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Environment Quality Authority

Protected Area Network Review and Design for the State of Palestine

CRITICAL ECOSYSTEM PARTNERSHIP FUND

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Protected Area Network Review and Design for the State of Palestine

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Executive Summary

A protected area review and design for Palestine was conducted during 2021-2022 with the aim of reviewing and updating the current protected areas using systematic conservation planning principles and The Convention on Biological Diversity (CBD) protected area design criteria to establish a connected, representative, efficient, and climate-resilient network of protected areas. This was done through a project funded by The Critical Ecosystem Partnership Fund (CEPF). The project was implemented by The International Union for Conservation of Nature (IUCN) in collaboration with the Enviornment Quality Authority of Palestine (EQA), Palestine Museum of Natural History, Ministry of Agriculture (MoA), Ministry of Local Government (MoLG), Biodiversity and Environmental Research Center (BERC), Nature Palestine, Palestine Wildlife Society (PWLS), and other relevant entities and national experts.

An analysis of the current Protected Area Network and Design was conducted, which revealed a number of gaps and challenges. These include a lack of systematic documentation, weak stakeholder engagement in the planning and designation process, unclear governance structure and management of protected areas, and unsystematic planning and designation based on natural values. It is evident that there is a need to set clear targets for conservation of critical habitats and species within the network. Furthermore, current research programs are not adequately dedicated to cover all protected areas in a systematic manner. Its essential to update and strengthen the current conservation legislation in Palestine to comply with international treaties and obligations. Detailed guidance must be provided on how the Environmental Quality Authority (EQA) should fulfill its duties as outlined in Article 40 of the law. Additionally, scientific data must be collected on all protected areas and potential protected areas using the best available methods for geography, geology, hydrology, fauna, and flora. This data can then be used to identify biodiversity hotspots for conservation priorities. Furthermore, management plans should be developed that take into account social, cultural and economic factors as well as an ecosystem approach. By doing so, Palestine can ensure that its conservation efforts are effective and in line with international standards. In order to ensure the proper planning and designation of protected areas across Palestine, a clear reference vegetation map must be used. The current review process for protected areas has identified a reference vegetation that can be used as a basis for the review and update of the PAs network. This reference vegetation map should provide detailed information on the various vegetation types present in Palestine, including their distribution, composition, and structure. This will enable decision makers to make informed decisions about which areas should be designated as protected areas and which should not. Additionally, this reference vegetation map will also provide valuable data for monitoring and evaluating the effectiveness of existing protected areas.

The following are the methodological steps applied in the PAN design and assessment.

1. Desktop study and report cards: A desktop was performed building on earlier work and used these reports cards (see references) in the work. Species distribution data is gathered locally from a number of sources focusing on endangered, threatened, vulnerable species data from IUCN published research papers.
2. Collective Decision on PAN Design and Criteria document: These were developed taking into account international agreements and regulatory frameworks, the 6th National Report, and the 2022 National Biodiversity Strategies and Action Plans (NBSAP). Further, some examples from other countries were consulted.

3. A Marxan analysis model was used to provide a targeted scenario to design protected areas and identify hotspots for inclusion within the protected areas network in regard to the already agreed protected area design criteria considering accessibility and ease of management.
4. The field work: It aimed to provide an updated status of the PAs based on the criteria. Notes were taken on including urban expansion and settlements nearby PAs. All protected areas, except Umm er Rihan and Marxan proposed areas, were visited in the period between March and August 2022 by biodiversity experts from the Palestine Institute for Biodiversity & Sustainability (PIBS) and EQA. Twenty-two field trips were conducted for this work.
5. Key information on each area was gathered, specifically related to threatened or endangered species. Information was collected from fieldwork, available online data, relevant publications, etc. Furthermor, data was collected on elements needed for scoring based on the criteria. Information was collated on suggested management of areas when these were not available, including threats and opportunities. For example, buffer zones were considered but not necessarily added to the protected area. However, as this is a utilitarian issue, moderate protection is therefore suggested especially if on private lands.
6. Applied the criteria to 50 designated protected areas plus eight potential new areas (seven identified from Marxan and one from new data). For each of the areas, a report card was generated including a summarised score based on the criteria developed in one in addition to a data sheet with all scores.
7. Set a cut-off value and excluded areas that do not meet the requirements.
8. Narrowed down and evaluated the distinctiveness of the remaining areas and then created a network of sites. The coverage would include all the biogeographic regions, ecosystems, and the majority of endangered species.
9. Consolidated and adjusted borders as needed to ensure cohesion, representation, integrity, coverage, and connectivity using management tools such as buffer zones and corridors.

Legal and implementation issues were summarised.

The assessment results identified a final identified 27 PAs in the West Bank and one in Wadi Gaza, bringing the total up to 28. The results aim to cover the representation of at least 10% of all vegetation cover types in the West Bank. In addition, the vegetation cover type size was calculated within the new PAN.

See the following table and figures that illustrate the new protected areas network. In addition, the report included a summary note on each selected site along with corresponding maps and photos. Furthermore, the assessment highlights the potential issues the implementation of the new protected areas network that might face and therefore, addresses a proposed costed strategy for proper implementation of the new network.

Table 1: A summary of memoranda and MOUs signed by the EQA on the national level.

Protected Areas		Area (km²)	Governorate/s	IUCN Category	Other notes
The Dead Sea	البحر الميت	235.08	Jericho, Jerusalem, Bethlehem, Hebron	IV	Most important area and of potential designation under IUCN ecosystem red listed as endangered
Ein al Auja	عين العوجا	12.37	Ramallah Al Bireh	II	Unchanged borders
Jerusalem Wilderness area	برية القدس	52.84	Jerusalem, Bethlehem, Jericho	Ib	Newly designated PA
Wadi al Qelt	وادي القلط	28.64	Jericho, Jerusalem, Ramallah Al Bireh	IV	Very small adjustments of borders on western side
Al Aghwar (Jordan Valley)	الأغوار	54.52	Jericho	II	Combining previously four adjacent areas
Wadi Fasayil	وادي فصايل	8.38	Jericho, Nablus	II	Unchanged borders
Al Kanub	الكانوب	29.01	Hebron	IV	Significant adjustments of borders
Al Muzawqa	المزوقة	28.33	Tubas	IV	Border adjustments
Al Miksar	المكسر	1.22	Jenin	IV	Border adjustments
Latrun	اللطرون	2.33	Ramallah Al Bireh	IV	Newly designated PA
Marj ez Zarur	مرج الزعرور	2.30	Jerusalem	IV	Unchanged borders
Qarn Sartaba	قرن سرطبة	31.19	Jericho	IV	Border adjustments
Umm er Rihan	أم الريحان	3.70	Jenin	IV	Border adjustments
Wadi Ein ez Zarqa el Elwi	وادي عين الزرقا العلوي	10.53	Ramallah Al Bireh, Salfit	IV	Border adjustments
Wadi Jannata	وادي جناتا	2.80	Ramallah Al Bireh	II	Border adjustments
Wadi Qana	وادي قانا	15.30	Salfit, Qalqilya	II	Border adjustments
Al Kuweiyis	الكويس	12.69	Hebron	IV	Border adjustments
Ain Qawabish	عين قوابيش	0.45	Ramallah Al Bireh	V	Border adjustments

Protected Areas		Area (km²)	Governorate/s	IUCN Category	Other notes
Deir Razih	دير رازح	0.35	Hebron	V	Border adjustments
Al Katar	الكتار	3.18	Jericho	V	Unchanged borders
Al Marj	المرج	0.41	Jenin	V	Significant adjustments of borders
Jabal al Qarn	جبل القرن	0.53	Hebron	V	Potential national eco-garden
Ras Jadir	راس جادر	9.50	Tubas	IV	Significant adjustments of borders
Shubash	شوباش	52.86	Tubas, Jenin	V	Potential biosphere
AL Arqoub	العرقوب	9.10	Bethlehem	V	Potential biosphere
Wadi al Quff	وادي القف	3.44	Hebron	V	Potential biosphere
Wadi ed Dilb	وادي الدلب	1.56	Ramallah Al Bireh	VI	Significant adjustments of borders
Wadi Gaza	وادي غزة	2.84	Gaza	VI	Unchanged borders

Table of Contents

About this report

This national report came as a result of an extensive participatory and consultative process lead by the International Union for Conservation of Nature, Regional Office for West Asia (IUCN ROWA) and the Enviornment Quality Authority of Palestine (EQA) through the project "Protected Area Network Review and Design for Palestine", which is funded by the Critical Ecosystem Partnership Fund (CEPF).

The protected area network review process included several extensive stakeholder consultations with key partners and stakeholders and was co-led by the EQA. Below are the principle contributing institutions and individuals, who were instrumental during the protected area review process.

International Union for Conservation of Nature Regional Office for West Asia (IUCN ROWA): Lead the implementation of the project with the following key contributors:

- Dr. Hany El Shaer, IUCN ROWA Regional Director: Strategic and technical oversight
- Eng. Natalia Boulad, Protected Areas, World Heritage and Biodiversity Programme Manager: Project management and conducts Marxan analysis
- Eng. Hanna Haddad, Programme Assistant: Admin and technical GIS support
- Eng. Shamel Bazouqa, Programme Assistant: Admin support and facilitation
- Mr. Mohammed Zarour, IUCN Consultant: PA Planning Consultant; compilation of the final report

Enviornment Quality Authority of Palestine (EQA): Key advisor and contributor to the protected area review process and field validation

- Dr. Issa Adwan, Technical lead of the EQA
- Mr. Mohammed Mahasneh, Director of Biodiversity & Protected Areas division
- Eng. Khaled Seleem, GIS support and data provision

University of Bethlehem (BU): Review and update of the desk review and gap assessment and lead the field validation process

- Prof. Mazin Qumsiyeh, Team leader of Bethlehem University, management of the sub-grant
- Prof. Zuhair Amr, BU consultant: Report technical revision
- Researchers, Mr. Mohammed Abusarhan; Mr. Mohammad Najajreh; Mr. Elias Handal

List of figures

List of Tables

List of acronyms

ARIJ:	Arab Reporters for Investigative Journalism
BERC:	Biodiversity & Environmental Research Center
CBD:	Convention on Biological Diversity
CEPF:	Critical Ecosystem Partnership Fund
CITES:	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS:	Convention on Migratory Species
EQA:	Environmental Quality Authority
EU:	European Union
GBIF:	Global Biodiversity Information Facility
GIS:	Geographical Information System
IBA:	Important Bird Area
IPA:	Important Plant Area
IUCN:	International Union for Conservation of Nature
KBA:	Key Biodiversity Area
LMOs:	Living Modified Organisms
MAB:	Man and Biosphere
MOA:	Ministry of Agriculture
MOL:	Ministry of Labour
MoLG:	Ministry of Local Government
MOPAD:	Ministry of Planning and Administrative Development
MOPIC:	Ministry of Planning and International Cooperation
MOT:	Ministry of Tourism
MOU:	Memorandum of Understanding
NBSAP:	National Biodiversity Strategy and Action Plan
NEAP:	National Environmental Action Plan
NGOs:	Non-government Organization
NSP:	National Special Plan
OECM:	Other Effective Area-based Conservation Measures
PA:	Protected Area
PAN:	Protected Areas Network
PWLS:	Palestine Wildlife Society
ROWA:	Regional Office for West Asia
SWOT:	Strengths, Weaknesses, Opportunities, and Threats
TOR:	Terms of Reference
UN:	United Nations
UNCCD:	United Nations Convention to Combat Desertification
UNEP:	United Nations Environment Programme
UNESCO:	United Nations Educational, Scientific and Cultural Organization
UNFCCC:	United Nations Framework Convention on Climate Change
WB:	World Bank
WHS:	World Heritage Site

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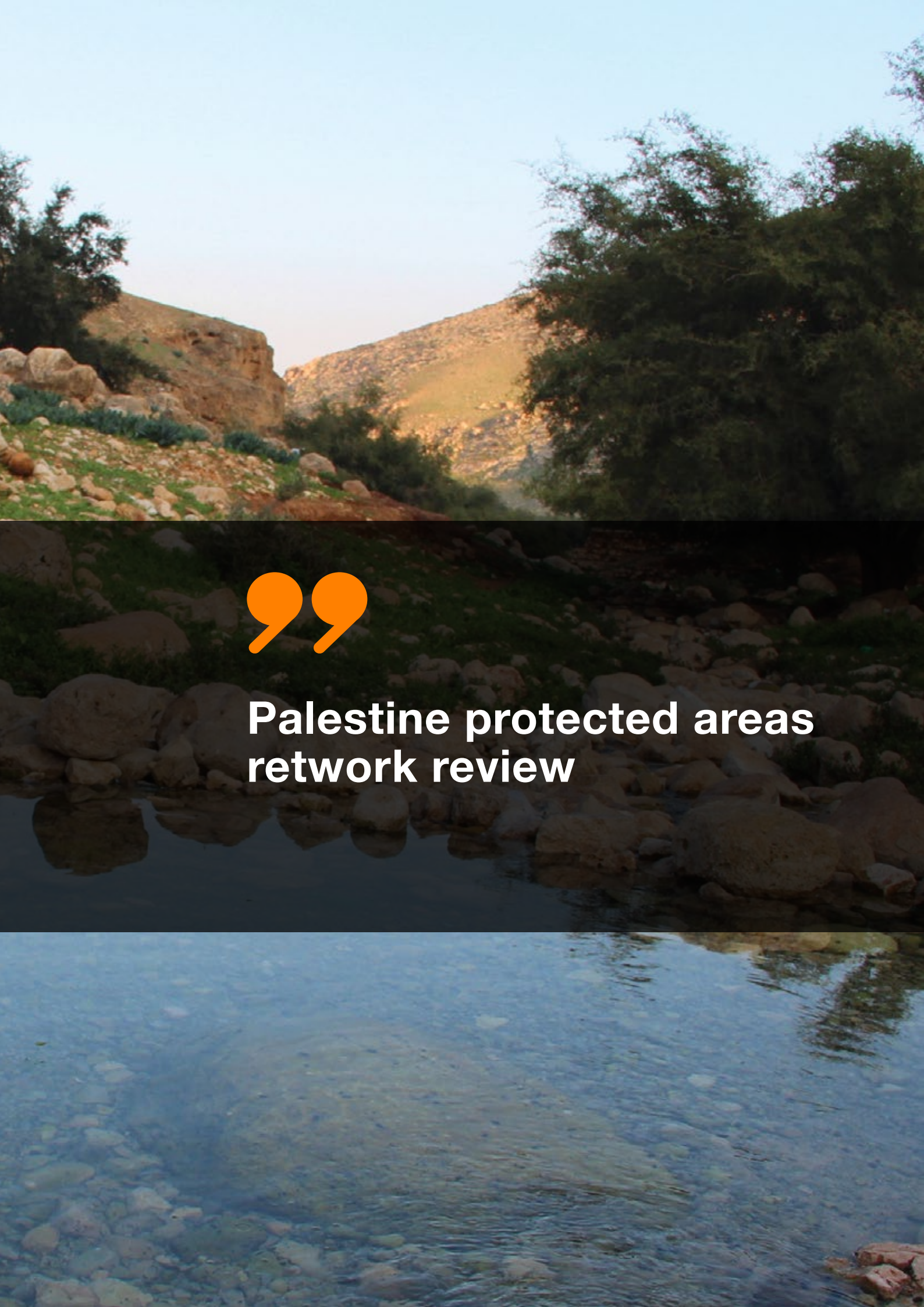


Palestine protected areas retwork review

1 Palestine protected areas retwork review

1.1 Introduction and background

Despite its small area, Palestine is a country with rich biodiversity. This comes due to its strategic location at the junction of four continents, its distinctive topography on the Great Rift Valley and bird's migration routes. Four phytogeographical regions are represented within its small area including Mediterranean, Irano - Turanian, Saharo -Arabian, and the Sudanian penetration.

The Ministry of Local Government (MoLG) developed a national spatial plan which indicates that about 9% of the total area of the West Bank consists of nature reserves, in addition to 1 % forming the total area of forests nationally. Palestine also identified 14 sites as key biodiversity areas (KBAs), 50 sites as rich in biodiversity, and 9 sites as important plant areas (IPA). Moreover, 13 sites were considered as nationally important bird areas, four of which were declared by BirdLife International as important bird areas (IBAs). Through the regional pilot project, GlobWetland II, five major wetlands have been identified in Palestine and one more has been identified as a potential site. Currently, Palestine is not a member in the Ramsar Convention.

Despite the declaration of 9% of the Palestinian territories as natural protected areas, lack of systematic grounds for the protected areas (PAs) declaration was noted. The declaration of protected areas of Palestine was not based on a comprehensive systematic assessment while a national representation target was absent according to Palestine's fifth national report for the Convention of Biological Diversity (CBD). The current natural protected areas network in Palestine was developed 15 years ago and current observation implies that some of these sites may not qualify as protected areas if systematic conservation planning principles were applied. Furthermore, KBAs, identified by Critical Ecosystem Partnership Fund (CEPF) ecosystem profile and the recent surveys and biodiversity assessments carried out by BirdLife International and other international organizations, have highlighted that areas of high biodiversity value were not represented in any of the current protected areas network (PAN).

The Government of Palestine also aims to develop a national master land use plan that includes revised Protected Areas into the land use plan. This requires developing a scientifically based network that is applicable on the ground.

1.2 Protected Area Network Review and Design for the State of Palestine project

The International Union for Conservation of Nature – Regional Office for West Asia (IUCN ROWA) executed the Project, "Protected Area Network Review and Design for the for the State of Palestine". The project is funded by CEPF; a joint biodiversity conservation initiative made up of a multi-donor fund consisting of Conservation International Foundation, International Bank for Reconstruction and Development, the Global Environment Facility through CI as implementing agency, the Government of Japan through IBRD as trustee of grant funds provided by the Ministry of Finance, Agence Française de Développement, and the European Union. The fund aims to protect the world's ecosystems, species, and biodiversity hotspots regionally and globally.

This project aims to review and update the PAN in the State of Palestine using systematic conservation planning principles and CBD protected area design criteria to establish a connected, representative, efficient, and climate-resilient network of protected areas.

The PA system will include regional cores, connected through other types of zones, biodiversity corridors, buffer zones, and other effective area-based conservation measures (OECMs). The PAN will be designed and planned to adapt to the long-term impact of climate change, and other threats like desertification and pandemic outbreaks and their impacts on key habitats.

2

Protected areas current status in the State of Palestine

2 Protected areas current status in the State of Palestine

2.1 PAs Legal context and related organisational structure

In Palestine, environment suffers from loss of natural resources, neglect of environment, environmental pollution, low water quality, depletion of water resources, and other human impacts leading to habitat loss and a loss in biodiversity. As response to that, the Palestinian National Authority has attempted to deal with environmental problems by establishing the needed legal, organizational tools and initiated key strategies and action plans targeting these problems. One of the key national initiatives and programs is the establishment and management of protected areas.

In 1998, in an attempt to deal with environmental issues, the Palestinian National Authority established the Ministry of Environmental Affairs which eventually evolved into the Environment Quality Authority (EQA) in 2002 with the same roles and powers. Therefore, the Environment Quality Authority and Ministry of Agriculture are the mandated organisations to manage and protect natural resources, establish and manage protected areas in the State of Palestine. The Environment Quality Authority is taking a leading position in the conservation of protected areas management and is acting as a focal point for national, regional, and international agreements and conventions. The EQA has signed several key international conventions such as CBD, UNFCCC, UNCCD, CITES, and CMS.

The State of Palestine as a nascent state falls far behind on implementing provisions of the Convention on Biological Diversity (CBD) partly because it is a state that is not in control of most of its Key Biodiversity Areas (EQA, 2015). The Palestinian Environmental Law Number 7. of 1999, under chapter 1, article 1, section on definitions, defines a protected area as: Areas designated to preserve certain types of living organisms or other ecosystems that have natural or aesthetic, where it is forbidden to eliminate, affect or kill themIn addition, in chapter five, articles 40-44 are related to biodiversity and protected areas conservation.

In 2003, the Palestinian Agriculture Law Number 2 Article 1 of section 1 defines a protected area as: “A geographically delineated area that is organized and managed for the purpose of its protection and to conserve its biodiversity”. article 9 of section 1 states: “The Ministry in cooperation with other competent authorities shall develop protected areas management plan and conserve all plants and living organisms living in protected areas”.

Other key organisations concerned with natural protection are the Ministry of Interior (Enforcement of Environmental and Agricultural laws), Ministry of Local Government (responsible for local communities’ involvement in protected areas management), Ministry of Tourism and Antiquities (ecotourism marketing nationally and internationally), and Ministry of Education (Environmental education in schools).

Few non-governmental organizations (NGOs) have been focused on the environment, agriculture, water resources or conservation. During the last 25 years, more than 11 NGOs were established in the State of Palestine to focus on nature conservation, ecotourism, environmental education, and research.

Since 2012, the State of Palestine has been recognised as a permanent, non-member observ-

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

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

Convention on Biological Diversity (CBD): The CBD is an international legal instrument for the conservation and sustainable use of biological diversity that came into effect in December 1993. The State of Palestine signed the agreement on 2 April 2015. To comply with the convention, the EQA has updated the national biodiversity strategy and action plan in alignment with the post 2020 biodiversity framework. This includes preparing lists of endangered species and building its capacities, along with those of national stakeholders, in the field of biodiversity. The Palestinian Authority submitted its fifth report in 2015 (EQA, 2015). In 2012, the EQA published “The National Strategy, Action Program, and Integrated Financial Strategy to Combat Desertification in the Occupied Palestinian Territories,” which outlined plans and sought funding for many educational projects to combat desertification. However, lack of funding and other challenges impeded compliance and implementation.

(https://www.cbd.int/convention/text/default.html)

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted on 22 March 1989 by the Conference of Plenipotentiaries in Basel, Switzerland, after public outcry in the 1980s following the discovery of deposits of toxic waste in Africa and other parts of the developing world imported from abroad. The State of Palestine signed the Basel Convention on 2 January 2015 and was ratified three months later on 2 April 2015. Articles 12 and 13 of the Palestinian Environment Law are largely influenced by the Cconvention. These articles form the legislative basis for preventing the entry of waste and hazardous substances into the State of Palestine. On these basis, the EQA has prepared a master plan for the management of hazardous materials and wastes and prepared a draft list of hazardous substances and wastes. Accession to the Basel Convention constituted a fulcrum in preventing waste and hazardous materials from being dumped locally or smuggled in from Israel. Yet, largely due to illicit cross-border cooperation by organized crime, waste continues to flow into the Palestinian areas from Israel (Khlaif and Qumsiyeh, 2016). (http://www.basel.int/TheConvention/Overview/tabid/1271/Default.aspx)

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

United Nations Framework Convention on Climate Change (UNFCCC): This treaty was negotiated at the 1992 Earth Summit in Rio de Janeiro and aims to address climate-change related

threats to human life and life on earth. The EQA prepared a national strategy for adapting to climate change, which included the formation of a national committee on climate change and a designated climate change unit within the EQA.

The United Nations Convention to Combat Desertification (UNCCD): This international environmental agreement addresses sustainable land management for combatting desertification. The State of Palestine is a party to this agreement and has implemented several projects and activities related to the convention objectives. The EQA was the national focal point, however, this role has been transferred to the Ministry of Agriculture. Nevertheless, the EQA initiated the formation of a National Committee to Combat Desertification and made efforts to prepare a national strategy for combatting desertification.

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

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

2.2 National strategies and plans

After the Oslo Accords, the Palestinian National Authority began issuing a series of legislation and a number of national strategies to deal with environmental issues. In 2000, the Authority issued the first 10-year environmental strategy and a National Environmental Action Plan (NEAP).

In 1999, one of the key strategies developed specifically for biodiversity conservation was the National Biodiversity Strategy and Action Plan (NBSAP). The Plan revealed some fundamental issues and gaps in biodiversity conservation in protected areas. These gaps include the lack of scientific data documenting species and ecosystems in protected areas, lack of human resources and related capacity, lack of funding, weak coordination between related organisations in the field of conservation.

The Environment Quality Authority has continued to prepare related national reports in compliance with CBD. The sixth CBD national report addressed the need to continue the efforts of biodiversity conservation at the national level. The report addressed a set of future objectives with special focus on conducting wildlife research to understand the habitat and species conservation and accordingly prepare appropriate conservation management plans, developing and managing Palestine's National Protected Areas network, strengthening wildlife law enforcement and promoting ecotourism and environmental awareness.

In 2012, the State of Palestine prepared the National Spatial Plan (NSP) and in 2014, adopted a framework for local and regional spatial plans with clear emphasis on biodiversity conservation mainstreaming in national and local development plans and land use activities. The plan limits land use and defines essential sensitive layers for agriculture, open space, Rich Biodiversity Areas, Protected Areas and forest areas.

2.3 Key governmental entities concerned with nature protection.

Key governmental institutions have assumed legal competency over protected areas and nature conservation, (see table 2). The development of national strategies requires their involvement in terms of policy formulation.

Table (2): List of key governmental institutions with legal competency over protected areas and nature conservation

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

2.4 Established protected areas in the State of Palestine

EQA in collaboration with International Union for Conservation of Nature (IUCN) has studied and reviewed 15 protected areas in detail including having completed SWOT analysis for each area in 2010. Based on the Oslo Agreements, land belonging to 19 distinct areas was handed over by the Israeli authorities to the Palestinian National Authority as PAs. When Israeli authorities handed over land belonging to 19 distinct areas to the Palestinian National Authority as PAs. EQA has suggested seven new areas to be studied to assess their potential as protected areas.

Eight protected areas are managed by the Ministry of Agriculture (MOA) through its Directorate of Forests, Rangelands and Wildlife department which has offices in all governorates. Forty rangers are responsible for inspecting and patrolling protected areas and natural forests. These areas represent a total area of less than 15 km2 of land accounting for less than 1% of the protected areas.

On 3 February 2015, the Palestinian Council of Ministers approved the recommendations of the National Committee for the Geographical Names in Palestine (consisting of members from the EQA, MOA and the MOPAD) on recognising and approving protected areas in the State

of Palestine. This document includes 50 protected areas with their names and their locations. These names are approved, and all governmental institutions are obliged to use them. In addition, the Authority established Wadi Gaza as a protected area in 2000. Therefore, the total of protected areas is 51. For more information and details about these protected areas see Annex 1.

Accordingly, the National Spatial Plan indicates that the total area of natural reserves in the West Bank is only 51,158 hectares, equaling 9% of the Palestinian Territories.

2.5 Towards a new Protected Areas Network (PAN) in the State of Palestine

2.5.1 Overview

The primary goal of the PAN project is biodiversity conservation and sustainable use in Palestine. Palestine's biodiversity is facing many challenges and threats. Challenges are arising from the need to reconcile environmental protection with development, while threats are arising from unsustainable development activities.

The project objective is to "Develop and start implementing the plan for the establishment of a national Protected Areas Network". Milestones for biodiversity conservation are protected areas and a well-structured and managed network of protected areas that can be key for preserving species and habitats and maintaining their viability and services.

Syntax a structured and managed network is presently missing in the State of Palestine. Due to a number of reasons of which the most important are addressed by this project, such a structured and managed.

The project components will address barriers and constraints to effective implementation of the national PAN, focusing on:

Design, planning and establishment of the national system of Protected Areas in the State of Palestine.

Strengthen the legal and institutional framework for Protected Areas through stakeholder consultation, capacity building and provision of technical tools to enable legislation enforcement.

Improve the involvement of the public/communities in conservation issues and raise awareness about the importance of ecosystem services and biodiversity conservation.

2.5.2 Gaps in Palestine PAN

The following is a summary of observed gaps in the State of Palestine PAN:

- Lack of systematic documentations of PAs network
- Lack of stakeholders' engagement in planning and designation process of PAs
- Lack of social and environmental safeguard considerations during the declaration process of PAs
- Lack of a clear governance and management of PAs
- Lack of a clear mandate for civil society to manage and operate PAs
- Lack of established natural and cultural values of designated sites
- Unsystematic planning and designation of PAs based on natural values of sites and clearly defined criteria of selection based on:

  a. **Values**

  - Environmental values
  - Historic values

- Aesthetic values
- Wilderness values
- Ecosystem values

b. **Quality**

- Representativeness
- Diversity
- Distinctiveness

c. **Feasibility: Implementation management objectives**

- Governance and management
- Size and boundaries
- Possible management tools
- Accessibility
- Tourism potential
- Threats

d. **Admin factors**

- Land ownership
- Impacts

2.5.3 Current shortcomings in pas planning and designing process

This section provides an overall picture of the current planning and designing processes for the protected areas network in the State of Palestine.

1. Protected areas network objectives

In the context of conservation objectives, scientific knowledge and planning, today, there is a gap in defining clear targets for conservation of critical habitats and species in the current network. The current research programmes are not well dedicated to cover all protected areas within the network in a systematic approach. The ecological baseline survey is an important tool in developing the needed knowledge for better formulating conservation measures within these areas. This could be also linked with a GIS software to form proper database for biodiversity research within protected areas network.

2. Laws and legislations

A comprehensive review and assessment of current environmental and agricultural laws are urgently needed to update and resolve conservation issues. Revising and updating Palestinian Environmental Law (1999) to create a stronger law in line with the State of Palestine's obligations signed international treaties as well as other treaties which Palestine may potentially sign. For example, the current law lacks more detailed guidance on how the EQA should fulfill its obligations as stated mainly in Article 40 regarding the management of protected areas.

3. Ecological research

The State of Palestine is in need of scientific data covering all areas of protected areas and potential protected areas by using the best available data collection methods in all areas such as geography, geology, hydrology, fauna, and flora. Such data can also help identify biodiversity hotspots for conservation priorities (Myers et al., 2000). Based on ecological studies and results, there is a necessity to develop management plans that use ecosystem approaches and take areas like social, cultural and economics into consideration (Slocombe, 1993; Adams et al., 2004).

4. Agreed classification for the ecosystems and habitats

There is no vegetation types map for the State of Palestine in order to have proper planning and designing process for a protected areas network. The current available information about the different vegetation types is not sufficent and can only be used to conduct proper analysis for ecosystems representativeness, comprehensiveness and balance, and adequacy within the current protected areas network.

5. Targets for representation and adequacy of ecosystems and habitats

By looking Annex 1, the current figures and representation of ecosystems within the current network reflect the lack of agreed national targets in order to effectively contribute to Aichi biodiversity targets. All relevant stakeholders must formulate a set of targets for representation and adopt it within the current review process for network.

6. Protected areas selection and nomination process

There are no clear guidelines for protected area nomination process nor are there clear legal instructions. The current process is not well documented and seems to be ad hoc. In addition, the protected area selection criteria is non existent, and therefore makes the selection and nomination process non-systematic. It is vital to review the current international best practices to develop a set of criteria for site selection in the State of Palestine.

7. Coherent official document for the State of Palestine PAN

By reviewing all documents and literatures, there is no official document for protected areas network in the State of Palestine. This document should be developed to show the details

of all protected areas within the network and systematic selection process and can act a as national reference for all stakeholders.

8. Innovative approach to engage local communities in the development of a new PAs network for the State of Palestine

This project will develop a cohesive strategy that also support and encourages creativity, innovation, and sustainability strategies in nature conservation in general and protected areas in specific. This includes comprehensive public engagement to ensure communities understand, respect and benefit from the protection of their natural resources.

2.5.4 Design requirements

In order to build the network, based on the criteria agreed upon, the following steps must be considered and reviewed regularly for the identification, selection, declaration and management of PAs in the State of Palestine:

- Confirm existing and identify new critical areas for Palestine biodiversity including habitats, ecosystems, species, landscapes or local communities' practices, based on existing knowledge and revised as needed when new knowledge or threats are identified
- Evaluate the representativity of the network of sites and its coverage of all the biogeographic regions, species and ecosystems
- When possible, ensure that each critical area is replicated at the national or international level
- Guarantee that sites are connected, using management tools such as buffer zones and corridors
- As a first step, Consider, international targets in terms of areas (percentage of the national territory of 10% for terrestrial protected areas and go further if considered appropriate or essential for some species or sites).

3

Methodological approach for PAN review

3 Methodological approach for PAN review

3.1 Introduction

In the State of Palestine, EQA can learn from many existing systems for protected area management. Dozens of books, resources and examples are available. For instance, Natura 2000 is the largest coordinated network of protected areas in the world stretching over 18% of the EU's land area and more than 8% of its marine territory (Natura, 2000).

In regards to working on PAs, Groves et al. (2002) proposes to:

- Identify conservation targets: Take into account communities and ecosystems, abiotic targets, focal and keystone species, and imperiled and threatened or endangered species.
- Collect information and identify information gaps
- Establish conservation goals
- Assess existing conservation areas for their biodiversity values
- Evaluate the ability of conservation targets to persist
- Assemble a portfolio of conservation areas
- Identify priority conservation areas

Similarly, Davey (1998) proposed that the uses of a national system plan for protected areas should involve:

- Clarifying objectives
- Promoting achievement of objectives
- Identifying options and their implications; encouraging systematic evaluation of options
- Increasing understanding of issues
- Defining of future management issues
- Predicting and orienting future actions
- Identifying priorities for investment
- Coordinating a range of inputs
- Building and sustaining commitment
- Creating and maintaining partnerships
- Establishing a baseline for evaluating and monitoring future actions

Our objectives here are in line with the State of Palestine's 2022 NBSAP main objectives, which include:

- Objective A1: The integrity and connectivity of ecosystems are enhanced, with an increase of at least 15% cent in SP, supporting healthy and resilient populations of all species: the rate of extinction is reduced at least tenfold, the risk of species extinction across all taxonomic and functional groups is halved, and genetic diversity of wild and domesticated species is safeguarded, with at least 90% cent of genetic diversity within all species maintained.
- Objective A2: Reducing the six major threats in SP that affect biodiversity: climate change, hgabitat destruction, pollution, overexploitation, invasive alien species, Israeli colonization.
- Objective B1. Nature's contributions to people are valued, maintained or enhanced through conservation and sustainable use, supporting the global development agenda with a substantial increase in both monetary and non-monetary benefits shared equitably.
- Objective C1: Develop programmes for capacity building, knowledge generation, and knowledge dissemination (awareness).
- Objective D1: Bridging science-policy/procedure gaps
- Objective D2: Mobilise enough resources (financial and otherwise) to achieve the Mission.
- The new NBSAP lays out 17 targets under these objectives with attendant action plans (total 76, annex 1). Each action plan, created using SMART criteria, will deliver them, timelines, indicator potential funding sources, and notes on implementation). The layout of the NBSAP report follows recommended structure based on CBD guidelines. Section 1 of the introduction includes background, local and international treaties, analysis of causes and consequences of biodiversity loss, issues of ecosystem services, stakeholders, and issues of synergies. Section 2 engages in stocktaking that helped build the NBSAP and covers such areas as threats, local issues of nature's contribution to people, conservation (including area, species, habitats), mainstreaming, gender, research, capacity building, modernisation, risks, and disaster management, biosafety, sustainable production and consumption, management of species and ecosystems, and mobilising resources.

Most PAs in the State of Palestine lack an ecological baseline survey, which is an important tool in acuiring the needed knowledge for better formulating conservation measures within these areas. In addition, most lack management plans that use ecosystem approaches and take areas like social, cultural and economics into consideration. There are weak data on most Palestinian areas of potential conservation value therefore, it is important to develop a PAN that reflects the best available current data while being flexible enough for future research and discovery.

The results remove or confirm existing PAs and identify new critical areas for Palestine biodiversity including habitats, ecosystems, species, landscapes, or local communities' practices. The work is further based on the new NBSAP and expert local knowledge aquired from EQA, PIBS, etc., for gap analysis and include:

- Data gathering both desktop and fieldwork.
- Listing specific threats and ecological analysis to be considered and managed such as overgrazing and hunting.
- Expand areas when threatened species (flora or fauna) are nearby and need to be protected.
- Understand the priorities of each PA including management, public engagement would have been desirable however, will be minimal considering the time limitation.
- After selection, although not part of this work, proposed categorisation and management of PAs (e.g., see http://www.francoandreone.it/docs/EOLSS.PDF)..

3.2 Component of work completed for PAN validation

The following steps were taken during the PAN validation:

1. Validate the existing PA's network against the protected areas design criteria, identify which of the criteria apply on each proposed site, and advise on inclusion of each site as a protected area or as OECM's.
2. Validate the small protected areas with areas less than 1 km^2 against protected areas design criteria, and advise on the inclusion or exclusion of these sites within the PAN or as OECM's.
3. Validate the PA's that are adjacent to each other against the agreed PA design criteria and advice on merging these sites or keeping them separate.
4. Validate the sites that were identified by the Marxan analysis (Daigle et al., 2020) for inclusion within the PAN against the agreed PA design criteria considering accessibility and ease of management. For more information about the Marxan approach conducted in this assessment, see section 3.4.
5. Present the findings of the validation in the PA validation workshop, which was organised by the IUCN on 31 August 2022.

3.3 Methodology carried out to fulfill the above

The following are the methodological steps applied in the PAN design and assessment:

1. Desktop study and report cards: a desktop was performed building on previous work and used the listed references in the work. Species distribution data gathered locally from a number of sources focusing on endangered, threatened, vulnerable species data from IUCN Red Lists and Meiri et al., 2019, published research papers, GBIF and BIOGIS data, and field data including the PIBS internal database.

2. Collective Decision on PAN Design and Criteria document: These were developed taking into account international agreements and regulatory framework, the 6th National Report, and the 2022 NBSAP. Furthermore, some examples from other countries were examined (e.g. https://cnslibrary.com/wp-content/uploads/Scoring-system-for-ranking-of-Nominations-for-Terrestrial-rotection-Areas-NCL-section-9-draft.pdf).

3. The field work aimed to provide an updated status of the PAs based on the criteria. Notes were taken on including urban expansion and settlements nearby PAs. All PAs except Umm er Rihan and some Marxan proposed areas were visited in the period between March and August 2022 by biodiversity experts from PIBS and EQA. Twenty-two field trips were conducted for both components of this work. See Table in annex 3.

4. Key information on each area was gathered especially about threatened or endangered species (collected from field work, available internet data, publications, etc.). Data was collected on elements needed for scoring based on the criteria. Information was collated on suggested management of areas when these were not available including threats and opportunities. For example, buffer zones were considered but not necessarily added to the protected area itself (moderate protection etc. especially if on private lands). This is a utilitarian issue.

5. Apply the criteria to 50 designated protected areas plus eight potential new areas (seven identified from Marxan and one from new data). A report card was generated and summary score for each site based on the criteria developed in Point 1 in addition to a data sheet with the scores.

6. Set a cut-off value and exclude areas that do not reach that level.

7. Narrow down and evaluate the representativity of the remaining areas and then create a network of site. The coverage would include all the biogeographic regions, ecosystems and majority of endangered species.

8. Consolidated and adjusted borders as needed to ensure cohesion, representation, integrity, coverage and connectivity using management tools such as buffer zones and corridors (Cox & Underwood, 2011).

9. Legal and implementation issues were summarised.

10. The process involved many phone calls, individual consultations, and emails to arrive at the output indicated.

The assessment team also attended or organised workshops and meetings related to the work, involving various components: PIBS, CEPF, IUCN, and the EQA. See annexes 4 and 5.

The assessment team also took into consideration both vegetation zones, phytogeographical zones, and borders of the already designated Mediterranean area biodiversity hotspot. See figure 1 and 2.

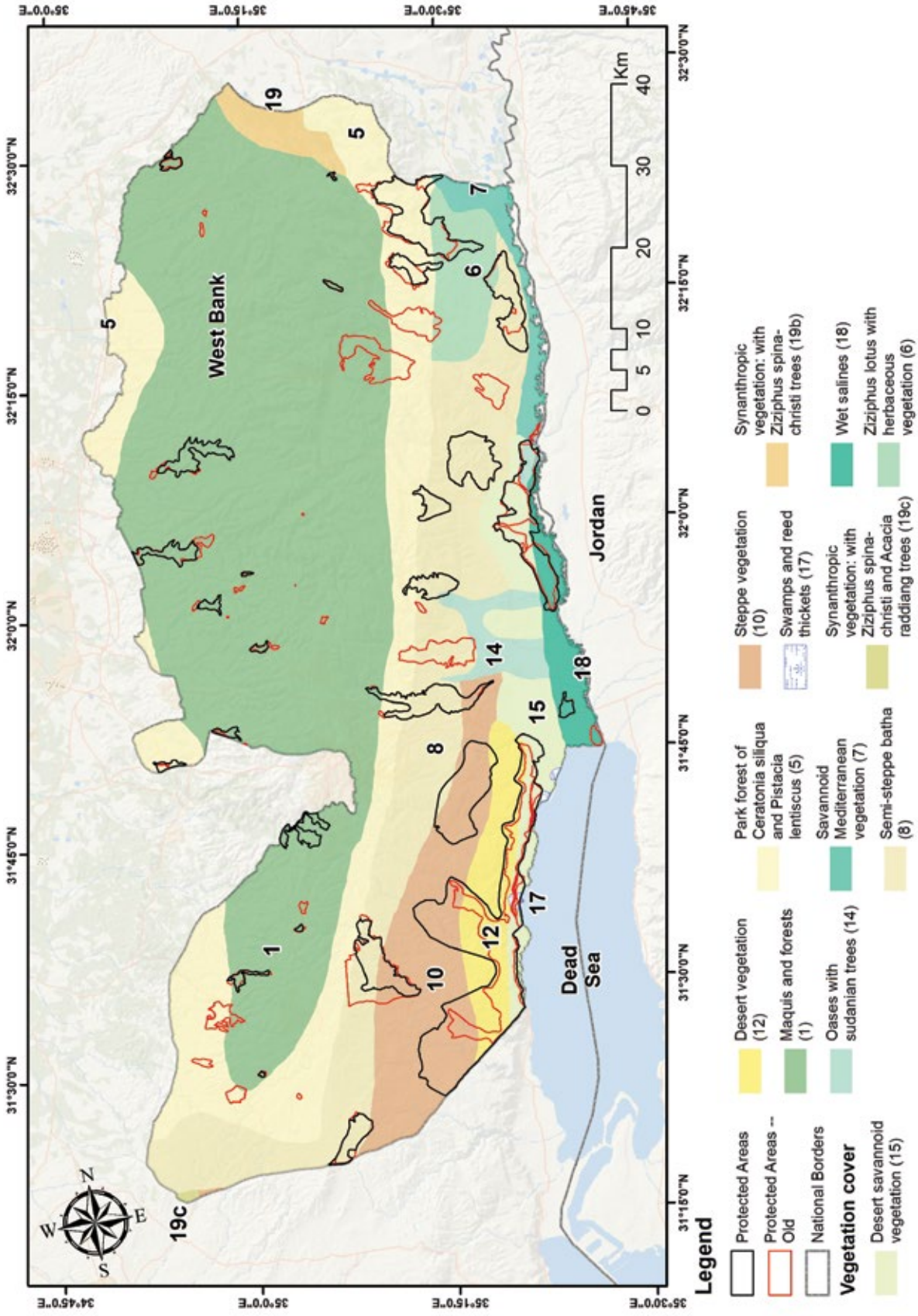
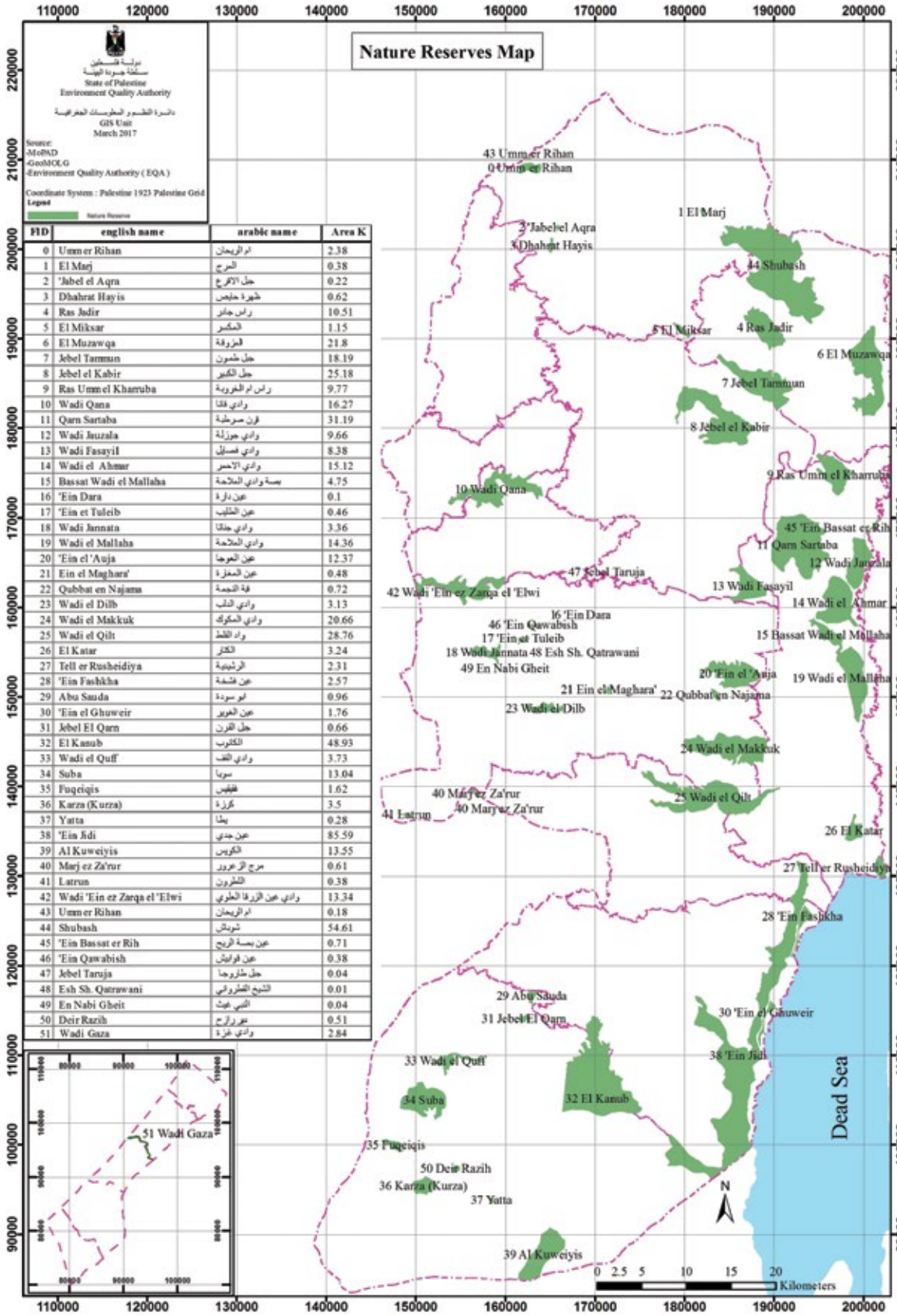


Figure 1: Map of the Palestinian Territories showing the protected areas and vegetation cover.



