STATE OF PALESTINE

FIFTH NATIONAL REPORT

TO THE CONVENTION ON BIOLOGICAL DIVERSITY

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PREFACE

The geographicl situation of the State of Palestine at the crossroads of the African, Asian and European continents have endowed it with rich biodiversity. Decades of Israeli occupation have led to environmental degradation and posed lots of challenges which adversely impacting our management of natural resources. Nevertheless, the presence of biological resources, as well as extensive indigenous knowledge, is fundamental areas that merit attention in the realization of the ecological and social values needed for the conservation of biodiversity. The continued Israeli occupation of our lands has left us with many social, political, economical and environmental challenges. Living under occupation, without control over our lands and resources, left us with no option but to put more pressure on available limited resources for subsistence and survival. In addition, the already fragmented agricultural lands that our farmers are cultivating are degraded every day by toxic wastes and pollution dumped on Palestinian lands by illegal Israeli settlements.

State of Palestine became an observer member state of the United Nations in November 2012, and as an emerging country, we are taking urgent steps to address our local environmental problems and conserve the biodiversity and natural resources. This brings with it a grave responsibility for stewardship over our biodiversity heritage and natural resources. Biodiversity Protection and preservation in the State of Palestine will have many environmental, health and economic benefits. It will create job opportunities in a wide-range of biodiversity programs, including the management of natural resources, protected areas, land use, etc. In addition, we need to invest in the protection of our biodiversity and natural heritage resources in order to attract the myriad of pilgrims to the holy lands to enable them to visit the ecological riches of State of Palestine as well as its ethnic, religious and cultural heritage and diversity.

The Environment Quality Authority (EQA) core mission is to promote sustainable environmental development via protecting the environment with all its elements and prevent the environmental pollution, hazards, threats and dangers facing life of all living organisms. Among the factors that determine the health of the people and the environment is the diversity of what nature has bestowed on this land– the plants, the animals and the habitats they need to continue their life. Palestinians are committed to the preservation and sustainable use of State of Palestine's rich heritage of biodiversity, land, water and marine natural resources, therefore, State of Palestine recently ratified the convention on biological diversity.

The government, the local communities, the non-governmental organizations– with support from UNEP–ROWA and IUCN-ROWA all came together in well-organized efforts for preparing State of Palestine's Fifth National Report on Biodiversity.

Eng. Adalah Atteerah

Chairman of Environment Quality Authority

ACKNOWLEDGEMENTS

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The EQA would also like to acknowledge the sincere dedication and commitment of the Ministry of Agriculture, the Palestinian Central Bureau of Statistics (PCBS), and our partners from the Palestinian NGO's including: Applied Research Institute-Jerusalem (ARIJ), Palestine Wildlife Society (PWLS), Environmental Education Center (EEC), Biodiversity and Environmental Research Center (BERC), Basha Scientific Center for Researches & Studies, Palestine Museum of Natural History (PMNH), Birziet University. Thanks also extended to Ministry of Foreign Affairs, for their valuable remarks.

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LIST OF ABBREVIATIONS

ARIJ	Applied Research Institute of Jerusalem
BAU	Business As Usual
BD/IUG	Biology Department at the Islamic University of Gaza
BERC	Biodiversity and Environmental Research Center
BGs	Botanic Gardens
BRC	Biotechnology Research Center
BSAPP	Biodiversity Strategy and Action Plan
CAM	Complementary and alternative medicine
CBD	Convention on Biodiversity
CEPA	Communication, Education and Public Awareness Strategy
CITES	Convention of International Trade in Endangered Species
COAP	Company of Organic Agriculture in Palestine
CR	Criticaly Endengered
DDT	Dichlorodiphenyltrichloroethane
Dunums	Dunam is 1,000 square meters (10,764 sq ft), which is 1 decare
EEC	Environmental Education Center
EIA	Environmental Impact Assessment
EN	Endangered
EQA	Environment Quality Authority
ESA	European Space Agency
ESCWA	UN Economic and Social Commission for West Asia
ESCWA-BGR	UN Economic and Social Commission for West Asia-Bundesanstalt für Geowissenschaften und Rohstoffe
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GIS	Geographical Information System
GMOs	Genetically Modified Organisms
GS	Gaza Strip
GW	GlobWetland
G-WOS	Global Wetlands Observing System
HICP	Harmonised Index of Consumer Prices
IAS	Invasive Alien Species
IBAs	Important Bird Areas
ICC	International Creminal Court
IMO	Institute of Market ecology
IPAS	Important Plant Areas
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Areas
LC	Least Concern
MCM	Million Cubic Meter
MDGs	The Millennium Development Goals
MEAs	Multilateral Environmental Agreements
MedWet	The Mediterranean Wetland Initiative
MEnA	Ministry of Environmental Affairs
MI	Marin Institution

MOPIC	Ministry of Planning and International Cooperation
MT	Metric Tons
NARC	National Agricultural Research Center
NBSAP	National Biodiversity Strategy and Action Plan
NDVI	Normalized Difference Vegetation Index
NGOs	Non Governmental Organizations
NIS	New Israeli Shekel
NSP	National Spatial Plan
NT	Near Threatened
OCHA	Office for the Coordination of Humanitarian Affairs
OMW	Indicators on the status and trends of Mediterranean Wetlands
PA	Protected Area
PARC	Palestinian Agricultural Relief Committee
PCBS	Palestinian Central Bureau of Statistics
PFTA	The Palestine Fair Trade Association
PIALES	Palestinian Institute for Arid Land and Environmental Studies
PMNH	Palestine Museum of Natural History, Bethlehem University
PNA	Palestinian National Authority
PWA	Palestinian Water Authority
PWLS	Palestine Wildlife Society
RAPPAM	Rapid Appraisal and Prioritization of Protected Areas Management
RII	Relative Importance Index
ROTEM	Israeli Land Information Center
RSCN	Royal Society for the Protection of Nature
SEA	Strategic Environmental Assessment
SGP/GEF	Small Grant Program/ Global Environmental Facility
SP	State of Palestine
TAPHM	Traditional Arabic Palestinian Herbal Medicine
UAWC	Union of Agricultural Working Committees
UN	United Nation
UNDP	United Nations Development Programme
USD	United States Doller
VU	Vulnerable
WB	West Bank
WCMC	World Conservation Monotering Center
WHO	World Health Organization

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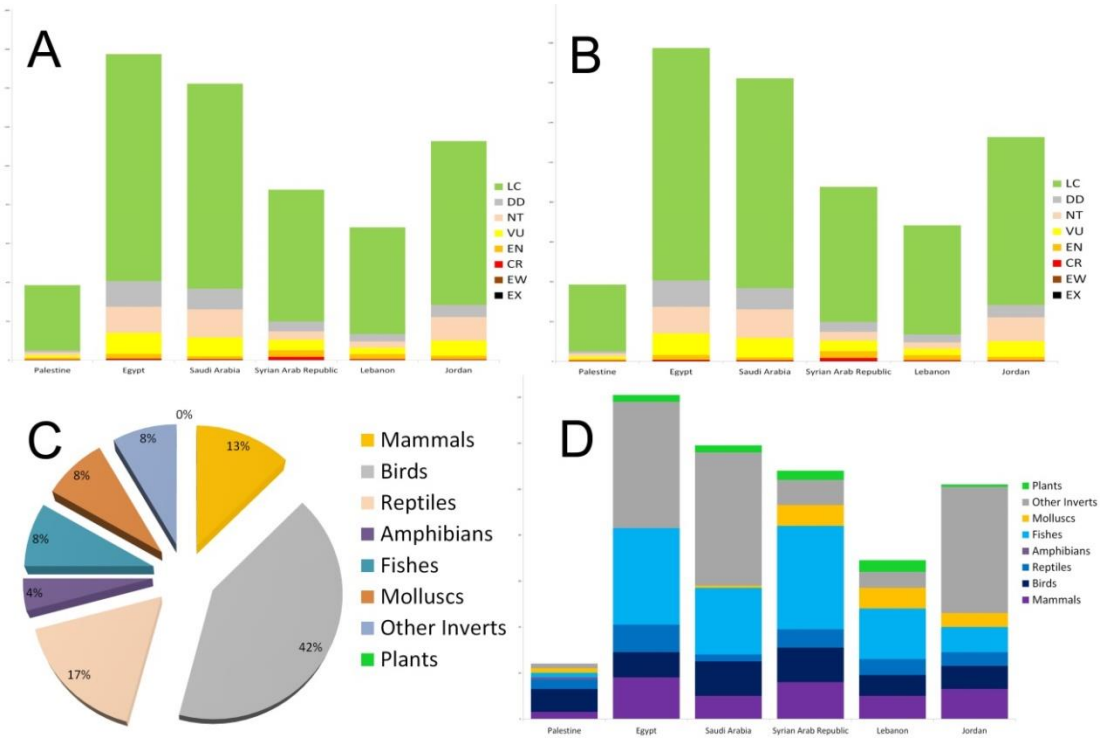
Executive Summary:

Despite its small area, State of Palestine's nature enjoys a rich biodiversity, compared to other countries in the region, due to its distinctive location as well as its special topography and history such as Great Rift Valley and bird's migrations etc. It contains **five bio-geographical zones** (Ecosystems) which associated with their climate and biodiversity (Central Highlands - Semi-Coastal Region - Eastern Slopes - Jordan Rift Valley - Gaza Strip), in addition to **four phytogeographical regions** (Mediterranean - Irano-Turanian - Saharo-Arabian - Sudanese/Ethiopian). It consists of two physically separated landmasses: the West Bank [WB] (including East Jerusalem) and the Gaza Strip [GS].

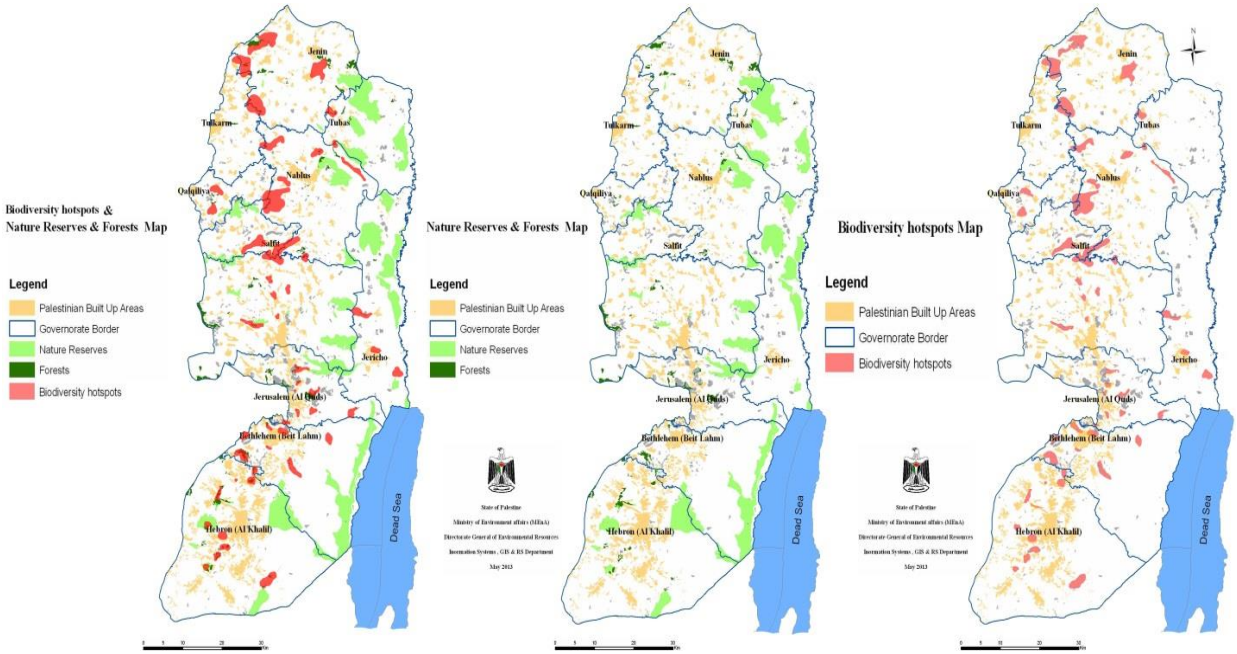
There are about 51,000 living species in the State of Palestine, constituting approximately **3% of the global biodiversity**. **There are more than 30,850 animal species**, consisting of an estimated 30,000 invertebrates, 373 birds, 297 fish, 92 mammals, 81 reptiles and 5 amphibians. **The state of Palestine also hosts over than 2,000 species of plants including 54 endemic plants** that do not exist in any other part of the world.



Red list status assessment for State of Palestine and some neighboring countries; A- Animal Red List Category summary, B- Plant Red List Category summary, C- Threatened taxonomic groups' percentage within State of Palestine, and D- Threatened taxonomic groups within State of Palestine and some neighboring countries

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 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.

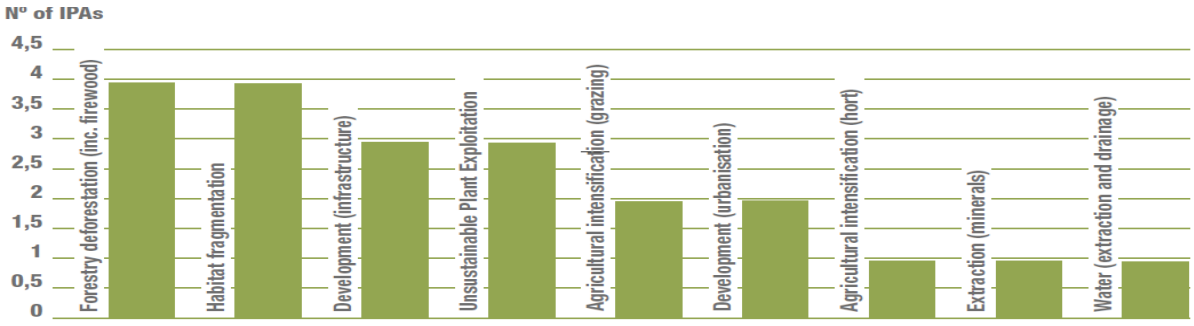
The country is rich in biodiversity including **more than 50 sites were identified as a key biodiversity area**, these sites were included in the national spatial plan for protection from any change or future land use. With regard to natural reserves, the Israeli the occupaying power has **declared 48 natural reserves in the West Bank** including east Jerusalem with a total area of 69,939 ha (hectares); forming 12.35% in the year 2005 (Spatial layer at ARIJ GIS department).



Nature reserves, forest and key biodiversity areas in West Bank; from left to right: key Biodiversity areas, Nature Reserves and Forest, and overlap between three parts.

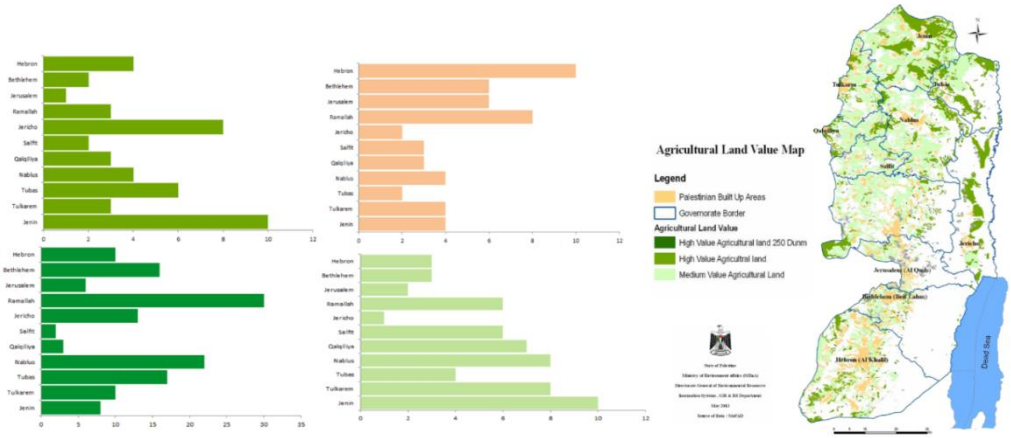
Nine IPAs have been identified by Al-Sheikh, (2011); four IPA's have been confirmed and described as internationally important sites, the remainder requires further investigation. **Three of these IPAs contain country endemic plants** and all sites contain species that have very restricted distributions. **Four sites** (Ein Al-Fashkha, Jericho, Jerusalem (east), and Jerusalem wilderness) cover about 21.500 ha were recognized by Birdlife International**as Important Bird Areas (IBAs)**. Wadi Gaza, Southern area of Jordan River, Al-Fashkha, Marj Sanour, and Wadi Al-Bhadan are the proposed Wetland sites by GlobWetland II.

As a result of a systematic review conducted by BERC in the year 2014 a "**National List of Medicinal Plants in the state of Palestine** was prepared ". This list comprises more than **368 plant species.**



Threats affecting IPAs in State of Palestine

Based on PCBS, (report 2014), the water supply in State of Palestine in 2014 was 342.7 MCM, 163.8 MCM in WB and 178.9 MCM in GS) and the daily allocation per capita was 81.7 Liter/capita/day. The most was supplied from groundwater wells were pumping about 246.3 MCM of water, make up the amount of water pumped from wells accounted for 71.8% of the amount of water available, followed by water purchased from the Israeli water company (Mekorot), where the quantity amounted to 63.5 MCM (18.5%), and finally the springs where the annual flow amounted to 28.5 MCM and accounted for 8.3% of the water sources that are relied upon to cover the demand for water for various uses. Morover, the Palestinian private sector companies of water (Botteled water) provide the amount of 4.7 MCM which is accounted for 1.4% (specieified for Gaza strip only). Palestinians are denied access to their rights of water resources in the Jordan River by the Israeli the occupying power whom completely continuing control it. Prior to the 1950s, the annual flow of the Jordan River was 1,300 MCM per year. As a result of heavy diversions by Israel the occupying power, the Dead Sea has experienced a rapid decline in water level and deterioration in water quality which has polluted the environment and destroyed ecosystems that are reliant on it. In the Gaza Strip the environmental situation is even more critical due to the continues ten years of siege by the Israel the occupying power. There is an increased pressure on available water resources because of Israeli occupying power policies of withholding and altering normal flows of places like Wadi Gaza. The increased demand for water has placed huge pressure on the coastal aquifer system. The Palestinians in Gaza Strip have resorted to over-extraction from the Coastal Aquifer at a rate of 50-60 MCM per year. This has caused the water table to drop below sea level and saline water to intrude rendering 90-95 percent unfit for human consumption. In addition, there are about 360 major wells in the West Bank mainly belonging to Palestinian and were drilled before 1967, destroyed by the Israel the occupying power.



Agriculture land value categories in West Bank and percentage of each category

Agriculture is of vital importance, accounting for about **4.1 percent of Gross Domestic Product (GDP) and 12.1 % of employment in year 2013**, with about **50 percent of Palestinian people** benefitting directly from agricultural returns. It is characterized by both **intensive irrigated agriculture**, in the Jordan Rift Valley and Gaza Strip, and partially in Tulkarm and Jenin, and **rain-fed farming** in the rest of the areas. In the plant production sub-sector, **rainfed agriculture forms** the largest cultivated area, which is **87.0% of the total cultivated land**. However, the actual contribution of rain-fed agriculture to the total plant production varies according to the amount and distribution of precipitation during the growing season. In regards to agricultural trade, the value of **agricultural exports grew by 32% from 2011 to reach $ 56.7 million in the year 2013**, contributing to **6.3% of the total value of Palestinian exports**.

Many biodiversity conservation challenges in the State of Palestine affect the whole region, giving special importance to the role of MEAs. **Habitat destruction** comes from a broad range of sources, including **unplanned urban expansion, overgrazing, over-exploitation, deforestation land degradation, unplanned forestry activities, desertification and drought, invasive alien species, and pollution from diffeerent contaminants.** In addition, the current Israeli occupying power aggression threatens biodiversity even worse, including but not limited to the uprooting of trees, land division to politically classified areas A, B, and C (Oslo II 1995), **land confiscation, colonial settlements, bypass roads, and the fragmentation of habitats mainly as a result of the annexation and separation wall**. These factors all serve to **affect genetic exchange** and, as a result, will weaken species composition in the future, thus precipitating the loss of this valuable resource and heritage. There are **challenges** that face conservation of biodiversity like **lack of systematic planning and the improper use of lands** due to topography and climate, as well as because of the prolonged **Israeli the ocuupying power** that exert considerable negative pressure on the Palestinian environment. In addition, the **lack of awareness**, the lack of a clear and **endorsed plan for land use** has led in turn to overlapping and conflicting land uses and allowed the creation of facts on the ground that may become a barrier to future efforts to regulate this situation.

Few studies concluded that the State of Palestine will be vulnerable to the **implications and outcomes of climate change** in various ways[1]:

- **A rainfall decline and temperature** increase is expected, which would aggravate the problem of **draught and water scarcity**. The **temperature increase** is estimated to range between **2.2-5.1°C** and the **annual rainfall** decline is estimated to be at **10% by 2020 and at 20% by 2050**.
- The climate change is expected to aggravate the problem of **land degradation and desertification**, which will compromise the **agricultural production and threaten food security**. This may have socio-economic implications in terms of **increased poverty and social instability**.
- The possibility of **increased frequency of natural disasters** resulting from draught or extreme climatic events, such as **storms, floods, and heat waves**.

There are concerns about **overfishing of pelagic fish and of demersal fish**. **Large trawlers** catch Demersal and benthic fish, and these are the **biggest threat to the fishes of Gaza Strip**. The main source of **pollution** is the **discharge of untreated wastewater and dumping of waste** along the beach in north, **central and southern Gaza**. This pollution has resulted in major health problems for living creatures and marine life, as well as the **degradation of the quantity of fish**.

Taking into consideration all the above, the impact of the Annexation and **Separation Wall** construction by the **Israeli the occupying power** on biodiversity are expected. The severe impact of the Wall on the Palestinian **faunal and floral biodiversity** is summarized by the following:

- **Destruction of the natural habitat** of great areas since the Wall forms a **physical barrier** to the terrestrial ecosystem.
- **Fragmentation of ecosystems** and habitats which limits the **movements to terrestrial animals** and the available habitats.

[1]EQA, (Environment Quality Authority), (2010b). Environment Sector Strategy-Executive Summary. Environment Sector Strategy 2011-2013

- **Removal** and clearing of the **natural vegetation** cover from the wilderness areas where the Wall passes. left the wild **animals** of the region **with no sources for food or shelter**.
- Affecting the **natural balance of the ecosystem** and natural habitats.
- **Threatening and endangering** many species of **plants and animals** as a result of fragmentation, **isolation, and habitat loss**.
- **Destruction** and threatening of the **archaeological sites.**

About 4% of the West Bank including east Jerusalem and Gaza Strip is forested (MoA, 1999 data), or about 23,000 ha of a total land area of 602,000 ha. **Total forested Area** in the West Bank region forms 7,830 ha.in the year 2012 **forming only 1% of the total WB area**. The **total forested area** annexed **behind the Annexation and Separation Wall** is 4,200 hain the year 2012. The total forested area annexed in the eastern wall zone is 150 haThe loss of different forest plantations can have a significant effect on Palestinian biodiversity. The environmental value of the forest trees should also be added to the economic value. Deforestation is currently an issue in State of Palestine. Between 1971 and 1999, it is estimated that some **24% of forest cover have been lost**. Deforestation in the West Bank and Gaza Strip stands currently at 0.82% (MoA, 1999 data).

Abu-Ghnaim Mountain after Israeli destruction of the forest (1997-2015)[2]

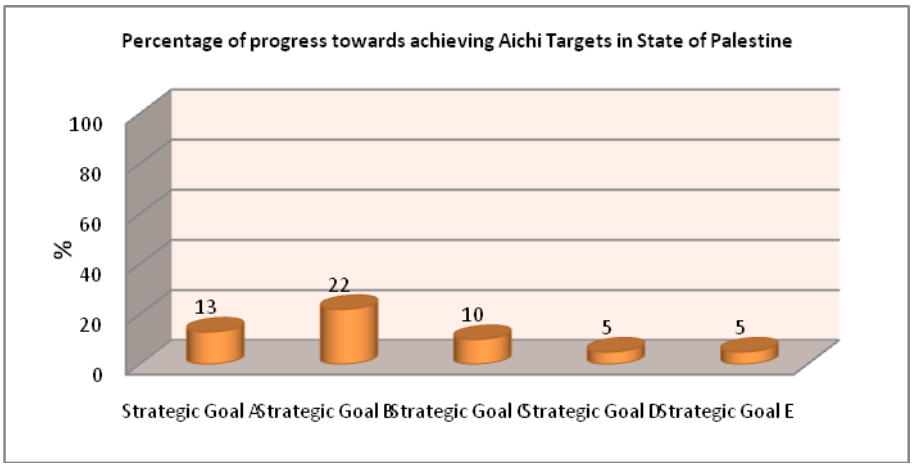
If deforestation continued at the rate observed in 1971 - 1999, in the '**business as usual' scenario** the total amount of **forest lost by 2020** would be 5,186 hectares, i.e. a **decrease of 22.4% of the current forest size**. If the target of **halting forest loss** is met instead, a possible path would be for the rate of deforestation to gradually and continuously fall until it **stops completely in 2020**. Although some forest will be inevitably lost in the next decade, its size will decrease at a lower rate than the current one, i.e. at 0.2% per year, and finally stabilize in 2020. If the theoretical target of halting deforestation by 2020 is met, and assuming a future carbon value ranging between 20€/ton (low), 39€/ton (medium) and 56€/ton (high), in 2020

[2] ARIJ

the carbon stored will be worth between 76.5 and 214.1 million €[3]. But in fact this is definitely not possible with all the exploitations and mismanagement that are taking place from the Palestinian side and the **confiscation of land and uprooting of trees from the Israeli theoccupying power and settler**.

The NBSAP's first objective is the conservation of Palestinian biodiversity, and the development and establishment of a representative **PA system** is listed as an **immediate priority action**. This strategy appears now outdated and **there is a need to revising and updating it**.

Although the updated Palestinian national biodiversity targets related to the **Aichi Targets** and their related indicators are **still not developed yet**, a biodiversity stakeholder national consensus through rapid assessment was undertaken on what has been done in relation to achieve the different Aichi Targets since their adoption in 2010 at global level approval. It is presented in the following figure where **Aichi targets are not properly achieved** for several reasons with the most important one is the **Israeli the occupying power**.



Percentage of progress towards achieving Aichi Targets in State of Palestine

State of Palestine **ratified the CBD and the Cartagena Protocol on Biosafety in 2014**, but has **not ratified the Nagoya Protocol** on Access and benefits Sharing of Genetic Resources, and is committed to the implementation of the provisions of the CBD. The **Environmental law didn't include** any article related to **Cartagena protocol on biosafety**, biotechnology or **Nagoya protocol** on access and benefit sharing of the genetic resources. Also, it has **no additional national legislations** or administrative mechanisms pertaining to **biosafety** and access to genetic resources and associated **traditional knowledge** and benefit sharing from their utilization. This is considered a key constraint towards achieving more meaningful benefit sharing.

The most recent report on poverty has shown that the **poverty rate in 2010**, based on monthly consumption patterns, **was 25.7%, with significant disparity between the West Bank and Gaza Strip** (18.3% and 38% respectively). The disparities between the West Bank and Gaza Strip are primarily due to the ten years conued **siege imposed by the Israeli occupying power on the Gaza Strip**, which prevents the entry of the basic raw materials needed to be economically active /implement projects. The market in the Gaza Strip is small,

[3]Görlach, B., Möller-Gulland, J., Bar-On, H. and Atrash, I. (2011). Analysis for European Neighbourhood Policy (ENP) Countries and the Russian Federation of social and economic benefits of enhanced environmental protection – occupied Palestinian territory Country Report.

but the siege has had a major impact on poverty rates and led to a leap in poverty to the unprecedented level of 55.7% in 2007 compared with 23.6% in the West Bank.

The available data show that the **percentage of households nationally lacking food security was 27% in 2011** (44% in the Gaza Strip and 17% in the West Bank). There has been a considerable improvement in food security compared with 2009 and 2010: the percentage of households without food security totalled 33% nationally in 2010 (52% in the Gaza Strip and 22% in the West Bank), while in 2009, the percentage nationally was 36% (60% in the Gaza Strip and 22% in the West Bank).

Palestinian **women have high enrolment rates** at **all levels of education**, actually **exceeding male enrolment rates** in some stages. The **ratio of females to males** in basic education **is 98 females for every 100 males**; in secondary education **the ratio is 118 females for every 100 males** and in university education the **ratio is 128 females for every 100 males**. In the labour market, there is still a wide gap between females and males. The **female participation rate** (15 years or older) in the labour force **was 15% in 2010** compared to 67% among males in the same age group. **Female unemployment stands at 27% compared to 23% for males**. These figures point to the presence of a large gap between males and females in relation to the labour market and the need for policies and interventions to encourage female participation and protect their rights.

Data from the Palestinian Ministry of Health in 2010 show that the main causes of **infant deaths in the West Ban**k were prenatal diseases (38.0%: 34.6% for males and 42.3% for females), congenital malformations (18.0%) and blood poisoning (11.1%).

Regarding the **seven goal of the MDGs** (ensure environmental Protection and sustainability), State of Palestine has **achieved substantial progress** on the legal front pertaining to the **protection of the environment**. The **percentage of land** under **Palestinian control** is limited to **22%** while Israel the occupying power continues occupying the whole West Bank and in particular the areas classified as Area C that make up approximately 60% of the West Bank. This has a direct impact on Palestinian control of other resources. **State of Palestine benefiting from just 21% of its water resources** while Israeli the occupying power control overall the Palestinian water resources and this hampers efforts to implement the measures required to protect the environment and conservethe biodiversity. **Around 13% of wastewater is treated and only 30% of solid waste is dumped in landfill sites in a sanitary manner**. Vital projects pertaining to wastewater treatment or the establishment of landfill sites are obstructed by Israel the occupying power, especially where projects might be established in Area C.

Recommendations:
After all these Palestinian efforts and activities there are some **recommendations developed during the preparation process of this report** which need **urgent and extra work** in order to achieve them. These recommendations are summarized as follows:

- The existing Palestinian **NBSAP is out of date** and there is urgent need to start the **update process** of it in order to achieve **Aichi targets mainly target no. 17**.
- More efforts needed on the **existing national outreach program** in order to mainstream biodiversity issues within the other **national sectorial plans and projects**, and to adequately address the **private sector and local communities** into projects identified.
- **Comprehensive fieldwork studies** about protected areas management and conservation, populations, species numbers, distribution and dynamics in **biodiversity**

(checklist of species) at **national scale** should be start to fill the existing gaps in knowledge and remove the conflicts in data certainty among different data sources.

- Extensive work on extracting the **values of ecosystem services** and linkage to **human livelihoods** is a recommended action that helps the decision making.
- It's very important to start working on topics like: **illegal hunting** – **illegal wildlife trade** – etc.; that will be hot issues in the near future at the global levels.
- **National studies** should be focus on genetic diversity, the amount of produces from **Genetic Modified Organisms (GMOs) -** there is an urgent support is needed to **prepare the National Framework on Biosafety** for the State of Palestine to maximize the benefits and to **minimize** the potential **threats of GMOs for biodiversity**.
- Some plants and birds species were investigated to be invasive, but a **comprehensive survey and assessment of the invasive species is urgently needed** to **develop a national strategy** for combating and eradicating **the invasive species**.
- Through collaboration, communication, and coordination between relevant organizations **it's very important**, for biodiversity conservation efforts, to determine the **severity, extent and ranking of threats affecting PAs, endemic and threatened species -** a ranking of the **root causes** leading to this **threats and mapping** them.
- **Modeling and future scenarios analysis for the impact of main biodiversity threats** are highly recommended to be taken as soon as possible.
- Establish a national museum for nature conservation
- Establish a national information bank to collect data about birds, migration patterns, habitats, and breeding grounds.
- Establishment and development of a national botanical garden and educational garden.
- Establishment ofa national seed bank of native species.
- There are **gaps in existing national legislations** about **biodiversity**, **protected areas**, **biosafety** and **intellectual property rights**. Therefore, immediate actions regarding **declaring or updating the national legislations** are required.
- It's very important to start **intensive national work** on the following topic:
    - Prediction models of **temperature and rain fall**.
    - Future scenarios on the **distribution of endemic and threatened species**.
    - Future impacts on areas of **agriculture and fisheries**
    - Future changes in **demography** and its effect on biodiversity and **ecosystem services**.

SECTION I:

CURRENT BIODIVERSITY STATUS, TRENDS AND THREATS

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1.1. COUNTRY PROFILE

The State of Palestine consists of the West Bank including East Jerusalem, and the Gaza Strip and the West Bank is surrounded by Israel from the west, north, south; and Jordan from the east (Map 1). The geographical location is between 31°13' and 32°33' Latitude, and between 34°13' and 35°34' Longitude. It is divided into Eleven Governorates Jenin, Tulkarm, Qalqilya, Tubass, Salfit, Nablus,, Jericho, Ramallah, Jerusalem, Bethlehem, Hebron, .; (2) The Gaza Strip is a coastal zone at the eastern extreme of the Mediterranean Sea on the edge of the Sinai Desert. The Gaza Strip is surrounded by Israel from the east and north, Egypt from the south and the Mediterranean Sea from the west. It is composed of five Governorates North Gaza, Gaza, Deir al Balah, Khan Yunis and Rafah (ARIJ, 2007).

Map 1: Location map of State of Palestine with West Bank and Gaza Stripgovernorates

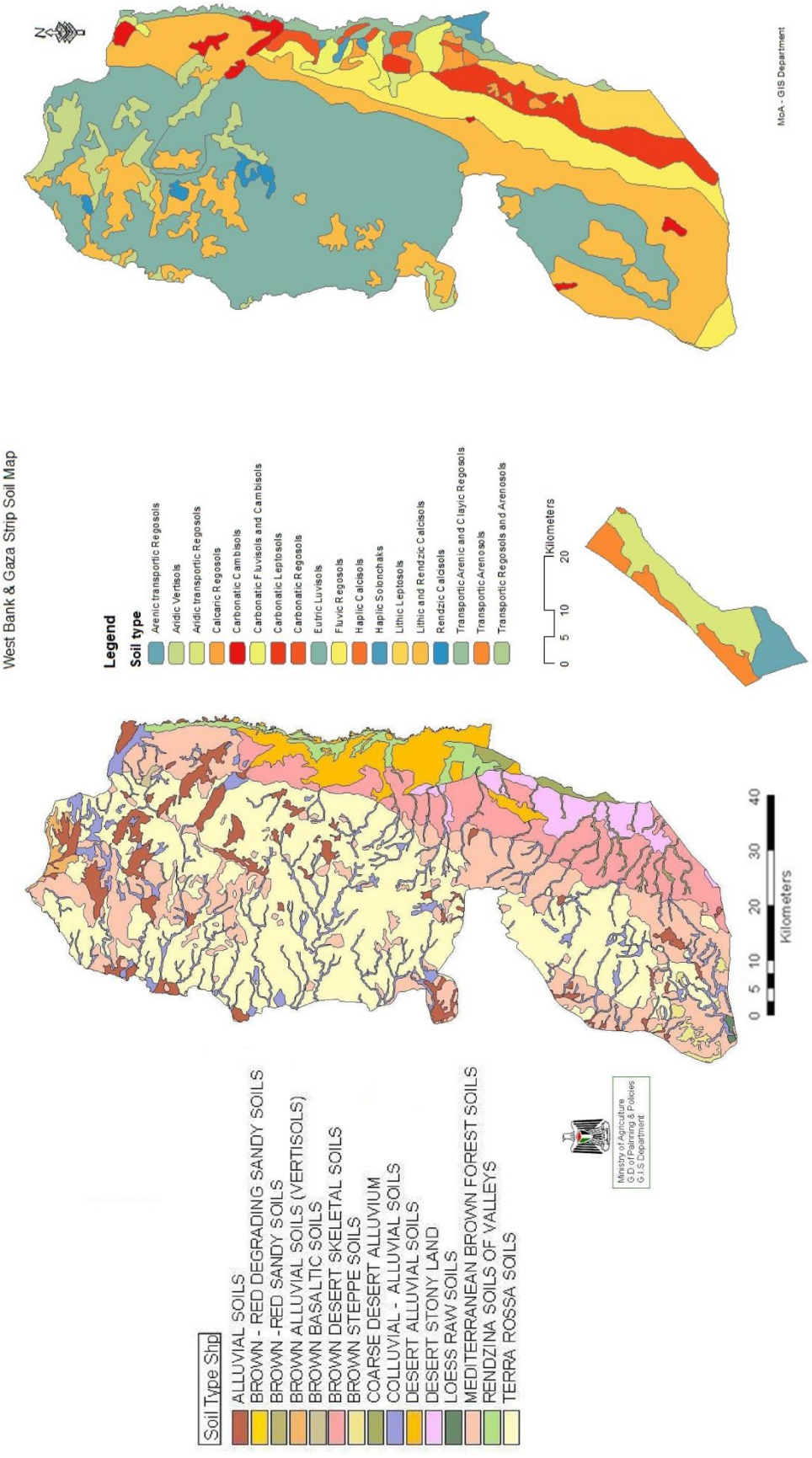
Despite its small geographical area, Palestine is characterized by a great variation in topography and climate. This variation is directly reflected on the distribution and diversification of agricultural and biogeographic patterns. The climatic and geographic factors allowed successful irrigated agriculture in the Jordan Rift Valley (the lowest area in the world) and rain fed farming in the mountains. The West Bank is divided into four major geomorphological parts: Semicoastal plains, Eastern Slopes, central highlands and the Jordan Rift Valley. The mountainous area of the West Bank serves as the main rainfall collection and replenishment zone for the underground water aquifers. Many drainage and valley systems are spread in and among the above mentioned four parts. The Gaza Strip is essentially a foreshore plain gradually sloping westwards. In the north of the Gaza Strip there are four ridges with different elevations ranging between 20 to 90 m above Sea Level. The ridges are: Coastal ridge, Gaza ridge, the el-Muntar ridge and the Beit Hanoun ridge. Active dunes can be found near the coast especially in the southern part between Deir el Balah and Rafah. Areas with large accumulation of loess can be found 15 km southwest of Gaza and east of Khan Yunis[4].

