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UMM AT-TUT NATURE RESERVE



MASTERPLAN



SUMMARY

The Umm at-Tut nature reserve was recognized by the Palestinian Authority following the Oslo Agreements. Under the authority of the Ministry of Agriculture (MoA) with shared responsibilities regarding the management together with the Environmental Quality Authority (EQA) it still lacks a management scheme addressing the near future and mid to long term conservation objectives. The reserve covers an area of 3.6 km²; most of it is public land with some privatized agricultural plots. The Umm at-Tut reserve consists of *sclerophyllous* vegetation that can only be found in the Mediterranean and is home to common and rare plant species forming a fragile balance between open and closed habitats. Surrounded by agricultural plots and herding, it suffers from these activities as they present threats to the habitats' balance and reduce available land and resources for wildlife. Due to its peculiarity in the middle of agricultural terrains, the Umm at-Tut nature reserve needs protection to secure a haven for migrating birds and the survival of this scarcely found habitat for the sake of all wildlife.

The purpose of this plan is to make conservation compatible with existing activities while making the Umm at-Tut space an example for environmental education and awareness. The first requirements are the limitation of agricultural extension and help to preserve the reserve's grounds. The relevant authorities in coordination with local actors will then discuss the scientific monitoring scheme and administrative management.

Within two to three years of implementation, this plan should lead to defining conservation objectives for specific wildlife populations while developing environmental education and awareness based on the existing knowledge and the facilities within the reserve.

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1

DEVELOPMENT AND PURPOSE OF THE PLAN

1.1 The ecological context of the area

1.1.1 Description and background

The main threat to biodiversity conservation in the Mediterranean area is habitat fragmentation (OECD). The political situation between Israel and the occupied Palestinian Territories (oPT) increased such threats (separation wall, fenced border, multiplication of roads and urban areas). In response to such fragmentation, the creation and conservation of ecological corridors presents durability in terms of species mobility, resource exchange, habitats diversity and connectivity, as well as shelter from neighboring entropized areas (urban centers, agricultural fields, etc.)

The Umm at-Tut protected area is placed under Jenin governorate, close to the northern border of the West Bank and the main urban center of Jenin. Clutched between villages and agricultural fields, it is one of the last biodiversity havens of the area. Among the diversity of biogeographic patterns in Palestine, Mediterranean climate is influencing Umm at-Tut landscape and biodiversity profile. It is part of the Eastern slopes and has terra rossa soil on which *sclerophyllous* woodland develops if undisturbed.

The climate changes from hot and dry periods during summer time into a moderately cool temperature in winter. Rainfall is limited to about four to six months a year with up to 65% of precipitation during the winter months. Intense sun activity causes high rates of evapotranspiration. Due to its topography and pluviometry, the region is subject to erosion and desertification, suitable mainly for a vegetation of shrubs and trees, which have access to deep-water resources.

According to prior basic studies, (IUCN, 2010) Umm at-Tut is home to a number of protected species of reptiles, birds and plants endemic to the Mediterranean region and some of them to the Arabian Peninsula. Due to urbanization dynamics, demographics, land use pressures and land degradation, pollution, and other threats such as hunting and poaching, their habitats already reduced in size.

Wildlife and nature conservation are detached from borders. Especially in a context of scarce resources and densely populated territories, transboundary conservation is therefore necessary, as decisions made on each side can affect the conservation on the other. The vicinity of the border separating Israel and the oPT requires coordination to fight threats and to implement efficient conservation within the reserve and beyond. The establishment of a management plan for the Umm at-Tut nature reserve may represent a first step towards addressing wildlife conservation in Palestine and aligning regional dynamics towards conservation.

1.1.2 Building a nature reserve in Mediterranean countries

Nature reserves exist all over the world with different sets of rules applying on such territories depending on the objectives pursued. The historical example for nature reserves are the US National Parks that were created in the 19th century as haven for wilderness conservation, aiming at conserving

a genuine, untouched territory from human activities. Such models correspond to a certain vision of nature and reinforce the duality between humans and nature. In the recent years, conservationists and stakeholders built nature reserves as mixed spaces between conservation areas and public open areas allowing activities in line with conservation objectives and traditional use of natural resources towards sustainable practices. The widespread examples of such reserves are the UNESCO biosphere reserves.

Around the Mediterranean Sea, different models developed: "Natura 2000" aims at reconciling economic activities with nature conservation while building a network of protected areas on a transnational level in Europe. Meanwhile the Lebanese government declared eight nature reserves; UNESCO also recognized some of them as Biosphere reserves.

An ad-hoc entity is managing eleven nature reserves in Jordan, integrating socio-economic development and nature conservation¹. In Egypt, national parks shelter wildlife and welcome tourists.

These areas are on sites combining biodiversity of interest, landscapes that represent high-value natural patrimony and territories with cultural history and/or heritage. The urban dynamics of the region and the broader land use planning of the countries they belong to are affecting them. In Palestine, urbanization and land use in general tends to leave only limited spaces for nature conservation, especially as agricultural land and water are scarce. Planners must consider these parameters when planning the management of a nature reserve.

1.1.3 What is biodiversity conservation?

Biodiversity conservation must consider several aspects: genetics, species, and landscapes. To address the conservation of genetics in populations one must ensure interactions between different populations of the same species. This happens through the maintenance of ecological continuity via corridors or patches coherent with the specific needs of species. Species biodiversity responds to multiple principles: First approached through conservation of iconic species (for instance big mammals), efforts have now evolved towards the conservation of ecosystems' functions supporting life of all species through the conservation of normal biodiversity. A combination of both concepts enables the conservation of iconic species as flagship or umbrella species and the conservation of the ecosystem, while relying on a more integrated management. The idea of a network or ecological corridor based on multiple spaces for conservation (a reserves network) appears relevant in the West Bank considering the territorial constraints linked to both occupation and development.

Another significant factor for conservation areas is the institutional scheme implemented. The state declares nature reserves and builds them mostly on nationally owned land. Management can then rely on central institutions, on ad-hoc structures specially created for the task (such as park authorities) or on independent nature conservation stakeholders. Highly dependent on local territorial management, they are also reliant upon local institutions such as municipalities whose decisions influence the development of a protected area (urban planning, agricultural incentives, and law enforcement).