FID	english name	arabic name	Area K
0	Umm er Rihan	ام الريحان	2.38
1	El Marj	المرج	0.38
2	'Jabel el Aqra	جبل الاقرع	0.22
3	Dhahrat Hayis	ظهرة حايص	0.62
4	Ras Jadir	راس جادر	10.51
5	El Miksar	المكسر	1.15
6	El Muzawqa	المزوقة	21.8
7	Jebel Tamnun	جبل طمون	18.19
8	Jebel el Kabir	جبل الكبير	25.18
9	Ras Umm el Kharruba	راس ام الخروبة	9.77
10	Wadi Qana	وادي قانا	16.27
11	Qarn Sartaba	قرن سرطبة	31.19
12	Wadi Jauzala	وادي جوزلة	9.66
13	Wadi Fasayil	وادي فصايل	8.38
14	Wadi el Ahmar	وادي الاحمر	15.12
15	Bassat Wadi el Mallaha	بسة وادي الملاحة	4.75
16	'Ein Dara	عين دارة	0.1
17	'Ein et Tuleib	عين الطليب	0.46
18	Wadi Jannata	وادي جانا	3.36
19	Wadi el Mallaha	وادي الملاحة	14.36
20	'Ein el 'Auja	عين العوجا	12.37
21	Ein el Maghara'	عين المغارة	0.48
22	Qubbat en Najama	قبة النجمة	0.72
23	Wadi el Dilb	وادي الدلب	3.13
24	Wadi el Makkuk	وادي المكوك	20.66
25	Wadi el Qilt	واد القلط	28.76
26	El Katar	القطار	3.24
27	Tell er Rusheidiya	الرشيدية	2.31
28	'Ein Fashkha	عين فشخة	2.57
29	Abu Sauda	ابو سودة	0.96
30	'Ein el Ghuweir	عين الغوير	1.76
31	Jebel El Qarn	جبل القرن	0.66
32	El Kanub	الكانوب	48.93
33	Wadi el Quff	وادي القف	3.73
34	Suba	سوبا	13.04
35	Fuqeiqis	فقيقس	1.62
36	Karza (Kurza)	كرزة	3.5
37	Yatta	يطا	0.28
38	'Ein Jidi	عين جدي	85.59
39	Al Kuweiyis	الكويس	13.55
40	Marj ez Za'rur	مرج الزعرور	0.61
41	Latrun	اللطرون	0.38
42	Wadi 'Ein ez Zarqa el 'Elwi	وادي عين الزرقا العلوي	13.34
43	Umm er Rihan	ام الريحان	0.18
44	Shubash	شوباش	54.61
45	'Ein Bassat er Rih	عين بسة الريح	0.71
46	'Ein Qawabish	عين قوابيش	0.38
47	Jebel Taruja	جبل طاروجا	0.04
48	Esh Sh. Qatrawani	الشيخ القطروني	0.01
49	En Nabi Gheit	النبي غيث	0.04
50	Deir Razih	دير رازح	0.51
51	Wadi Gaza	وادي غزة	2.84

Figure 2: Extent of Mediterranean area biodiversity hotspot over laid over KBAs (BirdLife International, 2017).

3.4 Marxan analysis and GIS modeling

Systematic conservation planning was applied in this project using a combination of open source and non open-source software packages in the different stages of the gap assessment and PA scenarios development. ArcGIS software developed by the Environmental Systems and Research Institute (ESRI) was used to prepare the input layers and present modeling outputs. Marxan Systematic Conservation Planning Software, developed by the University of Queensland, Australia, was used to perform the conservation planning analysis (Ball & Possingham, 2000; Possingham et al. 2000). Marxan is the most widely used conservation planning software. It was designed to solve the minimum-set problem, where the goal is to achieve certain amounts of each biodiversity feature at the lowest cost (McDonnell et al. 2002). Marxan has several graphical user interfaces (GUI) and user-friendly plug-ins and toolboxes such as: ArcMarxan python toolbox (https://aproposinfosystems.com/en/solutions/arcgis-plugins/arcmarxan-toolbox/), Conservation land use zoning CLUZ for ArcView 3.x (https://anotherbobsmith.wordpress.com/software/cluz/), and Protected area tools PAT for ArcGIS (Game & Grantham, 2008).

Marxan works by comparing alternate solutions composed of a set of planning units by a mathematical function that assigns a value for each set of units. The value is assigned based on the cost of including the planning units in the PA network and penalties for not meeting conservation targets. Giving a value for each set of planning units, or options (solutions) for reserve networks will enable the automation of the selection of good PA networks. Marxan also allows the consideration of the fragmentation of the PA network by testing the boundary length of each alternative for the PA network. Marxan addresses these requirements by having defined targets for each identified conservation feature. These targets become design constraints and are tested against the cost of the design.

The methodology followed to apply Marxan conservation planning software consisted of the following steps:

1- **Preparation of planning units:** The official border map of Plaestine was obtained from the EQA. The area was divided into identical hexagon planning units, each with a size of 100 Hectares. The planning units were created using the extension (Repeat shapes for ArcGIS 10.x) from Jenness Enterprises (http://www.jennessent.com). Figure 3 shows a sample of the produced planning units PU's.

   The total number of resulting planning units, 5,913, were used as the basis of analysis and for assessing environmental risk, conservation value and identifying the PA design scenarios.

2- **Identifying the environmental risk surface (ERS):** One of the objectives of systematic conservation planning is to create an efficient PAN at the lowest possible cost. Environmental risk elements at a certain planning unit are used to indicate the cost of including this unit within a certain protected area design. The ERS is a modelled surface that represents the overlaps, intensities and weights of different risk elements. A risk element or "threat" is defined as any element identified by experts as having a negative impact on key ecosystems or species. The ERS is used to steer the selection process of conservation planning units away from conflicting land uses and high-risk areas. ERS's are therefore used to create cost surfaces for the Marxan analysis.

   ERS for this project was created using the "Protected Area Tools for ArcGIS" plug-in developed by the Nature Conservancy in 2008 (Shil and Raber, 2009). In order to produce a modelled risk surface, each risk element should be mapped individually, then all risk elements should be combined. A risk element could be represented by a point, line or polygon.

   Each risk element is then assigned the following values:

   - Intensity value: Estimated by experts based on the degree of risk of the corresponding risk element on key habitats or species. These values should be

normalized and the same scale should be used across all risk elemants; a normalised scale of either (0-1) or (0-100) could be used.

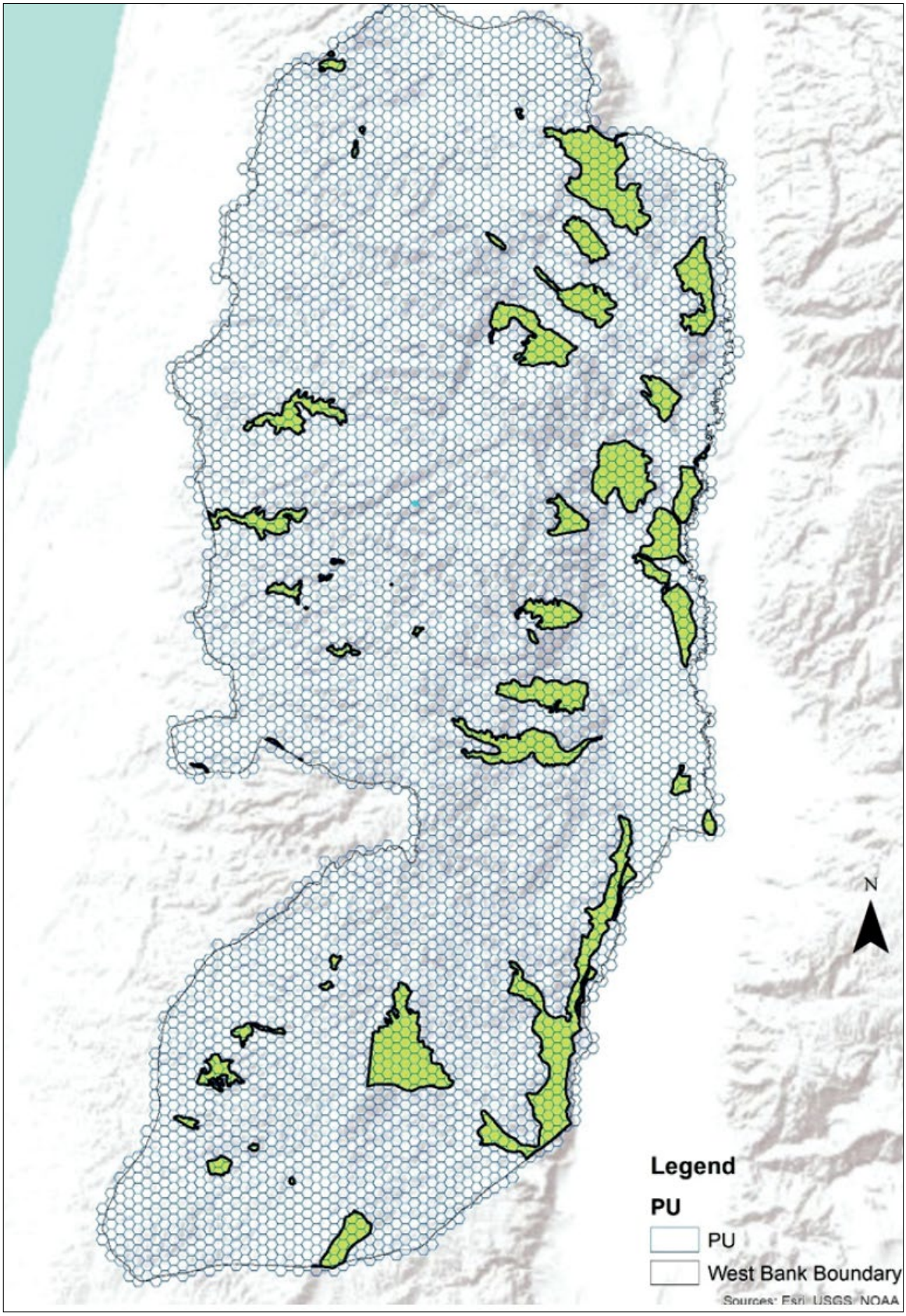


Figure 3: Planning Units (PU's)

- Influence distance: Corresponds to the spatial extent or footprint of the corresponding risk elemant. Represents the maximum distance within which the risk element has impact on biodiversity.
- Distance decay function: Dependent on the relationship between the risk element and the response of the ecosystem to the corresponding risk, different types of decay functions can be applied: linear, where the rate of intensity decay is linear until the maximum distance is reached and then it becomes zero, concave, which has a rapid intensity decrease initially, convex, which has a gradual intensity decay initially followed by a steep decay until the maximum distance is reached, and a constant decay that has no change in intensity until the maximum distance is reached. Table 3 below shows the layers that were used to create the ERS.

Table 3: Input layers for the ERS analysis

Risk alement	Geometry type	Intensity value	Influence distance (m)	Distance decay
Built up areas	Polygons	100	5,000	Concave
Municipal organisational boundaries (Master plan)	Polygons	100	5,000	Concave
Major roads	Lines	100	5,000	Convex
Minor roads	Lines	100	5,000	Convex
Negative land use types	Polygons	100	5,000	Concave
Construction sites	Points	100	5,000	Concave

3- **Relative biodiversity rareness index (RBI**): The RBI index calculation is complementary to the Marxan analysis. While Marxan analysis aims to identify the best solution for a PAN design problem, by having an efficient design that has representation of all targets, the Marxan solution might miss some planning units that have the highest remaining biodiversity elements. The RBI analysis is used to calculate the relative uniqueness or rareness of habitats across a study area and quantify the area weighted relative contribution of each planning unit compared to the total distribution of each conservation target using the following equation as stated in (Shil & Raber, 2009):

$$nRBI = \frac{RBI}{RAI}$$

where:

RBI = abundance (planning unit) / abundance (study area)

RAI = area (planning unit) / area (study area)

n = normalised

RBI can be calculated for different targets and summed for all targets representing an overall species rareness index. RBI can be calculated for biodiversity targets with different types of geometries like (points, lines and polygons).

The RBI module was applied using PAT for ArcGIS. The tool requires the identification of the analysis domain (study area or analysis extent), in addition to the input layers representing the distribution of biodiversity targets like the distributions of rare plants and animals as seen in Table 4. The module calculated the index based on the overlaps of these biodiversity targets in the different planning units, and by comparing the area covered by each biodiversity target in each planning unit compared to its distribution across the whole analysis extent.

Table 4: Layers used to create the RBI

Layer name	Geometry type	Source
Distribution of threatened plants NT, VU, EN, CR	Points	https://www.gbif.org/ Dr. Banan Al Sheikh
Distribution of threatened fauna and avifauna NT, VU, EN, CR	Points	https://www.gbif.org/
IBAs	Polygon	BirdLife International
KBAs	Polygon	KBA Database
Existing PA's	Polygon	EQA

4- Preparation and running of Marxan

The application of Marxan software to produce solutions for different scenarios for PAN includes several steps as follows:

Preparation of Marxan input files: Marxan uses a special file format with a specified structure, and has mandatory and optional files as shown in Table 5 below.

Table 5: Marxan input files and their default names (Shil and Raber, 2009)

	Input file	Default name	Required
1	Planning unit file	Pu.dat	Yes
2	Input parameter file	Input.dat	Yes
3	Conservation feature file	Spec.dat	Yes
4	Planning unit versus conservation feature file	Puvspr.dat	Yes
5	Boundary length file	Bound.dat	No

Below is a description of each input file as described in (Game & Grantham, 2008):

- **The planning unit file** was described at the beginning of chapter 3 as it was used for the ERS and RBI modules. It is a mandatory file for running Marxan and should have one obligatory field which is the "ID" of each planning unit. Other fields, which are optional are the "Status" and "Cost" fields. The "Status" field has four options to direct Marxan software on how to deal with each planning unit according to 4 possible values; "0" means that the planning unit is available to be included in the Marxan solution for a protected area network, "1" means that the planning unit will be included in the initial solution for the PA network but may not be included in the final PA system, "2" means that this planning unit is already a protected area so it can be locked for inclusion in all Marxan solutions, "3" means that this planning unit is not available for inclusion in any Marxan solution and will be locked out of all solutions. The "cost" field indicates the cost of including the planning unit in any Marxan solution for the PA network. It could be the actual cost of the land, or alternatively the area or ERS surface that could be used to indicate the cost of the planning unit. In this research, the ERS was used to calculate the cost value as described earlier. "Zonal statistics as table" from the ArcGIS Spatial Analyst extension was used to calculate the ERS mean within each planning unit. The planning unit shapefile was then joined to the resulting ERS mean statistics to calculate the cost per planning unit.

- **The input parameter file:** The input parameter file "input.dat" is the file that specifies how Marxan will run the analysis. It tells the software where to find input files, and where to store the output files. It specifies the algorithm to be used, number of iterations, Boundary length modifiers, in addition to other technical parameters related to the programme. For this research, the input.dat was created using ArcMarxan toolbox, and the default parameters were changed for number of iterations to be 1,000 iterations, and the Boundary length modifier (BLM) was changed to "5", to give preference for minimizing the overall boundary length of the PA system and to produce a less fragmented PA system.

- **The conservation feature file:** The default name for this file is spec.dat. It includes important information on the conservation features that the PA network solution is aiming to conserve. Each conservation feature should have a unique "ID" field, in addition to a field called "prop", which can be used to identify the target percentage for each conservation feature within the resulting PA network solution. Another optional field is the species penalty factor "spf", which indicates the importance of including each conservation feature in the final PA network solution and the penalty for not meeting the target for each conservation feature, where the higher the "spf" the more important is to have sufficient representation of this conservation feature within the final PA network solution. The target proportion of percentage for each conservation feature was changed depending on the different analysis scenarios.

- **Planning unit versus conservation feature file:** This file contains information on the distribution of conservation features across the planning units, and it has the default name "puvspr.dat". This file contains the "ID" for the conservation feature, the planning unit "ID", and the "amount" field, which indicates the amount of each conservation feature within each planning unit. This was calculated using tabulate areas tool from ArcGIS Spatial analyst extension, and the shapefile was converted to the "~ .dat" file using ArcMarxan toolbox.

- **The Boundary length file:** This file contains information on the effective length of shared boundaries between planning units. Default name is "bound.dat". This file can be used to calculate the boundary length modifier which enhances the compactness of the PA network design and reduces fragmentation.

- **Marxan Input Data Sources:** Marxan input files were prepared and processed using ArcGIS 10.8.1. Three types of datasets were required to produce input files for the PAN sections: a. datasets to prepare conservation features (conservation targets), and these included: the vegetation types map, the distribution of key threatened plant and animal species (obtained from the IUCN Red list), representing the data used to prepare the RBI, b. datasets representing the cost of achieving conservation targets, and these include layers representing the limitations for conservation and enviornmnetal risk variables like; distribution of settlements and urban areas, distribution of development projects, major roads, and land use types that could highly contradict with the establishment of PA like intensive agricultural activities; these include the data used to prepare the ERS as described above; and c. datasets representing types of existing designations, like established and proposed PA, boundaries of existing KBAs, and boundaries of IBA, etc.

- **Application of the PA scenarios**: The following different scenarios were applied to produce a proposal for the PAN for the State of Palestine:

  Scenario 1: This scenario aimed to conserve 5% of each vegetation type according to the vegetation basemap that was selected in addition to 5% of the extent of occurrence of threatened animals and plants. This representation target represents the minimum percentage.

  Scenario 2: This scenario aimed to conserve 10% of each vegetation type according to the vegetation basemap that was selected in addition to 10% of the extent of occurrence of threatened animals and plants.

  Scenario 3: This scenario aimed to conserve 17% of each vegetation type according to the vegetation basemap that was selected in addition to 20% of the extent of occurrence of threatened animals and plants.

  Scenario 4: This scenario aimed to conserve 30% of each vegetation type according to the vegetation basemap that was selected in addition to 20% of the extent of occurrence of threatened animals and plants, with a condition of having the current existing PAN locked in the analysis, meaning that the resulting scenarios does not exclude existing PA from the proposal.

  These four scenarios with different representation targets were produced to identify planning units that were selected as priority for inclusion in the PAN in each of the scenarios, also the first three scenraios were used to highlight existing PA that were not selected as priority in any of the scenarios. The ensemble of all four planning scenarios were the basis for revising the PAN for the State of Palestine. The Marxan proposals were validated in the field before finalizing the PA network proposal.

4

Sulieman

Protected Areas Network review results

4 Protected Areas Network review results

4.1 Criteria and design parameters

4.1.1 PAN principles for the State of Palestine

The following are the adopted principles for PAN design as agreed with EQA team:

- Represents all different vegetation types.
- In aggregate include >10% of plant species and 10% of animal species.
- Should limit environmental degradation and deal with threats.
- Assert local sovereignty.
- Address needs of society and land use ownership protected (ecosystem services).
- Consider ecosystems and corridors.
- Set stage for needed research.
- Consider buffer zones.
- Consider management effectiveness at local and national level.
- Maximise effectiveness by use of micro-reserves like Jinsafut/Uskar Pond.
- Include other effective area conservation measures (OECMs).
- Be part of a master management plan for all PA (integration effectiveness).
- When delineating borders, human development was considered areas (roads, agricultural lands, master plans) and if the border is in a natural area, the assessment team considered topography and species/habitat needs (e.g., the assessment team did not assign new borders in the middle of valleys).

4.1.2 Criteria and measures applied to each protected area

Highest score: 53, Lower score: 15: https://forms.gle/UMMFuDaz1Ksa4qKHA

1. The best representation of quality of vegetation type and coverage: Relative to similar vegetation zones/phytogeographical regions.
    - 3: Good plant cover types represented (quality and coverage)
    - 2: Average
    - 1: Low or Poor vegetation quality and coverage.

2. Biodiversity (given higher values because protected areas are focused on nature conservation) (see Humphries et al., 1995; Coetzee et al., 2014)

2.1 Richness in biodiversity (expert evaluation based on existing data)

- 3: Rich
- 2: Average
- 1: Below average or Poor

2.2 Flora species of importance (endemic, rare or endangered species)

- 5: >10 species
- 4: 5-10 species
- 3: 2-4 species

- 2: 1 species
- 1: None

2.3 Vertebrate fauna species of importance (rare or endangered species):

- 5: >10 species
- 4: 5-10 species
- 3: 2-4 species
- 2: 1 species
- 1: None

3. Wilderness/wildness values: Does the area contain the following characteristics e.g., remoteness, few or no people, an absence of human-made objects, traces, sounds and smells, untravelled or infrequently visited terrain that is particularly unique or representative components of the PA, including perceived naturalness of land cover, absence of modern human artifacts, rugged and challenging nature of the terrain, and remoteness (Cookson, 2011)
   - 3: High wilderness value
   - 2: Medium /average value
   - 1: Low wilderness value

4. Historic values: does the area contain features or objects that represent experiences, achievements, places or records that are important, significant or unusual in the course of human events and activity in the PA?
   - 3: Yes (e.g., near the Dead Sea area)
   - 2: Medium (e.g., W Zarqa Ulwi)
   - 1: No (e.g., Wadi Quff)

5. Aesthetic values: Does the area contain features or attributes e.g., beauty, inspirational qualities, scenic attraction and appeal that contribute to people's appreciation and sense or perception of an area? Intrinsic appeal/landscape value/s?
   - 3 Yes (e.g., near Dead Sea area)
   - 2 Medium (e.g., Wadi Quff)
   - 1 No/minimal (e.g. Jabal Tamun)

6. Existing designations and international relevance: IBA, IPA, KBA, Ramsar?
   - 3: Yes - two or more criteria
   - 2: one criterion
   - 1: None

7. Governance and Management authority to design management objectives and authority to implement these objectives.
   - 3: Yes
   - 2: Medium
   - 1: No

8. Accessibility/logistics: Is the area sufficiently accessible for management operations? Might the logistics needed negatively impact management objectives and are there alternative management options? Would inaccessibility help achieve management objectives by deterring potentially impacting activity?
   - 3: Can protect fully or partially
   - 2: Protection marginally feasible
   - 1: Protection extremely difficult (Area C behind the wall, a military zone)

9. Ecosystem services: Sites which could be developed for eco-tourism can raise income for their protection, provide jobs for local people and raise visitors' awareness of conservation. Is there an appropriate balance between the costs and benefits of protecting the area, and appropriate equity in the distribution of it and adjacent protected and unprotected areas? (See Puzyreva et al., 2022)

    - 5: Very high potential (at least two different areas are in favour of ecotourism and agricultural tourism)
    - 4: High potential
    - 3: Possible development
    - 2: Limited potential
    - 1: No potential

10. Free from threats:: To what extent has the area been free from threats? [Does the area lack signs of human activities (e.g., tracks, litters)? The five main threats are climate change, habitat destruction, pollution, overexploitation, invasive species, and the sixth local threat Israeli colonialism.

    - 5: Four of the main threats or more
    - 4: Three threats
    - 3: Two threats
    - 2: One threat
    - 1: No or minimal impact threats

11. Conservation vulnerability: Is there minimal loss of native species or lack of invasive alien species? To what extent is it or can it be actually protected? How vulnerable is it to human activities?

    - 3: Vulnerable
    - 2: Medium vulnerability
    - 1: Not vulnerable

12. Buffer zones: What is the degree of protection and value of the adjacent landscape and is it possible to enhance protection via buffer zones?

    - 3: High value buffer zones
    - 2: Medium value buffer zones
    - 1: Low or no value buffer zones

13. Land ownership: Accommodating land ownership for sustainable management.

    - 3: All govt land
    - 2: Mixed
    - 1: >90% Private land

4.2 Marxan scenarios and areas targeted in PAN review

This section lists the findings of the GIS analysis and modeling results covering the following:

- **Identifying the environmental risk surface (ERS)**

The resulting environmental risk surface values ranged between 0-502,, with 0 representing the lowest overall environmental risk and 502 representing the highest environmental risk. Figures 4 and 5 show that most existing protected areas are located within areas that have below-average total ERS values which indicates minimum conflict between existing PAs and environmental risk elements.

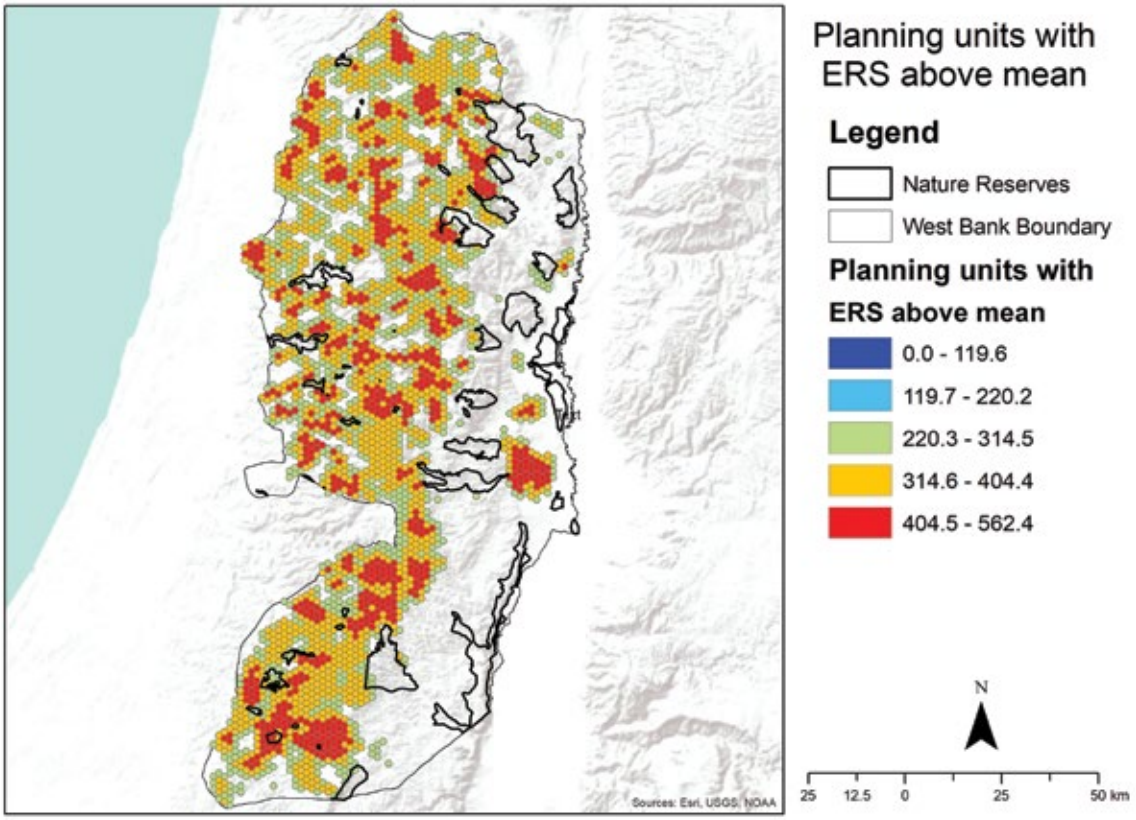


Figure 4: Areas with ERS above average

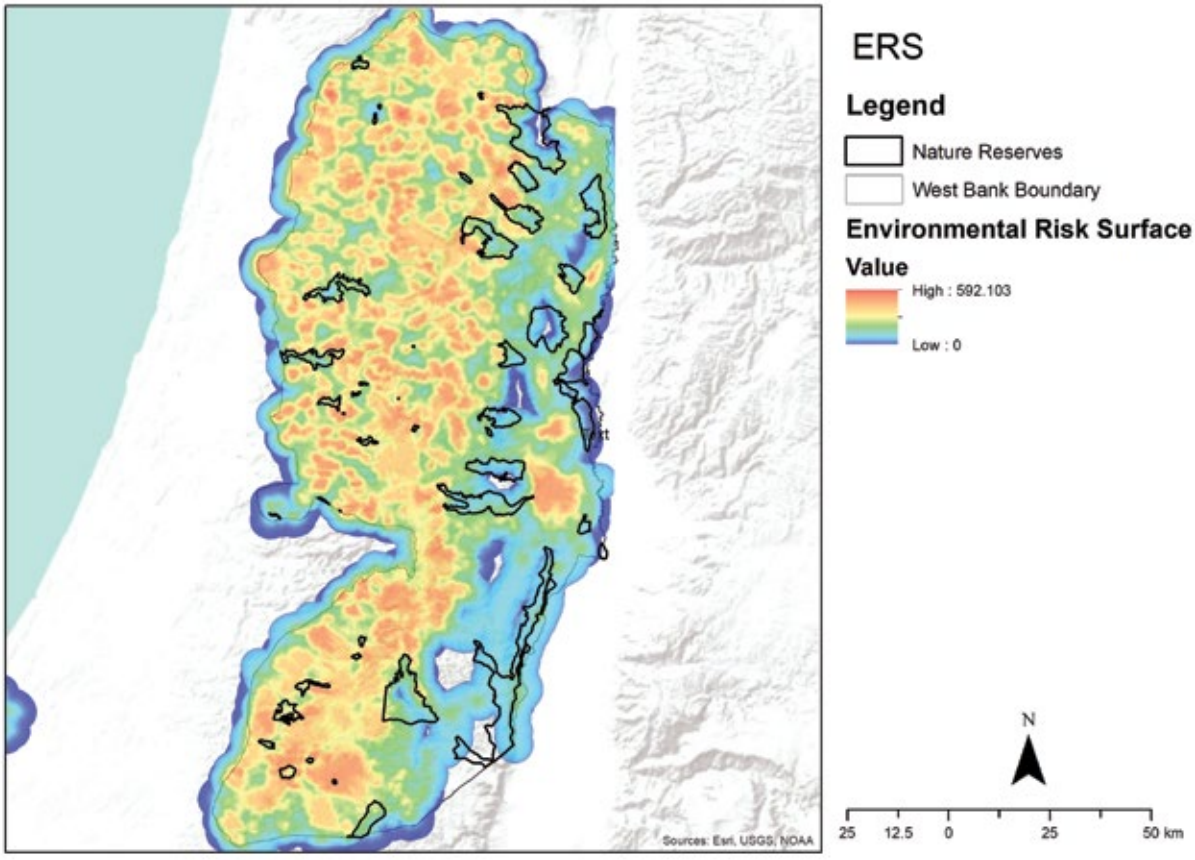


Figure 5: ERS analysis results

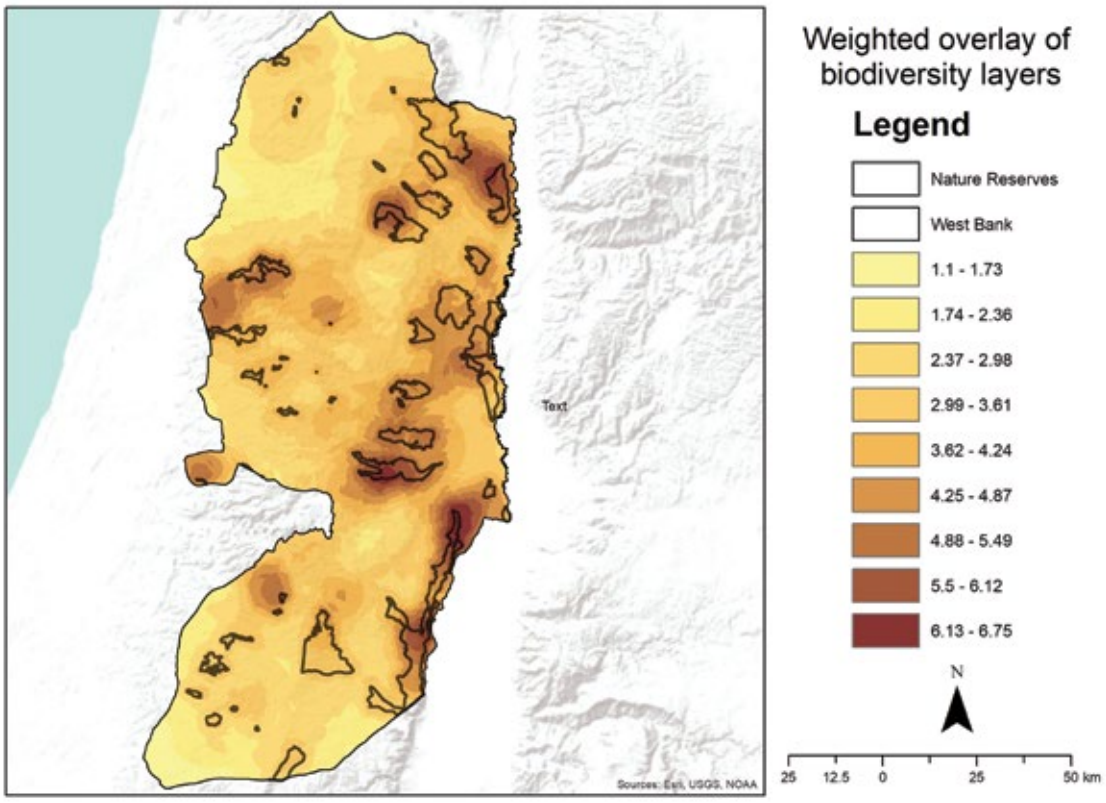


Figure 6: RBI analysis results

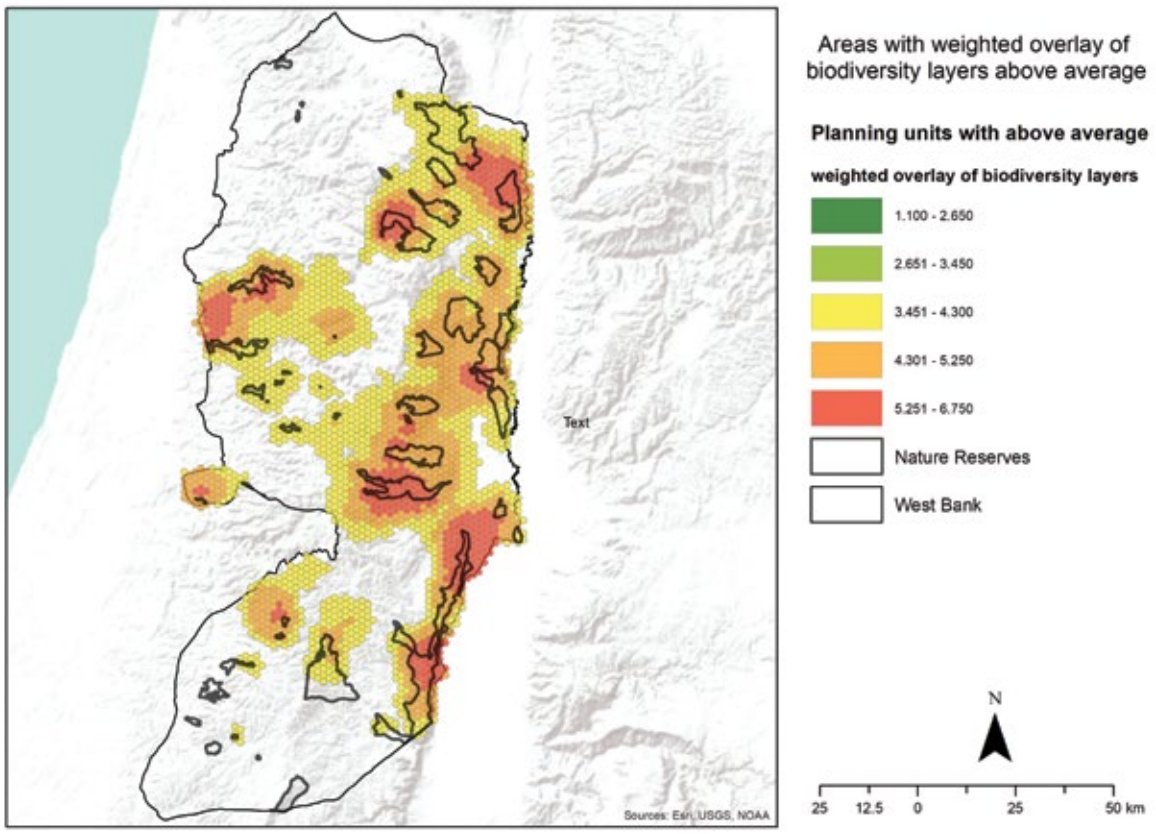


Figure 7: Areas with above average RBI values

- **Relative biodiversity rareness index (RBI):** The resulting RBI values ranged from 1.1- 6.75, with 1.1 indicating relative low RBI values and 6.75 indicating clustering of high biodiversity values. Figures 6 and 7 show that many of the existing PA are located within areas that have below average RBI values which is unexpected within PA, unless it is due to lack of biodiversity data that does not reflect the true relative biodiversity of a site. This was further addressed within the field validation of the PAs network.

- **Marxan scenarios for the PAN:**
  Each of the four Marxan scenarios resulted in a proposal to include planning units within the PAN that achieves the conservation targets set for each scenario. Figure 8 shows the results of each of the planning scenarios highlighting planning units that have been proposed for inclusion in each scenario. The ensemble of the four different scenarios was considered as the basis for the collective PAN review proposal. Overlay analysis of the solutions of each of the Marxan scenarios highlighted areas that were proposed for inclusion in the PAN in each of the scenarios. The analysis also identified existing PA that had not been identified in any of the solutions for the PA scenarios. Figure 8 and 9 show the common areas that were selected in each of the four Marxan PA network planning scenarios.

- **Field validation of the Marxan results:** As a basis for field validation and for finalizing the revised PAN, the following areas were validated:
- Areas that were selected in each Marxan scenario
- Existing PAs that were not selected in any of the PA scenarios (except scenario 4 as it has current PAs locked in the model)
- PAs that are adjancent to each other with no clear reason for separation;. validation was necessary to determine if there are practical reasons or field observations to support the decision of keeping adjacent PAs separate.
- PA that are small in size, less than 1 sq km, to validate these sites against the PAN design criteria and provide recommendations regarding their status.

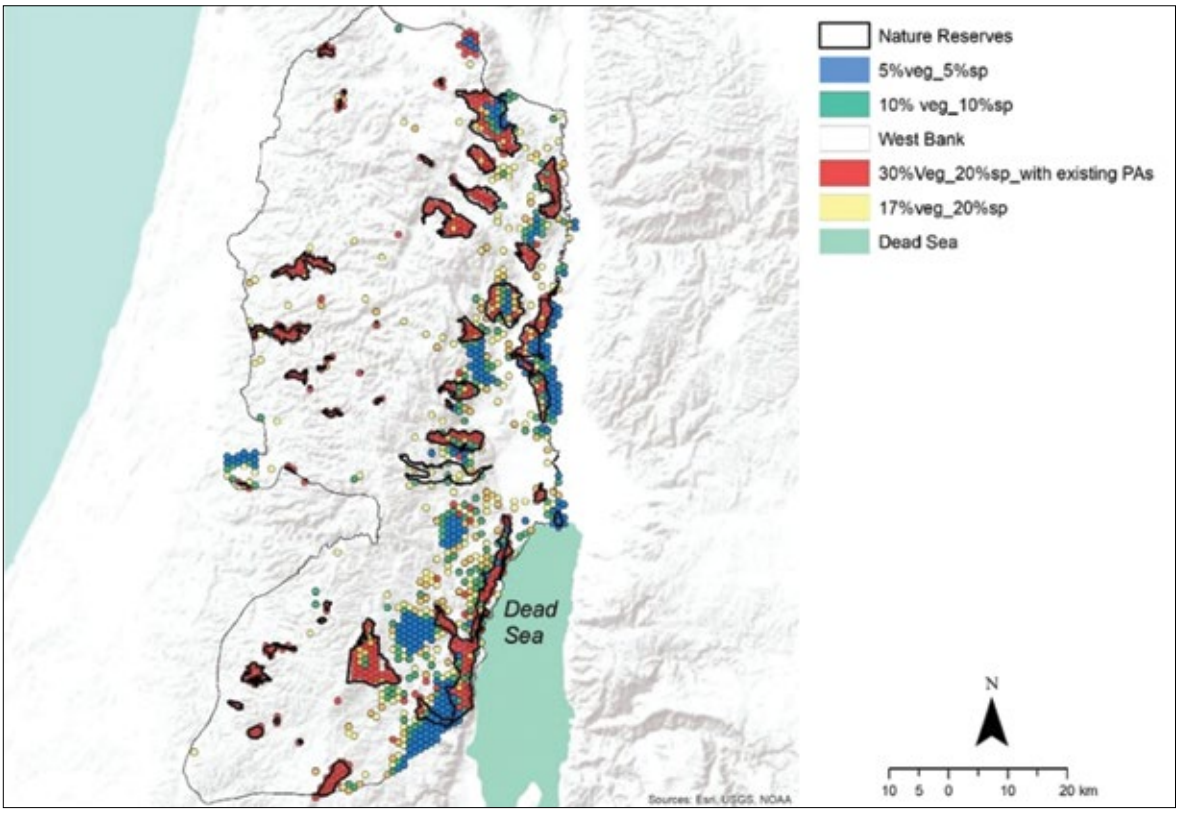


Figure 8: Solutions for the 4 Marxan scenarios

The University of Bethlehem along with the Environment Quality Authority led the field validation process and prepared score cards for each site as described in section 4.3, as a basis for finalising the revised PAN.

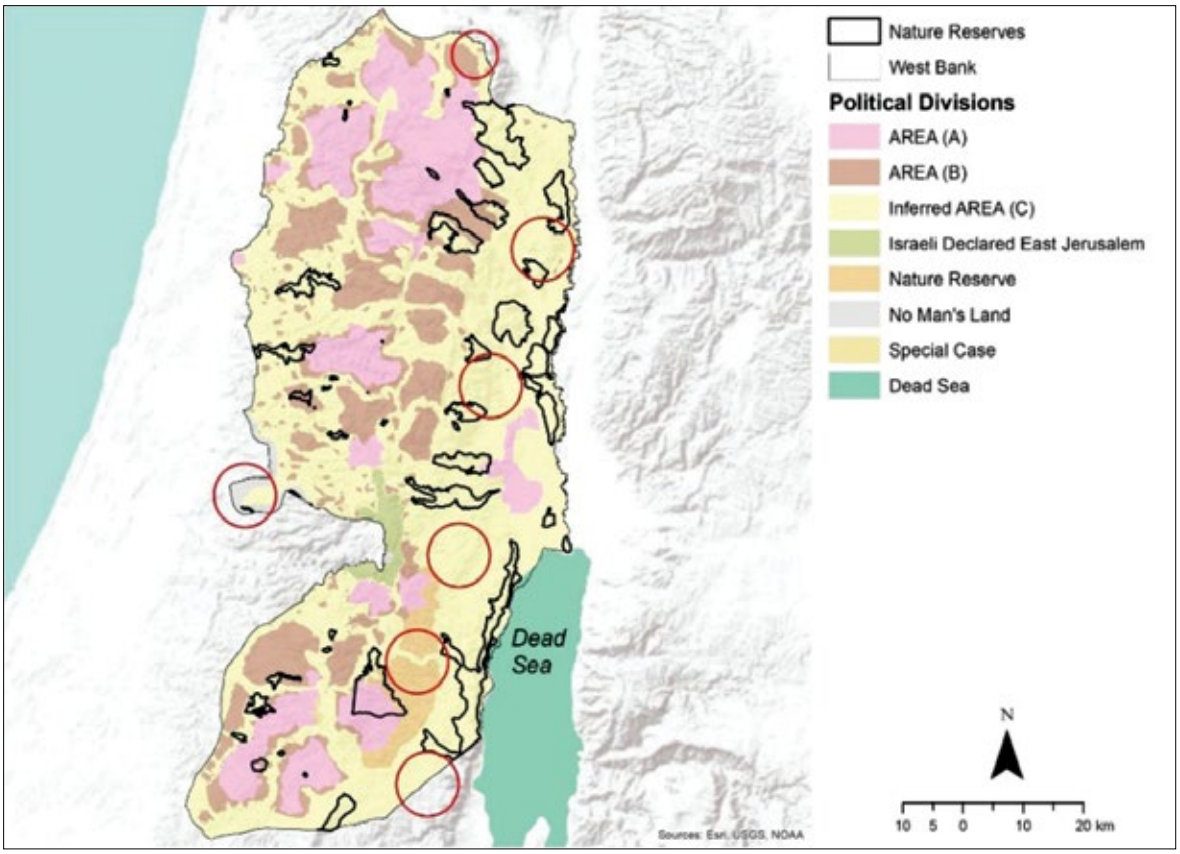


Figure 9: Common areas selected based on Marxan analysis

4.3 Report cards and scoring

The assessment includes 50 nature, reserves, 7 additional areas identified by Marxan analysis, as well as the southern Jerusalem area consisting of Wadis Al Makhrour, Husun, and Cremisan. They were all identified due to intensive study of a total of 58 areas, see figure 10.. The Marxan analysis was done via work by IUCN (Natalia Boulad) and based on the existing data. Thus, while useful, more work could potentially identify other areas through a revised Marxan analysis. As noted by AlHirsh et al. (2016) based on expert evaluations, there is a significant lack of original data including threats for many of the issues facing PAs.. The evaluation and scoring of the areas were carried out after collecting all relevant available data (from literature, reports, older notes taken by experts) and team visiting the areas, analysis and scoring was done collectively by consensus and involved representatives of the EQA and PIBS as well as external experts as needed. When information was lacking on any particular category, it was scored as average to avoid biasing data.

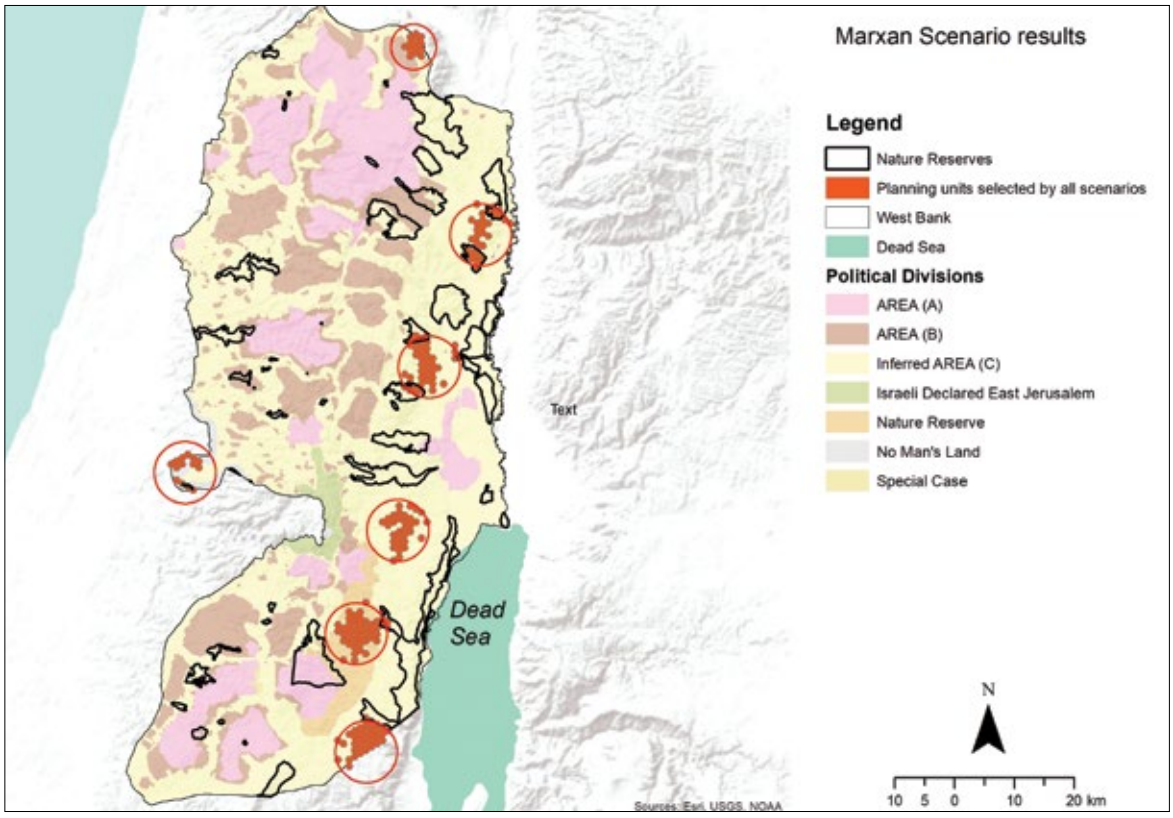


Figure 10: The Marxan scenario for protected areas in the the State of Palestine.