Soils are distinguished by its high range of variety in type and nature. Soils are formed due to several conditions including climate, mechanical weathering and soil erosion from wind and rainfall, and other topographic materials, geology, and vegetation. Climate and geology have a major influence on the formation of soils. Climate has two major influencing factors on soil formation. The first is the temperature and the second is rainfall. As the two factors increase, the weathering of rocks and minerals will be faster. For every 100 ^{o}C rise in temperature, the rate of biochemical reactions doubled (MYU, 2005). Thus, the weathering process of soil is witnessed to be the highest in the eastern parts of the West Bank, followed by the eastern-southern parts of Mandate SP, and decreases to the minimum in the middle parts of the West Bank (Governorates of Ramallah, Bethlehem, Hebron, and partially of Nablus).

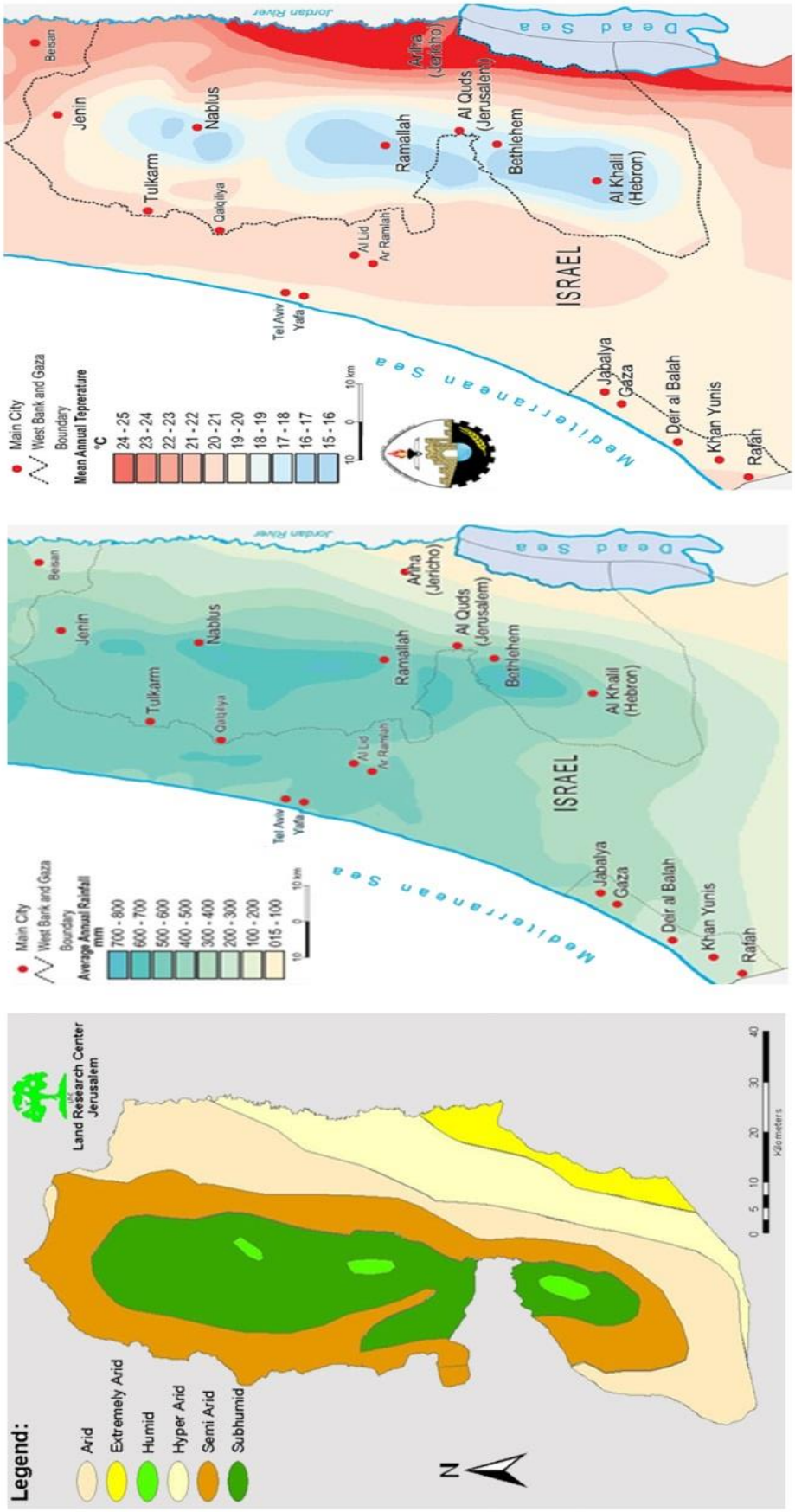
The most common soil associations are Terra Rossa and Brown Rendzinas, dominating in the central highlands of the West Bank. Brown Rendzinas and Pale Rendzinas are found to the north and south of the mountain ridge, in the Tubas, Qalqilya and Hebron Governorates, and also in the Eastern Slopes region[4]. In the Gaza Strip, the most common soil type is Grumosols, which dominates the semi-arid loess plain area. Grumosols are also found in the far north and far west of the West Bank, coinciding with low- lying areas that enjoy a more temperate climate than other parts of the highlands (Map 2).

Its location makes the area highly influenced by the Mediterranean climate. The Gaza Strip, in particular, is part of the Mediterranean coast. The Mediterranean climate is characterized by a long, hot, dry summer and short, cool, rainy winter. Rainfall is limited to the winter and spring months. The rainy season usually starts in the middle of October and continues up to the end of April. Snow and hail, although uncommon, occur in areas of the West Bank, with the greatest frequency falling in the west of, and over, the highlands (Rofe & Raffety, 1965). The climate within the relatively small area of the West Bank is affected by diverse ranges in topography and altitude. Temperature varies according to the geographical position, altitude, and exposure to marine influences[4], etc. (Map 3).

[4] ARIJ (2007)



Map 2: Soil map in West Bank & Gaza Strip, and detailed soil types in West Bank with wadies



Map 3: Climate of State of Palestine; from right to left: climatic classification of West Bank, AverageAnnual Rainfall (mm), and MeanAnnual Temperature (Celsius)

1. 2. BIOGEOGRAPHIC CLASSIFICATION

1.2.1. BIOGEOGRAPHICAL ZONES

Within the SP, there are a number of biogeographical zones exist, with their associated climates and biodiversity, (PNA, 2006) argued that these zones are:

1.2.1.1. The Central Highlands

This is the mountainous portion of the West Bank including east Jerusalem. This region is approximately 3500 square kilometers in area and 120 kilometers in length. Elevation reaches slightly more than 1000 meters above sea level (in Halhul (Jabal Naby Yunis-1020m)-Hebron area. Average annual rainfall ranges from 400 to 700 millimeters. Most of SP's natural and planted forests are located in this area. Agriculture depends on rainfall.

1.2.1.2. The Semi-Coastal Region

This area, located in the Jenin, Tulkarm and Qalqilya districts, is an extension of land inside the Green Line (the 1967 borders). It is 120 square kilometers in area and has an average annual rainfall of 600 millimeters.

1.2.1.3. The Eastern Slopes

This area runs from Jenin in the north to Hebron in the south. It is often referred to as the "Jerusalem wilderness." Traditionally, this was the winter grazing area for native sheep; shepherds used to move their flocks there during winter due to the moderate climate and grazing pastures. The eastern slopes are also home to most of wild mammals and much of its native flora. The area is under substantial development pressures due to Israeli occupation activities (e.g., intensive building of colonial settlements and associated roads and related activities).

1.2.1.4. The Jordan Rift Valley

This is a unique area that lies east of the West Bank highlands, between the eastern slopes and the mountains of Moab in Jordan. A semi-arid region with mild to warm winters and hot dry summers, it is a continuation of the African Rift Valley. Israel occupying power has expropriated much of this zone's land for illegal colonial settlement activities, and Israeli settlers practice intensive agriculture in this area. Many winter crops for export are planted using irrigated open and greenhouse agriculture. This region falls along bird migration routes, which is considered the second most important flyway for migratory soaring birds in the world and is the foremost route among Europe- Africa flyway. (Awad S., et al., 2013).

1.2.1.5. The Gaza Strip

This is the coastal zone along the eastern Mediterranean. The area has one of the highest population densities in the world, with the bulk of the population being refugees from 1948. Some migratory birds land in Gaza to rest and feed in route from Africa to Europe or vice versa. Excessive pumping of aquifers and the resulting saltwater intrusion has caused a dramatic increase in the salinity of water resources. Added to this is an increase in nitrate levels, thought result from leaching from sewage and the use of nitrate-based fertilizers

within and outside Gaza. Aquifer recharge largely depends on rainwater flowing underground from the Hebron hills and west.

1.3. PHYTOGEOGRAPHICAL REGIONS

Based on the geographic distribution of plant species[5], these regions divided as follow (Map 4):

1.3.1. The Mediterranean Region

The Mediterranean region extends along the coastal plain to the north of Gaza Strip, the central highlands, and the northern part of the Jordan Rift Valley and the western slopes of the Nablus and Jerusalem and Hebron Mountains, ending 65 kilometers south of Jerusalem. Its boundaries with the adjoining Irano-Turanian territory cannot be drawn with exact precision because humans, over many millennia, have caused heavy damage to Mediterranean territory vegetation. As a result, plants from the adjacent territories penetrated and extended into this area, resulting in a fairly broad belt of mixed flora and vegetation. The climate of this area is typical of the Mediterranean region, with a minimum annual rainfall more than400 millimeters. It is covered with vegetation includes forests, maquis, garigue (dwarf shrub formations) in which *Quercus calliprinos* Webb; *Pinus halepensis* Mill; and *Pistacia palaestina* Boiss are shown to be the dominant species. The local forests and maquis can be grouped as the Common Oak Forests, the Aleppo Pine Forests (*Pinus halepensis* Mill.); the Carob (*Ceratonia siliqua* L.); Mastic *Pistacia palaestina* Boiss and *P. lentiscus* Scrub Forests.The plants of this area have the largest number of associations and are found mainly on terra rosa soil and, to a lesser extent, on rendzina and consolidated sandy soils or sandstone.

1.3.2. The Irano-Turanian Region (Oriental Steppe)

This region consists of a narrow longitudinal belt to the east of the Mediterranean area. It covers the southern parts of the West Bank (the Jerusalem and Hebron wilderness, central Jordan Rift Valley and adjacent steppes and rocky areas facing the southern part of the Jordan Rift Valley). Annual rainfall ranges between 150 and 300 millimeters. Its dominant soil types are gray calcareous steppe and loess soils. Due to low rainfall, rain-fed cultivation is untenable except in the depressions. This area is composed of different associations such as the *Zizyphetumloti* association, the *Retameto- Rhudetum* association and the *Seriphidium herba-alba* (Asso) Soják; association in which *Zizyphus lotus*, and *Retama raetam* (Forssk.)Webbis the most common members of these associations respectively.Plant cover consists of steppe desert, thorny and broom-like brushwood and dwarf shrub communities. Trees are rarely associated with this area.

1.3.3. The Saharo-Arabian Region

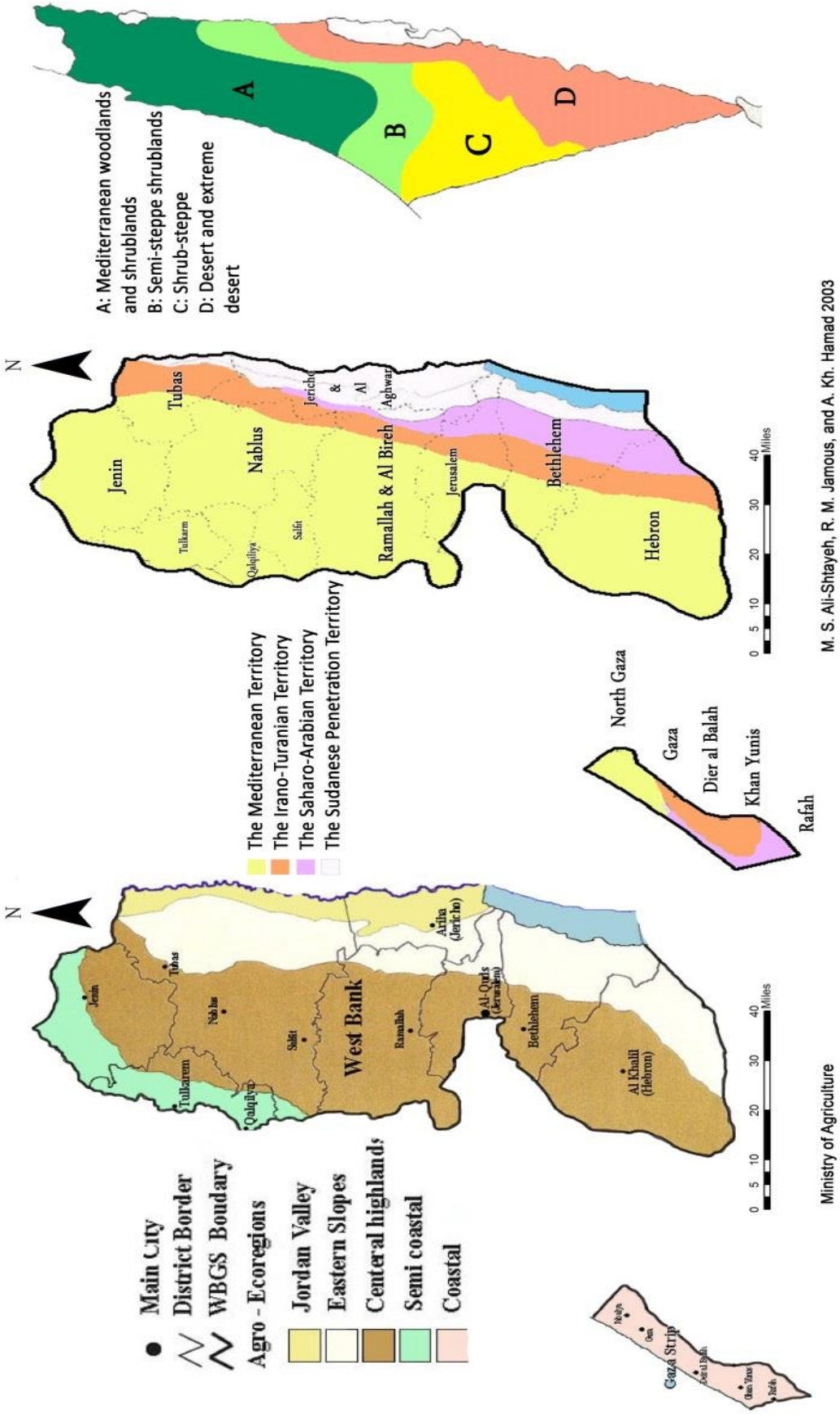
The Saharo-Arabian region is characterized by large expanses of gravels, curcar, salines, and sand dunes along with `the complete lack of cultivation, except for a considerable number of seasonal plant communities in and around springs and some trees near frequent water resources. Annual rainfall ranges between 50 and 150 millimeters.

1.3.4. The Sudanese Penetration Region

This region is a transitional zone between the Sudanese area and the Arabian Desert. Its high winter temperatures support the growth of many Sudanese species in the Dead Sea area and south of the Jordan Rift Valley. Dominant with some plant associations such as *Haloxyletea saliconici* (*Phoenix dactylifera* L.) and *Acacitea tortilis* (*Ziziphus spina-christi* (L.) Desf.and

[5] PNA, 2006

Vachellia tortilis (Forssk.) Galasso & Banfi.Plant cover is restricted to oases, with some plant associations being similar to those of the African Savanna.



Map 4: Biodiversity origin; from right to left: Biogeographical Zones, Phytogeographical Regions, and Biotope of State of Palestine.

2. BIODIVERSITY PROFILE

2.1. OVERVIEW

Compared to other countries in the region SP has a rich biodiversity and unique ecosystems due to its location as a significant conjunction bridge between Europe, Asia and Africa as well as special topography and history such as Great Rift Valley and migrations etc.. In Historical Palestine, there are about 51,000 living species, constituting approximately 3% of global biodiversity (ARIJ calculations based on Heywood and Watson, 1995). There are an estimated 30,850 animal species, consisting of an estimated 30,000 invertebrates, more than 2000 plants, 373 birds, 297 fish, 92 mammals, 81 reptiles and 5 amphibians.

2.2. FLORA

Due to its location, where the Mediterranean, Irano-Turanian, Sudanian and Saharo-Arabian phytogeographic zones intermingle in an area of varying climates and soil types (Euroconsult and IWACO, 1994; ARIJ, 2002; Ali-Shtayeh and Jamous, 2003). Based on plant species numbers mentioned by several publications e.g. PIALES, (1996), Boulos, (1997), Ali-Shtayeh & Jamous (2002), Danin, (2004), Sawalha, (2005), ARIJ, (2006), and Görlach *et al.*, (2011), it has been concluded that the records of Palestinian flora reach over than 2000 plant species and endemic flora species recorded as 54 species in SP.

The most dominant families are the Asteraceae with 96 genera and 260 species, Poaceae with 87 genera and 198 species, Fabaceae with 62 genera and 268 species, Brassicaceae with 63 genera and 124 species, Lamiaceae which is famous as a medicinal plants, with 23 genera and 99 species, Lilaceae known for its beautiful flowers, with 23 genera and 97 species, the Trifolium genus which is used as a forage plant contains 40 species, Medicago genus contains 22 species, and Trigonella genus, which contains 18 species (Bregheith, 1995).

2.3. FAUNA

2.3.1. Mammals

Currently there are more than 92 mammals in the West Bank including east Jerusalem and Gaza Strip comprising 33 families, 28 of which are bat species. This number does not include marine mammals in Gaza Strip. This number of mammals is relatively high in comparison to other countries in the region. Seventy-eight percent of Palestinian mammals that are described as widely distributed exist mainly in the Mediterranean region (MEnA, 1998).

Many large mammals continue to exist but in diminishing numbers: Striped Hyena, *Hyaena hyaena*, Syrian Wolf *Canis lupus syriacus*, three different species of Gazelles *Gazella gazelle, G. dorcas* and *G. arabica*, and wild cats *Felis silvestris*, and *F. chaus*. The only mammal endemic in the Gaza Strip, on the other hand, is the Buxton's Jird *Meriones sacramenti*, originated from Saharo-Arabian desert belt, and found in the sand dunes of the southern coastal plains of the Naqap and the Gaza Strip (MEnA, 1998). Work on mammals in the West Bank exists (e.g. Qumsiyeh, 1986; 1996; Qumsiyeh *et al.*, 1992), while in the Gaza Strip it seemed to be limited to few unpublished reports and a preliminary work (Abd Rabou, 1999 and 2000 and Yassin *et al*., 2005). Rodents and bats are the mammal orders that are most represented and contribute significantly to the local biodiversity (Qumsiyeh, 1986, 1996 and Korine *et al*., 1999).

Almost all of the higher mammals are on the Red Data List as threatened, extinct or rare[6]. Seven species of mammals have been extinct from 50 years ago, for example, the Cheetah *Acynonyx jupatus*, Syrian Brown Bear, *Ursus arctos syriacus*, Mesopotamian Fallow Deer *Dama mesopatomica*, and Roe Deer *Capreulus capreulus*. Nowadays, there are only 200 hyenas inhabiting SP. Implementation of wildlife management plans is very difficult due to the current Israeli the occupation power in SP. Currently hunting, agricultural expansion and poverty are actual obstacles to any progress in wildlife conservation and reintroduction. On the other hand, enforcement of wildlife protection laws is weak and need to be enhancened.

2.3.2. Marine mammals

It was reported the presence of two dolphin species; the Bottlenose Dolphin *Tursiops truncatus* and the Common Dolphin *Delphinus delphis*[7]. It is worth mentioning that studies on marine biota were lacking in SP. Little is documented on the status of marine mammals in the Gaza Striparea, the status of the Monk seals; Monachus monachus remains unclear (Gaza Environmental Profile, 1994).

2.3.3. Birds

More than 370 bird species were recorded in SP as a result of the great work which has been done on bird surveying and investigation by Palestinian experts including Simon Awad, (EEC), Anton Khalilieh, Imad Atrash (PWLS), and Walid Basha (Basha Scientific Center for Research and Studies and others, based on field work and surveys in the whole West Bank governnerates mainly in Hebron, Bethlehem, Jericho, Ramallah, Tulkarim, Tubas and Jenin districts) and literature reviews of all what is available about the birds of SP. The Environmental Education Center recently published the first "Checklist of Birds of Palestine," **identified 373 bird species in the State of Palestine** (West Bank and Gaza Strip 6220 KM²), **which represent 22 Orders, 64 Families, 30 subfamilies and 186 genera.** (Awad, S., et al., 2015). The largest order is PASSERIFORMES which consists of 22 families 6 subfamilies, 40 genera and 160 species. The second is CHARADRIIFORMES which consists of 10 families, 10 subfamilies, 26 genera and 67 species. The third is ACCIPITRIFORMES which consists of 2 families, 15 genera and 31 species. The largest family is Sylviidae which consist of 35 species. The second is Turdidae which consist of 32 species. The third is Accipitridae which consist of 30 species. In total four birds are considered extinct species: Ostrich (*struthio camelus*), Brown Fish Owl (*Bubo zeylonensis*), and the other two extinct as breeder: Lammergeier (*Gypaetus barbatus*) and Lappet-faced Vulture (*Torgos tracheliotus*).

There are 132 species of bird breeds in the State of Palestine, 52 species of which are considered as exclusively resident breeders (RB) including the three introduced breeder species (IB); namely: Rose-ringed Parakeet *(Psittacula krameri*), Common Myna (*Acridotheres tristis)* and Indian Silverbill (*Lonchura malabarica),* (These species spend the entire year within the borders of their breeding site with some seasonal dispersal). 38 species are considered as complex resident breeders, which are species with different categories of birding population, each exhibiting a different seasonal behavior. Further another 42 species are consider as complex summer breeders.

Sixteen of these breeding birds are threatened species, and their population are declining globally and locally. Four of those species are listed on the IUCN red list: the Egyptian Vulture (*Neophron percnopterus*) as an endangered species, Macqueen's Bustard

[6] MEnA, 1998

[7] MEnA, 2001

(Chlamydotis macqueenii) as a vulnerable species, and the (European) Roller (*Coracias garrulus*) and Sooty Falcon *(Falco concolor)* as Near Threatened species.

There are 277 bird's species that migrate through Palestine, 71 bird species of which are considered as exclusively Passage migrant (PM). These include a high percentage of the world population of Levant Sparrowhawk (*Accipiter brevipes*) pass along this flyway twice annually, along with Lesser Spotted Eagle (*Aquila pomarina*), (European) Honey Buzzard (*Pernis apivorus*), and Steppe Buzzard (*Buteo Vulpinus*). Moreover, there are 127 species that migrate through and winter in Palestine. Also 194 species are considered a complex winter visitors (WV), 10 of which are considered exclusively winter visitors. 22 species are considered Accidental Visitors, or Vagrant (AV, V): These birds are accidental visitors to Palestine; some of them are recorded rarely and unexpectedly while others are seen rarely but at predicted times. In addition, there are three invasive alien species; Rose-ringed Parakeet *(Psittacula krameri*), Common Myna (*Acridotheres tristis)* and Indian Silverbill (*Lonchura malabarica)* which will effect the other breeding bird species population and this need more study. (Awad, S., et al., 2015).

The checklist is a result of 67% of scientific field work in different locations in the State of Palestine (West Bank and Gaza Strip 6220 KM²), (32% depending on the ringing results of 120 ringed species, 8% specimen of 28 skin birds from the collection of EEC Natural History Museum and 27% of monitoring activities). However, the rest of the literature review is based on published material. The record of bird species will be extended if a large scheme of bird ringing, monitoring, and surveys throughout Palestine is created. (Awad, S., et al., 2015).

2.3.4. Amphibians

In the State of Palestine there are only five possibly species of amphibians reported (Salman *et al.*, 2014) but the number could climb to eight amphibians in historic Palestine. It belongs to two orders; (i) Caudata - Salamander; and (ii) Salientta - Anura with six families: (i) Salamandridae; (ii) Bufonidae; (iii) Hylidae, (iv) Ranidae, (v) Discorglossidae, (vi) Pelobatidae.

Almost all amphibians in SP are endangered[8] due to intensive farming, degradation of wetland habitats in the Dead Sea basin, Gaza Strip and fresh and grey water, rivers and Wadi systems. This phenomenon is very obvious in Gaza Strip where the drying of the main wadis and intensive use of remaining water resources has not given amphibians much chance to exist. Loss of amphibian species and diversity has led to an increase in the number of disease vector insects such as mosquitoes.

2.3.5. Reptiles

Reptiles are approximately 81 species, six of them are aquatic and the rest are terrestrial (Werner, 1989; Ali-Shtayeh & Hamad, 1995). One extinct species is the Nile crocodile. The highest distribution of reptiles is observed in the arid and semiarid Mediterranean and Saharo Arabian zones. The Gaza Environmental Profile (Gaza Environmental Profile, 1994) identifies the sea turtle species Caretta caretta (Loggerhead turtle) and Chelonia mydas (Green turtle) as existing in the coastal region of Gaza Strip. Turtle nesting areas of Gaza Strip are reported by The Coastal Zone Plan for Gaza Strip (MOPIC, 1996). Unfortunately, these species and their eggs are under extreme pressure from hunting and collecting.

[8] MEnA, 1998

Many reptilian species in SP are considered threatened. This is due mainly to: intensive agricultural practices, overgrazing, vegetation cover loss, mis-treatment of habitat, illegal trade, unplanned human development, transportation corridors and soil and habitat degradation. Several species became recently extinct as *Blanus stranch*, *Ripera lebetina*, *Crocodylus niloticus, Discoglossus nigriventir*, and several other species are endangered. Illegal trade in several species occurs including the; Dessert Monitor *Varanus griseus*, Spiny-tailed Lizard *Uromastix aegyptius microlepis*, Greek Tortoise *Testudo graeca* and Chameleon *Chameleo chameleo*. Three of these species are listed under CITES. Marine turtles are under threat from illegal trade, hunting and unsustainable fishing practices. One wetland species is highly endangered due to wetland degradation (i.e., draining for agriculture) is the Diamond Water Snake *Natrix tesselata*.

2.3.6. Invertebrates

There are few systematic studies of the diversity of invertebrates in the occupied State of Palestine. Two papers were published on scorpions (Qumsiyeh *et al.*, 2013, 2014a). One paper was completed on butterflies showing 55 species (Abusarhan *et al.*, 2015). Some work is being done at PMNH on land snails showing over 50 species. It is estimated that the number of invertebrate species in SP is in excess of several thousand. These species are being impacted upon by large scale habitat destruction from Israeli illegal colonial settlements, forest cutting, overgrazing, unplanned urban development and mining and quarrying[8]. Recently, EEC, University of Szczecin and Bird Migration Research Foundation, Poland carried out the "Ornithological and Parasitological Research", in Palestine (Jericho and Tulkaram), considering migrant-helminthic relations during migration (Awad, S., et al. 2013), which is crucial for understanding changes in biodiversity and both hosts' and parasites' population dynamics. Altogether 168 internal parasites were found in both migrant and in resident birds. This (ongoing) research since 2013 suggests that the most feasible and promising investigation will be further studies on the parasite fauna (Awad, S., et al. 2014).

2.4. RED LIST OF SPECIES

Based on IUCN global Red List criteria and guidelines there is only 24 species were listed as globally threatened in SP. From the 24 species, 10 birds, 4 reptiles, 3 mammals, 2 fishes, 2 molluscs, 1 amphibian, 2 other invertebrates, and there is no plant. However SP has the lowest number of listed threatened species in the red list in mammals, fishes, plants and other inverts between neighboring Arab countries (Egypt, Saudi Arabia, Syrian Arab Republic, Lebanon, and Jordan) it's the only one that listed amphibians (1 species) (It's important to know that the lowest number of listed threatened species are not because SP do not have threatened species but because there is need to conduct a comprehensive study to conclude SP species status based on the IUCN criteria. In addition, capacity building for human resources is needed in this field) (Table 1). (IUCN Red List version, 2015a).

Table 1: Number of threatened species (Critically Endangered, Endangered and Vulnerable categories only) in each major group of organisms in State of Palestine and neighboring countries (IUCN Red List version, 2015a)

Country	Mammals	Birds	Reptiles	Amphibians	Fishes	Molluscs	Other Inverts	Plants	Total
State of Palestine	3	10	4	1	2	2	2	0	24
Egypt	18	11	12	0	42	0	55	3	141
Saudi Arabia	10	15	3	0	29	1	58	3	119
Syrian Arab Republic	16	15	8	0	45	9	11	4	108
Lebanon	10	9	7	0	22	9	7	5	69
Jordan	13	10	6	0	11	6	55	1	102

Note: Red color: Lowest Value, and Green: Highest Value

A total of 121 plant species have been assessed until now in SP all of them listed as Least Concern (LC). The situation is different when talking about Animals Red List; 386 species assessed until now. 336 listed as Least Concern, 24 threatened species (4 Critically Endangered, 8 Endangered, 12 Vulnerable), 16 Near Threatened, and 10 Data Deficient. There aren't any extinct species listed in the IUCN Red List. In total, Egypt has the highest number assessed species of animals (1577 species) between the mentioned countries while SP falls in the end (IUCN Red List version (2015b), IUCN Red List version, (2015c)). See table 2 and figure 1.

Table 2: Red List Category summary for State of Palestine and neighboring countries totals (Plants and Animals)

Country	EX	EW	Subtotal	CR	EN	VU	Subtotal	NT	DD	LC	Total
PLANTS											
State of Palestine	0	0	**0**	0	0	0	**0**	0	0	121	**121**
Egypt	0	0	**0**	2	1	0	**3**	0	4	194	**201**
Saudi Arabia	0	0	**0**	0	2	1	**3**	0	0	169	**172**
Syrian Arab Republic	0	0	**0**	1	0	3	**4**	3	1	135	**143**
Lebanon	0	0	**0**	0	2	3	**5**	3	1	162	**171**
Jordan	0	0	**0**	0	0	1	**1**	1	1	91	**94**
ANIMALS											
State of Palestine	0	0	**0**	4	8	12	**24**	16	10	336	**386**
Egypt	1	1	**2**	6	24	108	**138**	135	132	1168	**1577**
Saudi Arabia	1	0	**1**	5	14	97	**116**	145	106	1055	**1425**
Syrian Arab Republic	1	0	**1**	16	34	54	**104**	43	51	678	**877**
Lebanon	0	0	**0**	6	25	33	**64**	32	39	549	**684**
Jordan	0	0	**0**	5	18	78	**101**	121	62	844	**1128**

Note: IUCN Red List Categories: EX- Extinct, EW- Extinct in the Wild, CR- Critically Endangered, EN- Endangered, VU- Vulnerable, NT- Near Threatened (includes LR/nt - Lower Risk/near threatened), DD- Data Deficient, LC- Least Concern (includes LR/lc - Lower Risk, least concern). Red color: Lowest Value, and Green: Highest Value

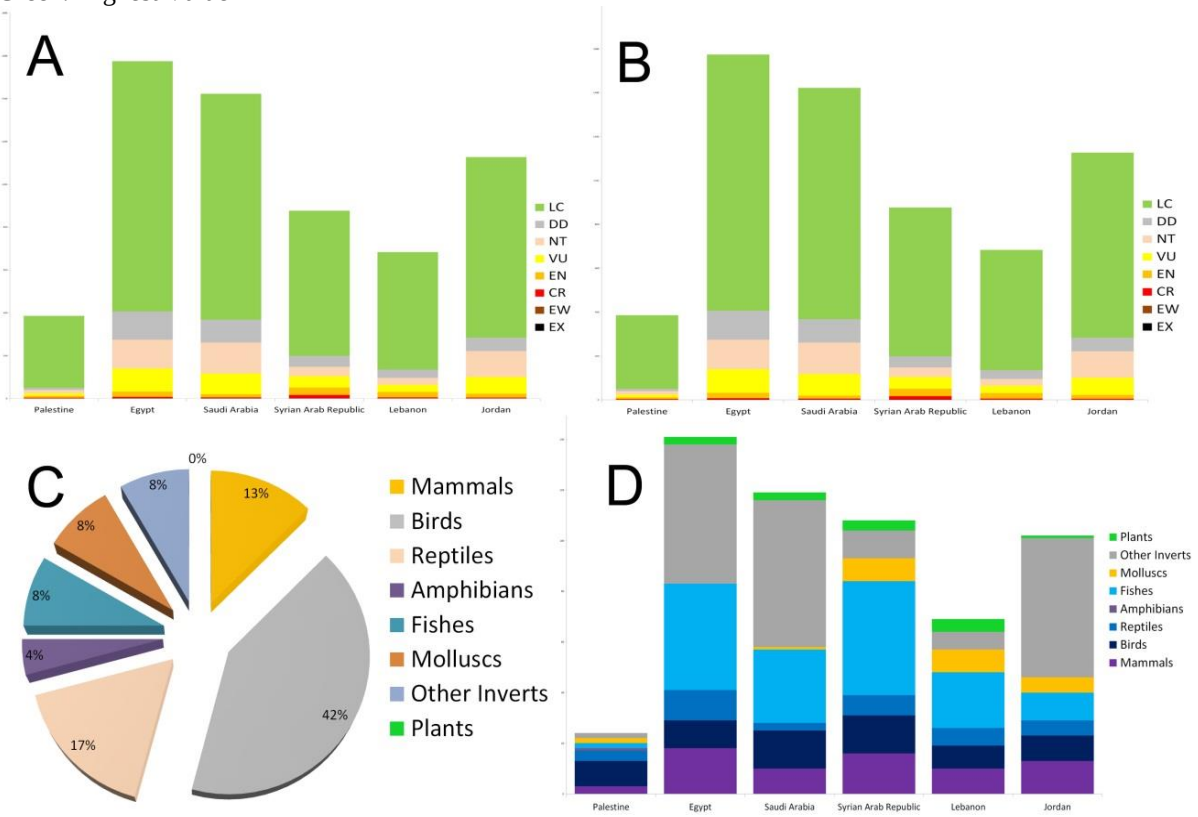


Figure 1: Red list status assessment for State of Palestine and some neighboring countries; A- Animal Red List Category summary, B- Plant Red List Category summary, C- Threatened taxonomic groups' percentage within State of Palestine, and D- Threatened taxonomic groups within State of Palestine and some neighboring countries Based on (IUCN Red List version, 2015a, 2015b, 2015c).