¹ For more information, check the following websites for some examples in the Mediterranean region: <http://www.rscn.org.jo/>; <http://shoufcedar.org/>; http://ec.europa.eu/environment/nature/natura2000/index_en.htm

1.2 Location of the planned area of the nature reserve

1.2.1 Description of the area

There are 22 nature reserves² in the oPT, occupying 12.4% of the total territory, most of them located in Area C and controlled by the Israeli authorities. Umm at-Tut is situated in Area B (very close to Area A, marking urban centers in the West Bank) and therefore falls under the control of the Palestinian National Authority. Following the 1993 Oslo Agreements between Israel and the PLO, nature reserves' management and appointment went back to the Palestinian Authority in Area B.

The Umm at-Tut nature reserve extends to a total size of 3.6 km² (36ha). It is located in the north of the West Bank on the territory of the Jenin Municipality between the towns of Jenin, Umm at-Tut and the American University of Jenin. Olive and almond groves cover surrounding areas in the direct vicinity of the reserve. A high variety of crops grows densely in the greater area, turning it into one of the main agricultural regions of the West Bank.

The main landscape within the reserve constitutes shrubby *sclerophyllous* woodland consisting of the dominating species of Palestine oak (*Quercus Calliprinos*) and Terebinth (*Pistacia palestinae*), Lentisc (*Pistacia lentiscus*), and a variety of other common shrubby species such as Thorny burnet (*Sarcopodium spinosum*). About a third of the reserve's territory contains now olive and almond groves.

A non-permanent stream facilitates various landscapes along the North-South axis. This area now displays flat agricultural fields and its vegetation has considerably changed compared to the surrounding woodland.

According to a prior assessment by the IUCN³, Umm at-Tut nature reserve shelters a high diversity of animals and plants. Depending on the season, it could play a role in the migration of several bird species due to its position along migration corridors.

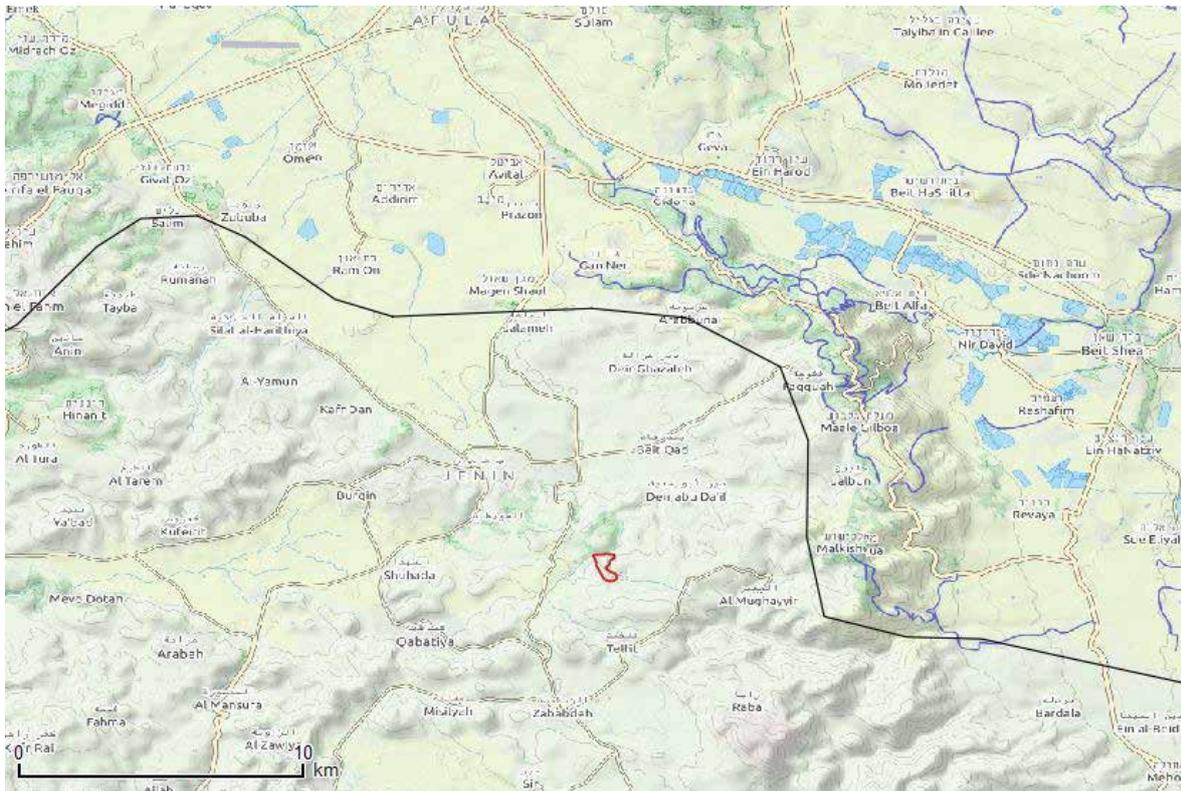
The nature reserve's small size though makes limited sense in terms of natural habitat and passage zones for wildlife, especially as agricultural plains and very few woodland areas encompass it. As part of a network of small reserves, Umm at-Tut nature reserve can be an effective space for nature conservation.