After application of the criteria to 50 designated protected areas plus eight potential new areas of which seven were identified from Marxan and one from new data, a report card was generated for each site and a summarized score based on the criteria developed[1], see Table 6 for summary evaluation score for each site.

1 Evaluation form for protected areas is in this Link
Results of evaluation is shown in this file
https://docs.google.com/spreadsheets/d/1NukhgEdDnatT0A8y_bTf2hxP5TSoJrUY3iX2yA46DLY/edit?usp=share_link

Table 6: Evaluation scores for the protected areas and Marxan identified areas.

Protected area	Total score (without threats)
Wadi al Qilt	44
‘Ein Jidi	44
‘Ein al Auja	43
‘Ein Fashkha	43
Wadi Jannata	42
‘Ein al Ghuweir	42
Marxan 3 (Mar Saba)	42
El Miksar	41
Wadi Ein ez Zarqa el Elwi	41
Southern Jerusalem Hills (Al Arqoub)	41
Deir Razih	40
Wadi al Quff	40
Al Muzawqa	40
Al Katar	40
Wadi Fasayil	40
Al Kanub	40
Jabal al Qarn	39
Umm er Rihan	39
Wadi al Mallaha	39
Marj ez Za’rur	38
Latrun	37
Wadi Jauzala	37
Shubash	37
Ras Jadir	36
El Marj	36
‘Ain Qawabish	36
Wadi al Ahmar	36
Bassat Wadi al Mallaha	36

Protected area	Total score (without threats)
Al Kuweiyis	36
Marxan 1 (Khashm Al Daraj)	36
Wadi Qana	35
Marxan 5 (Marj Na'je)	34
Wadi al Dilb	33
Qarn Sartaba	33
Wadi Gaza	33
Marxan 2 (Al Rashaydah)	31
Jabal Tammun	30
Esh Sh. Qatrawani	30
'Ein Bassat er Rih	28
Marxan 4 (Almughayir)	28
Ein al Maghara'	27
Marxan 6 (Faqqua)	27
'Ein et Tuleib	26
En Nabi Ghait	25
Qubbat en Najama	25
Wadi al Makkuk	25
Ras Umm al Kharruba	24
Jabal al Kabir	24
Jabal Taruja	24
Suba	23
Tell er Rusheidiya	22
Dhahrat Hayis	21
Abu Sauda	21
Karza (Kurza)	20
'Jabel al Aqra	19
Fuqeiqis	18
Marxan 7 (Latrun 2)	18
Yatta	17

4.4 A new Protected Area Network

The evaluation was completed for 50 existing (delineated though not necessarily actually protected) PAs, plus 7 areas identified from the Marxan analysis plus one area, Al Arqoub in the Southern Jerusalem hills, which had not been identified before, however now has sufficient data to be evaluated and added. Because of tabulations of the scores, the maximum score was 48/53 and minimum 21/53. The assessment team set a cut off value of 30, and all areas receiving a score of 30 or below were excluded, and thus 22 areas were eliminated from 57 areas (58 with Wadi Gaza). As can be seen from figure 11, this cut off value was deemed most logical as there was a clear break in line both with threats included (blue line) and without threats (red line). For more information about the eliminated areas, see annex 2.

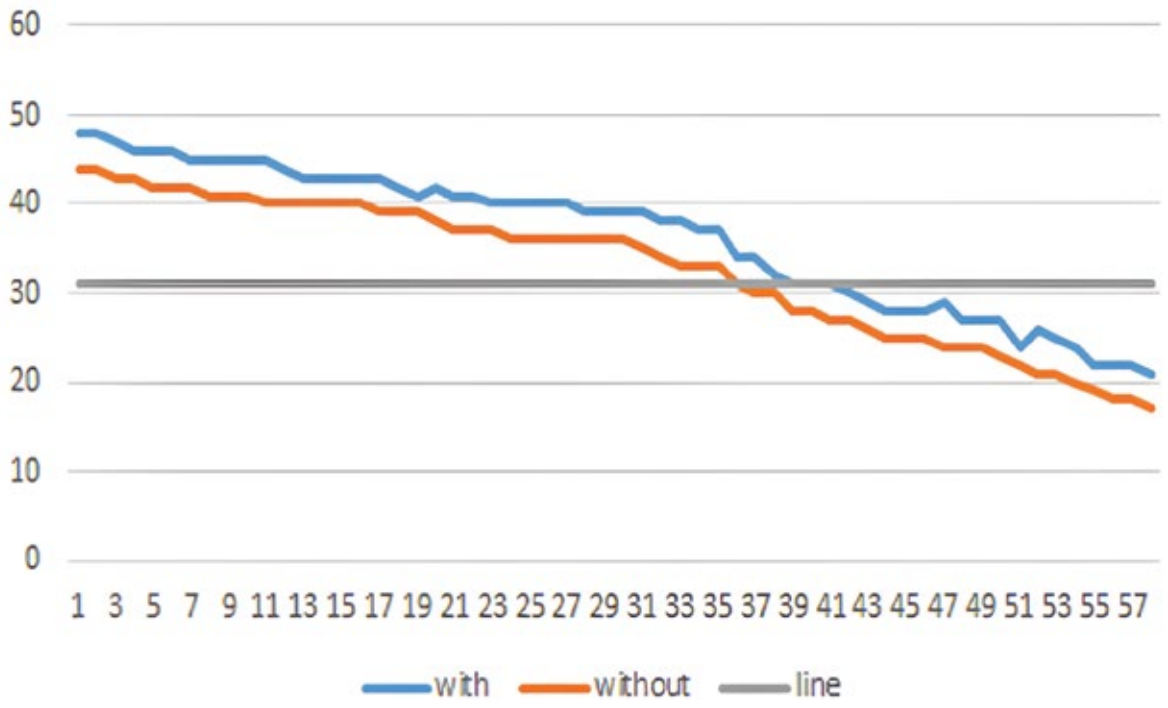


Figure 11: Distribution of scores for the 58 areas with threat component included or excluded and the cutoff line of 31 for score without threats

The other 35 areas (36 with Wadi Gaza) were then revisited for potential mergers. Following mergers in eight regions, the final list of areas on the protect becomes 27 (28 with Wadi Gaza). Small adjustments in borders were made to reflect on the ground evaluation (e.g., human development, following topographical features, species specific needs). These 27 proposed Pas include a total land mass of 616 km^2, which is 11% of the landmass of the Palestinian areas. They also cover all ecosystems, habitats, and phytogeographical regions. 19 of the original Pas and 3 of the Marxan identified areaswhich totalled 22 areas, scored 30 or less via the identified criteria and were therefore eliminated from further consideration. After taking the 36 areas with high scores, the assessment team looked at proximity and current maps and decided to consolidate areas and to also change borders of some areas accordingly. **The assessment results identified a final 27 Pas (28 including Wadi Gaza) aiming to cover the representation of at least 10% of all vegetation cover types in the West Bank. See table 7. The old network is shown in Figure 12 and the new PAN is shown in Figure 13. In addition, the vegetation cover type size is calculated within the new PAN, as shown in Table 7.**

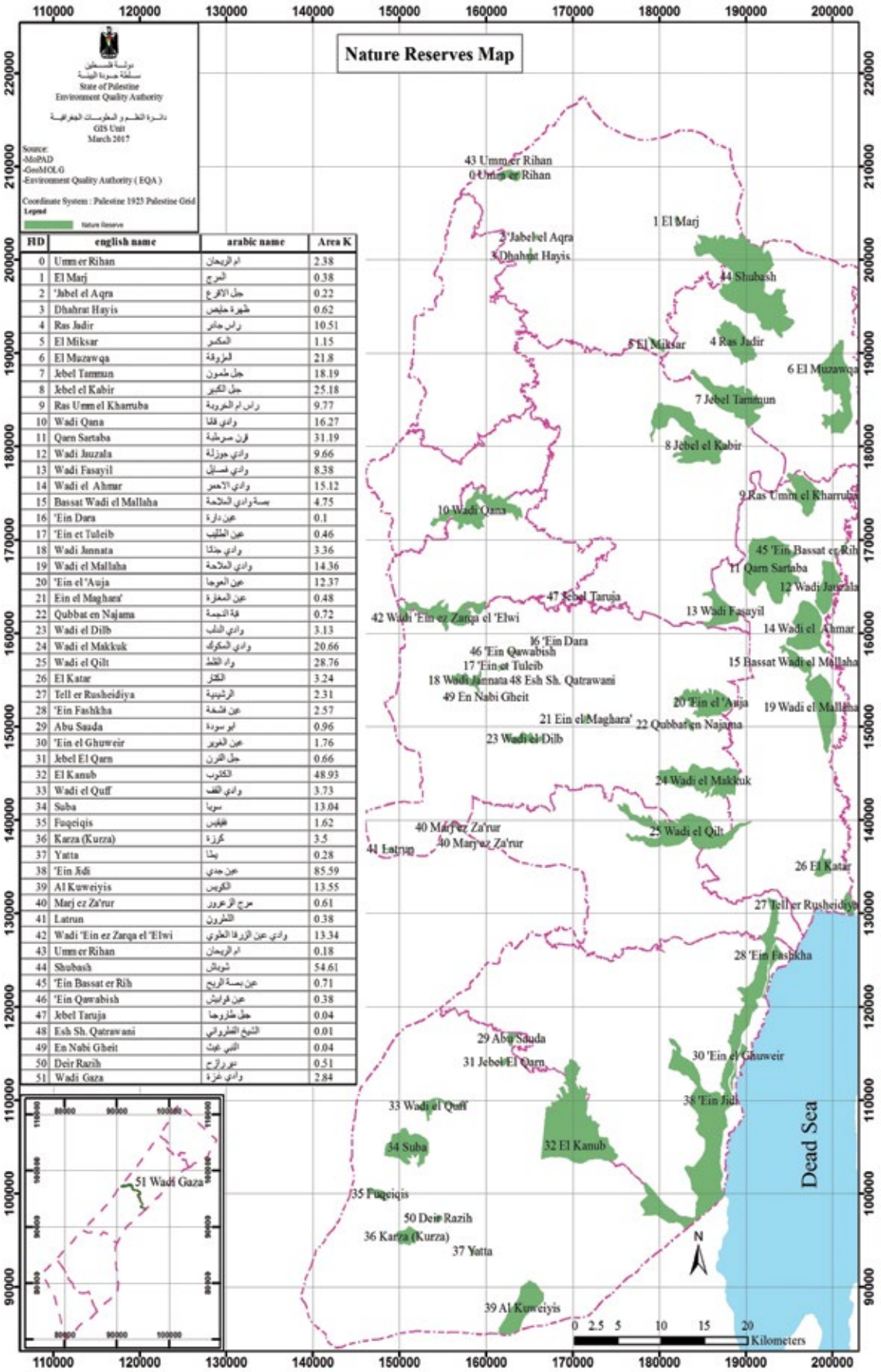


Figure 12: The old PAN

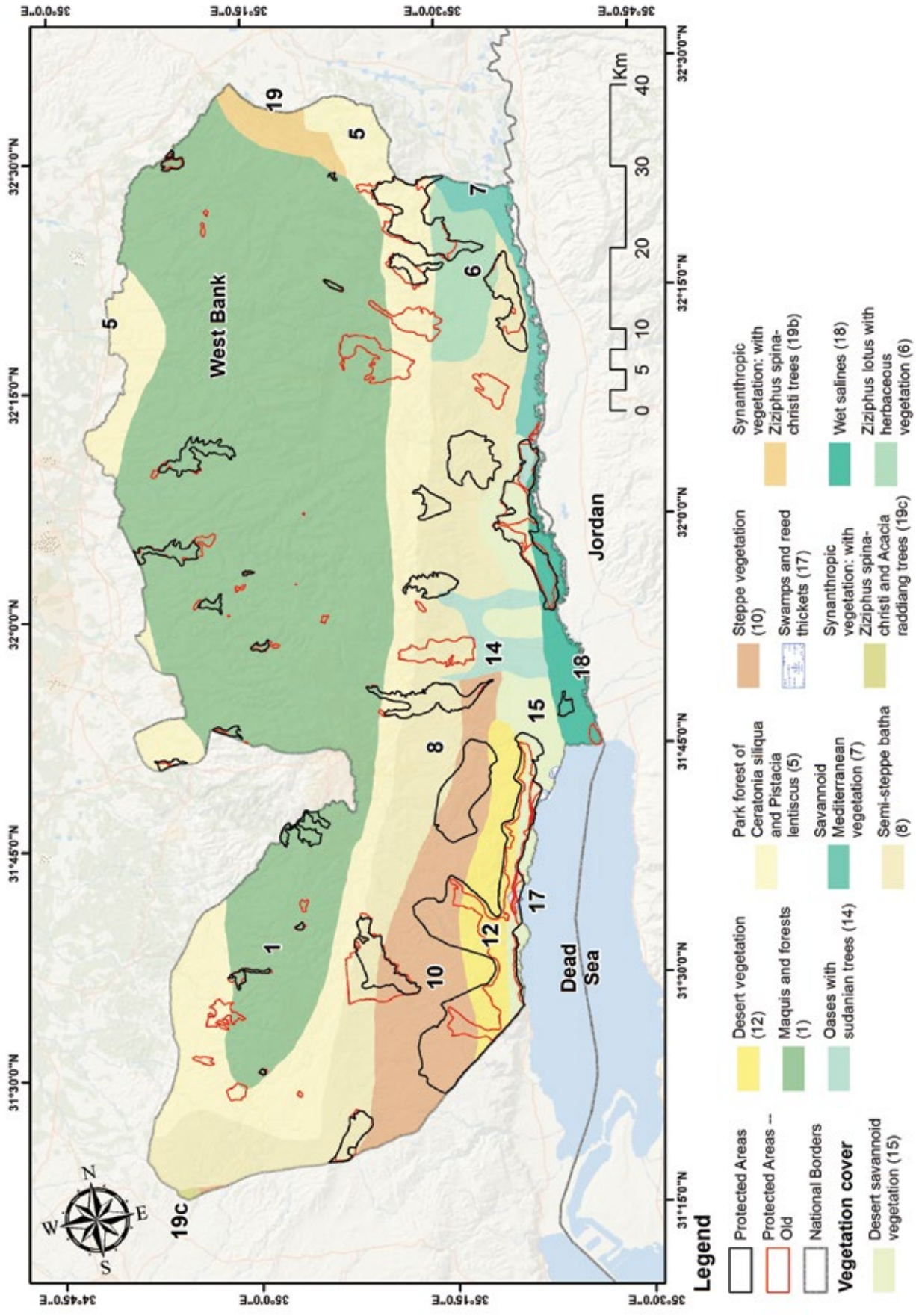


Figure 13: View of the new proposed network. Here and elsewhere, the new borders or areas are in red, and the old ones are in black.

Table 7: List of the new PAN.

Protected Areas		Area (km²)	Governorate/s	IUCN category	Other notes
The Dead Sea	البحر الميت	235.08	Jericho Jerusalem Bethlehem Hebron	IV	Most important area and of potential designation under IUCN ecosystem red listed as endangered
Ein al Auja	عين العوجا	12.37	Ramallah Al Bireh	II	Unchanged borders
Jerusalem Wilderness area	برية القدس	52.84	Jerusalem Bethlehem Jericho	Ib	Newly designated PA
Wadi al Qilt	وادي القلط	28.64	Jericho Jerusalem Ramallah Al Bireh	IV	Very small adjustments in borders on western side
Al Aghwar (Jordan Valley)	الأغوار	54.52	Jericho	II	Combining four previously adjacent areas
Wadi Fasayil	وادي فصايل	8.38	Jericho, Nablus	II	Unchanged borders
Al Kanub	الكانوب	29.02	Hebron	IV	Significant adjustments of borders
Al Muzawqa	المزوقة	28.33	Tubas	IV	Border adjustments
Al Miksar	المكسر	1.22	Jenin	IV	Border adjustments
Latrun	اللطرون	2.33	Ramallah Al Bireh	IV	Newly designated PA
Marj ez Zarur	مرج الزعرور	2.30	Jerusalem	IV	Unchanged borders
Qarn Sartaba	قرن سرطبة	31.19	Jericho	IV	Border adjustments
Umm er Rihan	أم الريحان	3.70	Jenin	IV	Border adjustments
Wadi Ein ez Zarqa el Elwi	وادي عين الزرقا العلوي	10.53	Ramallah Al Bireh Salfit	IV	Border adjustments
Wadi Jannata	وادي جناتا	2.80	Ramallah Al Bireh	II	Border adjustments
Wadi Qana	وادي قانا	15.30	Salfit, Qalqilya	II	Border adjustments

Protected areas		Area (km²)	Governorate/s	IUCN category	Other notes
Al Kuweiyis	الكويس	12.69	Hebron	IV	Border adjustments
Ain Qawabish	عين قوابيش	0.452	Ramallah Al Bireh	V	Border adjustments
Deir Razih	دير رازح	0.352	Hebron	V	Border adjustments
Al Katar	الكتار	3.18	Jericho	V	Unchanged borders
Al Marj	المرج	0.41	Jenin	V	Significant borders adjustments
Jabal Al Qarn	جبل القرن	0.533	Hebron	V	Potential national eco-garden
Ras Jadir	راس جادر	9.50	Tubas	IV	Significant borders adjustments
Shubash	شوباش	52.86	Tubas, Jenin	V	Potential biosphere
Al arqoub	العرقوب	9.10	Bethlehem	V	Potential biosphere
Wadi al Quff	وادي القف	3.44	Hebron	V	Potential biosphere
Wadi ed Dilb	وادي الدلب	1.56	Ramallah Al Bireh	VI	Significant adjust-ments of borders
Wadi Gaza	وادي غزة	2.84	Gaza	VI	Unchanged borders

Table 8: Vegetation cover in the new PAN.

Vegetation cover	Area of vegetation cover (Km^2)	Designated PAs (Area within vegetation type Km^2)	% of vegetation type from Designated PAs	KBAs (area within vegetation type)	% of vegetation type from KBAs
Desert savannoid vegetation (15)	227	74.30	32.7	130	57.2
Desert vegetation (12)	187	97.38	52.1	81	43.3
Maquis and forest (1)	2,559	53.86	2.1	531	20.7
Oases with Sudanian trees (14)	87	9.39	10.8	28	32.1
Park forest of *Ceratonia Siliqua* and *Pistacia lentiscus (5)*	917	59.03	6.4	185	20.1
Savannoid Mediterranean vegetation (7)	74	0.64	0.9	11	14.8
Semi-steppe batha (8)	846	123.40	14.6	333	39.3
Steppe vegetation (10)	448	153.64	34.3	167	37.2
Swamps and reed thickets (17)	5	2.51	50.2	3	60.0
Synanthropic vegetation with *Ziziphus spina-christi* trees *(19b)*	65	0.00	0.0	3	4.62
Synanthropic vegetation with *Ziziphus spina-christi* trees and *Acacia raddiana* trees *(19c)*	3	0.00	0.0	0	0.00
Wet Salines (18)	101	21.99	21.8	60	59.4
***Ziziphus lotus* with herbaceous vegetation (6)**	135	17.73	13.1	42	31.1
Total	5,654	614	-	1,57	-

5

Sites description

5 Sites description

5.1 Ain Qawabish (V)

Ain Qawabish protected area is located within the borders of the governorates of Ramallah and Al Bireh and covers an area of 0.45 km^2. The area is a rich habitat dominated by *Pinus halepensis, Quercus boissieri and Quercus coccifera, see Figure 14.* The borders are adjusted to reflect the actual topography of the forest area, see Figure 15.

Figure 14: View common trees in Ain Qawabish.

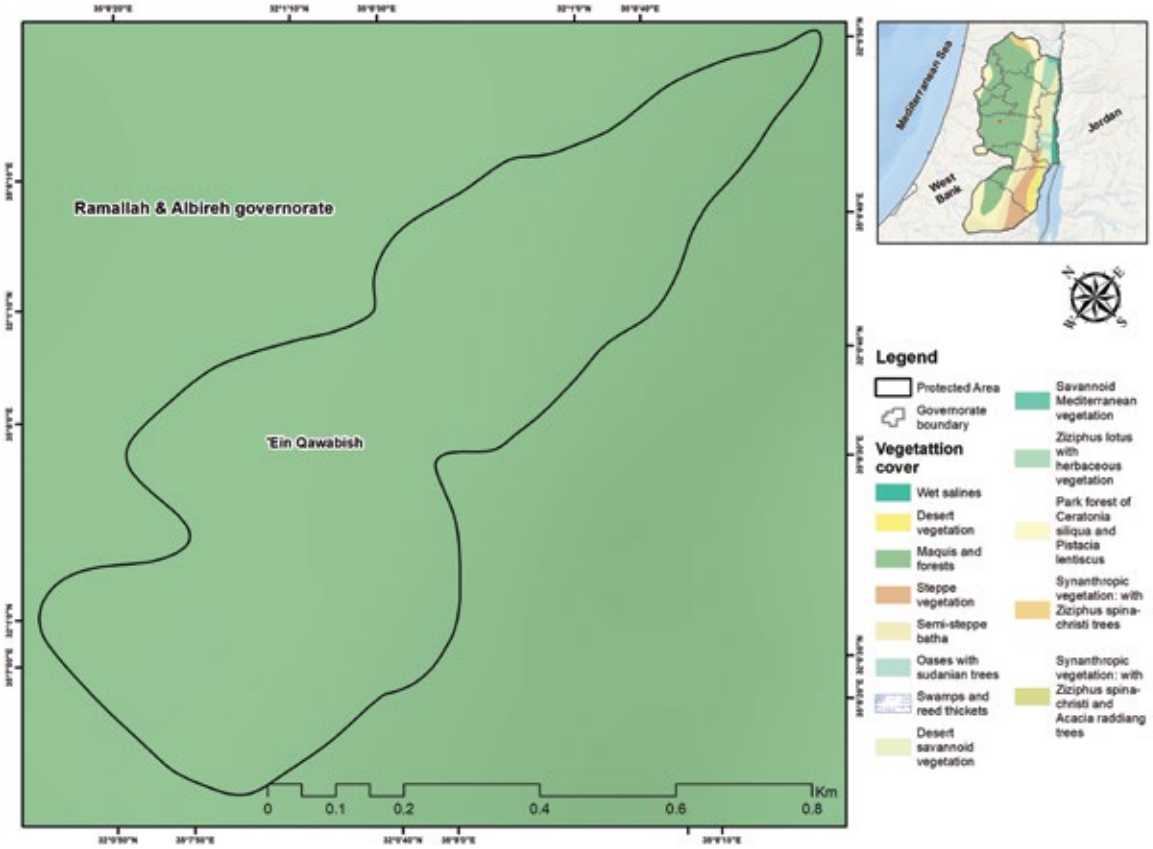


Figure 15: Map of Ain Qawabish.

Biodiversity of Ain Qawabish.

Nine species of birds were reported from this area, (see table 9). All species are listed under Least Concern category; except for *Streptopelia turtur*, moreover, some have conservation status in the Palestinian Territories such as *Alectoris chukar*. Five species of mammals were recorded, (see table 10).

Table 9: Bird species reported from Ain Qawabish.

Family	Species	IUCN global status
Columbidae	*Streptopelia turtur*	VU
Falconidae	*Falco subbuteo*	LC
Fringillidae	*Carduelis*	LC
Laniidae	*Lanius nubicus*	LC
Meropidae	*Merops apiaster*	LC
Muscicapidae	*Muscicapa striata*	LC
	Oenanthe hispanica	LC
Phasianidae	*Alectoris chukar*	LC
Upupidae	*Upupa epops*	LC

Table 10: Mammalian species reported from Ain Qawabish.

Family	Species	IUCN global status
Canidae	*Vulpes vulpes*	LC
Chiroptera	*Pipistrellus kuhlii*	LC
Muridae	*Apodemus mystacinus*	LC
	Acomys dimidiatus	LC
Suidae	*Sus scrofa*	LC

Sixteen interesting plant species were found in this site, trees that is dominated by *Pinus halepensis, Quercus boissieri,* and *Quercus coccifera*), (see table 11).

Table 11: Some vascular plants reported from Ain Qawabish.

Family	Species	IUCN status
Asteraceae	*Bellis sylvestris*	LC
Asparagaceae	*Scilla hyacinthoides*	LC
Cyperaceae	*Carex distans*	NT
	Juncellus distachyos	LC
Juncaceae	*Juncus rigidus*	LC
Linaceae	*Linum bienne*	LC
Lythraceae	*Lythrum hyssopifolium*	LC
Papilionaceae	*Lathyrus hierosolymitanus*	LC
	Trifolium fragiferum	LC
	Trifolium echinatum	LC
	Trifolium erubescens	LC
Poaceae	*Loliolum subulatum*	LC
	Polypogon monspeliensis	LC
Pteridaceae	*Cosentinia vellea*	LC
Ranunculaceae	*Ranunculus muricatus*	LC
Umbelliferae	*Tordylium carmeli*	LC

5.2 Al Kanub (IV)

Al Kanub protected area is located within the borders of the Governorates of Hebron and Bethlehem and covers an area of 29.02 km^2. Its area was significantly reduced from western and southern parts to exclude urban and query areas already developed and expanded in the northeastern regions, (see figure 16 -17). These areas were also identified by Marxan analysis.

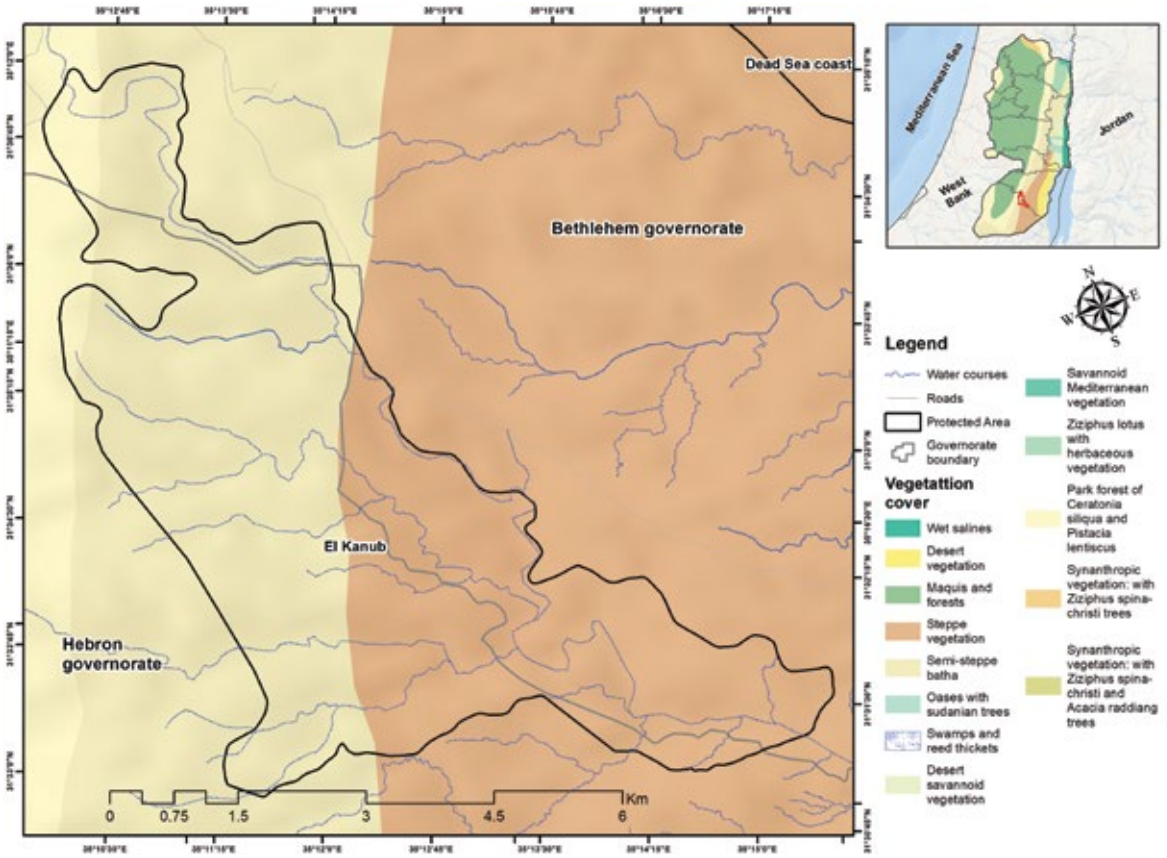


Figure 16: Map for of Al Kanub.

Figure 17: Landscape of Al Kanub.

Biodiversity of Al Kanub

Thirty-two species of birds belonging to 21 families were reported from this site. *Lanius senator* and *Chlamydotis undulata* have IUCN conservation status, (see table 12). All other 19 species are listed as Least Concern.

Table 12: Bird species reported from Al Kanub.

Family	Species	IUCN status
Accipitridae	*Buteo buteo*	LC
	Aquila chrysaetos	LC
	Buteo rufinus	LC
	Gyps fulvus	LC
Alaudidae	*Galerida cristata*	LC
	Lullula arborea	LC
Burhinidae	*Burhinus oedicnemus*	LC
Ciconiidae	*Ciconia ciconia*	LC
Columbidae	*Columba livia*	LC
	Streptopelia turtur	LC
Coraciidae	*Coracias garrulus*	LC
Corvidae	*Corvus corax*	LC
Cuculidae	*Cuculus canorus*	LC
Falconidae	*Falco pelegrinoides*	LC
Fringillidae	*Carduelis cannabina*	LC
Laniidae	*Lanius senator*	NT
Meropidae	*Merops apiaster*	LC
Motacillidae	*Anthus similis*	LC
	Motacilla alba	LC
Muscicapidae	*Oenanthe deserti*	LC
	Oenanthe finschii	LC
	Oenanthe hispanica	LC
	Oenanthe oenanthe	LC
Otididae	*Chlamydotis undulata*	VU
Phasianidae	*Coturnix coturnix*	LC
	Alectoris chukar	LC
Pteroclididae	*Pterocles orientalis*	LC

Family	Species	IUCN status
Strigidae	*Athene noctua*	LC
	Bubo bubo	LC
Sylviidae	*Scotocerca inquieta*	LC
	Sylvia conspicillata	LC
Turdidae	*Monticola solitarius*	LC
Upupidae	*Upupa epops*	LC

Three species of large mammals were found in this area, (see Table 13). All three are locally threatened, Gazella is endangered.

Table 13: Mammalian species reported from Al Kanub.

Family	Species	IUCN status
Bovidae	*Gazella gazella*	EN
Canidae	*Canis lupus*	LC
Hyaenidae	*Hyaena hyaena*	NT

As for reptiles and amphibians, *Testudo graeca* and *Bufotes viridis* were recorded. The Common Tortoise is listed as vulnerable according to the IUCN Red List

Key plant species recorded from Al Kanub include 11 species in eight families, (see table 14). Only the Jal'ad Iris, *Iris atrofusca,* is listed as vulnerable.

Table (14): Plant species reported from Al Kanub.

Family	Species	IUCN status
Caryophyllaceae	*Agrostemma githago*	LC
	Bolanthus filicaulis	LC
Equisetaceae	*Equisetum ramosissimum*	LC
Iridaceae	*Iris atrofusca*	NT
Lamiaceae	*Lallemantia iberica*	LC
Orchidaceae	*Epipactis veratrifolia*	LC
Papilionaceae	*Astragalus cretaceus*	LC
Primulaceae	*Lysimachia dubia*	LC
Umbelliferae	*Bunium paucifolium*	LC
Apiaceae	*Ferula orientalis*	LC
Apiaceae	*Turgenia latifolia*	LC

5.3 Al Kuweiyis (IV)

Al Kuweiyis protected area is located within the borders of the Governorate of Hebron and covers an area of 12.69 km^2. Its transition zone between the Irano-Turanian and the Saharo-Arabian zones and has a very rich fauna and flora biodiversity. We adjusted the borders of this area slightly to make it more logical (or practical) by adding areas for contiguity on the western side and deleting areas already developed by local communities. There is a community of shepherds who engage in simple farming of wheat and barley and some olives and almonds at edges of wadis. A hiking path already marked by Masar Falastine and a nice scenic area that can be developed into a national park, (See figures 18-19).

Figure 18: Habitat of Al Kuweiyis.

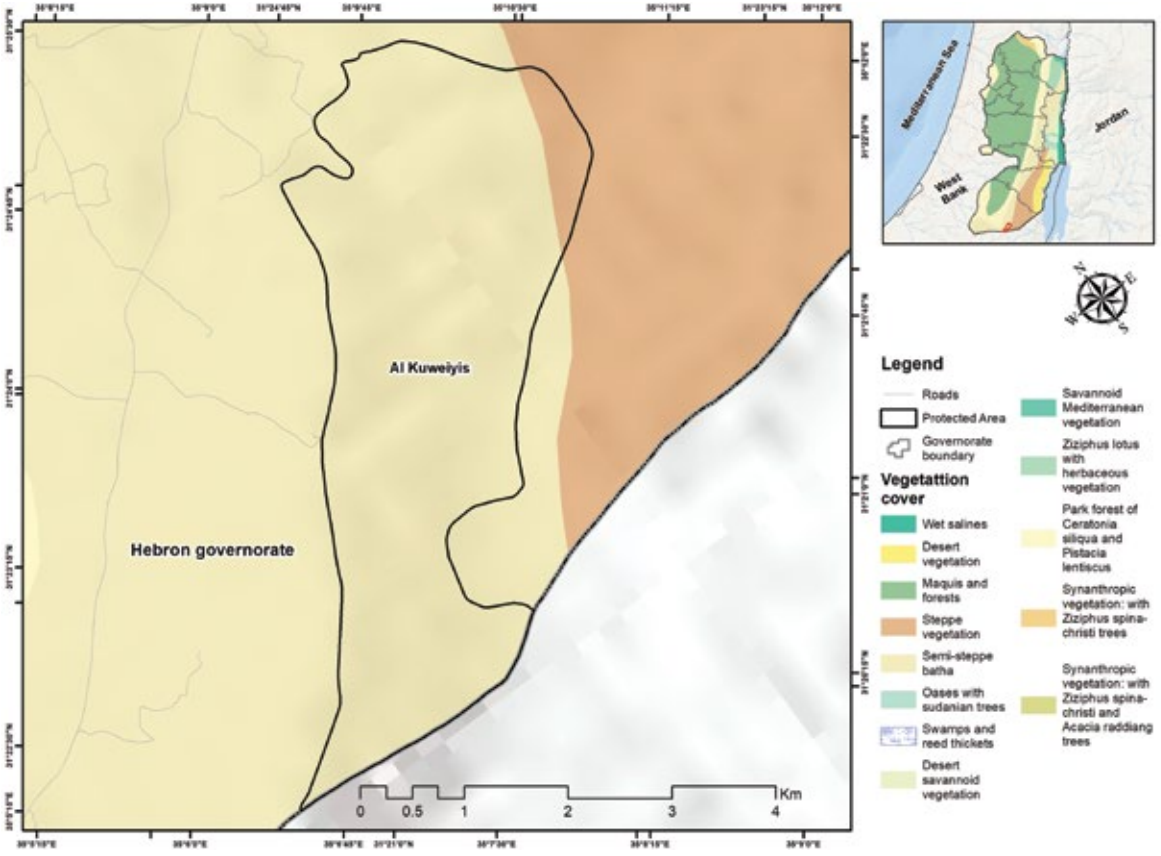


Figure 19: Map for boundaries of Al Kuweiyis.

Biodiversity of Al Kuweiyis.

Twenty-three notable (keystone) species of plants belonging to 14 families were recorded from this aera, (see Table 15). Two species of the family Iridaceae*; Vartanii Iris, Iris vartanii* and Jal'ad Iris, *Iris atrofusca* are listed as vulnerable and Near Threatened respectively.

Table 15: Plant species recorded from al Kuweiyis.

Family	Species	IUCN status
Aspleniaceae	*Asplenium sagittatum*	LC
Campanulaceae	*Legousia hybrida*	
Compositae	*Anthemis hyalina*	-
	Centaurea ascalonica	-
Dipsacaceae	*Cephalaria syriaca*	-
Cruciferae	*Chorispora purpurascens*	-
Euphorbiaceae	*Euphorbia phymatosperma*	-
Iridaceae	*Iris atrofusca*	NT
	Iris vartanii	VU
Lamiaceae	*Salvia ceratophylla*	-
	Salvia syriaca	-

Family	Species	IUCN status
	Lallemantia iberica	-
	Ziziphora tenuior	-
Liliaceae	*Gagea villosa*	-
	Bellevalia longipes	-
Papilionaceae	*Astragalus cretaceus*	LC
	Astragalus guttatus	LC
	Medicago monantha	LC
Primulaceae	*Androsace maxima*	-
Ranunculaceae	*Adonis aestivalis*	-
Umbelliferae	*Ferula biverticellata*	-
	Turgenia latifolia	-
Valerianaceae	*Valerianella oxyrrhyncha*	-

Twenty-three species of birds belonging to 10 families were recorded from this site, (see Table 16).The Eastern Imperial Eagle, *Aquila heliaca* and the Woodchat Shrike, *Lanius senator* are listed under VU and NT IUCN categories respectively.

Table 16: Bird species recorded from al Kuweiyis.

Family	Species	IUCN status
Accipitridae	*Aquila chrysaetos*	LC
	Aquila heliaca	VU
	Buteo rufinus	LC
	Gyps fulvus	LC
Alaudidae	*Galerida cristata*	LC
Burhinidae	*Burhinus oedicnemus*	LC
Ciconiidae	*Ciconia ciconia*	LC
Corvidae	*Corvus corax*	LC
Falconidae	*Falco subbuteo*	LC
Lamprophiidae	*Micrelaps muelleri*	LC
Laniidae	*Lanius nubicus*	LC
	Lanius senator	NT
	Lanius collurio	LC
Meropidae	*Merops apiaster*	LC
Motacillidae	*Motacilla alba*	LC
	Anthus similis	LC
Muscicapidae	*Oenanthe deserti*	LC
	Oenanthe hispanica	LC

Family	Species	IUCN status
Oriolidae	*Oriolus oriolus*	LC
Phasianidae	*Alectoris chukar*	LC
Sylviidae	*Phylloscopus collybita*	LC
	Sylvia conspicillata	LC
Upupidae	*Upupa epops*	LC

Three species of mammals were found to occur in this area, (see Table 17). The three species are of IUCN status, including the State of Palestine Mountain Gazelle (NT), the Marbled Polecat (VU) and the Striped Hyena (NT).

Table 17: Mammalian species reported from al Kuweiyis.

Family	Species	IUCN status
Bovidae	*Gazella gazella*	EN
Hyaenidae	*Hyaena hyaena*	NT
Mustelidae	*Vormela peregusna*	VU

As for reptiles, *Testudo graeca* was recorded. The Common Tortoise is listed as vulnerable according to the IUCN Red List.

5.4 Al Muzawqa (IV)

Al Muzawqa protected area is located within the borders of the Governorate of Tubas and covers an area of 28.33 km^2; an important area especially for birds with dozens of migratory species using the wetland areas there and at the Jordan River, (see Figure 20).

It was decided to change/expand the borders of this area in the south (near a Marxan identified area) due to the richness of habitats and the fact that this expansion does not impact human activities. The new area is about 28 km^2 and works as a category IV habitat PA contributing to the PAN in representing old vegetation.

Nearby settlements and activities carried out by the settlers within the PA, include agriculture https://www.btselem.org/arabic/press_releases/20211114_new_report_state_business

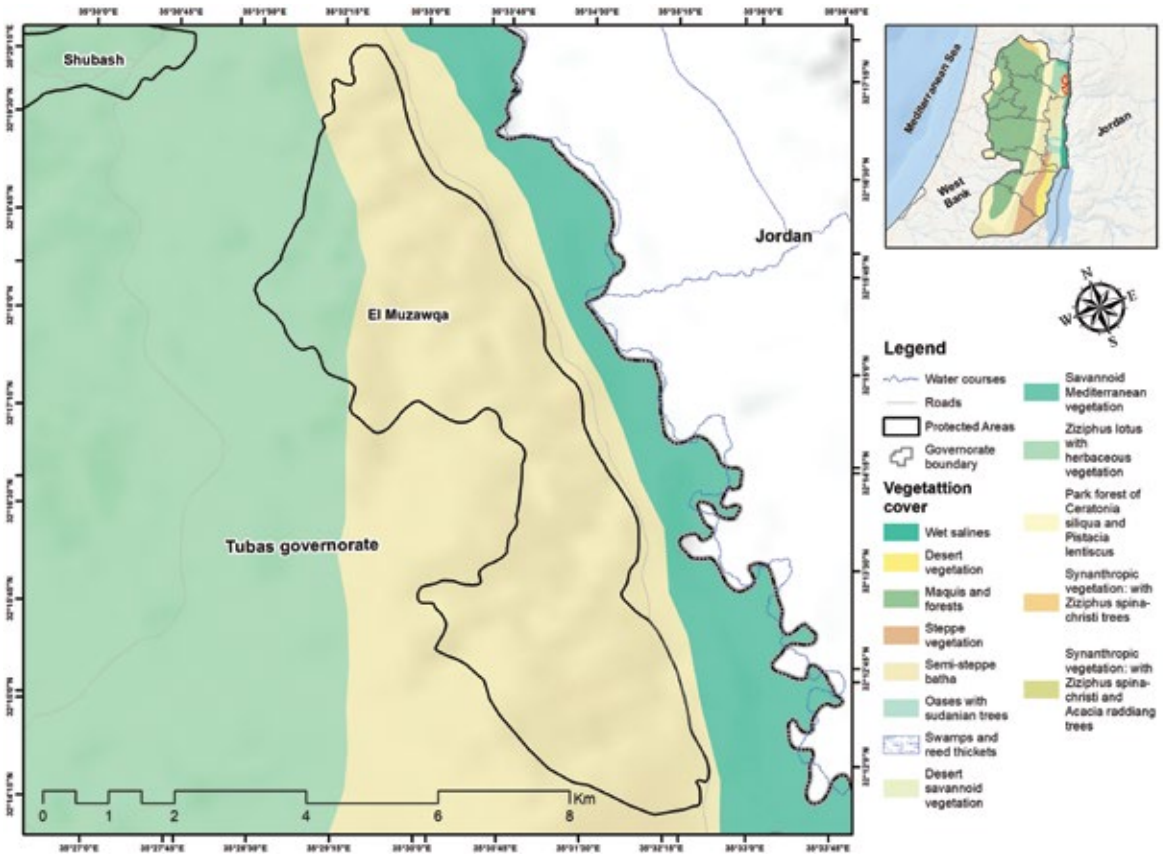


Figure 20: Map of Al Muzawqa.

Biodiversity of the Al Muzawqa

Thirty-six species of birds were reported from Al Muzawqa belonging to 19 families, (see Table 18). Three species have IUCN conservation status; the Egyptian Vulture, N*eophron percnopterus* (EN), Pallid Harrier, *Circus macrourus* (NT) and the Woodchat Shrike, *Lanius senator* (NT).

Table 18: Bird species reported from al Muzawqa.

Family	Species	IUCN status
Accipitridae	*Aquila chrysaetos*	LC
	Buteo buteo	LC
	Buteo rufinus	LC
	Circus macrourus	NT
	Hieraaetus fasciatus	LC
	Neophron percnopterus	EN
Alaudidae	*Galerida cristata*	LC
	Lullula arborea	LC
Burhinidae	*Burhinus oedicnemus*	LC
Ciconiidae	*Ciconia ciconia*	LC
Coraciidae	*Coracias garrulus*	LC
Corvidae	*Corvus corax*	LC
Cuculidae	*Cuculus canorus*	LC
Emberizidae	*Emberiza caesia*	LC
	Emberiza hortulana	LC
Falconidae	*Falco naumanni*	LC
	Falco pelegrinoides	LC
Fringillidae	*Carduelis cannabina*	LC
	Carduelis carduelis	LC
Laniidae	*Lanius nubicus*	LC
	Lanius senator	NT
Meropidae	*Merops apiaster*	LC
Motacillidae	*Anthus similis*	LC
	Motacilla alba	LC
Muscicapidae	Oenanthe *hispanica*	LC
	Oenanthe isabellina	LC
	Oenanthe oenanthe	LC
Phasianidae	*Alectoris chukar*	LC
	Coturnix coturnix	LC
	Francolinus francolinus	LC

Family	Species	IUCN status
Strigidae	*Athene noctua*	LC
	Bubo bubo	LC
Sylviidae	*Acrocephalus stentoreus*	LC
	Cisticola juncidis	LC
Turdidae	*Monticola solitarius*	LC
Upupidae	*Upupa epops*	LC

Five species of mammals in five families were reported from this site, (see Table 19). Two species are of IUCN status, including the Palestine Mountain Gazelle (EN) and the Striped Hyena (NT).

Table 19: Mammals species reported from al Muzawqa.

Family	Species	IUCN status
Bovidae	*Gazella gazella*	EN
Canidae	*Canis lupus*	LC
Emballonuridae	*Taphozous nudiventris*	LC
Rhinopomatidae	*Rhinopoma hardwickei*	LC
Hyaenidae	*Hyaena hyaena*	NT

As for reptiles and amphibians, *Testudo graeca, Ablepharus kitaibelii* and *Bufotes viridis* were recorded. The Common Tortoise is listed as vulnerable according to the IUCN Red List

Plants of interest include *Rhamnus palaestinus, Rhus tripartita, Asphodelus ramosus, Ferula communis, Asphodelus aestivus, Astragalus sp., Salvia dominica, Stipa capensis, Rumex cyprium, Phlomis brachyodon, Teucrium polium, Retama raetam*, Bromus sp., *Ziziphus spina-christi, Trichodesma boissieri, Allium* sp., *Tulipa* sp., and *Galium hierochuntinum*. Other key species are Listed in Table 20. Two species are of conservation status; *Iris atrofusca and Iris haynei.*

Table 20: Key plants species of in Al Muzawqa

Family	Species	IUCN status
Amaryllidaceae	*Allium hierochuntinum*	-
Caryophyllaceae	*Silene rubella*	-
Compositae	*Sonchus suberosus*	-
Iridaceae	*Iris atrofusca*	NT
	Iris haynei	VU
Orobanchaceae	*Orobanche palaestina*	-

5.5 The Dead Sea (IV)

The Dead Sea Protected area is located within the borders of the Governorate of Hebron, Bethlehem, Jerusalem, and Jericho, totalling an 235.08 km^2. This new PA merges several areas: 'Ein Jidi, 'Ein Feshkha, 'Ein al Ghuweir, as well as two proposed Marxan areas (M1 and M2). The logic of merging them is that the extended area has little human effect and rich biodiversity and thus can be designated IUCN category IV (wilderness area). The three phytogeographical zones represented are Irano-Turanian, Saharo-Arabian, and Sudanian-Ethiopian. Three vegetation zones include: Steppe, desert, and wetlands/reeds. In the wetland/ reed areas, many interesting and Red Listed plants, including from Sudanese Ethiopian penetration, with a total of 216 plant species having been observed. (see Figures 21-22).