3. BIODIVERSITY THAT SUPPORTS LIFE AND LIVELIHOODS

3.1. WATER RESOURCES

Water resources in the SP consist of both surface and ground water namely Jordan River and Ground water forming the West Bank aquifer system and the coastal aquifer in Gaza. Israel the occupying power controls almost all Palestinian water resources and is exploiting around 89% of the available water; leaving only 11 percent to the Palestinians (PWA, 2012). Palestinians are allowed to use only 342.7 MCM per year. There are about 360 major wells in the West Bank mainly belonging to Palestinians and were drilled before 1967 and destructed by the Israeli the occupation power. The total annual groundwater abstraction in the West Bank is about 121 MCM., 64 MCM is pumped from 228 agricultural wells and 43 domestic wells; the remaining 57 MCM is pumped from 49 wells controlled by Israelis and utilized for both domestic and agriculture (Dudeen, 2012).

Based on PCBS, (report 2014), the water supply in State of Palestine in 2014 was 342.7 MCM, 163.8 MCM in WB and 178.9 MCM in GS) and the daily allocation per capita was 81.7 Liter/capita/day. The most was supplied from groundwater wells were pumping about 246.3 MCM of water, make up the amount of water pumped from wells accounted for 71.8% of the amount of water available, followed by water purchased from the Israeli water company (Mekorot), where the quantity amounted to 63.5 MCM (18.5%), and finally the springs where the annual flow amounted to 28.5 MCM and accounted for 8.3% of the water sources that are relied upon to cover the demand for water for various uses. Morover, the Palestinian private sector companies of water (Botteled water) provide the amount of 4.7 MCM which is accounted for 1.4% (specieified for Gaza strip only) of the water sources that are relied upon to cover the demand for water for various uses (Figure 2).

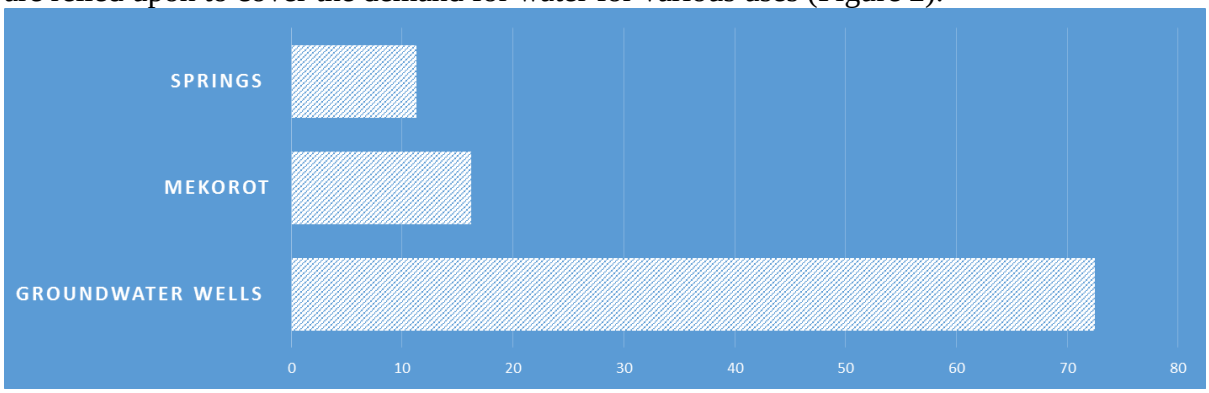
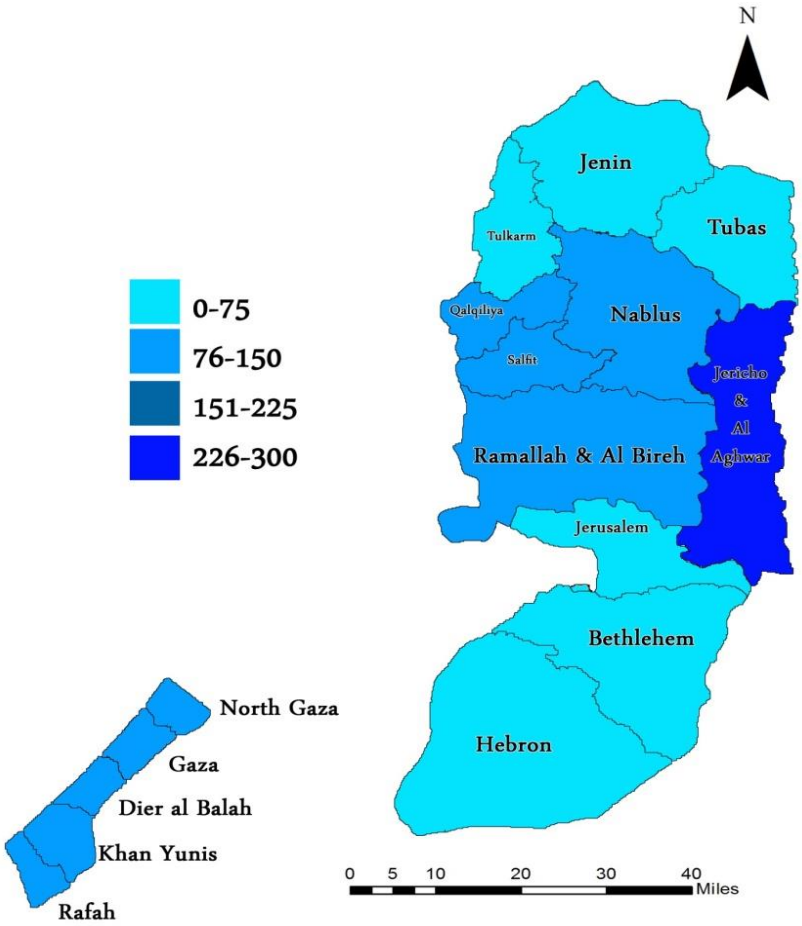


Figure 2. Percentage of the amount of water available for Palestinian from different sources.



Map 5. Daily allocation per capita (Liter/capita/day) by Governorate, 2010/2011[9]

3.2. AGRICULTURE

In 2011, PCBS reports estimated that the value of Palestinian agricultural production was $1,295 million (70% in theWest Bank, and 30% in the Gaza Strip) (PCBS, 2012). But, the agricultural sector's contribution to the Palestinian gross domestic product (GDP) was only 4.1% in the year 2013, and 3.4% of the GDP of the West Bank (PCBS, 2014). It is characterized by both intensive irrigated agriculture, in the Jordan Rift Valley and Gaza Strip, and partially in Tulkarm and Jenin, and rain fed farming in the rest of the areas (Isaac and Gasteyer, 1995). Although only about 10 percent of the cultivated area in SP, 5 percent in the West Bank and 60 percent in Gaza Strip is covered with irrigated agriculture, this type of cultivation, could potentially have a negative effect on long term sustainability. Intensive discharge of ground water and use of fertilizers, pesticides, other chemicals and non-degradable materials such as plastics, present a threat to biodiversity as they are hazardous not only to the soil, but to all the surrounding plant species and wildlife (Figure 3, Maps 6, and 7).

[9]PCBS, 2014

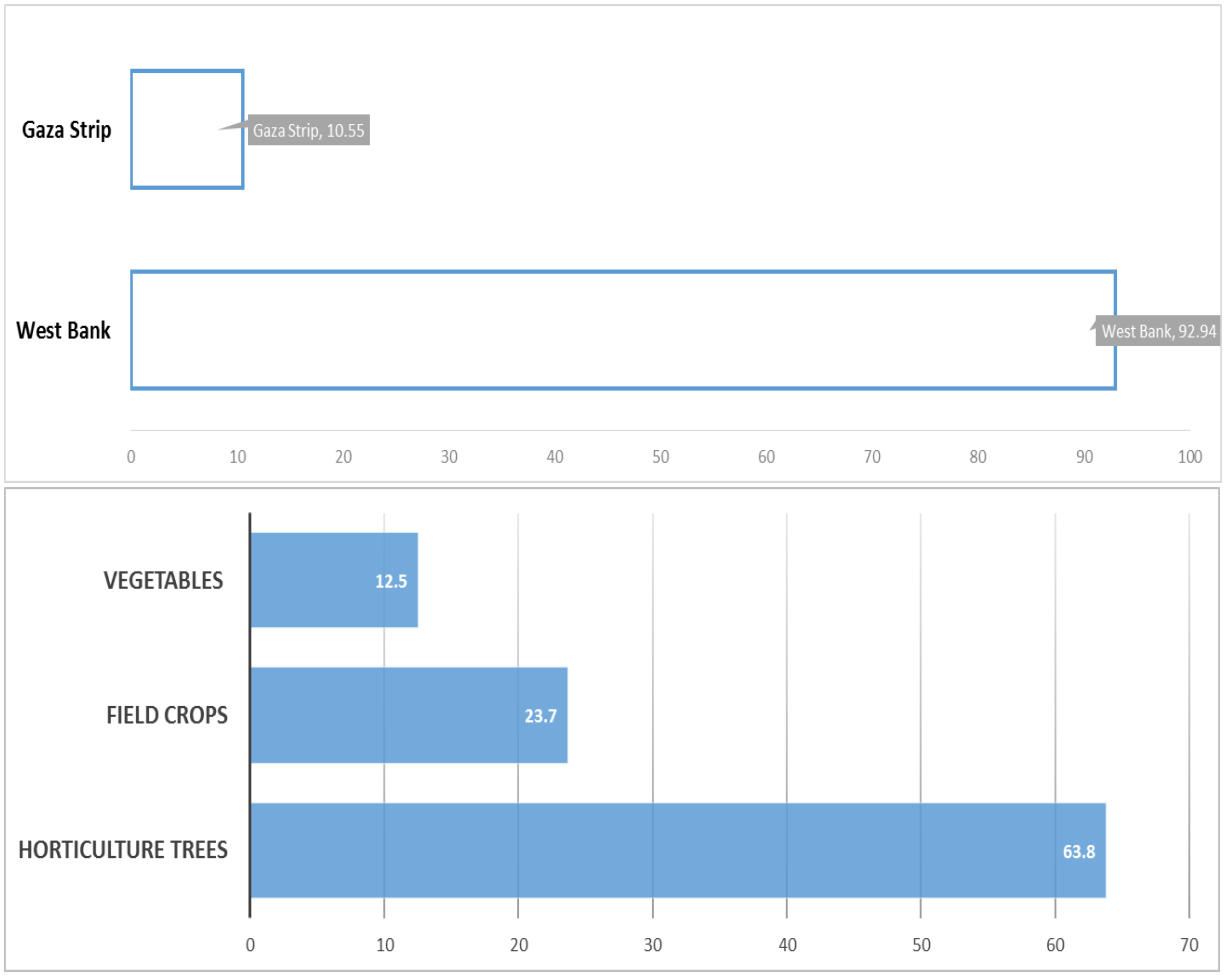
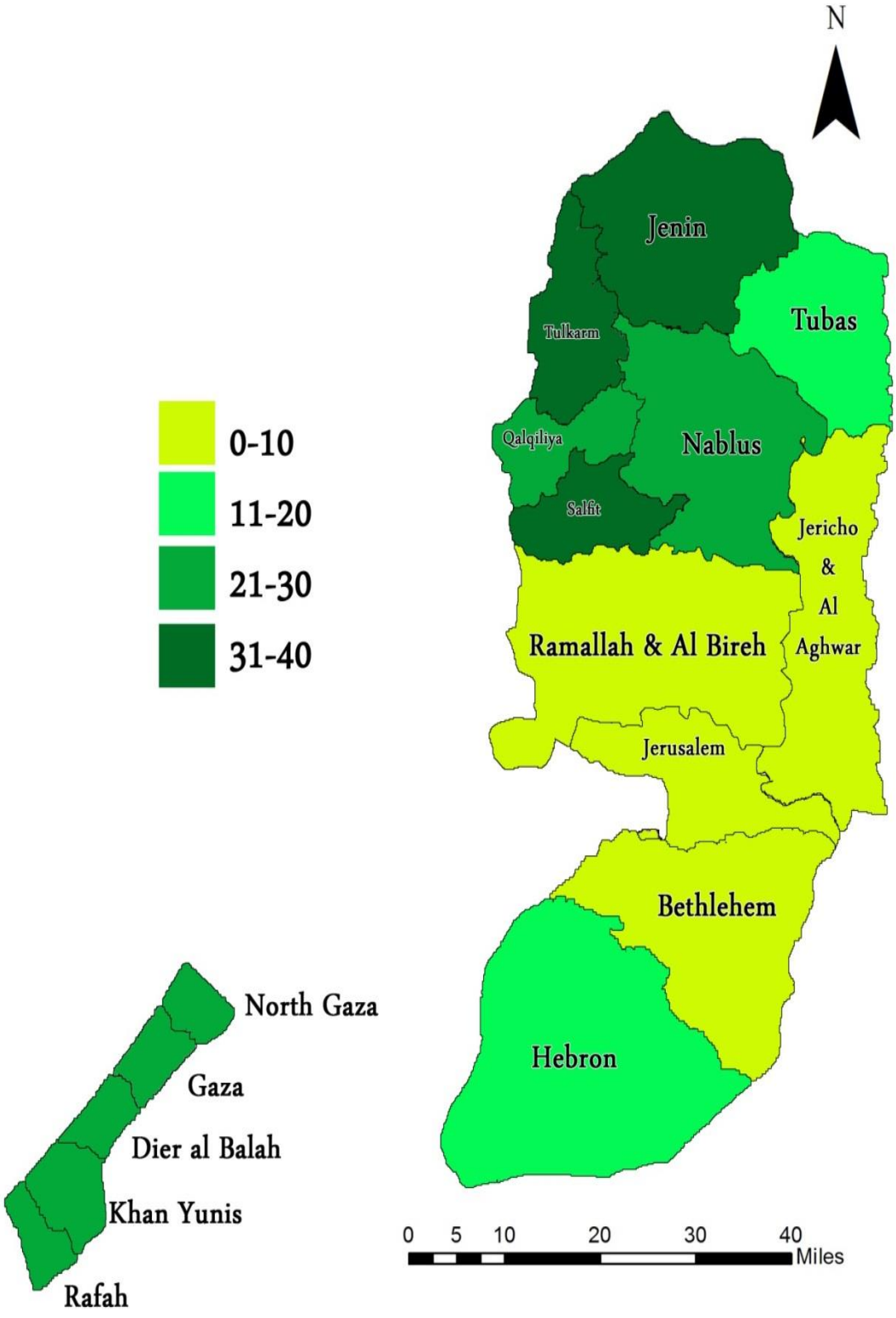


Figure 3. Agriculture in State of Palestine, UP- total area of land cultivated (thousand hectares), DOWN- Percentage of the composition of cultivated land[10].

Rainfed agriculture suffers from the opposite problem. This sector makes up 95 percent of the agricultural land in the West Bank and 40 percent in Gaza Strip, but remains underdeveloped. There has been a dearth of research in the area since the 1970s. One of the results has been that total cultivated area in the West Bank has fallen from 47 percent in the beginning of 1967, to less than 20 percent in 1994 (Isaac and Gasteyer, 1995). Also contributing to this was the lack of reliable markets, in large part because of Israeli occupying power restrictions, which has led to many farmers working outside of agriculture, and thus spending less time than might be necessary in maintenance of rainfed crops. It is also the case that tenure arrangements and restrictions on land use have diminished the size of agricultural plots, thus greatly diminishing the production potential for a given farmer. The combination of these things, along with often low amount of rainfall and variation in precipitation in different years[11], has meant that much of rainfed agriculture in SP operates at far below its development potential.

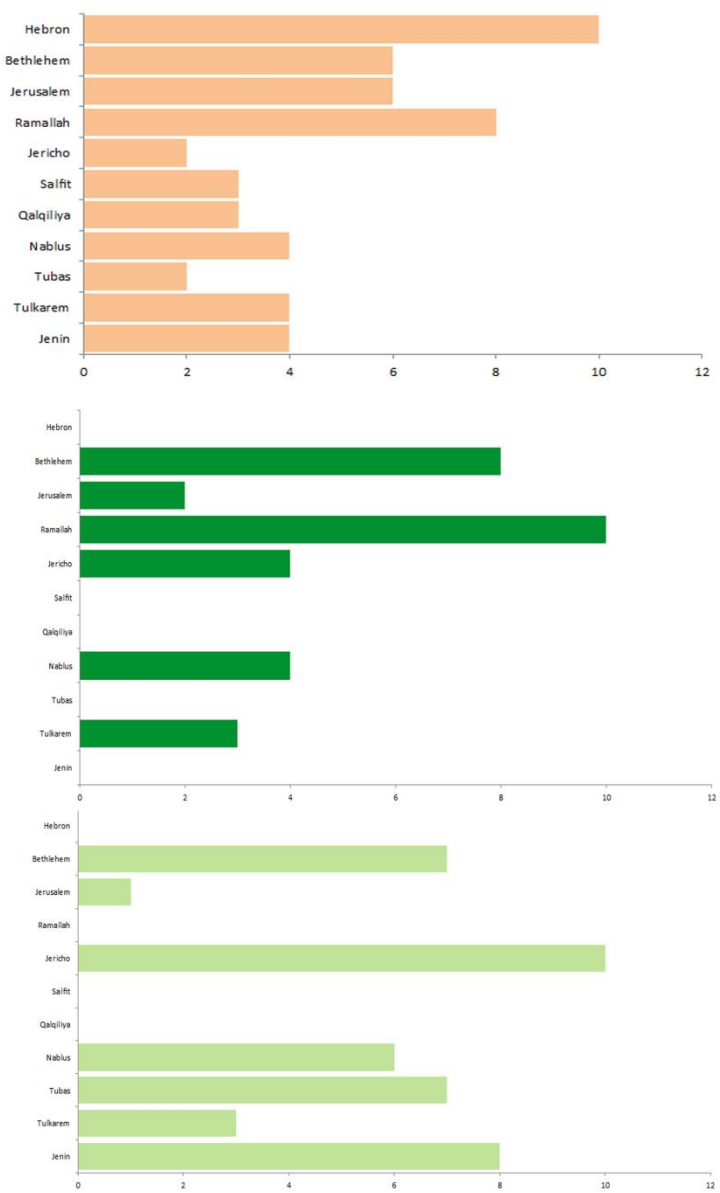
[10] PCBS, 2014

[11] Isaac and Gasteyer, 1995

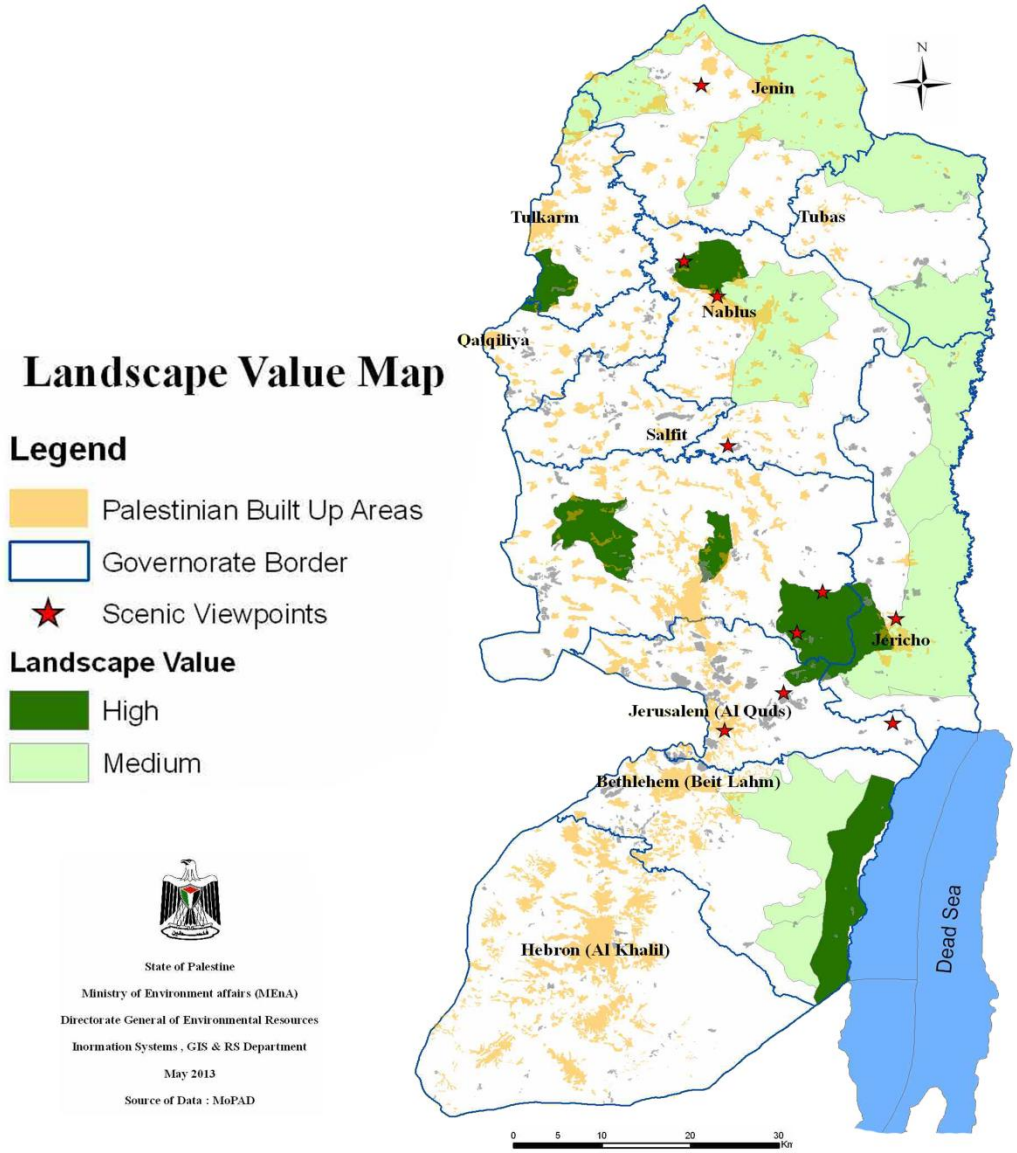


Map 6: Percentage of Cultivated Land Area from Total Area by Governorate, 2010/2011[12]

[12] PCBS, 2014



Map 7: Landscape Value in West Bank and percentage of each category.



3.2.1. Field Crops, Forages and vegetables

In the West Bank, 19.7% of total agricultural land in the West Bank (including vegetables, fruit trees, olives, and field crops) is utilized for the cultivation of productive field crops (MoA, 2013). Total production of surveyed field crops represents 15% of the total production of these crops. It is estimated that the average productivity of field crops is 492kg/dunum with atotal annual production of 79,923 tons. Up to 73% of field crops' harvesting takes place duringthe 4 months of January February, May, and June (ARIJ, 2015). While these sectors provide much of the base of the Palestinian diet, they have tended to fall short of meeting SP's needs. Currently SP produces only 11 percent of the wheat consumed, only 12 percent of the lentils consumed, and only 8 percent of the chickpeas consumed.

Vegetables are considered essential elements of the nutritional diet prevalent among Palestinian households. In the West Bank, only 8.1% of total productive agricultural land in the West Bankis utilized for the cultivation of surveyed vegetables (MoA, 2013). Despite this, the production of vegetables represents 65% of the total production of these crops. This is mainly due to the high productivity of vegetables per dunum in comparison with other crops. Survey results estimate that the average productivity of vegetables is 5,184kg/dunum, with a total annual production of 345,824 tons. Upto 59% of vegetables harvesting takes place during the six months of February, March, April-May, June, and December (ARIL, 2015). Vegetables produced under rainfed conditions make up only a small percentage of the vegetables produced. Production of all of these crops fell significantly up until the Intifada[13]when there was an attempt by Palestinians to reclaim the land. About 33% of the area cultivated with field crops was in Hebron governorate, about 21% of the area cultivated with vegetables was in Jericho and Al-Aghwar Governorate, and about 19% of the area cultivated with tree horticulture was in Jenin governorate (PCBS, 2011a). About 12.96 thousand hectares are cultivated area of field vegetables, and 24.5 thousand hectares are cultivated area of field crops in SP (PCBS, 2014).

3.2.2. Fruit Trees

In the West Bank, only 9.9% of total agricultural land of surveyed crops (including vegetables, fruit trees, olives, and field crops) is utilized for the cultivation of fruitful fruit trees in the West Bank (MoA, 2013). The production of fruit trees represents 16% of the total production of these crops. Another study carried out by ARIJ, (2015) estimate that the average productivity of fruit trees is 1,048kg/dunum, witha total annual production of 84,840 tons. 66% of fruit harvesting takes place during the 4 monthsof August, September, October, and November. The annual total production of citrus fruits is estimated at 19,430 tons in the West Bank, representing 4% of total production of all surveyed crops. Tulkarem governorate is the highest producer of citrus fruits, constituting 49% of total production, followed by Qalqilya governorate (27%), and Nablus governorate (14%). The annual total production of almonds is estimated at 3,676 tons in the West Bank, representing 1% of the total production of all surveyed crops. Tulkarem governorate is the highest producer of almonds, constituting 31% of total production, followed by Nablus governorate (27%), and Hebron governorate (13%).

3.2.3. Livestock

Livestock in SP includes: poultry; sheep and goats; and small numbers of beef and dairy cattle. Most rural Palestinian families have some form of livestock, which they use to provide dairy products, eggs and occasionally meat (Figure 4). However, livestock has increased

[13] First Palestinian Intifada: was a Palestinian uprising against the Israeli occupation of the West Bank and Gaza, which lasted from December 1987 until the Madrid Conference in 1991, though some date its conclusion to 1993, with the signing of the Oslo Accords (Nasrallah, 2013)

more slowly than population growth, resulting in a production shortage, especially in red meat. The total value of intermediate consumption for animal production in animal and mixed holdings in SP totaled million NIS 2,694.5: 82.7% was in the West Bank and 17.3% in Gaza Strip. Concentrated feed represented around 46.1% of the total value of intermediate consumption for animal production during the agricultural year 2012/2013 (PCBS, 2014).

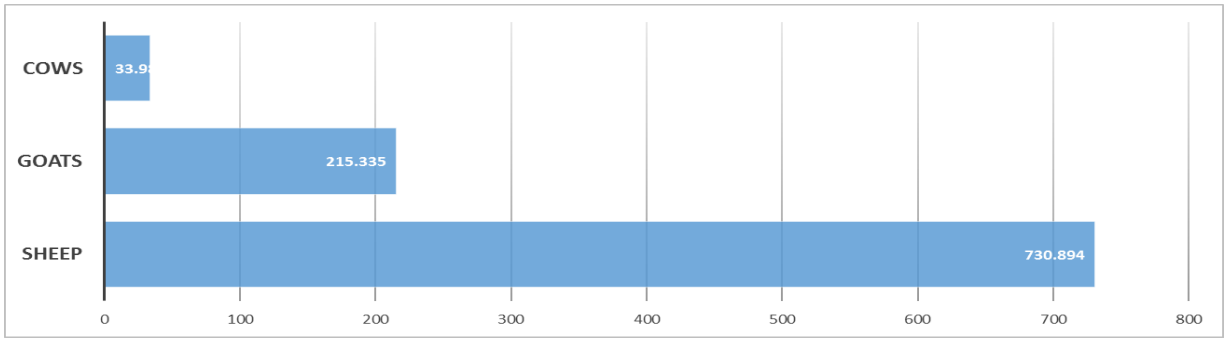


Figure 4. Livestock in State of Palestine (heads)[14]

Hebron had greatest number of cattle and goats, Jerusalem the least, about 26% of sheep were raised in Hebron governorate, and about 19% of camels were raised in Gaza governorate (PCBS, 2011a). Livestock holdings are also typically of small size, with over half of small ruminant (sheep and goats) holdings keeping a herd size between 1-19 heads, and 71% of cattle holdings having just 1-3 heads of cattle.

3.2.4. Agricultural Production

In the plant production sub-sector, rainfed agriculture forms the largest cultivated area in SP, which is 87.0% of the total cultivated land. However, the actual contribution of rain-fed agriculture to the total plant production varies according to the amount and distribution of precipitation during the growing season. In regards to agricultural trade, the value of agricultural exports grew by 32% from 2011 to reach $56.7 million in the year 2013, contributing to 6.3% of the total value of Palestinian exports (PCBS, 2013). In addition, agriculture plays a major role in the conservation of the environment, and supplies other sectors with inputs. Acourding to PCBS, (2014), agriculture, forestry and fishing activities contributing by about 4.1% to GDP in SP at Constant Prices by Economic Activity, 2013.

Total amount of harvested olives in season 2013 for oil extraction was about 65.829 tons, which has been extracted about 17.641 tons of oil. The added value of the activity of olive presses for the season of 2013 about 6.5 million US dollars, while the value of intermediate consumption amounted to about 2.5 million US dollars and the value of the contemporary production of about 8.6 million US dollars[14].

3.2.5. The Role of Agriculture in the Palestinian Economy

The agricultural sector is a vital sector in the Palestinian economy, as it has demonstrated to be one of the key sources of growth in the economic recovery that took place since 2003 (World Bank, 2006). The changes in agricultural activities are usually linked not only with climatologic conditions, but also with socio-political changes and Israelei occupying power. Despite the reduction in the contribution of the agricultural sector to the total Palestinian GDP in the period between 1997 and 2001, its contribution has gradually increased since 2002. The total contribution value between 1995 and 2004 varied from its lowest value in 2002 with 387.1 million $, to a maximum of 487.5 million $ in 2004 (PCBS, 2005).

[14]PCBS, 2014

The total value of the agriculture production in SP, for the agricultural year 2007/2008, reached 1,366.6 million $ divided between 60.9% for plant production (44.4% form West bank and 16.5% form Gaza Strip) and 39.1% for livestock production (31.2% from West Bank and 7.9% form Gaza strip). The total production cost reached 490.4 million $ of which 37.2% for plant production and 62.8% for livestock production (Figure 5).

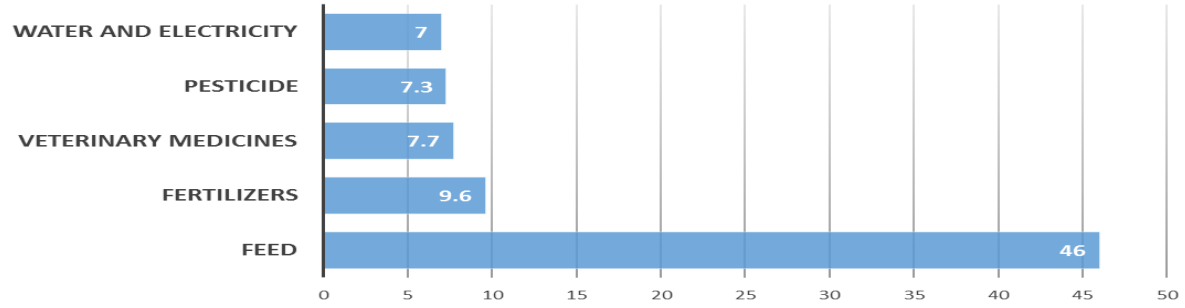


Figure 5. Precentage of costs of agro-production inputs.

Agricultural products account for 25% of the export trade from SP. Fruit (including strawberries and dates), olives and olive oil, vegetables and cut flowers are the primary export products. The shift to export-oriented agriculture increased the exploitation of cash crops and the dependency on imports of agricultural inputs used for intensive farming, as well as increased the dependency on Israeli occupying power as it is an inevitable primary transit point part of all available marketing channels (WFP, 2006). Israeli occupying power is the main importer of the Palestinian agricultural products (around two-thirds of total), followed by the Arab Countries and the European Union (World Bank, 2006). Due to Israeli occupying power, the value of agricultural commodities exported to Israel and other countries fell from 97.3 million $ in the year 2000 to 21.1 million $ in 2003, with a negative balance of 76.2 million $. During this period, exports to Israel fell by 84.7%. The value of imported Israeli agricultural commodities was significantly lower in 2003 compared with 2000 – 159.1 million $ and 386.7 million $ respectively, thus representing a reduction of 58.9%, (PCBS 2005).

3.3. FOREST

An earlier study by Breghieth and Qanam (1998) set out to assess both the use-values and non-use values of Palestinian Forests. For the direct use value, the results listed as follow (Ghattas *et al.*, 2005):

Table 3: Values of Palestinian Forests

Valuation Method / Output	Quantity	Value (US$1998)	Value (€2008)
Market price valuation			
Timber (m3)	1,500	125,000	141,400
Firewood (m3)	1,500	75,000	84,800
Seeds, stone fruits (t)	500	200,000	226,200
Medicinal plants (t)	700	245,000	277,000
Natural fruits (t)	300	90,000	101,800
Dyes and other colouring items (t)	50	15,000	17,000
Others	-	40,000	45,200
Substitute goods pricing			
Grazing (t of fodder)	5,040	504,000	570,000
Total direct use values		1,294,000	1,463,400

***Source**: Breghiet and Qanam 1998, cited in Merlo and Croitoru 2005, p. 142. Euro values converted to 2008 Euro based on harmonised historic inflation figures (HICP).*

Box 1: The Applied Research Institute- Jerusalem (ARIJ) Leading the Inventory of the Palestinian Forested Areas

Since 25 years of work, The Applied Research Institute- Jerusalem (ARIJ) has conducted inventory and assessment for forested areas in SP. ARIJ became a member in the International Conservation of Nature (IUCN) in the year 2014. It creates continuous inventory for the Palestinian Protected Areas (PAs) including Al Qarin, Wadi Al Quff and Um At tut PAs; all over the West Bank region. The findings are all documented in a web-based databases including forestry, flora and fauna and a Herbarium which was set at ARIJ premises.

ARIJ has been selected by the International Conservation of Nature (IUCN) to lead a learning project with 26 regional partners, entitled: "Palestinian Forests Sustainability and Rehabilitation: AL Qarin Protected Area in the Southern West Bank and Um At Tut Protected Area in the Northern West Bank within the Mediterranean Eco-system PFSR project" during March 2013. In this project ARIJ built the capacity of local NGOs. This includes learning an inventory of forested areas, GIS and remote sensing tools and applications including NDVI, endangered species identification according to the IUCN's Red List, green corridors setting, land degradation, guidelines for best practices and ecosystem services and management plans for selected PAs.

ARIJ also took the lead to rehabilitate paths for visitors within the two selected PAs and to conduct awareness campaign for neighboring communities about best practices and utilizations for forested. The paths were carefully selected after consultation with experts from the MoA and the IUCNand support of GIS and remote sensing applications. The rehabilitation included clearing small rocks and waste from almost 450m – 500m path in each PA; placing arrow signs along the path indicating the direction of the route, and installing information signs to give details of the most dominant species growing along the path. Each plant sign included the name of the plant in English, Arabic and Latin as well as its area of origin, description, uses, flowering and fruiting periods and best methods for its conservation.



ARIJ also conducted awareness campaign for neighboring communities and school students from Hebron and Jenin Governorate through conducting workshops, lectures and open days at both selected PAs. During the campaign, ARIJ specialists introduced the natural forest resources in the two protected areas, the importance of their sustainability in order to maintain the Palestinian environmental balance and the ecosystem services for them and the future generations. The specialists used stories, plays and posters to demonstrate the status and potential uses of the two Pas. In addition, ARIJ specialists in cooperation with MoA (Ministry of Agriculture – forestry and Rangeland Department) and EQA (Environment Quality Authority) continuously support the visitors' trips inside Al Qarin or Um At Tut PAs using the rehabilitated paths guided by the information signs that ARIJ had installed in both PAs. For more information please visit: www.arij.org

3.4. MEDICINAL AND WILD EDIBLE PLANTS

The use of traditional medicine in the 20th century, particularly herbal medicine, was widespread throughout the Middle East, including SP (Ali-Shtayeh et al,2000 and Roweha, 1983)). In SP, particularly in the West Bank a lot of ethnobotanical and ethnomedicinal studies have been carried out to explore the importance of medicinal plants. In addition, herbal medicine is used to treat various diseases, including gastrointestinal diseases, urinary tract infections, infertility, and cutaneous abscesses, and chronic diseases (Roweha 1983; Ali-Shtayeh *et al.*, 2000; Ali-Shtayeh & Jamous, 2006; Ali-Shtayeh *et al.*, 2011, 2012, 2013).

