owners, in collaboration with MOA. Core areas could be designated under category I (Strict Nature Reserve)





## Section 7

# NATIONAL ENVIRONMENTAL CHALLENGES AND CONSERVATION ISSUES

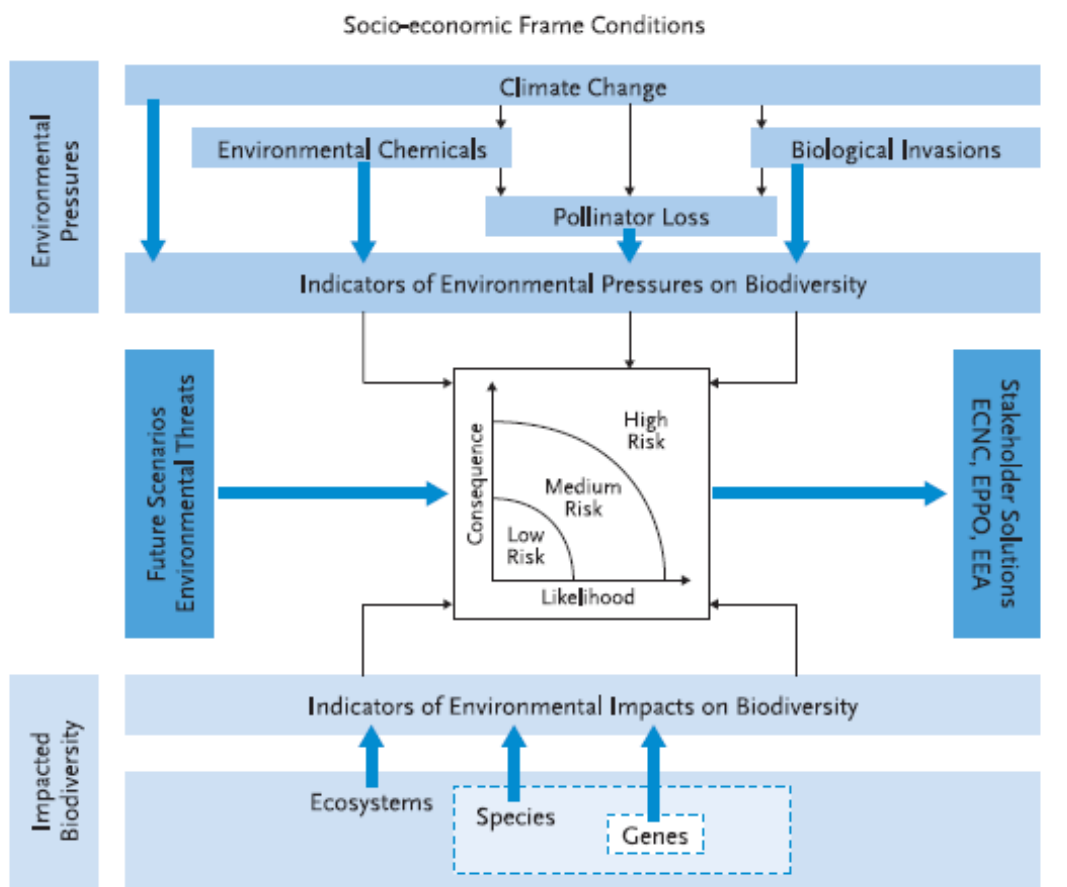
### 7.1. Introduction

Biodiversity levels are normally the outcome of the rate of natural extinction and evolution of new species by natural selection, yet the recent world-wide decline in biodiversity has largely been attributed to human interference (Joppa et al., 2016). Humanity faces environmental challenges that stem from the industrial revolution and the consumerist society that subsequently developed. We have inherited legacies of climate change and habitat destruction. Following the agricultural revolution, human population growth was small, but it mushroomed after the industrial revolution and is expected to reach 10 billion by mid-century (Lorey, 2003). Since the industrial revolution, the sustainability of ecosystems around the world has been eroded by human activity, causing habitat loss and environmental degradation. Over the last few decades, as humanity's understanding of how our actions induce climate change, increased awareness and efforts have focused on environmental conservation and trying to at least halt destruction and mitigate effects, along with some efforts towards reversing human induced habitat changes. These have mostly focused on conservation of natural resources in situ (Adams et al., 2004; AlHirsh et al., 2016). Furthermore, decades of globalization have exacerbated the problem for developing countries and the global South (Díez and Dwivedi, 2008; Cao and Orrù, 2014).

The main threats to conservation efforts can be sorted into issues that are uniquely Palestinian, and issues that overlap and must be addressed globally and/or elsewhere as well. This section addresses the latter, ranging from climate change, agricultural practices, and invasive species. Next, we address uniquely Palestinian issues. The fifth national report ranked threats to the Palestinian environment (Fig. 7.2); these seem reasonable, though adjustments may be necessary as additional data becomes available (EQA, 2015). Another report used the Delphi method, asking experts to identify the main threats. This resulted in somewhat different answers (Abdallah and Swaileh, 2011; AlHirsh et al., 2016). AlHirsh et al. (2016) conducted interviews with individuals involved in environmental issues in Palestine to identify the most severe threats in their eyes. Similarly, when the EQA, with help from the IUCN, summoned meetings with NGOs, academics, and government officials (roughly 15 people) in preparation of the 5<sup>th</sup> CBD report, this group listed a number of key threats (Fig. 7.2). The key vision driving environmental conservation in Palestine, as elsewhere, should be a sustainable human population in a sustainable, diverse, and natural environment.

Section 2 discussed the need for conservation, after basic data about the ecosystem has been collected and analyzed. In the following section, we discuss central challenges to appropriate conservation efforts in Palestine, besides those discussed under governmental, non-governmental, and education issues.

Decision makers' lack of understanding of conservation concepts stems from limited training, limited human resources, lack of awareness, duplication of efforts, etc. To organize conservation efforts, we must use a systematic approach and understand how different components relate to each other. For example, to examine the risk climate change poses to conservation, we must analyze all the connected and related components (see Figure 7.1).



**Figure 7.1** Relationships between the four environmental pressures and methods for conducting an Integrated Risk Assessment for different levels of biodiversity (Settele et al., 2005).



Threats	Underlying causes	Threat ranking	
		West Bank	Gaza
Habitats fragmentation	<ul style="list-style-type: none"> <li>• Unplanned urban expansion</li> <li>• Deforestation</li> <li>• Unplanned forestry activities</li> <li>• Drought</li> <li>• Land confiscation</li> <li>• Colonial settlements</li> <li>• Bypass roads</li> <li>• Segregation Wall</li> </ul>	Very High	Very High
Desertification and soil erosion	<ul style="list-style-type: none"> <li>• Overgrazing</li> <li>• Agricultural expansion</li> <li>• Sand mining</li> <li>• Fishing ports</li> <li>• Roads</li> </ul>	High	Very High
Urbanization	<ul style="list-style-type: none"> <li>• Military activities</li> <li>• Israeli colonial settlements</li> <li>• Political situation</li> <li>• Migration to the major cities</li> <li>• Establishment of commercial and industrial areas</li> </ul>	Very high	Medium
Removal of rocks for construction	<ul style="list-style-type: none"> <li>• Construction of ports</li> <li>• Breakwaters and Coastal structures</li> </ul>	Very low	Very high
Uprooting trees	<ul style="list-style-type: none"> <li>• Israeli colonial settlements</li> <li>• Israeli military bases</li> <li>• Security buffer zones</li> <li>• Bypass roads</li> </ul>	Low	High
Overgrazing	<ul style="list-style-type: none"> <li>• Limited rain fall Invasive plant species</li> </ul>	Low	Very low
Land degradation	<ul style="list-style-type: none"> <li>• Israeli occupation Israeli colonial settlements</li> <li>• Military camps Lack of economic motivations</li> <li>• Limited education to farmers Lack of credit and marketing facilities</li> <li>• Limited technology used in agriculture</li> <li>• Absence of Land Use Planning</li> </ul>	High	Very High
Invasive alien species		No data	No data
Climate change	<ul style="list-style-type: none"> <li>• Unfamiliar rain patterns Population shift</li> </ul>	Low	Medium
Overexploitation	<ul style="list-style-type: none"> <li>• Weak legal instruments Traditional and commercial hunting</li> <li>• Lack of law enforcement Low public awareness</li> <li>• Overfishing</li> </ul>	High	Very High
Pollution	<ul style="list-style-type: none"> <li>• Discharge of wastewater into wadis and agricultural lands</li> <li>• Excessive use of pesticides and chemical fertilizers</li> <li>• Discharge of untreated wastewater into sea.</li> <li>• Dumping of waste along the beach in north, central and southern Gaza</li> <li>• Chaotic disposal of industrial and municipal wastes</li> <li>• Chronic oil spillage Oil spill accident</li> </ul>	Medium	Very high
Segregation Wall	<ul style="list-style-type: none"> <li>• Israeli occupation</li> <li>• Israeli colonial settlements</li> <li>• Military camps</li> </ul>	Very high	Very low

**Figure 7.2** Designation of threats (EQA, 2015), highlighting the perceived threats to biodiversity in the West Bank and Gaza Strip, their underlying causes, and severity.