1.2.2 Map

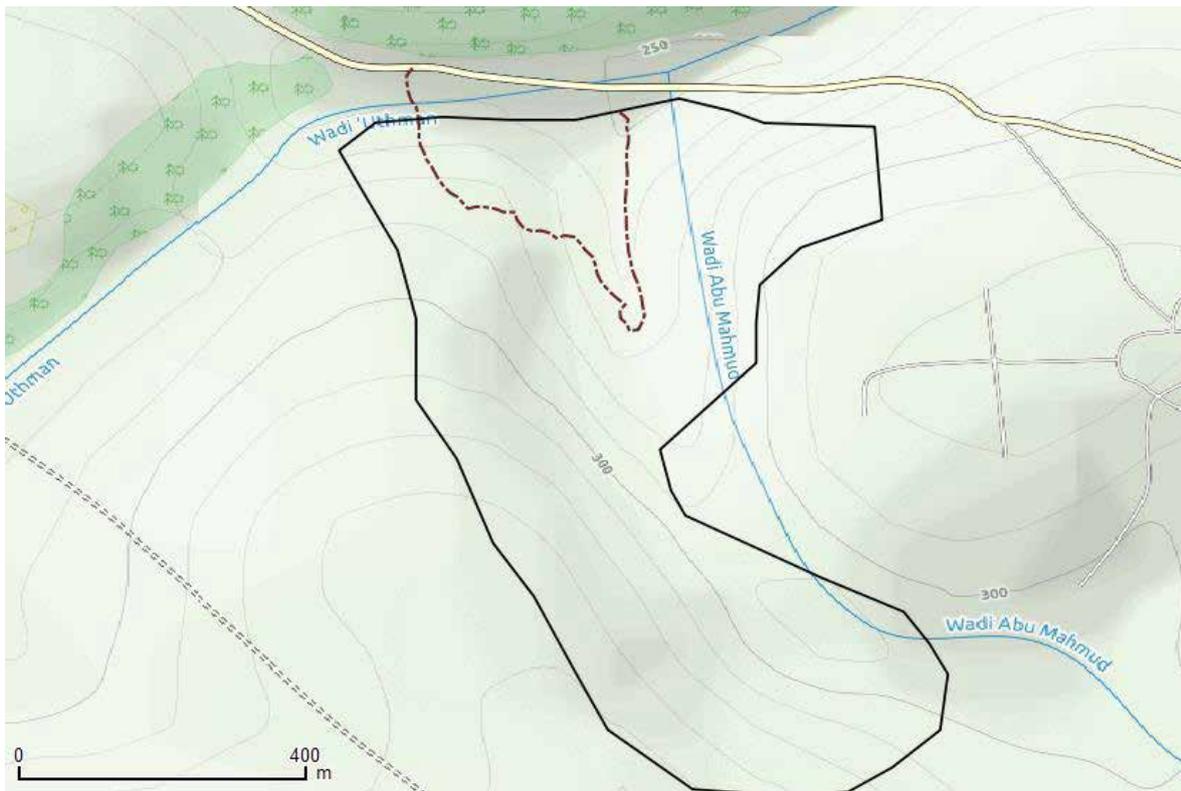
The black line on Map 1 marks the separation border between the West Bank and Israel. Urban centers appear in black letters and major roads in light yellow. The reserve is located off road 60 at the heart of an agricultural and forestry region spreading on the hills around Jenin.

² See appendix 1 for the list as quoted by ARIJ, 2013

³ *Assessment of some Palestinian nature reserves*, IUCN, 2010



Map 1: Umm at-Tut nature reserve (red outline) in the transboundary oPT-Israel context.



Map 2: Close-up view of the Umm at-Tut nature reserve map and the marked hiking trail in brown color.

Map 2 shows the hiking trail and streams within Umm at-Tut nature reserve as well as the nearby roads. The streams are not permanent, and fieldwork in March did not reveal any surface water within the reserve.

1.2.3 Greater area

The greater area surrounding the park might influence management measures depending on the priorities of the neighboring towns and their dynamics (urban planning, traffic growth, etc.). This section therefore provides a close description of the area.

The vicinity of Jenin and the location of the Umm at-Tut reserve between Jenin and the university makes the adjacent road quite busy. North of the reserve spread the outskirts of Jenin, while east the village of Umm at-Tut lies on the highest line of the hills. Across the road, is a planted, exploited pine forest and south and west agricultural fields prevail. Umm at-Tut has a population of only a 1000 people. 50% of them have livelihoods relying on agriculture, mostly orchards and livestock (sheep, goats and cows) with approximately 1000 heads of livestock in the area (IUCN, 2010).

Authorities must consider urban dynamics of Jenin and its greater area when protecting and conserving the nature reserve, as growing population and demand for land increase while resources remain scarce.

1.2.4 Pre-existing activities and their impacts on the environment

As stated earlier, the Umm at-Tut nature reserve lies close to agricultural land. With a tradition of herding and cultivating, demand for land for pasture and crops is high. The consultant noticed traces of domestic animals within the reserve, while orchards extend far within its borders. Those economic activities shape the landscape and have consequences on the habitats of the Umm at-Tut nature reserve for dwelling and migrating species.

Its vicinity to a major urban center makes it a good candidate for leisure activities. A previous project marked a hiking trail. The presence of visitors also has impact on wildlife.

Plants picking, logging and hunting are other pre-existing activities that can have an influence on the efficiency of the reserve as a protected area.

2

DATA COLLECTION AND ANALYSES

2.1 Field work calendar and methodology

The consultant spent a month between March 5, 2017 and April 6, 2017 in Jerusalem and on the field in the occupied Palestinian Territories. The consultant divided the time between meetings, interviews, field data collection, data analysis and treatment, documentation and drafting of the current report. Upon arrival, on March 10, the consultant followed a community event in the Sirris nature reserve, making use of the occasion to meet local stakeholders in nature conservation, birding and botany. Those first contacts gave way to meetings with the municipality of Jenin and the local branch of the Ministry of Agriculture (both meetings took place on April 4).

Between the 13th and 24th of March, five days were spent in the Umm at-Tut nature reserve to collect data. The consultant received the benevolent help of Marianna Odru, agronomist, during these five days.

The objectives of the examination were the following:

- establish a habitat survey
- assess plant diversity and presence of protected species
- assess threats and locate them
- evaluate existing and potential leisure infrastructure
- locate management needs

On the 13th and 14th of March, the consultant hiked the existing roads and paths within the reserve to get a general overview of the geography and land use within the reserve; her next hike took her along the perimeter of the protected area. Following the first empiric observation, she decided to map the agricultural plots bordering and invading the nature reserve to highlight agricultural land use and its evolution compared to the theoretical limits of the nature reserve. On March 14, in the afternoon, she tested the quadrat method (method for the data collection of botanical diversity) to assess ground vegetation diversity.

The next days were spent analyzing data and incorporating them in maps using QGIS (free and open-source desktop geographic information system application), for the creation of a basic map showing land use and habitats limits between agricultural plots and *sclerophyllous* woodland. Planning the next field trip, the consultant developed methodologies to assess ligneous species' density and to plant biodiversity.