A systematic review was carried out in SP on studies that included a list of medicinal plants that were known and/or used in Traditional Arabic Palestinian Herbal Medicine (TAPHM). This use of medicinal plants as part of complementary and alternative medicine (CAM) and provided a list of the therapeutic indications of the species as well as presenting the scientific names of these species. The resulted inventory (BERC 2014 "National List of Medicinal Plants in Palestine - West Bank and Gaza Strip") comprises 368 plant species with their Latin name, Family name, English name, Arabic name, geographical region, growth form, abundance, blooming time, and the references that cited the plant. This national inventory of medicinal plants is expected to serve as a reference on herbs used in TAPHM (Ali-Shtayeh et al., 2014).

An ethnopharmacological survey carried out among 102 informants living in the West Bank revealed that there were at least 63 reliable plant species still in use for treating skin, urinary system, gastric system, prostate diseases as well as cancer and other ailments (Ali-Shtayeh *et al*., 2000), while our knowledge on Gaza Strip medicinal plants is still very restricted. A comparative ethnobotanical study on Traditional knowledge of wild edible plants was carried out in fifteen local communities distributed in five areas of the Northen West Bank. The study recorded 100 wild edible plant species, distributed across 70 genera and 26 families (Ali- Shtayeh *et al*., 2008). The previous study mentioned that the most significant species include *Origanum syriacum* L., *Foeniculum vulgare* Mill., *Malva sylvestris* L., *Salvia fruticosa* Mill., *Cyclamen persicum* Miller, *Clinopodium serpyllifolium* subsp. *fruticosum* (L.) Bräuchler, *Arum palaestinum* Boiss., *Trigonella foenum-graecum* L., *Gundelia tournefortii* L., and *Matricaria aurea* (Loefl.) Sch. Bip., all these species with the highest mean of cultural importance values, were cited in all five areas.

An ethnopharmacological survey was carried out on 2006 among Palestinian communities in the West bank and Gaza strip, the survey included 382, and 153 informants in both The West Bank and Gaza Strip respectively. The study revealed that there were 253 plat species belonging to 82 families and 218 genera are still in use for the treatment of different human ailments (Ali-Shtayeh & Jamous, 2006). While, 120 species belonging to 50 families and 107 genera are still in use in Gaza strip. This study reveals that 261 plant species belonging to 84 families are still in use the the West bank and Gaza Strip, the most representative families were Papilionaceae (22 species, 21 genera), Asteraceae (20 species, 18 Genera), and Risaceae (19 Species and 16 Genera) (Ali-Shtayeh & Jamous 2006). ARIJ (2002) described the wild and agriculture plants occurring in SP with their nutritional, economic, medicinal and fodder values.

A great work was done in the field of ethanobotany, detecting and testing the antidermatophytic, antibacterial, anticandidal and antioxidant substances from extract of plants as well as studying fungal diversity in SP for long time by Ali-Shtayeh, (1988), Ali-Shtayeh & Arda (1989), Ali-Shtayeh *et al.*, (1988, 1989, 1991, 1997, 1998, 2003a,b,c, 2013, 2015), Ali-Shtayeh, & Jamous (2000), Ali-Shtayeh, & Saleh, (1999), Ali-Shtayeh, and Abu

Ghdeib (1994, 1999), Ali-Shtayeh, and MacDonald (1991), Al-Nuri *et al.*, (2007), Hilal *et al.*, (2006), Husein *et al.*, (2014), Jamous *et al.* (2015), Macdonald *et al.*, (1994), etc.

3.5. GENE BANK

State of Palestine didn't succeed in establishing a national gene bank as one of the national priorities of biodiversity conservation. But instead, there are many small gene banks (National Agricultural research center gene bank have accessions of most wheat landraces – NARC, The Biodiversity and Environmental Researce Center-BERC gene bank,The Palestinian Agricultural Relief center (PARC) gene bank, The Union of Agricultural Working Committees (UAWC) gene bank) with accessions of the most local landraces and varieties of most crops and vegetables which are adapted to drought and salinity conditions and resistant to many common diseases.

Study has been conducted in six villages of the Nablus District (Ali-Shtayeh, & Jamous 2005), to understand their current seed status, especially traditional varieties, the processes by which Palestinian farmers' communities have maintained their biodiversity of seeds, and by which farmers can be encouraged to revive systems of varietal maintenance, and hence ensure food crops security at household and community levels. The results indicate that over the last few decades, there has been a considerable decline in the number of local crop varieties cultivated in the Nablus District partially due to rapid changes brought about in agricultural technology, including the introduction of new or improved varieties. This trend has resulted in genetic erosion and disappearance of eco-geographically adapted crop cultivars, decrease in farmers' choice of traditional varieties, and simultaneously endangering farmers' traditional knowledge of seed selection, treatment and storage.

The results[15], however, showed that traditional crop varieties are still prevailing in the semi-arid agriculture in the area under study, with these varieties being more diverse under rain-fed agriculture (81 %) than under irrigated agriculture (71 %). The relative importance index (RII) estimated based on numbers of farmers, area of the cultivated crop, and total area of different crop varieties, was used in this study as an indicator of the relative importance of each of the cultivated crops in a certain area. It has been possible by using this method to compare between crop varieties cultivated in one village or a group of villages. Based on their RIIs, the following varieties were shown to be the most important of all crop varieties in the study area: wheat (haytieh samra), common vetch (traditional variety), barely (traditional variety), wheat (Anbar, an improved variety), wheat (haytieh safra), and traditional varieties of lentil vetch, chickpea, broad beans, Egyptian cucumber, and lentils. The survey results[15] showed that there is a great demand for the revival of traditional varieties in the Palestinian areas under semi-arid agriculture, and through financial support from Small Grant Program/ Global Environmental Facility (SGP/GEF), community effort and BERC involvement, a seed conservation system namely a Community Seed Bank is being established at Til Village in the Nablus district. The Community Seed Bank functions as a facility and center for seed requirements of farmers, and enhances the tradition of nurturing diversity through: access to seeds of farmers' choice; farmers' capacity building in producing desired seed of specific crop cultivars; providing strategic seed reserve in drought years; etc.

The Biotechnology Research Center (BRC) of SP Polytechnic University-Hebron, success lies in a BRC program to preserve the genetic heritage of Palestinian crop species by generating a gene-bank of genetic fingerprints from local plant cultivars. **So that, an urgent support is needed to prepare the National Framework on Biosafety for SP to maximize the benefits and to minimize the potential threats of GMOs for biodiversity.**

[15]Ali-Shtayeh, & Jamous 2005

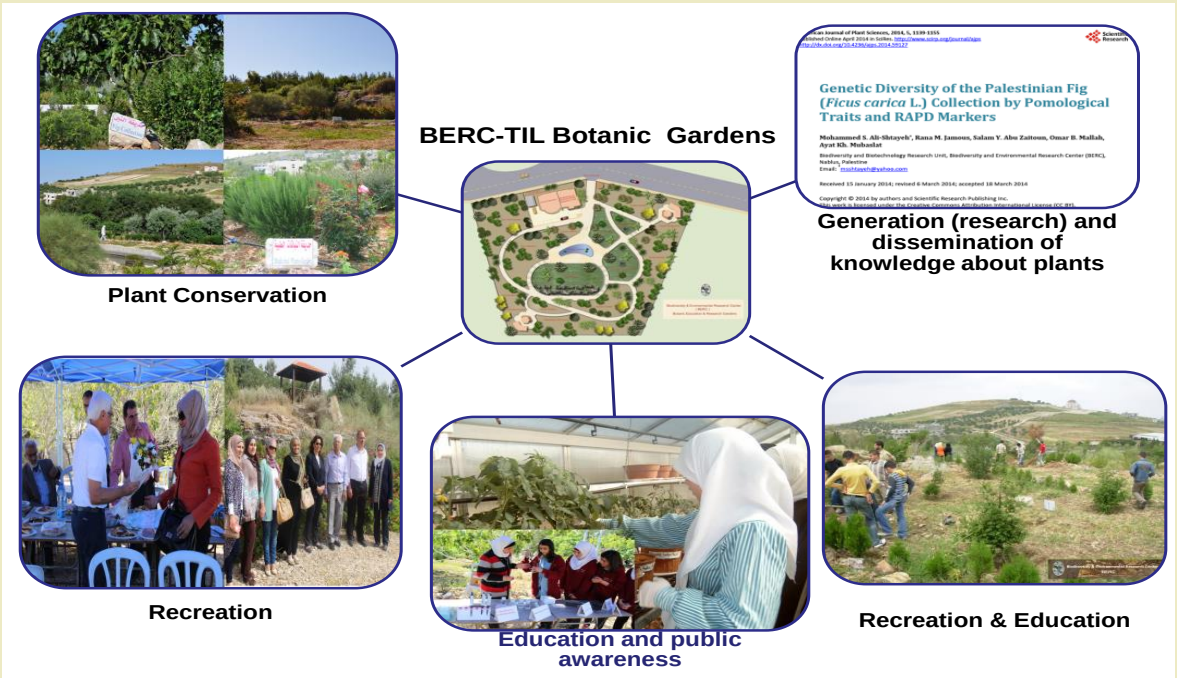
Box 2: The BERC-Til Botanic Gardens

The Biodiversity & Environmental Research Center (BERC) - a non-government organization in SP dedicated to research and development - has established the BERC-Til Botanic Gardens (BERC-Til BGs) in 2003 with the mission of contributing towards better management of the earth environment by increasing knowledge and understanding of plants on the basis that they constitute the foundation of life on earth. One of the gardens main purposes is to display the plants and also to establish genetic stores of these plants. The gardens and the existing BERC research facilities has formed a good basis for educational and research programs directed towards promotion of plant biodiversity conservation, environmental and plant conservation education, and horticulture.

BERC-Til BGs are located in Til village, about 5 km southwest of Nablus. The total area of the BGs is 15,000 m^2 comprising 15 plant gardens and collections: the Poplar Garden; the Rose Garden; the Pistacia Garden; the Linden Garden; the Olive Collection (23 varieties); the Carob Garden; the Palestinian Oak Forest; the Pine Forest; the Eucalyptus Garden; the Redbud Garden; the Rock Garden; the Fig Collection (18 varieties); the Storax Garden; Medicinal Plants Conservation Site; and the Aquatic Garden. More than 220 plant species are conserved in these collections. The management program of the BERC-Til BGs includes the following operational objectives:

1. The establishment of botanic gardens, as a national leader in the interpretation and teaching of systematic botany and fungi, conservation of a wide range of endangered and threatened wild plants and their habitats, biodiversity assessment and management, and herbarium and botanic gardens management.
2. The development and implementation of an educational and research program that would carry out applied research aiming at plant conservation using advanced technologies, and disseminate knowledge and understanding of the value and importance of plants to the public.
3. The production of basic and applied information on biodiversity and environmental resources and to manage and communicate this to all our stakeholders.
4. To assist actively in capacity-building biodiversity, environmental sciences, and related biotechnology.
5. To network effectively with leading universities, research centers, colleges, schools and other similar institutions to develop research and education in biodiversity and environmental sciences.
6. The implementation of a targeted educational and environmental awareness raising program for local schools, youth and decision makers.
7. The preparation of good practice guidelines for effective management BERC-Til BGs based on international best practices and knowledge.
8. To provide a recreation site by making use of plants multipurpose uses including their effects on environmental health and aesthetic values.

The BERC-Til BG is managed under a participatory approach by a Board of Trustees comprising 3 members of Til Village Council, 3 members from BERC, 2 members from the community, and 2 reserved for women. Technical, Scientific and educational aspects of the Gardens are solely the BERC's responsibility. A small fee is now being collected from visitors, and being used for maintaining living plant collections and gardens services.

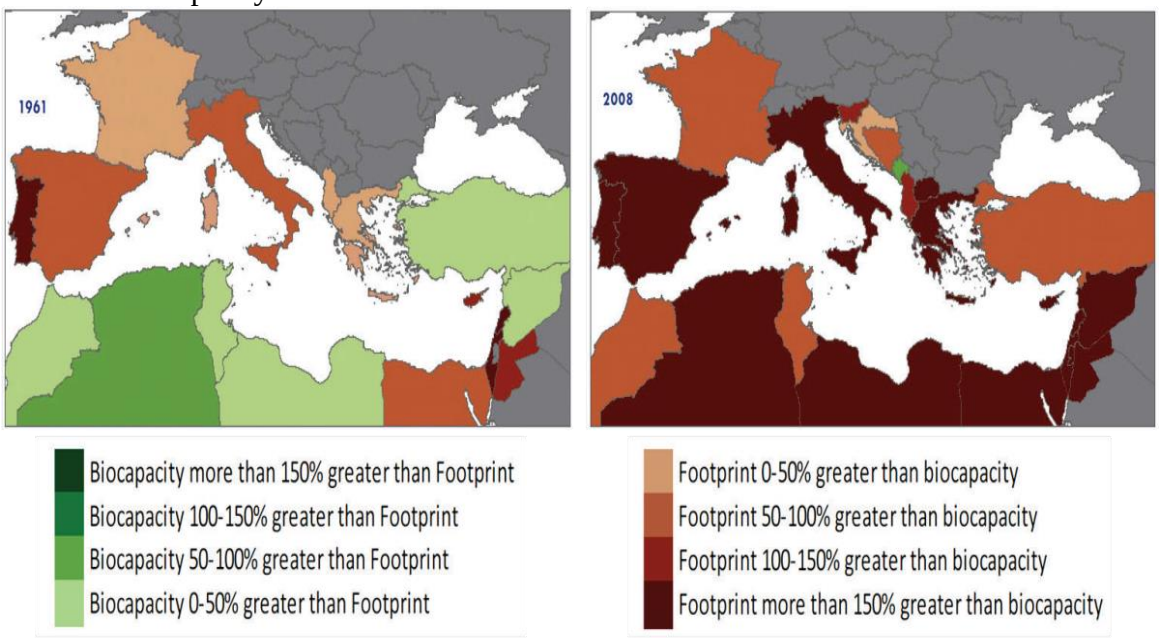


4. IMPACTS OF STATE OF PALESTINE ON GLOBAL BIODIVERSITY

4.1. ECOLOGICAL FOOTPRINT

Human activities consume resources and produce waste, and as our populations grow and global consumption increases, it is essential that we measure nature's capacity to meet these demands. The Ecological Footprint has emerged as one of the world's leading measures of human demand on nature. On the asset side, biocapacity represents the planet's biologically productive land areas including our forests, pastures, cropland and fisheries. These areas, especially if left unharvested, can also absorb much of the waste we generate, especially our carbon emissions. The Ecological Footprint represents the productive area required to provide the renewable resources humanity is using and to absorb its waste. The productive area currently occupied by human infrastructure is also included in this calculation, since built-up land is not available for resource regeneration (Global Footprint Network, 2015).

In today's world, where human population mismanagement of resources, climate change, etc., ecological assets are becoming more critical. Each country has its own ecological risk profile: Many are running ecological deficits, with Footprints larger than their own biological capacity. Others depend heavily on resources from elsewhere, which are under increasing pressure. National governments using the Footprint[16] are able to: (1) Assess the value of their country's ecological assets; (2) Monitor and manage their assets; (3) Identify the risks associated with ecological deficits; (4) Set policy that is informed by ecological reality and makes safeguarding resources a top priority; (5) Measure progress toward their goals. Map (8) provides an overview of the Ecological Footprint and biocapacity in 24 Mediterranean countries between 1961 and 2008. The green color indicates that the biocapacity is higher than the Ecological Footprint of consumption in the specific year and country; a red color indicates a biocapacity deficit.



Map 8: Ecological deficit (red) or reserve (green) status of the Mediterranean countries in 1961 (left) and 2008 (right)[17].

[16] Global Footprint Network, 2015

[17] Ecological Footprint of Mediterranean Diets, 2015

Between 1961 and 2008 all countries in the Mediterranean have either turned into a biocapacity deficit or grown deeper into deficit than they were in 1961. Algeria experienced the greatest change from biocapacity 50-100% greater than its Footprint in 1961 to a Footprint more than 150% greater than its biocapacity in 2008 Ecological Footprint of Mediterranean Diets, 2015).

The Ecological Footprint analyzes demand on six different land types. The first three, namely crop and grazing lands and fishing grounds, are primarily demanded by the agriculture and food industry. The forest and built-up land provide construction material and the necessary ground for building infrastructure such as cities and roads. The carbon-uptake land – also referred to as carbon Footprint – reflects the waste absorption capacity in terms of forest land that would be required to sequester all anthropogenic CO2 emissions released every year in the atmosphere. Figure 6 gives an overview on the Ecological Footprint of consumption by different land types for each country in the world in 2014, while Figure 7 gives an overview on the Ecological Footprint of consumption by different land types for each country in the Mediterranean in 2010.

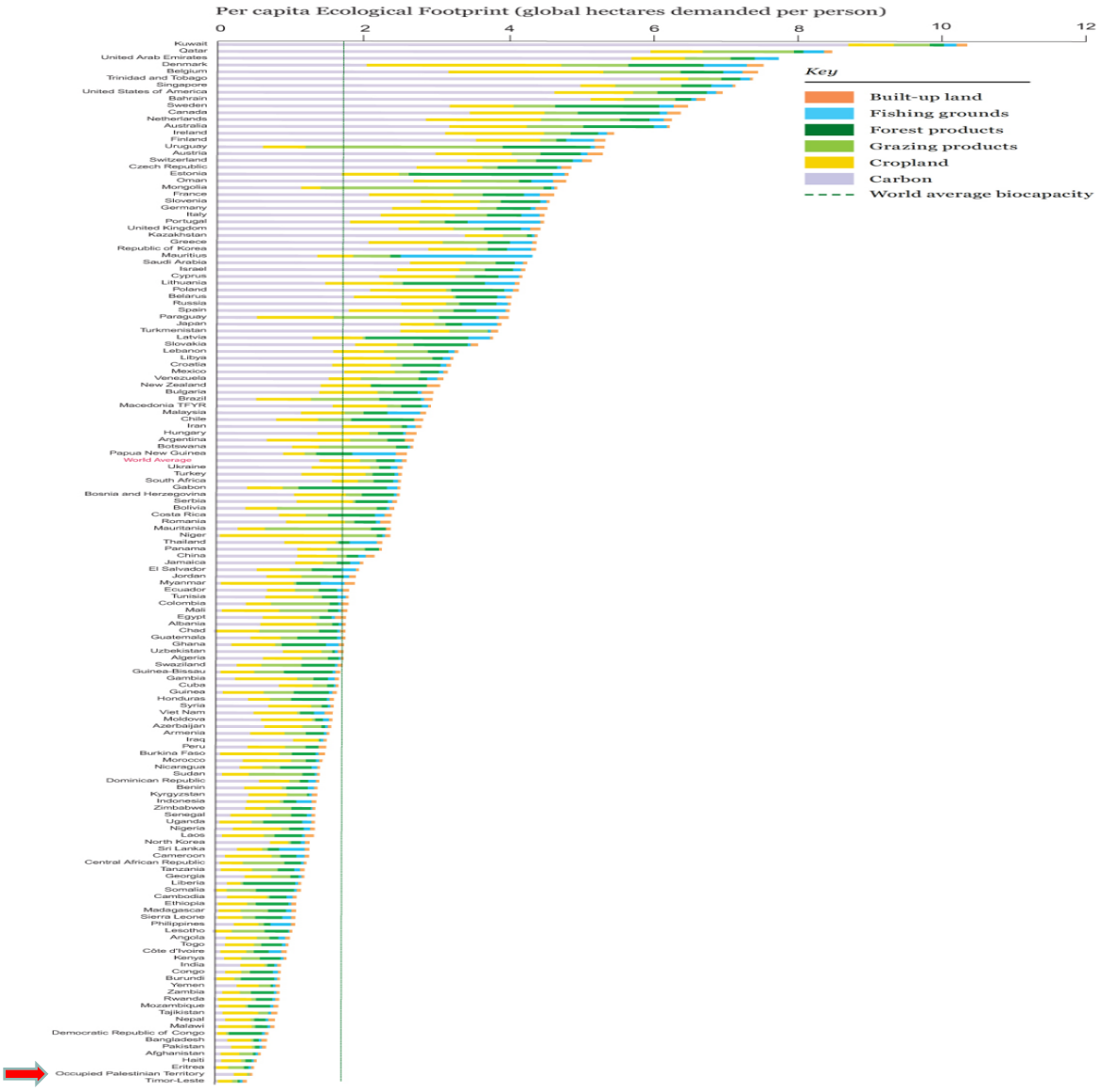


Figure 6: Ecological Footprint of consumption by land type of 24 Mediterranean countries, in 2010 – (Living Planet Report, 2014).

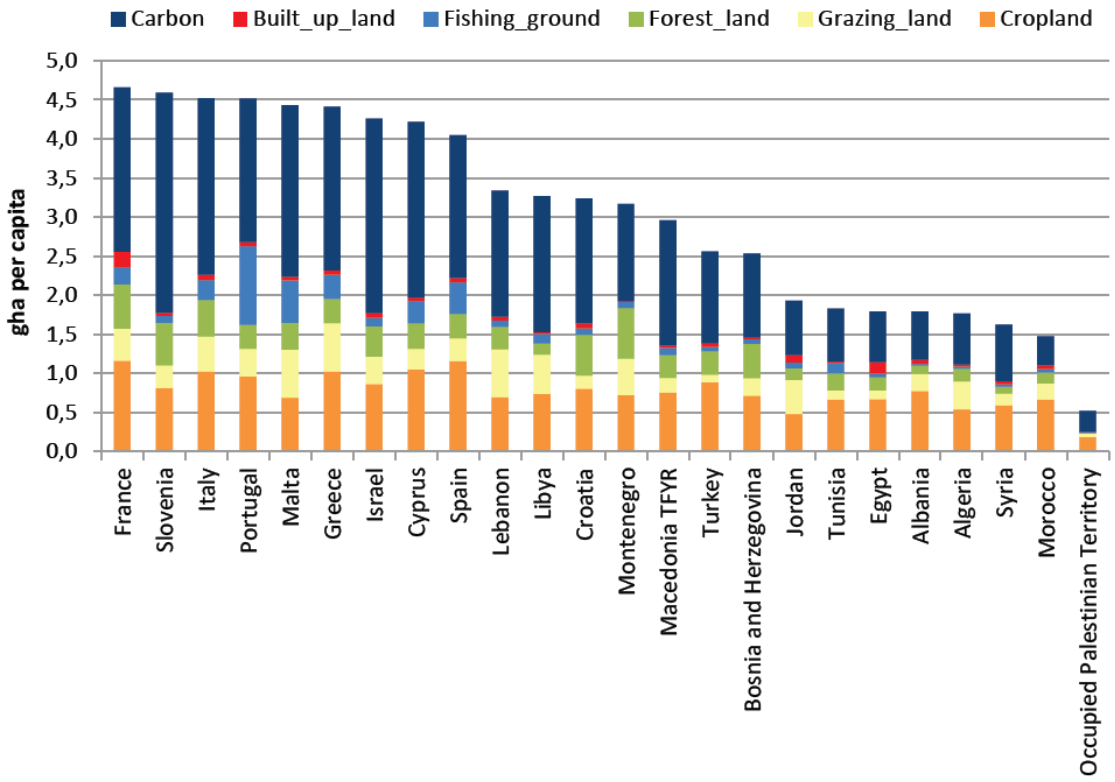


Figure 7: Ecological Footprint of consumption by land type of 24 Mediterranean countries, in 2010 – (Ecological Footprint of Mediterranean Diets, 2015).

4.2. KEY BIODIVERSITY AREAS

State of Palestine is rich in biodiversity including more than 50 sites were identified as a biodiversity sites, these sites were included in the National Spatial Plan (NSP) for protection from any change or land use. The investigation of these sites were carried out in 1996, which is now outdated, and needs a new investigation and assessment. EQA, signed an agreement with the Belgium cooperation to re-assess and re-evaluate the situation of the biodiversity sites with main objective to re-delineate the borders of these sites and producing new maps to be included into the national spatial plan, for the benefit of the local communities and easing of the pressures they suffer from the spatial plan (Map 9).

4.3. PROTECTED AREAS

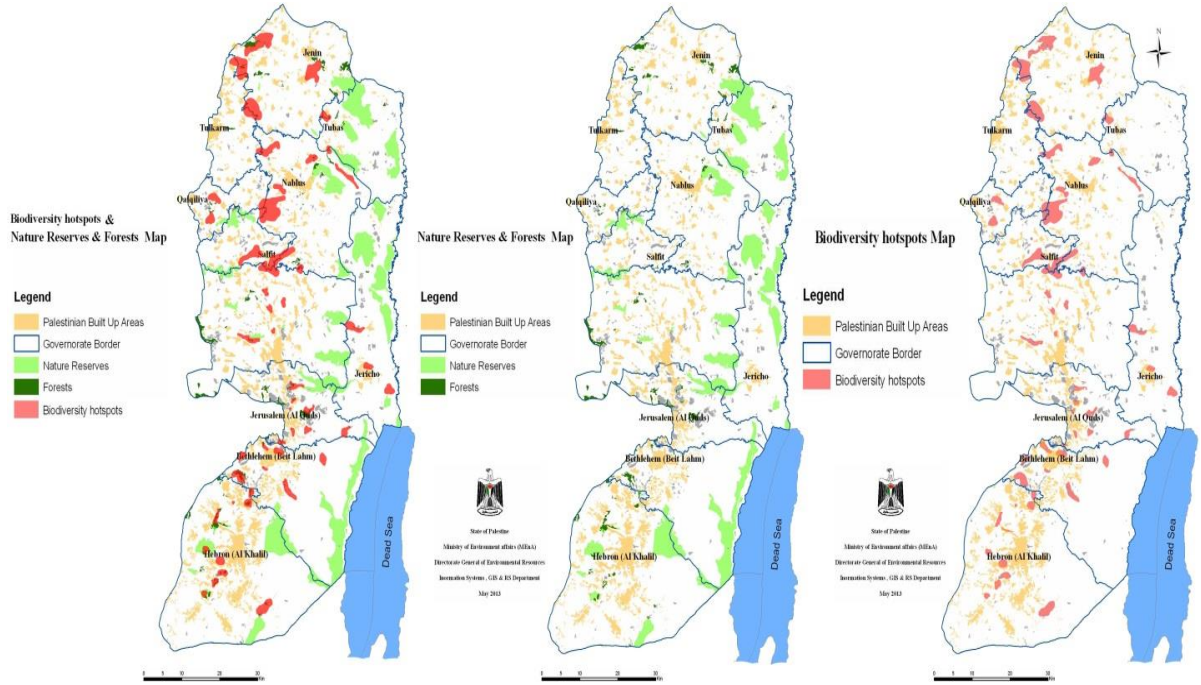
With regard to natural reserves, the Israeli occupation power has declared 48 natural reserves in the West Bank. The total area of the designated nature reserves is 69,939 hectares; forming 12.35% in the year 2005 (Spatial layer at ARIJ GIS department). However, the National Spatial Plan prepared by the MoLG indicates that the total area of natural reserves in the West Bank including east Jerusalem 51,157 hectares forming 9% (Isaac *et al.*, 2011). They are located mainly in the eastern slopes and Jordan River area. The Palestinians prevented by Israeli occupation power from access and work freely in them, which clarifies that the Israelis occupation policy of nature protection has political aims rather than those of protecting biodiversity. A portion of these reserves have been converted to Israeli illegal settlement regime and occupation military bases and a large part were included within the annexation and separation Wall. Map 9 presents the distribution of Nature reserves and forest in West Bank and its overlapping with biodiversity hotspots. It's noted that most Nature reserves and forest are away from the areas of biodiversity richness, this can explain the above mentioned conflict.

The largest nature reserve is on the riparian areas of the Dead Sea in the Bethlehem governorate, and accounts for more than a fifth of the protected area alone (ARIJ 2005). Most of the existing nature reserves in the West Bank belong to the Area C, which means they are fully controlled by the Israeli civil administration (Görlach *et al*. 2011). Only 13 reserves (or 11.3% of the total reserve area) are within the Area B and are therefore in principle under Palestinian control, unless Israeli occupation power restricts Palestinian access to these areas, since the state of Palestine is fully occupied by the Israeli occupying power. This means that the Palestinian management agencies, currently the Environment Quality Authority (EQA) and the Ministry of Agriculture (MOA), cannot access most of the protected areas on the West Bank for management purposes – although enforcement activities in some reserves may be possible.

4.4. FORESTS

The total forested Area in the West Bank including east Jerusalem region forms 7,830 hectares in the year 2012 forming only 1% of the total WB area. The total forested area annexed behind the annexation and separation wall is 4,200 hectares in the year 2012. The total forested area annexed in the eastern annexation and separation wall zone is 150 hectares (this type of data is updated every 4 years by ARIJ). This area (annexed behind the annexation and separation wall and eastern zone[18]) forms 55.5% of the total forested area in the west Bank region. The designated forested area in the West Bank including east Jerusalem and the Gaza Strip forms a larger area than covered forested areas, in which the designated forests covered 229.6 km^2, and 2 km^2 respectively according to ARIJ-GIS Land Use/Land Cover analysis 2007 (ARIJ-GIS-RS 2015). Most of these forests were planted during the British mandate, although a small percentage was made up of remnants of natural forests (Map 9). The loss of different forest plantations can have a significant effect on Palestinian biodiversity. The environmental value of the forest trees should also be added to the economic values. Plantation trees are also a usable commodity and provide an alternative to harvesting or using natural forests for fuel, construction and furniture, which are likely to come under increased pressure in the area where afforested areas have already destroyed (UNEP, 2002).

[18]The eastern segregation zone is an area of 1664 km square (only 5% of which under Palestinian control) located along the eastern terrain of the West Bank that stretch for 200 km from south to north, most of which declared as closed military area, and is of limit for Palestinians.



Map 9: Nature Reserves, Forest and biodiversity hotspots in West Bank; from left to right: Biodiversity hotspots, Nature Reserves and Forest, and overlap between three parts.

In addition, Israeli occupation power continues to invest the green forested areas mainly the public lands for the establishment of the Israeli settlement power, example is the Abu-ghnaim mountin forest which transformed compleletly to Gillo-Colonial settlerment (See figure8).

Figure 8: Abu-Ghnaim Mountain after Israeli destruction of the forest -1997-2015[19]

[19] ARIJ

4.5. IMPORTANT PLANT AREAS (IPAs)

A total of nine IPAs have been identified in SP; four have been confirmed and described as internationally important sites the remainder requires further investigation, due to access difficulties and lack of capacity (Figure 9,10). Three IPAs contain single country endemics and all sites contain species that have very restricted distributions but cross adjacent borders for example *Iris haynei* in SP and Israel. The current distribution of many of these locally endemic species is not known (Al-Sheikh, 2011).

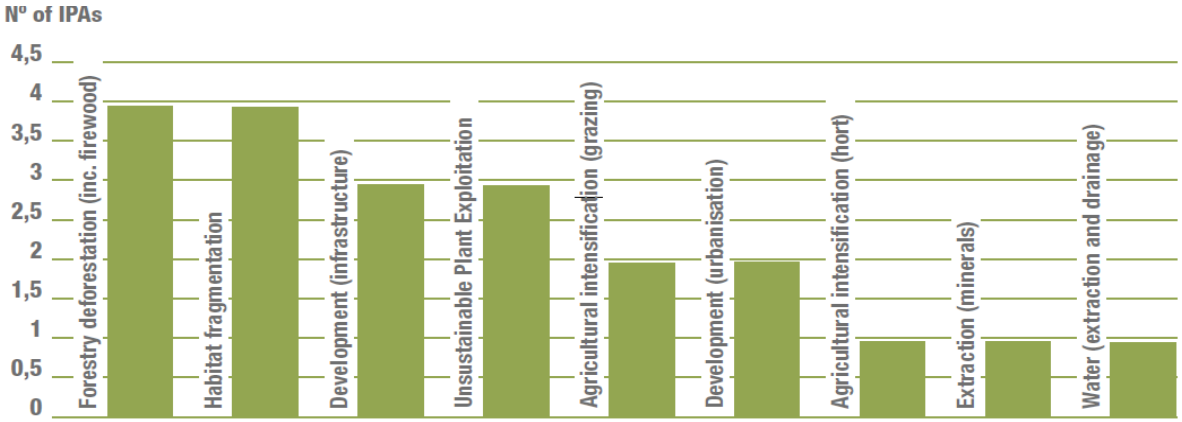


Figure 9: Threats affecting IPAs in State of Palestine (Al-Sheikh, 2011).

The IPAs of SP are dominated by maquis (chaparral) vegetation – both dense and open, with *Pistacia palaestina* Boiss., *P. lentiscus*, *Rhamnus palaestina* Boiss., *Quercus calliprinos* Webband *Q. boisseri*, frequently interspersed with ancient olive groves. The softer leaved garrigue (phyrgana) with *Cistus* × *incanus* L., *C. salvifolious*L., *Smilax aspera* L.; and many medicinal and aromatic species such as *Origanum syriacum*L., *Satureja thymbra* L.*and Teucrium spp*., is found on some IPAs (Al-Sheikh, 2011).

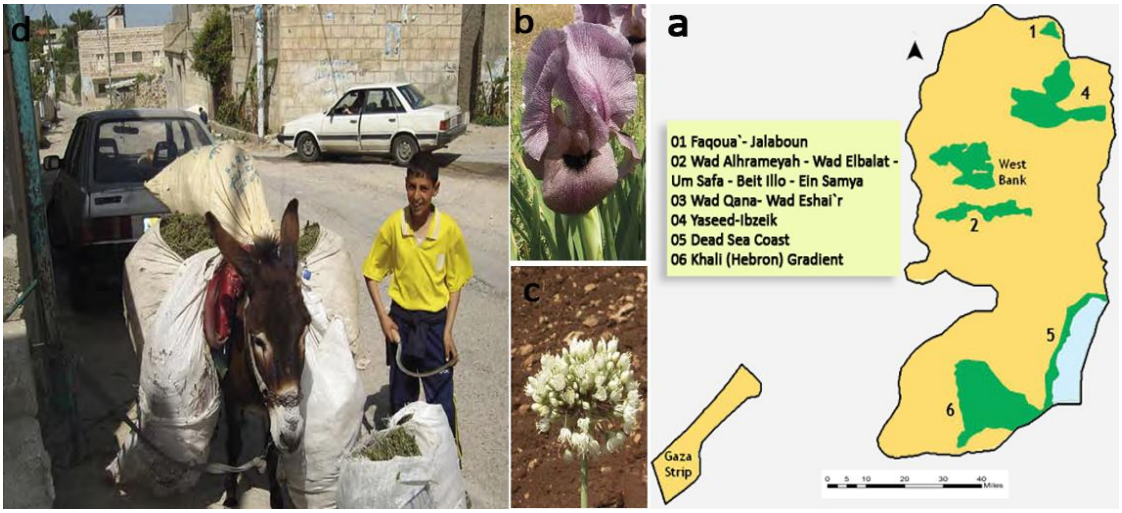


Figure 10: IPAs of State of Palestine; a- IPAs distribution, b- *Iris haynei*, c- *Allium qasunense* site restricted endemic species State of Palestine, and d- Over collection of medicinal plants affects many IPAs in State of Palestine (Al-Sheikh, 2011).

4.6. IMPORTANT BIRD AREAS (IBAS)

Four sites (Ein Al-Fashkha, Jericho, Jerusalem (east), and Jerusalem wilderness) cover about 21.500 hawere recognized by Birdlife International, (2015a) as Important Bird Areas (IBAs) using a set of internationally agreed criteria, based on the presence of species at sites and their population sizes (Table 4). In each one Site description, Key Biodiversity, and Populations of IBA trigger species were presented. A programme of monitoring of sites seeks to assess changes to bird populations, track threats and ensure that appropriate conservation actions can be implemented are needed. There is an urgent need for full comprehensive fieldwork study on the areas proposed to be declared as IBAs in the future based on the international criteria by Birdlife International.