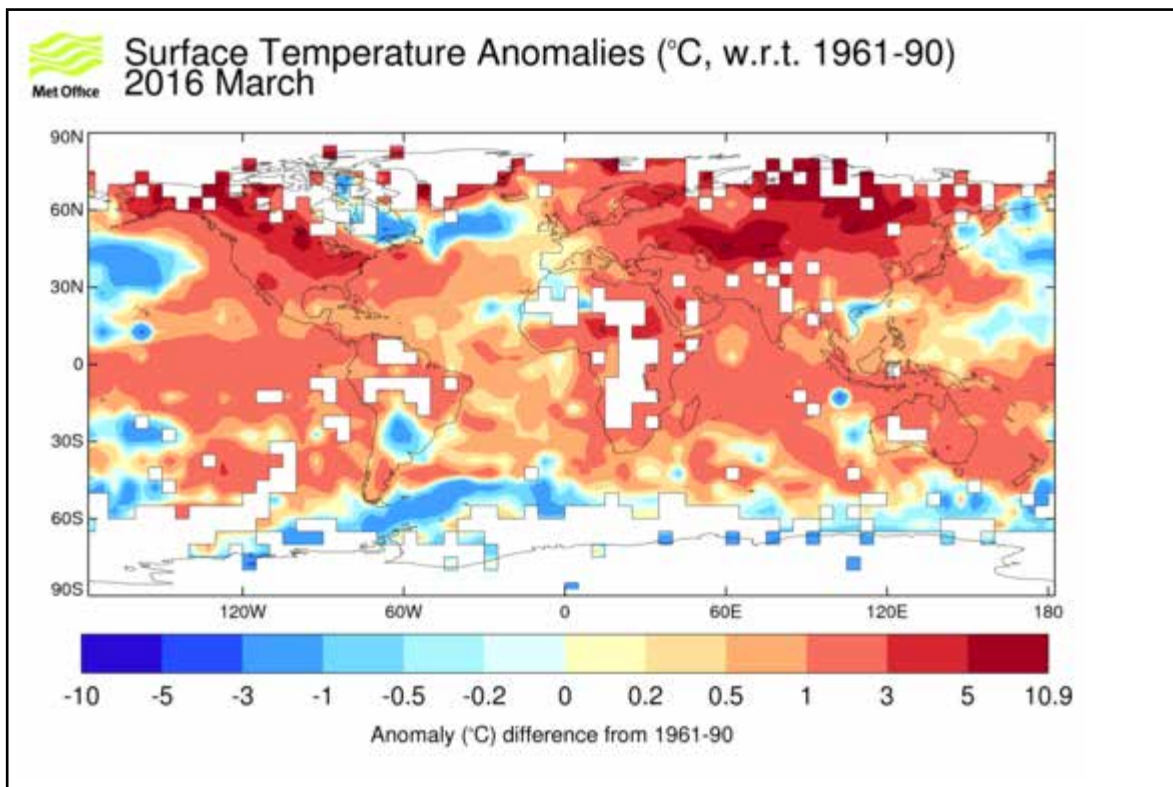
## 7.2 Climate Change

Climate change will dramatically impact biodiversity, human health, and sustainability (Harvell et al., 2002; Portnov and Paz, 2008; Rinawati et al., 2013), requiring us to integrate educational, evolutionary, and ecological responses into models and potential remedies (Settele et al., 2005; Lavergne et al., 2010; Sternberg et al., 2015). Since ecosystems play a significant role in human well-being, humans must rise to the challenge of facing climate change, especially as it threatens life on earth as we know it (UNDP, 2007). Humanity is now fully aware of the potentially devastating impact of our own activities upon the climate. While it is commonly accepted that climate change affects biodiversity mostly via habitat alterations, performing such studies can be challenging (Rinawati et al., 2013). Industries and countries that benefit from burning carbon may attempt to thwart or foil any work likely to stop environmental deterioration, or at least moderate humans' impact. However, scientific evidence is extremely compelling (e.g. the Intergovernmental Panel on Climate Change, 2007). Scientists at international meetings have warned of the impending global challenge (e.g. the United Nations Framework Convention on Climate Change <http://unfccc.int>).

Global warming will not affect everyone equally. Even if similar effects are observed in neighboring areas, a joint statement by eleven national academies of science warned: "Developing nations that lack the infrastructure or resources to respond to the impacts of climate change will be particularly affected. It is clear that many of the world's poorest people are likely to suffer the most from climate change. Long-term global efforts to create a more healthy, prosperous and sustainable world may be severely hindered by changes in the climate" (<http://nationalacademies.org/onpi/06072005.pdf>). Specific models have predicted the consequences for the Mediterranean region (Sala et al., 2000).

In November 2012, The World Bank issued a report collating data on the impact of human-induced climate change on the Arab countries (Verner, 2012). Over the past 20 years, climate-monitoring stations across these regions have indicated an increase in average annual temperatures. Years with high average temperatures correlated with low rainfall and vice versa. Thus, we can safely assume that increasing temperatures will lead to water shortages (Richard and Isaac, 2012). Furthermore, such trends cause desertification, land degradation, and pose a threat to natural habitats.

Newer models have attempted to integrate species' responses (ecologically, genetically, etc.) by predicting changes to habitats and distribution resulting from climate change (Lavergne et al., 2010). In one study, preliminary data from Palestine showed a decline in vertebrate biodiversity, as the Bethlehem District underwent desertification (Qumsiyeh et al., 2014b).



**Figure 7.3** Temperature differences globally. In our area, the data indicate that temperatures have risen by 1-3° C in the 30-year period measured (Morice et al., 2012).

### 7.3 Water and Waste Issues

The region known as the biblical Land of Canaan has always had a limited water supply, serving the human population and natural ecosystems. The aforementioned study by the World Bank showed that across the Arab countries, the gap between the supply and demand of water will grow from 16% to 51% by 2040-2050. In the West Bank and Gaza, current demand is 567 million cubic meters (mcm) while only 170 mcm are available (already a significant shortage). However, by 2040-2050, demand is expected to grow to 1587 mcm, while supply is expected to drastically shrink to 96 mcm. The World Bank study also showed that population growth with limited resources and environmental capacity is most acute in places like Gaza and the West Bank. Total biocapacity in the West Bank and Gaza was the lowest among Arab countries, at 0.16 ha/person (Verner, 2012). This problem also threatens the biodiversity of freshwater species, such as fish (Goren and Ortal, 1999). The story of water allocation in the Land of Canaan does not reflect international law governing shared resources, but rather an imbalance of power, heavily tilted towards Israel (Stauffer, 1996). A case in point is the resources of the Jordan River basin. Water from Israel, Palestine, Jordan, Syria, and Lebanon flows into the Jordan River. International law requires equitable and fair use of this water resource. Yet Israel diverts most of the water for its own use (e.g. irrigation of the Negev region), (Elmusa, 1998). The UN found similar phenomena for large underground aquifers in the West Bank (see the UN Commission on Human Rights, 2000).

That said, the Palestinians also mismanage the limited water resources available to them. Decaying water infrastructure has not been a priority for state funding, which focuses on security, education, and healthcare, among other things. Water leaks through the aging pipes and freshwater is poorly protected. For example, in the key biodiversity area of Wadi Al Badhan near Nablus, sewage flows into the freshwater spring just below the picnic and park areas (ARIJ, 2015). Furthermore, there is

no organized program to alert tourists to conserve water, even as the Ministry of Tourism works to increase the number of pilgrims to the Holy Land.

Sewage management in the occupied Palestinian areas has reached a critical point. In Gaza, a significant portion of the sewage flows untreated to the Mediterranean Sea (Ashour et al., 2009). For further reading, see *Raw Sewage Divides Jerusalem*:

(<http://stephensizer.blogspot.co.il/2013/04/raw-sewage-divides-jerusalem.html>).

Between 2001-2012, the GLOWA Jordan River Project published studies focused on the effects of global climate change, options for adapting water and land management, and the vulnerability of water resources in the eastern Mediterranean region (Tielborger et al., 2013) <https://publikationen.uni-tuebingen.de/xmlui/static/html/ProjectReports.pdf>.