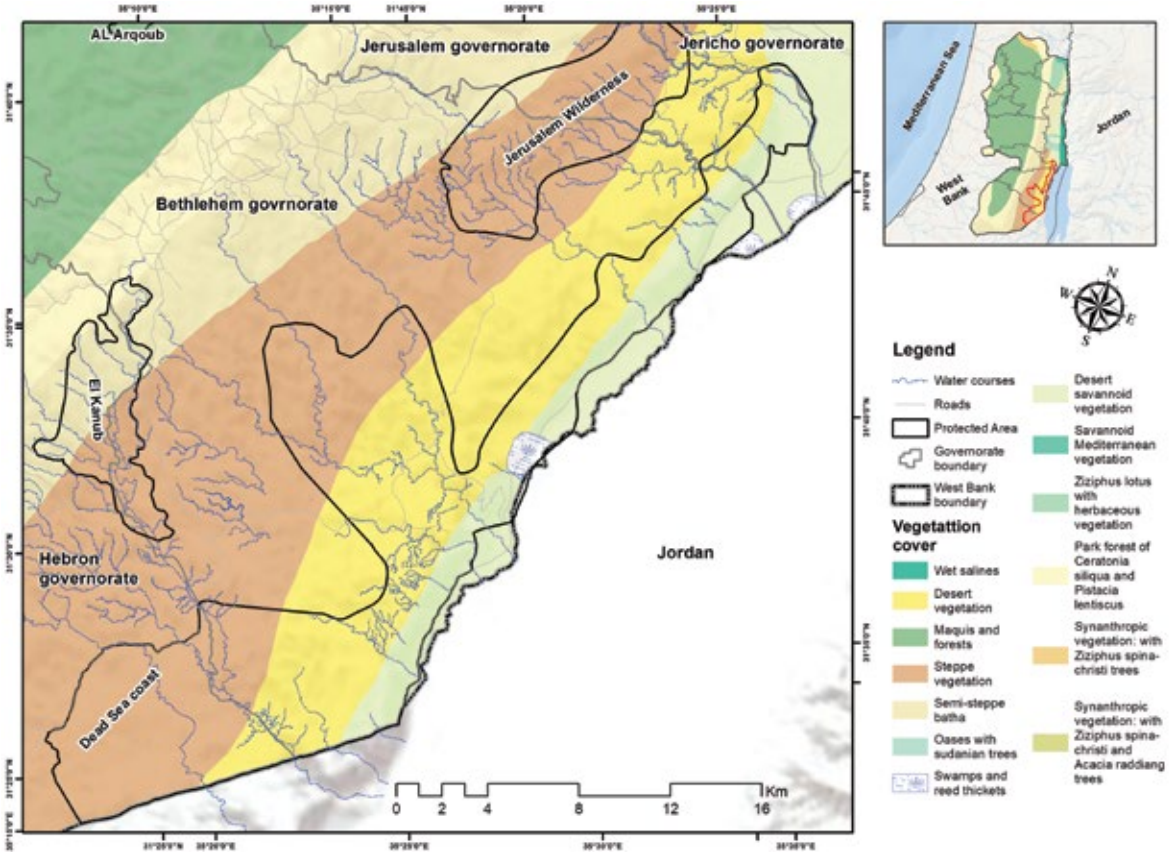


Figure 21: Map for boundaries of the Dead Sea.

Figure 22: View of the Dead Sea.

Biodiversity of the Dead Sea.

Sixty-seven key bird species were recorded from the Dead Sea, (see Table 21). The area is notable for rare/endangered birds (both resident and migratory) such as the Bearded Vulture *Gypaetus barbatus,* Dead Sea sparrow (*Passer moabiticus*, LC) and the lesser kestrel (*Falco naumanni*, LC).

Several species have a conservation status including; *Aquila heliaca* (VU), *Circus macrourus* (NT), *Neophron percnopterus* (EN), *Streptopelia turtur* (VU), *Falco concolor* (VU) and *Lanius senator* (NT).

Table 21: Bird species occurring in the Dead Sea area.

Family	Species	IUCN status
Accipitridae	*Aquila chrysaetos*	LC
	Aquila heliaca	VU
	Buteo buteo	LC
	Buteo rufinus	LC
	Circus macrourus	NT
	Gyps fulvus	LC
	Hieraaetus fasciatus	LC
	Neophron percnopterus	EN
Alaudidae	*Ammomanes cincturus*	LC
	Galerida cristata	LC
Anatidae	*Anas platyrhynchos*	LC
Apodidae	*Apus affinis*	LC
Ardeidae	*Ardea purpurea*	LC
	Ardeola ralloides	LC
Burhinidae	*Burhinus oedicnemus*	LC
Charadriidae	*Charadrius alexandrinus*	LC
Ciconiidae	*Ciconia ciconia*	LC
Columbidae	*Columba livia*	LC
	Streptopelia turtur	VU
Coraciidae	*Coracias garrulus*	LC
Corvidae	*Corvus corax*	LC
	Corvus rhipidurus	LC

Family	Species	IUCN status
Cricetidae	*Sekeetamys calurus*	LC
Cuculidae	*Cuculus canorus*	LC
Emberizidae	*Emberiza caesia*	LC
	Emberiza hortulana	LC
	Emberiza striolata	LC
Falconidae	*Falco biarmicus*	LC
	Falco concolor	VU
	Falco naumanni	LC
	Falco pelegrinoides	-
	Falco peregrinus	LC
Fringillidae	*Carduelis cannabina*	LC
Glareolidae	*Cursorius cursor*	LC
Hirundinidae	*Ptyonoprogne rupestris*	LC
Laniidae	*Lanius collurio*	LC
	Lanius nubicus	LC
	Lanius senator	NT
Meropidae	*Merops apiaster*	LC
	Merops superciliosus	LC
Motacillidae	*Motacilla alba*	LC
	Motacilla flava	LC
Muscicapidae	*Muscicapa striata*	LC
	Oenanthe deserti	LC
	Oenanthe finschii	LC
	Oenanthe isabellina	LC
	Oenanthe oenanthe	LC
Oriolidae	*Oriolus oriolus*	LC
Phalacrocoracidae	*Phalacrocorax pygmeus*	-
Phasianidae	*Alectoris chukar*	LC

Family	Species	IUCN status
	Coturnix coturnix	LC
Podicipedidae	*Tachybaptus ruficollis*	LC
Pteroclididae	*Pterocles orientalis*	LC
Rallidae	*Fulica atra*	LC
Strigidae	*Athene noctua*	LC
	Bubo bubo	LC
Sylviidae	*Acrocephalus arundinaceus*	LC
	Acrocephalus melanopogon	LC
	Acrocephalus stentoreus	LC
	Hippolais languida	LC
	Hippolais olivetorum	LC
	Phylloscopus collybita	LC
	Scotocerca inquieta	LC
Turdidae	*Cercotrichas galactotes*	LC
	Monticola solitarius	LC
Tytonidae	*Tyto alba*	LC
Upupidae	*Upupa epops*	LC

Twenty-four notable species of mammals belonging to 11 families are known to occur in this PA, (see Table 22). This includes eight species of bats, three felines, two canids and three bovids. Several species are of conservation status including; *Gazella dorcas* (VU), *Gazella gazella* (EN), *Hyaena hyaena* (NT). The local status of the Arabian leopard, *P. pardus*, requires confirmation.

Table 22: Mammalian species occurring in the Dead Sea area.

Family	Species	IUCN status
Vespertilionidae	*Eptesicus bottae*	LC
	Hypsugo ariel	DD
	Pipstrellus rueppellii	-
	Plecotus christii	DD
Rhinolophidae	*Rhinolophus clivosus*	LC
Rhinopomatidae	*Rhinopoma cyctops*	-
	Rhinopoma hardwickei	LC
	Rhinopoma microphyllum	LC
Nycteridae	*Nycteris thebacia*	-
Molossidae	*Tadarida teniotis*	LC
Hyaenidae	*Hyaena hyaena*	NT
Felidae	*Felis chaus*	LC
	Felis silvestris	LC
	Panthera pardus	VU
Dipodidae	*Jaculus jaculus*	LC
	Jaculus orientalis	LC
Muridae	*Acomys russatus harrisoni*	--
	Nesokia indica	LC
Canidae	*Canis lupus*	LC
	Vulpes cana	LC
Bovidae	*Capra ibex*	LC
	Gazella dorcas	VU
	Gazella gazella	EN

One snake species, *Platyceps sinai,* with near threatened status, and one freshwater fish, *Aphanius dispar,* were reported in the area.

A total of 30 species of plants belonging to 17 families have been recorded in this area, (see table 23). In Ein Al Ghuweir, *Abutilon hirtum, Suaeda monoica, Epipactis veratrifolia* (can only be found in this area), *Doellia bovei, Populus euphratica, Tribulus bimucronatus, Sarcocornia fruticosa, Aristida adscensionis* (rare in the country but common in this area), *Zygophyllum dumosum were found and* only grows in this area of the West Bank.

Table 23: Plant species occurring in the Dead Sea area.

Family	Species	IUCN status
Amaryllidaceae	*Allium hierochuntinum*	-
Apocynaceae	*Pentatropis nivalis*	-
Boraginaceae	*Cordia sinensis*	LC
	Matthiola arabica	-
Capparaceae	*Capparis decidua*	LC
	Maerua crassifolia	LC
Chenopodiaceae	*Sarcocornia fruticosa*	-
	Suaeda monoica	-
	Suaeda palaestina	-
Compositae	*Doellia bovei*	-
	Sonchus suberosus	-
Convolvulaceae	*Cuscuta babylonica*	-
Cyperaceae	*Cyperus eleusinoides*	LC
	Cyperus jeminicus	Extinct in Palestine
Euphorbiaceae	*Euphorbia granulata*	-
Malvaceae	*Abutilon hirtum*	-
	Abutilon indicum	-
	Corchorus trilocularis	-
	Grewia villosa	LC
Moringaceae	*Moringa peregrina*	LC
Nyctaginaceae	*Boerhavia repens*	-
Orchidaceae	*Epipactis veratrifolia*	LC
Poaceae	*Aeluropus lagopoides*	LC
	Aeluropus littoralis	LC
	Enneapogon desvauxii	-
	Enneapogon persicus	-
Rubiaceae	*Galium hierochuntinum*	-
Salicaceae	*Populus euphratica*	LC
Zygophyllaceae	*Tribulus bimucronatus*	-
	Zygophyllum album	-

5.6 Deir Razih (V)

Deir Razih protected area is located within the borders of the Governorate of Hebron and covers an area of 0.35 km^2.

Although the ownership of the protected lands is the private property of the people of the area, the ecosystem in the area is very distinguished and needs further biodiversity studies in the reserve. In addition, archaeological studies prove that there is much evidence of archaeology in the region.

There is a modification of borders from some areas where agricultural lands and urban expansion are spread.

Further study in Deir Razih is needed and is expected to harbor rich biodiversity judging from the plant cover, (see Figures 23-24).

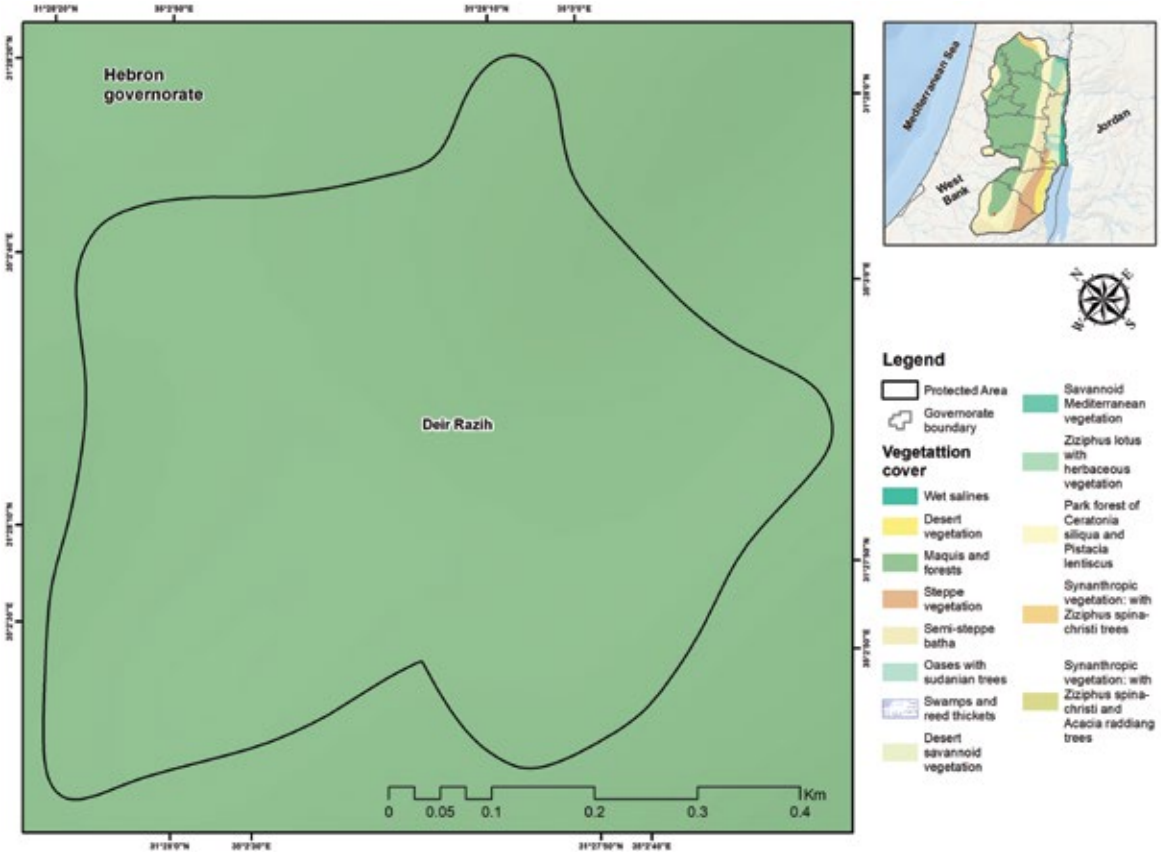


Figure 23: Map for boundaries of Deir Razih.

Figure 24: Old and modified boundaries of Deir Razih.

5.7 Ein al Auja (II)

Ein al Auja protected area is located within the borders of the governorates of Ramallah and Al Bireh and covers an area of 12.37 km^2.

Ein al Auja is considered one of the important areas on the overlap between the Mediterranean basin region and the desert and semi-desert vegetation zones.

The borders were expanded towards the north-east to include part of the areas that were defined by the Marxan.

This is a rich biodiversity area with floral habitat transitions from Mediterranean to Irano-Turanian to Saharo-Arabian phytogeographical zones. Starting near Taybeh and Deir Jarir, (see Figures 25-26).

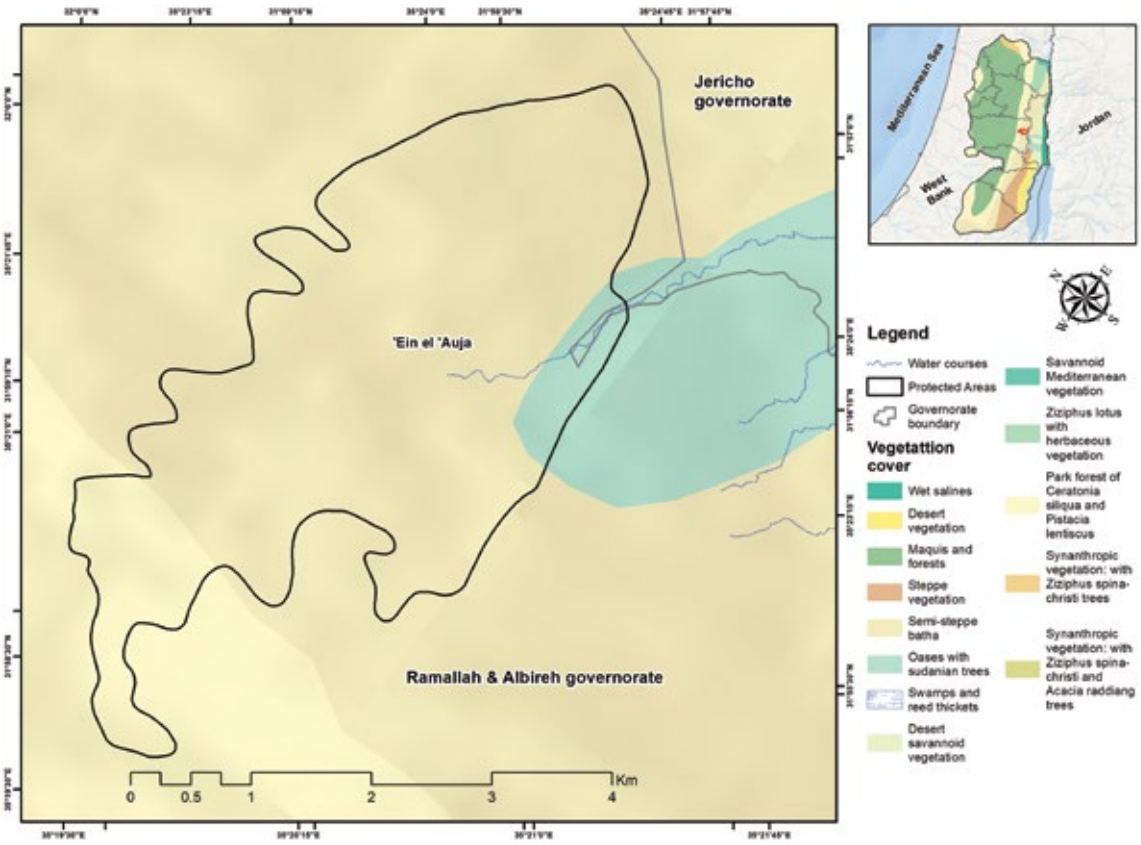


Figure 25: Map of Ein al Auja.

Hiking trails and many recreational activities are available https://www.mahmiyat.ps/ecotourism/3092.html A proper management plan is needed to build on the very high potential of ecotourism in protected areas (Eagles et al. 2002).

Biodiversity of Ein Al Auja PA

This area has a rich and interesting biodiversity. Table 24 lists all the bird species occurring in the Al Auja, and table 25. list all the plant species occurring in the Dead Sea area.

Figure 26: Habitats of Ein al Auja.

Table 24: Bird species occurring in Al Auja

Family	Species	IUCN status
Accipitridae	*Aquila chrysaetos*	LC
	Buteo rufinus	LC
	Hieraaetus fasciatus	LC
Alaudidae	*Ammomanes cincturus*	LC
	Galerida cristata	LC
Apodidae	*Apus affinis*	LC
Columbidae	*Columba livia*	LC
	Streptopelia turtur	VU
Corvidae	*Corvus corax*	LC
	Corvus rhipidurus	LC
Cuculidae	*Cuculus canorus*	LC
Emberizidae	*Emberiza caesia*	LC
	Emberiza striolata	LC
Falconidae	*Falco pelegrinoides*	--
Hirundinidae	*Ptyonoprogne rupestris*	LC
Laniidae	*Lanius senator*	NT
Motacillidae	*Motacilla alba*	LC
	Motacilla flava	LC
Muscicapidae	*Muscicapa striata*	LC
	Oenanthe deserti	LC
	Oenanthe finschii	LC
	Oenanthe isabellina	LC
Oriolidae	*Oriolus oriolus*	LC
Phasianidae	*Alectoris chukar*	LC
	Coturnix coturnix	LC
Strigidae	*Athene noctua*	LC
	Bubo bubo	LC
Sylviidae	*Acrocephalus arundinaceus*	LC
	Scotocerca inquieta	LC
Upupidae	*Upupa epops*	LC

Table 25: Plant species occurring in Al Auja.

Family	Species	IUCN status
Asparagaceae	*Ornithogalum montanum*	-
	Hyacinthella nervosa	-
Compositae	*Centaurea ascalonica*	-
	Achillea arabica	-
Crassulaceae	*Rosularia lineata*	-
Iridaceae	*Iris atrofusca*	NT
Lamiaceae	*Stachys palaestina*	-
	Salvia judaica	NT
Resdiaceae	*Reseda alba*	-
Solanacea	*Solanum incanum*	LC

5.8 Al Katar (V)

Al Katar protected area is located within the borders of the Governorate of Jericho and covers an area of 3.18 km^{2}, (see Figures 27-28).

This is an interesting relatively small location with distinct habitat of a small oasis north of the Dead Sea. Careful management with the involvement of the Deir Hijla Monastery (the Greek Orthodox Monastery of Saint Gerasimus) and local residents of this area can positively impact the site.

An ecotourism hotspot could be developed with activites for bird watching. The Ain al Nakheel spring must be rehabilitated.

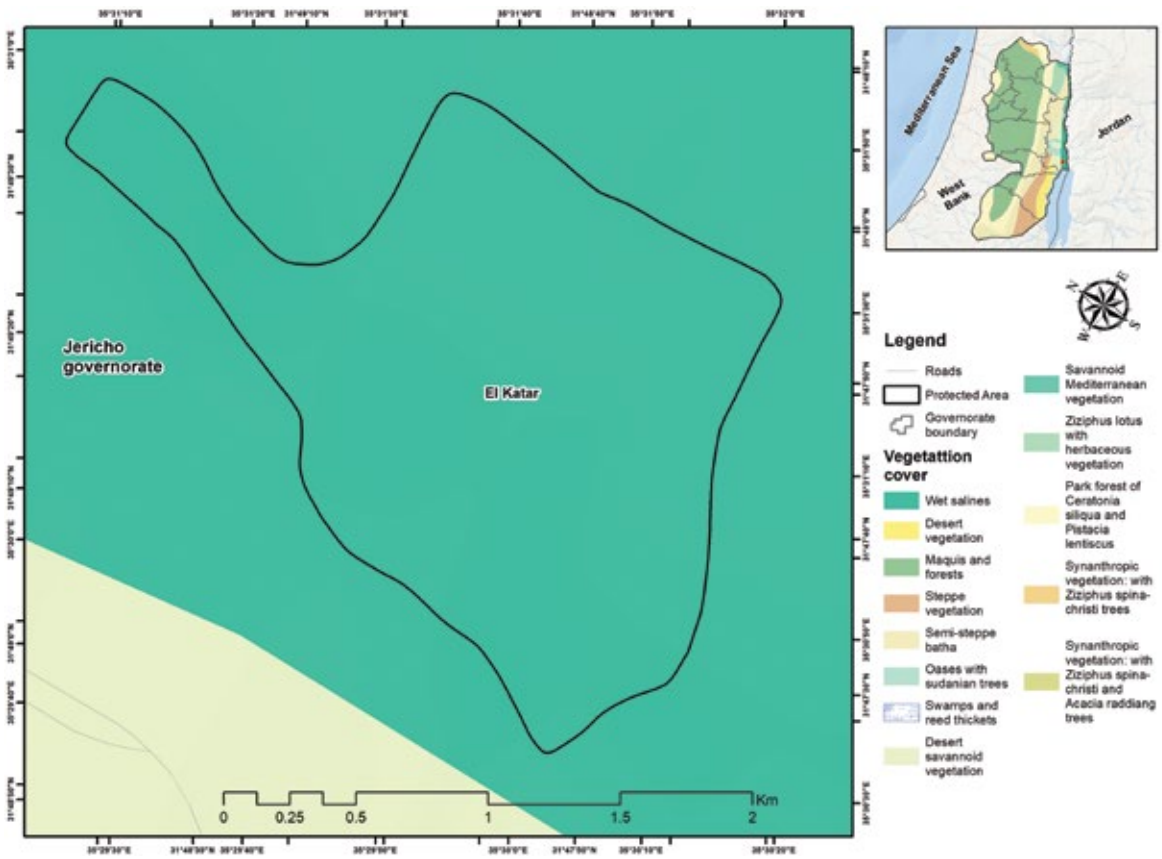


Figure 27: Map of Al Katar.

Figure 28: Habitats of Al Katar.

Biodiversity in Al Katar

Table 26: Key plant species occurring Al Kattar

Family	Species	IUCN status
Aizoaceae	*Aizoon hispanicum*	-
	Mesembryanthemum nodiflorum	-
Amaranthaceae	*Atriplex halimus*	LC
	Atriplex leucoclada	-
Arecaceae	*Phoenix dactylifera*	LC
Brassicaceae	*Erucaria rostrata*	-
	Matthiola aspera	-
	Sisymbrium irio	-
Caryophyllaceae	*Spergula fallax*	-
	Spergularia diandra	
Chenopodiacea	*Arthrocnemum macrostachyum*	
	Bassia eriophora	
	Beta vulgaris	LC
	Salsola inermis	
	Salsola jordanicola	
	Salsola tetrandra	
	Salsola vermiculata	LC
	Seidlitzia rosmarinus	
	Suaeda aegyptiaca	
	Suaeda fruticosa	
Compositae	*Aaronsohnia factorovskyi*	-
	Anthemis pseudocotula	
	Calendula arvensis	
	Carthamus nitidus	
	Centaurea hyalolepis	
	Crepis aspera	
	Filago desertorum	
	Koelpinia linearis	

Family	Species	IUCN status
Malvaceae	*Malva parviflora*	
Papilionaceae	*Trigonella stellata*	-
Plumbaginaceae	*Limonium pruinosum*	-
Polygonaceae	*Emex spinosa*	-
	Polygonum palaestinum	-
Resedaceae	*Reseda alopecuros*	-
Tamaricaceae	*Tamarix nilotica*	LC
Tamaricaceae	*Tamarix tetragyna*	LC
Zygophyllacea	*Peganum harmala*	-
Zygophyllaceae	*Zygophyllum dumosum*	-

Table 27: Key bird species occurring in Al Katar

Family	Species	IUCN status
Accipitridae	*Accipiter nisus*	LC
Alaudidae	*Galerida cristata*	LC
Falconidae	*Falco tinnunculus*	LC
Motacillidae	*Motacilla flava*	LC
Muscicapidae	*Oenanthe lugans*	LC
Sylviidae	*Acrocephalus arundinaceus*	LC
Upupidae	*Upupa epops*	LC

5.9 Al Marj (V)

Al Marj protected area is located within the borders of the governorates of Jenin and covers an area of 0.41 km^2.

The reserve can be developed as a protected landscape (IUCN V) since it includes a small but a viable habitat of *Quercus calliprinos, Ceratonia siliqua, Quercus ithaburensis, Pistacia palaestina, Pistacia lentiscus, Styrax officinarum, Crataegus aronia, Rhamnus palaestina* and *Rhamnus alaternus*, (see Figure 29).

There is an issue of jurisdiction like most PAs in the West Bank. The borders are adjusted to include all government owned forest areas (on the western side) and exclude a little more of the land that is already damaged by agriculture and urban development on the Eastern side. A management plan is already in place (https://www.mahmiyat.ps/cached_uploads/view/2022/01/13/umtut-masterplan-nc-1642073780.pdf).

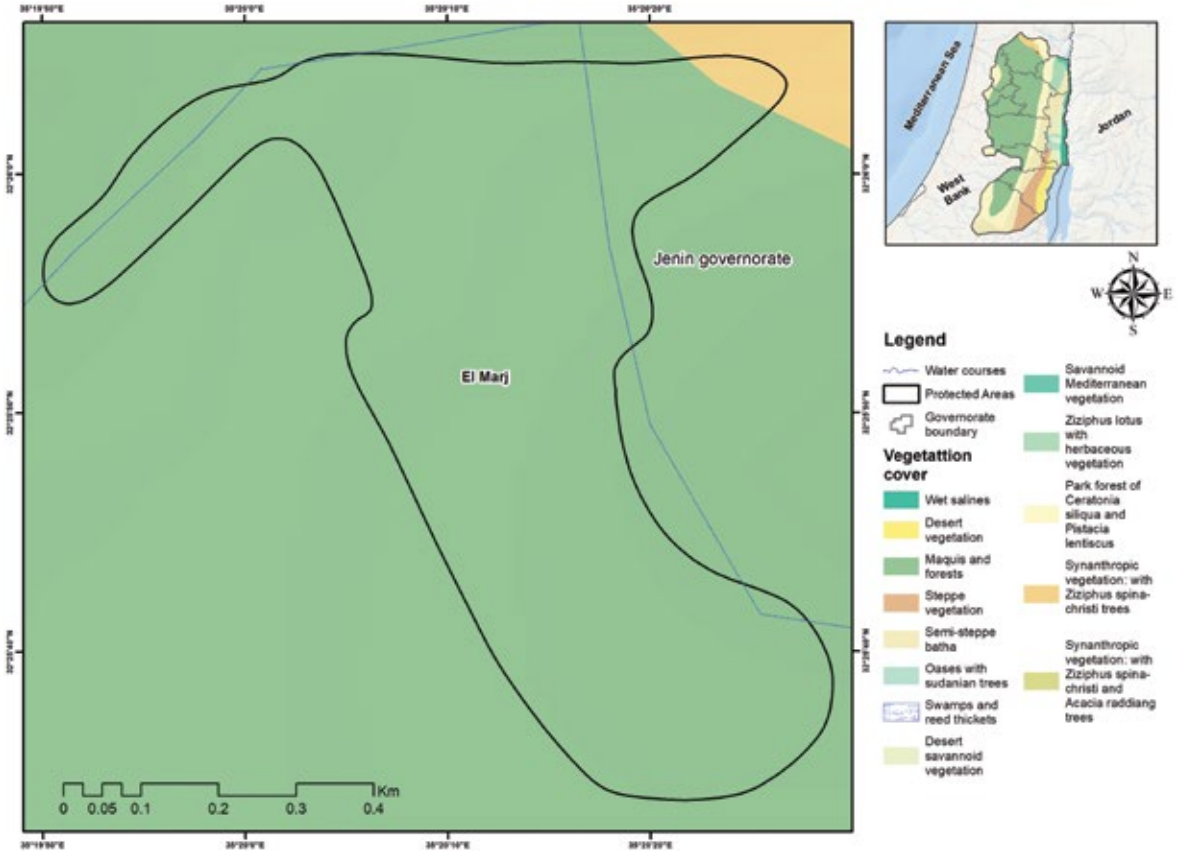


Figure 29: Map of Al Marj.

Biodiversity in Al Marj

Table 28: Key plant species occurring Al Marj.

Family	Species	IUCN status
Aizoaceae	*Aizoon hispanicum*	-
	Mesembryanthemum nodiflorum	-
Amaryllidaceae	*Allium neapolitanum*	LC
Asparagaceae	*Bellevalia flexuosa*	-
	Ornithogalum narbonense	-
Asphodelaceae	*Asphodelus ramosus*	LC
Brassicaceae	*Biscutella didyma*	-
Boraginaceae	*Anchusa aegyptiaca*	-
	Anchusa undulata	-
	Podonosma orientalis	-

Family	Species	IUCN status
Campanulaceae	*Campanula stellaris*	-
Capparaceae	*Capparis zoharyi*	-
Cistaceae	*Cistus creticus*	-
Compositae	*Chiliadenus iphionoides*	-
	Crepis sancta	-
	Hedypnois rhagadioloides	-
	Helichrysum sanguineum	-
	Leontodon tuberosus	-
	Sonchus oleraceus	-
Crassulaceae	*Sedum caespitosum*	--
Dipsacaceae	*Lomelosia prolifera*	-
Geraniaceae	*Erodium malacoides*	-
Geraniaceae	*Geranium molle*	-
Gramineae	*Dactylis glomerata*	-
Iridaceae	*Moraea sisyrinchium*	-
Lamiaceae	*Micromeria nervosa*	-
	Prasium majus	-
	Salvia horminum	-
	Teucrium divaricatum	-
Linaceae	*Linum pubescens*	-
Orobanchaceae	*Orobanche aegyptiaca*	-
Papilionaceae	*Hymenocarpos circinnatus*	-
	Lathyrus aphaca	LC
	Lathyrus blepharicarpos	LC
	Lotus peregrinus	-
	Tetragonolobus palaestinus	-
	Trifolium clypeatum	-
	Trifolium pilulare	-
	Trifolium purpureum	-
	Trifolium stellatum	-
	Vicia hybrida	LC
	Vicia palaestina	-
Plantaginaceae	*Plantago afra*	-
	Plantago lagopus	-
Primulaceae	*Cyclamen persicum*	-
Ranunculaceae	*Adonis microcarpa*	-

Family	Species	IUCN status
	Clematis cirrhosa	-
Rosaceae	*Crataegus aronia*	LC
	Sarcopoterium spinosum	-
Rubiaceae	*Cruciata articulata*	-
	Rubia tenuifolia	-
	Valantia hispida	-
Solanaceae	*Mandragora autumnalis*	LC
Umbelliferae	*Eryngium creticum*	-
Umbelliferae	*Lagoecia cuminoides*	-
Umbelliferae	*Torilis leptophylla*	-

5.10 Al Miksar (IV)

El Miksar protected area is located within the borders of the Governorate of Jenin and covers an area of 1.22 km^2. This is a government-owned zone surrounded by three Palestinian communities. It passed the evaluation with a high score as it represents a unique habitat. The original borders were modified to account for the agricultural lands around the PA. The entrance to the PA was recently improved/cleaned, (see Figures 30-31).

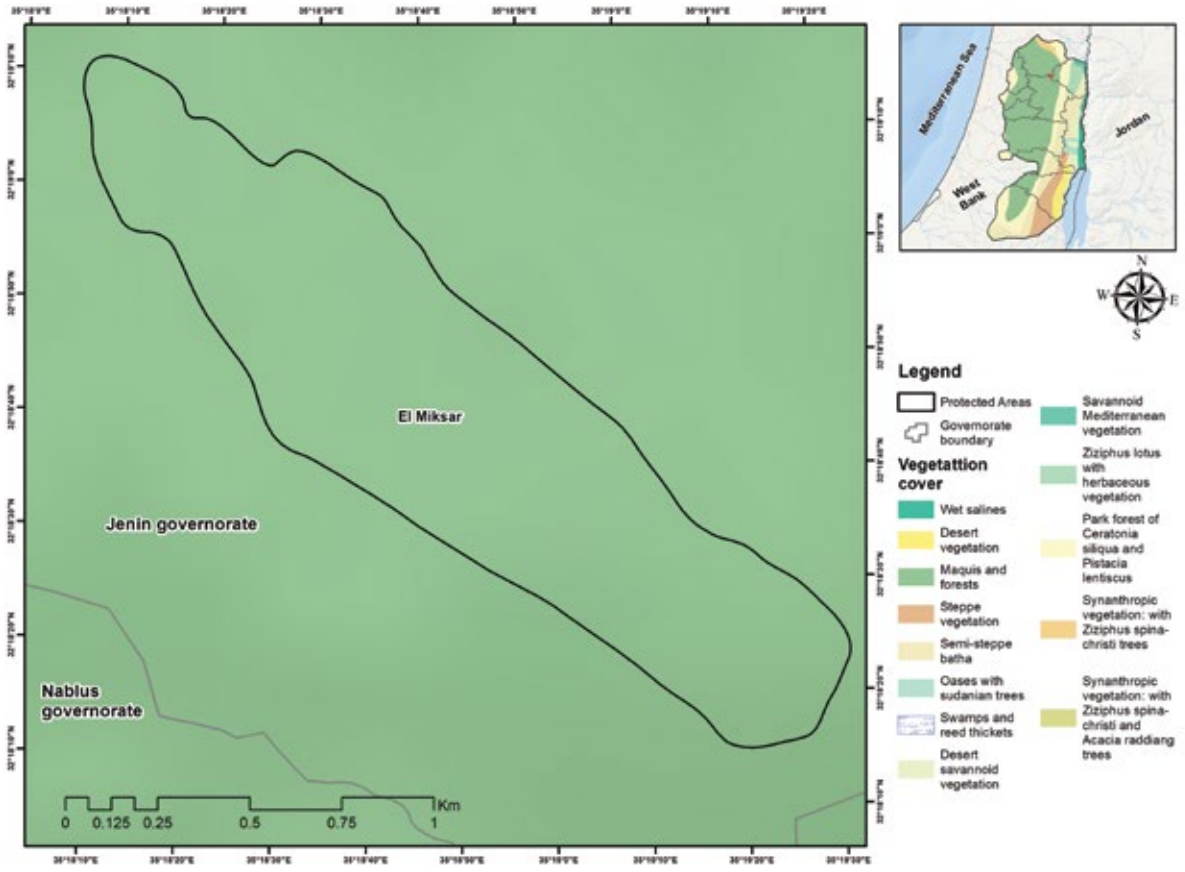


Figure (30): Map of Al Miksar.

Figure 31: Habitats of Al Miksar.

The fauna has not been studied enough, however the occurrence of the common cuckoo, *Cuculus canorus* , which is rare and threatened, was noted.

Open savannah of trees and shrubs of *Quercus calliprinos,* accompanied by a remarkable number of *Q. boisseri, Ceratonia siliqua and Pistacia palaestina.*

Key vascular plant species include *Carlina lanata, Iris lortetii, Tritcum diococoides, Nigella ciliaris, tyrax officinalis, Medicago polymorpha, Avena sterilis, Rosa phoenicia* and *Phlomis pungens.*

5.11 Jabal Al Qarn (V)

Jebel Al Qarn protected area is located within the borders of the governorates of Hebron and covers an area of 0.53 km^2. Jabal Al Qarn is distinguished by its vegetation cover and the spread of maple plants, (see Figures 32-33). Viewed as one of the areas that must be considered as a botanical garden due to its distinctive biodiversity and the fact that it is protected from the encroachments of the surrounding population. Its borders have been modified and the agricultural lands and urban areas located therein have been removed. However, an administrative plan must be proposed to develop and protect Jabal al Qaran and its biodiversity. With the slightly adjusted map taking into account already managed spaces, this area fits into IUCN category V (protected landscape). Management plans should be developed and could include fencing in the area and developing it into a national protected botanic garden considering the rich flora found in Jabal al Qaran.

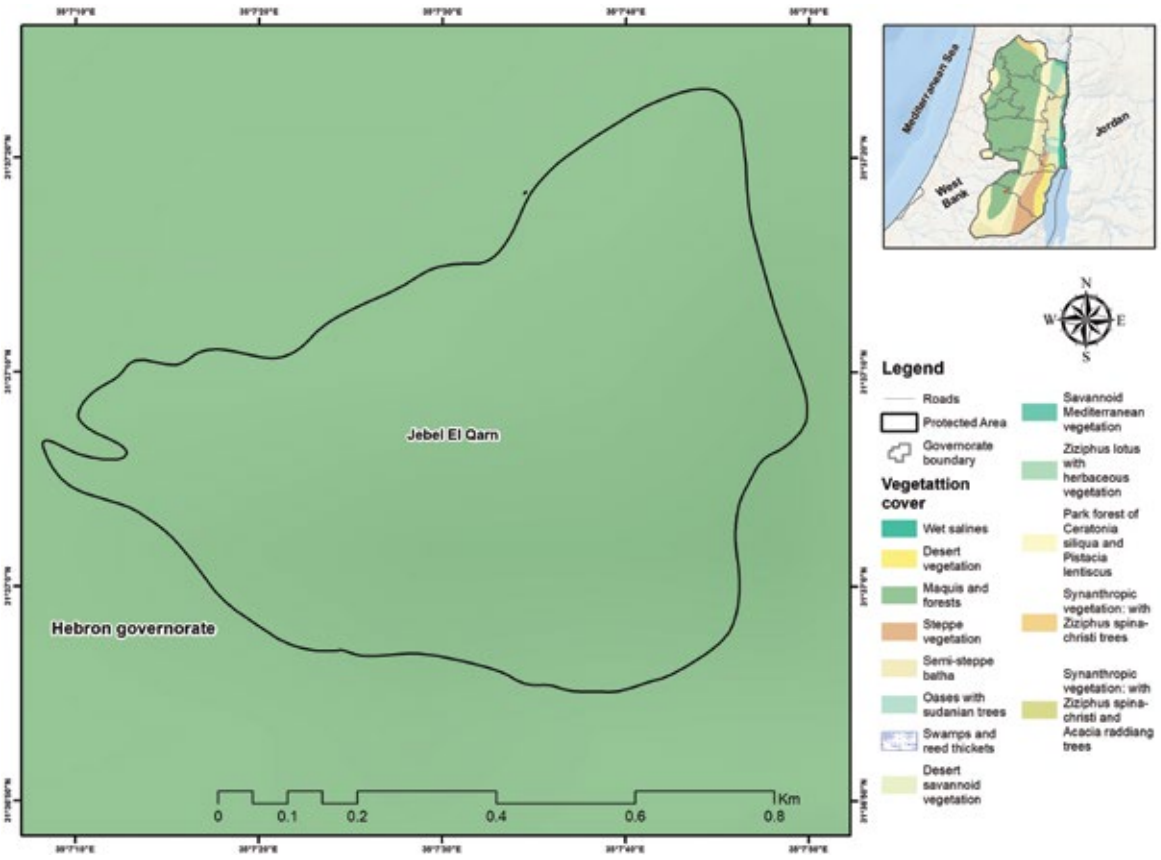


Figure 32: Map of Jabal Al Qarn.

Figure 33: Habitats of Jabal Al Qarn.

Biodiversity of Jabal Al Qarn

Notable records of birds such as *Accipter nisus, Bubo bubo*, and *Falco tinnunculus*. In terms of mammals, there are bats, *Felis silvestris, Lepus capensis, Vulpes vulpes* as well as the Mountain *Gazelle Gazella gazella*, Reptiles were also found including *Hemidactylus turcicus* and *Chamaeleo* chamaeleon. Key plant species are listed in Table 29. Three species of orchids occur at this site.

Table 29: Key plant species reported from Jabal al Qarn.

Family	Species
Asteraceae	*Bellis sylvestris*
	Lupinus micranthus
	Agrostemma githago
Orchidacea	*Ophrys lutea var. Galilaea*
	Orchis anatolica
	Orchis galilaea
Lamiaceae	*Prsium majus*
Ericaceae	*Arbutus andrachne*
Fagaceae	*Quercus calliprinos*
Pinaceae	*Pinus halapensis*
Crassulaceae	*Umbilicus intermedius*

5.12 Jerusalem Wilderness area (Ib)

Jerusalem Wilderness protected area is located within the borders of the Governorate of Bethlehem, Jerusalem and Jericho and covers an area of 52.85 km^2, (see Figures 34-35).

The area is distinguished by its biodiversity and richness in species of living creatures- birds

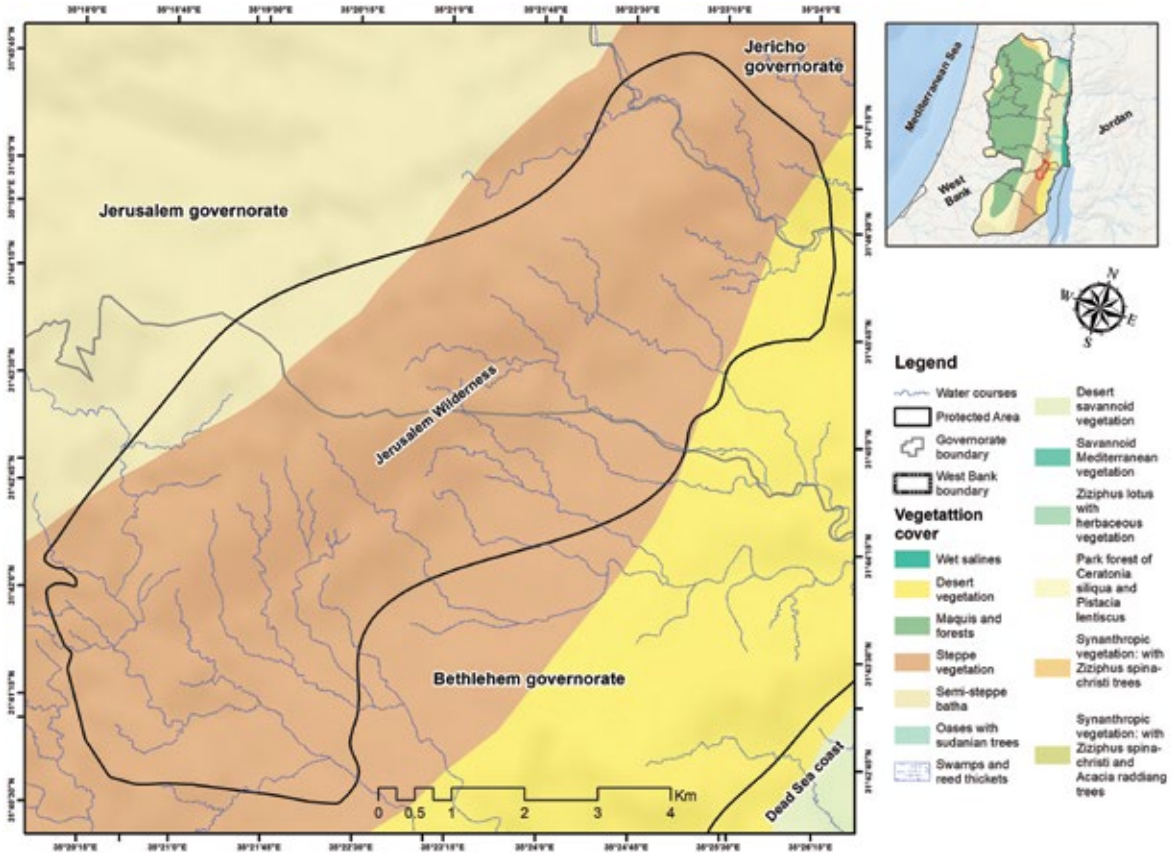


Figure 34: Map of the Jerusalem Wilderness.

and mammals. In addition, the presence of sewage streams, plants and insects, the area has been enriched with a growing population of birds and bats that feed on the insects. Highly aesthetic and natural value. In habitats, semi desert and desert areas are found with both Irano-Turanian and Saharo Arabian habitats.

Figure 35: Habitats of the Jerusalem Wilderness

Biodiversity of Jerusalem Wilderness area

Nine species of plants are considered as key species in this site, see table (30).

Table 30: Key plant species of the Jerusalem Wilderness.

Family	Species
Amaryllidaceae	*Allium hierochuntinum*
Amaryllidaceae	*Allium negevense*
Lamiaceae	*Satureja thymbrifolia*
	Fagonia bruguieri
	Delphinium peregrinum
	Lycium shawii
	Fagonia mollis
Malvaceae	*Abutilon indicum*
Plantaginaceae	*Kickxia judaica*

Twenty-four key species of birds belonging to 16 families have been reported from this site, (see Table 31). *Neophron percnopterus* is listed as endangered.

Table 31: Key bird species of the Jerusalem Wilderness.

Family	Species
Accipitridae	*Buteo buteo*
	Buteo rufinus
	Hieraaetus fasciatus
	Neophron percnopterus
Alaudidae	*Galerida cristata*
Burhinidae	*Burhinus oedicnemus*
Corvidae	*Corvus corax*
	Corvus rhipidurus
Emberizidae	*Emberiza caesia*

Emberizidae	*Emberiza caesia*
	Emberiza striolata
Falconidae	*Falco naumanni*
	Falco pelegrinoides
Fringillidae	*Carduelis cannabina*
Laniidae	*Lanius nubicus*
Motacillidae	*Anthus similis*
Muscicapidae	*Oenanthe finschii*
	Oenanthe oenanthe
Phasianidae	*Alectoris chukar*
Pteroclididae	*Pterocles orientalis*
Strigidae	*Athene noctua*
	Bubo bubo
Sylviidae	*Phylloscopus collybita*
Upopidae	*Upupa epops*

Two species of mammals of conservation status have been also reported including *Gazella gazella* (EN), and *Hyaena hyaena* (NT). The area is also very rich in bats (8 species recorded via echolocation) and is a key habitat for Hyrax *Procavia capensis*.