Table 4: Important Bird Areas (IBAs) of State of Palestine based on Birdlife International, (2015b,c,d, and e)

Area	IBA Criteria	Area\ha	Habitats	Protected area	Land use
Ein Al-Fashkha	A4iv, B1iv, B2, B3	2500	Wetlands (inland) /Desert	Yes	Rangeland/pastureland (Major), agriculture (Minor), tourism (Minor), and nature conservation and research (100%)
Jericho	A1, A4iv, B1iv, B2, B3	3500	Artificial – terrestrial/ Wetlands (inland)	No	Urban/industrial/transport (Major), and agriculture (Minor)
Jerusalem (east)	A1, B2	500	Artificial – terrestrial/Shrubland	No	Tourism (Major), and Urban/industrial/transport (Major)
Jerusalem wilderness	A4i, B1i, B1iv, B2, B3	15000	Desert/ Wetlands (inland)/Rocky areas	No	Rangeland/pastureland (Major), agriculture (Minor), and tourism (Minor)

4.7. WETLANDS

GlobWetland II is a regional pilot project of the Ramsar Convention on Wetlands including SP, funded through the European Space Agency (ESA). The primary objective of GlobWetland II is to facilitate the integration of remote sensing into the conservation and management of wetlands. The overarching objective of the GlobWetland II project is to contribute to the set up of a Global Wetlands Observing System (G-WOS). The GlobWetland II project aims principally at developing a G-WOS pilot information system, also called the GlobWetland II information system. The system consists of maps and system software. The system software capacity was demonstrated through the production of a number of wetland related geo-information maps and indicators, over 200 wetland sites and surrounding areas, which was selected over the coastal catchment areas of the Southern and Eastern part of the Mediterranean basin, extending from Morocco to Turkey (less than 100 km from the coastline) including maps of 5 areas in SP (http://webgis.jena-optronik.de/) for three different periods of time (years 1975,1990, 2005) for change detection (Figure 11).

Figure 11: Proposed Wetland sites by GlobWetland II in State of Palestine

The Palestinian Environment Quality Authority (EQA) signed a Memorandum on Understanding with Observatory of Mediterranean Wetlands in 2010 and SP is a member of the MedWet Initiative and participates in its activities, and close cooperation exists with MedWet and OMW. These are the proposed Wetland sites by GlobWetland II in SP which are:

1- Wadi Gaza: is considered as one of the most important coastal wetlands located on the Eastern Mediterranean Basin, very rich in biological diversity (both flora and fauna). The wadi is also a station point for the migratory routes from north to south and from south to north. Wadi Gaza is considered as a unique area characterized by a high degree of biological diversity, including globally threatened, endemic, and rare species. In recognition of its importance as a natural area and as the only wetland in SP, Wadi Gaza was declared a nature reserve in June 2000. The Ministry of Environmental Affairs (MEnA) requested that municipalities should revise their land use plans so that they ensure that the Wadi bed be respected as a protected area. Wadi Gaza experience a continuos and systematic distruction by the Israeli the occupying power especially for the last ten years of siege.

2-Southern area of Jordan River: The Jordan River is a 251-kilometre (156 miles)-long river in West Asia flowing to the Dead Sea in SP border the river to the west, while the Golan Heights and Jordan lie to its east.The southern area of the Jordan River is very rich in Biodiversity of fauna and flora. Most of the endemic flora limited to SP is found there, with more than about 25 plants species of these endemics. In addition, the majority of wild mammals are inhabited this important area.

3- Al-Fashkha: it is a protected region and considered a wetland area, which contains a lot of fresh and salt springs, its decline from the sea level is between 380-400m below sea level. It is located south to Jericho city, the oldest city in the world. The Dead Sea located in the south part of this region and which is considered as the lowest area in the world. The oasis of Al-Fashkha extended in a distance of 1400 m in order to reach the Dead Sea in several sites.

This area is very rich in biodiversity of fauna and flora, that exist in the wetland and also contains springs which make it an ecotourism area with great potential.

4- Marj Sanour: includes one of the largest plain in the northern part of West Bank within Jenin governorate area. The plain surrounded by mountains from the four directions. Of these mountain 210 hectares are natural forests in Siris and Misilya, 93 hectares are planted forest in Siris, and 722 bare areas in Sanour and Judeida. The Biodiversity of Marg Sanour is not that differs from the North part of SP in general, but with some specificity with the presence of the water lacks late April to May which enhance the immigrant birds to land on the area. Mediterranean plant communities are dominated the area while other desert, and subtropical plant communities are also present, In Addition, Marj Sanour has the largest bird biodiversity due to the immigrant birds that pass through it during spring resting and feeding on the poles formed in the area.

5- Wadi Al-Bhathan: Wadi Al Bhathan is one of the major tributaries of Wadi Al Faria River. Discharge measurements of six major Wadi springs taken over the past 24 years have been evaluated. The springs drained between 1.27 and 14.2 MCM/year during the hydrological years of wet and dry seasons. The average calculated recharge area is about 16.8 km^2, which actually exceeds the orographic area (10.5 km^2), indicating one or more additional feeding water sources. It was found that there is a strong relationship between the discharge of this group and the intensity and distribution of rainfall. This area is considered the main area for eco-tourism and recreation at the national level. Because the area rich of water springs which is running all the year, it is very rich in biodiversity resources, mainly the birds, so that, it is considered an IBA for birds. In addition, most of the fauna species are accommodated this area for the availability of food and water.

In addition to the previous Wetland sites that were proposed by GlobWetland II in SPthere is an importnat site should be treated as wetland in the near future:

6- Al-Muquatta valley (Wadi Al-Muquatta): Originally it was river gathered fresh water from four main springs in Jenin toward the Mediterranean. Now it is polluted with sewage, but still form a host for many animals such as moorhen, spur-winged lapwingand, coypu, otter and caspian turtle in addition to thousands of migratory birds such as glossy ibis, plovers, sandpipers, snipe, black wing stilt (breeding), yellow wagtail and many other species. (Ongoing study by basha scientific center for research and studies)

5. THE CURRENT SITUATION AND TRENDS OF THREATENED SPECIES

5.1. FLORA

A comparison between the floral surveys over the past 20 to 40 years was done by a specialized ARIJ team, where it was found that up to 636 species (of 2,076 recorded plant species growing it SP) were found endangered of which 90 species are very rare (ARIJ, 2014). Such results indicate that the plant species growing in SP are subjected to pressures of various types, which cause a reduction in number and dramatically threaten their existence. Thus, if the root causes for such changes are going to continue, the existence of those species and others is threatened with un-sustainability and lack of viability for the long run (Ghattas, 2008).

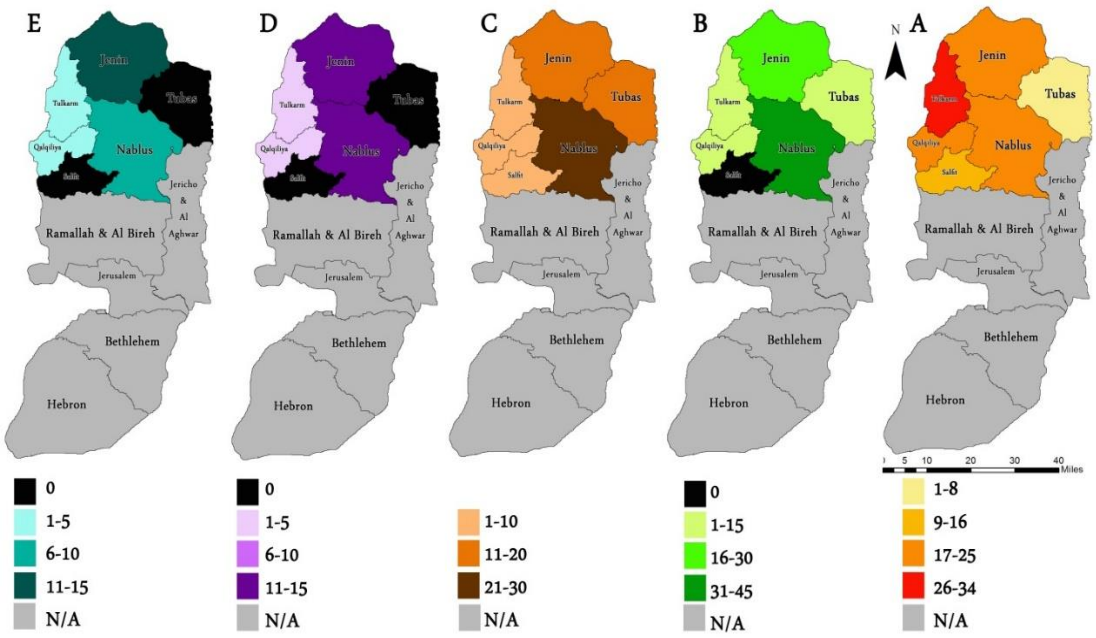
A study entitles: "Degradation of vegetation in the Eastern Slopes of Palestinian Central Mountains: (Jerusalem and Hebron Wilderness) as a case study" (Al-Haly, 2007) conclude the flowing:

- The presence of strong relationship between climate change and the state of vegetation and connotations on these changes in the Jerusalem wilderness are the spread of invasive plant and exotic species at unusual rapid pace, not to mention the decline in the intensity of some of the species that depend on certain quantities from the rains especially if we learned that the rains showed significant changes from 500ml/year to 50 ml/year.
- Photographs that were taken of vegetation in the wilderness in the twenties of the twentieth century confirmed substantial changes in density and types of vegetation, this truth agreed with the information provided by the elders and old people of the Bedouinscommunities whose confirm the spread of harmful species in large quantities like *Ricinus communis* and *Nicotiana galauca*.
- Exacerbated deterioration of the vegetation cover in the Jerusalem wilderness rapidly after Israel occupation power for the rest of the Palestinian Radii 1967, after land confiscaton, conversion and the partition and arrogance of pastures to military areas.
- Negative Human activities in the wild causing threat on plant species in this area. The activities including overgrazing, fires and over-collecting for fuel random Landfills and drilling operations for the purpose of the establishment of colonial settlements. Most of these activities led to the removal of vegetation and increased rates of runoff and then drift more plant species and leave the area of the rule of harmful and exotic species.

Many naturally occurring forests across SP disappeared and the consequent reshuffling of the vegetal composition led to the loss or marginalization of large numbers of native flora (Isaac, 1994). Although forest area in the West Bank is very small (about 4900 ha - <1%), it is estimated that 23% of the forest area has been destroyed from 1971 to 1999 (Dudeen, 2012). The majority of this destruction has been caused by the construction of Israeli illegal settlement regime and occupation military camps.

5.1.1. Medicinal plants:

Many threats facing wild edible plants in their habitat. These threats resulted mainly as of human activities. The level of impacts of these activities varied from location to location. Among these activities were: insecticides, agricultural land expansion, fuel wood collection, over grazing, over harvesting and uncontrolled fire setting (Hinnawi, 2010).



Map 10: Ranking of factors considered as threats to wild edible plants (Source of raw data Hinnawi, 2010). A- Insecticides, B- Agricultural land expansion, C- Fuel wood collection, D- Over- grazing, and E- Over-harvesting. (Based on no. of informants)

Its recommended[20]to apply conservation measures in the regions aiming at protecting endangered species and this could be done through the establishment of reserved areas, societies, public awareness that encourage plant protection and maintenance of these wild plants.

- The need for preserving knowledge through documentation and encouragement of people working in the field (extension).
- Better communications and information exchange, as well as direct contact with nature in everyday life aspect is necessary to encourage the consumption of edible wild plants.
- The need for identification of possible side effects of using and utilizing these wild plants to limit complications that might occur due to miss use of such plants.
- The need for further investigation on these plants including bioassays of the important species.

5.2. FAUNA

5.2.1. Birds

The decline of many bird species indicated by most of Wadi Gaza inhabitants could be attributed to anthropogenic factors including Israeli occupation power systematic distruction, overpopulation and residential expansion at the expense of natural ecosystems, lack of awareness and environmental education, destruction and transference of ecological habitats into cultivated ones, wastewater, over- use of pesticides, over-hunting and poor implementation of environmental laws and legislations (Abd Rabou *et al.* 2007a). According to D'Andrea *et al.* (1999), the replacement of natural habitats by cultivated areas has been changing the structure of animals and plant communities, chiefly in relation to the composition and abundance of species. Moreover, wastewater is an actual problem both to humans and wildlife and the environment as well (Abu Shaban, 2002).

[20]Hinnawi, 2010

5.2.2. Mammals

Massive deterioration and destruction to ecosystems were carried out by the Israeli the occupation power forces and Israeli illegal settlement regime in the Gaza Strip for claimed Israeli security reasons, where the uprooting of vast areas whether natural or cultivated had its major impact on wildlife ecology in the area. Habitat modification and fragmentation which was apparent in Wadi Gaza and other areas of the Gaza Strip may have a capital role in changing animal composition and distribution. Gaines *et al*. (1994) indicated that habitat loss and increased insularity can reduce population sizes to such low levels that species go extinct. The Gaza Strip, which is totally fenced by the Israeli occupying power and subjected to various anthropogenic disturbances, suffers the absence of large mammals except the vagrant species such as Jackals *Canis aureus* and Wolfs *Canis lupus* which seem to enter the area from historical SP through gaps or burrows in or beneath such fences. No records of their occurrence since decades were present (Abd Rabou, 2005). The large home ranges of big mammals (Wilson and Delahay, 2001) made the presence of large mammals in a very small and crowded area like the Gaza Strip impossible.

A study recently took place in Bethlehem entitled: "Decline in Vertebrate Biodiversity in Bethlehem, SP" (Qumsiyeh *et al*. 2014b) recorded 31 species of mammals in the targeted area. But things have been changing very rapidly in this region. Thirteen of the 31 species that we noted in the 1960s and 1970s were not recorded by us in the past five years. This may even be an underestimate of the actual changes in the past century. For example, Tristram (1866) noted that *Plecotus auritus* (*Plecotus christie*) is "very common in all the hill country in SP especially the caves and tombs around Bethlehem and Jerusalem". However, we have not noted this species even after an extensive search by using ultrasound detectors that are supposed to distinguish this species. Out of the 31 species that were collected previously in the study area, 13 species were not recorded and four became rare during the 2008-2013 study. Bats were severely affected, with the absence of 4 species out of seven used to be either common or recorded several times. Similarly, species of carnivores dropped from eight to three species. Populations of the Arabian Hare declined drastically[21] to the level that no individuals were observed during the past five years.

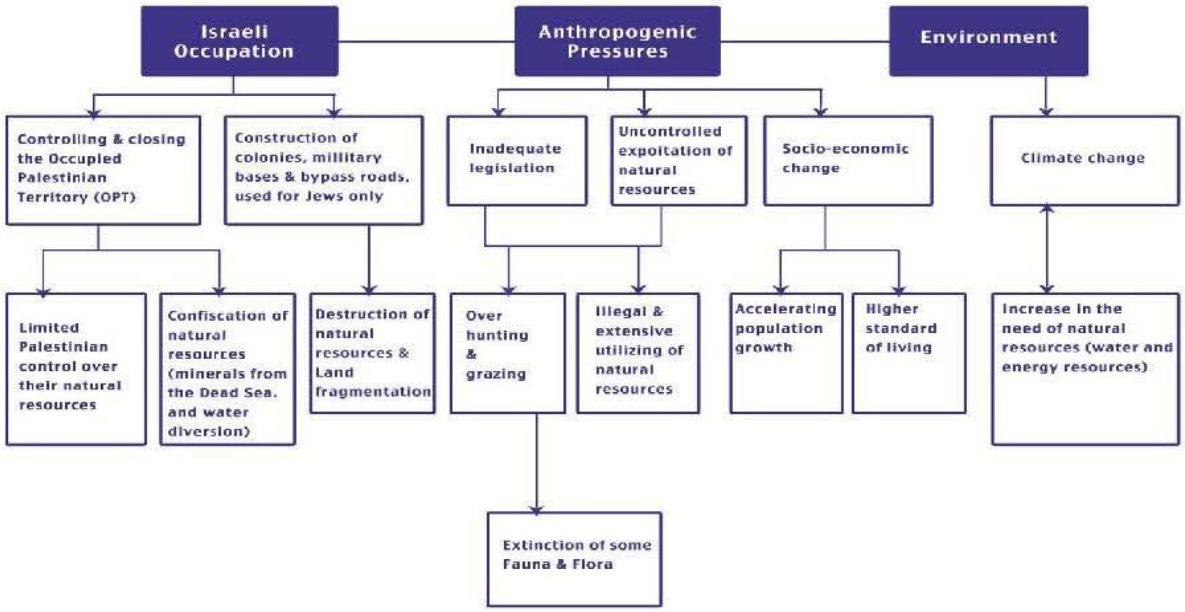
5.2.3. Reptiles and Amphibians

The various ecosystems including wetlands, sand dunes, natural vegetation and agricultural orchards provide reptiles and amphibians with all needs; shelter, food, breeding and camouflaging sites. However, the ever-increasing human impact on the existing natural resources in the Gaza Strip has threatened many wildlife species including herpetofaunistic ones (Abd Rabou *et al*., 2007b). The populations of frogs and many reptilian species are declining in an alarming trend. The results reinforce the necessity of long-term inventories in order to understand the dynamics of animal communities. It is expected that the population over-crowding, the residential and agricultural expansions, the intensive and extensive infrastructural and developmental projects and the poor implementation of environmental laws and legislations are major factors contributing to the gradual decline of biodiversity in the area. In this regard, the Israeli occupying power and Israeli illegal settlement regime played a capital role in deteriorating and destroying both natural and cultivated ecosystems in SP`s (Abd Rabou*et al*., 2007b). The Tree Frog, *Hyla savignyi*, was rather common in the areas of Solomons' pools and Artas and declined rapidly over the past few decades[21]. It still occurs in Husan and Battir areas though in small numbers. The toad *Pseudepidalea viridis* was extremely common in the district in the 1970s.

[21]Qumsiyeh et al. 2014b

6. MAIN THREATS TO THE BIODIVERSITY CURRENT SITUATION AND TRENDS

A wide variety of factors puts stress on the availability and integrity of the natural resources in SP. The greatest threat to the Palestinian natural heritage is the systematic distruction by the Israeli occupying power, the unsustainable use of natural resources; namely poorly planned development, land management challenges, and pollution. It is also important to mention the threats from the Israeli occupying power, which often create a situation where Palestinians cannot benefit from their natural resources, whereas Israel occupying power moves to exploit the resources in an unsustainable manner; and inflicts damage on the Palestinian environment. The Israeli occupying power impact needs to be monitored, assessed, and taken into account in the design of development plans and management of the natural resources (Figure 12). Population growth, technological change, and urbanization are all responsible for rapidly rising resource consumption. As the population, technology and lifestyle demands grow exponentially, people use increasing amounts of many natural



resources. This often results in adverse impacts, both to the land and on its living and non-living resources (ARIJ, 2007).

Figure 12: Factors threatening and increasing pressures on natural resources in State of Palestine[22]

6.1. HABITAT LOSS AND FRAGMENTATION

Many biodiversity conservation challenges in SP affect the whole region, giving special importance to the role of MEAs. Habitat destruction comes from a broad range of sources, including mainly the Israeli the occupation power with its various aggresions, unplanned urban expansion, overgrazing, over-exploitation, deforestation and unplanned forestry activities, desertification and drought, invasive alien species, and pollution and contaminants. In addition, the Israeli occupation power threatens SP's biodiversity, including but not limited to the uprooting of trees, land shaving, land division to politically classified areas A, B, and C (Oslo II 1995), land confiscation, Israeli illegal settlement regime and bypass roads, and the

[22] ARIJ 2007ccupation power

fragmentation of habitats mainly as a result of the annexation and separation Wall. These factors all serve to affect genetic exchange and, as a result, will weaken species composition in the future, thus precipitating the loss of this valuable resource and heritage (Ghattas, 2013) (Figure 13).

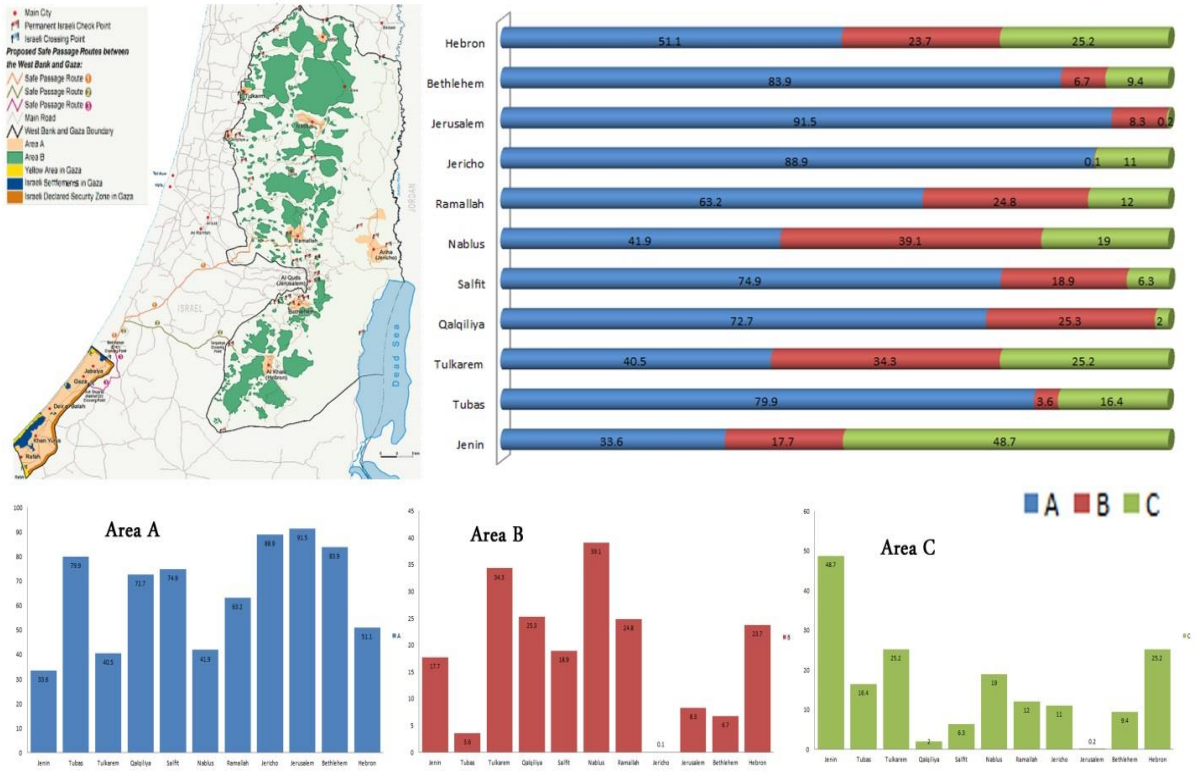


Figure 13: Distribution of agricultural areas- percentage in each geopolitical classification by Governorate, A- Geopolitical areas according to Oslo II 1995, B- Percentage of agriculture areas within the 3 areas.

One of the major constraints facing SP in the conservation of its biodiversity is the lack of Palestinian sovereignty over natural resources because of the Israeli occupation power. This is in addition to the political reality of denial of access and control over land and natural resources as agreed in the international peace accords signed with Israel occupation power, including Oslo I, Oslo II, and Wye River Memorandum[23] (Map 11). The anexxation and separation Wall will extend 774 km and is set to isolate 13.6 percent of the total area of the West Bank upon completion (EQA, 2010). Habitat fragmentation as a result of the Wall acts as a physical barrier that may prevent many species of mammals from travelling to their sources of food and mating, which may endanger the survival of specific populations or lead to the creation of new sub-populations. Such an action will increase the probability of Palestinian natural heritage loss[23] by impacting the existence of a large number of plant and animal species that grow and inhabit this area which is already affected by other destructive practices that cause the loss of valuable and irreversible resources.

Concerns are also expressed over the potential impacts of the on-going development of the annexation and separation along the western and eastern parts of the West Bank. In view of the amount of land confiscated from the West Bank, and the commensurately greater development pressures, the Segregation Zone is causing major challenges in conserving representative ecosystems, landscapes, and habitat linkages, especially between protected areas, and forests[24]. The Segregation Zone also causes Strip clearing of land, including forest and other vegetation covers. Almost 49 forested and 40 protected areas are included in the

[23] Ghattas, 2013
[24] ARIJ- GIS, 2011

Segregation Zones, forming up to 55.5 percent and 75.5 percent of the total covered forested and protected area of the West Bank respectively[24]. This action will mostly have a detrimental impact on the functions of natural reserves[23], in particular the conservation of animal, plant, and mineral forms, and threaten the existence of a unique natural vegetation cover.

Map 11: Overlap between Forests, Natural Reserves and Israeli activities across the Agro-ecological Zones of the West Bank

6.2. DESERTIFICATION AND SOIL EROSION

The eastern slopes and areas with rainfall lower than 300 mm per year, which constitute about 50% of the West Bank, are among areas most vulnerable to the desertification because of climate conditions and climate change and/or human factors, such as overgrazing and agricultural expansion into marginal lands, which are considered natural pastures. These factors have led to the deterioration of vegetation, loss of biodiversity and degradation of the ecosystem, in addition to the decline in soil's physical and biological properties and soil erosion. Climatic conditions and human activities also play an important role in the process of soil erosion; changes both in the quantity and intensity of rainfall, the decline in soil's physical and biological properties and the deficit of the vegetation cover make the soil more prone to erosion by water and/or wind[25]. Sand mining and theft is becoming a serious problem for marine environment and coast, with the estimated amount of sand mined during the past 20 years reaching more than 25 MCM from an area of only 520 hectares. Erosion is another problem primarily resulting from the construction of numerous facilities, such as ports, docks, wave's breaks, roads, etc. These facilities, especially fishing ports and the Gaza port, have caused sand erosion and imbalance in the natural sedimentation processes[25].

6.3. URBANIZATION

Urban space has increased in the cities of Ramallah and Al Bireh and multiplied by 422% in 2005 than it was in 1972. While reduced area of agricultural land in the two cities in 2005 to 18% of the agricultural land which had been present in 1972. There are a lot of plans in the municipalities of Ramallah and Al Bireh to preserve the environment and environmental awareness, but that these plans remain just ink on paper unless they are taken Readiness to apply[26]. Israeli illegal settlement regime plays a key role in the shrinking area of agricultural land in the city through the issuance of military orders to confiscate annexation of the most fertile of the city of agricultural land for the establishment and expansion of Israeli illegal settlement regime on such settlement of Beit Eil and Psagot and Kochav Jacob, and limit the expansion of the two cities to the east and northeast. The steady increase in population in the cities of Ramallah and Al Bireh is inversely proportional with agricultural activity. Increase the value of land price has encouraged owners to sell them and turn them into high buildings and towers which contributed to the shrinking of agricultural land in the city. Establishment of infrastructure by municipalities and government institutions to in agricultural areas significantly contributed to the ease of conversion of agricultural land to residential, commercial and industrial areas[26].

6.4. UPROOTING TREES

The Israeli occupying power systematic attack on Palestinian trees has started early with the occupation backed in 1967 and resulted in the uprooting of more than 1000,000 trees in 1999. However, and with the begining of the Intifadain the year 2000, Israel occupation power has intensified its belligerent attack on the Palestinian agriculture and trees in particular for many reasons, the most proclaimed of which' for security purposes', that is to say: to establish more occupation military bases, security buffer zones to illegal settlement regime and bypass roads, but the real turn started with the annexation and separation wall in the year 2002 when israel

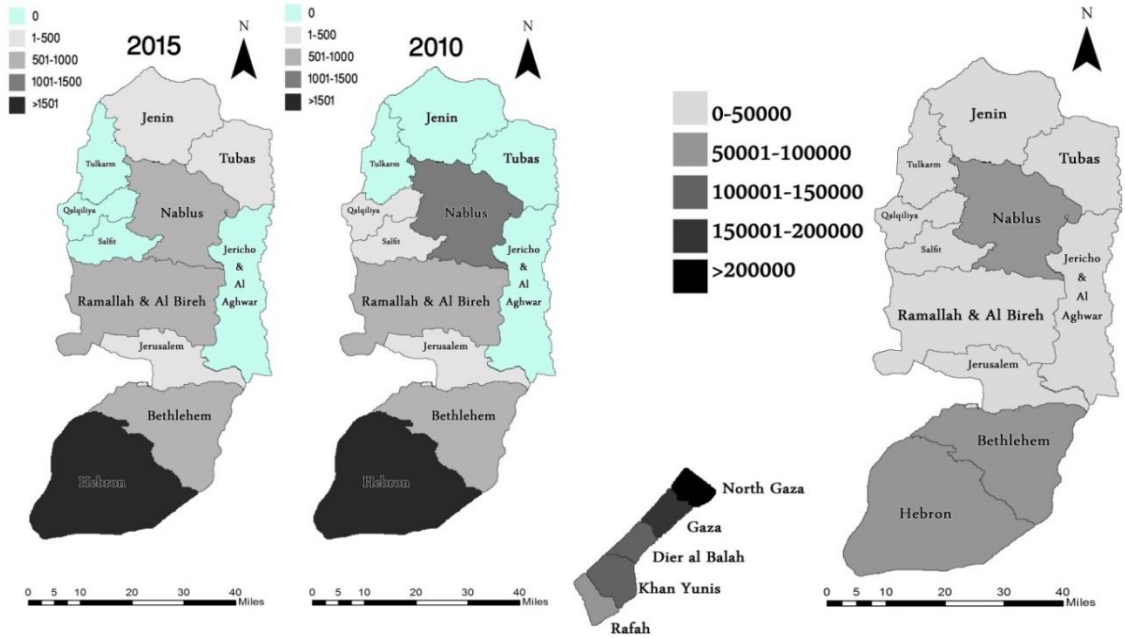
[25] EQA, 2010b

[26] Kittaneh, 2009

started the organized crush of the agricultural land started uprooting hundreds of thousands of trees to set the route for wall (ARIJ, 2007,) (Table 5,6, Map 12, figure 14).
"for

Table 5: Number of trees uprooted from Palestinians' lands by the Israeli Army and settlers throughout the West Bank's & the Gaza Strip's Districts in the period between September 2000 –December 31, 2006

WB Districts	Uprooted Trees	Gaza Strip Districts	Uprooted Trees
Jenin	14,707	Northern Gaza	602,208
Tubas	1,228	Gaza	186,737
Tulkarm	14,934	DeirAl-Balah	124,723
Nablus	53,746	KhanYunis	132,656
Qalqilya	16,237	Rafah	74,446
Salfit	17,926		
Ramallah	14,082		
Jericho	25,537		
Jerusalem	3,558		
Bethlehem	66,521		
Hebron	56,412		
Total	**284,888**	**Total**	**1,120,770**
WB & Gaza Strip Grand Total	**1,405,658**		
Trees include Olive, Citrus, Stone Fruit, Forestry, Date Palm, Banana, Grape, others.			



Map 12: Uprooted trees in PT; FROM LEFT TO RIGHT: Number of trees uprooted from Palestinians' lands by the Israeli Army and settlers throughout the West Bank's & the Gaza Strip's Districts in the period between September 2000 –December 31, 2006, comparison between number of trees uprooted in the first 6 months of 2010 and 2015 in west bank.

Figure 14: IsraeliArmy Bulldozer uprooting of olive trees to set the route for the SegregationWall (ARIJ, 2007).

Table 6: Land use/ land cover in West Bank and Gaza Strip.

West Bank Land use/Land cover 2006		Gaza Strip Land use/Land cover 2005	
Item	**Area/ km²**	**Item**	**Area/ km²**
Arable land	951	Arable Land	99.61
Heterogeneous agricultural areas	193	Green Houses	16.78
Pastures	552	Heterogeneous Agricultural Areas	25.42
Permanent crops	1172	Industrial, commercial and transport unit	2.89
Plastic Houses	12	Inland Water	0.74
Artificial non-agricultural vegetated areas	0	Open Space with Little or no Vegetation	42.16
Industrial, commercial and transport unit	5	Permanent Crops	43.27
Mine, dump and construction sites	24	Shrubs and/or Herbaceous Vegetation	1.76
Palestinian Built-up Area	292		
Israeli colonial settlements	186	Urban Fabric	130.07
Israeli Military Base	47		
Forests	71		
Open spaces with little or no vegetation	1884		
Shrub and/or herbaceous vegetation	264		
Wall zone	6		
Inland waters	1		
Total	**5661**	**Total**	**362.704**

6.5. OVERGRAZING

Intensive grazing is highest in spring (during the flowering and fruiting stages) when it is the main feed source until crop residues become available after harvest in early summer. This lead to the reduction of seed regeneration of the most valuable species, therefore plant populations, species numbers, also the biomass of vegetation cover is severely reduced. This reduction in plant cover leads, in turn, to decreased infiltration and retention of rainwater into the ground and therefore increased soil erosion. Thus, the carrying capacity of the land is permanently downgraded. Many grasses and forages have been depleted and nearly lost[27], especially in the case of species belonging to the *Papilionaceae* family (*Trifolium spp.*, *Vicia Palastinaea*, and *Trigonila* spp) and *Gramineae* family (*Hordeum*spp.).

Hebron district is a good example where an intensive year round grazing is taking place especially in the wilderness area of the district (Eastern Slopes). This has resulted in the loss of many beneficial species of range plants, and the degradation of the vegetative biomass. The intensity of grazing has been especially high as only 15 % of the grazing area has been left open to herders after 1967. Species which are predominant in the eastern slopes are herb plant species and spiny bushes such as *Sarcopoterium spinosum* (thorny burnet), which are generally of low nutritional value and grazed only with difficulty by goats. Its competitive plants disappear due to their high grazing. The remaining 85% of this wilderness is still off limits to Palestinians[27], as they are declared closed military areas by Israel the occupying power.

[27] MEnA, 1998

6.6. LAND DEGRADATION

The driving forces or factors inducing land degradation in SP can be classified into human activities and natural factors. These factors would be described as follows[28]:

6.6.1. Human Induced Factors:

6.6.1.1. Historical Aspects:

Wars throughout the history of SP led to severe vegetation destruction (Figure 15). Throughout the history of Palestine, humans have contributed most to the damage of the sensitive balance of nature systems. Each civilization that inhabited this area fought over land and has exploited the natural resources found here. Old testament references indicate that the cutting of forests in Palestine began centuries ago, a practice which has continued ever since with varying degrees of intensity. Turks, British mandate and Israeli occupation power have all played the major role in habitat destruction and green vegetation cover demolishing. Thousands of forested trees have been cut to provide cleared areas for construction or building railways, or burning for fuel. Many species have been hunted to extinction. These human activities have contributed greatly to degradation of the land and loss of species, all accelerating the changes in related ecosystems (Isaac and Gasteyer, 1995).

6.6.1.2. Political Aspects:

Israeli occupation power and absence of Palestinian control over land is the main factor affecting the state of land degradation in SP. This situation affected all aspects related to land conservation and land use planning. According to the agreements between Israeli occupying power and Palestinians, WB& Gaza Strip land is divided into A, B and C classified areas with different control authorities and regulations. Area A should be under full Palestinian control, area B is under Palestinian civilian control and Israeli security control, area C is under full Israeli occupying power control. The estimated area of A land is 722 km^2 (12%); B land is about 1318 km^2 (22.6%). Also, there is about 3% of the land assigned as a nature reserve extending over east of Hebron and Bethlehem Districts. The total land area that the Palestinians can control is about 38% of the area of the West Bank. The remaining 62% (C area) is under full Israeli occupation control. The C area is mainly occupied by illegal settlement regime, closed occupation military zones, military camps or declared as nature reserves (52%). The remaining 10% of the area C is occupied by Palestinian villages and hamlets but under Israeli occuopying power full control. It is evident according to this situation how difficult is managing the natural resources taking in consideration that the Palestinian controlled area is mainly urban with small area of agricultural use.

6.6.1.3. Socioeconomic Aspects:

The special socioeconomic facts in SP affected negatively soil conservation. Land tenure system and ambiguity of land ownership, the inaccessibility of land due to the lack of rural and agricultural roads, lack of liquidity and cash, lack of economic motivations, limited education to farmers, lack of credit and marketing facilities and simple technology used in agriculture are important social and economic factors led to less utilization of land and hence more land degradation. Also, with population growing at around 4% a year, and the population density in some of the most vulnerable rural areas increasing even faster, the

[28] Dudeen, 2012

dangers posed by this cycle of increasing poverty and accelerating land degradation are readily apparent. Lack of awareness of environmental, social and economic values of land degradation is a serious factor of land degradation.

6.6.1.4. Absence of Land Use Planning (mismanagement of land):

Effective land management is negatively affected by the absence of land use planning. WB & Gaza Strip have been under Israeli occupation power since 1967. This occupation restricted the use of land for various purposes mainly due to security reasons. Urbanization and even wells construction are prohibited without an Israeli permission. Currently, land reclamation projects are confined to A and B zones which are either urbanized or agricultural areas. Vast areas are being threatened by wildly over-zealous plans for expanding heavy industry, tourism initiatives, and unnecessary transportation infrastructure without land use plan of action.

Figure 15: The effect of Israeli tanks on the agriculture areas in Gaza Strip.