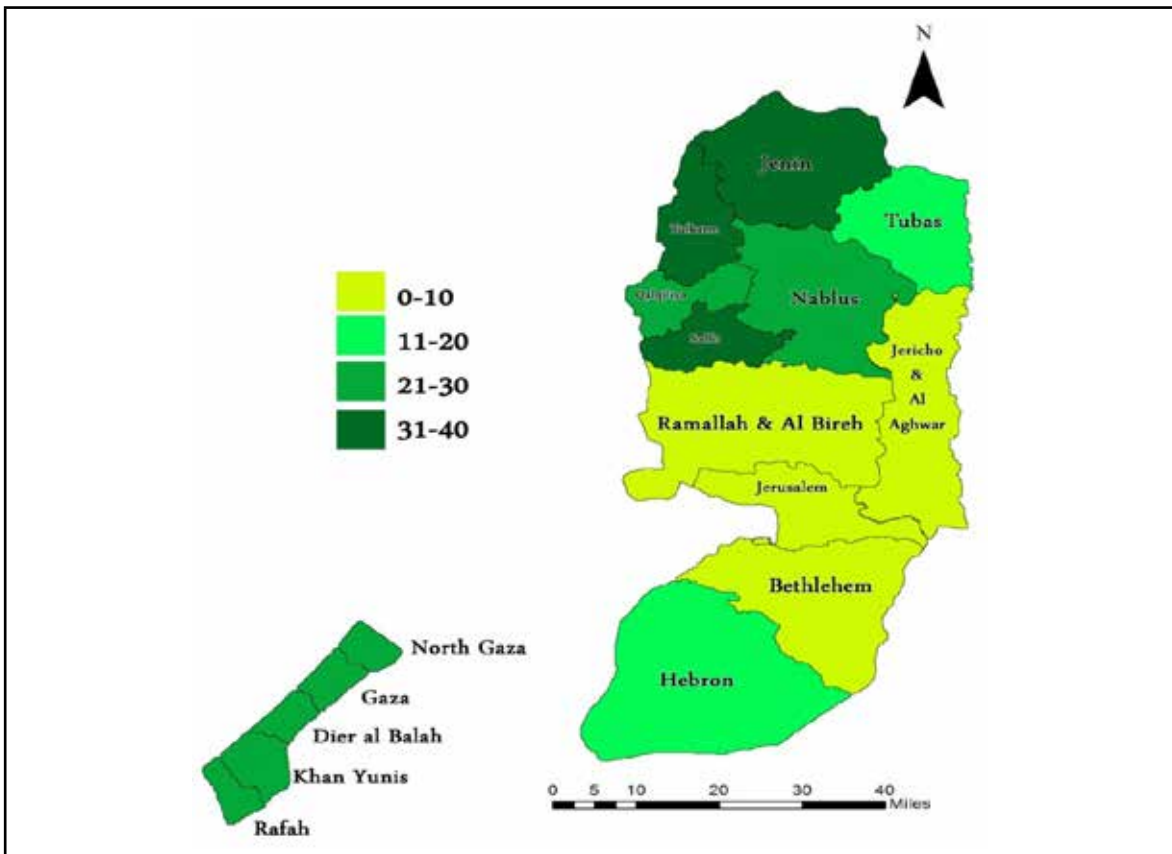
According to UNEP (2003), 70% of solid waste in the occupied Palestinian territories is of organic nature. This is a very high ratio, which invites the opportunity to reduce waste (and create fertilizer) via composting. Sewage should be treated, and other solid waste (e.g. metal, plastic, and glass), should be recycled. Evidence shows that wastewater flows into some significant, supposedly protected areas like Wadi Qana, Wadi Nar, Wadi Far'a (Badhan), and around Salfit (EQA, 2015), as well as into the Mediterranean Sea, where it is highly damaging (Akram and Cheslow, 2016).

The logistics and financing for proper solid waste disposal in Palestine are facing a severe crisis (Abu Thaher, 2005; Al-Khatib et al., 2007). Most solid waste in areas such as Nablus is organic, indicating a great potential for resource utilization (e.g. composting/fertilizer), (Al-Khatib et al., 2010). But as in many developing countries, management of such solid waste lags significantly, leading to pollution (Ahmeda and Alib, 2004).

## 7.4 Agricultural Practices

Palestinian agriculture developed during the Natufian period and existed in relative harmony with nature for over 10,000 years. The modern practices of agriculture, especially chemical pest control, resulted in significant environmental damage and overexploitation of the land. Palestinian agriculture uses pesticides extensively, even in impoverished Gaza (Abu Middain, 1994). Nitrates seem to have had an effect on public health in Gaza (Abu Naser et al., 2007; Al-Absi, 2008).

Agricultural practices that do not ensure agricultural biodiversity or practice crop rotation (e.g. monoculture and industrial agriculture) are devastating to the sustainability and protection of the environment (Garnett et al., 2013; Tschardt et al., 2012; Wezel et al., 2014). Agricultural biodiversity websites, such as Bioversity International (<http://www.bioversityinternational.org/>) are important for gaining knowledge and raising awareness. The conservation of agrobiodiversity became part of the Palestinian national agenda when the MOA adopted a national policy for "promoting the conservation of Agrobiodiversity."



**Figure 7.4** Percentage of cultivated land by Governorate, 2010/2011 (Raw data from PCBS 2014, but modified by the EQA's 2015 CBD report).

**The National Agriculture Sector Strategy “Resilience and Development” 2014-2016** identified four strategic objectives for the three-year period under consideration:

1. Ensure farmers’ resilience and attachment to their land, while fulfilling the contribution of the agriculture sector in providing requirements for development of the State of Palestine.
2. Efficient and sustainable management of natural resources.
3. Enhanced agricultural production, productivity and competitiveness, as well as enhanced contribution of agriculture to food security.
4. The agriculture sector has effective and efficient capacities, institutional frameworks, legal environment, infrastructure and agricultural services.

According to the EQA (2015), “Organic farming has grown into a thriving business, by Palestinian standards, since it first was introduced in the West Bank in 2004. Now, at least \$5 million worth of organic agricultural products, mainly olive oil, is exported every year. An average of 17,000 tons of olive oil is produced in the West Bank every year by thousands of farmers.” Anabtawi (2016) demonstrated that small-scale permaculture farms may be the key to sustainable, environmentally sensitive food security in Palestine. Anabtawi’s thesis data was summarized in Arabic and received significant attention when it was published “البيروماكتشر» في ظل الاحتلال هل هي الخيار الممكن؟.... عنوان رسالة ماجستير للباحثة والصحفية” الفلسطينية ربي عنبتاوي (<https://goo.gl/mex23i>).

Kruijssen et al. (2007) explained how involving farmers in small-scale actions could assist biodiversity conservation. Krasny and Tidball (2009) showed how community gardens can promote civic engagement, including on environmental issues. These and many other examples suggest that much

work can, and should, be done to reduce the use of insecticides, develop family farming, and develop permaculture – all which may bolster environmental protection efforts.

## 7.5 Invasive Species

Alien (non-native) species form an increasing percentage of local fauna and flora species worldwide, threatening biodiversity (Sandlund et al., 1999). Nearly half a million species have been identified as invasive (Pimentel et al., 2001), and their spread has been eased by transportation and human-induced habitat destruction. Invasive species are considered the second largest threat to biodiversity, after direct habitat destruction (Kettunen et al., 2009). The best way to curb invasive species is to eliminate specimens before they can become abundant and widespread, while knowledge about population biology, genetics, and evolution can help predict the potential threat of invasive species (Allendorf and Lunquist, 2003). There is still some debate whether increased local biodiversity protects from invasive species or not, and how to best deal with this phenomenon (Levine, 2000).

Massive changes to the landscape of historic Palestine include the introduction of non-native species (first by the British then by the Israelis), with destructive effects on the local fauna and flora. Many invasive plants and animals exist in Palestine today, including birds: *Pistacula krameri*, *Acridotheres tristis*, and *Lonchura malabarica*. Birds escape from human captivity and, in the case of the myna, are highly adaptable and significantly affect local species. There are about 50 species of invasive plants, including *Prosopis juliflora*, *Acacia saligna*, *Ailanthus altissima*, *Conyza bonariensis*, *Nicotiana glauca*, *Oxalis pes-caprae*, *Solanum elaeagnifolium*, and *Ambrosia confertiflora*. Invasive species in Palestine are growing, both in terms of the number of species and their abundance. Studies on their distribution have yet to be conducted. The Ministry of Agriculture determines the main restrictions on the import of species, but Israel remains in charge of borders (EQA, 2015).

## 7.6 Energy Use

Due to a weak economy, including the near lack of industry, Palestinian emissions of greenhouse gases are low compared to other countries. Yet over 12 million people live between the Jordan and the Mediterranean with over 3 million cars, creating significant air pollution and increased lead pollution (Tal, 2002; Safi et al., 2006). The energy sector relies primarily on non-renewable sources of energy, such as petrol and gas. In fact, the ideal scenario for future development would emphasize renewable energy sources (RES). There is a lot of potential for developing wind, geothermal, and solar energy in the SP (Yaseen, 2009). RES already account for 18% of the energy sector, and 80% of households use solar energy to heat water (Görlach et al., 2011). The Palestine Energy Authority (PEA) is the government authority responsible for outlining legal and procedural issues, while the Palestinian Energy & Environment Research Centre (PEC) is the national institution tasked with R&D in the energy sector (Tsikalakis et al., 2011). Such practices are still limited, but could potentially be developed (Yaseen, 2009).

## 7.7 Urbanization and Human Pressure

We already see significant population growth in Israel and Palestine. In 1916 the region contained less than one million people, reaching over 13 million by 2016, both through natural population increase and Jewish immigration. Additionally, growing cities and migration from villages into the cities, e.g. to the Bethlehem area, have been noted in recent years. This has created pressures on the environment, as evidenced through a decline in vertebrate biodiversity (Qumsiyeh et al., 2014b), a decline in frog



populations (Salman et al., 2014), and changes to the diet of raptors like the Eagle-owl (Amr et al., 2016). In addition to increased population density, Israel restricts Bedouin communities, and they overuse shrinking areas, resulting in overgrazing in the few remaining open areas (ARIJ, 2015).

In Gaza, fishermen are limited to an area of 3 nautical miles. These restrictions developed over the years, especially after discovering large, offshore gas reserves (Ismail et al., 2013). These restrictions result in overfishing and, along with the effects of gas extraction, pose a significant threat to Mediterranean biodiversity.