5.13 Latrun (IV)

Latrun protected area is located within the borders of the Governorates of Ramallah and Al Bireh and covers an area of 2.33 km^2. This area already has designation as a partially protected area and is also identified by Marxan. The main complication is that it is found within the no-man's land (disputed area between Palestinians and Israelis). There is a spring with the only available population of the Newt in the West Bank as it is a unique habitat, and thus makes sense to include it in the West Bank areas in any future negotiations (thenewtNewt is found elsewhere inside the 1948 areas). Over 240 species of plants are recorded in the area and deserve protection, (see Figures 36-37).

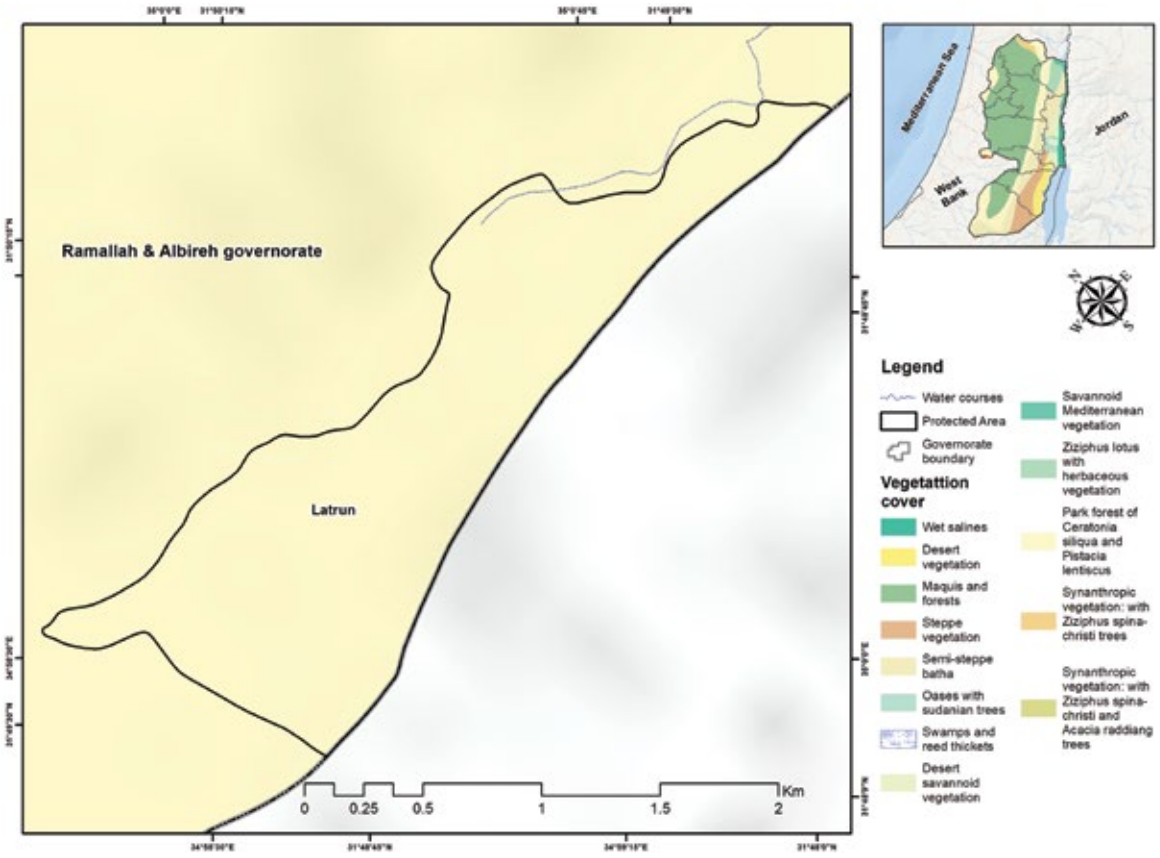


Figure 36: Map of Latrun.

Figure 37: Habitats of Latrun

Biodiversity of Latrun

Flora shows a very rare tree Fraxinus angustifolia (RR) and many others, (see Table 32).

Table 32: Key plant species of the Jerusalem Wilderness.

Family	Species
Apiaceae	*Ammi visnaga*
	Ferula communis
	Foeniculum vulgare
	Ridolfia segetum
Asteraceae	*Centaurea iberica*
	Cichorium endivia
	Lactuca serriola
	Xanthium strumarium
Boraginaceae	*Echium glomeratum*
	Nasturtium officinale
Capparaceae	*Capparis zoharyi*
Caprifoliaceae	*Cephalaria joppensis*
Cyperaceae	*Scirpus maritimus*
Fabaceae	*Acacia saligna*
	Bituminaria bituminosa
	Ceratonia siliqua
	Ononis spinosa
Geraniaceae	*Geranium dissectum*
	Geranium robertianum
Lamiaceae	*Mentha longifolia*
	Moluccella laevis
Lythraceae	*Lythrum junceum*
Plantaginaceae	*Veronica anagallis-aquatica*
Poaceae	*Bromus scoparius*

Family	Species
	Crypsis schoenoides
	Cynodon dactylon
	Echinochloa crus-galli
	Hordeum glaucum
	Phalaris paradoxa
	Phragmites australis
	Poa trivialis
Polygonaceae	*Polygonum equisetiforme*
Primulaceae	*Cyclamen persicum*
Resedaceae	*Reseda alba*
Rhamnaceae	*Rhamnus lycioides*
Rosaceae	*Rubus sanctus*
Salicaceae	*Salix acmophylla*
Solanaceae	*Nicotiana glauca*
	Solanum nigrum

Regarding fauna, Triturus vittatus (ER) was found in addition to fifteen bird species from three families were all recorded from Latrun, (see Table 33).

Table 33: Key bird species in Latrun.

Family	Species	IUCN status
Accipitridae	*Accipiter gentilis*	LC
	Accipiter nisus	-
	Aquila chrysaetos	LC
	Aquila clanga	VU
	Aquila heliacal	-
	Aquila pomarine	-
Accipitridae	*Buteo buteo*	LC
	Buteo rufinus	LC
	Bubulcus ibis	LC

Family	Species	IUCN status
	Burhinus oedicnemus	LC
Falconidae	*Falco vespertinus*	VU
	Falco Subbuteo	LC
	Falco peregrinus	LC
	Falco naumanni,	LC
	Falco tinnunculus	LC

5.14 Marj ez Zarur (IV)

Marj ez Zarur protected area is located within the borders of the governorates of Ramallah, Al Bireh and Jerusalem and covers an area of 2.30 km^2. Another area located in the no-man's land that should be part of the Palestinian PAN for its rich habitats. Located near Khirbet Um Al Lahim and just to the North of forested areas in West Jerusalem, (see Figures 38-39).

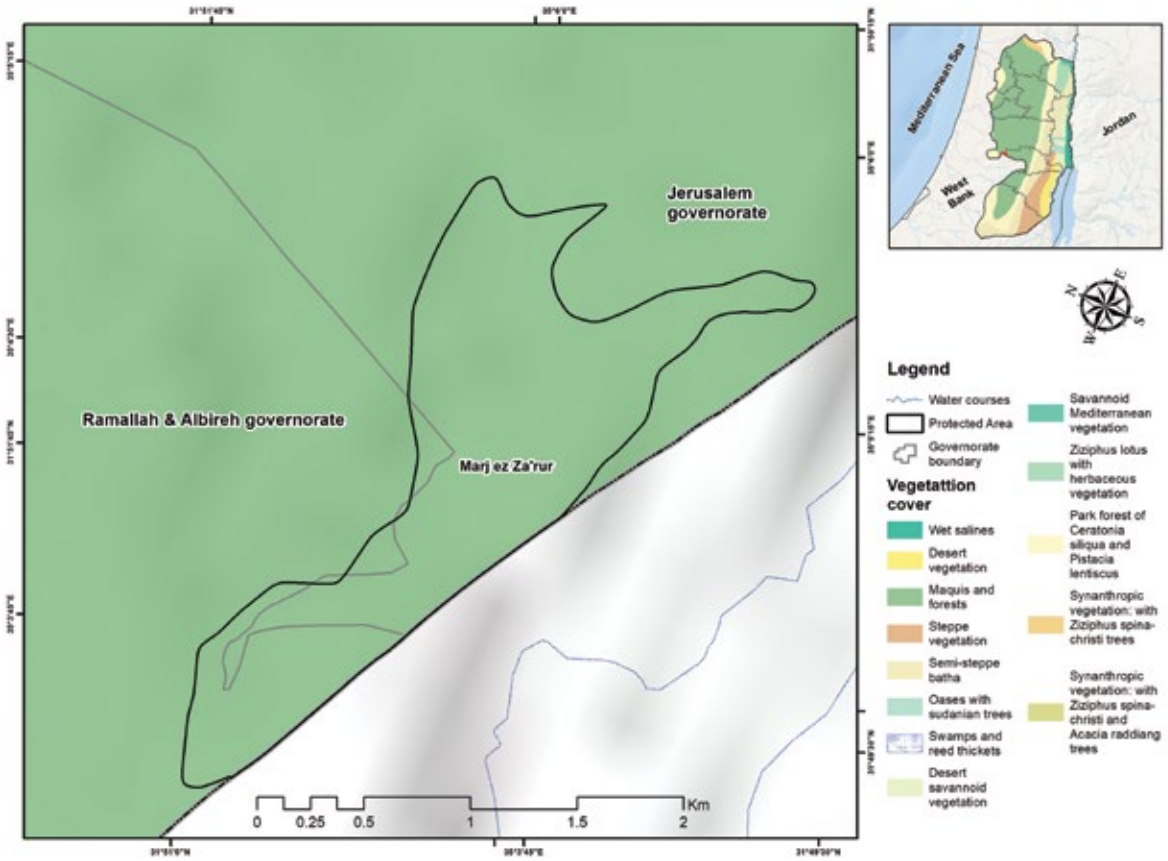


Figure 38: Arial view of Marj ez Zarur showing modification of boundaries.

Figure 39: Habitats of Marj ez Zarur.

Biodiversity of Marj ez Zarur

Seventeen species of birds have been recorded from this site, (see Table 34). There are also very interesting plant species including *Ornithogalum neurostegium* (Asparagaceae).

Table 34: Key bird species in Marj ez Zarur.

Family	Species	IUCN status
Accipitridae	*Aquila heliacal*	-
	Buteo buteo	LC
	Buteo rufinus	LC
Alaudidae	*Galerida cristata*	LC
	Lullula arborea	LC
Columbidae	*Streptopelia turtur*	VU
Cuculidae	*Cuculus canorus*	LC
Emberizidae	*Emberiza hortulana*	LC
Fringillidae	*Carduelis cannabina*	LC
Laniidae	*Lanius nubicus*	LC
	Lanius senator	NT
Meropidae	*Merops apiaster*	LC
Phasianidae	*Alectoris chukar*	LC
Strigidae	*Athene noctua*	LC
	Bubo bubo	LC
Turdidae	*Monticola solitarius*	LC
Upopidae	*Upupa epops*	LC

5.15 Qarn Sartaba (IV)

Qarn Sartaba protected area is located within the borders of the governorates of Jericho and Nablus and covers an area of 31.19 km^2, (see Figures 40-41). This is an important and rich area on the eastern slopes overlooking agricultural fields in the Jordan Valley and with habitats that include some Saharo-Arabian and Irano-Turanean flora and fauna. The borders have not been adjusted. Threats include use by the Israeli military and occasional grazing on the east side. All the nature reserve area is considered a firing zone and military coordination is required to access.

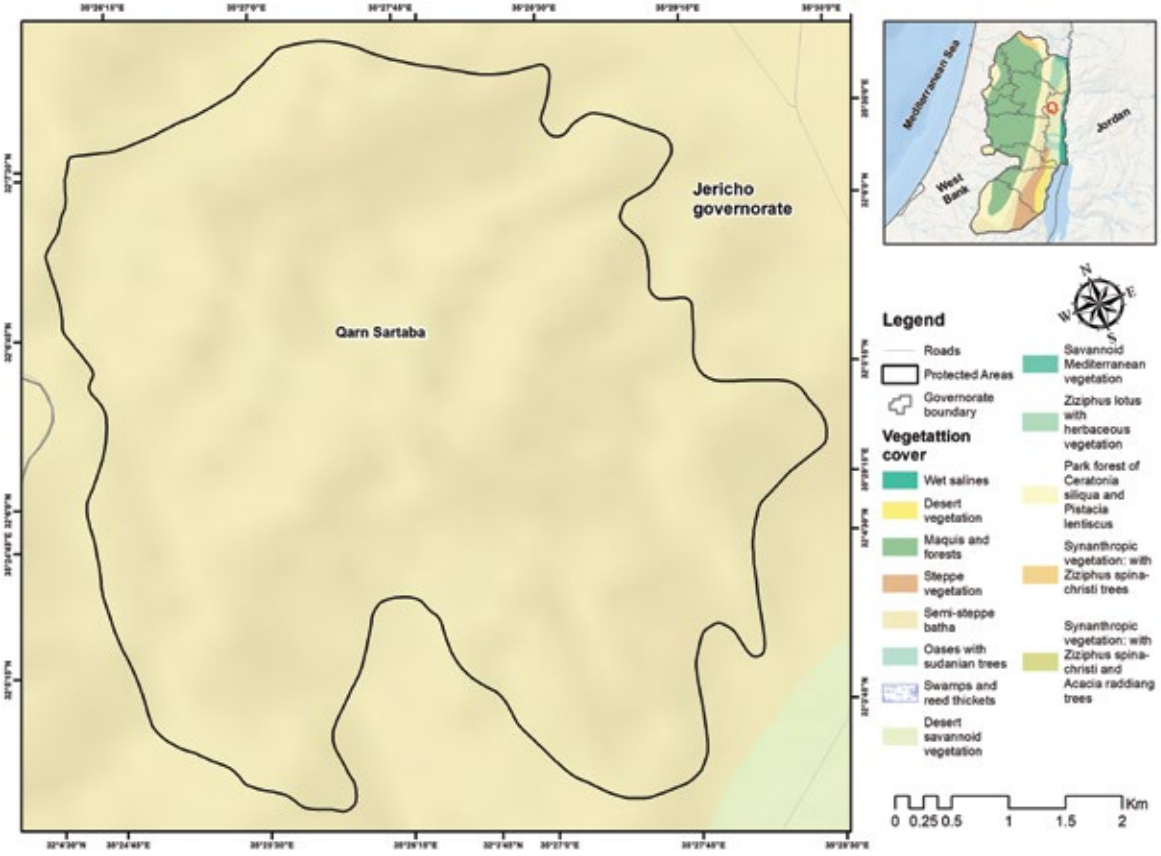


Figure 40: Map of Qarn Sartaba

Figure 41 : Habitats of Qarn Sartaba.

Biodiversity of Qarn Sartaba

Thirty-three species of birds belonging to 18 families, (see Table 35). Three species are considered of conservation status including; *Aquila heliaca, Circus macrourus* and *Neophron percnopterus.*

Table 35: Bird species recorded from Qarn Sartaba.

Family	Species	IUCN status
Accipitridae	*Aquila heliacal*	VU
	Aquila chrysaetos	LC
	Aquila fasciata	LC
	Buteo buteo	LC
	Buteo rufinus	LC
	Circus macrourus	NT
	Gyps fulvus	LC
	Neophron percnopterus	EN
Alaudidae	*Melanocorypha calandra*	LC
	Galerida cristata	LC
Burhinidae	*Burhinus oedicnemus*	LC
Ciconiidae	*Ciconia Ciconia*	LC
Coraciidae	*Coracias garrulus*	LC
Corvidae	*Corvus corax*	LC
Cuculidae	*Cuculus canorus*	LC
Falconidae	*Falco naumanni*	LC
	Falco pelegrinoides	LC
Fringillidae	*Linaria cannabina*	LC
Glareolidae	*Cursorius cursor*	LC
Laniidae	*Lanius nubicus*	LC
Meropidae	*Merops apiaster*	LC
	Merops superciliosus	LC
Motacillidae	*Anthus similis*	LC
	Motacilla alba	LC
Muscicapidae	*Oenanthe finschii*	LC
	Oenanthe hispanica	LC
Phasianidae	*Alectoris chukar*	LC
	Coturnix coturnix	LC
	Francolinus francolinus	LC

Family	Species	IUCN status
Strigidae	*Athene noctua*	LC
	Asio flammeus	LC
Turdidae	*Monticola solitarius*	LC
Upupidae	*Upupa epops*	LC

Six species of mammals were reported from Qarn Sartaba, (see Table 36). Two species have conservation status; *Gazella gazella* and *Hyaena hyaena.*

Table 36: Mammals species recorded from Qarn Sartaba.

Family	Species	IUCN status
Bovidae	*Gazella gazella*	EN
Hyaenidae	*Hyaena hyaena*	NT
Canidae	*Canis lupus*	LC
Felidae	*Felis chaus*	LC
Felidae	*Felis silvestris*	LC
Rhinopomatidae	*Rhinopoma microphyllum*	LC

Two species of reptiles were reported, (see Table 37). The Common Tortoise is listed as vulnerable according to the IUCN Red List

Table 37: Reptiles species recorded from Qarn Sartaba.

Family	Species	IUCN status
Testudinidae	*Testudo graeca*	VU
Varanidae	*Varanus griseus*	LC

Nine species of plants were recorded from this location, (See Table 38). *Iris lortetii* is listed as endangered according to the IUCN Red List.

Table 38: Plant species recorded from Qarn Sartaba.

Family	Species	IUCN status
Amaryllidaceae	*Allium albotunicatum*	-
	Allium hierochuntinum	-
Caryophyllaceae	*Petrorhagia zoharyana*	-
	Silene oxyodonta	-

Family	Species	IUCN status
Iridaceae	*Iris lortetii*	EN
Papilionaceae	*Tetragonolobus requienii*	-
Rubiaceae	*Callipeltis factorovskyi*	-
	Galium hierochuntinum	-
Scrophulariaceae	*Kickxia Judaica*	-

5.16 Ras Jadir (IV)

Ras Jadir protected area is located within the borders of the Governorate of Tubas and covers an area of 9.50 km^2, (see Figures 42-43). While this area is not as biodiversely rich as Shubash, the location nearby,, it does need protection because the habitat is interesting and unique. *Ceratonia siliqua* and *Pistacia lentiscus* forest on limestone foothills of the central mountains of the Mediterranean zone of Palestine. In management of this area, while most of it was Area B, Israel uses it for military activities. There is a need to develop a practical management plan and present it as part of the negotiations to obtain total control of these areas.

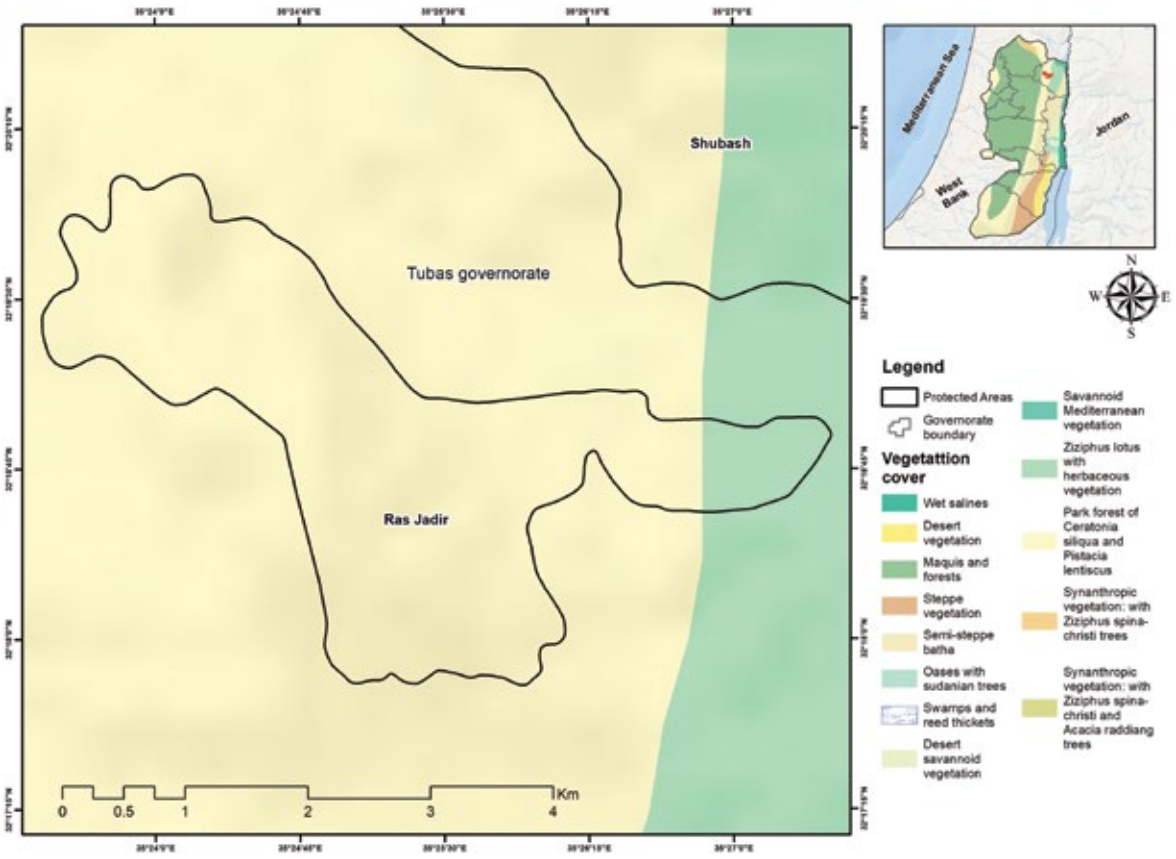


Figure 42: Map of Ras Jadir.

Figure 43: Habitats observed in Ras Jadir.

Biodiversity of Ras Jadir

Eight species of birds were reported from this site, (see Table 39). All listed as least concern according to the IUCN Red List.

Table 39: Bird species recorded from Ras Jadir.

Family	Species	IUCN status
Accipitridae	*Gyps fulvus*	LC
	Aquila fasciata	LC
Alaudidae	*Galerida cristata*	LC
Burhinidae	*Burhinus oedicnemus*	LC
Fringillidae	*Carduelis carduelis*	LC
Phasianidae	*Alectoris chukar*	LC
Strigidae	*Athene noctua*	LC
Upupidae	*Upupa epops*	LC

Regarding the mammals, the Palestine Mountain Gazelle, Gazella gazella, was reported. This species is listed as Endangered according to the IUCN Red List. One species of reptiles, *Testudo graeca*, was found. It is listed as Vulnerable according to the IUCN Red List.

The main tree species are comprised of *Ruta chalapensis, Callicotome villosa, Rhamnus palaestinus, Rhamnus alaternus, and Quercus calliprinus*. Notable plants also include *Iris atrofusca, Allium aschersonianum, Eryngium creticum, Notobasis syriaca, Lavetera cretica, Malva nicaeensis, Crataegus aronia, Ziziphus lotus, Ziziphus spina-christi, Tamarix sp., Carex distans, Urtica pillulans, Phoenix dactylifera, Loranthus acaciae, Retama raeatum, Asphodelus aestivum, Arum palaestinum, Cyclamen persicum, Erodium malacoides, Urgenia maritima, Phlomis pungens, Lachnophyllum noeanum, Hydrocotyle ranunculoides* (RR). Two species of irises have conservation status, (see Table 40).

Table 40: Key plant species recorded from Ras Jadir.

Family	Species	IUCN status
Arecaceae	*Phoenix dactylifera*	-
Cyperaceae	*Carex distans*	LC
Iridaceae	*Iris atrofusca*	NT
	Iris vartanii	VU

Family	Species	IUCN status
Papilionaceae	*Callicotome villosa*	-
Rhamnaceae	*Rhamnus lycioides*	-
Rutaceae	*Ruta chalepensis*	-
Umbelliferae	*Hydrocotyle ranunculoides*	LC

5.17 Shubash (V)

Shubash protected area is located within the borders of the governorates of Tubas and, Jenin and covers an area of 53.91 km^2, (see Figures 44-45). The habitat of Shubash PA is typical of the foothills of the central highlands where they face the eastern slopes - Eastern Watershed. The plant communities here are more drought and heat resistant than those dominated by *Quercus calliprinus*. At Shubash PA, the principal natural habitat occurs in a mosaic with agricultural lands of various types, typically on slopes and other inaccessible sites. There are Bedouins with their livestock live in the area. The borders were adjusted by trimming already developed areas in the west and adding key habitats in the East.

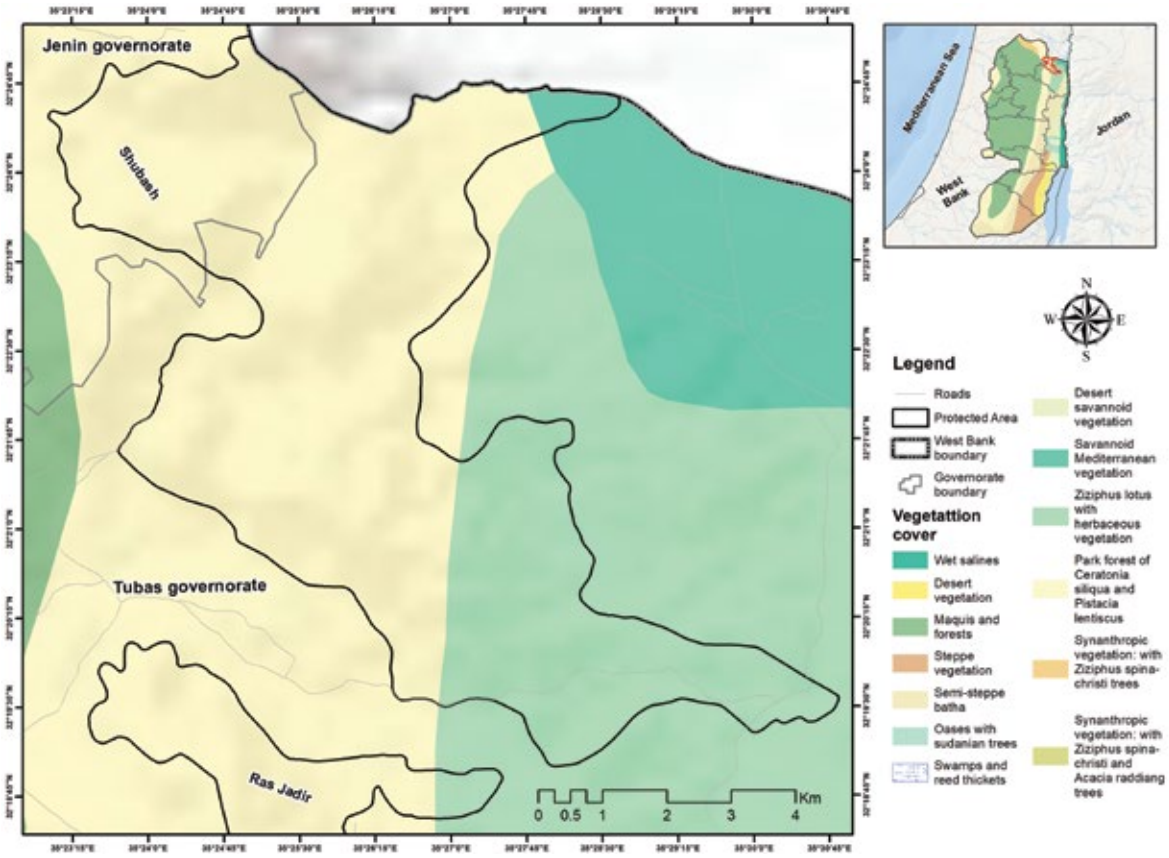


Figure 44: Map of Shubash and Ras Jadir.

Figure 45: Habitats of Shubash.

Biodiversity of Shubash

Thirty-four species of birds belonging to 19 families were reported from Shubash, (see Table 41). Four species have a conservation status including; *Circus macrourus* (NT), *Neophron percnopterus* (EN), *Streptopelia turtur* (VU), and *Lanius senator* (NT).

Table 41: Bird species reported from Shubash.

Family	Species	IUCN status
Accipitridae	*Aquila fasciata*	LC
	Buteo buteo	LC
	Buteo rufinus	LC
	Circus macrourus	NT
	Gyps fulvus	LC
	Neophron percnopterus	EN
Alaudidae	*Galerida cristata*	LC
Burhinidae	*Burhinus oedicnemus*	LC
Ciconiidae	*Ciconia ciconia*	LC
Columbidae	*Streptopelia turtur*	VU
Coraciidae	*Coracias garrulus*	LC
Cuculidae	*Cuculus canorus*	LC
Emberizidae	*Emberiza caesia*	LC
	Emberiza melanocephala	LC
Falconidae	*Falco naumanni*	LC
	Falco subbuteo	LC
Fringillidae	*Linaria cannabina*	LC
Laniidae	*Lanius nubicus*	LC
	Lanius senator	NT
Meropidae	*Merops apiaster*	LC
Motacillidae	*Anthus similis*	LC
	Motacilla alba	LC
Muscicapidae	*Oenanthe finschii*	LC
	Oenanthe hispanica	LC

Family	Species	IUCN status
Phasianidae	*Alectoris chukar*	LC
	Coturnix coturnix	LC
	Francolinus francolinus	LC
Strigidae	*Athene noctua*	LC
	Bubo bubo	LC
Sylviidae	*Curruca conspicillata*	LC
	Hippolais olivetorum	LC
Turdidae	*Cercotrichas galactotes*	LC
	Monticola solitarius	LC
Upupidae	Upupa epops	LC

Three mammals were found to occur in Shubash; including *Hyaena hyaena* (NT), *Gazella gazella* (EN) and *Canis lupus*. The common tortoise, *Testudo graeca* (VU), was also recorded.

Five key plant species were recoded, (see Table 42). *Iris haynei* is listed as vulnerable while *Ornithogalum fuscescens* is listed as endangered.

Table 42: Keystone species of plants in Shubash.

Family	Species	IUCN status
Asparagaceae	*Ornithogalum fuscescens*	EN
Caryophyllaceae	*Petrorhagia zoharyana*	-
Crassulaceae	*Sedum palaestinum*	-
Gramineae	*Alopecurus arundinaceus*	LC
Iridaceae	*Iris haynei*	VU

5.18 AL Arqoub

Al Arqoub protected area is located within the borders of the Governorate of Bethlehem and covers an area of 9.10 km^2., (see Figures 46-47). This area was not in the original list of PA. However, it was suggested to be designated as a new PA due to the following: a) it passed the evaluation for PAs with a high score of (43/53); b) new research shows high diversity of fauna and flora in the area; c) it has a high cultural value as a WHS. A management plan is already in place for this PA, however, it should be further developed to manage the site as a protected landscape (V) or even as a biosphere reserve. See this conservation plan made for biodiversity in the world heritage site (two valleys): https://www.palestinenature.org/conser-

vation/Final-Biodiversity-Conservation-Plan-for-WHP-23-December-2019--by-Roubina-Ghattas.pdf A third valley (Cremisan) needs to be added now as there are more studies on this (see https://docs.google.com/document/d/1IlQob5sG8-r_EFy6fcNKd88S4B5OBxsG/edit?usp=sharing&ouid=103470623884782626782&rtpof=true&sd=true).

See also Qumsiyeh, MB. et al. (2022 Biodiversity Conservation of a UNESCO World Heritage Site in a Conflict Area: Case Study of designating a new protected area in Al arqoub, Palestine. Parks Journal (IUCN). Submitted

State of Conservation report Al-Makhrour Jan 2019

https://whc.unesco.org/fr/documents/171885?fbclid=IwAR1RLvjIKDhU_dtO4w5Yntba2m0C-dyLZ7qRGuGuxvCb6T6CZ1L0l-GCnleA State of Conservation report https://whc.unesco.org/fr/documents/171885. All our documents are at almakhrour.palestinenature.org

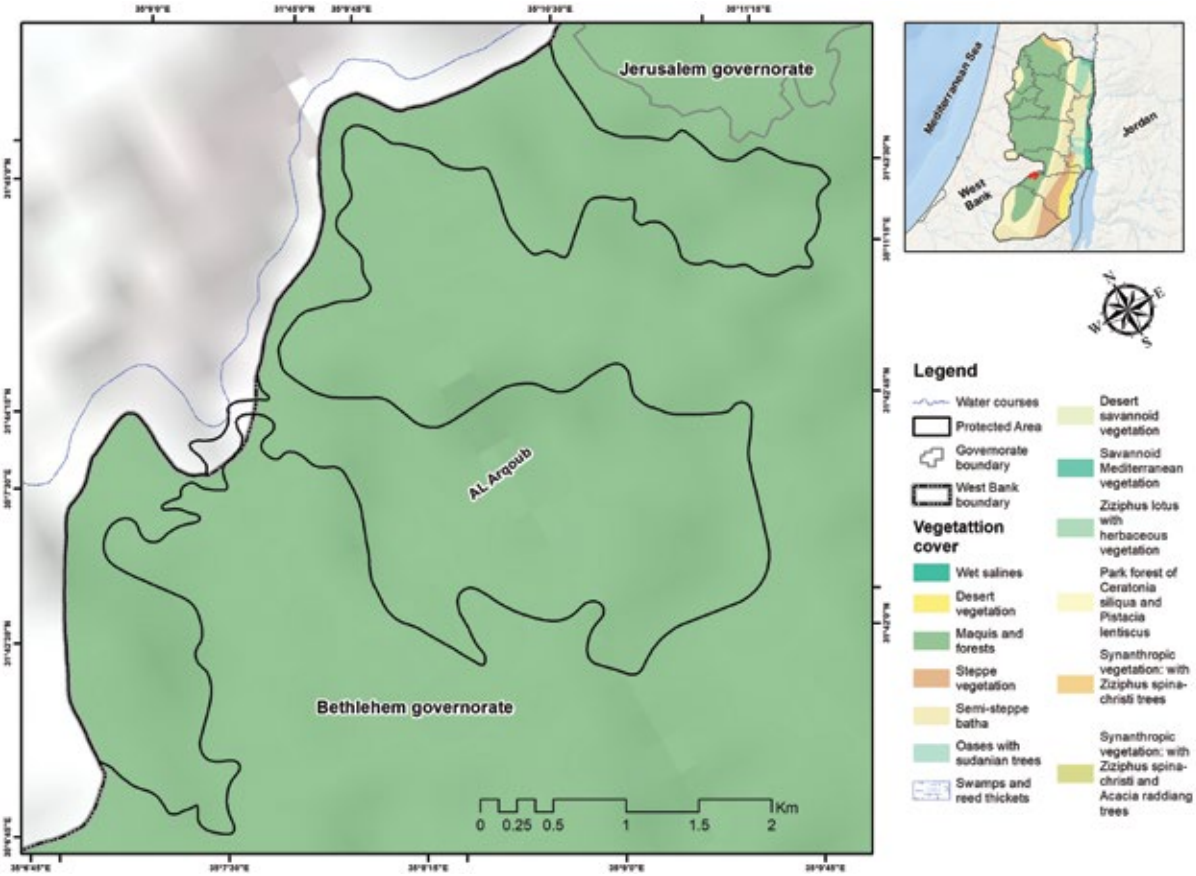


Figure 46: Arial map showing **Al Arqoub**.

Figure 47: Habitats of **Al Arqoub.**

Biodiversity of Al Arqoub

In Al Arqoub a total of 417 plant species, 15 mushrooms, 105 birds, 3 amphibians, 12 reptiles, and 31 mammals were documented. There are interesting species of mushrooms here: *Amanita ovoidea, Arrhenia rickenii, Coprinopsis friesii, Coprinus comatus, Cryptomarasmius corbariensis, Lentinus arcularius, Lepista sordida, Lycoperdon perlatum, Psathyrella bipellis, Suillus collinitus, Volvopluteus gloiocephalus, Xerocomellus redeuilhii.* The presence of the Conifer Beetle is noted (Qumsiyeh & Handal; 2019). See Tables 43-44 for key indicator plant species in the area.

Table 43: Key indicator plant species in Al Arqoub.

Family	Species	IUCN status
Boraginaceae	*Buglossoides tenuiflora*	-
Caryophyllaceae	*Stellaria pallida*	-
Compositae	*Crepis reuteriana*	-
Cruciferae	*Arabis verna*	-
	Erophila minima	-
Dipsacaceae	*Lomelosia argentea*	-
Lamiaceae	*Salvia indica*	-
Linaceae	*Linum bienne*	-
Juncaceae	*Juncus bufonius*	LC
Papilionaceae	*Coronilla cretica*	-
Ranunculaceae	*Adonis annua*	-
Rubiaceae	*Putoria calabrica*	-
	Sherardia arvensis	-

Table 44: Key indicator plant species recorded in Al Arqoub

Family	Species	IUCN status
Boraginaceae	*Buglossoides tenuiflora*	-
Caryophyllaceae	*Stellaria pallida*	-
Compositae	*Crepis reuteriana*	-
Cruciferae	*Arabis verna*	-
Cruciferae	*Erophila minima*	-
Dipsacaceae	*Lomelosia argentea*	-
Lamiaceae	*Salvia indica*	-

Family	Species	IUCN status
Linaceae	*Linum bienne*	-
Juncaceae	*Juncus bufonius*	LC
Papilionaceae	*Coronilla cretica*	-
Ranunculaceae	*Adonis annua*	-
Rubiaceae	*Putoria calabrica*	-
Rubiaceae	*Sherardia arvensis*	-

Here is a partial listing of recorded birds: *Accipiter nisus, Acridotheres tristis, Actitis hypoleucos, Actitis hypoleucos, Alauda gulgula, Alcedo atthis, Alectoris chukar, Ammomanes deserti, Ammomanes deserti, Ammoperdix heyi, Anas acuta, Anas clypeata, Anas crecca, Anas platyrhynchos, Anthus campestris, Apus apus, Asio otus, Athene noctua, Bubo bubo, Bubulcus ibis, Burhinus oedicnemus, Buteo buteo, Buteo rufinus, Buteo rufinus, Calandrella cinerea, Carduelis cannabina, Cercotrichas galactotes, Ceryle rudis, Chlamydotis undulata, Ciconia ciconia, Ciconia nigra, Circaetus gallicus, Circus aeruginosus, Circus cyaneus, Circus macrourus, Coracias garrulus, Corvus corax, Corvus monedula, Corvus ruficollis, Corvus ruficollis, Coturnix coturnix, Cursorius cursor, Egretta garzetta, Elanus caeruleus, Falco naumanni, Falco peregrinus, Falco tinnunculus, Francolinus francolinus, Fulica atra, Galerida cristata, Galerida cristata, Gallinago gallinago, Gallinula chloropus, Grus grus, Himantopus himantopus, Hippolais pallida, Hirundo daurica, Hirundo rustica, Hoplopterus spinosus, Lanius excubitor, Lanius minor, Larus argentatus, Larus ridibundus, Luscinia luscinia, Merops apiaster, Merops orientalis, Merops superciliosus, Miliaria calandra, Milvus migrans, Muscicapa striata, Oena capensis, Oenanthe deserti, Oenanthe finschii, Oenanthe hispanica, Oenanthe isabellina, Oenanthe lugens, Onychognathus tristramii, Passer domesticus, Passer moabiticus, Pelecanus onocrotalus, Phoenicurus ochruros, Prinia gracilis, Pterocles orientalis, Pycnonotus xanthopygos, Rhodospiza obsoleta, Riparia riparia, Saxicola rubetra, Saxicola torquata, Scotocerca inquieta, Streptopelia decaocto, Streptopelia turtur, Sturnus vulgaris, Sylvia atricapilla, Sylvia conspicillata, Sylvia curruca, Tachybaptus ruficollis, Tadorna tadorna, Tringa totanus, Turdus merula, Tyto alba, Upupa epops, and Vanellus vanellus.*

There are also interesting mammals such as bats, foxes, gazelles, mustelids and the bryophytes, in particular the *Aloina bifrons, Pottia commutata, Pottia davalliana, Pottia starckeana, Tortula brevissima, Tortula muralis.*

Rare bird species from the BioGis records that overlap with the bird list available on the Avibase website are the *Streptopelia turtur, Circus macrourus, Neophron percnopterus.*

5.19 Al Aghwar (Jordan Valley) (II)

Four protected areas, namely Wadi al Mallaha, Wadi Jauzala, Wadi al Ahmar, Bassat Wadi al Mallaha were merged together due to their proximity and complementary habitats. The new PAs total area is 54.4 km^2 and its completely in Area C. The integrated cluster of PAs in this region form a corridor along the Western Part of the Jordan valley for key habitats and together with three other good-sized protected areas, (see Figures 48-49) provide protection for Irano-Turanian, Saharo-Arabian and Ethiopian-Sudanese elements. For both migrating and resident birds, this area is critical to protect.

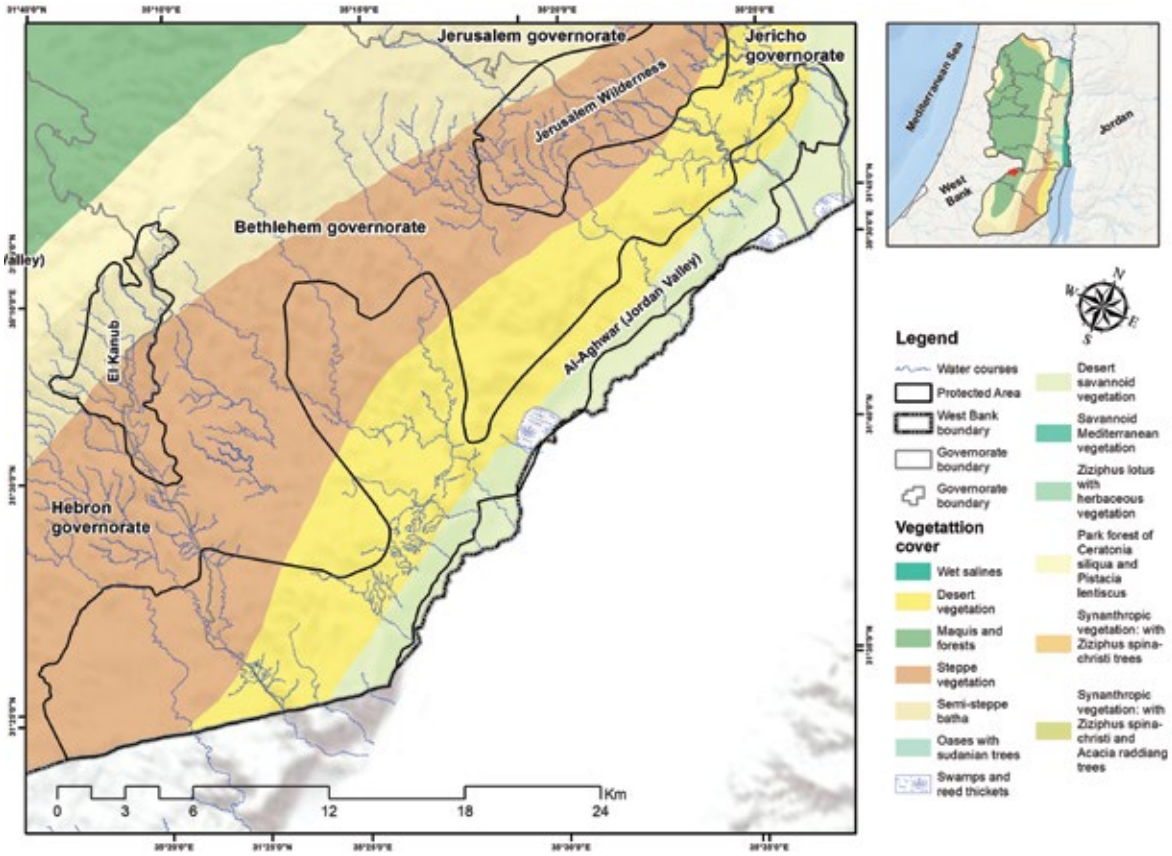


Figure 48: Map of Southern Jordan Valley.

Figure 49: Habitats of Wadi Mallah.

Biodiversity of Al Aghwar

The new area includes in its midst a wetland (Basset Wadi Al Mallaha) that has not been well studied however, an initial investigation has revealed the presence of the following plant species; *Anabasis articulata, Rumex sp., Avena sp., Arthrocnemum macrostachyum, Hordeum spontaneum, Minuartia or Spergularia sp., Suaeda fruticosa* which is uncommon, and grows only in the Jordan Valley and the Dead Sea area. Finally, Cynomorium coccineu, a parasitic rare plant was recorded.

Elsewhere plant speces such as *Allium qasyunense, Amaranthus palmeri, Arthrocnemum macrostachyum, Arundo donax, Atriplex halimus, Atriplex leucoclada, Chlamydophora tridentata, Cistanche tubulosa, Corchorus trilocularis, Dianthus strictus, Hymenolobus procumbens, Juncus acutus, Lamarckia aurea, Mesembryanthemum nodiflorum, Nitraria retusa, Pimpinella cretica, Prosopis farcta, Salsola vermiculata, Sphenopus divaricatus, Suaeda aegyptiaca, Suaeda monoica* and *Tamarix jordanis* were found..

5.20 Umm er Rihan (IV)

Umm er Rihan protected area is located within the borders of the Governorate of Jenin and covers an area of 3.71 km^2, (see Figures -50-51). This is the only area where no field work has been conducted since it occurs between the Green Line and the segregation and annexation wall. However, from the BioGIS, GBIF and iNaturalist literature, as well as remote sensing,, it is very clear that the area has rich Biodiversity, natural Mediterranean forest with high canopy cover. The main tree species are oak both *callprinus* and *boissieri* and *Pistaci palestinena*, and carobs. The borders were adjusted to merge the two areas within this PA that were separate and to include the whole forest within the Green Line..