Using the map illustrating the limits of the reserve, the consultant randomized 40 points (a number sufficiently high to calculate an average). Measuring the distance from each of them to the nearest ligneous living individual, enabled us to assess the average distance to the nearest tree on any point of the reserve, in other words the density of woodland. The consultant also roughly calculated heights of closest individuals (under or above three meters) as height is one of the factors that characterize forest ecosystems¹. Similarly, she randomized ten points used as the center of quadrats to assess botanical

¹ Excerpt of the FAO (Food and Agriculture Organization of the United Nations) forest definition: "The trees should be able to reach a minimum height of 5m at maturity in situ. May consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground; or open forest formations ..."

diversity at different places of the reserve. The consultant stratified randomization for botanical quadrats (a quadrant in each different land use area) so as to evaluate diversity in the different systems observed on the field. The consultant then delimited one square meter² and counted the number of plant species she found. Identifying them on the field was time consuming and sometimes impossible with the knowledge at hand. The consultant therefore decided to prepare a quantitative assessment of plant diversity. Quadrats and density checks were implemented on the 20th and 21st of March. Hiking from quadrat to quadrat and to the several density points, the consultant located traces of domestic animals (pellets and wool) as well as traces of fires, garbage and other kind of manmade impact. Combined with the limits of agricultural plots, she thus produced the threat maps.

On March 24, the consultant collected data about possible parking location and fixed-point photography monitoring. She chose points for photography according to the view they offered on the reserve. Orientation is also very important to produce comparable photographs. She therefore fixed a sign on the field. She chose her gear carefully and used it repeatedly.

Finally, she attempted at following open paths to create an alternative, longer hike. The consultant traced a GPS track and analyzed it afterwards on the map. Barely longer than the existing marked path, it was more challenging for the hiker and more disturbing for the ecosystem. Hence, the consultant discarded this trail.

The following sections present the results coming from those field visits.

2.2 Land use and land cover

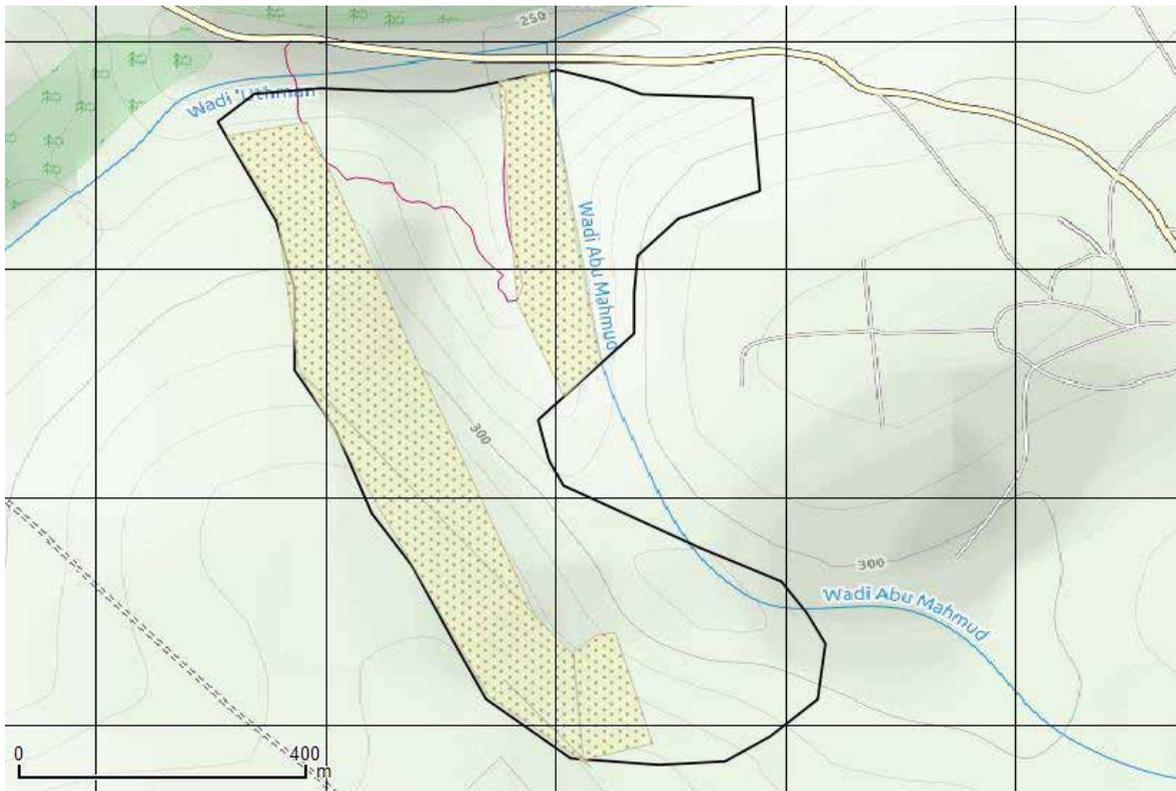
2.2.1 Diagnosis of existing habitats

The first step for building a monitoring scheme is to characterize and assess the existing abiotic and biotic factors influencing biodiversity in the reserve. Such diagnosis starts with habitat mapping.

Following field visits and interviews with local experts, the consultant has worked out different forms of land use within the limits of the reserve. Agricultural terraces occupy part of the reserve planted with olive and almond trees. The natural habitats are made of a dense vegetation cover of ligneous species and shrubs covering steep slopes of terra rossa (soil) and outcropping limestone. The non-permanent riverbed (or wadi) cutting through the reserve on a North-South axis has been artificially turned into flat fields for agricultural purposes, transforming the natural shrubby vegetation into more homogenous grassland.

Consequently, the first steps for surveying biodiversity in Umm at-Tut is to map the existing habitats and entropized spaces and assess heterogeneity of the observed habitats.

The consultant built such a map, recording the borders of the agriculture plots all around the reserve, with a GPS track.



Map 3: Agricultural plots and transformed areas due to agricultural activities in the reserve.