No significant hunting of wildlife (including via nets and traps, by locals or visitors) was reported in Palestine (Yom-Tov, 2003). Yet illegal hunting affected Wadi Gaza and its vicinity (Abd Rabou et al., 2007, 2015; AlHirsh et al., 2016).

Illegal logging in protected areas is a common practice in many parts of Palestine (e.g. Wadi Al Quff; see Qumsiyeh et al., 2016). Yet infrastructure development must also consider logging, while allowing wildlife continuity, whether in terms of road building (Achiron-Frumkin, 2013) or the security barrier in the West Bank.

## 7.8 Economy and Ecotourism

The concept of ecotourism (nature tourism with social and environmental conservation benefits) was developed in the 1980s as an alternative to mass tourism (Orams, 1995). Ecotourism opposes the notion that development requires “using nature” (i.e. all that is natural is undeveloped and can/should be utilized towards human needs). In contrast, ecotourism presupposes the values and philosophy of environmentalism in the modern sense (Stephen and Neil, 1999; Honey, 2008). Ecotourism is a tiny segment of the global tourism industry that is valued at trillions of dollars worldwide (roughly 10% of world GDP). If done properly and through well-designed programs, ecotourism may play a significant role in reversing negative trends of development and contribute significantly to the Millennium Development Goals (Bricker et al., 2012).

For better or for worse, and without gathering extensive data, Palestinians have recently begun offering ecotourism. Palestine has much to offer as a destination, and there is significant interest in going beyond pilgrimage sites to alternative tourism (Isaac, 2010; Isaac et al., 2016). Overall, Palestine has a unique, promising, and rich landscape, including wildlife habitats and ecosystems that are rich with ecotourism potential. Several nascent projects exist: The Nativity Trail, offered by ATG, is a 160-km, 11-day journey throughout the West Bank (<http://atg.ps/programs/nativity-trail>). EEC offers four pathways (masarat) in Bethlehem (Battir and Mar Saba) and Jericho (Wadi Al Qilt and Ein Al 'Auja). As early as 2014, the MOA, along with the PWLS, began offering ecotourism programs in Wadi Al Quff, Umm at Tut, and Beit Illu, providing visitors to the trails with historical information (Quttaineh, 2015).

According to Ghrouf (2010), an ecotourism survey suggested that important areas are the southern Jordan Valley, the Dead Sea, the Mount of Temptation, and Ein Fash'ha. A master thesis from Al-Quds University suggested indicators for evaluating ecotourism destinations (Quttaineh, 2015).

Beside its ecological benefits, ecotourism can help create jobs and improve infrastructure in rural areas. Yet ecotourism also faces obstacles, such as a lack of investment in tourism, poor publicity, a deficiency in qualified human resources and scientific research, and a lack of sovereignty over various destinations (Quttaineh, 2015).

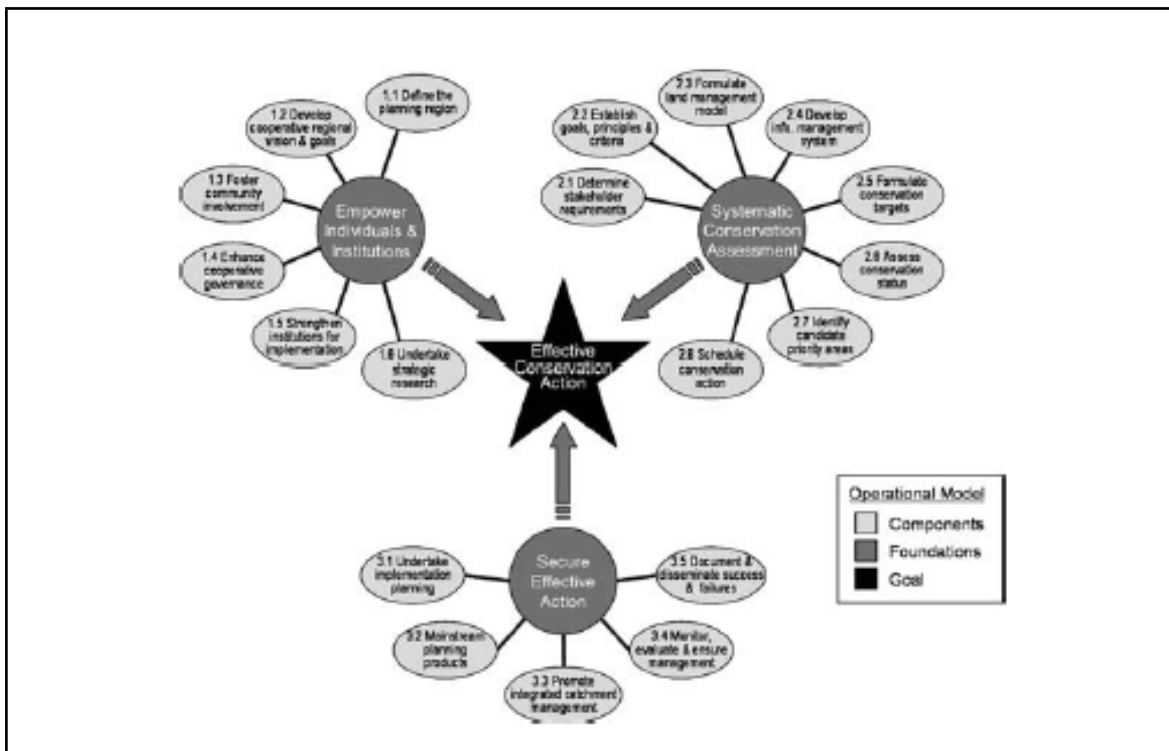


## 7.9 Mainstreaming Conservation

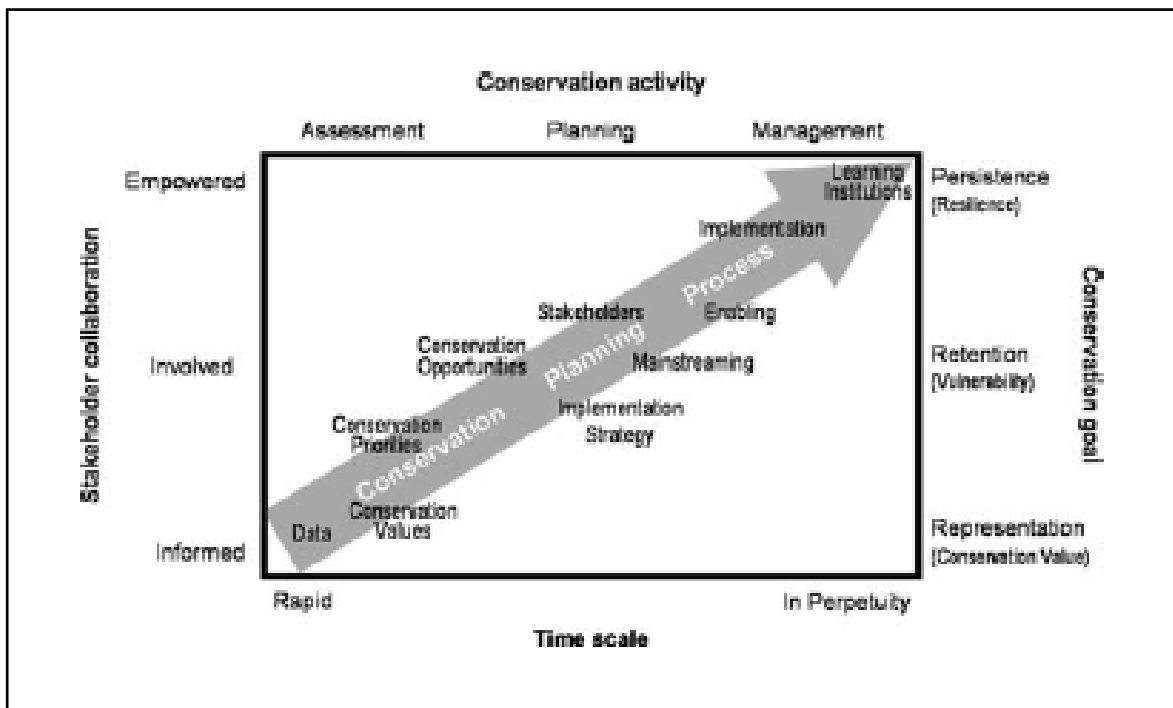
There is still much to be learned in terms of perfecting conservation. Information alone will not suffice, and the key is empowering communities and individuals to achieve results (Fig. 7.5; Knight et al., 2006).

It is incumbent on us in Palestine to build a comprehensive conservation strategy that takes all stakeholders and relevant activities into account (research, setting priorities, laws, action, and implementation), and that these are done in a timely fashion, aligned with the SMART criteria (specific, measurable, achievable, relevant, and time bound).

The reviewers also suggested other methodologies, e.g. aligning conservation efforts with different social and economic sectors, the landscape/seascape management concept, the nature based solution, and involving local communities in conserving nature while developing their small business.