6.6.2. Natural Factors:

Climate, Geomorphology, Scarcity of Water, Pressures on Land are the most driving forces, either human or natural, led to various types of pressures on land resulted in the degradation of its quality and quantity. The location and severity of each significant land degradation process is stressed. The main impacts of these pressures are low agricultural and forage productivity and more abandonment to agricultural practices that collectively lead to more poverty and more fragile ecosystems. The negative impact on human and animal health is indirectly deduced by the comparatively high percentage of cancers in SP. The general characteristics of ecosystems in SP at various scales are getting worse when investigated over short period of time[29].

6.7. INVASIVE ALIEN SPECIES

All habitats of SP of terrestrial and aquatic include the Invasive alien species of both plants and animals. The invasive species is a plant, fungus, or animal species that is not native to a specific location (an introduced species), and which has a tendency to spread to a degree believed to cause damage to the environment, human economy or human health. Therefore our biodiversity resources and natural landscape is at risk from invasives which are not native

[29] Dudeen, 2012

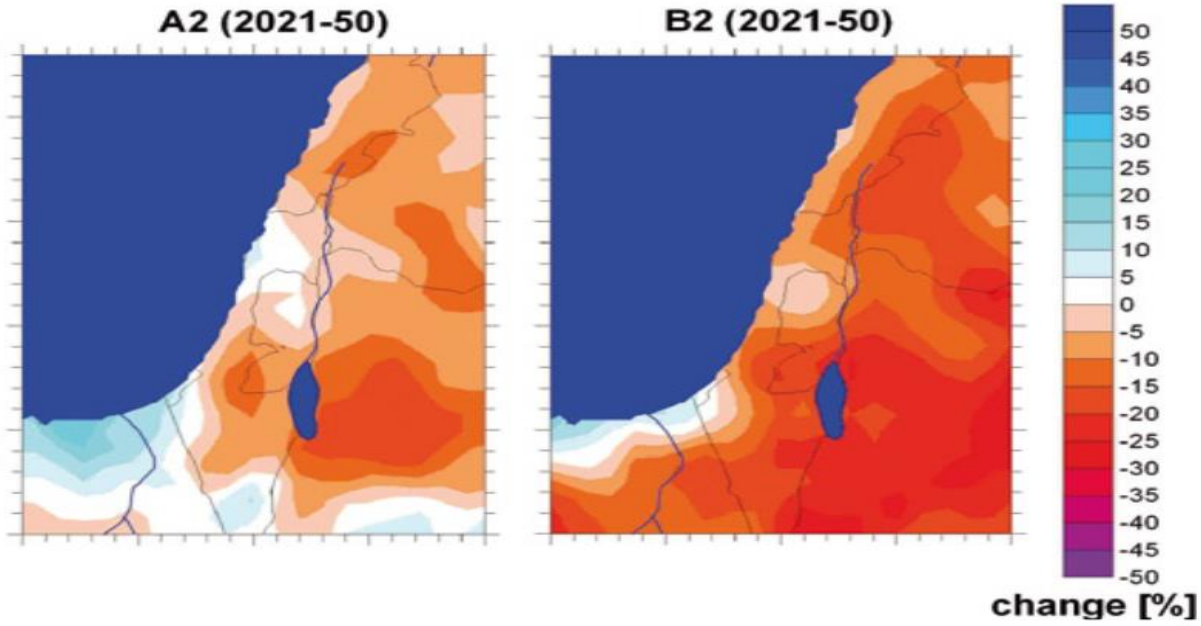
to SP, and whose presence constitutes a serious threat. Unfortunately, no surveys, assessments, research studies have been carried out to investigate them, their causes, pathways, establishment, patterns and their impacts on biodiversity and the environment in general. Furthermore, there are no tools, national policy, strategy for combating, prevention, management, enforcement and eradication of the invasive species till now in SP.

Some plants and bird's species were investigated to be invasive in SP, but a comprehensive survey and assessment of the invasive species is urgently needed to develop a national strategy for combating and eradicating the invasive species. The invsive bird species includes three species (*Pisttacula krameri*, *Acridotheres tristis*, *Lonchura malabarica*). Most of the bird species are escaped from cages of pet shops and keepers, and is newly widespread all over SP concentrating in the highlands, feeding on fruits and seeds, and in winter preferring the warm Jordan Rift Valley rich with intensive agricultural crops and orchids. *Myocaster coypus* recorded as invasive mammals. The invasive plants species includes about 50-species, the species of high invasiveness include (*Prosopis juliflora* (Sw.) DC., Acasia saligna, *Ailanthus altissima* (Miller) Swingle, *Conyza bonariensis* (L.) Cronquist, *Nicotiana glauca* R.C. Graham, *Oxalis pes-caprae* L., *Solanum elaeagnifolium* Cav., *Ambrosia confertiflora* DC.).

The Invasive species in SP are increasing both in the number of species and in the degree to which some of them have proliferated. The main restrictions on the import of species into the country are those of the Ministry of Agriculture (mainly considering phyto- and animal sanitation, but with a growing awareness to problems of invasive species). Work are processing now to detect the checklist of invasive species, its distribution and dynamics, its effect on other biodiversity, as well as pathways.

6.8. CLIMATE CHANGE

The World Bank report in November 2012 on the impact of human induced climate change on the Arab world revealed unsustainable trends. Over the past 20 years, climate monitoring stations across the Arab world have already shown an increase in average annual temperature. Computer models predict that in the next two to three decades' annual rainfall will decrease in our area by nearly 25% and average annual temperatures will climb by 4-5 degrees. Climate change makes things far worse because of changes that will impact habitats due to unfamiliar rain patterns (Alpert *et al*., 2002) and the way it will interacts with other issues like urbanization and population shifts (IPCC, 2007; Qumsiyeh, 2013).



Map 13: Projected two climatic change scenarios in State of Palestine.

Climate change is one of major crises facing humanity, involving serious and long-term challenges that will affect the different regions of the globe. It is noteworthy that Environment Quality Authority (EQA), in cooperation and coordination with relevant stakeholders and with support from UNDP, has developed in 2009 two important documents on climate change and associated challenges at the Palestinian level: Analysis of the Status of Climate Change and Climate Change Adaptation Strategy (EQA, 2010b). These two documents concluded that SP will be vulnerable to the implications and outcomes of climate change in various ways:

- A rainfall decline and temperature increase is expected, which would aggravate the problem of draught and water scarcity. The temperature increase is estimated to range between 2.2-5.1°C and the annual rainfall decline is estimated to be at 10% by 2020 and at 20% by 2050.
- The climate change is expected to aggravate the problem of land degradation and desertification, which will compromise the agricultural production and endanger food security. This may have socio-economic implications in terms of increased poverty and social instability.
- Other possibilities include an increased frequency of natural disasters resulting from draught or extreme climatic events, such as storms, floods, and heat waves.

Based on PCBS (2014), the estimated amount of carbon dioxide emitted in SP from the energy, agriculture and waste sectors during 2011, about 3.1 million tons, divided as 2.7 million tons resulted from the energy sector, and 326 thousand tons resulted from the agriculture sector, and 63 thousand tons resulted from the waste sector as a result of open burning. It's recorded that the emissions quantity in SP from energy, agriculture and waste Sectors in ton CO2 equivalent increased 47% from 1.644.188 ton/year in 2001 to 3.100.538 ton\year in 2011.

Changes of annual mean temperatures: Significant increase of temperatures in the order of 1°C in the last 50 years. Until 2050, a further increase in mean annual temperature of around

1 - 2 °C is expected. Relative changes in yearly precipitation: A decrease of mean annual precipitation is expected for larger parts of the region (up to 30%) until 2050, continuing with higher levels of significance till 2100 (http://www.glowa-jordan-river.de/).

6.9. OVER EXPLOITATION

6.9.1. Hunting

7. There are around 1000 illegal hunting weapons that are used within the SP, where the most focus on the areas of Jericho, Halhul and Biqa'a that starts during afternoon. Most of the weapon owners and users are in area C, where there isn't any Palestinian control over these areas. In addition, many migratory species are hunted through their migration routes, stop over areas or wintering sites, some of them are globally endangered species and their populations are in decline. In SP many of these species are hunted[30]. The following are list of the most hunted migratory species in SP:

Table 7: Most hunted migratory bird species in State of Palestine

Common Name	Scientific Name	Arabic Name
Teal	*Anas crecca*	الحذف الشتوي , الحذف الشتوي البط
Gargany	*Anas querquedula*	شرشير صيفي
Quail	*Coturnix coturnix*	السمانى
Turtle Dove	*Streptopelia turtur*	القمري, القمري حمام بر, القمرية, اليمام القمري
Meadow Pipit	*Anthus pratensis*	الزرعي, جشنة المروج, جشنة المروج بصوة
Tree Pipit	*Anthus trivialis*	ابو فصية الشجر, جشنة الشجر, جشنة الشجر بصوة
Robin	*Erithacus rubecula*	أبو الحناء, أبو الحنّاء, أم الحنا
Nightingale	*Luscinia megarhynchos*	العندليب
Thrush Nightingale	*Luscinia luscinia*	العندليب, العندليب الأرقط
Bluethroat	*Luscinia svecica*	هزار أزرق الزور
Redstart	*Phoenicurus phoenicurus*	حميراء
Black Redstart	*Phoenicurus ochruros*	حميراء دبساء
Wheatear	*Oenanthe oenanthe*	أبلق شمالي
Song Thrush	*Turdus philomelos*	سمنة مطربة
Garden Warbler	*Sylvia borin*	دخلة البساتين
Black Cap	*Sylvia atricapilla*	أبو قلنسوة
Orphean Warbler	*Sylvia hortensis*	هازجة
Lesser Whitethroat	*Sylvia curruca*	هازجة فيراني
Whitethroat	*Sylvia communis*	دخلة فيراني

The illegal hunting of Wild Hares *Lupus capensis* and Hedgehogs (*Hemiechinus auritus* and *Paraechinus aethiopicus*) for meat consumption in Wadi Gaza and the Gaza Strip are common practices that could hurt the populations of these mammals to low levels that species may go extinct.

These is due to the lack of information by the hunters in specific and the public in general about the species; the insufficient number of programs and projects that support conservation of species and migratory birds, except for the humble work that is done in the Jericho Wildlife Monitoring Station; and there are no research studies on management regimes for sustainable hunting that is for any bird species (PWLS, 2005).

6.9.2 Overfishing

There are concerns about overfishing of pelagic fish and of demersal fish. In the Gaza Strip marine zone there is a high density of fishermen (723 boats on 660 km^2) and there is also evidence of catches of undersized or juvenile fish. In addition, there is the problem of 'by-catch', but exact numbers are not known. The large trawlers catch Demersal and benthic fish, and these are the biggest threat to the fishes of Gaza Strip[30]. Especially in the shallow coastal zone, fish species are under severe threat as a result of using extensively the beach purse seine fishing to catch small, juvenile fish. Another method used in shallow waters is the plastic bottles to attract fry fish (small fish). This also affects many species of fish usually found during the spawning season near the beach. Striped sea bream (*Lithognathus mormyrus*) is a particular species that is threatened by this method.

6.9.3 Wildlife trade and use

In an attempt to combating the continuous abuse on wildlife species through illegal trade and smuggling, many national efforts had been executed to address the conservation challenges of biodiversity resources of fauna and flora. However, despite SP didn't ratify the Convention of International Trade in Endangered Species (CITES), and treated as observers, a collective attempts implemented to prevent the illegal trade and smuggling activities since many years ago. Monitoring of the local markets by EQA staff and the cooperation with the ministry of Agriculture for the trading in wildlife species round the year leading to a great decrease in animal's number at the local market. The trading concentration was on the rare bird species mainly raptors, and of mammals the Gazelles, hystrix, and some species of traditionally used medicinal plants. The monitoring activities lead to confiscation of a number these trading species, despite of the absence of Palestinian legislations and laws related to licensing systems and hunting at the national level. However, all regulations and laws related to these activities are still the old laws from the Ottoman, British, Jordanian, and Israeli occupation power Military orders which are weakly implemented. Furthermore, there isn't any real assessments or field surveys to the illegal wildlife trading, smuggling and hunting activities. This situation requires a collective effort to develop the national hunting law, the licensing systems, and to implement a national assessments and field surveys to identify the species status, the by-laws of hunting including the species lists and the time allowed for hunting, and the wildlife trading legislations in harmony with the CITES convention.

The information available on wildlife trade and use in SP are very limited because they are not appropriately regulated, or managed through permit and licensing systems, all available data conclude that the commercial collection, absence of awareness and habitat destruction by Israeli occupation are the main factors which have led to the disappearance of many wildlife species. However, Law no (5) for 1995 of the transfer of Authorities in the West Bank and Gaza Strip to the PNA, states that PNA has all legal rights to implement and enforce all laws and regulations existed before 1994. There are about 6- reptile's species are included in the CITES indices in SP, and more than 20 bird's species also listed at the indices of CITES, in addition to more than 13 mammal's species also, listed on the CITES indices. The plants species listed on CITES appendices include only one plant species which is the *Cyclamenpersicum.*

[30]Mahmoud, 2002

6.10 POLLUTION

6.10.1 Soil Pollution:

Primarily pollution results from the discharge of wastewater into wadis and agricultural lands, in addition to the excessive use of pesticides and chemical fertilizers, especially in areas with rainfall lower than 200 mm per year, leading to soil salinity. In addition, the remains of stone quarries and stone and marble industry in the form of dust or slurry lead to the clogging of soil pores and destruction of vegetation. Such pollution involves various risks, most importantly the pollution of water sources. Gaza Stripcoast and marine environment suffers from many environmental problems, notably the problem of pollution. The main source of this pollution is the discharge of untreated wastewater and dumping of waste along the beach in north, central and southern Gaza Strip. This pollution has resulted in major health problems for creature and marine life, as well as the degradation of the quality of fish[31].

6.10.2 Soil Contamination:

One of the dramatic conclusions drawn is that may be there is a strong correlation between soil contamination with the fact that the West Bank and Gaza Strip have one of the highest percentage of cancer in the world according to the World Health Organization recent reports. Pesticides and insecticides are the main soil contaminant in irrigated areas. About 20,050 hectares which are used as irrigated land in the West Bank (3.6% of the land area) are intensively exposed to these chemicals. It is estimated that the total quantity of pesticides used in SP in 95/96 growing season is 454 tons. Unfortunately, some of the used pesticides are internationally forbidden (Dudeen, 2012).

The excessive and uncontrolled use of fertilizers is another source of contamination for both soil and groundwater. It is estimated that the total quantity of fertilizers used in the years 1995/96 growing season is 49,420 tons. Chaotic disposal of industrial and municipal wastes is another source of soil contamination in the West Bank. Sewage streams can be easily noticed around major cities and big towns leading to severe soil contamination. There are about 450 dumping sites in the West Bank. Unfortunately, most of the dumping sites are located in wrong places either adjacent to agricultural arable land or urbanized areas. There are several hot spots in terms of the negative effects of the industries waste disposal[32].

6.10.3 Waste water discharge:

The discharge of untreated wastewater into the shallow waters of Gaza Strip is a serious problem for the status of the marine ecological system. About 80% of the wastewater generated in Gaza Strip is currently discharged without treatment into the sea (50,000 m^3 per day). The untreated sewage discharge affects the complete marine food chain ranging from phytoplankton, via zooplankton, crustaceans, macro benthos, and macro-algae to fish and mammals. An important effect is the decrease of the dissolved oxygen content of the water, due to the breakdown of organic material in the sewage water. Another effect is eutrophication, the increase of nutrient concentration. Originally the waters of the Southern Levantine are oligotrophic (low in nutrient levels). An increase in nutrient concentrations can therefore change the ecosystem. High nutrient level, high temperatures and sunlight enhance the growth of phytoplankton species to bloom and increasing the seawater toxicity. Excessive bacterial growth may also occur. The increased nutrient and organic matter concentrations may favor certain species at the expense of others (Zaqoot *et al.*, 2012).

[31] EQA, 2010b

[32] Dudeen, 2012

6.10.4 Solid waste dumping:

The dumping of solid wastes in the marine environment may affect the marine ecosystem through a number of ways (Figure 16). Small particles, for example plastics, can clog the gills of fish and may therefore affect their respiration. The solid wastes may also contain some toxic substances, such as the remains of oil, paint and pesticides. Furthermore, the large quantities of solid wastes dumped into the coast of Gaza Strip are a direct threat to the habitats of the coastal and marine species. Another effect is the solid waste collection by the nets of fishermen which reduces the rate of fish catch by preventing the fish to enter their nets and consequently the fishermen spend long time to clean their nets and leave the wastes on the beach (Mahmoud, 2002).

Figure 16: Sewage discharge into sea (Wadi Gaza).

6.10.5 Oil spills:

The majority of oil pollution in Gaza Strip waters does not come from major accidents, but from sewer outfalls, ship bilges and possibly oil tanker operations near Asqalan city. Most of these types of spills are small, but they lead to a diffuse and chronic oil spillage that forms a threat to marine ecology. A second type of oil pollution is major oil spill accident. The chance of such an accident in Gaza Strip waters is small but oil tankers are nearby, off the coast of Ashkelon or entering and leaving the Suez Canal. A generalization of the observed damages is complicated because the toxicity of the spilled oil changes in time due to weathering processes and varies with the type of oil. The small volatile, and generally most toxic, compounds will evaporate or dissolve during the first day of the spill. The oil is further dispersed and degraded by spreading on the surface, dissolution, and dispersion of small droplets in the water column, sedimentation, biodegradation and oxidation (Mahmoud, 2002).

6.10.6 Pesticide Use:

A total of 123 varieties of pesticides are currently used in the West Bank compared to 350 different types used in Israel and 334 in Jordan. Among these used in the West Bank, fourteen types have been banned or restricted by the World Health Organization (WHO) for health and environmental reasons. Seven are among the "dirty dozen" such as DDT, Chlordane, Aldicarb, Lindane, Paraquat, Parathion and Pentachlorophenol. These are prohibited in farm use in most industrialized countries, but are still commonly used in the West Bank, Gaza Strip and in many other developing countries[33].

Approximately 302.7 tons of pesticides including sulfur and 200 tons of methyl bromide were used by farmers for the agricultural pest control. In addition, 4 tons of other types of

[33] MEnA, 1998

pesticides were used by different municipalities for public health purposes (ARIJ, 1997). In the Gaza Strip, 100 tons of pesticides are used per year. This also includes the banned pesticides (Ali-Shtayeh & Hamad, 1995). The total area treated with pesticides is 38,734.4 hectares, of which 74.7% is under rainfed farming and 25.3% under irrigated farming. Despite that, irrigated farming accounts for approximately 56.5% of the total pesticide consumption. The largest area treated with pesticide is found in the Nablus district and the Jordan Rift Valley. It comprises approximately 69%[34] of the total treated area. One third of the rainfed treated area is concentrated in the Hebron district, of which 77% is cultivated with trees.

Pesticides were reported to cause a decline in the number of local birds and animals due to changes in agricultural practices in SP (Ali-Shtayeh & Hamad, 1995). The increased use of pesticides negatively impacts the health of birds, wild and domestic animals by causing depression of cholinesterase and reduction of the oxidation reactions. As a result of exposure to pesticides, falcons are laying eggs with thinner shells[34], which are easily broken during incubation. Nesting occurs late in the season. Intensive use of pesticides may ultimately lead to groundwater pollution, which is a very serious problem. Nitrate fertilizers used in agriculture make up 70 % of the nitrate load in the Gaza Strip groundwater resources. Most wells used for domestic water supply contain nitrate concentrations far above the WHO-standard for drinking water. A wide variety of pesticides (some 150 different types) are used in the West Bank and Gaza Strip; WHO, including DDT, linden and parathion has banned several of these[34].

6.11 THE ANNEXATION AND SEPARATION WALL

According to the international law and the ICC advisory opinion the wall is illegal. Taking into consideration all the above, the impact of the wall construction including the construction process on biodiversity are expected. The severe impact of the Wall on the Palestinian faunal and floral biodiversity is summarized by the following:

- Destruction of the natural habitat of great areas since the Wall forms a physical barrier to the terrestrial ecosystem.
- Fragmentation of ecosystems and habitats which limits the movements to land animals and the available habitats.
- Removal and clearing of the natural vegetation cover from the wilderness areas where the Wall passes. Shaving of natural plantation from the areas surrounding the Wall leaves the wild animals of the region with no sources for food or shelter.
- Affecting the natural balance of the ecosystem and natural habitats through habitat destruction and fragmentation.
- Threatening and endangering many species of plants and animals as a result from fragmentation, isolation, and habitat loss, for more details follow EQA, (2010a).

It is expected that the negative impact of the Wall will be severe, long-term environmental impact. As a result of the habitat loss, the micro-ecology of the area is impacted and weeds, pests and pathogens which are often exotic (alien) will possibly invade and thrive in the disturbed areas. These species then spread to adjacent areas becoming a problem for native species and as a result diminish the native diversity of the ecosystem. Habitat fragmentation of both flora and fauna reduces genetic diversity. The remaining small populations are then vulnerable to all the problems associated with rarity: genetic deterioration from inbreeding

and random drift in gene frequencies, and environmental catastrophes[34]. As a result of both construction activities and the long-term existence of the Wall, populations of resident species will be impacted. During construction process large areas were shaved and tens of thousands of trees were uprooted. Such pressure on the integrity of ecosystems and stability of natural resources increases the risk of losing the livelihood, the historical, the cultural, environmental, and economical values of Palestinian biodiversity, despite the fact that these costs are difficult to quantify, or may indeed be immeasurable and irreplaceable[35]. Biodiversity, in particular, is one of the pillars of future sustainable development in SP and can be interpreted as an indicator of environment quality.

Figure 17: Agricultural Lands in Falamieh Village shaved to erect the Wall 29/12/2002[35].

In conclusion, based on WWF Threat Ranking, all the previous described threats summarized in the following table (table 8) where a specific ranking for the magnitude of each threat has been identified for both West Bank and Gaza Stripbased on the available literatures and the expert opinion:

Table 8: Ranking of threats affecting biodiversity in both West Bank and GazaStrip

Threats	Underlying causes	Threat ranking	
		West Bank	Gaza
Habitats fragmentation	• Unplanned urban expansion • Deforestation • Unplanned forestry activities • Drought • Land confiscation • Colonial settlements • Bypass roads • Segregation Wall	Very High	Very High
Desertification and soil erosion	• Overgrazing • Agricultural expansion • Sand mining • Fishing ports • Roads	High	Very High
Urbanization	• Military activities • Israeli colonial settlements • Political situation • Migration to the major cities • Establishment of commercial and industrial areas	Very high	Medium

[34] EQA, 2010a

[35] ARIJ

Threats	Underlying causes	Threat ranking	
		West Bank	Gaza
Removal of rocks for construction	• Construction of ports • Breakwaters and • Coastal structures	Very low	Very high
Uprooting trees	• Israeli colonial settlements • Israeli military bases • Security buffer zones • Bypass roads	Low	High
Overgrazing	• Limited rain fall • Invasive plant species	Low	Very low
Land degradation	• Israeli occupation • Israeli colonial settlements • Military camps • Lack of economic motivations • Limited education to farmers • Lack of credit and marketing facilities • Limited technology used in agriculture • Absence of Land Use Planning	High	Very High
Invasive alien species	•	No data	No data
Climate change	• Unfamiliar rain patterns • Population shift	Low	Medium
Overexploitation	• Weak legal instruments • Traditional and commercial hunting • Lack of law enforcement • Low public awareness • Overfishing	High	Very High
Pollution	• Discharge of wastewater into wadis and agricultural lands • Excessive use of pesticides and chemical fertilizers • Discharge of untreated wastewater into sea. • Dumping of waste along the beach in north, central and southern Gaza • Chaotic disposal of industrial and municipal wastes • Chronic oil spillage • Oil spill accident	Medium	Very high
Segregation Wall	• Israeli occupation • Israeli colonial settlements • Military camps	Very high	Very low

7 THE IMPACTS OF CHANGES OF BIODIVERSITY ON ECOSYSTEM SERVICES AND HUMAN WELL-BEING

Due to the continuous and permanent depletion of its natural resources alongside incessant pollution by the Israel the occupation power, the Palestinian environment and Palestinian environmental rights are under pressure and in rapid decline. Moreover, the scarcity of resources, closures and restrictions on mobility, and high unemployment rates pose an additional impediment to meeting the needs of a rapidly expanding population, and the growing requirements of economic conditions. Following Israel's occupation of the Palestinian territory that remained to Palestinians in the wake of the 1967 war, it has continued to pursue a systematic policy for the destruction of the Palestinian environment. The methods adopted, which include the destruction of the cultural heritage of the Palestinian people, are the same as those adopted in gaining control of SP following the establishment of the state of Israel in 1948 (Ramahi, 2012).

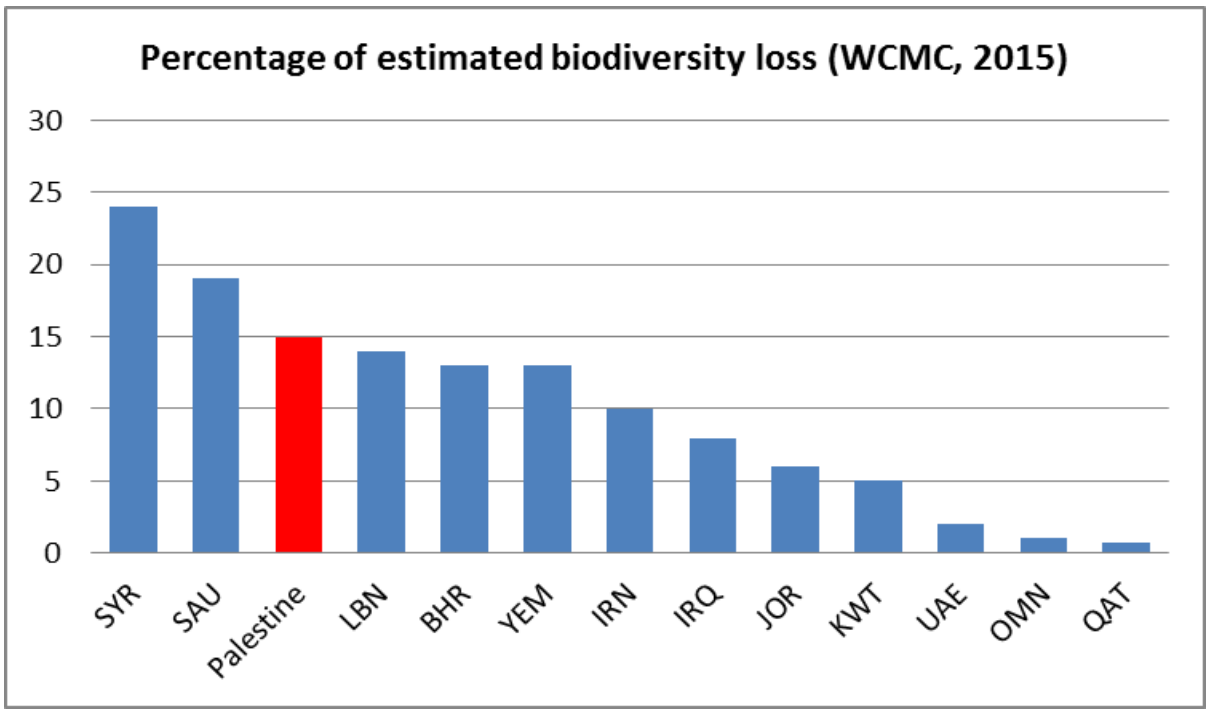


Figure 18. Precentage of estimated biodiversity loss (UNEP-WCMC, 2015)

According to PSBC, 2010 there were 144 (officially recognized by Israel the occupying power illegal settlements in the West Bank and Jerusalem, alongside 221 outposts and 85 other sites bringing the total number of illegal Israeli settlements to 450. The numerous illegal settlements established strategically across SP and concentrated in particular areas, aim at facilitating the fragmentation and eventually annexation of Palestinian areas. They have also become one of the most prominent and serious manifestations of Israel's degradation and destruction of the Palestinian environment.

Israeli illegal settlements have proliferated around Palestinian towns and cities in such a way as to form settlement axes which, while fragmenting the occupied territory, have also isolated Palestinian areas from their environmental surroundings. The Israeli iellegal settlement axis in the Jordan Rift Valley separates the Valley from the rest of the West Bank in one direction, and separates the West Bank from its natural environment east of the Jordan River in the other. The illegal settlement axis that stretches along the 1949 armistice line again separates

the West Bank from the rest of SP, and similarly the Ariel axis of 'Trans-Samaria' divides the West Bank into two halves – the northern part incorporates the governorates of Jenin, Qalqilya, Tulkarm, Nablus and Tubas, while the southern part incorporates the provinces of Jericho, Jerusalem, Bethlehem and Hebron. The Israeli Illegal Settlement regime around Palestinian cities have had a significant impact on local biodiversity, which in many cases has been altered as wild flora and fauna are unable to reproduce naturally. These practices deprive the Palestinian population of their rights to the use of their land[36], which has led to the depletion of groundwater reserves and loss of control over its resources.

The impact of Israeli illegal settlement regime on the environment falls under the following headings:

7.1 THE IMPACT OF ISRAELI ILLEGAL SETTLEMENT REGIME ON PALESTINIAN GROUNDWATER SUPPLIES

Israel the occupation power has used its illegal settlement regime in the West Bank and the Gaza Strip to control and misappropriate Palestinian water supplies. The Oslo Convention estimates the quantity of groundwater (the West Bank and the Gaza Strip) at around 734 million cubic meters. Palestinians are allocated a mere 235 million cubic meters of this water while the remainder goes to meeting Israeli ccupation power oneeds.

In 1993, 60 million cubic meters of water were allocated for use in illegal settlements with a then estimated combined population of only 350,000 individuals. This is an extraordinary inequality given that the Palestinian population exceeds three million. Aquifers in the West Bank suffer from annual water deficits of around 50 million cubic meters, while in the Gaza Strip the average annual deficit is around 70 million cubic meters. Since 1993, the Israeli settler population has increased massively and continues to increase on an annual basis. According to statistics, in 2008 it had reached an estimated 500,000 and is now headed toward the 1 million mark. This has led to an obvious increase in the amounts of water being used in Israeli illegal settlements and a congruent decrease in the amounts of water being allocated for use by Palestinians[37].

7.2 CONTAMINATION BY ISRAELI ILLEGAL SETTLEMENT REGIME RWASTE WATER

Israel occupation power has contributed to damaging the Palestinian environment by neglecting the necessary requirements for sanitation. Damage to the environment is largely the result of the actions of Israeli illegal settlements regime which pump millions of cubic meters of waste water into Palestinian valleys in the Jordan River Basin, as well as onto agricultural lands. The following regions are among those affected most severely:

- Wadi al-Nar— affected by 30,000 cubic meters of waste water per day from the illegal settlements surrounding Jerusalem
- The north eastern region of Hebron - affected by waste water from settlement wineries
- Wadi Qana - affected by waste water from the Ariel illegal settlements and others in the region
- Wadi Qalqilya, Zawata in Nablus, Jenin and Wadi al-Samn in Hebron are all affected by settlement waste water
- Wadi Fukeen
- Bruqin and villages nearby in Salfit (from illegal settlements like Barqan and others surrounding Salfit)

[36] Ramahi, 2012

A report published in 2009 by the Israeli human rights organization BTselem indicates that large quantities of waste water are being pumped from Israeli illegal settlements into the valleys and streams of the West Bank as well as onto agricultural land causing contamination to both the environment and groundwater. It confirmed that more than one-third of Israeli illegal settlements dispose of their untreated waste water in this manner with less than two-thirds being linked to reclaimed water plants. This means that every year more than 2 million cubic meters of raw sewage flow into the valleys and streams of the West Bank. The report states that Israel's occupying power continued neglect has caused severe damage throughout the West Bank which may eventually lead to the contamination of the mountain groundwater which is considered the most important source of quality water in the area (B'Tselem, 2009).

A study was held by Shreim, (2012) focused on the environmental assessment and economic valuation of wastewater generated from Israel illegal settlements in the West Bank. Results showed the total numbers of illegal settlements in the West Bank are 173 illegal settlements with total population equal 483 thousand, which produced around 60MCM/year, this means that the wastewater generated per capita per day per each settler approximately 343 liter according to the calculations throw this research. In addition, the numbers of illegal settlements in the Western aquifer are 65 which produced 25 MCM/year, while in the Eastern aquifer are 97 illegal settlements which produced 33 MCM/year and in the Northeastern aquifer are 9 illegal settlements which produced nearly 2 MCM/year.

The study confirmed that the wastewater generated from Israel illegal settlements considered as one of the main sources of pollution for Palestinian land, environmental, groundwater resources and it is effect on the economy. Overall, the recommendations call all relevant authorities to assume their responsibilities and to take immediate actions to control an if possible to prevent deterioration of the Palestinian land and the groundwater contamination[37].It was found that half million illegal Israeli settler live in the West Bank and Jerusalem that produced around 60 MCM/year of wastewater and most of them is not treated according to the calculations through this research. Several Israeli occupation power industrial zones established within the West Bank regions of unknown number and processes discharge not only liquid and solid waste but also air pollution over Palestinian communities. Israel the occupation power has not approved Palestinian request to build wastewater treatment facilities without connect the Israeli illegal settlement to this treatment facility[38].
The study[38] recommends supporting the future studies and addressing the following issues regarding the management of the wastewater generated from Israel illegal settlements:

- Because the illegal settlements were illegal from the outset, and given the infringement of human rights cause by their presence, the international community and the state of Palestine must take all necessary action to dismantle all the illegal settlements.
- The Palestinian water authority should start soon to evaluate the impact of wastewater generated from the illegal settlements. And make a comprehensive strategy, this strategy should include all impact such as economical environmental, health, etc. and all stockholders should participate in drafting this strategy.
- The Palestinian water authority should start to make periodic laboratory test for all ground water well that located near Israel illegal settlements.
- The Palestinian water authority should start to make workshops that aim to increase the level of awareness toward wastewater generated from illegal settlements.

[37] Shreim, 2012
[38] Shreim, 2012

7.3 THE IMPACT OF ILLEGAL ISRAELI SETTLEMENTS ON PALESTINIAN FLORA AND FAUNA

Since the Israeli occupation power starts, it has constructed roads meant to serve its military bases and illegal settlements. These roads are characterized by the destruction they bring to various elements of the Palestinian environment. This includes damage done to environmental pathways as a result of deep drilling in mountains long used by wild animals. This activity puts the lives of these animals at risk during their natural migrations. Wild animals such as hedgehogs, turtles, squirrels and snakes are often seen dead on the verges at the side of these roads. Road construction has also led to the destruction of the natural habitat of wild animals and birds - their nesting and breeding sites - which has created an imbalance in their numbers threatening their survival. Statistics indicate that 70.7% of the total forest area of the West Bank has been damaged, and that no more that 29.3% of it is left. They indicate that most of this damage results from the construction of Israeli illegal settlements in addition to the confiscation of land for the construction of occupation military sites, closed zones and bypass roads[39].

The uprooting of fruit trees is carried out under various Israeli occupying power security pretexts which essentially serve a single goal; the construction of new illegal settlements and the expansion of existing ones alongside the development of the infrastructure in preparation for further occupation military expansion into the Palestinian Territory. During 2010, 10,591 fruit-bearing trees were uprooted[40], dug up, or burned in the occupied West Bank, with the districts of Hebron, Nablus, Bethlehem and Salfit experiencing the largest number of their trees being destroyed.

7.4 HAZARDOUS SOLID WASTE POLLUTION BY ILLEGAL ISRAELI SETTLEMENTS

Solid waste products from Israeli illegal settlements are disposed of inside SP contributing to pollution. The city of Abu Dis has a huge rubbish dump sites which services a number of Israeli illegal settlements and covers an estimated 300 hectares (around 3 million square meters). The same goes for the area of Jayous to the west of Qaliqilya where the rubbish dump serving the illegal settlements of Karni Shamron, Qadumim, Tasufim, and Maale Shavei Shomron, covers an estimated area of 1.2 hectare. The following table shows some Israeli illegal settlements and where they dispose of their waste:

Table 9:Israeli illegal settlements and their corresponding disposal waste sites

Settlement	Disposal site
The Ariel Settlement	Agricultural land in Salfit
Israeli military camps around the 1967 borders near	The lands of Araba in Jenin
Israeli military camps	The city of Tubas
The Yitsar Settlement	The Abdali region of Abu Dis
The Alon Morieh Settlement	The lands belonging to the village of Beit Fourik and Azmout in Nablus

This solid waste poses numerous risks, including being the source of a terrible smell, insects and epidemics. In addition, it contributes to the pollution of large tracts of agricultural land, soil and drinking water reserves as lechetes from these solids seep into the subterranean reservoir[40]. Similarly, the disposal of this waste by means of incineration causes air pollution.