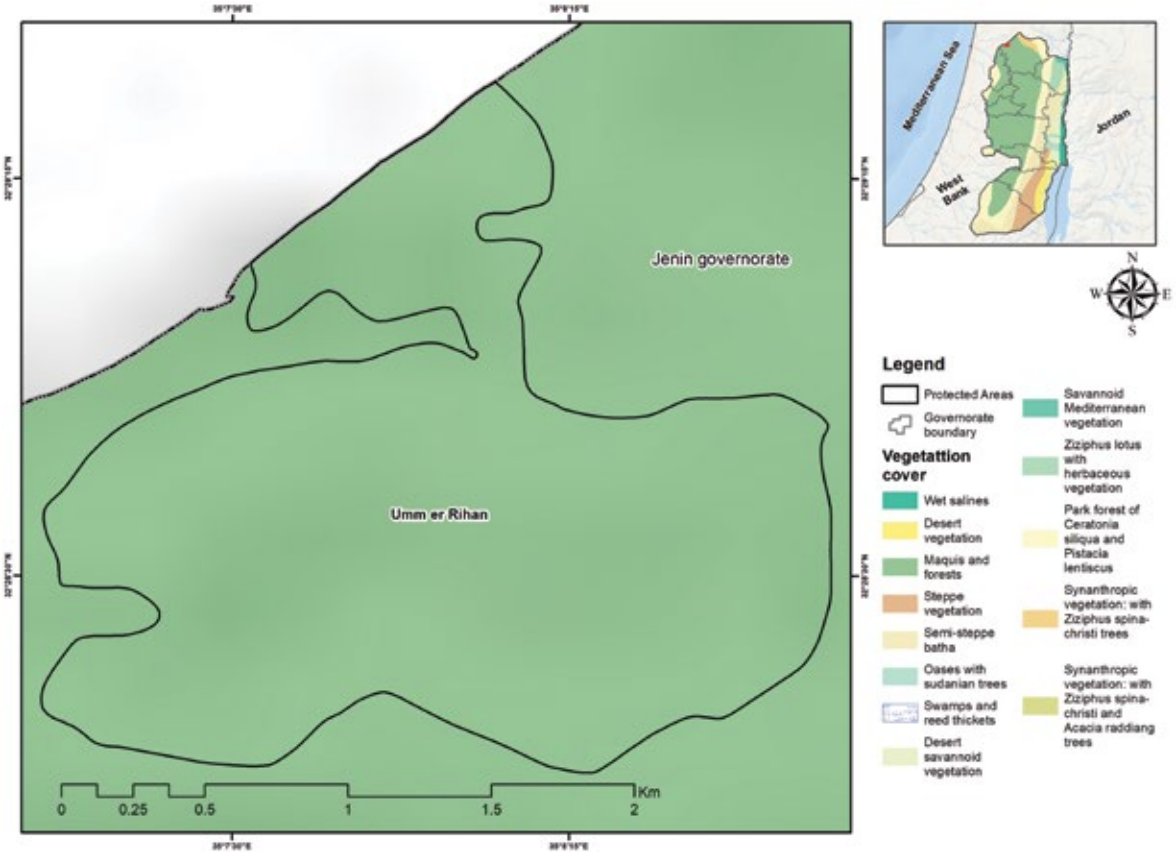


Figure 50: Map of Umm er Rihan.

Figure 51: Habitat of Umm er Rihan.

Biodiversity of Umm er Rihan

Flora

Many common shrubs can be seen in the forest such as *Calicotome villosa, Styrax officinalis and, Lonicera etrusca*. The assessment recorded *Tulipa agenensis*, orchids, and other rare and threatened plants. A complete botanical survey must be carried out. There are also interesting bryophystes some of which are not found elsewhere in the West Bank: *Bryum torquescens, Fissidens incurvus, Oxystegus tenuirostris, Scorpiurium deflexifolium, Tortella nitida* and *Tortella tortuosa*, (see Table 45).

Table 45: Keystone plant species in Umm er Rihan.

Family	Species	IUCN status
Anacardiaceae	*Pistacia palaestina*	LC
Compositae	*Bellis sylvestris*	-
Fagaceae	*Quercus calliprinos*	-
Fagaceae	*Quercus boissieri*	-
Liliaceae	*Tulipa agenensis*	LC

Fauna

Among the birds, Bubo bubo, *Buteo buteo, Circaetus gallicus, Clamator glandarius, Egretta garzetta, Erithacus rubecula, Falco tinnunculus, Garrulus glandarius, Nectarinia osea, Pycnonotus xanthopygos, Streptopelia decaocto, Sylvia atricapilla,* and *Turdus merula* were noted, (see Table 46).

Table 46: Keystone bird species in Umm er Rihan.

Family	Species	IUCN status
Accipitridae	*Buteo buteo*	LC
Phasianidae	*Alectoris chukar*	LC
Strigidae	*Athene noctua*	LC
Strigidae	*Bubo bubo*	LC

5.21 Wadi Al Quff (V)

Wadi Al Quff protected area is located within the borders of the Governorate of Hebron and covers an area of 3.46 km^2, (see Figures 52-53). This is a *Quercus calliprinos* woodland on limestone along with with *Pinus halepensis* cultivated trees. Its very interesting fauna and flora that is well studied. The PA is mainly threatened by urban expansion from Tarqumiya, Bayt Kahel and Halhul areas. The agricultural lands and built-up areas were excluded from the PA upon border modification. There are detailed reports on the very rich flora and fauna of the area as well as one published paper and a series of papers on the threats and potential management plan published in the Jordan Journal of Natural History https://www.palestinenature.org/conservation/JJNH3-edit-final-pages.pdf

Wadi al Quff is the only area in the State of Palestine which is listed on the IUCN Green List (Hockings et al., 2019: https://iucngreenlist.org/country/palestine).

Simple interventions can help conserve and protect the habitats of plants like orchids, *Allium carmeli, Salvia indica, Clematis cirrhosa*, for birds like *Circaetus gallicus* and mammals like bats, porcupines, *Vormela peregusna* and reptiles like *Ophisops elegans*.

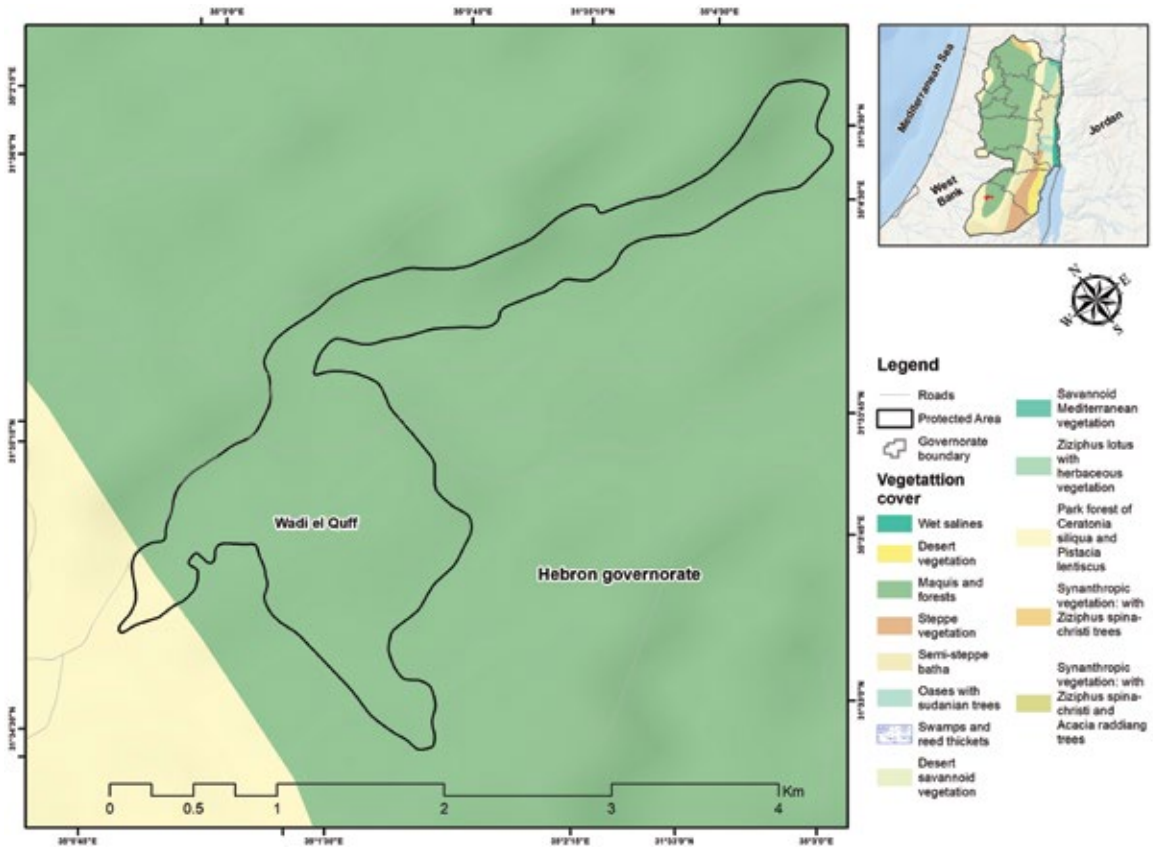


Figure 52: Map of Wadi Al Quff.

Figure 53: Habitats of Wadi Al Quff.

Biodiversity of Wadi Al Quff

Table 47 shows some key plant species in this site. It includes two orchids.

Table 47: Keystone species of plants in Wadi Al Quff.

Family	Species	IUCN status
Amaryllidaceae	*Allium carmeli*	NT
Compositae	*Helichrysum sanguineum*	-
Ericaceae	*Arbutus andrachne*	LC
Lamiaceae	*Salvia indica*	-
Orchidaceae	*Orchis anatolica*	LC
	Orchis galilaea	LC
Pinaceae	*Pinus halepensis*	LC
Ranunculaceae	*Clematis cirrhosa*	-

Three vertebrate species which are considered as key species were recorded from this site, (see Table 48).

Table 48: Keystone species of vertebrates in Wadi Al Quff.

Family	Species	IUCN status
Accipitridae	Circaetus gallicus	LC
Lacertidae	*Ophisops elegans*	LC
Mustelidae	*Vormela peregusna*	VU

5.22 Wadi ed Dilb (VI)

Wadi ed Dilb protected area is located within the borders of the Governorate of Ramallah and Al Bireh and covers an area of 1.60 km^2, (see Figures 54-55). The expansion of the settlements in this area is clearly the main reason for designating the borders of this PA.

http://poica.org/2013/07/the-re-classification-of-nahal-shilo-nature-reserve-for-the-favor-of-beit-arye-settlement/ While most of the local species can be found in other Mediterranean climate areas, it is believed that the area needs a protective measures as it is a protected landscape in the sprawling metropolitan area of Ramallah - the de facto capital of the area of the West Bank under Palestinian control. The borders are adjusted to allow for human development in a way that preserves the most vulnerable cluster of biodiversity which is to the west.

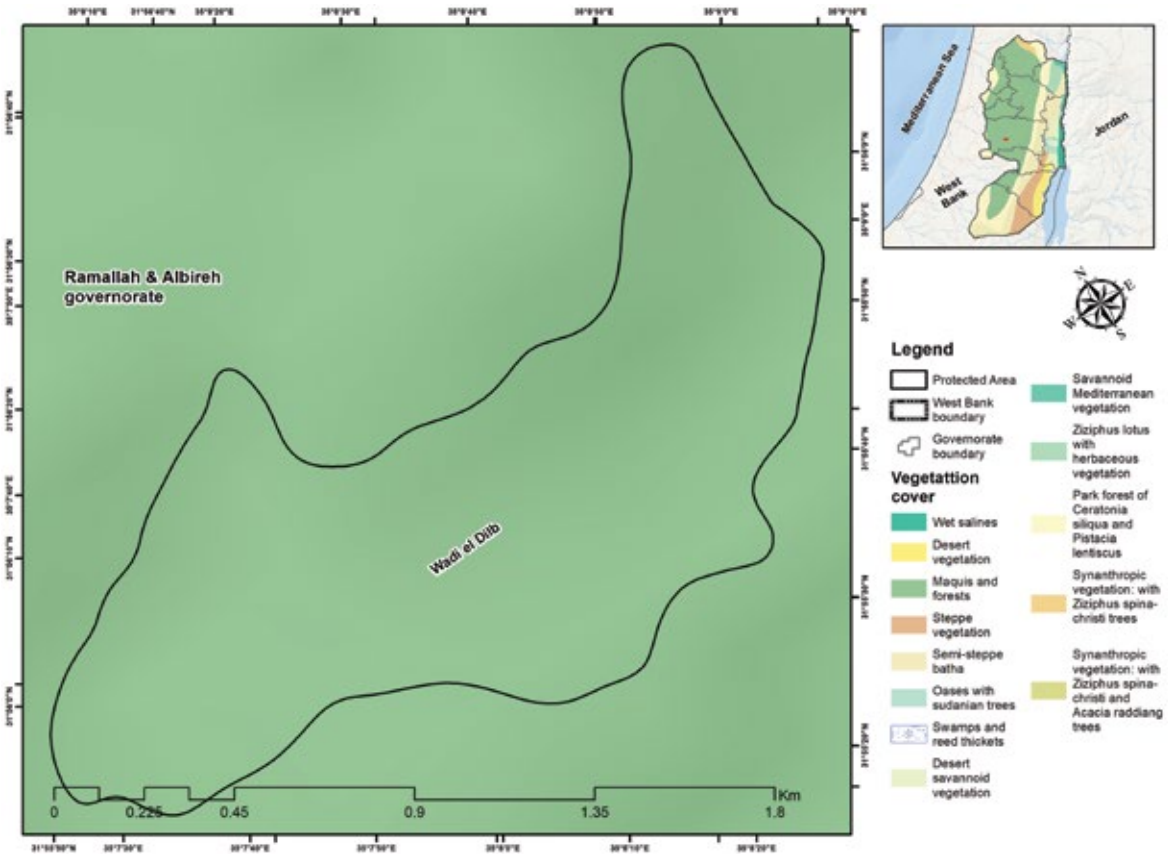


Figure 54: Map Wadi ed Dilb.

Figure 55: Habitats of Wadi ed Dilb.

Biodiversity of Wadi ed Dilb

Six species of birds which are considered as key species were reported from this site, (see Table 49).

Table 49: Key bird species reported from Wadi ed Dilb.

Family	Species	IUCN status
Accipitridae	*Buteo buteo*	LC
	Buteo rufinus	LC
Laniidae	*Lanius nubicus*	LC
Phasianidae	*Alectoris chukar*	LC
Strigidae	*Athene noctua*	LC
	Bubo bubo	LC

5.23 Wadi el Qilt (IV)

Wadi al Qelt protected area is located within the borders of the Governorate of Ramallah, Al Bireh, Jerusalem and Jericho and covers an area of 28.64 km^2, (see Figures 56-57). Wadi el Qilt constitutes a contact area between the Mediterranean basin and the semi-desert region, which a suitable environment for semi-desert plants in addition to the biodiversity around the three water springs (Fawwar, Fara, Qelt). The heritage value is within the protected lands, therefore, the borders were adjusted. The Mikhmas, Hizma and Jaba' sides have been modified, given the environment in that area is similar to the rest of the protected areas, and given that the available urban expansion towards the reserve due to the settlement expansion in the area.

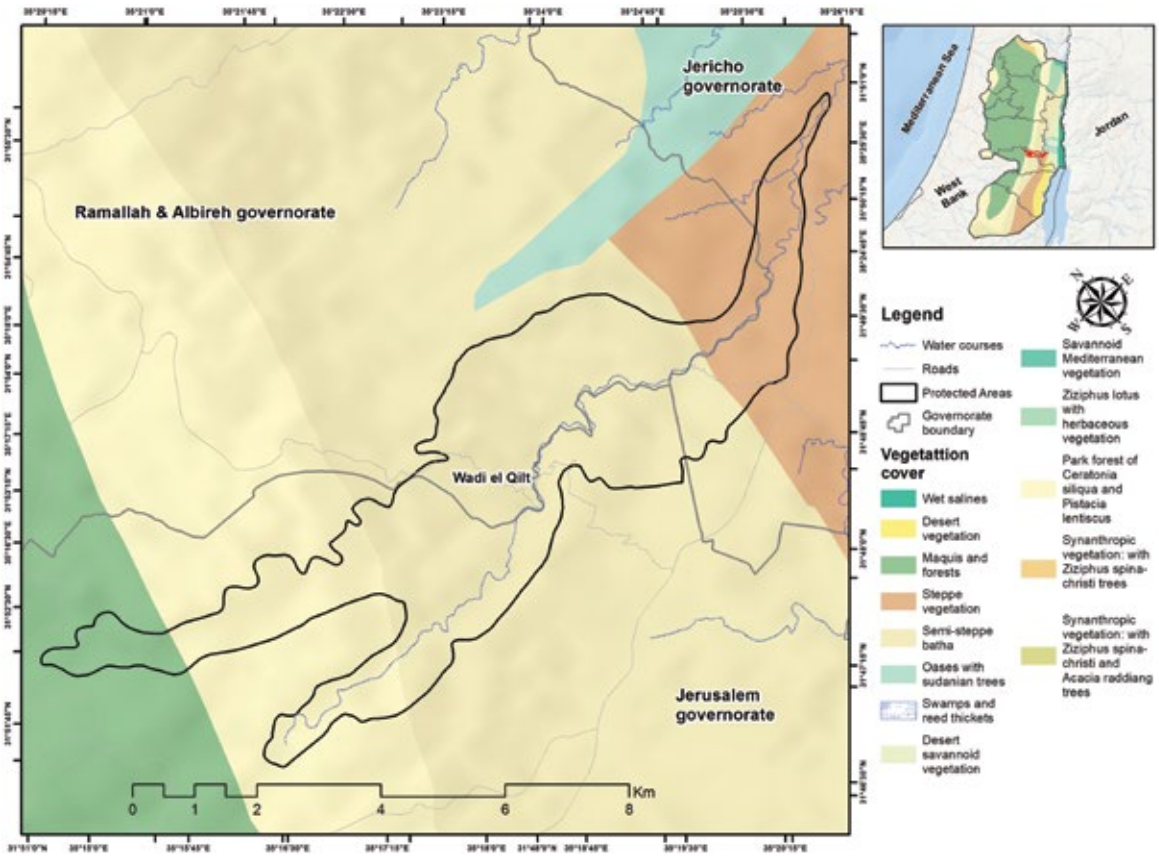


Figure 56: Map of Wadi al Qelt.

Figure 57: Habitats of Wadi al Qelt.

Biodiversity of Wadi el Qilt

Rich biodiversity includes the following plants: *Tulipa systola, Allium aschersonianum, Allium hirochunticum, Ziziphus spina-christi, Pheonix dactylifera, Abutilon sp., Cleome arabica, Urtica pilulifera, Pluchea dioscoridis(R), Prietaria judiaca, Podonosma orientalis, Kickxia judaica, Cucumis prophetarum (RR), Moringa peregrina (O), Blephris ciliaris, Carthamus sp., Reseda alba, Pteranthus dichotomus, Gynarrhena micranthus, Emix spinosa, Atriplex sp., Muscari sp., Rhus tripartita, Rumex cyprium Solanum incanum RR, Anchusa milleri R, Salsola vermiculata, Erodium neuradifolium R, Silene colorata, Medicago sp.* and *Trichodesma boissierithe*. Table 50 lists the keystone species of plants in the area.

Table 50: Keystone species of plants in Wadi al Qelt.

Family	Species	IUCN status
Amaryllidaceae	*Allium hierochuntinum*	-
Brassicaceae	*Alyssum marginatum*	-
Caryophyllaceae	*Petrorhagia zoharyana*	-
	Silene rubella	
	Suaeda palaestina	-
	Onopordum jordanicolum	-
	Sonchus suberosus	-
Chenopodiaceae	*Cyperus eleusinoides*	-
Compositae	*Ephedra alata*	LC
Euphorbiaceae	*Euphorbia phymatosperma*	-
Gramineae	*Sphenopus divaricatus*	LC
Lamiaceae	*Lallemantia iberica*	-
	Salvia syriaca	-
Liliaceae	*Bellevalia longipes*	-
Malvaceae	*Abutilon indicum*	-
Moringaceae	*Moringa peregrina*	LC
Nyctaginaceae	*Boerhavia repens*	-
Papilionaceae	*Lathyrus gorgonei*	LC
Rosaceae	*Amygdalus arabica*	NT
Rubiaceae	*Galium philistaeum*	-
Scrophulariaceae	*Kickxia judaica*	-
Solanaceae	*Solanum sinaicum*	-

Birds include the Eurasian Oystercatcher, *Haematopus ostralegus*, Bearded Vulture, Gypaetus barbatus, Pallid Harrier, *Circus macrourus*, desert partridge, desert larks, wheatears, and Tristram's grackle, (see Table 51) which lists 63 bird species reported from this site.

Table 51: Bird species Wadi al Qlet.

Family	Species	IUCN status
Accipitridae	*Aquila chrysaetos*	LC
	Buteo buteo	LC
	Buteo rufinus	LC
	Circus macrourus	LC
	Hieraaetus fasciatus	LC
	Neophron percnopterus	EN
Alaudidae	*Galerida cristata*	LC
	Lullula arborea	LC
	Melanocorypha calandra	LC
Anatidae	*Anas platyrhynchos*	LC
Apodidae	*Apus affinis*	LC
Ardeidae	*Ardeola ralloides*	LC
Burhinidae	*Burhinus oedicnemus*	LC
Ciconiidae	*Ciconia ciconia*	LC
Columbidae	*Columba livia*	LC
	Streptopelia turtur	VU
Coraciidae	*Coracias garrulus*	LC
Corvidae	*Corvus corax*	LC
Cuculidae	*Cuculus canorus*	LC
Emberizidae	*Emberiza caesia*	LC
	Emberiza hortulana	LC
	Emberiza striolata	LC
Falconidae	*Falco naumanni*	LC
	Falco pelegrinoides	LC
	Falco subbuteo	LC
Fringillidae	*Carduelis carduelis*	LC
	Linaria cannabina	LC
	Serinus syriacus	VU
Glareolidae	*Cursorius cursor*	LC
Hirundinidae	*Ptyonoprogne rupestris*	LC
Laniidae	*Lanius collurio*	LC

Family	Species	IUCN status
	Lanius nubicus	LC
	Lanius senator	NT
Meropidae	*Merops apiaster*	LC
Motacillidae	*Anthus campestris*	LC
	Anthus similis	LC
	Motacilla alba	LC
Muscicapidae	*Muscicapa striata*	LC
	Oenanthe deserti	LC
	Oenanthe finschii	LC
	Oenanthe hispanica	LC
	Oenanthe isabellina	LC
	Oenanthe oenanthe	LC
Oriolidae	*Oriolus oriolus*	LC
Phasianidae	*Alectoris chukar*	LC
	Coturnix coturnix	LC
Pteroclididae	*Pterocles orientalis*	LC
Rallidae	*Fulica atra*	LC
Strigidae	*Athene noctua*	LC
	Bubo bubo	LC
Sylviidae	*Acrocephalus arundinaceus*	LC
	Acrocephalus stentoreus	LC
	Cisticola juncidis	LC
	Curruca conspicillata	LC
	Hippolais languida	LC
	Hip, polais olivetorum	LC
	Locustella luscinioides	LC
	Phylloscopus collybita	LC
	Scotocerca inquieta	LC
Turdidae	*Cercotrichas galactotes*	LC
	Monticola solitarius	LC
Tytonidae	*Tyto alba*	LC
Upupidae	Upupa epops	LC

Fourteen species of mammals were reported from Wadi el Qilt, (see Table 52). This includes 10 bat species, three carnivores and the endangered *Gazella gazella*.

Table 52: Mammal species Wadi al Qelt.

Family	Speceis	IUCN status
Bovidae	*Gazella gazella*	EN
Emballonuridae	*Taphozous perforatus*	LC
Felidae	*Caracal caracal*	LC
	Felis silvestris	LC
Hyaenidae	*Hyaena hyaena*	NT
Molossidae	*Tadarida teniotis*	LC
Rhinolophidae	*Rhinolophus clivosus*	LC
	Rhinolophus hipposideros	LC
Rhinopomatidae	*Rhinopoma cyctops*	-
	Rhinopoma hardwickii	LC
	Rhinopoma microphyllum	LC
Vespertilionidae	*Eptesicus bottae*	LC
	Otonycteris hemprichii	LC
Vespertilionidae	*Pipistrellus kuhlii*	LC

In addition, two amphibians and two lizards were also recorded from Wadi el Qilt, see table (53).

Table 53: Reptiles and amphibians species at Wadi al Qelt.

Family	Species	IUCN status
Bufonidae	*Bufo viridis*	LC
Hylidae	*Hyla savignyi*	LC
Scincidae	*Ophiomorus latastii*	DD
	Ablepharus kitaibelii	LC

5.24 Wadi Ein ez Zarqa el Elwi (IV)

Wadi Ein ez Zarqa el Elwi protected area is located within the borders of the Governorates of Ramallah, Al Bireh, Salfeit and covers an area of 13.22 km^2, (see Figures 58-59). The reserve constitutes one of the relatively largest reserves in the West Bank, and Its environment, whether in places rich in vegetation or close to Deir Ballut with light vegetation cover, constitutes an entire zone abundant in biodiversity. Despite that, the borders have been modified from the side of Kafr al Dik and Deir Ghassaneh in view of urban expansion, agricultural lands, the problem of waste in that area, and finally, the limited structural plans of the villages of Kafr al Dik, Deir Ghassaneh, and Broqin. The borders have been modified to allow urban expansion towards that area. The borders on the Deir Ballut side were also modified to permit urban expansion from that side due to the lack of important biodiversity in it and the prevailing cover is agricultural lands with the expansion of the borders from the southwestern side to include some areas that require further study from Al Leban Al Gharbeya. There is a detailed survey and management plan for the area. (PMNH, 2018): https://www.palestinenature.org/conservation/WadiZarqaTechnical.pdf

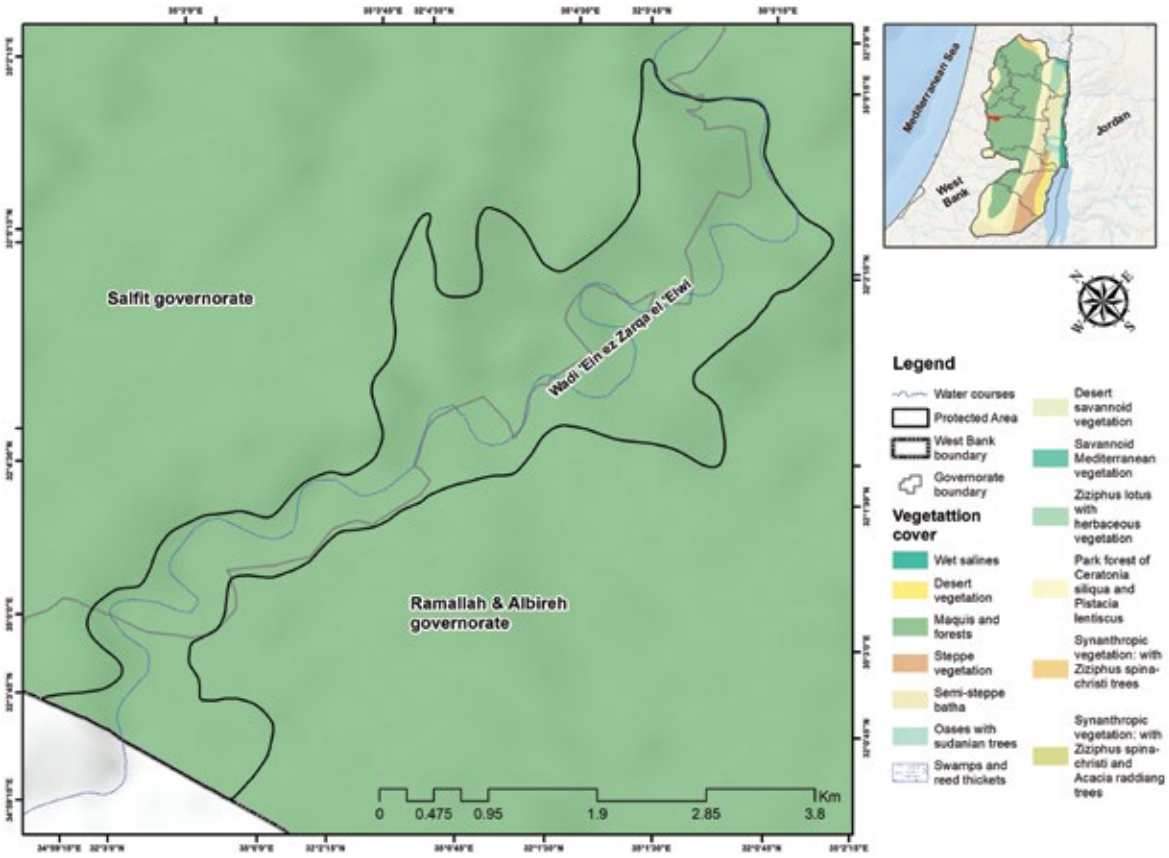


Figure 58: Arial view of Wadi Ein ez Zarqa el Elwi showing previous and modified borders.

Figure 59: Habitats of Wadi Ein ez Zarqa el Elwi.

Biodiversity of Wadi Ein ez Zarqa el Elwi

Twenty bird species have been recorded from this site, (see Table 54). *Streptopelia turtur* and *Lanius senator* are of conservation status.

Table 54: Key bird species of Wadi Ein ez Zarqa el Elwi.

Family	Species	IUCN status
Anatidae	*Anas platyrhynchos*	LC
Accipitridae	*Buteo buteo*	LC
	Buteo rufinus	LC
Alaudidae	*Galerida cristata*	LC
	Lullula arborea	LC
Columbidae	*Streptopelia turtur*	VU
	Columba livia	LC
Cuculidae	*Cuculus canorus*	LC
Fringillidae	*Linaria cannabina*	LC
	Carduelis carduelis	LC
Laniidae	*Lanius nubicus*	LC
	Lanius senator	NT
Muscicapidae	*Oenanthe finschii*	LC
	Oenanthe oenanthe	LC
Phasianidae	*Alectoris chukar*	LC
Strigidae	*Athene noctua*	LC
	Bubo bubo	LC
Sylviidae	*Cisticola juncidis*	LC
Turdidae	*Monticola solitarius*	LC
Upupidae	*Upupa epops*	LC

5.25 Wadi Fasayil (II)

Habitat is on semi-steepe slope in the Irano-Turanian zone with Batha (dwarf shrubs) and Christ's throne and acacia trees.. Plants include *Ziziphus spina-christi, Vitex agnus-castus, Mentha longifolia, Pluchea dioscoridis, Cynodon dactylon, Pennisetum divisum, Cyperus longos, Typha angustata*. Noted birds: Tristram Starling, White Throated Kingfisher, Kestrel, White Stork, Blackstart, Golden Eagle and Black Kite. The assessment team did not adjust borders

and the area includes part of the Marxan designated area. The nature of the area is distinctive in addition to the presence of the water spring and the water gatherings, which constitute a distinctive environment for the living organisms in the area, but the area needs more studies of biodiversity. No changes have been made on the borders of the reserve, (see Figures 60-61).

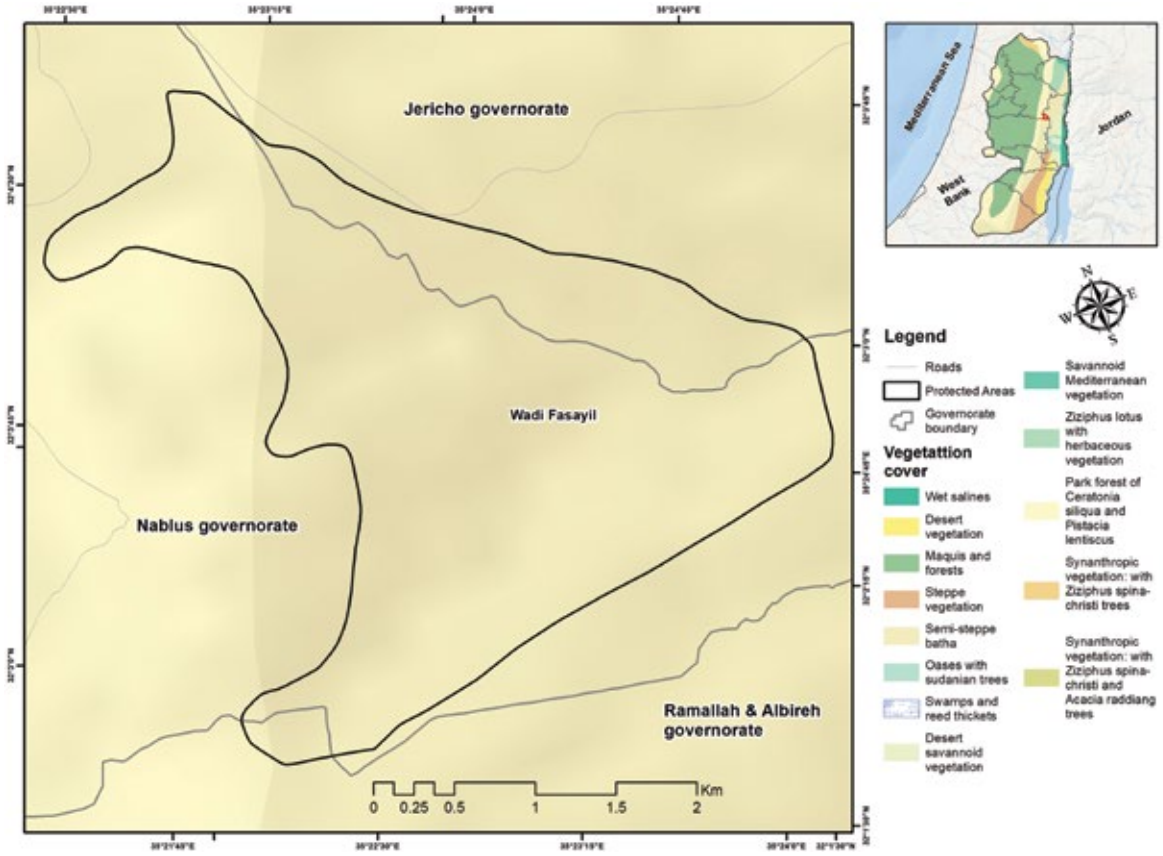


Figure 60: Arial view of Wadi Fasayil.

Figure 61: Habitats of Wadi Fasayil.

Biodiversity of Wadi Fasayil

Four plant species are considered as key species, (see Table 55).

Table 55: Key plant species recorded from Wadi Fasayil.

Family	Species	IUCN status
Compositae	*Cardopatium corymbosum*	-
Caryophyllaceae	*Silene oxyodonta*	-
Euphorbiaceae	*Euphorbia phymatosperma*	-
Rubiaceae	*Callipeltis factorovskyi*	-

A total of 14 species of birds are viewed as key species, (see Table 56). *Streptopelia turtur* have conservation status.

Table 56: Key bird species recorded from Wadi Fasayil.

Family	Species	IUCN status
Accipitridae	*Buteo buteo*	LC
	Buteo rufinus	LC
Alaudidae	*Galerida cristata*	LC
Columbidae	*Streptopelia turtur*	VU
	Columba livia	LC
Corvidae	*Corvus rhipidurus*	LC
Cuculidae	*Cuculus canorus*	LC
Fringillidae	*Carduelis carduelis*	LC
Laniidae	*Lanius nubicus*	LC
Phasianidae	*Alectoris chukar*	LC
Strigidae	*Athene noctua*	LC
	Bubo bubo	LC
Sylviidae	*Scotocerca inquieta*	LC
Upupidae	*Upupa epops*	LC

One species of reptiles, *Ophiomorus latastii,* was recorded from this site.

5.26 Wadi Gaza (VI)

it is believed that it is important to say something about this critical ecosystem in the State of Palestine, (see Figure 62). As noted by Ghattas et al., (2015) “The Coastal Region constitutes the main ecosystem in Gaza. Most relevant species are *Suaeda splendens, Salsola soda, Aster tripolium, Atriplex hasitatata, Ipomaea stolonifera, Salsola kali and Euphorbia peplis. Tamarix nilotica, Artemisia monosperma* and *Ammopila arenaria* are the main sand dune-fixation species. Most of the natural forests in Gaza were sparsely planted for fixation of sand dunes and are classified as planted forests.” http://www.mahmiyat.ps/en/park/about?park_id=15.

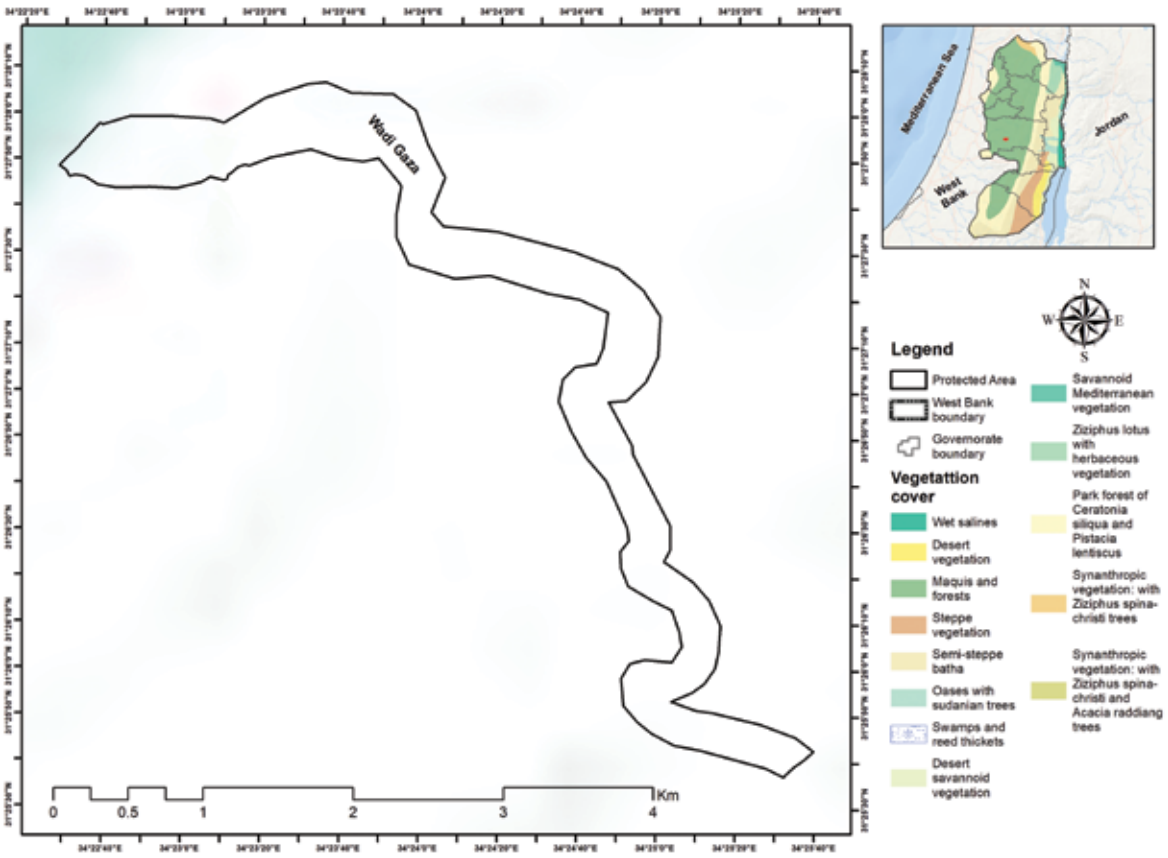


Figure 62: Arial view of Wadi Gaza.

5.27 Wadi Jannata (II)

Wadi Jannata protected area is located within the borders of the Governorates of Ramallah and Al Bireh and covers an area of 2.80 km^2, (see Figures 63-64). This is a rich area where scoring showed high values for biodiversity, possibility due to proper management and importance given to protect habitat that is unique with some interesting flora and fauna. The borders are adjusted slightly on the east side to include a small area where there are rare plants. There are two management plans available online:: https://app.luminpdf.com/viewer/6300a61bfb84bbb76982aa5f and Management Plan for Wadi Jannata Protected Area by Roubina Ghattas - Final Version - 30 March 2018.docx

The reserve is surrounded by the villages of Deir Abu Mishaal, Shuqba, Jamala, Betalo, and Deir Nizam, which suffer from settlement expansion at the expense of Palestinian lands and at

the expense of the protected areas. In addition, some surrounding villages experince hardships due to limited ability for expansion because of settlement and the possibility of expansion towards the borders of the reserve. Consequently, the borders of the reserve were changed to allow the expansion of the structural plans of some Palestinian villages without affecting the biodiversity in the reserve or the ecosystem services within. Some studies have been carried out on the biodiversity of the reserve, however, further studies of the biodiversity in the region. In addition to the implementation of the administration plan that has been developed for the area and the management of the reserve by the neighboring local authorities.

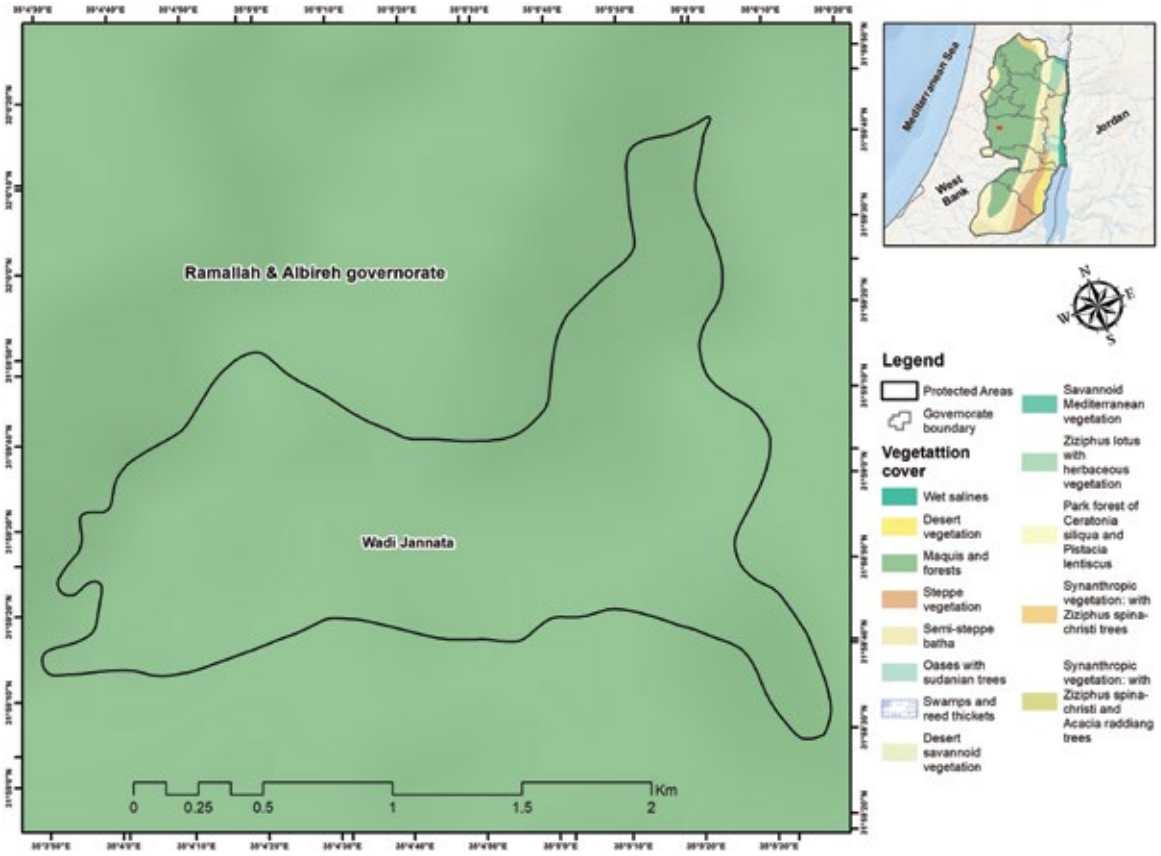


Figure 63: Map of Wadi Jannata.

Figure 64: Habitats of Wadi Jannata.

Biodiversity of Wadi Jannata

Eighteen bird species have been recorded from this site, (see Table 57). Four species have conservation status including *Neophron percnopterus* (EN), *Streptopelia turtur (VU), Falco tinnunculus* (EN), and *Pycnonotus xanthopygos* (VU).

Table 57: Key bird species recorded from Wadi Jannata.

Family	Species	IUCN status
Accipitridae	*Aquila nipalaensis*	LC
	Neophron percnopterus	EN
Apodidae	*Apus apus*	LC
Cisticolidae	*Prinia gracilis*	LC
Columbidae	*Streptopelia turtur*	VU
Emberizidae	*Emberiza hortulana*	LC
Falconidae	*Falco naumanni*	LC
Falconidae	*Falco naumanni*	LC
	Falco tinnunculus	EN
Fringillidae	*Carduelis carduelis*	LC
	Serinus serinus	LC
Muscicapidae	*Cercotrichas galactotes*	LC
Pelecanidae	*Pelecanus onocrotalus*	LC
Phasianidae	*Coturnix coturnix*	LC
Pycnonotidae	*Pycnonotus xanthopygos*	VU
Strigidae	*Asio otus*	LC
Strigidae	*Bubo bubo*	LC

Seven species of mammals are known to occur in this site, (see Table 58). Two are of conservation stratus including *Gazella gazella* and *Hyaena hyaena.*

Table 58: Key mammals species recorded from Wadi Jannata.

Family	Species	IUCN status
Bovidae	*Gazella gazella*	EN
Canidae	*Canis aureus*	LC
	Vulpes vulpes	LC
Felidae	*Felis silvestris*	LC
Herpestidae	*Herpestes ichneumen*	LC
Hyaenidae	*Hyaena hyaena*	NT
Mustelidae	*Meles meles*	LC

Nine species of reptiles and one species of amphibians were recorded from this site, (see Table 59).

Table 59: Key reptiles species recorded from Wadi Jannata.

Family	Species	IUCN status
Agamidae	*Stellagama stellio*	LC
Anguidae	*Pseudopus apodus*	LC
Atractaspididae	*Micrelaps muelleri*	LC
Chamaeleonidae	*Chamaeleo chamaeleon*	LC
Colubridae	*Dolichophis jugularis*	LC
	Eirenis rothii	LC
	Hemorrhois nummifer	LC
Gekonidae	*Mediodactylus kotschyi*	LC
Hylidae	*Hyla sp.* (Hyla savignyi)	LC
Scincidae	*Chalcides ocellatus*	LC

Seven plants are considered as key species in this site, (see Table 60).

Table 60: Key plant species reported from Wadi Jannata.