**Figure 7.5** Components of a pragmatic and effective conservation program (Knight et al., 2006).



**Figure 7.6** Steps towards developing conservation strategies in a socio-ecological construct (Knight et al., 2006).

Palestine has two specific problems in terms of conservation: lack of appropriate knowledge and a gap between knowledge and implementation. Limited knowledge is indeed a disadvantage, but it should not hinder any and all progress. It has been argued that a lack of definite, concrete knowledge in biodiversity may be useful in science education because it allows students to understand the value and process of gaining new knowledge (Van Weelie and Wals, 2002). The second obstacle is even more troublesome: ensuring effective implementation with measurable results. For example, the existence of a rich, biodiverse, and “protected area” guarantees neither effectiveness nor results. The real test is to study what would have happened without interventions (Ferraro and Pattanayak, 2006). Such studies can be done scientifically, by measuring and comparing outcomes in areas with and without intervention/conservation efforts (these should preferably be randomly assigned). Many places in the world, including Palestine, do not use this approach. Yet it has many benefits (see recommendation in Section 8).

Old concepts of species management have given way to ecosystem-based approaches, which are applied in “ecology, human ecology, environmental planning, [...] and other disciplines” (Slocombe, 1993) to successfully integrate environment and development. It is incumbent upon us to develop holistic approaches to ecosystems, and learn how to manage our resources in an integrated fashion, considering various components (wild habitats, human stakeholders, and other groups) to ensure long-term sustainability. Furthermore, in a small area like the SP, we must also consider the approach of trans-boundary conservation areas (TBCA), because many areas are, or will be, shared with neighboring states, regardless of future political arrangements (Holness et al., 2011). See recommendation in Section 8 for more.



## Section 8

# ANALYSIS AND RECOMMENDATIONS

### 8.1 Introduction

The extensive information outlined in sections 1-7 is a snapshot of current reality. We now turn to a SWOT analysis and recommendations for each of the areas covered. We end by providing an overall picture and ranking, providing stakeholders and decision makers with the necessary tools for addressing Palestinian society's dire environmental needs. In the context of environmental conservation objectives (including education), scientific knowledge and planning are critical, yet today a gap exists. Knight et al. (2008) recommended the following measures towards closing the gap:

- Acknowledge the research-implementation gap is real.
- Source research questions from practitioners.
- Situate research within a broader conservation planning model.
- Expand the social dimension of conservation assessments.
- Support conservation plans with trans-disciplinary social learning institutions.
- Reward academics for societal engagement and implementation.
- Train students in skills for "doing" conservation.

In Palestine's CBD report, gaps between knowledge and actions were identified in many areas (EQA, 2015): an outdated NBSAP, lack of scientific field surveys of biodiversity, lack of economic valuation of biodiversity, lack of studies on Palestine's global impact, few studies on declines of biodiversity associated with habitat loss, ecosystem services, and biodiversity awareness programs. But again, the key is not merely gaining knowledge, but meaningfully linking that knowledge to action. In this section we do precisely that. Without directly referencing the earlier sections, the following SWOT analysis and recommendations are clearly the outcome of the data presented above.

### 8.2 Research and Databases

The process of inventorying biodiversity includes surveying, mapping, and cataloging genes and individual species in a particular area. Scientific research is critical to policy-making and implementing conservation measures (Heywood and Watson, 1995). It seems obvious that environmental management, education, and protection efforts must be based on validated scientific data. Yet, we could fill a book citing Palestinian examples where decisions are made, funding are allocated, and resources are spent in directions not based on any valid data or outcome analysis. This generates significant loss of resources.

**Table 8.1** SWOT analysis for research and databases.

Strengths	<ul style="list-style-type: none"><li>• Significant research data, useful websites, and databases on neighboring Israel and Jordan, making it possible to accelerate research in Palestine.</li><li>• New programs producing quality, alpha-level taxonomy on flora and fauna (e.g. PMNH at Bethlehem University).</li><li>• Nascent natural history museums can provide material for comparative studies.</li><li>• Significant global resources (financial and human) can help in Palestine (e.g. collaborative scientists)</li></ul>
Weaknesses	<ul style="list-style-type: none"><li>• Few local biodiversity researchers (weak human resources).</li><li>• Population and key stakeholders lack an understanding of what research is, let alone its value.</li><li>• Still poor infrastructure for R&amp;D and data acquisition.</li></ul>
Opportunities	<ul style="list-style-type: none"><li>• Significant interest in biodiversity, and available resources that could be tapped.</li><li>• Potential for novel findings and contributions to the scientific literature, considering current dearth of information.</li></ul>
Threats	<ul style="list-style-type: none"><li>• Decline of biodiversity and elimination of many species in Palestine (such as the Syrian spadefoot toad, <i>Pelobates</i>) may occur before studies are conducted (a race against time).</li><li>• Conflict of interest between researchers who want quality research and some stakeholders who want to sustain programs without enough data or scientific backing.</li></ul>

## Recommendations

- **Data-based research, education, and conservation:** Universities and passionate, academic-oriented individuals within the various ministries are best qualified to conduct the basic research needed. Given limited resources, priorities should be determined by experts who are capable of evaluating literature, conducting local studies, and making solid conclusions – preferably in collaboration with others (Sutherland et al., 2011, 2012). Professional and scientific gathering of biodiversity data (in both quality and quantity) requires training more professionals. We recommend establishing an academic program in biodiversity research (most likely at Bethlehem or Birzeit, which already have a basis for such a program).
- **Using biodiversity databases:** While it may be too early to use [observation.org](http://observation.org), similar educational websites can be created and used after different fields of knowledge have been mainstreamed. We suggest first relying on professionals (e.g. ornithologists, mammologists, etc.), especially university teachers, to cultivate a new generation of professional and lay naturalists. The next step, geo-referencing and visualizing biodiversity data, should occur only after professional and proper identification of taxa. After developing human capital, we recommend introducing and expanding use of the Global Biodiversity Information Facility (GBIF).
- **Expand use of botanical gardens and natural history museums:** Such controlled settings can help educate young students of their generation's critical role in environmental conservation. Seed money can be raised locally and internationally for such centers, but they ought to become self-sufficient within 5-10 years of their establishment.

### 8.3 Governmental Structures and Environmental Laws

Many societies’ traditional measures of growth and wealth have shifted and evolved to include biodiversity conservation. In other words, societies that do not protect their natural resources and engage in serious biodiversity conservation cannot develop in a sustainable way and will fall behind (Rands et al., 2010). Thus, good governance is the key to poverty reduction and environmental protection (Grindle, 2004). The Environmental Law (1999) must be updated to match current needs and international obligations such as the CBD, as well as other international agreements, including the Cartagena Protocol on Biosafety and the Nagoya Protocol on Access and Equitable Benefit Sharing of Genetic Resources. Furthermore, the Environmental Law (1999) is vague in terms of how the EQA should fulfill its obligations for managing protected areas (mainly Article 40).

**Table 8.2** SWOT analysis for governmental structures

Strengths	
Legislation	<ul style="list-style-type: none"> <li>• A legal framework pertaining to protected areas.</li> <li>• A national biodiversity strategy and action plan.</li> </ul>
Administrative	<ul style="list-style-type: none"> <li>• Structured governmental organizations related to conservation and the environment</li> </ul>
Human resources	<ul style="list-style-type: none"> <li>• Qualified personnel handling environmental issues.</li> <li>• Several NGOs involved with environmental issues.</li> </ul>
Education and awareness	<ul style="list-style-type: none"> <li>• High degree of environmental education and awareness among the local community.</li> <li>• Integration of environmental concepts in the Ministry of Education curricula.</li> </ul>
Research	<ul style="list-style-type: none"> <li>• Research institutions concerned with biodiversity and the environment.</li> </ul>
Weaknesses	
Legislation	<ul style="list-style-type: none"> <li>• EQA is not an official ministry and thus cannot participate in cabinet sessions.</li> <li>• Outdated Environmental Law (1999).</li> <li>• The Environmental Law (1999) does not align with international obligations and agreements.</li> <li>• The Environmental Law (1999) lacks details on the management of protected areas.</li> <li>• Weak enforcement of existing laws.</li> <li>• The Agriculture Law does not provide a comprehensive approach to protected areas and their management.</li> <li>• Absence of legal body to implement environmental laws.</li> <li>• Absence of specialized courts for environmental cases.</li> <li>• Lack of coordination between the different governmental authorities on environmental issues.</li> <li>• Ambiguous roles of different authorities.</li> <li>• Lack of experience dealing with urgent environmental issues.</li> </ul>

Opportunities	<ul style="list-style-type: none"> <li>• PNA's increased tendency to regulate the environment as a single sector.</li> <li>• Global and international attention to environmental issues, with promising financial support.</li> <li>• Cooperation opportunities between NGOs and governmental/academic research institutions.</li> <li>• Environmental conventions that guarantee the right of peoples under occupation to protect their environment.</li> </ul>
Threats	<ul style="list-style-type: none"> <li>• Violations and destruction perpetrated by the Israeli occupation against the Palestinian environment.</li> <li>• Obstacles of the Israeli occupation to Palestinian development.</li> <li>• Lack of control over many environmental and natural resources due to administrative divisions of the occupied territories.</li> <li>• Global environmental problems, such as climate change, desertification, pollution, etc.</li> <li>• Financial challenges that take priority over environmental issues.</li> <li>• The current political situation in the Palestinian territories.</li> </ul>