The agricultural plots are the yellow dotted areas on the map. The western one corresponds to the olives and almonds groves while the eastern one covers the areas of the wadi used or transformed for agricultural purposes. Agricultural plots have moved forward reducing the natural habitat available for wildlife species. A comparison of aerial views from 20 and 10 years ago and current land use could complement this observation. A double check of those limits with property titles might be necessary as olive and almond groves are spreading on the outskirts, inside the reserve, and on the flat lands of the wadi.

The produced map is a reference for all surveys. Indeed in order to randomize survey points and transects, a grid needs to be superimposed on the habitat map (like the one on map); the consultant then sampled areas for the survey in all habitats for flora and fauna.

2.2.2 Suggestions for future monitoring methods of habitats change

Woodland and scrub habitats changes are visible over cycles of at least 10 years.

Once the researcher produced the reference map (see map 3), he can implement a monitoring scheme. This will require regular hike around the reserve on the main paths to note any noticeable changes, such as:

- burnt areas
- change in land use
- fallen or cut trees and branches
- major or new littering spots
- other important events that might occur (appearance of new tree species, drought, floods, landslide...)

Taking pictures from an overlooking point at regular intervals (for instance once a year) can help assessing whether the habitat is closing or opening and monitor changes. For such photography, the consultant determined two points through field visits. In order to receive precise and usable photographs, the location of the camera, orientation and superimposition compared to previous pictures will need to be exact. The table 1 displays the recommended coordinates and orientation.

	Location 1	Location 2
Coordinates	35.33658,32.43324	35.33945,32.43344
Orientation	West	South East

Table 1: Coordinates and orientation for fixed-point photographs monitoring method

The researcher can also adopt quantitative indicators such as regeneration rate for trees or mortality rates. However, those are more resource-intensive and time-consuming, so for now a qualitative monitoring should show trends and major changes.

2.3 Plants

Apart from the IUCN assessment of 2010, there was no other proper plant survey within the Umm at-Tut nature reserve. The IUCN assessment revealed presence of the following species. *Quercus calliprinos*, *Ceratonia siliqua*, *Quercus ithaburensis*, *Pistacia palaestina*, *Pistacia lentiscus*, *Styrax officinarum*, *Crataegus aronia*, *Rhamnus palaestina* and *Rhamnus alaternus*, *Sarcopoterium spinosum*, *Cistus creticus*, *C. salviifolius*, *Salvia fruticosa*, *S. dominica*, *Teucrium divaricatum*, *T. capitatum*, and *Phlomis viscosa* ; and two plant species of high conservation value according to the IUCN Red List of Threatened Species : *Verbascum galilaeum* and *Lachnophyllum noeanum*.

For the purpose of this plan, the consultant conducted a basic quantitative botanical survey to reflect the state of the vegetation in Umm at-Tut.

First, she assessed the density of trees and ligneous species to characterize the dominant habitat. Using the baseline map (map 3), 40 random points were located within the reserve. She measured and recorded the distance to the closest living tree (or ligneous shrub) at each point.²

Because of randomization, eight of those 40 points were located on agricultural plots within the reserve. Hence, the consultant could not measure the distance to the nearest tree for these points. The density expressed for the Umm at-Tut nature reserve is the one of the actual conservation area that was left undisturbed by agricultural plots.

The average distance between any point in the reserve and the closest tree is 1.25m. The density of ligneous species is 0.64, meaning there are 0.64 ligneous individuals per meter square. An important observation showed that, if most of these species can reach up to three meters or more, they are present as much lower individuals within Umm at-Tut, usually smaller than two meters. This peculiarity makes for a characteristic landscape of shrubby mix of *Quercus calliprinos* mingled with *Pistacia*

2 The consultant chose a time-efficient method to assess density of ligneous species. Measuring the distance of the closest tree to a number of random points allows assessing an average distance of ligneous species from any point. The density is therefore the expression of the inverse of the average distance measured to the square, giving a number of trees per m²: $d = 1 / (D_m)^2$ where D_m is the average of distances to the nearest tree (see appendix 3 for a table of data)

lentiscus and *P. palestina* at shrubby states. Close to *garrigue* ecosystems and other dry woodland landscape, this habitat is highly specific to the Mediterranean region and is proof of long-term human intervention on these landscapes. The very limited height of trees is due to human activities mainly. The combination of logging of major higher trees and the use of the territory for pasture prevents regeneration of tall trees and results in the observed shrubby habitat. The high density of shrubby forms of the observed species tends to increase competition for space between ligneous individuals, contributing to limiting the size of each. Shrubby forms of those species are also highly competitive in dry habitats making them suitable for the eastern slopes landscape in the oPT.

If ligneous species diversity is quite limited (with a dominance of *Qercus calliprinos*, *Q. ithaburensis*, *Pistacia lentiscus*, *P. palestina*, and a few carob trees), ground plant diversity is high. The consultant located ten randomly stratified 1m² squares to quantify ground plant diversity for this study. Selecting March for fieldwork turned out to be an ideal time, as most flower plants were blooming. Of the ten squares, two were located on agricultural lands and showed bare soil or dead plants. Up to 27 different species of plants populated the eight others. Within the natural habitat of the reserve, the difference in diversity between the squares depended on the proximity of the closest ligneous species. Squares located directly under low shrubs were poorer in plant diversity. Open patches in between shrubs showed the highest plant species diversity per square meter (refer to appendix 3 for location of squares and number of species found in each). The location of those ten squares is an indication, but they should not be permanent, as repeated study of their composition would affect it. New surveys shall repeat the randomization of squares.

As stated in the previous section, woodland changes tend to occur on long time-scales. To monitor those, the consultant already mentioned regular photography. For smaller plants, researchers can implement seasonal surveys, focusing on certain groups of plants. The consultant implemented this initial survey in early spring and could not locate two vulnerable species that are supposed to be in the reserve: *Lachnophyllum noeanum*, and *Verbascum galilaeum*. Targeted surveys should trace those.