[39]Ramahi, 2012

[40]Ramahi, 2012

The practice of transferring Israeli occupying power factories outside to the West Bank never-declared 'borders' has resulted in a proliferation of factories inside illegal settlements causing environmental damage. The number of factories inside Israeli illegal settlements is now estimated at 200. They produce products for the various chemical and other industries including aluminum, leather, batteries, plastics, cement, food cans, glass wool, rubber, alcohol, porcelain, marble, chemical cleaners, gas, pesticides and secret military items. A detailed informations are presented in Ramahi, (2012).

8 FUTURE CHANGES AND SCENARIOS FOR BIODIVERSITY

8.1 CLIMATE CHANGE

On the basis of predictions on the combined biophysical and socio-political vulnerabilities, water resources appear to be most susceptible to climate change, with the already existing problems related to water scarcity in both the West Bank and Gaza Strip deteriorating as a consequence[41]. The agricultural sector will be affected by climate change, due to seasonal temperature variability, higher frequency of extreme weather events (storms, torrential rain and resulting floods), higher frequency of temperature extremes that may endanger cold and heat sensitive crops, and – most importantly - decrease in water availability. In addition, public health will also be adversely affected by the lack of water may result in an increase of health issues such as diarrhoea, cholera, and dehydration[42]. The risk of parasitic disease may also increase with climate change.

While the impacts of climate change and possible responses to them have been identified as a policy matter, the mitigation of greenhouse gas emissions has been quite low on the policy agenda. However, in recent years the SP has expressed increased interest in climate change mitigation, notably the anticipated role for renewable energy sources and greater energy efficiency in an independent Palestinian energy system. Currently, renewable energy sources already account for nearly 18% of final energy consumption in the Palestinian territory, mainly through Solar Water Heaters which are installed on more than 60% of the households (Yaseen, 2009). The remaining 80% of the energy consumed is based on fossil fuels, in the form of electricity and petroleum products, which are almost entirely imported from Israel. This creates a serious restrain for SP in developing its own energy policy, and amounts to an energy bill of about EUR 385 million per year (nearly 10% of the GDP).

8.2 DEFORESTATION AND DESERTIFICATION

About 4% of the West Bank and Gaza Strip is forested (1999 data), or about 23,000 ha of a total land area of 602,000 ha. Deforestation is currently an issue in SP. Between 1971 and 1999, it is estimated that some 24% of forest cover have been lost, i.e. around 6,900 of the 30,000 ha. More recent data, however, is not available. In the 1971 – 1999 periods, around 250 ha of forests were lost each year on average, or 0.82% of the forested area[42].

Table 10: Trend in total net forest cover, 1971 and 1999 estimates

Year	1971	2000
Total net forest cover(ha)	30,074	23,159

Source: ARIJ 2006a

Deforestation in the West Bank and Gaza Strip stands currently at 0.82% (1999 data). If deforestation continued at the rate observed in 1971 - 1999, in the 'business as usual' scenario the total amount of forest lost by 2020 would be 5,186 hectares, i.e. a decrease of 22.4% of the current forest size. If the target of halting forest loss is met instead, a possible path would be for the rate of deforestation to gradually and continuously fall until it stops completely in 2020[43]. This would imply that, under the target scenario, forest cover will decrease to 22,186 hectares and remain at this level as from 2020. This would represent a loss

[41] Mimi et al., 2009

[42] Görlach et al., 2011

of about 4.2% of forest land by 2020, but will still result in the avoided loss of 18.2% of forest land if deforestation were to continue at the current level. Compared to the baseline scenario, this would save 4,213 hectares of forest in the next decade. According to 2000 estimates, each hectare of forest stores on average 4725 tonnes of carbon, i.e. 172.34 tonnes of CO_2 (FAO, 2011a). This would correspond to a net saving of about 726,068 tonnes of CO_2 in living forest biomass[43].

Table 11: Comparative assessment for CO2 stored under BAU and target scenarios.

Year	1999	2020-continued deforestation	2020-deforestation halted	Net saving
CO_2 stored (tonnes)	3,991,222	3,097,467	3,823,535	726,068

Source: own calculations based on (ARIJ), 2006a

It can be seen that disaster risks directly related to climate change are significant: the probability of damage from droughts and desertification is estimated to be high in the long run, though still deemed to be less of a policy priority than the Israeli occupation, population displacement, and earthquake preparedness (Al-Dabbeek, 2008).

Table 12: Estimated value of carbon storage in 2010 and 2020 (high and low estimate)

	Value in 2010		Value in 2020			
			Unit value (€/ton)	If deforestation not halted	If deforestation halted	Difference
	Unit value (€/ton)	Total value (m€)	Unit value (€/ton)	Total Value (m€)	Total value (m€)	Net value (m€)
Low estimate	17.2	68.6	20	61.9	76.5	14.6
Medium estimate			39	120.8	149.1	28.3
High estimate	32	127.7	56	173.5	214.1	40.6

SECTION II:

NATIONAL BIODIVERSITY STRATEGY AND MAINSTREAMING BIODIVERSITY

SECTION II: National Biodiversity Strategy and Mainstreaming Biodiversity

Due to the Israeli occupation power, and the absence of Palestinian sovereignty and control over their land and natural resources, a set of national priority initiatives (targets) were identified as part of the 1999 National Biodiversity Strategy and Action Plan, and are considered the milestones used to assess the national performance under the various themes of environmental protection including biodiversity conservation. These Priority Initiatives include:

1- Basic faunal and floral studies at specialized centers to understand exactly what exists and where and how best to manage these natural resources
2- Development and Management of a Palestinian Protected Areas System
3- Development of Management Plans/Structures in Designated Protected Areas Based on Biodiversity Surveys and Inventories
4- Protecting and Using Traditional Indigenous Knowledge and Property Rights for Biological Diversity
5- Implementation of Biosafety Measures on Biotechnology in SP
6- Habitat Restoration (including rangelands, forests, wetlands, sacred groves and integrated agro-ecosystems)
7- Collaborative Management of Biodiversity
8- Combating Desertification and Coping with the Adverse Effects of Climate Change
9- Elaborating and Enforcing a National Legislation/Legal Frameworks on Biodiversity
10- Establishing a Biodiversity Information and Social Education Centre (Available as the Palestine Museum of Natural History)
11- Promotion of Eco-tourism/Economical Aspects of Biodiversity
12- Coastal Zone Management in Gaza Strip and the Dead Sea
13- Establishment of a Gene Bank in SP

The NBSAP identified habitat loss as the key pressure on the valuable biodiversity of SP, and concluded that the development of a protected area system would be the most promising way of easing this pressure. This conclusion was re-enforced by a number of additional policy and legal documents of the SP since, most notably the Assessment of Capacity Building Needs and Palestinian Priorities in Biodiversity. This assessment contains chapters on “Human Resource Capacity Needs in Biodiversity” and an “Assessment of Institutional Biodiversity Capacity Needs in the Palestinian Territory”. Similar to the NBSAP, there has been no follow-up on these useful analyses, likely due to funding constraints” and their impact has since been limited.

The following are the main challenges facing the implementation of the NBSAP include:

- The Israeli occupation power:
    - Prevent the Palestinian sovereignty over their lands.
    - The denial of access to Palestinians from controlling their natural resources;
    - Fragmentation of the West Bank into small Cantons through hundreds of check points
    - Establishing illegal settlement regime and by-pass roads
    - The annexation and separation wall

- Fragmentation of the ecosystems and natural habitats
- Uprooting of the green vegetation cover in the West Bank
- Industrial illegal settlements dumping toxic waste on the Palestinian areas

- Resources;
  - Lack of specialized scientific experts (need human resources developed)
  - Lack of resources for a specialized center for biodiversity research (such as PMNH)
  - Lack of funding and support for biodiversity conservation
  - Absence of a national resource mobilization strategy;
  - Lack of real national data and information, knowledge of the management system specific for biodiversity (need comprehensive surveys);
  - Weak national coordination, and cooperation among stakeholders of biodiversity;
  - Lack of awareness on NBSAP which was not mainstreamed into other national sectoral plans and projects;
  - Lack of rehabilitation center to take care of injured wild birds and wild animals.
  - Lack of National History Museum
  - The NBSAP was not adequately address the private sector and local communities into projects identified;
  - The NBSAP was not accompanied with a continuous national outreach program.
  - The implementing agencies were not clearly identified for each of the proposed projects.

9 International and Regional Agreements and Strategies for Cooperation

9.1 Multilateral Environmental Agreements:

9.1.1. Basel Convention- Tranboundary movement of Hazardous Waste, 2015

Palestine get accession to Basel Convention on Trans-Boundary Movement of Hazardous Waste and by April 2nd 2015 SP became a party for this conventions. The convention requires SP:

- To take appropriate measures to ensure that hazardous waste generation is kept to a minimum
- To ensure trans-boundary movements of hazardous waste are reduced to a minimum
- To prepare and submit Annual National Report on hazardous waste management

9.1.2. United Nations Convention on Biological Diversity, 2015

Palestine get accede to the United Nations Convention on Biological Diversity and by April 2nd 2015 SP became a party to the convention on biological diversity. To comply with the convention EQA is looking to **update** the national biodiversity strategy and action plan**, to** prepare the endangered species lists and to build its capacities and the national stakeholders capacities in the field of biodiversity

9.2. Memorandum of understandings:

9.2.1. Regional level:

A. Memorandum of understanding between Environment Quality Authority (EQA)- SP and Royal Society for the Protection of Nature -RSCN, Jordan Amman2000- up-to-date 2015.

B. Memorandum of understanding between Environment Quality Authority (EQA)- SP and Ministry of Equipment and Environment – Tunisia, April 2013 to enhance and to consolidate the cooperation to protect the environment through exchange of experience, information, documents, and to implement joint projects in different environmental themes.

C. European Union (EU) – Palestine (PA) Action Plan (agreement) 2012: To ensure the implementation and monitoring progress of the plan a Joint EU-PA committee were established and chaired by Ministry of Foreign Affairs. This committee forms eight sub groups and one of them is called Energy-Environment-Water and Transportation working group.

D. EQA is a member in the Council of Arab Ministers Responsible for Environment (CAMRE)

E. EQA is a member in the Council of Islamic Countries Ministers Responsible for Environment

9.2.2. National level:

A. Memorandum of understanding between EQA and Palestinian Central Bureau of Statistics (PCBS, 2013): to enhance and to consolidate the cooperation and to exchange of data and information. Moreover, the MoU seek to implement a specialized environmental surveys and to build the central administrative records, update, develop and computerization to cover the common interest statistics.

B. Memorandum of understanding between EQA and Custom Authority, 2014: to enhance the cooperation in the field of controlling solid and hazardous waste smuggling through the borders and inside the West Bank.

C. Memorandum of understanding between EQA and Political and Moral Guidance Commission, 2014: to enhance the cooperation in the field of environmental awareness raising of the youth sector. However, both parties shall provide what it needs from the other party, like media publicity and awareness documents. Studies and reports, and reinforce the concepts of environmental protection.

D. Memorandum of understanding between EQA and Ministry of Women Affairs, 2013: to ensure the mainstreaming of gender in environment in general and solid waste in specific, the agreement aims to determine the general terms and conditions of the framework of cooperation between the parties, in all aspects of achieving the goals and policies of mainstreaming gender in the environment sector strategy (Focusing on water and solid waste management for the years 2013-2017).

E. **Memorandum of understanding between EQA and the Palestine Museum of Natural History 2014.** The objective is mutual benefirt for two areas: education and conservation in biodiversity.

9.3. National Legislation and Institutional framework

9.3.1. National legislation:

The existing Environmental national legislation in SP has overlapping jurisdictions with other laws associated with weak law enforcement. There are only limited provisions in the Environmental Law No. 7 for 1999 dealing with biodiversity. Furthermore, the existing provisions related to biodiversity are inadequate to be harmonized and comply with the resolutions and obligations of the Convention on Biological Diversity (CBD), they provide a basis for a national legislative framework for biodiversity conservation. There are many factors that lead to the inability of enforcement of legislations in SP, including lack of experienced staff, absence of Environmental policy, financial and technical capacity of responsible departments, and unclear enforcement procedures for existing legislation. Therefore, there is strong need for a mechanism to harmonize the existing legislations and policies through a comprehensive review and assessment. Under the umbrella of the general government policies of SP, there are a number of more specific policies, programmes and plans that either deal directly with biodiversity conservation and PAs, or are of immediate concern to it. The most important ones are the following:

- **State of Palestine Environmental Law:**

Palestinian Environmental Law was issued in 1999, it includes a full chapter with five articles on biodiversity. Chapter 5 of this law deals with the protection of natural, historical and archaeological areas and includes five articles:

Article (40): tasks the Ministry of Environmental Affairs (EQA now) 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."

Article (41): It is prohibited to hunt, kill, or catch the birds, marine and wild animals, and the fish specified in the bylaw of this law. Moreover, it is prohibited to possess, transport, walk with, sell or offer them for sale neither dead nor alive, or to damage their nests or the eggs.
Article (42): The Ministry (EQA now), in coordination with the competent agencies, shall specify the conditions necessary to guarantee the preservation of bio-diversity in SP.
Article (43): The Ministry (EQA now), in coordination with the competent agencies, shall set the bases and standers that determine the plants, wild and woodland are forbidden by these standards to be, temporally or permanently, picked up, harvested, damaged or cut off to ensure their endurance and continuation.
Article (44): postulates that "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, affect the esthetical aspects of such areas". Generally, this article shows that, this is a clear obligation to protect natural heritage in PAs, the penalty for violations of this Article is very limited. Article (72) of Chapter 3, which deals with penalties and other issues, states: "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."

The Palestinian Environmental Law (1999) is considered old and urgently needs to be updated, this is because it is not comprehensive and not synchronized and harmonized with the CBD Strategic plan 2011-2020, and the CBD protocols, including Cartagena Protocol on Biosafety, and the Nagoya Protocol on Access and Equitable Benefit Sharing of Genetic Resources. In addition, it also lacks more detailed guidance on how the EQA should fulfill its obligations as stated mainly in Article (40) regarding the management of protected areas.

- **Bylaw on Nature Protection, Nature Reserves, Protected Areas and National Parks:**

The Environment Quality Authority EQA (the legal successor of the Ministry of Environmental Affairs, which no longer exists) has been starting drafting the bylaw which will be developed in coordination with the Ministry of Agriculture and other relevant stakeholders in nature protection,

- **Agricultural Law:**

The Law of agriculture No. 2 was issued in 2003, by the Ministry of Agriculture with chapter 2 on Protection of Nature and Agricultural Land and Soil Conservation includes one article related to the protected areas:
Article (9) In cooperation with the other competent authorities, the Ministry shall develop a plan on the administration of natural reserves as well conservation of all plants and living beings which inhabit them.

This is the only article related to biodiversity and nature protection mentioned in the agricultural law, and contradicts with articles of Environmental law on nature conservation mainly the management of protected areas.

- **Palestinian Basic Law:**

The Palestinian Basic Law (Article 33) states that a well-balanced and clean environment is a basic human right. Thus the preservation and protection of the Palestinian environment from pollution, for the sake of present and future generation, is a national duty." This indicates that environmental preservation and protection should be one of the basic and important principles that guide governing SP.

- **Palestinian Presidential Decree:**

Palestinian President issued a decree in January 2010 in which changes of forest and nature reserve lands to any uses other than nature conservation were prohibited.

- **National Spatial Plan of State of Palestine (2012):**

The Ministry of Planning and administrative affairs, leading the preparation of the National Spatial Plan of SP as a comprehensive scheme that takes into consideration the spatial dimension in directing development and the geographical distribution for economical and social activities, including biodiversity conservation, forests and PA's. The plan defines which areas should be dedicated to which uses, particularly in the context of a rapidly growing population, the ongoing rapid and often uncontrolled urbanization, the Israeli continuing military occupation and the potential return of refugees to SP from neighboring countries in the future

- **The Palestinian National Development Plan for 2011-2013: highlights the environment:**

It including forests and nature reserves, as an indispensable part of the green infrastructure of SP, It acknowledges the importance of protected areas as part of this infrastructure and includes their rehabilitation and development among its objectives: "*In order to protect and sustain our environment for future generations, we will step up our efforts to reduce contamination of air, water and soil; promote waste reduction, reuse and recycling initiatives; ensure mechanisms are in place for safe handling of solid waste and hazardous materials; rehabilitate our nature reserves and our coast line, and ensure environmental goals are reflected in land use planning and resourceuse policies and practices.*" It is difficult to gauge from the National Development Plan and other related documents the relative weight that biodiversity conservation and PA system development is given when it comes to inevitable conflicts with other development goals.

- **National Biodiversity Strategy and Action Plan (NBSAP, 1999):**

Biodiversity conservation and protected areas in particular are covered by the National Biodiversity Strategy and Action Plan. The NBSAP's first objective is the Conservation of SP's Biodiversity, and the development and establishment of a representative PA system is listed as an immediate priority action.

The Plan also includes project concepts 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 that the resident communities are involved in establishing those protected areas and in managing them. While the relevant agencies of the SP have published several reports related to it since 1999 – among them an Assessment of Capacity Building Needs and Palestinian Priorities in Biodiversity, and a report on the Implementation of Article 6 of the CBD – the progress of implementation of the plan has not been systematically assessed and reported to date. However, the most relevant priority actions of the NBSAP in relation to PA system development (and apparently also in related areas) have not been implemented over the last 14 years. **The plan appears now outdated and in need of revision: although the NBSAP does not appear to have been written for a specific period, its age now significantly exceeds the typical lifespan of such documents**

- **Environmental Sector Strategy (2014):**

The Environmental Sector Strategy of EQA for 2014-2016 concretizes the provisions of the Palestinian National Development Plan 2011-2013 for the environmental sector. It is particularly important as a central strategic planning document of the Environment Quality Authority (EQA). The sector strategy identifies five broad priorities for the work of EQA and the entire sector. One of these is directly relevant to biodiversity and PAs, while two of them are indirectly relevant:

• Priority 2: Natural environment and cultural heritage in SP are preserved and maintained,

• Priority 5: The institutional and legal environmental framework is strong, effective and working in an integrated and concerted manner,

• Priority 6: The State of Palestine is committed to international conventions and treaties on environment.

In addition, it also proposes two indicators relevant to biodiversity and PAs (on the proportion of endangered species among the flora and fauna of SP and on the area extent of the PA system).

9.3.2. Institutional Framework:

- **EQA - Environment Quality Authority:**

EQA is responsible for the development of legislations, strategies and policies for the PA system, in the context of overall environmental policy development in the West Bank. Responsibility is delegated to Biodiversity and protected areas Department, Directorate of Environmental Resources."

- **Ministry of Agriculture:**

The Ministry of Agriculture (MoA) implements the aspects of the agro-biodiversity policy of SP on the ground and some of biodiversity aspects in coordination with EQA. this function is delegated to the Department of nature and Forests under the Directorate of Forests, Rangeland and Wildlife.

- **Ministry of Planning and Administrative Development:**

The Ministry of Planning and Administrative Development (MOPAD) leads the cross-sector planning, develops comprehensive development policies with multi-institution participation, and coordinates as well as supports sector planning in individual ministries and agencies and relevant to PA establishment and management in SP because it, aimed at ensuring consistency with the comprehensive cross-sector approaches and plans. In addition, it develops different plans – such as the National Spatial Plan - and programs, for approval by the Cabinet and/or Legislative Council. The development in SP across sectors coordinates by the Ministry of Planning, it is an important institutional stakeholder of any PA establishment as it can ensure – through its coordinating role – that such plans are not compromised by conflicting land use and development plans of other ministries or entities. The National Spatial Plan is one concrete application of this function as it "reserves" PA lands from other land uses such as agricultural development or urbanization. This plan is being elaborated by various ministries and agencies, with coordination by a project which is based at the MOPAD.

9.4. Conservation and management of wildlife

There are two small zoos in the West Bank in Qalqiliya and Beit Sahour housing a few wild animals. Qalqiliya Municipality is the responsible side for the management and protection of the zoo while Palestine Wildlife Society (PWLS) manages the one in Beit Sahour. Another zoo in Gaza was heavily damaged during the Israli attack war. These zoos are considered for entertainment and have limited additional uses. They need to be regulated so as to ensure they do not house wild animals in unnatural habitats (cages) and act as real educational centers for conserving wild animals. Another zoo is the wildlife Treasures Garden, which belongs to the PalestineWildlife Society (PWLS), managed by it, and aiming at raising the awareness of the public on the wildlife conservation and protection. In addition, the Biodiversity & Environmental Research Center (BERC) - a non-government organization in SP dedicated to research and development - has established the BERC-Til Botanic Gardens (BERC-Til BGs) in 2003 with the mission of contributing towards better management of the earth environment by increasing knowledge and understanding of plants on the basis that they constitute the foundation of life on earth (Box 2). Also, BERC has a herbarium contain a wide range of plants from all over SP, it contain about 1030 herbarium specimens belong to 776 plant species which belongs to 437 genera belongs 108 families. inspite of all these efforts, it's very vital to work in this aspect deeper.

9.5. Conservation of Agro-biodiversity

The cultivated area is estimated at 120.000 hectare, or 21% of the total area of the WBGS, of which 90% in the West Bank and 10% in the Gaza Strip. The rain-fed area constitutes 81% while the irrigated area constitutes 19% of the total cultivated land. Morever, the existing rangelands in the West Bank is estimated to be about to 200.000 hectare; however, the area available for grazing is only 62.100 hectare of which 85% denied of access to Palestinians by Israeli illegal settlements regime or occupation Military areas and the separation and annexation wall, thus, the estimated carrying capacity of this area is limited as the average annual rainfall varies between 100-250 mm, epically in the southern pastures of the West Bank

The Ministry of Agriculture in April 2005, issued the National Policy and Legislation for Promoting the Conservation of Agrobiodiversity. The rainfed agriculture (drylands) in SP predominates on more than 90 % of cultivated lands. The local varieties in those areas remain the major income generating option for the farming families. It is worth noting that SP, as part of the Fertile Crescent, is an important centre of genetic diversity for a wide range of crops such as wheat, lentils, peas and vetch that were domesticated in the Fertile Crescent 10000 years ago (Zohary and Hopf, 1988). Plants of this country are of greater importance to mankind than those of most parts of the world. The life-sustaining crops of wheat, barley, vines, olives, onions and pulses all originated within the geographical land of SP. The wild ancestors of these crops, which now only occur in tiny remnants of natural vegetation, represent a vital resource for future crop breeding (ARIJ, 2007). The trends show a substantial degradation in agrobiodiversity. Moreover, overgrazing, expansion of non-agricultural lands and expansion of quarrying activity have adversely affected the agrobiodiversity and the traditional farming systems.

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 the 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. Most is for local or personal use, and only about 1,000 tons is exported a year.

Organic Agriculture and Farming Bodies:

1- Company of Organic Agriculture in Palestine (COAP): is accredit as a certificate body (CB) for Organic Agriculture since 2013 by IOAS- "international organic accreditation Services" as an inspection body operating on ISO guide 65 and IACB standard "international accredited Certification bodies" which is equivalent to European Union organic production & processing standard for third countries. Our services are to certify agriculture units (farmer or processor) as organic according to IACB Standards. The company has been founded for developing healthy and safe agricultural farming in SP as well as farmers' empowerments by enabling them to accesses and competes in foreign markets.

2- The Palestine Fair Trade Association

The Palestine Fair Trade Association (PFTA) is the largest fair trade producers' union in SP, with over 1700 small Palestinian farmers joined in fair trade collectives and cooperatives across the country. Collectively our farmers produce the traditional olive oil and food delicacies from SP, and sell them internationally to buyers and markets not available to an individual farmer. We revitalize farming traditions and a culture of sustainability by linking the traditionally organic farming methods of SP to modern organic/ecological movements and markets. A growing portion of the production of PFTA farms is certified Organic by the Institute of Market ecology (IMO) of Switzerland.In 2006, PFTA successfully certified the production of 375 olive growers as organic. They farm 1,830 hectare which produce an annual average of 400 metric tons (MT) of oil. In 2007, organic certification was expanded to include almonds, sesame seeds, wheat, and tomatoes -- currently 10 hectare of almonds and 600 hectare of annual crops.

3- Canaan Fair Trade: is a Palestinian commercial enterprise that provides premium agricultural goods produced by networks of smallholder groups in SP. While Canaan works with both conventional and organic products, sustainability and economic empowerment for rural Palestinian communities through fair trade and low impact technologies remain our primary business focus. Canaan Fair Trade sells olive oil, almonds, and other delicacies, supplying bulk as well as finished and packaged olive oil and a wide range of other specialty foods to Europe, North America, Australia, Asia, and the Middle East.

9.6. Local community empowerment

Local community empowerment-conserved areas are increasingly recognized as legitimate and powerful tools for biodiversity conservation and sustainable use. Local communities are strongly involved in the conservation practices of the agrobiodiversity resources, but none of the existing protected areas is being managed by local communities (community based conservation and management). The local communities are engaged and considered principal stakeholders in protected areas management and conservation of biodiversity by EQA, for example in Wadi-Al-Quff protected area the local communities are deeply involved in the management plan preparation. Local community's role in safeguarding biodiversity remains a challenge to real progress. **An urgent need for local community involvement and participation in the conservation practices is very applicable through the "so called" Hemma. The Hemma is an old technique since the beginning of Islam by the Khalyfah Omar Ben Khattab.**

9.7. Regulating Access and Benefit Sharing of Genetic Resources and Associated Traditional Knowledge

The Israeli occupation power ongoing pressures imposed further impoverishment of Palestinian communities as they have been denied access to their lands and natural resources. For example, the limited access to only 15%, by Palestinians to rangelands and ground water resources prevent the development of Palestinian communities as a result of bypass roads and land confiscation for Israeli illegal settlements regime and security zones,. This situation has imposed serious pressures and constraints for the access and equitable sharing of natural resources, and has put additional pressures on biodiversity and ecosystems conservation in SP.

Palestine ratifying the CBD and the Cartagena Protocol on Biosafety in 2014, but not signed the Nagoya Protocol on Access and benefit Sharing of Genetic Resources, and is committed to the implementation of the provisions of the CBD. The Environmental law didn't include any article related to Cartagena protocol on biosafety, biotechnology or Nagoya protocol on access and benefit sharing of the genetic resources. Also, SP has no additional national legislations or administrative mechanisms pertaining to biosafety and access to genetic resources and associated traditional knowledge and benefit sharing from their utilization. This is considered a key constraint towards achieving more meaningful benefit sharing. Furthermore, a proposed draft by- law on the regulation of access to genetic resources and related traditional knowledge and the equitable sharing of benefits from their use has been in process.

The natural intrinsic heritage of medicinal plants is preliminary surveyed, including their traditional medicinal uses, but need more comprehensive investigation. In addition, improving partnerships with the private sector and local communities was taken into consideration and adopted by EQA in the biodiversity conservation policies. Furthermore, the handicrafts linked to cultural heritage with natural heritage in protected areas will be investigated. Therefore, a national project for comprehensive survey and support for the indigenous people to maintain their traditional knowledge of resource management, and encourage local communities to explore opportunities for developing a larger market share for domesticated products harvested sustainably.

9.8. Managing the impacts of climate change

The Climate Change Adaptation Strategy and Programme of Action for SP issued in 2010 by the EQA-Environment Quality Authority. The strategy consideration of the impacts of potential climate change on biodiversity is outside the remit of this Palestinian Adaptation Programme of Action, and focused on human well-being in the face of existing and future threats to food and water security. Therefore, it is very important for the further investigations and development of climate change adaptation policies to focus on the linkages between livelihoods, health and biodiversity conservation. Palestinians are denied of access to their rights in carbon sinking, because Israel occupation power confiscate their sovereignty and control over land and natural resources mainly nature reserves and forests. This situation urges the international community has to uphold their responsibility to insure respect to the international law and to assis Palestinians to get their rights.

The national adaptation to climate change focusing on climate events that pose a significant risk to SP. Over the next 40-50 years for SP, regional climate change trends are likely to include a fall in annual average precipitation, an increased incidence of drought, and an increase in the frequency of extreme events. Climate change impacts are likely negatively to affect human and economic development in a number of key areas – agriculture and food security, water resources, biodiversity, coastal zones, public health, and disaster risk reduction.

The focus of the following proposed adaptation measures is also on proactive (planned) as opposed to reactive actions. Proactive responses involve anticipation and planning in climate change risk management, while reactive responses are taken after climate change impacts have been realised. It is important to note that, while any national strategy for climate adaptation should stress proactive actions to reduce the severity of climate change impacts, the uncertainties in forecasting climate hazards mean that reactive responses will always also be necessary. The strategy and programme of action concentrates on the following issues:

a. Identification of key adaptation needs
b. Identification of adaptation measures
c. Provision of recommendations for mainstreaming climate change adaptation in SP

Six major risks are identified, which are linked to the vulnerability pathways for the West Bank and the Gaza Strip including:

1. Crop area changes due to decreases in optimal farming conditions
2. Decreased crop and livestock productivity
3. Increased risk of floods
4. Increased risk of drought and water scarcity
5. Increased irrigation requirements
6. Increased risks to public health from reduced drinking water quality (including saline intrusion in the Gaza Strip).

There are major structural challenges facing the State of Palestine agencies relating to effective climate adaptation policy-making, which have been traced by observers to political differences, resource deficiencies and managerial weaknesses. In terms of PA capacity-building, coordinated environmental information collection and use is an immediate priority. Again, though, such constraints are accentuated by the external challenges posed by the Israeli occupation power. Adaptive capacity at the national level in SP is directly compromised by movement restrictions as well as insecure, insufficient water and land resources. Some of the best agricultural land is taken by Israeli illegal settlements regime in the Jordan River Valley, while 20% of arable land in the Gaza Strip is off-limits to farmers because it falls within the Israeli occupaying power security zone adjoining the border. Similarly, Israeli occupation power restrictions prevent both bulk imports of clean water in the Gaza Strip and the development of irrigation in the West Bank. Plans to develop capacity to reduce climate vulnerability must be grounded in the current Israel ioccupation reality of State of Palestine institutions with limited jurisdiction and weak authority.

9.9. Communication, Education and Public Awareness

EQA specify a general directorate for environmental awareness and education, which implement many programs and awareness campaigns including biodiversity importance and conservation. In addition, there are many NGO's specialized in environmental awareness and education related to biodiversity which are supervised by EQA. Furthermore, different achievements in nature conservation were progressed, including Awareness materials,

environmental clubs, TV films, demonstration field trips, Lectures and Annual anniversaries' festivals. Which participate in the awareness raising of the public.

EQA-Environment Quality Authority prepared A Communication, Education and Public Awareness Strategy (CEPA) in 2014 with commitment to the CBD guidelines. The strategic objectives of SP CEPA strategy are:

- Effective and active environmental Media in raising the level of environmental awareness;
- An integrated and innovative educational activities methodology, and educational curricula;
- Environmental upscale values and practiced by community groups;

10. Mainstreaming of biodiversity

The impacts and root causes of biodiversity loss cut across a wide range of economic sectors. It is therefore essential to "mainstream" biodiversity in development policy and planning processes, rather than pursue them as separate agendas. The challenge of integration, or "mainstreaming", is to bring on board and engage other development sectors, in particular those government ministries and agencies that are responsible for national development.

10.1. Mainstreaming biodiversity across related sectors

The National Biodiversity Strategy development and implementation requires a multidisciplinary approach and a collective cooperation and collaboration between different ministries, NGO's, policy and decision makers and the central and regional administrations, with the support of the academic and scientific national capacity, and with the partners and stakeholders from various sectors. The effective mainstreaming of biodiversity will contribute directly to implementation of Strategic Goal A of the CBD Strategic Plan for Biodiversity 2011-2020, which reads: *"Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society".*

The State of Palestine has divided its National Policy Agenda into four major sectors: governance, social, economic and infrastructure. The infrastructure sector is divided into the following sub-sectors: energy, environment, housing, transportation, and water and wastewater management. It should be noted here that the environment has been acknowledged as a cross-cutting sector in 2009. With this change, an increased interest to the environment has been observed.

There is limited evidence showing that biodiversity concerns are being seriously considered in plans, policies, legislation and regulations governing most of the productive sectors. Biodiversity conservation is still viewed as an environmental issue and was not effectively integrated into national development planning and policy-making. Therefore, it did not receive priority attention in the face of competing needs. The main challenges to integration are:

I) Lack of awareness of the potential impacts of biodiversity loss for ecosystem services and their importance for human well-being. Much remains to be done to understand and forecast the likely socioeconomic impacts of biodiversity loss at the local and national levels.

II) The lack of effective institutional mechanisms for integrating biodiversity issues in broader national development policies to ensure coordination, cross-sectoral policy integration and budgetary allocations. Implementation of the NBSAP should not be the sole responsibility of the EQA, but of all stakeholder governmental institutions. Protected areas have been the main vehicle for mainstreaming biodiversity.

The following section will describe the different sprated efforts of SP that are used to, somewhat, apply the mainstreaming of biodiversity within the different sectors, strategies and plans.

1. **Environmental Impact Assessment (EIA) Environmental Policy:** The Environmental Impact Assessment process has become the main systemic tool for managing risks to biodiversity and it's mainstreaming in most important sectors. All EIA assessments of the development projects have been taken into consideration the effects on biodiversity. This has proven to be a critical tool in managing impacts on biodiversity

resources outside the PAs, where there is still a need for legislation that regulates their use.

2. **National Spatial Plan:** One of the most important aspects of mainstreaming natural resources is the national spatial planning. Recently, the introduction of environmental objectives in spatial national planning has become a priority to the national government, as can be seen from the approval of the Ministerial Cabinet on the national spatial plan. The national spatial plan provides a framework for local and regional spatial plans. The spatial national plan is a map that limits land use for protection purposes, such as agricultural (high and medium sensitivity), landscape (high and medium), natural observatory points, forests, biodiversity, natural conservation areas, cultural and historical areas, and archeological sites.

3. **National Agriculture Sector Strategy "Resilience and Development"2014 – 2016:** The following four strategic objectives for 2014 – 2016 have been defined. The objectives reflect the priorities of the agriculture sector, and clarify the importance of natural resources including biodiversity and protected areas for Palestinians current life and future generations:
   A. First strategic objective: Ensure farmers' resilience and attachment to their land, while fulfilling the contribution of the agriculture sector in providing requirements for development of State of Palestine.
   B. Second strategic objective: Efficient and sustainable management of natural resources.
   C. Third strategic objective: Enhanced agricultural production, productivity and competitiveness, as well as enhanced contribution of agriculture to food security.
   D. Fourth strategic objective: The agriculture sector has effective and efficient capacities, institutional frameworks, legal environment, infrastructure and agricultural services.

4. **The National Strategy, Action Programme and Integrated Financing Strategy to Combat Desertification in the Occupied Palestinian Territory:** The EQA has developed a strategy on combating desertification in 2012. The overall objective of the strategy is "*to prevent, halt and where possible, reverse the effects and impact of desertification, land degradation and droughts, in order to contribute to poverty alleviation, improve livelihoods of people and achieve Sustainable Development*". The strategy has identified five priority projects that should be complementary to what has been identified in the NDP for the years 2011 2013, in the sum of USD 4.2 million, with lead agency as EQA in cooperation with other Palestinian stakeholders, including non-governmental and private sector. The main causes of soil pollution were summarized in the environmental strategy as: increased desertification and soil erosion, soil pollution due to mismanagement of liquids and solid waste, natural and manmade soil erosion, and soil pollution caused by Israeli occupation power military activities. This strategy is a promising tool to improve and enhance the agricultural productivity through the conservation and improvement of agricultural soil fertility. Moreover, it is considered an effective mainstreaming strategy for biodiversity and protected areas conservation and development.

5. **Climate Change adaptation strategy and program of action:** The EQA has developed the climate change adaptation strategy and program of action. The strategy consideration of the impacts of potential climate change on biodiversity is outside the remit of this Palestinian Adaptation Programme of Action, and focused on human well-being in the face of existing and future threats to food and water security. Therefore, it is

very important for the further investigations and development of climate change adaptation policies to focus on the linkages between livelihoods, health and biodiversity conservation. The concept of climate vulnerability has been adopted by the strategy, which was defined as "the propensity of people or systems to be harmed by climate hazards". The strategy has identified the agricultural and the water sector as the most sensitive sectors to climate hazards at present and in the future; leading to strategic focus on adaptation on water and food insecurity.