## Recommendations

1. **Law revision:** A comprehensive review and assessment of current environmental and agricultural laws is urgently needed to resolve conservation issues and bring laws up to date. Revising and updating the Environmental Law (1999) will help align Palestinian law with various obligations stemming from current and future international treaties. For example, the current law lacks detailed guidance on how the EQA should fulfill its obligation of managing protected areas. Such a review must be done by competent legislative authorities, and may be postponed until the overdue Palestinian elections.
2. **Law enforcement:** Reform and strengthen governmental agencies, especially in terms of law enforcement. Allocate resources for implementing laws and policies (no law or policy should be issued/revised without clear mechanisms for its implementation/enforcement). A few concrete suggestions: a) Train and equip police officers to enforce environmental laws (e.g. laws against littering or hunting); b) Create a division within the law enforcement community focused on environmental issues, deputized to go beyond regular duties (e.g. in remote communities); c) Remove ineffective rangers, retrain remaining ones under MOA to maximize effectiveness. Ensure adequate supervision of all three categories of law enforcement officers listed here.
3. **Honor current international obligations and sign future agreements only if they can be implemented:** Form a task force with the relevant authorities (the EQA and MOA) with support from academia and other stakeholders, to review international agreements signed or under consideration, specifically their implementation and obligations imposed upon SP. This includes the CBD, the United Nations Convention to Combat Desertification (UNCCD), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on Migratory Species (CMS), and the United Nations Framework Convention on Climate Change (UNFCCC). To ensure compliance, increase communication among government officials and NGOs at all levels.
4. **Regulate NGOs:** The Ministry of Interior (MOI) registers NGOs, while the EQA is responsible for those with an environmental focus. The MOI and EQA should be given mandates to take more vigorous and effective action to examine transparency, effectiveness, lack of cooperation, etc.

among NGOs. The government should facilitate the work of NGOs by providing support and cooperation. Independent audits by government-approved auditors, and not those selected by the NGOs, may be effective in ensuring that NGOs best serve the Palestinian environment.

5. **Environmental Impact Assessments (EIAs):** The Palestinian Environmental Law grants the PNA the right and responsibility to study, assess, approve/reject, and monitor any project for its environmental impact, and to manage and protect natural resources. The PNA should protect the environment and public health and welfare, while acting to conserve endemic or endangered species. The PNA further has the right to conserve ecologically sensitive areas. Adherence to the law would require all projects with the potential for environmental damage to undergo an EIA by competent independent evaluators. EIAs primarily focus on: 1) Land use, landscape, and visual aspects of projects; 2) Geology, topography and soil; 3) Hydrology, water quality, and waste water treatment plans; 4) Air quality and climate; 5) Terrestrial and aquatic ecology; 6) Fauna and flora; 7) Transportation; 8) Noise; 9) Socio-economic impacts; and 10) Interrelationships between effects. The EQA should carefully select and define who may conduct such studies (currently many unqualified engineering firms offer their services).
6. **Implement existing policies:** MOPAD, EQA, MOA, and other government agencies must implement whatever policies they have already agreed to, both in the National Spatial Plan and in the National Development Plan – especially in terms of protecting key areas, including preventing development and enforcing laws (e.g. prevent illegal hunting and logging).

## 8.4 Non-Governmental Organizations

Game et al. (2013) listed six mistakes that are commonly associated with setting priorities for conservation: 1) Not acknowledging that conservation plans are priorities; 2) Trying to solve an ill-defined problem; 3) Not prioritizing actions; 4) Arbitrariness; 5) Hidden value judgments; and 6) Not acknowledging risk of failure. We noted many such examples both in NGOs and governmental programs. For example, many NGOs hold workshops that satisfy funders but do not seem to produce an outcome aligned with any stated objectives or strategy. In some cases, the workshops are led by unqualified people and some information may be inaccurate or misleading (see section about NGOs).

**Table 8.3** SWOT analysis for NGOs

Analysis	Remarks
Strengths	<ul style="list-style-type: none"> <li>• Many NGOs interested in biodiversity, environmental education and awareness, and environmental protection.</li> <li>• Several published manuals and booklets on environmental education and awareness.</li> <li>• Success incorporating environmental concepts in the Ministry of Education's curricular and extra-curricular activities (including in private schools).</li> <li>• Environmental NGOs have developed successful strategies for gaining name recognition and promoting their activities in the public arena (media), as well as locating sources of funding.</li> </ul>



Weaknesses	<ul style="list-style-type: none"> <li>• Plethora of activities based on little strategy or that do not fit into any institutional or a national strategy.</li> <li>• Lack of outcome-driven activities according to the SMART criteria (specific, measurable, achievable, relevant, and time bound)</li> <li>• Lack of coordination/joint efforts between local NGOs, academia, and government institutions.</li> <li>• Many NGO webpages are out of date.</li> <li>• Duplication of efforts, such as publications, brochures, and educational materials.</li> <li>• EQA lacks mechanisms for evaluating NGOs' activities.</li> <li>• Some NGOs need for human resources and technical assistance.</li> <li>• Long-term leadership by the same person (sometimes for decades) and a lack of female and/or fresh leaders.</li> </ul>
Opportunities	<ul style="list-style-type: none"> <li>• Several international agencies fund such projects.</li> <li>• A wide range of studies on biodiversity, conservation, and environmental education and awareness can be utilized by NGOs to improve their work and even inspire new directions.</li> <li>• Organizational failures can be leveraged as organizational learning, but only if NGOs are willing to change.</li> </ul>
Threats	<ul style="list-style-type: none"> <li>• Lack of substantial internal funds, and fluctuations in international fund raising.</li> <li>• Reluctance to change that hinder progress.</li> </ul>

## Recommendations

1. **Effectiveness:** Despite having 56-64 registered NGOs claiming to work on environmental issues, we see little effectiveness. Above we outlined our suggestion regarding government regulators. But much can be done by the NGOs themselves. For example, PENGON could invite more NGOs to join its network, and insist that members adhere to certain guidelines (e.g. that all NGOs publish their finances on their website, that they report their activities accurately and correctly, and that they open their books to anyone who would like to examine them). NGOs addressing biodiversity, conservation, and other environmental issues should become members of PENGON, revitalizing the network and enabling it to play a significant role in implementing recommendations and policies agreed to by stakeholders. NGOs should consider organizational changes, including retiring old executives and involving younger leaders (especially women). Also, to avoid nepotism, hiring should become more transparent.
2. **Cooperation, coordination, and collaboration:** PENGON, EQA, and key NGOs should encourage their colleagues to cooperate, or at least coordinate, in an effort to avoid redundancy, wasting resources, and unnecessary friction and/or competition. The same applies to NGOs and governmental/academic institutions.
3. **Sustainability:** NGOs should reduce their dependence on foreign aid by identifying practical means for sustainability, through money-generating side projects and/or partnership with the private sector. NGOs should also join forces to insist grants serve the Palestinian agenda and not donor interests.

## 8.5 Education

The most cutting-edge educational paradigms focus on developing conceptual thinking and high-level understanding of phenomena by emphasizing hands-on, fun learning (Roussou, 2004). In Palestine, we must pause to consider how environmental education (EE) is taught today. Despite valiance and good intentions, current methods have shown no actual improvement. This may be a bitter pill to swallow, but we must face ongoing environmental degradation. Hungerford and Volk (1990) recommend that EE go beyond knowledge and awareness aimed at creating a sense of ownership and empowerment, and result in measurable behavioral changes. The Palestine Museum of Natural History and Bethlehem University's Institute of Biodiversity and Sustainability developed modules focused on respect: beginning with self-respect (empowerment), then respecting others, and, finally, respecting the environment.

**Table 8.4** SWOT Analysis for Education

Strength	<ul style="list-style-type: none"> <li>• Some environmental issues have entered the school curriculum.</li> <li>• Many universities provide undergraduate- and graduate-level environmental training.</li> <li>• Education is a cultural value.</li> <li>• EE uses both traditional and social media platforms.</li> </ul>
Weakness	<ul style="list-style-type: none"> <li>• Redundancy resulting from lack of communication/coordination between universities.</li> <li>• Redundancy resulting from lack of coordination of extracurricular strategies offered by competing NGOs, each producing different manuals and outcomes.</li> <li>• Lack of coordination between academia, government (esp. the EQA), and third/private sector actors.</li> <li>• Poorly qualified trainers/educators.</li> </ul>
Opportunities	<ul style="list-style-type: none"> <li>• International agencies fund the strengthening of human resources (e.g. ERASMUS).</li> <li>• Potential to integrate education and research, leading to much stronger EE programs.</li> </ul>
Threats	<ul style="list-style-type: none"> <li>• Potential for "brain drain," as qualified people find better opportunities abroad.</li> <li>• Mobility and other obstructions to education under occupation.</li> <li>• Educators' reluctance to change the status quo.</li> </ul>

## Recommendations

1. **Base program on scientific data:** Educational theories have evolved significantly over the past 30-40 years, affecting all fields alike. Much of the environmental education done in Palestine today use outdated and discredited methods. We recommend reinvigorating the teaching methods, based on research and knowledge. This may be done in conjunction with faculties of education and/or sciences at Palestinian universities, as well as international institutions. To increase public awareness, we must first gain new environmental knowledge, and then share it effectively, based on the scientific principles of learner-centered education. How we teach environmental issues is itself a science, going beyond sharing accurate information and focusing on *how* it is shared and measuring *changes* to behavior.
2. **Schools:** NGOs, the EQA, universities, and others should coordinate a campaign to reach out to

schools based on the principles outlined above. Such a program should integrate the EE school guidelines published by many NGOs, creating a uniform set of guidelines, to be distributed widely by the MOE. We should expand the environmental clubs at schools, and add field trips and practical workshops, including visits to existing (and future) museums, botanical gardens, and modern permaculture farms.