2.4 Birds

The consultant spotted many different bird species during fieldwork but did not implement a systematic survey. Considering the habitat and the location of the reserve on migration corridors, ornithologists with a scientific background should do point counts seasonally in spring and autumn. They should do the observations between 6am and 10am, with each observer standing ten minutes (five minutes and then turning around for another five minutes) in place and recording sights and hearing of birds located at a 360° angle around him. Estimations of the distance of the observed birds are very useful to assess population density. Distance is estimated roughly by assessing in which concentric circle the spotted bird is located (recommended diameters are: <5m, between 10 and 20m, between 20 and 50m, >50m). See appendix 4 for an exemplary observation form.

2.5 Mammals

The consultant did not initiate a survey for mammals and sightings were very limited. Indirect identification showed presence of Palestine mole rats (*Spalax ehrenbergi*) on the reserve's territory. Burrows and surfacing holes were observed everywhere except of the agricultural plots that had been plowed recently.

She observed some rodents; some very common species were found within the reserve and tend to live near agricultural fields where they can find food.

She also observed droppings of carnivores but could not identify them.

Mammal surveys rely on direct spotting of individuals but also on indirect methods like looking at traces, burrows and feces. They require the definition of transects (twelve in total) and the identification of the above-mentioned indicators of mammal presence on these transects. These searches require training in mammal identification. Regarding the timing of searches, the researcher must do data collection both during the day and during the night to spot day active and nocturnal species. Other methods such as movement cameras or color traps are useful as well, but they require more equipment that is less likely to be available in the oPT.

Activity of mammals will be higher during the breeding season and during cooler moments of the day (early morning and dusk). Data collection can be more intensely in spring but can continue throughout autumn and winter. Once the twelve transects have been defined, data collection could be organized every two months on two or three transects at a time with at least one being searched at night. In winter, the researcher can put accent on spotting tracks in wet soil. Mammals are usually good flag species for communication on conservation effort. The bigger species spotted are more vulnerable to habitat loss, as they tend to occupy and need bigger areas for foraging and refuge. In addition, they are the first affected by habitat fragmentation reducing drastically their mobility and thus their adaptation capacities.

Flag species are animals or plants that gather a high conservation value and a value to the public (cuddling factor, endemic and beauty): Such species are communicating the value of conservation efforts in an area and raise awareness to increase the advantage towards biodiversity conservation. The most iconic flagship species is the WWF panda.

2.6 Other groups

Researchers can survey any group with different methodologies. The consultants defined priority for the above groups considering their ecological and touristic significance but also regarding the availability of local experts. For the following groups, survey methods are more invasive (traps, artificial refuges) and require expertise in specific groups and taxa.

2.6.1 Butterflies

A recent study has identified butterflies present in the West Bank. Encouraging further research in this area could be helpful to sustain the local scientific community.

Weekly recordings from April, 1st to September, 30th are ideal. For each count, the surveyor should walk at a uniform pace along the transect and record all butterflies seen within five meters on either side of the transect. The researcher must meet certain weather criteria to ensure comparability of counts.³

2.6.2 Amphibian

Almost all amphibians are on the red list as endangered in the Mediterranean region due to intensive farming, degradation of wetland habitats and wadi systems. The absence of a permanent stream in Umm at-Tut and the artificialization of the wadi for agricultural purposes make it unsuitable for most amphibian species, but to rule out presence and need for protection a thorough survey should be implemented.

³ For a more detailed survey information please check: <http://cesco.mnhn.fr/sites/default/files/Nowicki%20et%20al%202008%20ISR%20J%20ECOL%20EVOL%20butterfly%20monitoring.pdf>.

To count small amphibians the researcher needs to trap them. For bigger amphibians, transects walks are suitable methods. These must be concentrated around water bodies and should correspond to the ecology of the observed species. Trapping requires training for safe manipulation of individuals and the agreement of the ministry in charge.

Such a survey should not be a priority for the Umm at-Tut reserve.

2.6.3. Reptiles

Reptiles' habitat conservation is important in the Mediterranean region. According to the IUCN assessment, as many as five species of endangered reptiles are in the Umm at-Tut reserve. During the initial survey, five different individuals of *Testudo graeca* were encountered within the reserve (see picture 1 below), among which one juvenile. Presence of a significant population of this endangered tortoise is an argument for the conservation of this habitat. It would be interesting to undertake a specific survey of this species' global population within the reserve. Perhaps it could become a flag species of conservation in the area.



Picture 1 (a, b, c): Some of the specimen of *Testudo graeca* spotted in Umm at-Tut in March 2017.

Some six reptile species abundant in Palestine are regulated under the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) convention protecting rare and endangered species from illegal trade and traffic. Monitoring all reptiles' populations will help enforcing the convention but requires strong identification skills and sometimes trapping. Therefore only well trained and experienced reptile experts could implement such a survey.

To conduct basic surveys, the positioning of an artificial refuge (metal plates, roofing felt) along a predefined transect can help counting reptiles. These would indeed tend to hide under such structures where the researcher can spot them more easily. Hereby artificial refuges would become artificial pre-identified hiding spots. Surveyors must be trained and aware of dangerous species of the area.

2.6.4. Other invertebrates

Invertebrates' englobe a diversity of taxa, that each requires specific knowledge for identification and trapping.

Looking at Hymenoptera could be interesting for local and international research on pollination. This is also a way and to assess their role in the local agricultural system.

3

CONFLICTS AND OPPORTUNITIES IN THE AREA

3.1. Threats

The consultant has already listed pre-existing activities in the area, those activities and evolution of the local and regional land use could threaten the reserve or on the other side, reinforce it. Environmental degradation can happen very fast, while the restoration of ecosystems and environmentally friendly behavior have effects on the long term. Land use planners and managers (both urban and agricultural) must consider the conservation objective (this is also true for road), when adopting this plan. This means that after assessing possible effects on the ecosystem, decisions regarding activities surrounding the reserve rely on these assessments and that the reserve should not shrink anymore.

If considering map 3, agricultural plots seem to be expanding within the reserve's grounds having captured almost up to a third of its total territory. Field observations revealed plots of young almond trees and signs of potential agricultural expansion within the reserve (uprooting of trees and bushes, fences, more opened habitats) located especially on the side bordering the village of Umm at-Tut. Local institutions could not answer the questions about who would have the power to check and prevent further agricultural expansion.