6. **Tourism Strategy:** The tourism sector characterized by its nature of rich in religious, historical sites, unique natural features such as the Dead Sea, and the rich natural and cultural and heritage sites and activities. In addition, SP generally has unique and promising rich landscape and wildlife habitats and ecosystems which are very important for the ecotourism potential. However, the weaknesses to develop tourism include a lack of a clear national tourism development strategy; a lack of resources, financial and human, to manage, develop and promote Palestinian destinations. There still a narrow vision of tourism, without connections to the different key attractions and with other sector such as agriculture.

   Moreover, the approach to heritage is that cultural and natural heritage is listed in official sources as having monumental value, not including rural heritage or urban frameworks, Moreover, Palestinians and stakeholders do not seem to have adequate awareness of the advantages found in the cultural and natural heritage and what It can offer to local development plans and the local economy. The 2011 - 2013 national strategy indicates that the Palestinian Government represented by the Ministry of Tourism and Antiquates) jointly with the private sector has identified the needs of the sector in developing the infrastructure, improving SP tourism reputation locally and internationally and developing the private sector to form a strategic partner for the government. These needs were translated to strategic activities that consist of:

   d. Institutional reform
   e. Promotion of tourism & private sector development
   f. Rehabilitation and conservation of heritage sites
   g. Developing museums

7. **Education Development Strategic Plan (2014 -2019):** The strategy of education enhancing and the promoting the awareness issues on the environmental themes as it is related to the public health and food security sector. In addition, it promotes the role of education system in the development of national identity and develop programs required to strengthen the sense of national belonging, preserve the cultural and natural heritage and help channel youth potentials in the optimal way.

8. **The National Development Plan:** In the infrastructure sector of the National Policy Agenda the statement "*Fully integrating infrastructure networks will enable good stewardship of Palestine 's environment and natural resources,* the concern is the result which is "good stewardship". In comparison, principles were included in the social sector; such as social equality in order to guide the work of the government, where "*The state that embraces supreme human values of tolerance, openness, social justice and equality*". Accordingly, to follow the example of the social work agenda statement, using the environmental values such as protection and conservation, the statement can read as follows: *The state that embraces environmental values, such as protection and preservation.* In addition, Institutional obstacles that environmental management is facing include:

   - Limited implementation of the first generation of strategies due to repressive

- Israeli occupation power measures;
- Inability to enforce laws due to lack of sovereignty imposed by Israeli occupying power;
- Inability to introduce integrated control of resources and continued violation of Israeli occupation power to Palestinian natural sources; environmental management principles due to limited
- No environmental taxation has been introduced up to date;
- Environmental services provided by EQA are free of charge including environmental approvals;
- Limited implementation of Polluter Pays Principle that was introduced in the Law
- Concerning the Environment;
- Limited financial allocation to environment in the national budget;
- Limited international aid to environmental management
- Lack of a national environmental fund that could be utilized for environmental
- rehabilitation and conservation;
- Insufficiency in laws to implement and enforce various environmental strategies and plans
- Limited number of technical staff at EQA compared to the tasks at hand;
- Lack of representation of experts on environment at the Ministerial Cabinet, where all decisions and policies are approved;
- Weak of mainstreaming of environmental aspects in the national policies, strategies and local master plans as none of these plans have undergone Strategic
- Environmental Assessment (SEA) that is mandated by the Environmental ImpactAssessment (EIA) Policy.

For the biodiversity conservation, preservation and protection in SP, it will be crucial to build national capacities among the existing conservation community and individual State institutions such as EQA, MoA, and NGO's, and also at the level of the general public and particularly among decision makers in legislative and government organizations.

To this end, the following steps are recommended:

- **CEPA**: QA, MoA and specialized NGO's should engage in communication, education and public awareness raising activities, in order to inform the general public and decision makers about the importance and intrinsic values of Palestinian biodiversity and PAs.
- B**iodiversity and PAs for economic benefits**: **and Human well being:** concentration should be directed to the important function of biodiversity as part of the green infrastructure, as a provider of ecosystem services and rich associated human wellbeing benefits, such as biotechnology products, hydrological regulation, recreation, medical values, education and science.
- **The Palestinian national heritage of biodiversity and PAs**: Biodiversity, PA's and landscapes form an important part of SP's national heritage. This could be used more clearly in mainstreaming related to biodiversity conservation and protected areas.
- **Strengthening of National Spatial Plan:** The Spatial Plan of SP is an important potential mainstreaming tool as it anchors Biodiversity hot spots and PAs in a legally binding national consensus on how various land uses are categorized.
- **National cooperation with relevant organizations and individuals:** EQA should continue and extend efforts to build a broad coalition among all stakeholders specifically MoA and other local and central government, NGO, academia and donors, which support conservation goals. In addition, individuals from the media with high standard profiles, culture and Civil Society should be nominated as nature conservation leaders.

- **Integration of mainstreaming in policy and plans**: A more in-depth concept for the mainstreaming of biodiversity conservation across sectors should be included into relevant policy documents and plans, such as an updated NBSAP.

Box 3: The Palestine Museum of Natural History (PMNH) and the Palestine Institute of Biodiversity and Sustainability (PIBS) (http://palestinenature.org)

According to survey done for UNESCO and the Ministry of Higher Education in 2012, Research & Development in SP suffers from significant obstacles but has certain potentials and possibilities for improvement. Particularly deficient R&D areas include biodiversity, agriculture, and healthcare (including environmental issues affecting human health). We need research, we need education, and we need active intervention to conserve our nature and to for sustainable development. The Palestine Museum of Natural History (PMNH) and the Palestine Institute of Biodiversity and Sustainability (PIBS) were established at Bethlehem University to research, educate about, and conserve our natural world and our Palestinian culture and heritage, and to use this knowledge to promote responsible, empowered human interactions with all components of our environment**. Our vision is to arrive at an informed and involved society living in healthy sustainable environment that is safe for all living things.**

The university provided us initially 1.2 hectare of land and 800 square meters of indoor space and $45000 for infrastructure improvements. Professor and Mrs. Qumsiyeh donated $250,000 to be delivered over 4 years (2014-2017). Much was accomplished including refurbishing and remodeling existing rooms and structuring landscape. We have also built a pool and an aviary. We spent on some projects like the science festival that accommodated hundreds of school children to do experiments (20-29 November 2014). We also did and continue to do significant biodiversity research and documentation of Palestinian fauna and flora as well as human impact on the environment. The initial finances also allowed us to begin to do permaculture systems on site.

Accomplishments since launching on site August 2014-August 2015

1) Started and developed the museum (PMNH) so that it is now a functioning institution and involved in research, education and conservation. We received visitors including students, researchers, volunteers, and community members. We have now two employees one for the botanical garden (Mohammad Najahrah) and one museum biologist (Elias Handal). The (volunteer) director Prof. Mazin Qumsiyeh taught and did research for many years at many institutions. The volunteer financial and administrative officer (Jessie Chang) is certified public accountant. Dozens of other volunteers work at the museum as well as students from several universities.
2) Held a science festival that brought hundreds of school children and volunteers together for activities such as experiments and discussions on topics ranging from critical thinking to physics to environmental protection.

3) Published significant research with high impact.

4) Worked intensely on our land site to both reclaim and create an integrated ecosystem of endogenous Palestinian animals and plants, in an attractive setting.

5) Held over a dozen workshops including on such areas as Scorpions (14 July 2015), Water Innovation and Project Development (15 June 2015), Peace Gardens and Trauma Relief (24 May 2015), Museums in Palestine (23 April 2015), Bee Keeping (April 2015), Mushrooms (24 March 2015), Geology and Paleontology (31 March 2015), Environment Day (30 March 2015), Cancer (3 March 2015), Research Methodology and Ethics (27 January 2015), Taxidermy (December 2014).

6) Began to rehabilitate some injured and abandoned animals, mostly wild.

7) Began recycling and upcycling waste material.

8) Expanded our digital library for fauna and flora.

9) Expanded our digital photo collection.

10) Undertook partnership with many organizations and government entities. For example: involved in preparing the 2015 national report on biodiversity in compliance with the Convention on Biological Biodiversity (in cooperation with Environmental Quality Authority) and with the Ministry of Agriculture for tree planting. Also traveled to Europe and developed good working relationships with universities, individual scientists, and student and faculty exchanges etc.

11) Raised some needed funds for work projects. Individual donations (mostly from Palestinians) for the first year exceeds $25,000. We also received two contracts for specific consulting work.

12) Carried out over 50 field trips in various parts of SP. Over forty volunteers have worked at the Museum in various capacities such as agriculture, education, research, and conservation.

13) Media and Publicity: Developed a webpage (palestinenature.org), a Facebook page, a Twitter account, and published several articles about the Museum in major magazines such as "This Week in Palestine," and in books such as *Museums in Palestine*. We were featured in several articles and we commissioned a film for encouraging volunteerism for the museum. Here is a videotape of volunteer efforts produced by one of the volunteers: https://www.youtube.com/watch?v=APxvAZh8qrQ

Our five goals for the second year of operation (academic year 2015/16) are:

a) Publish five research papers,
b) Do five educational workshops,
c) Develop five interactive exhibit areas (three indoors, two outdoors),
d) Add five partners (governmental or non-governmental),
e) Study five Palestinian geographic locations intensively.

SECTION III:

THE ACHIEVEMENT LEVELS FOR THE AICHI BIODIVERSITY TARGETS AND THE CONTRIBUTION TO THE MILLENNIUM DEVELOPMENT GOALS

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11. The achievement status of the Aichi Biodiversity Targets:

The State of Palestine former (Palestinian National authority (PNA)) since its establishment in 1994 was committed to support the objectives and principles of many of Multilateral Environmental Agreements (MEAs). Despite it has not been able to become a signatory to the multilateral environmental agreements (MEAs), SP implement most of the (MEA's) resolutions and commitments. This is reflected in the high priority given to biodiversity conservation in the Palestinian Environmental Law (1999). However, Palestine in view of its observer status in the United Nations General Assembly, and after November 2012 Palestine status in the United Nations General Assembly changed to State of Palestine as an observer state. The State of Palestine in 2015 acceeded to many MEA's including the CBD. The Convention on Biological Diversity (CBD), coming into force at the end of 1993, requires all member states to develop a National Biodiversity Strategy and Action Plan (NBSAP) as the primary mechanism for the implementation of the CBD strategic plan with the aim to stimulate conservation action at the national level.

One of the main achievements of the Environment Quality Authority is the development of the National Biodiversity Strategy and Action Plan (NBSAP) in 1999. The NBSAP includes several project proposals within an action plan for biodiversity conservation at the national level. The NBSAP constitutes a major contribution to the country's development plan. The strategy envisages that land, water, pasture, terrestrial and marine ecosystems as well as wildlife and aquatic resources in particular are central to agriculture, fisheries and tourism development. Also, it envisages habitat protection, natural resource conservation and sustainable use options offer significant opportunities for demonstrating that conservation of biodiversity represents a vital investment in future sustainability of SP's economic and social development.

The NBSAP is presented in five objectives, each with its action agenda given at three priority levels divided into immediate, medium- and long-term actions. The objectives reflect five principles that guide the formulation of the BSAPP

1. Conservation of SP's Biodiversity.
2. Sustainable use of SP's biodiversity
3. Enhancement of local knowledge, skills and improvement of people's attitudes and practices for the conservation and the sustainable use of biodiversity
4. Equitable sharing of biodiversity benefits within SP
5. Development of Palestinian institutional and human resource capacity in the field of biodiversity.

The national biodiversity targets of SP related to the Aichi Targets and their related indicators are still not developed yet. As a first step, a biodiversity stakeholder national consensus through rapid assessment was undertaken on what has been done in relation to achieve the different Aichi Targets since their adoption in 2010 at global level approval. An urgent update to the NBSAPP is considered a national priority with the development of our national Aichi targets depending on the rapid assessment done.

Table 13: shows the relation between the NBSAP and the strategic plan of the CBD and the relation with the Aichi Targets.

NBSAP Objectives	Global Strategic Plan Objectives (Aichi targets)	Related Aichi Targets	Percent of progress
Conservation of State of Palestine's 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 State of Palestine's biodiversity	**Strategic Goal B: re**duce the 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 & sust. use	**Strategic Goal C:** Improve the status of biodiversity by Safeguarding, species ecosystems, and genetic diversity	T11, T12, T13	10%
Equitable sharing of biodiversity benefits in SP	**Strategic Goal D**: Enhance the benefits to all from biodiversity and ecosystem services.	T14, T15, T16	5%
Development of Palestinian institutional and human resource capacity in the field of biodiversity.	**Strategic Goal E:** Enhance implementation through participatory planning, knowledge management & capacity building	T17, T18, T19, T20	5%

12. Actions taken by other sectors with EQA to implement the Palestinian NBSAP:

The primary step towards safeguarding and restoring SP natural wealth is the integration of the economic values of biodiversity and ecosystems services into national and local development planning levels. It is urgently needed to protect SP intrinsic natural capital stock from accelerated depreciation due to myopic decision making and planning. In addition, it is important that harmful subsidies are removed and environmental friendly incentives encouraged and implemented.

- The Environment Quality Authority implementing SP forest and natural reserves assessment in 2010 which was conducted by IUCN ROWA, with funding from UNEP and in collaboration with the Ministry of Agriculture, as well as additional national stakeholders. The assessment aimed to assess and compare the biodiversity, ecosystem services and resources, pressures and threats, management constraints and stakeholders of 26 out of 48 known nature reserves. 19 of these areas were from a list of nature reserves handed over to the Palestinians under the Oslo I and II agreements, and an additional seven were proposed for inclusion by the Environmental Quality Authority of the SP. Four of the reserves could not be assessed in detail because of lack of access or data. As a result, 22 candidate protected areas (CPAs) were assessed based on the analysis of literature and documents, site visits, interviews with local and national authorities and stakeholders, and using international best practice methodologies including Gap Analysis for Key Biodiversity Areas (KBA analysis) and parts of the Rapid Appraisal and Prioritization of Protected Areas Management (RAPPAM) tools.
- Marj Sanour biodiversity assessment and conservation project was implemented by Basha Scientific Centre for Research and Studies (IUCN, 2010). The assessment conducted to survey the rich biodiversity resources of the Marj Sanour's area and the urgent need to conserve the biodiversity components of this site. Hundreds of species of the flora and the fauna were recorded and observed to accommodate to the Marj Sanour's ecosystem site. Of these species available, many are of great importance as they are considered endangered and threatened species, while some other species considered endemic to the area.
- The ministry of Tourism and Antiquates in cooperation with EQA starts to identify the trial ways and roads for ecotourism investment and attractiveness. The selection process of the sites concentrates on the rich biodiversity areas, the areas with rich springs and artesian wells, and the areas with rich natural ad cultural heritage. In addition to ecotourism promotion and encouragement, the other main target of these trails will concentrate on the awareness raising of the public on the importance of biodiversity, ecosystems, natural habitats and the natural and cultural heritage.
- BERC- the Biodiversity and Environmental Research Center-Til-Nablus, implementing many projects related to the conservation of Biodiversity:
  - Conservation of Biodiversity in SP: BERC-Til Educational and Research Botanic Gardens.
  - Medicinal Plants as a Source of Therapeutics for the Treatment of Human Diseases.
  - Establishment of a Community-Based Seed Bank in the Nablus District.
  - Conservation of Medicinal Plants and related traditional knowledge in the State of Palestine.
  - Bio Exploration – Novel methodology for the Identification of Valuable Natural Products Derived from Mediterranean Flora
- In cooperation with the NGO's, many natural heritage sites, or proposed protected areas are assessed for their content of biodiversity resources, their potential as protected areas, or as a natural heritage sites. For example:

- ARIJ institute, is one of the leading institutions in Palestine in mapping and remote sensing of forests, key biodiversity areas, nature reserves, built up areas, construction of annexation and separation wall and the Israeli illegal settlements regime. In addition, they implement many projects related to Environmental themes including but not limited to: forests, biodiversity and protected areas conservation and management. These activate targeting the capacity building on protected areas management, nature conservation, and awareness enhancement and improvement.
- Palestine wildlife society (PWLS), this society is specialized mainly in Environmental awareness and education with concentration on nature conservation issues. Moreover, they are active in many other disciplines, such as, bird watching and ringing, wildlife conservation, nature protection and other environmental issues. also, they implement different projects on nature conservation, these activities concentrated on the training of the rangers in protected areas on the methods of conservation and protection in the nature reserves in cooperation with specialists in governmental sectors. In addition, other activities related to awareness rising on the importance of biodiversity and protected areas were implemented by PWLS.
- Environmental Education Center-EEC, is specialized in the environmental awareness rainsing campaigns with concentration on the nature conservation and biodiversity conservation mainly the birds (ringing, surveying, studying…etc). Moreover, EQA, ain cooperation with EEC adopted and announcing the Palestine National Environmental Day to be on 5th of March every year and agreed by the cabinet. In addition, EQA also adopted and announcing the Palestine National Bird to be the Palestine Sunbird or northern orange-tufted sunbird (*Cinnyris osea) with* Synonyms (*Osea nictarina*), which is agreed by the Cabinet. Moreover, the EEC is very active in bird watching and monitoring during the migration seasons in spring and autumn, they arrange the annual weeks of bird watching and monitoring during the two seasons spring, and autumn,

- **Basha Scientific Centre for Research and Studies:**
  This research center focused mainly on birds watching, monitoring, and identification. In addition, the center implemented many project on biodiversity investigation and assessment, such as the Marj Sanour biodiversity assessment and investigation. Also the center is active in research related to DNA genotyping of bird species and other living species of fauna and flora.

- Moreover, many NGO's achieved good progress in awareness promotion an improvement related to nature conservation, these include the birds of SP, Plants biodiversity, and mammal's biodiversity. In addition, a lot of projects and initiatives were executed and implemented by many NGO's specialized in Biodiversity and nature conservation. These include but not limited to (Land Resarch Center, Union of Agriculutral Working Committees (UAWC), Basha Scientific Centre for Research and Studies which concentrates on the study and investigation of birds, in addition to biodiversity, Moreover, man research centers at the Universities also have participated the research related to biodiversity in different ways.

It is clear that SP faces a lot of challenges and gaps in implementing effective measures and policies to conserve its biodiversity and natural assets. Therefore, SP Government has a long way to go to conserve its natural resources using the advantage of being observer member

state in the UN. The following table tries to summarize some of the gaps in the current SP's efforts regarding conservation of biodiversity as a first step to enhance the current national capacities of its institutions (Table 14).

Table 14: Gap of data knowledge in State of Palestine and supposed actions to be taken

Gaps	Action to be taken
The existing NBSAP is out of date and not cover all aspects of biodiversity conservation and emerging issues at both national and international scales.	There is an urgent need for updating NBSAP of SP to fill the gaps in order to accompany with a continuous national outreach program, mainstreaming into other national sectorial plans and projects, and to adequately address the private sector and local communities into projects identified.
Characteristics of biodiversity in State of Palestine from the global perspective	Comprehensive fieldwork studies about numbers, distribution and dynamics of SP biodiversity (checklist of species) at national scale should be start to fill this gap and remove the conflicts in data certainty among different data sources.
Economic valuation of biodiversity	Extensive work on extracting the values of ecosystem services and linkage to human livelihoods is a recommended action that helps the decision making process in SP.
Impacts of Palestinian on global biodiversity	It's very important to start working on topics like: illegal hunting – illegal wildlife trade – Alien Invasive Species – etc.; that will be hot issues in the near future at the global levels.
Major changes to the biodiversity status and trends: a. The current status and trends of ecosystems b. The current status and trends of threatened species c. The current status and trends of genetic diversity d. The current status and trends of PAs system in SP	**a.** Extensive national fieldwork to detect and describe the percentage of each ecosystem compare to total area of SP – species richness in each ecosystem –threatened and endemic species in each ecosystem – degraded areas and percentage within each ecosystem in the last 10 years to detect changes – effect of climate change on each ecosystem – effects of alien and invasive species in each ecosystem – effect of pollution on each ecosystem – effects of urbanization on each ecosystem. **b.** There's an important need to do Red List Assessment based on IUCN international criteria for SP flora and fauna, changes of No. of species through the Red List Categories over the time – No. of species become extinction – No. and percentage of change in No. over the past 10 years of each threatened species or group of species (CR – EN – VU) and what the reason for such change. **c.** National studies should be focus on genetic diversity, amount of produces from Genetic Modified Organisms (GMOs) - there is an urgent support is needed to prepare the National Framework on Biosafety for SP to maximize the benefits and to minimize the potential threats of GMOs for biodiversity **d.** Representativeness of different habitats within the national PAs system, representativeness of global habitats types (biomes) within the national PAs system, No. and percentage of both endemic and threatened species within the national PAs system should be detected.
Main threats to the biodiversity current situation and trends • Habitat loss and Degradation • Invasive Alien Species • Climate Change • Overexploitation • Pollution	• Through collaboration, communication, and coordination between relevant organizations it's very important for biodiversity conservation to determine the severity, extent and ranking of these threats on the PAs, endemic and threatened species - ranking of root causes leading to this threat – threat mapping, pathways of invasive alien species. • Modeling and future scenarios analysis for the impact of these threats are highly recommended to be taken as soon as possible
The impacts of changes of biodiversity	For each of these themes it's very important to start intensive

Gaps	Action to be taken
on ecosystem services and human well-being **a.** Impacts of Habitat loss and Degradation **b.** Impacts of Invasive Alien Species **c.** Impacts of Climate Change **d.** Impacts of Overexploitation **e.** Impacts of Pollution	national work on: **a.** Impacts on agricultural production – impacts on water quantity and quality – impacts on crop production and livestock species – impacts on commerce and economy – impacts on subsistence fisheries – impacts on coastal protection – impacts on traditional knowledge – impacts on tourism sector **b.** Impacts on spread of diseases to new ranges – impacts on the effectiveness of protected areas - changes in the resilience of ecosystems. **c.** Impacts on ecosystems productivity – eutrophication - anoxic water bodies – impacts on fisheries
Future changes and scenarios for biodiversity **a.** Future impacts of the global warming **b.** Future impacts on Invasive Alien Species **c.** Demography	It's very important to start intensive national work on: **a.** Future prediction of temperature and rain fall – future scenarios on endemic and threatened species distribution **b.** Future impacts on species diversity – future impacts on areas of agriculture and fisheries – future impacts on human health **c.** Future changes in demography and its effect on biodiversity and ecosystem services.

13. Contribution to the achievement of the Millennium Development Goals

The State of Palestine has expressed its full commitment to working towards achieving the MDGs and has embarked on formulating special national reports to monitor progress in that direction. The national policy agenda referred to in the Reform and Development Plan 2008-2010 established national priorities related to the building of government institutions in SP in preparation for independence, liberation from the Israeli occupation power and the creation of an environment conducive to development. The program of the thirteenth Palestinian government, 'Ending the Occupation and Establishing the State' as declared in August 2009, set the vision of the Palestinian state as a fact and reality. It defined the strategies that each government institution was required to implement in order to establish state institutions within two years. The priorities of each institution are closely linked to the achievement of development in general, including the fulfilment of the MDGs.

The Palestinian government then issued the National Development Plan 2011-2013. This was based on 23 sectoral and cross sectoral strategies prepared by national teams representing all partners: government, civil society and the private sector. The policies and options defined in the national plan and sectoral strategies form a general framework that outlines the means to utilize national efforts and resources in order to implement high priority policies that serve the developmental process in SP, including the MDGs.

In recent years, the government has made important achievements in all major sectors. With regard to governance, the government has reinforced security and safety in Palestinian society and ensured the building of institutions with mechanisms to monitor performance. The government has also become more transparent and accountable to the public through the publication of data and information, including statements of budgets and spending. The justice sector has also achieved notable progress in its work as the courts have become more effective.

In the social sector, the government has continued to make improvements in education, health and social protection, with particular focus on groups such as women, youth and children. Substantial progress has been achieved in terms of educational infrastructure and teacher training in order to improve the quality of education. Important achievements are also apparent in the health sector and many health centers and complexes have been built and developed. Notable achievements have been made in the fight against communicable diseases, especially in the provision of vaccines for all children in SP, and major improvements have been introduced in the field of mental health. The government has made substantial progress in the provision of social protection to all regions and social sectors. A greater number of families receive assistance from cash transfer and food programs and violence against women has been tackled, including the availability of safe houses.

In regard to the economy, the government has established trade agreements with many countries. In addition, it has succeeded in establishing a legal environment that enables private sector growth and the development of its capacity to assume its natural role in leading economic growth. The government has also developed public infrastructure with projects to develop the water and wastewater sector, energy projects and road construction.

Nonetheless, all these achievements remain vulnerable to Israeli occupation power policies that limit the implementation of projects in Area C, in East Jerusalem and in the besieged Gaza Strip. More substantial progress would have been possible in all areas if the SP had full

control over the land and the available natural resources. Israeli occupation power control over Palestinian land and its resources has limited the capacity of the SP to advance further on the path towards building the independent Palestinian state and towards the aspired development of SP that could benefit all regions and social groups.

The most recent report on poverty in SP has shown that the poverty rate in 2010, based on monthly consumption patterns, was 25.7%, with significant disparity between the West Bank and Gaza Strip (18.3% and 38% respectively). Of this percentage, 14.1% suffered from extreme poverty (8.8% in the West Bank and 23% in the Gaza Strip) (PCBS, 2011b). The disparities between the West Bank and Gaza Strip are primarily due to the 10-years continuous siege imposed Israeli occupation power on the Gaza Strip, which prevents the entry of the basic raw materials needed to be economically active /implement projects. Agricultural products are banned from export abroad and fishermen are banned from fishing. The market in the Gaza Strip is small, but the siege has had a major impact on poverty rates and led to a leap in poverty to the unprecedented level of 55.7% in 2007 compared with 23.6% in the West Bank.

Food security in SP is linked to a large extent to poverty. The available data show that the percentage of households nationally lacking food security was 27% in 2011 (44% in the Gaza Strip and 17% in the West Bank).9 There has been a considerable improvement in food security compared with 2009 and 2010: the percentage of households without food security totalled 33% nationally in 2010 (52% in the Gaza Strip and 22% in the West Bank), while in 2009, the percentage nationally was 36% (60% in the Gaza Strip and 22% in the West Bank).

State of Palestine has made notable progress in educational quantitative indicators and is ahead of many countries in the region and internationally. This progress is apparent in gender equality in terms of student enrolment rates in basic and university education. In fact, female enrolment rates are higher than those of males at some stages. It endorses basic education as a compulsory stage which continues up to tenth grade. Data show that net enrolment in basic education was 94.4% in the 6-15 age group and 88.5% thereafter (Database of the Ministry of Education and Higher Education). These are high ratios, but further effort will be made to raise the ratio until all male and female students are enrolled at this stage through a series of appropriate policies and interventions. One sector that requires focus and attention to raise enrolment rates at the basic education stage is among students with special needs. Currently only 45% of children with special needs in the 6-15 age group are enrolled (Database of the Ministry of Education and Higher Education). Specific policies and interventions are crucial to ensure their participation in education.

Palestinian women have high enrolment rates at all levels of education, actually exceeding male enrolment rates in some stages. The ratio of females to males in basic education is 98 females for every 100 males; in secondary education the ratio is 118 females for every 100 males and in university education the ratio is 128 females for every 100 males (PCBS, 2011c). There is greater disparity in female and male enrolment rates in scientific specializations in universities and in vocational and technical education in the secondary phase, where there are only 56 females for every 100 males (Database of the Ministry of Education and Higher Education). This gap is due to the traditional view of the role of women and their chosen field of work. Policies are required to bridge this gap in the foreseeable future and gradually eradicate this discrepancy in enrolment numbers. In the labour market, there is still a wide gap between females and males. The female participation rate (15 years or older) in the labour force was 15% in 2010 compared to 67% among males in the same age group. Female unemployment stands at 27% compared to 23% for males (PCBS, 2011d). These figures point to the presence of a large gap between males and females

in relation to the labour market and the need for policies and interventions to encourage female participation and protect their rights.

Available data show a steady decrease in infant mortality rates in SP. The infant mortality rate in the interval 1990-1994, which is the period prior to the establishment of the PNA, was 33.2 deaths for every 1000 live births. This ratio decreased annually to reach 24 deaths for every 1000 live births in 2010.The same trend applies to newborn mortality where the rate decreased from 27.3 deaths per 1000 live births during 1990-1994 to 20 deaths in 2010 (PCBS, 2011c). Despite these improvements, infant and newborn mortality rates remain high and efforts need to be exerted to further reduce them. There is a gap in infant and newborn mortality rates between the West Bank and Gaza Strip. The infant mortality rate in the West Bank was 21.2 for every 1000 live births in 2010 while in the Gaza Strip the mortality rate was 27.7 deaths. The newborn mortality rate was 18.2 deaths for every 1000 live births in 2010 in the West Bank and 22.4 deaths in the Gaza Strip (PCBS, 2011a). This gap demonstrates that increased investment needs to be allocated to the health sector in the Gaza Strip to eradicate the factors behind the existing mortality rates of infants and newborns.

Data from the Palestinian Ministry of Health in 2010 show that the main causes of infant deaths in the West Bank were prenatal diseases (38.0%: 34.6% for males and 42.3% for females), congenital malformations (18.0%) and blood poisoning (11.1%). The main causes of newborn deaths in the West Bank were respiratory diseases (37.6%: 37.5% for males and 37.7% for females), congenital malformations (19.0%: 18.7% for males and 19.3% for females), communicable diseases (12.2%: 12.7% for males and 11.5% for females), and premature birth and low birth weight (11.3%: 11.6 for males and 10.9% for females). Ministry of Health data show that the maternal death rate was 38 cases per 100,000 live births in 2006, with this rate falling to 32 deaths in 2011. Data show that only 38.4% of women received postnatal services and this may be a factor behind maternal deaths and infant mortality and requires improved provision of postnatal services to women. In 2010, 41% of deliveries were to women under 18 years of age. Modern family planning methods were used by 41.3% of women nationally (44.1% in the West Bank and 36.6% in the Gaza Strip). Those with unmet family planning needs totaled 20% nationally (19.4% in the West Bank and 20.9% in the Gaza Strip) (PCBS, 2011a).

Regarding the seven goal of the MDGs (ensure environmental Protection and sustainability), SP has achieved substantial progress on the legal front pertaining to the protection of the environment. Policies for environmental protection have been prepared in cooperation and coordination with all ministries. The degree to which these Palestinian strategies can be implemented remains dependent on Israeli occupation power policies. The percentage of land under Palestinian control is limited to 22% while Israel the occupation power controls the remainder, in particular the areas classified as Area C that make up approximately 60% of the West Bank. This has a direct impact on Palestinian control of other resources. SP controls just 21% of its water resources and this hampers efforts to implement the measures required to protect the environment. Around 13% of wastewater is treated and only 30% of solid waste is dumped in landfill sites in a sanitary manner. Vital projects pertaining to wastewater treatment or the establishment of landfill sites are obstructed by Israel occupation power, especially where projects might be established in Area C.

A set of targets has been defined regarding environmental protection. General indicators linked to these targets appear in the table below with the specific targets to be achieved by 2015. These indicators reflect national percentages and targets.

Table 15: Indicators of national progress achieved towards Millennium Development Goal No. 7.

Seventh Goal: Ensure environmental protection and sustainability			
Objectives	Indicators of progress achieved		
	Indicator	Base	Target
		2010	2015
To control environmental and natural resource sand their management In asustainable and integrated manner	Percentage of land under Palestinian control	22%	Depends on political progress
	Percentage of treated wastewater	13%	25%
	Percentage of solidwaste dumped in landfills in asanitary manner	30%	70%
	Percentage of water resources under Palestinian control	21%	Depends on political progress
	Percentage of drinkable water out of available resources	55.3%	60%
	Percentage of alternative energy use	19%	25%
	Percentage of area of forestland	1.63%	2%
To limit the loss of biological diversity and protect natural heritage	Percentage of nature reserves (land and sea)	8.55%	10%
	Number of archaeological and natural sites under renovation	110	160
	Number of species threatened with extinction	636 plants and 22 animals	550 plants and 18 animals

Box 4: Environmental Education Center: 29 Green Years!

The Environmental Education Center (EEC) of the Evangelical Lutheran Church in Jordan and the Holy Land (ELCJHL) stands on top of a high mountain on the outskirts of Beit Jala.The EEC began with "Education for Awareness and Involvement" (EAI) program in cooperation with the highly esteemed Birzeit University in 1986, to be subsequently transformed into "Children for the Protection of Nature in Palestine (CPNP) in 1992. As workers in both programs became more experienced, the CPNP was renamed to "The Environmental Education Center" (EEC) in 2001, to reflect the expansion in the scope of its work, as well as the number of beneficiaries.

At the EEC, theoretical knowledge is coupled with practice and is a pioneer in environmental awareness and education. Tours in the EEC main sections, as well as its numerous facilities and programs provide visitors with a panoramic scene, where they not only acquire knowledge and entertainment, but would have a view of biodiversity, and an opportunity for bird identifying, monitoring and ringing. The ringing and monitoring station, opened in 2000, the first station of its kind in SP and the Arab World, is run by a Palestinian team specialized in bird ringing, monitoring, and tracking their annual migration track. Within a few years, members of the team were able to ringing thousands of birds, including rare species that were recorded in SP for the first time.

They visit the Natural History Museum, which dates back several decades, to explore its invisible components, or secrets, and most importantly to re-invigorate the international advocacy. The Natural History Museum of the EEC is the first one of its kind in SP. It contains more than 2,500 specimens of fossils and stuffed animals, some of which date back to 1902, in addition to dozens of birds, mammals, reptiles, amphibians and fish that have been preserved to attract viewers and generate a sense of curiosity. The museum also protects our national heritage and preserves examples of several extinct and endangered animal species.

On top of a mountain in the mountain ranges of western Jerusalem, approximately 900 meters above sea level, lies a botanical garden, which disperses its colors over fourhectare. Being one of the most significant environments, and a habitat for dozens of trees and plants, particularly wild flora and fauna. The Environmental Exhibition is designed to articulate environmental challenges that the Palestinian society confronts. It aims, through paintings, samples and several audiovisual aids in an impressive manner, to promote environmental awareness, enhance interest in the preservation of the environment, ensure the right of people to live in a healthy environment and assist them in reducing environmental hazards.

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15. APPENDIX

Appendix 1: Palestinian Efforts towards preparation of the Fifth National Report on the Implementation of the CBD:

As State of Palestine acceded the CBD recently in 2015, it is committed to the implementation of the provisions of the CBD. And based on CBD article 26: "Each Contracting Party shall... present to the COP, reports on measures which it has taken for the implementation of the provisions of this Convention and their effectiveness in meeting the objectives of this Convention." It's become an urgent need to SP to submit a fifth national report summarizing its activities in the field of biodiversity Conservation. Several unofficial national reports had been done by SP; however, this report will be the first official report to submit to CBD.

Several national expert's meetings were held in SP followed by two workshops have been conducted in Amman Jordon with the support of IUCN ROWA and UNEP in order to set a criterion, format, and structure for this important report. Numbers of stockholders from SP have been invited to attend the discussions within these workshops. Of the Parties present (Sorted alphabetically): Biodiversity and Environmental Research Center (BERC), Birzeit University, Environment Quality Authority (EQA), Environmental Education Center (EEC), Ministry of Agriculture (MoA), National Agricultural Research Center (NARC), Palestine Museum of Natural History (PMNH), Palestine Wildlife Society (PWLS), and Palestinian Central Bureau of Statistics (PCBS).

Data for this report were gathered within the first workshop from attending stakeholders from 31th May to 3rd June 2015. Most of the data collected were from governmental, research centers, universities report, and personal scientific publications. The shortages in data in specific fields were full filled from online scientific resources.

The collected data was then analyzed; and informations presented in the form of tables, maps, and figures. Based on CBD national report format the report divided to 3 main chapters and executive summary as well as appendixes were filled.

After the finalization of the first draft, the report was sent to all stakeholders in order to get feedback and comments. The contracted expert collect all comments came from the different stakeholders and responded to all. The second workshop was held on 25th and 26th of October 2015 in order to discuss the comments, responses and approve the final report.