3. **Universities:** University administrators, faculty, and students should be encouraged to mainstream environmental conservation issues. This can be done through curricular and extra-curricular activities. The latter may include forming environmental clubs, organizing nature hikes, visiting museums and botanical gardens, and more. Some thought and research are needed to determine where best to introduce the students to these issues (mainstreaming). This requires MOE involvement.

## 8.6 Protected Areas and Rich Biodiversity Areas in Palestine

We cannot conserve our biodiversity or manage reserves/parks without accurate, objective information. This goes beyond anecdotal data and must adhere to the criteria of scientific research, including proper methodologies, professionalism, and publication in peer-reviewed journals.

Confiscation of land for settlements is a one of the major threats to Palestinian protected areas. The confiscation of Ras Imweis and six adjacent areas known as Nahal Shilo, located northwest of Ramallah, is among the best examples of Israelis stealing Palestinian land. Previous cases have also evinced the destruction and distortion of protected areas in the occupied West Bank as an integral part of Israeli practices, including exploiting the term “nature reserve” for the sake of settlements. Such exploitation was obvious in the Bethlehem Governorate in 1997, when the settlement of Har Homa was established on Abu Ghneim Mountain, which was considered one of the largest forests in Bethlehem (POICA, 2013). Another report has shown that Israel built settlements in the Har Kabir reserve, while the Alonei Shilo and Elmatan outposts were built in the Nahal Kane reserve. (Etkes and Ofran, 2007).

A detailed SWOT analysis for Palestinian protected areas was outlined by Garstecki et al. (2010). In general, all protected areas, whether declared or proposed, shared several criteria. Table 8.5 summarizes major strengths, weaknesses, opportunities, and threats.

**Table 8.5** SWOT analysis for protected areas (see also Garstecki et al., 2010).

Strength	<ul style="list-style-type: none"> <li>• Over 10% of the SP can be protected.</li> <li>• Rich biodiversity represents many biomes. Our ecosystems are fragile yet promising.</li> <li>• 40 rangers available to work.</li> <li>• Hotspots and protected areas are identified in the spatial plan.</li> </ul>
Weakness	<ul style="list-style-type: none"> <li>• Limited scientific research about the protected areas, their delineation, status, biodiversity, etc. (Only one study exists: Wadi Al Quff).</li> <li>• The areas are limited in size and near urban areas.</li> <li>• Protected areas are mostly under Israeli control.</li> <li>• Increasing human pressures and habitat destruction.</li> <li>• Conflicts between governmental stakeholders (MOA, EQA) over park management.</li> <li>• Significant environmental deterioration may be irreversible.</li> <li>• Lack of proactive agendas.</li> </ul>

Opportunities	<ul style="list-style-type: none"> <li>• Potential for simultaneously developing ecotourism and park conservation.</li> <li>• Available national and international support and funding.</li> <li>• Available knowledge bases can be mobilized (especially academics).</li> <li>• Small actions with limited budgets can potentially have a huge impact on conservation.</li> </ul>
Threats	<ul style="list-style-type: none"> <li>• Mismanagement of reserves (e.g. using parks as political bargaining chips).</li> <li>• Continued occupation restricts ability to act on conservation issues.</li> <li>• Challenges, including mobility, to conservation programs under occupation.</li> <li>• Fires.</li> <li>• Continued habitat destruction (overgrazing etc.).</li> <li>• Environmental threats such as poor agricultural practices and climate change.</li> </ul>

The MOA is responsible for the administration and guarding of forests and protected areas, while the MOA and EQA share responsibility for managing protected areas.

A number of strategic options exist for obtaining long-term policy objectives:

1. Preserving nature and forests, increasing their areas, protecting wild plants and animals, and coordinating their use to avoid overuse;
2. Promoting and strengthening the institutional structure and human capacity needed to protect forests and nature;
3. Developing an adequate legislative framework for nature conservation, sustainable forest management, and protection of plant and animal species, consistent with regional and international laws, agreements, and acts;
4. Inventorying, monitoring, and researching forests and nature, to establish a scientific basis for planning and management;
5. Increasing public awareness and enhancing local knowledge and skills necessary for conservation and the sustainable use of nature and forests;
6. Developing and increasing regional and international cooperation in forest and nature conservation.

## Recommendations

1. **Data gathering:** Palestine needs scientific, accurate, and up-to-date data covering all current and potential protected areas. We recommend that qualified academic centers spearhead efforts to gather baseline data of the geography, geology, hydrology, fauna, and flora. These experts must be chosen in an orderly fashion, including announcements of the funding available. One of the few protected areas where such data has been collected is Wadi Al Quff (Qumsiyeh, 2016 a, b; Qumsiyeh et al., 2016; Khalilieh, 2017). With over 48-51 areas in need of protection (see Section 5), the task is daunting and may take a few years. We suggest prioritizing Al Qarin, Wadi Al Haramiya, Wadi Al Qilt, Umm at Tut, and Wadi Qana within the next five years. Other regions should be studied in future years.
2. **Management plans:** Next, we must develop holistic management plans, taking social, cultural, and economic needs into consideration. These should be designed by trained experts (of which there are few in our region). Thankfully, groups like the RSCN (Jordan) are willing to help. The conflict between EQA and the MOA in terms of authority over parks should be resolved. A good first step was the EQA's draft of a management plan for Wadi Al Quff, developed with help from experts.

That single project cost over \$100,000 and lasted for two years. The next step should be a high level governmental decision how and who should implement the plan. Unfortunately, they have failed to do just this, and instead are planning to transfer responsibility the municipality of Hebron. Local municipalities are subject to various pressures, resulting in unsustainable conservation efforts. Such a transfer would bide poorly for this rich area, replete with key endangered species such as raptors. It would also set a very bad precedent. (Refer to Section 3.3.2 for the EQA's point of view.)

3. **Educating for protected areas:** EE programs in and around protected areas should be rooted in scientific principles and developed cooperatively by NGOs and academia with a cohesive strategy that fosters creativity, innovation, and sustainability. This includes comprehensive public engagement with parks service resources, to ensure communities benefit from the protection of their natural resources. This system should also encourage current and emerging leaders to assume tasks relating to protected areas, programs, and strategies at a local, regional, and global scale. Marketing, education, and cooperative associations can help raise awareness, leading to increased interest, research, and protection.
4. **Selective conservation efforts:** Due to limited resources, it is critical to identify, prioritize, and fund hotspots and key species for conservation (Myers et al., 2000), as well as establish buffer zones around parks with local buy-in. This should be done by conservation experts with relevant experience. One example is the urgent need to protect the last remaining habitat for the Syrian spadefoot toad (*Pelobates syriacus*), which is a single pool in the northern West Bank (Salman et al., 2014).

## 8.7 Challenges

Human activity has caused significant land degradation in our region (Dudeen, 2008). The SP's environment continues to deteriorate at an alarming rate (ARIJ, 2015) and, as discussed above, current mechanisms suffer from weakness and significant threats. In terms of conservation, a gap exists between legislation, knowledge, and implementation. Laws were passed to protect the environment, but implementation remains lax. All modern societies that wish to live sustainably must focus their resources on environmental conservation.

**Table 8.6** SWOT analysis for environmental challenges (section 8).

Strength	<ul style="list-style-type: none"> <li>• Increased general awareness surrounding conservation issues.</li> <li>• Schools and many institutions are developing conservation programs.</li> <li>• The global community is very supportive of conservation efforts.</li> <li>• Many NGOs and governmental/academic institutions are interested in being involved.</li> <li>• Rich biodiversity in a globally important area.</li> <li>• Ecotourism is a nascent field in Palestine, related to environmental conservation.</li> </ul>
Weakness	<ul style="list-style-type: none"> <li>• Little mobilization of resources.</li> <li>• Lack of communication/coordination between stakeholders, leading to conflicts that delay/foil action.</li> <li>• Lack of proactive agendas.</li> <li>• Inefficient use of funding.</li> <li>• Workshops and programs result in little change of behavior.</li> <li>• Increased population (Israeli settlers and Palestinians) impacts a very fragile area.</li> <li>• Israeli policies limit the potential for sustainable development.</li> </ul>
Opportunities	<ul style="list-style-type: none"> <li>• Opportunities to work with families and small communities (e.g. permaculture).</li> <li>• Global expertise and funding are available, and knowledge can be easily transferred.</li> <li>• Conservation strategies can enhance local economic development (e.g. permaculture).</li> <li>• Available knowledge bases can be mobilized.</li> <li>• Small actions with limited budgets can have a huge impact on conservation.</li> </ul>
Threats	<ul style="list-style-type: none"> <li>• Continued occupation and lack of sovereignty limit human potential and the ability to deal with impending threats.</li> <li>• Resources are potentially unstable and may decrease.</li> </ul>