These changes in land use have impact on landscapes, habitats, and species biodiversity. Artificialization of local landscape turns the *sclerophyllous* woodland into orchards, changing species composition, tree sizes, cover, and eventually nutrients and water availability. Human intervention linked to agricultural practices such as plowing have collateral or direct effects on wildlife (destroying burrows, uprooting bushes). Such practices deeply transform the ecosystem. The effects of domestic animals grazing in the reserve are also a threat to the conservation of the natural habitat found in Umm at-Tut as its ecosystem is in a fragile balance between closed and open habitats. The consultant saw many traces of grazing animals within the reserve (map 4 and picture 2).



Map 4: Records of traces of domestic animals.



Picture 2: Wool left by passing sheep in U. a.-T.

The consultant observed logging in the reserve, leaving small branches on the ground or stumps (see picture 3). Combined to the uprooting of young trees it leads to the opening of the habitat.



Picture 3 (a, b): Stumps and branches left after the logging or uprooting of bushes.

Cutting trees and bushes has two purposes: Logging for fuelwood and keeping the habitat open for domestic animals or the development of new agricultural plots. In both situations, it results in the disturbance of local dwelling species and modification of the ecosystem.

The nearby road shows signs of enlargement:



Picture 4: Enlargement work on the neighboring road in March 2017.

This could also present threats: Direct threats to the part of the reserve closest to the road that could suffer from later enlargements; an indirect threat as intensification of movement on the road could lead to more wildlife disturbance due to traffic.

The consultant found gun cartridges within the reserve, meaning hunting is a direct threat to wildlife in the area (picture 5).



Picture 5: Gun cartridge found inside the Umm at-Tut nature reserve.

Beyond all question, hunting and poaching should be prohibited in the reserve, with strong enforcement of these rules.

3.2. Strategy towards fulfilling four objectives

Nature conservation often appears constraining for local populations whose access tends to be restricted and use of natural resources forbidden. Acceptability and respect of such areas therefore rely on the creation of a win-win situation promoting wildlife conservation and community development through the activities held in the reserve.

The strategy for Umm at-Tut relies on four objectives:

1. Wildlife and habitat conservation
2. Environmental education and awareness
3. Sustainable use of resources
4. Safe outdoor activities

In the case of the Umm at-Tut reserve, the four pursued objectives are complementary: Considering threats on wildlife and biodiversity in the Palestinian territories as an effort towards education and environmental awareness could help reduce those drastically. Knowledge about the outdoor, the surrounding species, and the specificity of the habitat ensures safety of visitors regarding dangerous species. Promotion of leisure activities in the reserve can help create a complementary market for ecotourism based on hiking, educational tours and promotion of the area. The conservation of the woodland habitat found in the reserve will therefore be necessary for the promotion of the reserve and what it has to offer. The development of birding as an amateur activity in the Umm at-Tut reserve relies on the knowledge about spottable bird species and behavior acquired through systematic monitoring.

Working towards all four objectives means working on each one of them at the same time. While establishing the described monitoring scheme, it is necessary to train new observers. Building awareness of visitors goes hand in hand with promoting the reserve and consequently increasing the number of visitors. The local ranger and trained guides could see more demand and shall thus adapt the offer to the new requirement of the protected area. Transmission of knowledge will be the key to building a sustainable and safe recreational use of the reserve.

On a longer term, education directed towards children should help shape mentalities towards nature conservation and enjoyment of sustainable outdoor activities such as hiking. Reaching out to local schools with educational tours could be an action in that direction.

4

RESULT BASED PLANNING RECOMMENDATIONS

4.1. Core protection areas

This section will help to determine the need for entirely closed areas, why and where they are necessary and how to implement such interdictions.

Considering the limited size of the reserve and the heterogeneity of land use within the reserve additional largely of land converted to agriculture, the existence of entirely closed areas would be difficult to sustain, as local farmers have to pass through the reserve to reach their fields. The preexistence of agricultural plots within and in the direct vicinity of the reserve, as well as the proximity of the village impede the restriction of access to any part of the area. Hiking paths should be traced on the main used trajectories to avoid further disturbance of the ecosystem. Grazing should be strictly forbidden on the slopes of the reserve and domestic animals should be kept in the agricultural plots and in the wadi area.

The existing hiking path is short and convenient to access and has been durably marked. Nevertheless, it will be necessary to advise visitors to remain on the marked path to avoid disruption of wildlife and of monitoring protocols.

Transects and squares will be located mostly off path, but should not bear permanent marking to avoid attracting visitors to these areas.

4.2. Getting there and around: leisure activities and frequency

4.2.1. Getting there: roads and parking areas

The Umm at-Tut nature reserve is situated about twenty minutes off road 60, south of Jenin, and is easily accessible through paved roads.

There is no plan for a parking area yet, but current road enlargement could lead to easier and more numerous parking spots for visitors. The consultant located a dumping site right outside of the reserve along the road that is in the process of clearing.



Picture 6: Picture of a potential parking area located on the southern side of the road, out of the Umm at-Tut nature reserve.

This site would suit perfectly parking needs for visitors while keeping the cars out of the reserve. Planning a parking area there requires involving the municipality that has been supporting work on the road leading to Umm at-Tut.

4.2.2. Hiking trails

An 800 meters long hiking path has been marked thanks to a prior project. It presents absolutely no challenge for inexperienced hikers and invites for a short hike in a perfectly open path.

The reserve could offer other hiking opportunities which would require marking a new path and working on making it accessible. A 4km hike could be possible starting in the wadi, going towards the Umm at-Tut village and back down in the wadi to the other slope. Professionals should mark such a hike before opening it to the public. However, establishing a new path would mean disturbing the natural habitat by cutting some bushes and trampling ground vegetation. As for now, until demand for more outdoor trails increases, the path in Umm at-Tut should remain as it is.

4.2.3. Biking trails

Umm at-Tut is a small nature reserve, suffering from intensification of agricultural activities in the surrounding area. Biking trails would be of very limited interest (too short) and would damage the natural habitat in a permanent way. Hence, they are neither necessary nor recommended.

4.2.4. Educational trails

The 800m marked trail within the reserve is an education trail depicting species of trees and providing

an information panel about the species in the reserve. These installations got old but are still useful. Someone, for example the ranger, should monitor the path and keep it open. He could also renew some of the signs and install further ones.