Family	Species	IUCN status
Cyperaceae	*Carex distans*	LC
Cyperaceae	*Schoenus nigricans*	LC
Equisetaceae	*Equisetum ramosissimum*	LC
Gramineae	*Briza minor*	-

Family	Species	IUCN status
Linaceae	*Linum bienne*	-
Ranunculacae	*Clematis flammula*	-
Sinopteridaceae	*Cheilanthus villea*	-
Scrophulariaceae	*Veronica anagallis-aquatica*	LC

5.28 Wadi Qana (II)

Wadi Qana protected area is located within the borders of the Governorates of Salfeit and Qalqilya and covers an area of 15.33 km^2, (see Figures 65-66). Wadi Qana is a rich but heavily impacted habitat mostly by the Jewish settlements that surround the valley and have impacted most hilltops in the area. Nevertheless, there are still many interesting fauna and flora. Over 320 species of mostly mediterranean typical vascular plants are known here. In the buffer zone, a vernal pond ,Birkat Uskar between Jinsafut and Al-Funduk, exists with unique faunaand flora. It is the only place in the West Bank that hosts the Syrian Spade-footed toad *Pelobates syriacus*. The pond has a unique flora with many species not always found elsewhere. More work is needed on management. There is only brief allusion to management of Wadi Qana in the discussion about the management of Birket Uskjar which was designated by the Palestinian Authority as protected in 2019. See also the report on the work in this area: https://www.palestinenature.org/conservation/MRV-Report-Final-Version.pdf

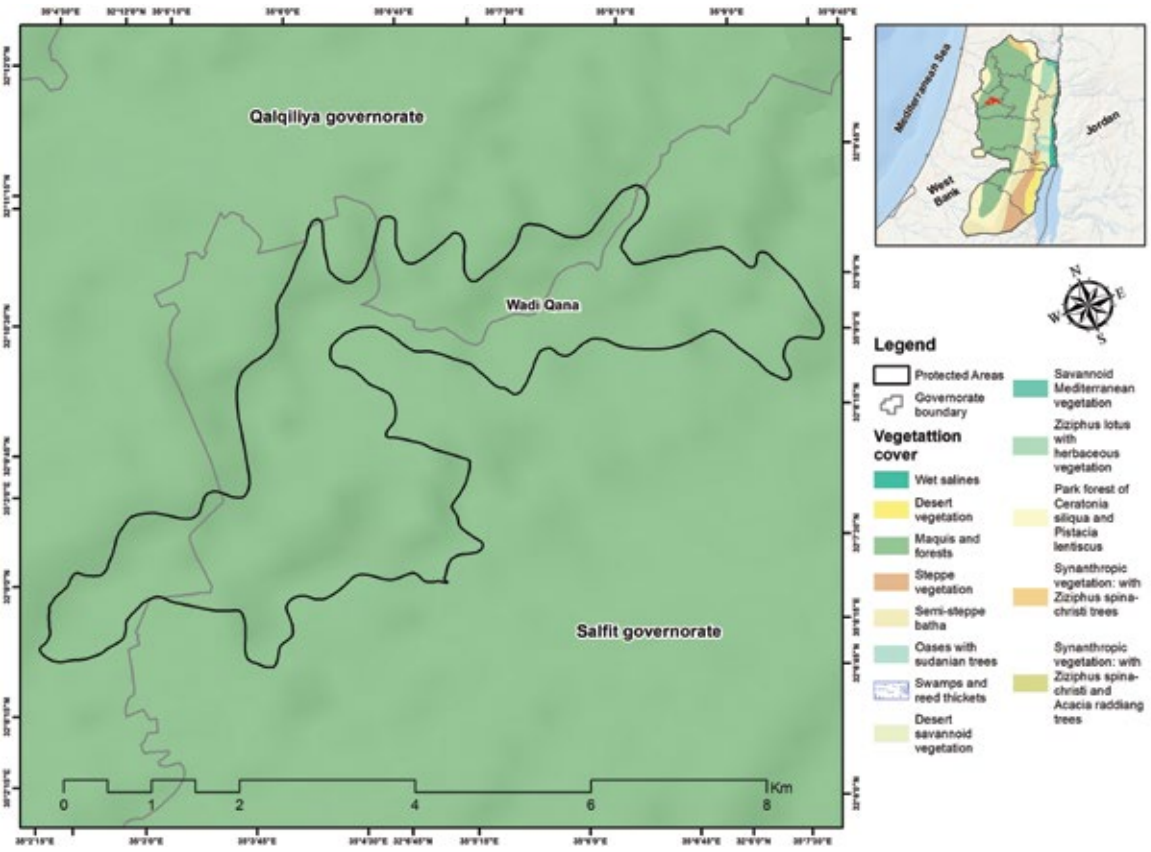


Figure 65: Map of Wadi Qana.

Figure 66: Habitats of Wadi Qana.

Biodiversity of Wadi Qana

Flora

Examples of flora include: *Taraxacum cyprium, Lemna minor R, Crypsis factorovskyi O, Adonis microcarpa, Glebionis segetum, Trigonella berythea, Vicia narbonensis, Convolvulus siculus RR, Ononis biflora RR, Ranunculus peltatus R, Gundelia tournefortii, Trifolium fragiferum RR, Ranunculus muricatus RR, Trifolium physodes RR, Geranium dissectum, Echium glomeratum R, Ranunculus muricatus RR, Carex pachystylis RR, Trifolium repens RR,* and *Hordeum glaucum*. Some key species are listed in Table 61.

Table 61: Key plant species in Wadi Qana.

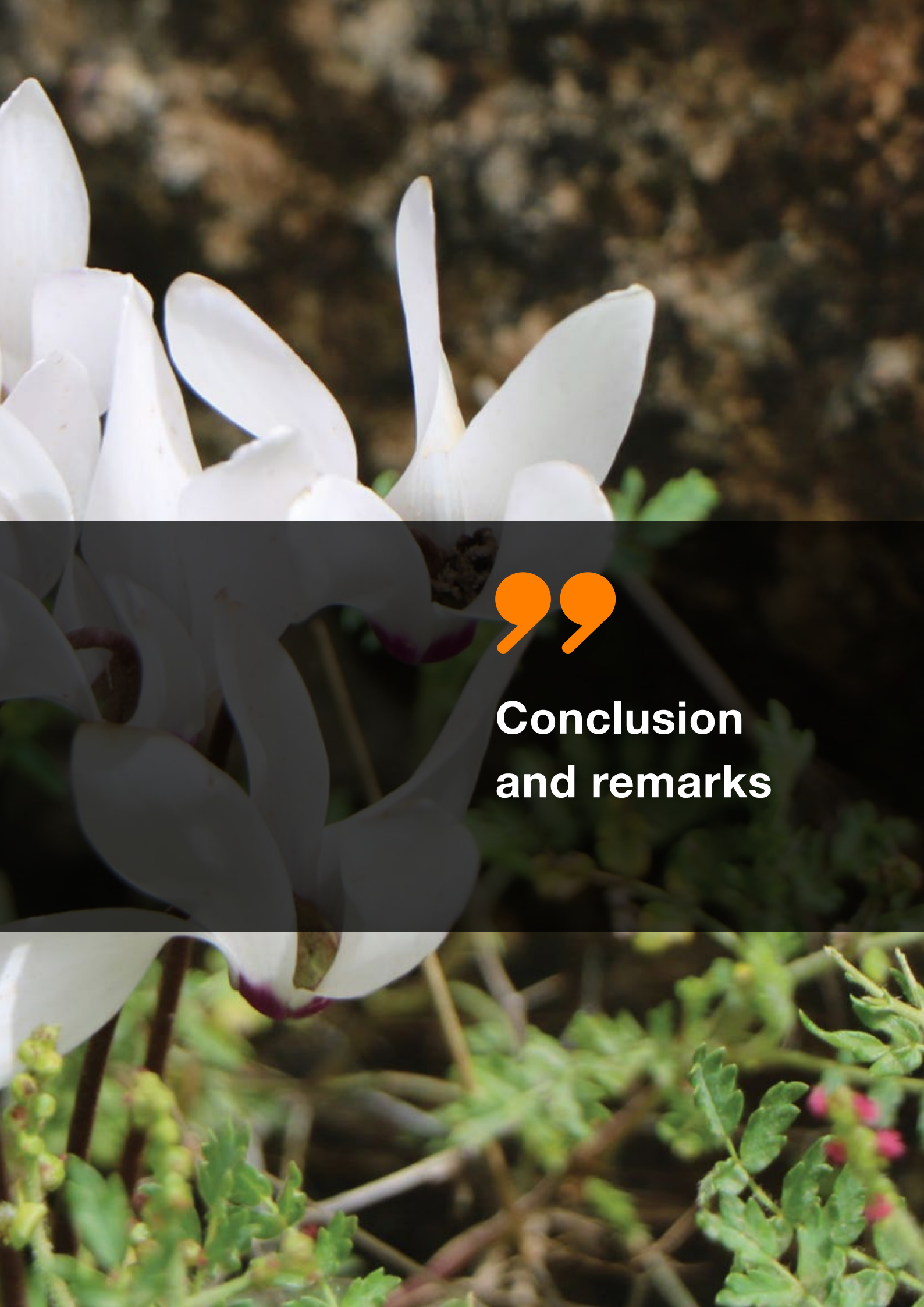
Family	Species	IUCN Status
Compositae	*Bellis sylvestris*	-
Gramineae	*Crypsis factorovskyi*	
Ranunculaceae	*Ranunculus peltatus*	LC

Fifteen species of birds belonging to 13 families have been reported from Wadi Qana, see Table 62. The common tortoise *Testudo graeca* was also reported as was the vesper bat *Pipistrellus kuhlii*

Table 62: Bird species reported from Wadi Qana.

Family	Species	IUCN Status
Accipitridae	*Accipiter nisus*	LC
Anatidae	*Anas platyrhynchos*	LC
	Anas crecca	LC
Ardeidae	*Egretta garzetta*	LC
Columbidae	*Streptopelia turtur*	VU
Emberizidae	*Emberiza hortulana*	LC
Falconidae	*Emberiza hortulana*	LC
Laniidae	*Lanius collurio*	LC
Meropidae	*Merops apiaster*	LC
Motacillidae	*Motacilla alba*	LC
Phasianidae	*Alectoris chukar*	LC
	Lanius collurio	LC
Picidae	*Dendrocopos syriacus*	LC
Strigidae	*Buteo buteo*	LC
Upupidae	*Upupa epops*	LC

6



Conclusion and remarks

6 Conclusion and remarks

6.1 Notes on representation, specific taxa, and habitats

The 27 (28 including Wadi Gaza) areas identified to be included in the new PAN for the State of Palestine cover all vegetation zones, all phytogeographical zones, key habitats, and the two eco-regions identified as part of the critical biodiversity hotspots in the Eastern Mediterranean region (the Conifer-Sclerophylus broad leaf forests and the Jordan River basin habitats, Birdlife International., 2017). If managed well, the PAN can protect the majority of known endangered and threatened species. The PAN terrain includes:

1) Western slopes: (Typocal Mediterranean but also coastal elements near Qalqilya like Wadi Ein Al Zarqa Al Ulwi PA). Protected areas are relatively small by necessity as they are in midst of urban developments and settlement expansions.

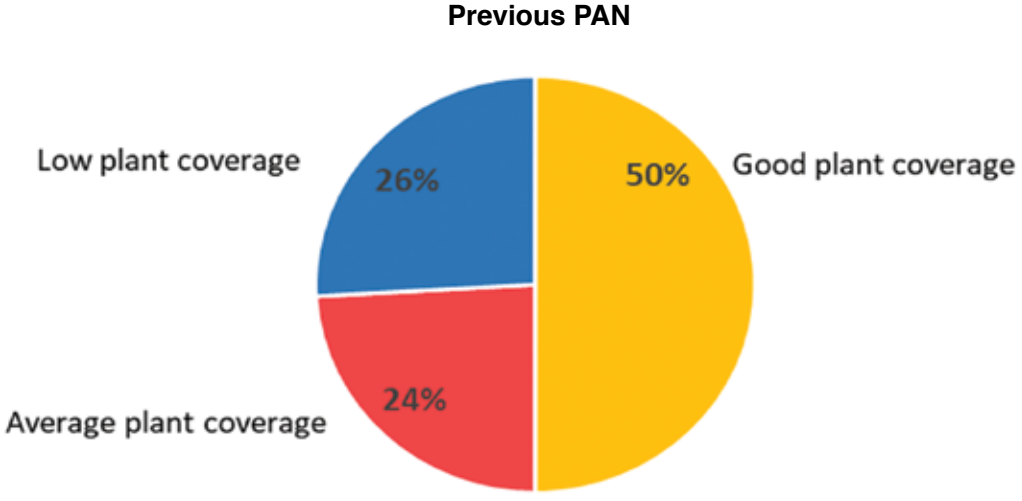
2) Eastern slopes: Unique habitats with transitions from Mediterranean to Irano-Turanian to Saharo-Arabian elements.

3) Jordan Valley area: arid areas with oasis and penetration of Sudanese-Ethiopian elements.

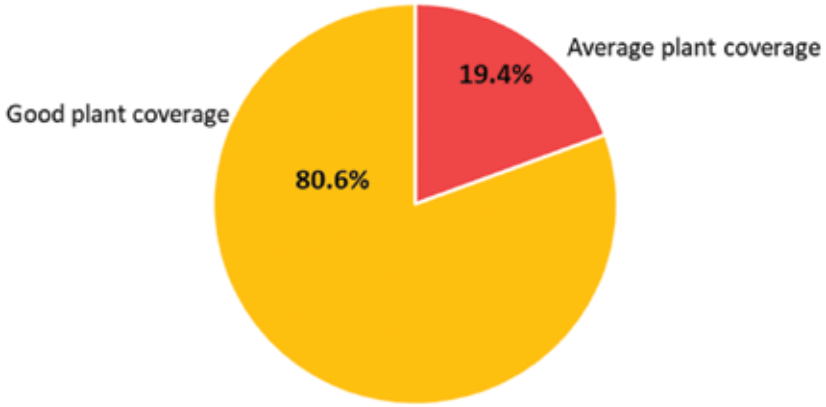
4) Wadi Gaza: coastal areas

Below is the scoring of the 58 evaluated areas compared to the 37, which later consolidated to 28 final PAN for selected categories which illustrate that the new PAN has a better representation and stronger attributes.

Previous plant cover and the new PAN graphs showing increase in representation:

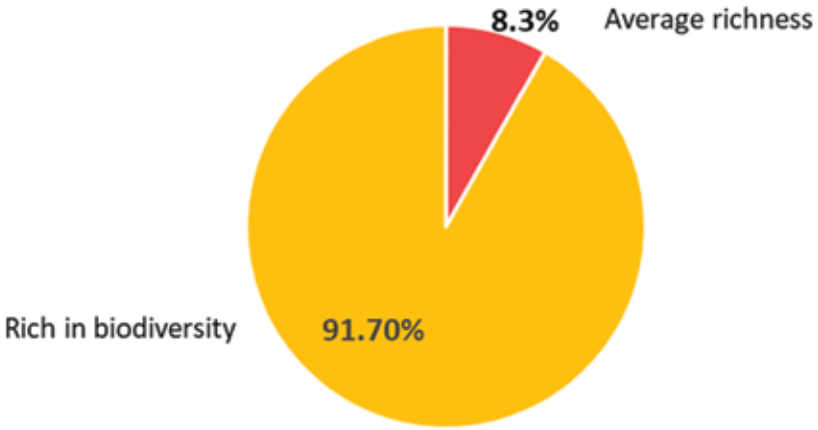


New PAN

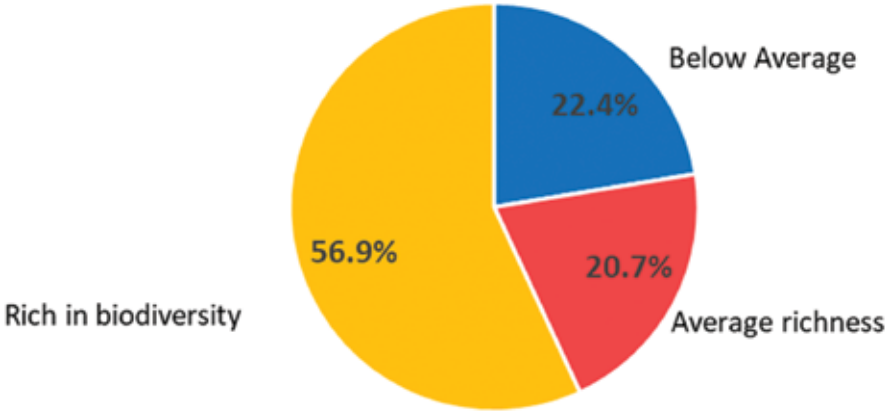


For richness in biodiversity before and the new PAN graphs showing increase in representation:

New PAN

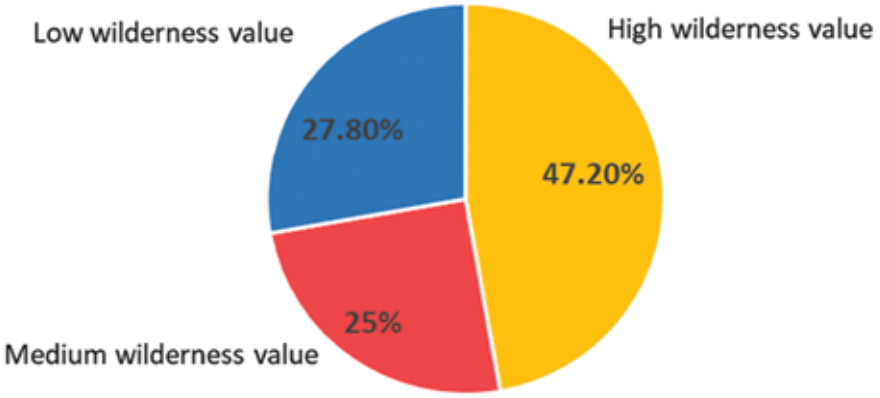


Previous PAN

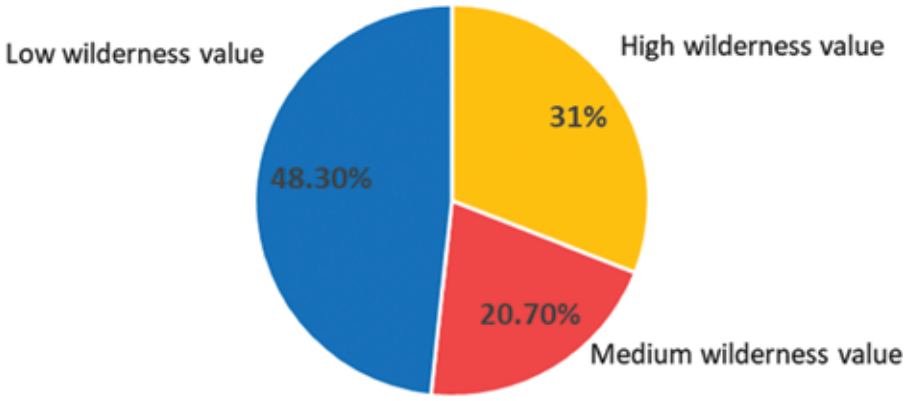


Previous wilderness/wildness value and the new PAN graphs showing increase in representation:

New PAN

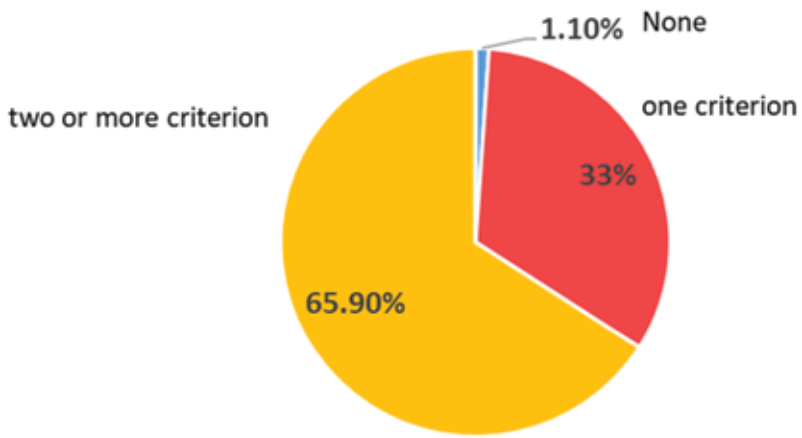


Previous PAN

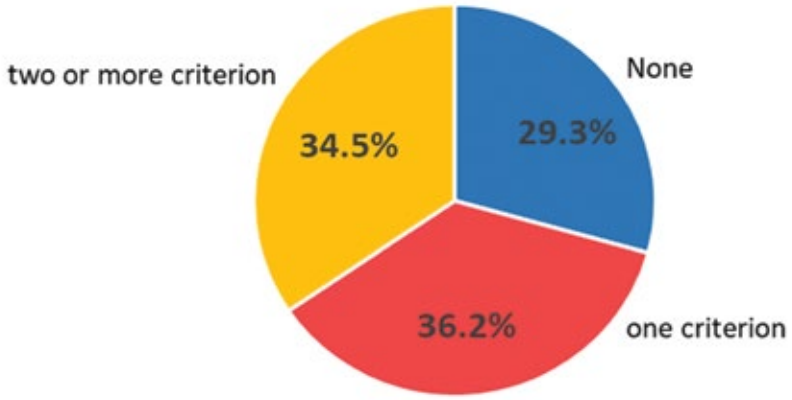


For existing designation as KBA, IBA, IPA, etc, previous and new PAN graphs showing increase in representation:

New PAN

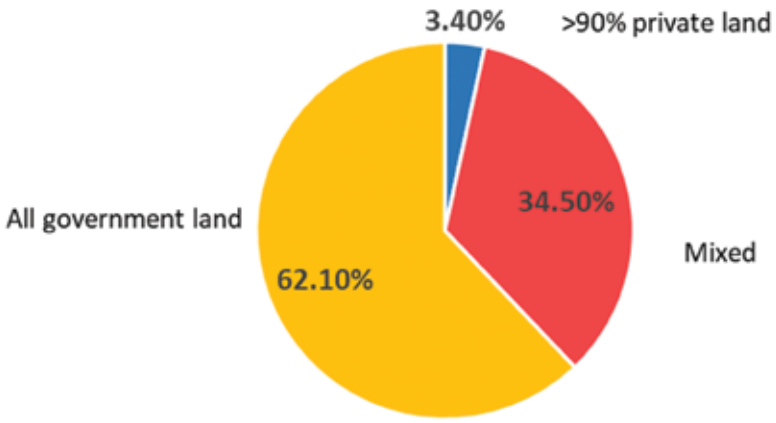


Previous PAN

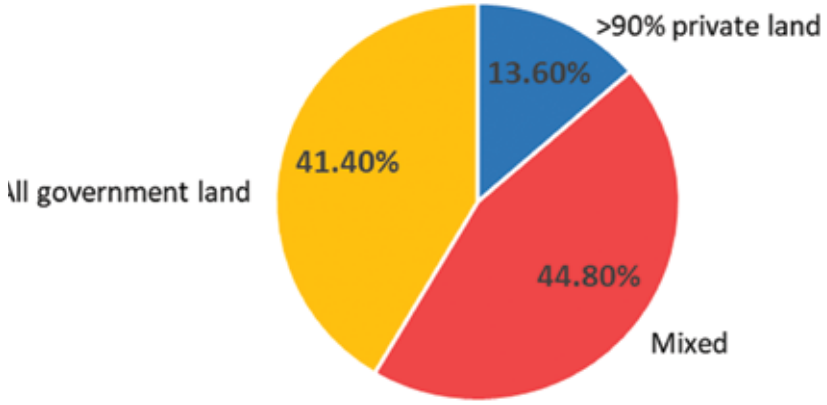


Previous and new land ownership PAN graphs showing increase in representation

New PAN



Previous PAN



Other criteria were also effectively increased via the new PAN including the most important areas like potential/actual ecosystem services and potential for containing threats. While some areas in the new PAN are small, their value in conservation cannot be underestimated (Riva & Fahrig., 2022).

The global system of ecosystem typology is now well developed (https://global-ecosystems.org/) and of those different typologies the following exist in the State of Palestine:

1. Terrestrial
2. T2 Temperate boreal forests and woodlands
3. T3 Shrublands
4. T5 Deserts and semi-deserts
5. T7 Intensive land use biome
6. Marine
7. Marxan 4 Anthropogenic Marine Biome
8. Freshwater
9. F1 River and stream biome
10. Subterranean
11. S1 Subterranean lithic biome
12. Marin-Terrestrial (transitional)
13. MT4 Anthropogenic shoreline
14. Terrestrial-Freshwater (transitional)
15. TF1 Palustrine wetlands biome

Our network of protected areas covers most of these ecosystems. Shoreline and coastal areas of Gaza must be protected. Further studies and protection of some caves must be undertaken to include S1. Finally, the Jordan River needs to be protected regardless that it is used as a political border between Jordan and the State of Palestine (see comments on transnational issues)

No ecosystems in our region has been red listed (https://assessments.iucnrle.org/search). However, this is likely due to lack of assessments not absence of danger. In our opinion a thorough study could Red List ecosystems like the Dead Sea basin, which is the lowest point on earth.

Mammals: Mediterranean habitat areas for mammals are hereby protected

1) Wadi Al Makhrour and Wadi Cremisan to be added as a nature reserve/protected areas (in addition to being a World Heritage Site) because of presence of *Felis chaus* (Wild cat, rare), *Rhinolophus euryal*e and *Rhinolophus mehelyi* (rare and vulnerable)

2) Beitillu expand west to add land between the village of Shukba and the colonial settlement of Shabtin for the following reasons:

a) Presence of caves with vulnerable bats including *Rhinolophus euryale*

b) Shukba cave in Wadi Nattuf is where the first evidence of domestication of plants was found and from which Natuffian agricultural period was designated

3) Um Al-Rihan: Vulnerable *Myotis cappaccini* (Vulnerable) and several horseshoe bats as well as endangered carnivores and potential squirrel habitats unfortunately, the area is difficult to study since it was engulfed behind the wall.

Areas south and east of West Bank which contain Irano-Turania, Saharo Arabian, and Ethiopian elements and are protected via the Dead Sea: This includes protection for *Gazella dorcas* present, Ibex *Capra nubiana*, and hyrax *Procavia capensis*. Most critically, the area includes at least 12 species of insectivorous bats. This is also an area of the West Bank with *Vulpes cana, Acomys russatus, Nesokia indica* (only found in this location) and many gerbil species. Moreover,, Syrian wild ass, Equus h. hemippus, locally extinct, was reintroduced in Wadi Araba and may extend here. *Felis chaus* and *Felis silvestris* while not red listed are rare and must be be protected. *Panthera parus* (leopard). The new Wadi AnNar – Mar Saba PA is important for having a very interesting assemblage of mammals some like *Eliomys melanurus* are not found elsewhere in the Palestinian areas or are fairly uncommon for example *Vormela peregusna*. Additionally, the area is also a great ecotourism potential for mammals like Hyrax and Raptors.

Birds

Some endangered, vulnerable and threatened birds are noted in PAN. Some examples are: *Haematopus ostralegus* (one record in Wadi al Qelt PA, in the West Bank.). The PAN would include (if managed correctly) successful preservation of *Vanellus vanellus* (20 records in West Bank, see map), *Pelecanus crispus* (one record in WB - in Ain Jedi PA) *Gypaetus barbatus* (2 records close to Ain Jedi and Wadi Qelt in the West Bank), *Aegypius monachus* (one record close to Ain Jedi PA), *Circus macrourus* (43 records in WB - see map), *Emberiza cineracea* (one record in the city of Hebron):

A total of 6 species of birds (*Aquila heliaca, Circus macrourus, Falco concolor, Neophron percnopterus, Serinus syriacus, Streptopelia turtur*) were recorded from 20 PAs, (see Table 63).

Table 63: Summary of the number of rare bird species per protected area.

Protected area	Rare bird species
Ein Jidi	5
Wadi el Qilt	4
Shubash	3
Wadi el Makkuk	3
Qarn Sartaba	3
Wadi Jauzala	3
Wadi el Mallaha	2
Ein Fashkha	2
El Muzawqa	2

Protected area	Rare bird species
Marj ez Za_rur	2
Wadi _Ein ez Zarqa el _Elwi	1
Wadi Qana	1
Bassat Wadi el Mallaha	1
El Kanub	1
Ain Qawabish	1
Wadi Fasayil	1
Ein el Ghuweir	1
Jabal el Kabir	1
Al Kuweiyis	1
Jabal Tammun	1

Fish: The Golden Barble *Luciobarbus longiceps* in the Jordan River *basin* should be protected by the PAs through the Jordan river.

Plants: Some 600 rare plants may occur in the West Bank. When the PAN is overlayed with the vegetation zones, it is noted that there is very good representation of habitats. The level of the team's knowledge of plants in each of the protected areas, though still inadeqate in some of the areas, allows for the confident conclusion that if the 27 areas in the PAN are managed and indeed protected going forward, especially from human encroachment both native and Israeli settler, then most of the threatened and/or vulnerable species of plants will be maintained.

A total of 37 rare species of plants (*Abutilon indicum, Adonis aestivalis, Aeluropus littoralis, Allium hierochuntinum, Alyssum marginatum, Androsace maxima, Anthemis hyalina, Astragalus cretaceus, Bellevalia warburgii, Boerhavia repens, Bupleurum brevicaule, Callipeltis factorovskyi, Catabrosa aquatica, Centaurea ascalonica, Chlamydophora tridentata, Chorispora purpurascens, Cyperus jeminicus, Ferula orientalis, Gagea villosa, Galium hierochuntinum, Iris atrofusca, Iris haynei, Iris lortetii, Moringa peregrina, Onopordum jordanicolum, Ornithogalum fuscescens, Orobanche palaestina, Petrorhagia zoharyana, Populus euphratica, Salvia syriaca, Sedum palaestinum, Silene oxyodonta, Silene rubella, Sphenopus divaricatus, Suaeda palaestina, Tetradiclis tenella, Turgenia latifolia*) were recorded from 19 PAs, (see Table 64).

There are also two ecosystems that should be protected, and the new network with its supplementary areas should protect:

1) **Wetlands**: There are certain areas that are critical and are included in protected areas: a) the wetlands of the Basset Al Maleha within Al Aghwar protected area, b) Ain Al Fashkha and Ain Al Ghweir included in the Dead Sea protected area. There are other areas that are near PAs (buffer zones) and should be included in management of PAs (specifically Uskar vernal pond near Jinsafut/Wadi Qana, Deir Ballut vernal pool near

Wadi Ein Al Zarqa Al Ulwi). Finally, there are streams with permanent water like Al Auja, Fasayel, and Wadi Qilt that were included. The region of the Jordan River is not protected, but should be despite jurisdiction and transboundary issues. The State of Palestine should accede and become a partner to the Ramsar Convention and add the Palestinian wetlands to its list. Moreover, some areas can be listed in the Peatland database: https://greifswaldmoor.de/global-peatland-database-en.html

2) **Marine areas:** Marine areas were not evaluated. It would be possible to do so if the State of Palestine reclaims sovereignty over its marine coastline in Gaza to protect at least the southern part of it. Guidelines available (Kelleher., 1999).

Table 64: Rare plant species per protected area.

Protected area	Rare plant species
Wadi el Qelt	13
Al Kuweiyis	10
Ein Jidi	9
Al Muzawqa	6
Wadi el Makkuk	6
Qarn Sartaba	6
Wadi Jauzala	5
Shubash	4
Wadi al Mallaha	4
El Kanub	3
Ein al Auja	3
Bassat Wadi el Mallaha	3
Jabal al Kabir	3
Ras Umm al Kharruba	2
Wadi al Ahmar	2
Wadi Fasayil	2
Ein Fashkha	1
Dhahrat Hayis	1
Jabal Tammun	1

6.2 Notes on Threats and Opportunities

The main threat to effective management of the new PAN is lack of sovereignty followed by need for capacity building and better Palestinain management structure. While the State of Palestine needs to develop better plans for managing the resources, a big impediment to implementation of the many existing plans (e.g. for water resources) or to comply with signed International treaties is the fact that the State essentially has no control over most of its natural resources (due to the Israeli occupation). The report by the UNEP (2003) made over 100 recommendations to address the environment in the State of Palestine and seven of them deal with natural resources but none could be implemented without having sovereignty over our land and resources. Further, the Israeli occupation is one of causes of habitat destruction leading to a decline in the biodiversity of the State of Palestine.

The State of Palestine needs to deal with the five major global threats (**Climate Change, Habitat Destruction, Pollution, invasive alien species., and overexploitation**) plus the local one in the State of Palestine (Israeli colonization/occupation, political instability). There needs to be tailored responses (action plans, activities, targets) to the regional, national, and local community situation which also link directly to global/international strategies, agendas, and policies as adopted by international conventions. Transboundary and regional issues should be taken into consideration in strategy actions (Mason et al., 2020; Perrings & Halkos., 2012).

Land use and allocation of protection was done for ideological reasons where scientific grounds were absent and thus “more than half of protected areas are located in desert areas and are thus biased in their representation of land cover classes” (Shaffer & Levin., 2014). According to Alterman (2001): “

Designating biosphere reserves is also desirable as it benefits eco-friendly economic development in surrounding areas/communities (Batisse., 1982; Beltrán., 2000; Reed., 2016). Based on this IUCN categorization, the mosaic of natural and cultural landscapes around south-east of Jenin, including Shubash and Um Al-Tut, (Garstecki et al., 2010) and Wadi Al-Quff (Qumsiyeh et al., 2016) as biosphere reserves did show their value in ecosystem services and conservation (Bouamrane et al., 2019). UNESCO’s Man and Biosphere (MAB https://en.unesco.org/mab/) program had over 50-year history of developing international cooperation related to human interaction with the biosphere. Over 700 biosphere areas in >120 countries are dedicated to conserving biodiversity, demonstrating sustainable development, and conducting research and education. The International Coordinating Council of the MAB Program was held virtually in 2020 where the Technical Guidelines for Biosphere Reserves were adopted (see https://en.unesco.org/sites/default/files/tgbr_en.pdf). The ArabMAB Network was officially launched in Amman (Jordan) in 1997. The concept has evolved over the years and now covers three functions: biodiversity conservation, sustainable development, and logistical support for research and capacity building. See UNESCO. Ecological Sciences for Sustainable Development. www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphererereserves/world-network-wnbr/wnbr/ and (Bridgewater., 2016; Reed., 2016)

6.3 Notes on PAN Implementation

In the State of Palestine one of the obstacles to protecting nature is the diminishing availability of space due to human urban expansion/housing needs as already highlighted by Weil and Levin (2015) for historic Palestine. For the State of Palestine (West Bank and Gaza (Occupied Palestinian territories)), the situation is exacerbated because of colonial settlement activities and presence of Palestinian refugees from 1948 areas. The General Directorate of Environmental Resources in EQA is the main body responsible for preparation of studies on biodiversity (Fauna and Flora), and cooperates in protecting protected areas. One important function of EQA is to monitor the NGO’s related to environmental issues through the Law of Charitable Organizations and National Authorities for the year 2000. Within the Biodiversity & Protected Areas section, a number of environmental inspectors are responsible for inspecting sites with environmental problems such as pollution, water resources etc. Environmental inspectors serve as law enforcement

officers, with legal power to implement the Environmental Law. Other sections as the Marine & Coastal Environment and Water Quality are involved with monitoring such resources. The General Directorate for Environmental Awareness and Education within the EQA works mostly with schools but can be expanded to areas like university education. Other activities include summer camps for school students, walking in natural trails and identifying plants and birds. A number of other publications were issued such as “Garden is a Friend of the Environment’’ stories for school children with emphasis on environmental concepts and a national strategy for environmental education. In general, the EQA suffers from the lack of human and financial resources to perform the overwhelming duties under the current stressful political conditions.

Through the Agriculture Law for the year 2003, the Ministry of Agriculture is responsible to implement Article 9 of section 1 of this Law that states: “The Ministry in cooperation with other competent authorities shall develop nature reserves management plan and conserve all plants and living organisms living in protected areas”. Two other laws are the Forest and Afforestation and the Rangelands Bylaws.

There are obviously many challenges to effective conservation including area-based conservation in the State of Palestine but it is possible to act even within those constraints (Qumsiyeh & Abusarhan., 2021; Qumsiyeh & Amr., 2017, 2020; Qumsiyeh et al., 2018). Concerning actual protection, we propose that for each area

1) Conduct fauna, flora, and habitat survey focusing on endangered, threatened or vulnerable species

2) Create a detailed management plan that consists of: a) goals of management in the area, b) local and national roles and responsibilities, c) action plans with specific targets and deliverables, d) a monitoring plan (with clear hierarchy of responsibility)

3) Mainstreaming stakeholder engagement

Stakeholders should be involved in this process and they include: researchers, government officials, landowners, leaders of the local communities within and around the PA, and the private sector.

1) 7. Costed Implementation Strategy and Action Plan

Reference to the Palestine’s current protected areas network challenges in aspects related to implementation (as mentioned in the previous report’s sections), the following is a summary of the main pillars and strategic directions that focus on the development of implementation strategy and action plan for the State of Palestine new PAN.

1. Complete the national network of protected areas and manage them effectively to ensure that their ecological, landscape, cultural and economic values are maintained for all time.
2. Continue studies on the status and distribution of the State of Palestine biodiversity as the basis for conservation strategies development and management with special focus on the new protected areas network.
3. Minimize wildlife losses from illegal hunting and generally support the development and implementation of legislation and conventions to protect wildlife.
4. Work to integrate nature conservation programs of the species and habitat of the important ecosystems with big development projects and plan and the national land use plans.
5. Involve local communities as partners in the establishment and management of protected areas and ensure they are the prime beneficiaries of socio-economic programs.
6. Promote the integration of nature conservation with socio-economic development,

focusing on eco-tourism and other small business initiatives in protected areas.

7. Develop and implement proper “information technology” and communication systems to guarantee effective support for all EQA’s PAN operations.
8. Continuously monitor and upgrade the institutional and human resource capacity of EQA to ensure that it meets its current and planned commitments efficiently and effectively.
9. Work to reach financial sustainability for the new the State of Palestine PAN’s activities and programs.

Based on the above-mentioned strategic directions and pillars, table (65) presents a summary for costed implementation strategy and action plan for effective and efficient implementation of the new the State of Palestine PAN.

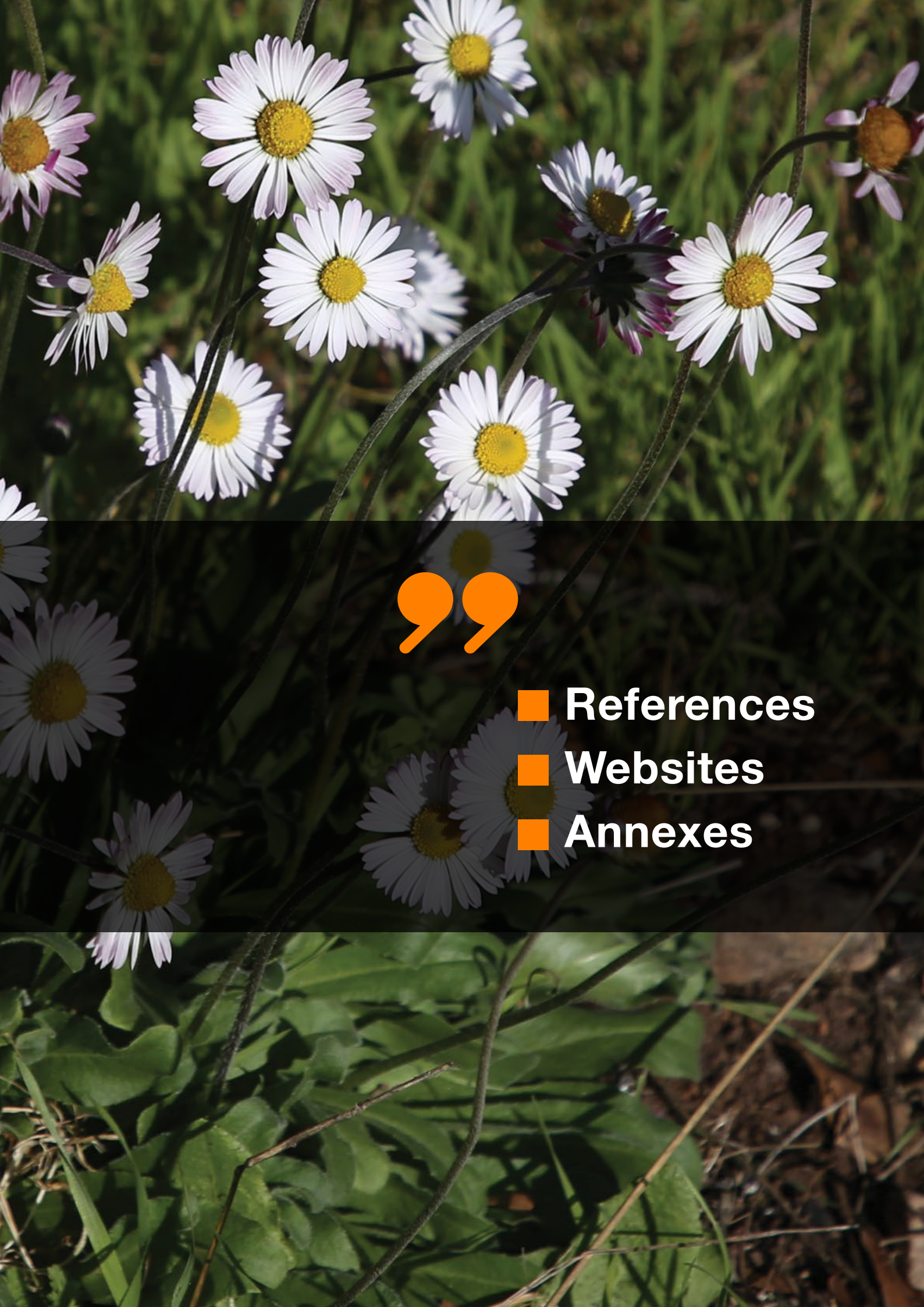
Table 65: The State of Palestine PAN costed strategy and action plan

No.	Action plan	Time frame					Indicative cost (USD)
		Year 1	Year 2	Year 3	Year 4	Year 5	
1.	**Complete the national network of protected areas and manage them effectively to ensure that their ecological, landscape, cultural and economic values are maintained and sustained indefinitely.**						
1.1	The Cabinet official approval on the new national PAN						20,000
1.2	All proposed sites within the new PAN are declared and Established						1,000,000
1.3	Prepared management plans for all Protected area.						250,000
1.4	Monitoring system to evaluate the performance and efficiency of protected areas management based on clear criteria and indicators for all protected areas aspects.						100,000
1.5	Issued periodic review and monitoring reports for protected areas programs, and share it with the relevant stakeholders and ministries						20,000
1.6	Clear institutional set up for all protected area including organization structure, job descriptions, communication system, financial procedure..etc.						50,000
	All protected areas staff recruited qualified and trained their respective roles to manage and operate protected areas.						1,000,000
2	**Continue studies on the status and distribution of the State of Palestine's biodiversity as the basis for conservation strategies development and management with special focus on the new protected areas network.**						
2.1	Well-established and documented ecological baseline information as a base for effective management for each protected area with the new PAN						500,000
2.2	A well-developed and updated functioning national biodiversity database as a basis for national conservation strategies development and management						100,000
2.3	Upgraded and operating GIS and remote-sensing for effective data analysis and interpretation for management to guarantee effective support for all EQA's PAN operations						100,000
3	**Minimise wildlife losses from illegal hunting and fully support the development and implementation of legislation and conventions to protect wildlife.**						
3.1	Effective support for the establishment of an environment police department to follow up the enforcement of wildlife protection laws.						100,000
3.2	A comprehensive patrolling plan for effective protection and conservation of the new PAN.						50,000

3.3	Establish focused groups of hunters in main cities to facilitate cooperation and communication between EQA and other hunters.						70,000
3.4	A developed national system for a team of conservation officers linked to enforcement of wildlife protection laws in all PAN sites						500,000
3.5	Advise relevant government ministries in developing biodiversity related laws, bylaws, and conventions.						30,000
4	**Work to integrate nature conservation programms of the species and habitat of the important ecosystems into large development projects and plan the national land use plans.**						
4.1	Effective participation in major development projects' assessment and consultation processes						50,000
4.2	Active participation in implementation of the biodiversity strategy and other related strategies.						50,000
4.3	Developed and specified Buffer zones and zoning plan areas in and around the announced protected areas approved by EQA and integrated in the land uses plans.						70,000
4.4	Effective participation in reviewing the development projects sites licensing and selection system within the Ministry of environment, to include the nature reserves sites and important ecological sites within the terms and criteria.						50,000
4.5	Standards and different uses categories instructions in land use plans developed according to international best practices, and promoted among related partner organizations.						150,000
5	**Involve local communities as partners in the establishment and management of protected areas and ensure they are the prime beneficiaries of socio-economic programs.**						
5.1	Clear mechanisms, which guarantee participation of local community in defining boundaries of new pas.						50,000
5.2	Clear mechanisms which guarantee participation of local community in developing land use planning for Pas specially grazing plans and tourism plans						100,000
5.3	New plans for local community participation in major issues of established Protected Areas according to each protected areas situation						150,000
5.4	Comprehensive policies for employment in PAs and income generation projects, which ensure that the target groups are the prime beneficiaries.						50,000

6	**Promote the integration of nature conservation with socio-economic development, focusing on eco-tourism and other small business initiatives in protected areas.**						
6.1	Baseline socio-economic appraisals of local communities and feasibility studies completed for new income generation projects						100,000
6.2	New product lines developed for all new income generation projects						500,000
6.3	Formula and procedure devised and implemented for maximizing economic returns to local communities						50,000
6.4	All new tourism facilities appropriately developed and fully operational						3,000,000
6.5	Minimum required interpretation media completed in all protected areas designed and installed						500,000
6.6	All tourism staff recruited, qualified and trained for their respective roles to manage and operate tourism facilities						800,000
7	**Work to reach financial sustainability for the new the State of Palestine PAN's activities and programs.**						
7.1	The State of Palestine PAN fund for nature strategy developed and implemented effectively						3,000,000
7.2	Continue the development of the investment of the fund to generate reasonable income to cover the running cost of the the State of Palestine PAN						500,000
7.3	the State of Palestine PAN fund for Nature strategy promoted with donors, international funds and individuals						200,000
7.4	Developed fundraising activities to achieve financial returns						500,000