## Recommendations

1. **Data-based policies:** We must invest more in studying, responding to, and developing strategies for mitigating threats. This must be performed by experts at academic institutions and be rooted in accurate, verifiable data. We must then align knowledge with practice, while fostering cooperation among stakeholders.
2. **Respond to threats:** The SP must consider environmental threats as highly serious threats to our population. The SP can seek recourse in international tribunals and adopt other legal, non-violent strategies to end the Israeli occupation and gain sovereignty, but this sovereignty must be exercised per international obligations, for example under the CBD (EQA, 2015).
3. **Respond to climate change:** For a developing state like Palestine to address climate change, awareness must be mainstreamed, while actions and policies must be institutionalizing at the

- level of municipalities (Roberts, 2008). We recommend adding schools for all sectors of society. This requires studying the effects of climate-change, having experts design teaching modules, and having credible NGOs and/or the educational sector implement well-designed programs.
4. **Combat invasive species:** Stakeholders (especially EQA, MOA, and NGOs) need to follow best practices and apply international standards (Kettunen et al., 2009), in order to combat those species that pose a significant threat to biodiversity,
  5. **Dealing with liquid and solid waste:** Programs should be mainstreamed (by EQA, MOH, NGOs, and others) to reduce both liquid and solid waste. Concurrently, programs for dealing with waste must be developed. Sewage treatment facilities can be expanded or built to preclude sewage from reaching ecologically sensitive areas like Wadi Nar (Mar Saba and beyond). The recycling and upcycling of solid waste can be expanded and mainstreamed (e.g. using discarded plastic bottles to build green walls). This should be done via municipal programs, in partnership with NGOs and/or the private sector and/or affected communities. Since 70% of solid waste in the SP is organic, we highly recommend developing composting centers. This can be done at academic institutions and run by NGOs or governmental agencies (MOA, EQA). PMNH has a model center and is now working with schools on this issue.
  6. **Energy:** The Ministry of Energy, in partnership with the private sector, must develop alternative renewable energy sources like solar and wind (Yaseen, 2009). If done in the right areas, this will positively impact biodiversity conservation. Bird migration routes should be considered when developing infrastructure for harnessing wind energy.
  7. **Economy and ecotourism:** Develop strategies for conservation that also enhance local economic development. Occupation should not be an obstacle for promoting tourism, especially cooperative venture between academia and NGOs, such as *Masar Ibrahim* (Abraham's Path). Other possible partnerships may involve the private sector, civil society, and government ministries where civil society holds more of an official position. It is crucial to restructure the EQA and invest in its capacities, enabling it to oversee partnerships, ensure that programs are outcome-driven, avoid duplication, and maximize efficiency. Much can be done to ensure that conservation benefits the local community rather than harms the economy.
  8. **Mainstreaming conservation:** We need to expand the local knowledge base, and link it to global conservation efforts (mostly academics with some support from NGOs, the EQA, and MOA). Awareness-raising efforts must be systematic, explaining conservation, its importance, and how every person's behavior can make a difference. The current leadership of NGOs, academic institutions, and governmental bodies must prioritize conservation.
  9. **Peacebuilding:** Ending the Israeli occupation and achieving Palestinian sovereignty can be done in tandem with conservation efforts, and even enhance them. Peacebuilding efforts aimed at environmental justice are not the same as normalization.



## 8.8. Five Year Plan, as Proposed by the Authors

**Note:** This action plan is based on the analysis and recommendations above, yet it may be refined or edited with further input from stakeholders (beyond the consultancy stage), especially governmental agencies.

#	YEAR	Recommendation	Outputs	Responsibility	Estimated budget (US\$) plus notes
1	1	Conduct a comprehensive review and assessment of current environmental and agricultural laws.	<ul style="list-style-type: none"> <li>• Fulfill obligations (as outlined primarily in article 40) regarding the management of protected areas.</li> <li>• Align requirements with obligations stemming from international agreements (e.g. (CITES, CMS, CCD, UNFCCC)</li> <li>• Pass comprehensive laws for protected areas and their management.</li> <li>• Form legal body to implement environmental laws.</li> <li>• Clarify the role of the different authorities regarding protected areas and their management.</li> </ul>	MOA and EQA	50,000 (fees for legal experts)
2	1	Reform and strengthen governmental agencies responsible for law enforcement.	<ul style="list-style-type: none"> <li>• Allocate resources for implementing laws and policies.</li> <li>• Train and equip police officers to enforce environmental laws.</li> <li>• Create and train a division within the law enforcement community focused on environmental issues.</li> </ul>	MOA and EQA	50,000 (this should be government matched)
3	1-2	Conduct holistic studies of protected areas and areas of rich biodiversity, focusing on threats.	<ul style="list-style-type: none"> <li>• Conduct detailed studies of target ecosystems (fauna, flora, abiotic elements).</li> <li>• Publish research in various areas (invertebrates, vertebrates, plants, ecosystems), focusing on protection.</li> <li>• Collect specimens and photographs for comparative database.</li> <li>• Publish checklists of biodiversity groups.</li> <li>• Conduct conservation assessments.</li> <li>• Red-list species.</li> </ul>	Academic and research institutions	250,000 (utilizing existing resources makes this amount feasible; redundancy will render this amount insufficient)
4	1-2	Build environmental capacity via local training and sending people abroad.	<ul style="list-style-type: none"> <li>• Train a cadre of MSc and PhD students in a range of fields.</li> <li>• Restructure local capacity, with help from international and local experts.</li> </ul>	Academia, with help from NGOs, EQA	200,000 (scholarships exist, e.g. DAAD, AMID-EAST)
5	2	Increase environmental education and awareness.	<ul style="list-style-type: none"> <li>• Coordinate efforts of various groups by insisting on joint projects.</li> <li>• Collaborate on official printed and electronic material (e.g. guidelines for environmental clubs and education), based on scientific principles.</li> <li>• Raise awareness of environmental issues among 500,000 Palestinians, using scientific principles (i.e. aim for behavioral changes rather than merely conveying information).</li> </ul>	NGOs with academic support (e.g. faculties of education at universities)	100,000 (higher if there is lack of cooperation or poor organization)

6	2	Cooperation and coordination among NGOs.	<ul style="list-style-type: none"> <li>• Coordinate joint efforts between local NGOs, academia, and government institutions.</li> <li>• Ensure all active NGOs have updated webpages.</li> <li>• Monitor NGOs activity (EQA).</li> <li>• Capacity building in NGOs: human resources and technical assistance is required to increase transparency and effectiveness.</li> </ul>	EQA and NGOs (PEN-GON could play a role)	50,000
7	2	Evaluate and update current university programs related to biodiversity.	<ul style="list-style-type: none"> <li>• Update graduate and undergraduate curricula to meet current biodiversity needs.</li> <li>• Build capacity and train university professors and graduate students in various fields of biodiversity.</li> </ul>	Palestinian universities and colleges	100,000 (Erasmus+ programs can offer funding, in cooperation with European universities)
8	3	Support natural history museums and botanical gardens in major Palestinian cities.	<ul style="list-style-type: none"> <li>• Document Palestinian flora and fauna.</li> <li>• Establish comprehensive collections for scientific study.</li> <li>• Build knowledge of different floral and faunal groups.</li> <li>• Raise public awareness among the local community.</li> </ul>	Palestinian universities and research centers	250,000
9	3	Delineate and identify protected areas within the Palestinian territories that can be managed by the PA.	<ul style="list-style-type: none"> <li>• Define and formulate management plans for each protected area.</li> <li>• Build capacity among the staff of each protected area.</li> <li>• Conduct baseline surveys and identify biodiversity in each area.</li> <li>• Identify threats.</li> </ul>	EQA and MOA, in cooperation with academia and NGOs	1,500,000
10	3	Conduct workshops to identify milestones, set goals, and coordinate efforts.	<ul style="list-style-type: none"> <li>• Identify active stakeholders.</li> <li>• Present updates on activities and achievements of various projects.</li> </ul>	All stakeholders	30,000
11	4	Fund ecotourism and public awareness initiatives, based on scientific principles and basic research in biodiversity.	<ul style="list-style-type: none"> <li>• Promote ecotourism among stakeholders.</li> <li>• Include local communities in public awareness programs.</li> <li>• Continue investing in basic research on local biodiversity to complete the database.</li> </ul>	NGOs and EQA	100,000
12	4	Prepare National Strategy on Biodiversity.	<ul style="list-style-type: none"> <li>• Update the existing strategy based on successful outcomes.</li> </ul>	All stakeholders	200,000
13	5	Fund proposals that respond to climate change, pollutions, threats, etc.	<ul style="list-style-type: none"> <li>• Seek funding for scientific studies on how climate change and pollution affect Palestinian biodiversity.</li> </ul>	NGOs, universities and EQA	150,000
14	4-5	Develop citizen science and citizen engagement.	<ul style="list-style-type: none"> <li>• Aim for 30,000 trained Palestinians (especially youth) involved in field studies, supervised data gathering, and utilizing appropriate portals (we think starting now on this is premature)</li> </ul>	NGOs and academia	100,000

## Section 9

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