7



- References
- Websites
- Annexes

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Annexes

Annex 1: Palestine Protected Areas Matrix

#	Protected area English Name	الأسم العربي للمحمية	Governorate	Area (Dunum)	Area km2	Area ha	Habitat type	Ecosystem	Biogeographic region
1	Wadi Jannata	وادي جناتا	Ramallah	3365.700	3.365700	336.5700	Quercus calliprinus woodland on limestone +Pinus halepensis and Arbutus andrachnae woodland	Mediterranean	Mediterranean
2	En Nabi Gheit	النبي غيث	Ramallah	416.000	0.416000	41.6000	Pinus halepensis woodland	Mediterranean	Mediterranean
3	'Jabel el Aqra	جبل الاقرع	Jenin	2231.750	0.223175	22.3175	Semi-steppe batha	Mediterranean	Mediterranean
4	Dhahrat Hayis	ظهرة حايص	Jenin	624.122	0.624000	62.4122	Semi-steppe batha	Mediterranean	Mediterranean
5	Jebel el Kabir	جبل الكبير	Nablus	25183.493	2.525000	252.5000	Pinus halepensis woodland+ Quercus Calliprinus woodland on limestone	Mediterranean	Mediterranean
6	El Kanub	الكانوب	Hebron	48925827.000	48.925800	4899.2600	Steppe vegetation	50% Irano, 50% Med	30% Saharo, 70% Irano
7	Esh Sh. Qatrawani	الشيخ القطرواني	Ramallah	6.683	0.006683	0.6683	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
8	Jebel Taruja	جبل طاروجا	Nablus	43.607	0.043607	4.3607	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
9	Shubash	شوباش	Jenin+Tubas	513242.730	51.324273	5132.4700	Ceratonia siliqua and Pistacia lentiscus forest	50% Irano, 50% Med	50% Irano, 50% Med
10	El Miksar	المكسر	Jenin	1149486.000	1149.486000	114948.6000	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
11	Jebel Tammun	جبل طمون	Tubas	16600649.000	16.600000	1660064.9000	Semi-steppe batha	50% Irano, 50% Med	50% Irano, 50% Med
12	Ras Jadir	راس جادر	Tubas	10508638.000	10508.638000	1050863.8000	Ceratonia siliqua and Pistacia lentiscus forest	50% Irano, 50% Med	50% Irano, 50% Med
13	El Marj	المرج	Jenin	377451.000	0.377451	3.7.7451	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
14	Wadi el Dilb	وادي الدلب	Ramallah	1931431.000	1.931431	1931.4310	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
15	Wadi 'Ein ez Zarqa el 'Elwi	وادي عين الزرقا العلوي	Ramallah	13340.529	13.340529	1334.0529	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
16	Jebel El Qarn	جبل القرن	Hebron	659.110	0.659110	65.9110	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
17	Deir Razih	دير رازح	Hebron	506.210	0.506210	50.6210	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
18	'Ein el 'Auja	عين العوجا	Ramallah	12365819.000	12.365819	1236.5819	Steppe vegetation	Iranoturanian	Iranoturanian
19	Suba	سوبا	Hebron	7796808.000	7.796810	779.6810	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
20	Wadi el Quff	وادي القف	Hebron	3730088.000	3.730088	373.0088	Quercus calliprinus woodland on limestone+ Pinus halepensis woodland	Mediterranean	Mediterranean
21	Wadi el Qilt	واد القلط	Jerusalem	28763138.000	28.763138	2876.3135	Steppe vegetation	50% Saharo, 50% Irano	50% Saharo, 50% Irano
22	Umm er Rihan	ام الريحان	Jenin	2382632.000	2.382632	238.2632	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
23	Umm er Rihan	ام الريحان	Jenin	175668.000	0.175668	17.5668	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
24	El Muzawqa	المزوقة	Tubas	21804.912	21.804921	2180.4921	Steppe vegetation	Iranoturanian	Iranoturanian
25	'Ein et Tuleib	عين الطليب	Ramallah	459242.000	0.459242	45.9242	Quercus calliprinus woodland on limestone+ Pinus halepensis woodland	Mediterranean	Mediterranean
26	'Ein Qawabish	عين قوابيش	Ramallah	377911.000	0.377911	37.7911	Quercus calliprinus woodland on limestone+ Pinus halepensis woodland	Mediterranean	Mediterranean
27	Ein el Maghara'	عين المغارة	Ramallah	477112.000	0.477112	47.7112	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
28	Qubbat en Najama	قبة النجمة	Ramallah	719979.000	0.719900	71.9979	Steppe vegetation batha	Iranoturanian	Iranoturanian
29	Wadi el Makkuk	وادي المكوك	Ramallah	20662.719	20.662719	2000.7190	Steppe vegetation	Iranoturanian	Iranoturanian
30	Latrun	اللطرون	Ramallah	375575.000	0.376000	37.5575	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
31	Marj ez Za'rur	مرج الزعرور	Jerusalem	614853.000	0.614850	61.4853	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
32	Ras Umm el Kharruba	رأس ام الخروبة	Jericho	9765594.000	9.765590	979.5594	Steppe vegetation	Iranoturanian	Iranoturanian
33	'Ein Bassat er Rih	عين بصة الريح	Jericho	7066.150	0.706600	70.6615		Subtropical	Subtropical
34	Qarn Sartaba	قرن صرطبة	Jericho	31194.112	31.194000	3119.4112		Subtropical	Subtropical
35	Wadi Jauzala	وادي جوزلة	Jericho	9660299.000	9.660299	966.0299		Subtropical	Subtropical
36	Wadi el Ahmar	وادي الاحمر	Jericho	15118804.000	15.118800	1511.8804		Subtropical	Subtropical
37	Bassat Wadi el Mallaha	بصة وادي الملاحة	Jericho	4746459.000	4.764590	474.6459		Subtropical	Subtopical
38	Wadi el Mallaha	وادي الملاحة	Jericho	14356677.000	14.356677	1435.6677		Subtropical	Subtopical
39	El Katar	الكتار	Jericho	3235049.000	3.235050	323.5050		Subtropical	Subtropical
40	Tell er Rusheidiya	الرشيدية	Jericho	2306777.000	2.306777	230.6777		Subtropical	Subtropical
41	'Ein Jidi	عين جدي	Beithlehem	85592267.000	85.592267	8559.2267		Subtropical	Subtropical
42	'Ein Fashkha	عين فشخة	Beithlehem	2572836.000	2.572836	257.2836		Subtropical	Subtropical
43	'Ein el Ghuweir	عين الغوير	Beithlehem	1762175.000	1.762175	176.2175		Subtropical	Subtropical
44	Abu Sauda	ابو سودة	Hebron	957366.000	0.957366	95.7366	Pinus halepensis woodland+ Quercus Calliprinus woodland on limestone	Mediterranean	Mediterranean
45	Al Kuweiyis	الكويس	Hebron	13549895.000	13.549895	1354.9895	Quercus calliprinus woodland on limestone+ Semi-Steppe batha	Iranoturanian+ Iranoturanian	Iranoturanian+ Iranoturanian
46	Fuqeiqis	فقيقس	Hebron	1615347.000	1.653470	165.3470	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
47	Karza (Kurza)	كرزة	Hebron	3501117.000	3.501117	350.1117	Pinus halepensis woodland+ Quercus Calliprinus woodland on limestone	Mediterranean	Mediterranean
48	Yatta	يطا	Hebron	275119.000	0.275119	27.5119	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
49	Wadi Qana	وادي قانا	Salfeet	16270444.000	16.270444	1627.0444	Quercus calliprinus woodland on limestone	Mediterranean	Mediterranean
50	Wadi Fasayil	وادي فصايل	Nablus	8382479.000	8.382479	838.2479	Semi Stippe Batha	Iranoturanian	Iranoturanian

Representativeness	Biodiversity Value	IBA	KBA	Area A	Area B	Area C	Governanve	Management	IUCN category	Type	Defined Geographical Space	Recognized	MET T	Management Plan	Vulnerability	Irreplacability
		Potential			B	C	MoA	EQA	I	Strict Nature Reserve	Yes		No	Yes		
		NO			B		MoA	EQA	III or no PA at a	Natural Monument	Yes		No	No		
		NO				C	MoA	EQA	IV	Managed Reserve	Yes		No	No		
		NO				C	MoA	EQA	IV	Managed Reserve	Yes			No		
		Potential			B		MoA	EQA	IV	Managed Reserve	Yes		No	No		
		Yes				C			IV	Managed Reserve	Yes		No	No		
		NO		A			Local council of Attara		III or no PA at a	Natural Monument	Yes		No	No		
		NO				C			III	Natural Monument	Yes		No	No		
		Potential		A		C	MoA	EQA	IV	Managed Reserve	Yes		No	No		
		Potential		A			MoA	EQA	I	Strict Nature Reserve	Yes		No	No		
		yes		A	B	C	MoA	EQA	IV	Managed Reserve	Yes		No	No		
		Potential			B		MoA	EQA	IV	Managed Reserve	Yes		No	No		
		Potential			B		MoA	EQA	IV	Managed Reserve	Yes		No	No		
		Yes		A		C	MoA	EQA	IV	Managed Reserve	Yes		No	No		
		Yes		A	B	C	MoA	EQA	IV	Managed Reserve	Yes		No	Yes		
		Potential				C	MoA	EQA	I	Strict Nature Reserve	Yes		No	No		
		Potential			B	C	MoA	EQA	IV	Managed Reserve	Yes		No	No		
		Yes				C	MoA	EQA	IV	Managed Reserve	Yes		No	No		
		NO		A	B	C	MoA	EQA	I	Strict Nature Reserve	Yes		No	No		
		Yes			B	C	MoA	EQA	V	Protected Area	Yes		No	Yes		
)		Yes				C	MoA	EQA	IV	Managed Reserve	Yes		No	No		
		Yes				C	MoA	EQA	I	Nature Reserve	Yes		No	No		
		Yes				C	Inside the Wall		I	Nature Reserve	Yes		No	No		
		NO				C	MoA	EQA		Nature Reserve	Yes		No	No		
		Potential				C	MoA	EQA		Nature Reserve	Yes		No	No		
		Potential				C	MoA	EQA		Nature Reserve	Yes		No	No		
		Potential				C	MoA	EQA		Nature Reserve	Yes		No	No		
		NO				C	MoA	EQA		Nature Reserve	Yes		No	No		
		NO				C & E edge	MoA	EQA		Nature Reserve	Yes		No	No		
		NO				C	MoA	EQA		Nature Reserve	Yes		No	No		
		NO				C	MoA	EQA		Nature Reserve	Yes		No	No		
		NO				C	MoA	EQA		Nature Reserve	Yes		No	No		
		Potential				C	MoA	EQA		Nature Reserve	Yes		No	No		
		Potential				C	MoA	EQA		Nature Reserve	Yes		No	No		
		NO				C	MoA	EQA		Nature Reserve	Yes		No	No		
		NO				C	MoA	EQA		Nature Reserve	Yes		No	No		
		NO				C	MoA	EQA		Nature Reserve	Yes		No	No		
		NO				C	MoA	EQA		Nature Reserve	Yes		No	No		
		NO				C	MoA	EQA		Nature Reserve	Yes		No	No		
		NO				C	MoA	EQA		Nature Reserve	Yes		No	No		
		Yes				C	MoA	EQA		Nature Reserve	Yes		No	No		
		Yes				C	MoA	EQA		Nature Reserve	Yes		No	No		
		Potential				C	MoA	EQA		Nature Reserve	Yes		No	No		
		NO				C	MoA	EQA		Nature Reserve	Yes		No	No		
		NO				C	MoA	EQA		Nature Reserve	Yes		No	No		
		NO				C	MoA	EQA		Nature Reserve	Yes		No	No		
		NO		A	B	C	MoA	EQA		Nature Reserve	Yes		No	No		
				A			MoA	EQA		Nature Reserve	Yes		No	No		
		Y				C	MoA	EQA	IV	Nature Reserve	Yes					
		P				C	MoA	EQA			Yes					

Annex 2: Areas Excluded (Did not pass the criteria score total)

En Nabi Gheit: This is a tiny (41 dunam or 0.041 km2) forested (planted with *Pinus halepensis*) area with no significant biodiversity value. The locals traditionally considered it a shrine of the Prophet Ghaith and is owned by the Religious Waqf Endowments. Used as a public park for the .(See figure (60 .people of the nearby villages

Figure 67: Arial view and landscape of En Nabi Gheit.

Jabel el Aqra: Probably originally designated to prevent Palestinians (town of Araba) from use near a colony Mevo Datan. Excluded for small size 0.250 km2, intense intrusion of agricultural and other activities and low biodiversity. See figure (61).

Figure 68: Arial view and landscape of Jabel el Aqra.

Dhahrat Hayis: Excluded for small size (some 0.6 km2 with limited natural vegetation), surrounded by tobacco agricultural land and shows a low biodiversity. On route to the ancient town khirbet al hamam tens of thousands of *Urginea maritima* or *Drimia maritima* can be found however they are located outside the boundary of the nature reserve. Close by near the ancient town of Jat, *Iris mesopotamica* can be found flowering. Previously it was a natural forest, high biodiversity, high value plants. (Garstecki., 2010). The reserve is located near the village of Fahma, in which there are agricultural lands planted with olive trees, in which the cultivation of smoke plants and the use of pesticides are widespread on it, which severely affects the biodiversity and fertility of the soil significantly, with some spots with natural vegetation cover. The area has some archaeological ruins, which need to be studied and protected by the Palestinian Ministry of Tourism and protection, with the work of an administrative plan to exploit them for tourism for the benefit of the people of the area.

The only rare plant species from BioGIS Records that overlaps with the rare plant list by Al-Sheikh B and Qumsiyeh (2021): *Bellevalia warburgii.* See figure (62).

Figure 69: Arial view and landscape of Dhahrat Hayis.

Jabal el Kabir: This rather large area (25 km^2) was excluded due to similarity in habitats to other areas and to allow for highly needed areas for development without impacting. Three rare plant species from BioGIS Records that overlaps with the rare plant list by Al-Sheikh B and Qumsiyeh (2021): *Ferula orientalis*, Iris *lortetii*, *Petrorhagia zoharyana*. The only rare bird species from BioGIS Records that overlaps with the bird list Avibase website is Circus *macrourus*. But the area needs more study. See figure (63).

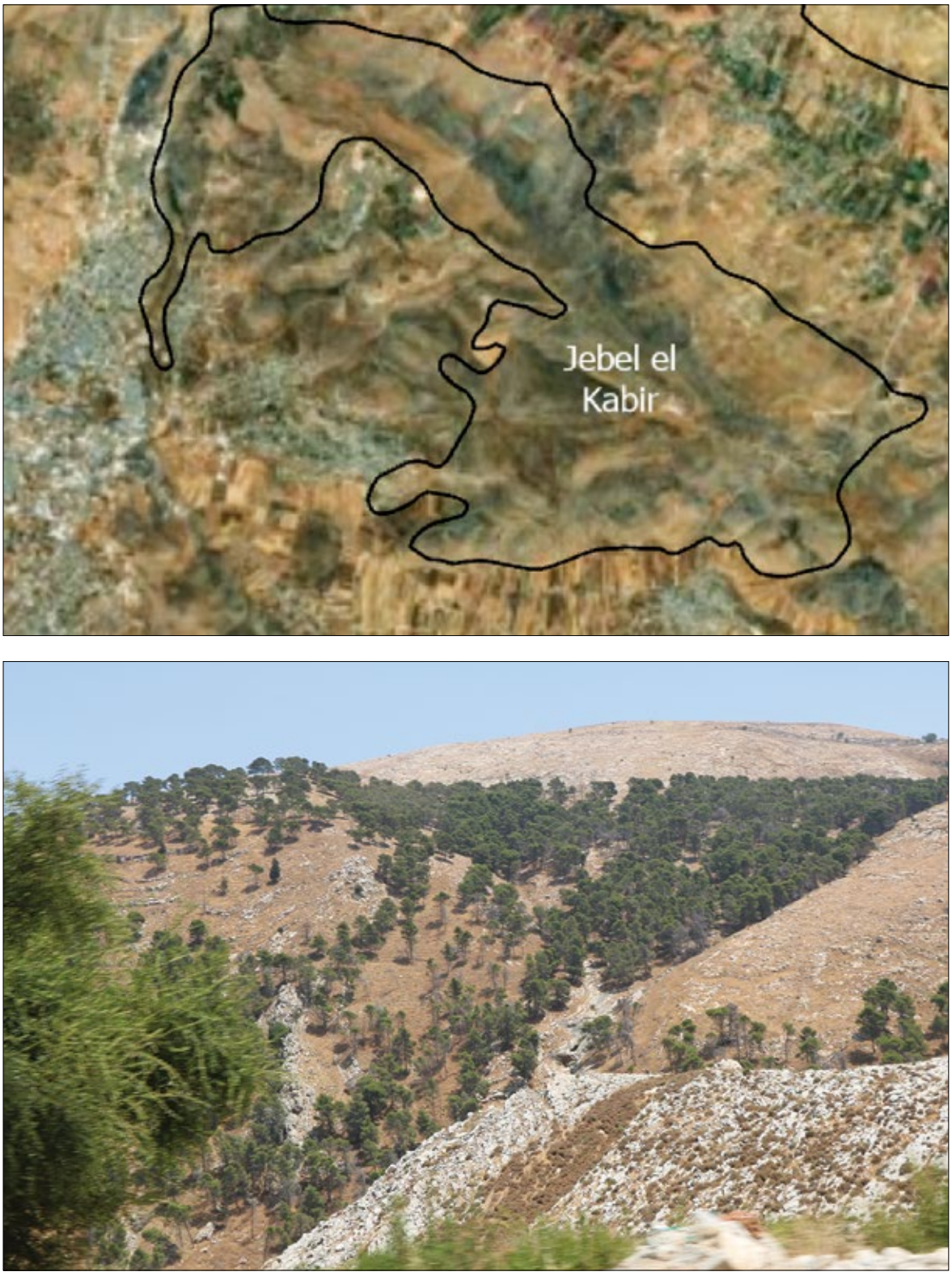

Figure 70: Arial view and landscape of Jabal el Kabir.

Esh Sh. Qatrawani: This tiny area (0.066 km^2) is waqf land used as a park for the village and is of low biodiversity value. It is protected by the village council of Attara. See figure (64).

Figure 71: Arial view and landscape of Esh Sh. Qatrawani.

Jabal Taruja: This PA was excluded due to the fact that it is tiny (0.043 km^2) with a maqam that is already protected from further encroachment of human activities. It is surrounded by buildings and some agricultural land. See figure (65).

Figure 72: Arial view and landscape of Jabal Taruja.

Jabal Tammun: This area is in the transition zone along the eastern slopes. It is of average biodiversity value. Significant threats from grazing. Is also on ecotourism paths and can be developed further with ecotourism and other benefits from nature to the local communities of Tamun, Atuf, Mukhayam Fari'a, Khirbet Bayt Hassan. It is little studied area and may be reconsidered for protection) Rare plant species from BioGIS Records that overlaps with the rare plant list by Al-Sheikh B and Qumsiyeh (2021): *Bupleurum brevicaule*. Rare bird species from BioGIS Records that overlaps with the bird list Avibase website: *Circus macrourus*. See figure (66).

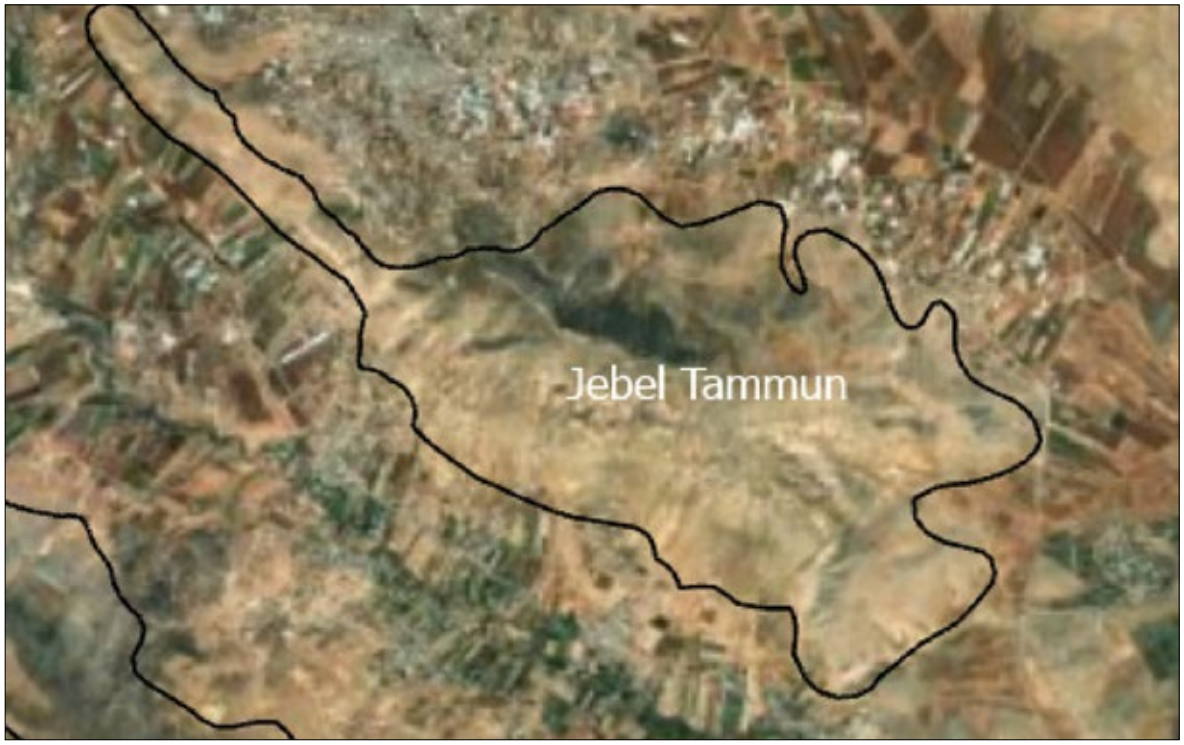

Figure 73: Arial view and landscape of Jabal Tammun.

Suba: It is not clear the original purpose of designating this area as protected with a very unusual shape. Most of it is developed private lands with three remaining small forested regions: two to the east and one to the wes, see figure (67) below. It is suggested to the local community to preserve those as green spaces.

Figure 74: Arial view and landscape of Suba.

Ein et Tuleib: This area was designated a nature reserve by the Israeli authorities for political purposes (to exclude Palestinians and allow for expansion of the Israeli colonial settlement (obvious from the photo below), and shows a low biodiversity and received low score on other areas in the scoring system (e.g., vegetation cover). See figure (68).

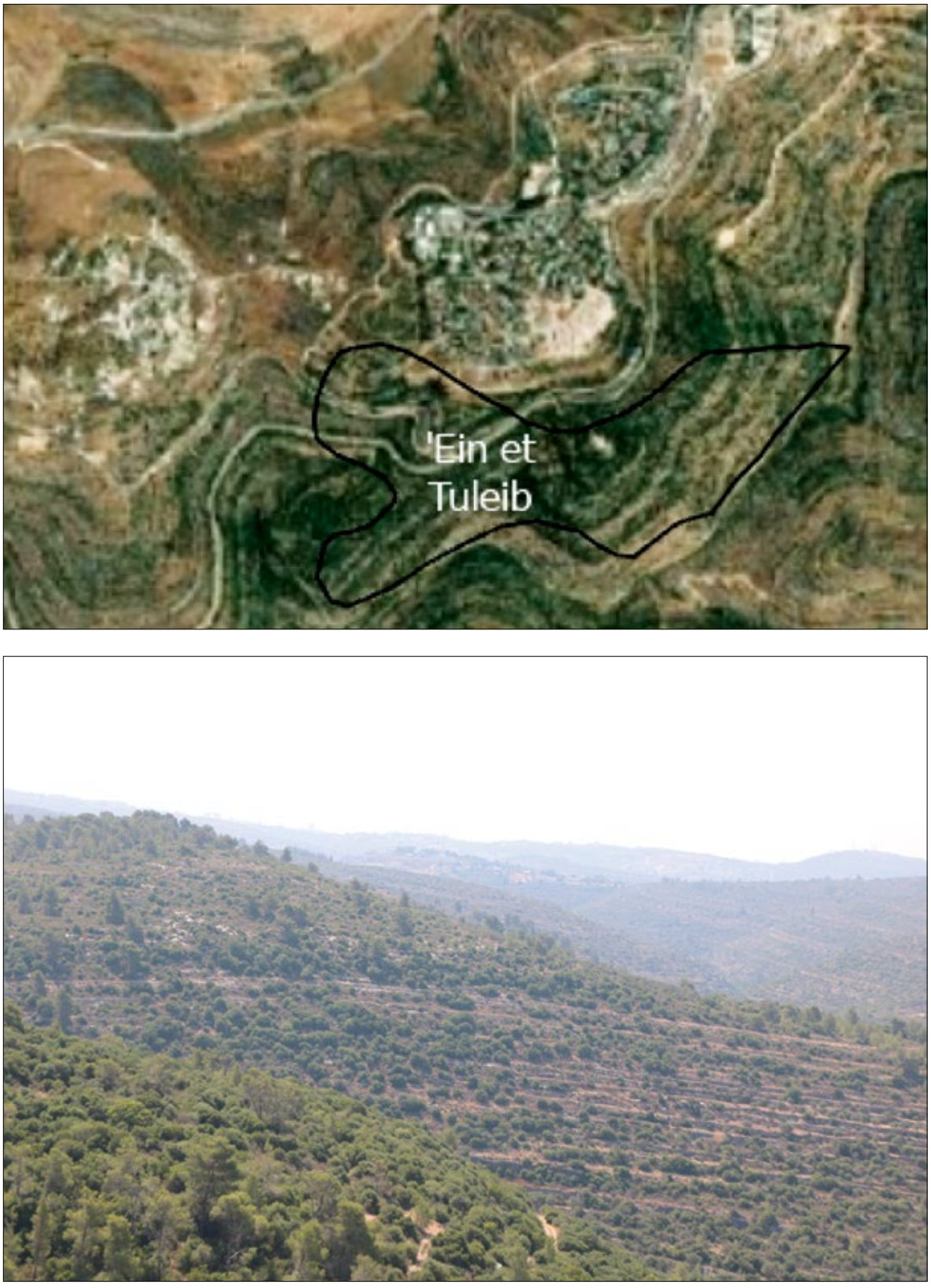

Figure 75: Arial view and landscape of Ein et Tuleib.

Ein el Maghara': This area was designated a nature reserve by the Israeli authorities for political purposes (to exclude Palestinians and allow for expansion of the Israeli colonial settlement (obvious from the figure (69)).

Figure 76: Arial view and landscape of Ein el Maghara'

Qubbat en Najama: This area was designated a nature reserve by the Israeli authorities for political purposes (to exclude Palestinians and allow for expansion of the Israeli colonial settlement (obvious from the figure (70) below).

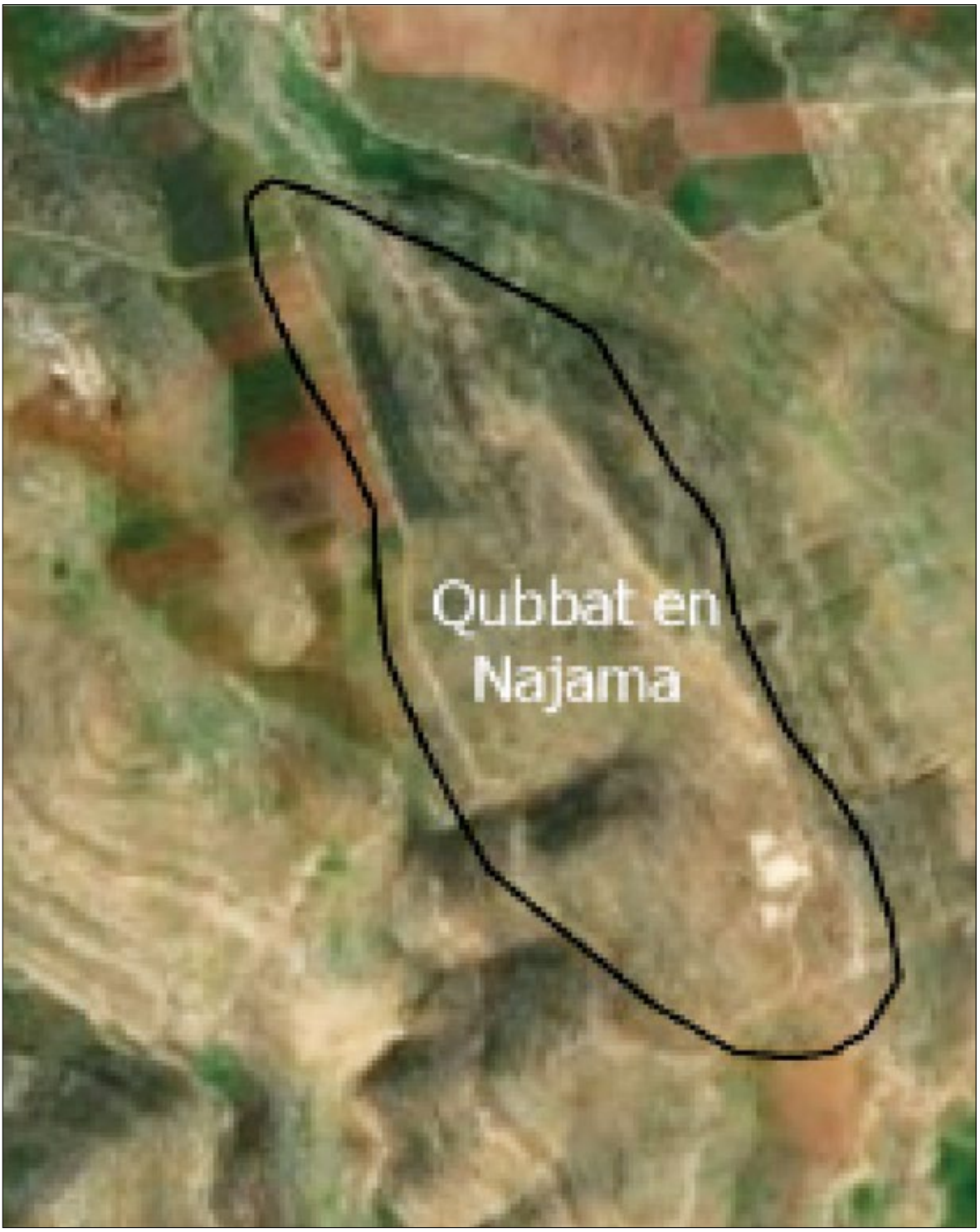

Figure 77: Arial view of Qubbat en Najama.

Wadi el Makkuk: The likely reason for initial designation of this area as “Protected” by the Israelis is strategic and political. It is an elevated area overlooking Jericho and the Jordan valley and is used as a military training exercise area. Rare plant species from BioGIS Records that overlaps with the rare plant list by Al-Sheikh and Qumsiyeh (2021): *Bupleurum brevicaule, Callipeltis factorovskyi, Centaurea ascalonica, Ferula orientalis, Iris atrofusca* and *Iris haynei*. Rare bird species from BioGIS Records that overlaps with the bird list Avibase website: *Circus macrourus, Neophron percnopterus* and *Serinus syriacus.* See figure (71).

Figure 78: Arial view and landscape of Ein el Maghara’.

Ras Umm el Kharruba: This area also includes an area identified by Marxan analysis. It is a firing zone for the Israeli military (probably the reason for the initial designation). The biodiversity in it is also found in nearby areas like Wadi Fasayel. Rare plant species from BioGIS Records that overlaps with the rare plant list by Al-Sheikh and Qumsiyeh (2021): *Boerhavia repens, Galium hierochuntinum.* See figure (72).

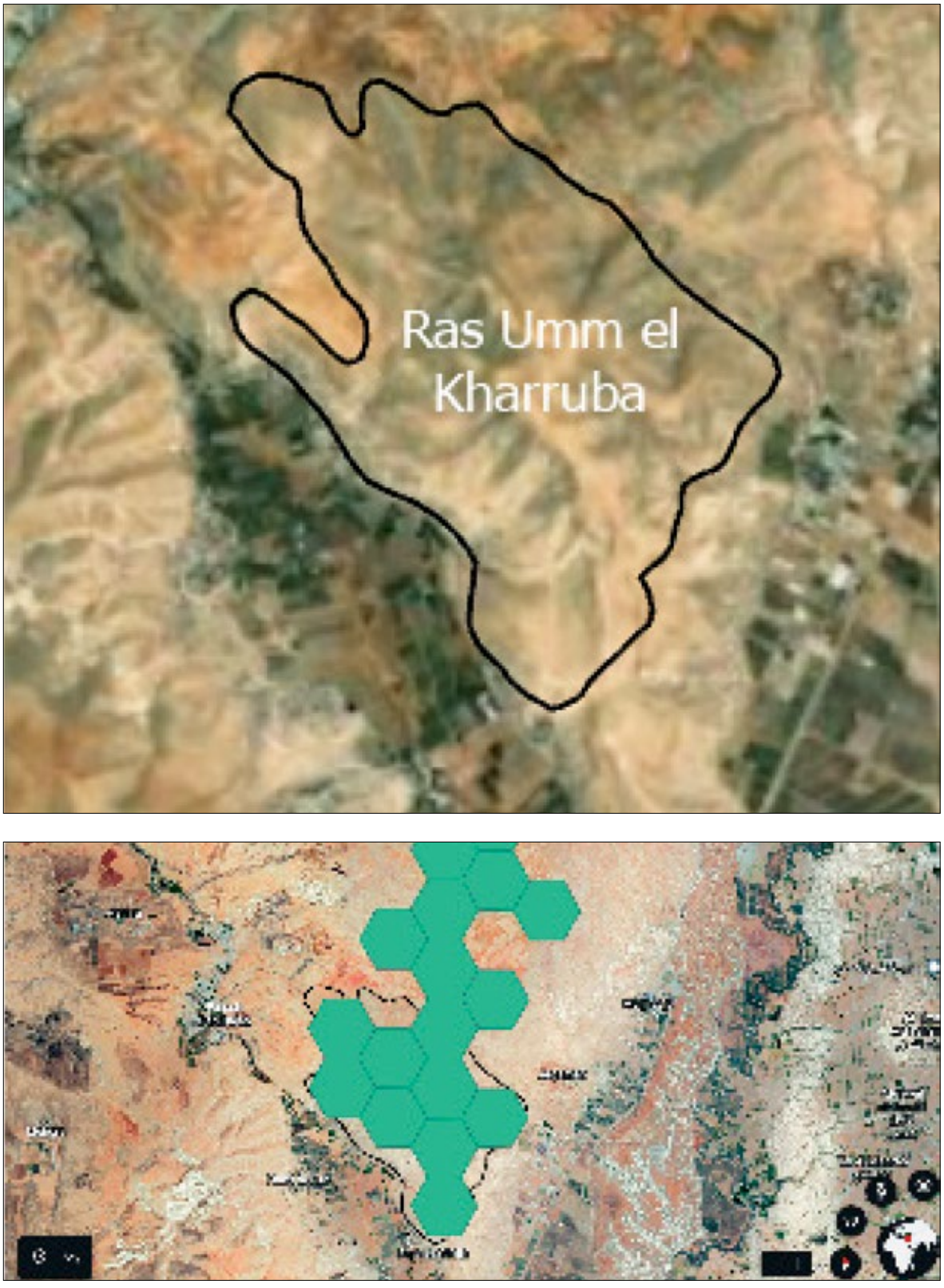

Figure 79: Arial view and landscape of Ras Umm el Kharruba

Ein Bassat er Rih: Located near the Jordan River. this area is designated mostly to serve Israeli political interests of exclusion of locals and to allow agricultural development. While little data is existed on biodiversity it is likely similar to nearby designated areas (including Al-Aghwar .(PA). See figure (73

Figure 80: Arial view of Ein Bassat er Rih.

Tell er Rusheidiya: This is a small elevated plateau (2 km^2) at the north end of the dead sea near the Jordan river. It is a military zone designated for “protection” likely due to strategic military interests not biodiversity (its habitats would be poorer than the poorest area of the already accepted protected area of Al-Katar near Deir Hijla). See figure (74).

Figure 81: Arial view and landscape of Tell er Rusheidiya.

Abu Sauda: This is mostly planted pine trees with few natural original vegetation remaining. While some interesting plants like 3 species of orchids there, it needs to be merely a recreation area (now used as such by colonial settlers). See figure (75).

Figure 82: Arial view of Abu Sauda.

Fuqeiqis: Designated strictly for political purposes to expand the two settlements and the best evidence of this is the new colonial buildings in the middle of the designated area. See map in figure (76).

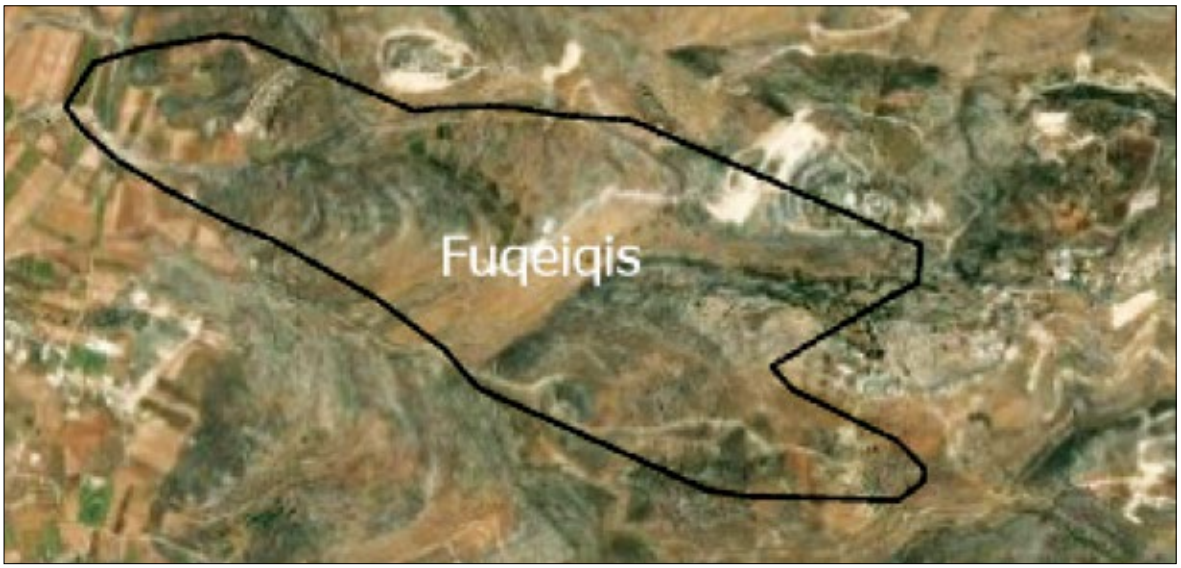

Figure 83: Arial view and landscape of Fuqeiqis.

Karza (Kurza): Two *Pinus halepensis* woodland with significant Cypressus patches (likely all planted) *Quercus calliprinus*

small area left on a tiny third area. Not much biodiversity and mostly disturbed habitats. See map in figure (77).

Figure 84: Arial view and landscape of Karza.

Yatta: There is hardly any natural cover left in this area. It is in the middle of a city with a handful of wild trees left. See map in figure (78).

Figure 85: Arial view and landscape of Yatta.

Marxan 4 Almughayir: This area falls between and overlaps two already high scoring protected areas (Al Auja and Fasayel) and with the redrawn map of a third enlarged area to the east (South Jordan valley PA), the habitats and biodiversity would be covered while maintaining ecosystem coverage and conservation.

Marxan 6 Faqqua: The area is mostly agricultural. There is a small area (plateau) of about 50 dunums which is state land, and includes some *Iris haynei* (national flower). Yet between the other areas interesting plants were found such as: *Scozonera multiscapa, Rhaphanus rostratus, Ornithogalum fuscens, Lathyrus ochrus, Teucrium parviflorum, Ophrys sphegodes* R, *Triticum dicoccoides* R, *Alkanna galilaea* RR, *Ophrys sphegodes* R, *Hordeum vulgare*. While the scoring was low and did not justify protective area status, local community can preserve *Iris haynei* and some of the other species noted above. Preservation of other species can be facilitated by transplantation to the small state land and protecting it by fencing. See figure (79).

Figure 86: Arial view and landscape of Marxan 6 Faqqua.

Marxan 7 Latrun 2: Another area of special interest but that was not designated protected is Marj Sanour (which has mostly agricultural fields planted after the vernal pond begins to dry. There are some interesting plants there that are rarely noted elsewhere in Palestine: L*ythrum hyssopifolium* O (1-3 sites only), *Crypsis schoenoides* O (1-3 sites only), *Verbena supina* O (1-3 sites only), *Cuscuta campestris, Convolvulus arvensis*, *Alhagi graecorum* Rare, *Scirpus litoralis* Very Rare, *Glycyrrhiza glabra* Very Rare, *Heliotropium supinum* O (1-3 sites only), *Glinus lotoides* O (1-3 sites only), *Crypsis alopecuroides* Rare*, Crypsis acuminate* Rare, *Damasonium alisma* Very Rare, *Phalaris paradoxa*, *Trigonella lilacina* Rare, *Heliotropium supinum* Very Rare, *Lythrum salicaria* Rare, *Lythrum thymifolium* O (1-3 sites only). The area also attracts many .migrating birds. See figure (80) for a landscape of Marxan 7 Latrun 2

See also: https://thisweekinpalestine.com/marj-sanour/

Figure 87: landscape of Marxan 7 Latrun 2.

Annex 4: Efforts and localities visited during the study period.

Date and Day	Localities	Participants
03 April 2022 Sunday	Wadi Al-Quff, Al Qarn, Abu Suda,	Julius, Mazin Qumsiyeh
04 April 2022 Monday	Southern Jerusalem Hills (Husan)	Mohammed Abusarhan, Banan AlSheikh
06 April 2022 Wednesday	Al Marj, Al Miksar, Wadi Qana,	Mohammed Abusarhan, Banan AlSheikh, Julius
08 April 2022 Friday	Marxan 3 (Mar Saba)	Julius, Mehmet, Sohrab
09 April 2022 Saturday	Wadi Al Haramiyeh, Jericho, Wadi Jannata	Mazin Qumsiyeh, Majd Salsaa, Julius
19 April 2022 Tuesday	Southern Jerusalem Hills	AH and DH
20 April 2022 Wednesday	Southern Jerusalem Hills	AH and Mohammed Najajreh
20 April 2022 Wednesday	Al Marj, Al Miksar, Wadi Qana,	Mohammed Abusarhan, Daniella and Banan AlSheikh
06 June 2022 Monday	Tour of N Jordan Valley for PARC/Oxfam climate change project	Mazin Qumsiyeh
07 June 2022 Tuesday	Al Kanub	Mohammed Najajreh, EH
11 June 2022 Saturday	Ein Fara (from paid Israeli entrance)	Mazin Qumsiyeh, JQ, volunteers
15 June 2022 Wednesday	Ein Fara (from paid Israeli entrance)	JQ, Mazin Qumsiyeh's siblings
16 June 2022 Thursday	Southern Jerusalem Hills (Husan)	Mohammed Najajreh, SK
17 June 2022 Friday	Southern Jerusalem Hills (Battir)	Mohammed Najajreh
05 July 2022 Tuesday	Abu Suda, Al Qarn, Wadi Al Quff, Deir Razih, Kurza, Fuqeqis, Suba,	Mohammed Najajreh, Bertrand De Rasel
14 July 2022 Thursday	Al Kanub, Marxan 3	Mohammed Najajreh, EH
21 July 2022 Thursday	Latrun, Marj Alzarur, Marxan 7 (Latrun),	Mohammed Najajreh, DH, Mohammed Mahasnah
1 August 2022 Thursday	Al Kanub, Marxan 3	EH
02 August 2022 Tuesday	Ain Jidi, Ain Fashkha, Ein Al Ghuwair, Tell Rusheidiya, Wadi Mallaha, Basset Wadi Mallaha, Wadi Jauzala, Wadi Al Ahmar, Ein Basset Al Rih, Wadi Al Qilt, Marxan 1, Marxan, Marxan 3	Mazin Qumsiyeh, EH, Banan AlSheikh, Mubarak, Mohammed Mahasnah

Date and Day	Localities	Participants
03 August 2022 Wednesday	Jericho, Nablus, Jabal Al Kabir, Jabal Tammun, Shubash (south), Al Muzawqa, Ras Um Al Kharroubeh, Qarn Sartaba, Ein Al Auja, Wadi Fasayil, Qubbet Al Nejmeh, Marxan4, Marxan5	EH, Mubarak, DH, Mohammed Mahasnah,
09 August 2022 Tuesday	Ain Al Mghara, Ain Qawabish, Sheikh Qatrawani, Ain Tuleib, Wadi Jannata, Nabi Gheith, Wadi Zarqa Ulwi, Wadi Al Dilb, Marj Za'rour,	Mazin Qumsiyeh, Mohammed Najajreh, Banan AlSheikh,
10 August 2022 Wednesday	Jabal Taruja, El Miksar, Ras Jadir, Jabal Tammun, Shubash, Dahret Hayes, Jabal Al Aqra', Marxan 6 (Faqqu'a)	Mohammed Abusarhan, Banan AlSheikh, EH

.Annex 5: workshops attended or organized during the study period

Date and day	Title	Attendees	Links
2022 June 01 Wednesday	IUCN red listing of species in context of biodiversity 2020-post 2030) framework (goals 2050 milestones	PIBS team	https://www.reversethered.org/events/national-red-listing-and-its-links-to-global--2020-the-post biodiversity-framework
2022 June 07 Tuesday	Environmental impact of the occupation (Kumi (Now event	MQ ((presenting	https://youtu.be/4pWA_asKc9H
2022 July 03 Sunday	Red list of threatened species plants	IUCN (Bertrand de (Montmollin	https://youtu.be/GpQdlOXPQxw
2022 July 04 Monday	Red list of threatened ecosystems KBA in Palestine Protected Area Network in the State of Palestine	IUCN (Bertrand de (Montmollin	https://youtu.be/MnHJsrfxa-k
2022 July 27 Wednesday	How to apply the IUCN Red List Criteria for National Red List assessments	PIBS team	https://www.reversethered.org/events/how-to-apply-the-iucn-red-list-criteria-for-national-red-list-assessments
2022 August 10 Wednesday	Step-by-Step Guidelines to Setting Up a National Red List Project - Live Webinar	PIBS team	https://www.reversethered.org/events/setting-up-a-national-red-list-project
2022 August 25 Thursday	Land-use Planning in the MENA Region workshop	EQA and PIBS team	https://www.unep.org/events/webinar/land-use-planning-mena-region
September 11 Sunday 2022	Workshop on direction of research in the State of Palestine (MQ gave presentation on research (in PAN	PIBS team & Dr. Issa Mousa from EQA	

.Annex 6: Meetings attended with various agencies during the study period

Date and day	Attendees	Purpose of Meeting
13 April 2022 Wednesday	Issa Albaradeiyah (EQA), Moh'd Mahasneh (EQA), MQ, MN.	Preparation for the Project
21 April 2022 Thursday	Issa Albaradeiyah (EQA), Moh'd Mahasneh (EQA), MQ, MN, Duaa	Generating report cards for each potential or existing area
28 April 2022 Thursday	Issa Albaradeiyah (EQA), Moh'd Mahasneh (EQA), MQ, MN, Duaa	Report cards for each potential or existing area
12 May 2022 Thursday	Issa Albaradeiyah (EQA), Moh'd Mahasneh (EQA), MQ, MN, Duaa	Criteria and design parameters
22 May 2022 Sunday	Issa Albaradeiya, Natalia Boulad, Mazin Qumsiyeh	Agree to adjust scope of work
26 May 2022 Thursday	Issa Albaradeiyah (EQA), Moh'd Mahasneh (EQA), MQ, MN, Duaa	Criteria and design parameters
29 May 2022 Sunday	Issa Albaradeiya, Natalia Boulad, Hanna Haddad, Mohammad Zaarour, Mohammad Mahasneh, Mazin Qumsiyeh	Criteria and design parameters
09 June 2022 Thursday	Issa Albaradeiyah (EQA), Moh'd Mahasneh (EQA), MQ, MN, Duaa	Criteria and design parameters
10 June 2022 Friday	Issa Albaradeiyah (EQA), MQ, MN,	Report cards for each potential or existing area
17 June 2022 Friday	Issa Albaradeiyah (EQA), MQ, MN,	Preparation for the workshop with Bertrand
24 June 2022 Friday	Awatef, Pierre, Bertrand, Mazin	IUCN redlisting and travel
03 July 2022 Sunday	Moh'd Mahasneh (EQA), MQ, MN, Bertrand De Rasel	National red listing for the State of Palestine
04 July 2022 Monday	Issa Albaradeiyah (EQA), Moh'd Mahasneh (EQA), MQ, MN, Bertrand De Rasel	National red listing for the State of Palestine
29 July 2022 Friday	Issa Albaradeiyah (EQA), MQ, MN	Field work and PAs profiles

Date and day	Attendees	Purpose of Meeting
03 August 2022 Wednesday	Awatef, Natalia, Mazin	Logistics issues
10 August 2022 Wednesday	Issa Albaradeiyah (EQA), Moh'd Mahasneh (EQA), MQ, MN, DH	Protected Areas Evaluation
11 August 2022 Thursday	Issa Albaradeiyah (EQA), Moh'd Mahasneh (EQA), MQ, MN, MA, DH	Protected Areas Evaluation
15 August 2022 Monday	Khalid Salim (EQA), MQ, MN, MA, Banan	Editing borders of PAs
16 August 2022 Tuesday	Khalid Salim (EQA), Issa Albaradeiyah (EQA), Moh'd Mahasneh (EQA), MQ, MN, MA, Banan	Editing borders of PAs
25 August 2022 Thursday	Khalid Salim (EQA), Issa Albaradeiyah (EQA), Moh'd Mahasneh (EQA), MQ, MN, MA, Elias Handal	Review first draft of PAN report
08 September 2022 Thursday	Min of Agriculture (Husam Tlaib) and Min of Local Government (Najwa Qanzoaa). Dr. Issa, Bannan AlSheikh, Khaled Salem, Mazin Qumsiyeh, Mohammed Abusarhan, Mohammed Najajreh.	Two meetings held 1) AM to decide on final 5 areas 2) PM internally without two other ministries going overdraft report

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