4.2.5. Other potential leisure activities

The flat and open space in the wadi could serve as a nice camping ground. Groups or individuals could enjoy it as part of an educational trip about the environment. Nevertheless, such an activity would require rules about garbage disposal, fires, and flower picking to be enforced. The West Bank does not have many camping spaces and it represents an activity that is mostly unknown yet. Local residents can offer homestays, a possibility of having visitors stay overnight. Creating a campsite would also mean having a frequent garbage collection, a 24/7 helpline, restrooms (dry toilets for instance), and water. These activities could bring new jobs and income for the neighboring village, but again participation of the villagers to such an initiative is mandatory.

Birdwatching as a form of ecotourism in the reserve might attract more people with environmentally sound practices and raising awareness on the diversity of the area. Therefore, trained birdwatchers can act as guides; for spotting and identifying the birds.

4.3. Buildings and permanent furniture

4.3.1. Information center with shop

The reserve is already quite small and does not comprise any pre-existing building. It would be a pity to build something in this landscape. A staffed information center can be considered as inappropriate and should be placed in much bigger protected areas.

4.3.2. Restrooms

For the same reason, there is no need to build restrooms on the grounds of the reserve. As the next village is close by and the reserve is very small, there is no need for restrooms. If there will be a camping ground, restrooms would be necessary. Many environmentally friendly solutions are available, like dry toilets (would solve the problem of water).

4.3.3. First aid Station

Considering there is no ranger living in the reserve, the first aid station can only be located in the village. Umm at-Tut is easily accessed, and a first aid station is not immediately necessary. This might change later with the diversification of activities in the reserve.

4.3.4. Permanent furniture

The stony landscape offers many natural benches. Except near a potential camping ground, the need for furniture is limited.

4.3.5. Others?

Wooden signs and trail marks on stones can mark the hiking trails. A wooden sign should also mark the parking lot when established. Road signs signaling the reserve will be necessary in addition to the existing metal road signs.



Picture 7: Those signs indicate the reserve and the path from the road.

4.4. Wildlife watching hotspots

Guided tours for wildlife watching will require a frequent monitoring of interesting species and their whereabouts. Defining spots as part of an educational trail or a specialized one (for instance for birding) could be interesting later on.

4.5. On-site maps and information

The beginning of the existing trail displays a map, but is neither very obvious nor visible. Information is available only in Arabic. Building up on available information, a similar map and information panel at the entrance of the reserve near the wadi would be valuable. Visible from the road and close to the parking area, it would be accessible to all visitors.

4.6. Safety concept for wildlife and visitors

Visitors coming to a nature reserve have to deal with the conservation constraints and the environment surrounding them. It is important to inform them about risks related to outdoor activities, wildlife proximity and rules.

Some species in the oPT can be dangerous if exposed to bad practices, e.g. venomous snakes or wild boars. Locals tend to know about the threats and good practices to handle them, but foreigners or urban dwellers would be more at risk. Good practices regarding the exposure to these species stated in the set of rules of the reserve and shown on the information panel and the website would be valuable to the visitors. The absence of a ranger on site will make it impossible to update information regularly, so the rules related to safety shall apply at any time of year.

The maintenance of trails will help safeguarding the environment as well as to prevent injury of visitors. Keeping people on paths is one of the priorities to enhance safety for both wildlife and visitors.

Rules are necessary to protect wildlife from accidental fires, heavy disturbance, and pollution from littering and environmental degradation. The enforcement of these rules, as stated in appendix 5, by the ranger or by the local police (seen active around the site) is indispensable.

Fire prevention requires; limited areas where visitors can build fire far away from or cleaned of any easily burnable vegetation. Recommended are stone barbecue that protect ashes from the wind and the floor, or stone hearths with clear and closed borders. Fireworks should be prohibited both within and around the reserve. Moreover, loud noises (music or screams) should be forbidden as well as the displacement of stones, stumps, and any natural formations in order to prevent spatial disturbance. For the same reasons, walking out of the defined paths should also be prohibited (for both humans and domestic animals such as goat, sheep, and pets). Littering and garbage disposal within the reserve should result in heavy fines and prosecution.

Rangers and police must enforce sanctions for those, caught not respecting these rules. Rule enforcement requires education of the local police as well as a reinforced ranger presence in the reserve.

5

GENERAL CONSERVATION APPROACHES – EFFECTIVE PROTECTION

5.1. Identifying viable and important institutions

As stated in the introduction, nature reserve efficiency relies as much on the institutional framework as on the environmental factors. The Oslo Agreement article on nature reserves (article 25) transfers power and responsibility to the Palestinian authorities. The interpretation of this article motivated the Ministry of Agriculture to designate the reserves and assign rangers to some of them. According to interviews led at the EQA and to discussions with major stakeholders, management is in the hands of the Environmental Quality Authority. These two institutions provide the global frame and means for reserve management in the West Bank.

In the case of Umm at-Tut, the consultant did not see the assigned ranger within the reserve during the fieldwork month. Despite the existence of this ranger, rules enforcement on the reserve ground is a problem as the development of agricultural plots and the disposal of garbage obviously attest. It also raises concern that the ranger never checked on the activities of the consultant within the reserve. Local police could also play a role in enforcing conservation by supervising visitors' behavior and practices. A responsible person from the existing staff at the Jenin branch of the Ministry of Agriculture could monitor the ranger's activities and follow-up on rule enforcement and other issues within the reserve. This person would also be responsible of informing the central office of the Ministry of Agriculture about the observed activities.

The local municipalities from Umm at-Tut and Jenin should be included in the management scheme as they will be the information holders in charge and as they represent the places where most visitors will come from. Urban development projects (led by the municipalities) should take into account the conservation objectives. The municipalities, the Ministry of Agriculture and the EQA have to ensure the effective management of the reserve as a conservation area by adopting a common project.

For specific tasks these institutions (MoA, and both municipalities as well as EQA) can rely on:

- Local universities (especially the University of Jenin as located very close to the reserve), that can cover part of the scientific work to be held in the reserve. This can be done through courses aiming at learning biodiversity surveys' methods and naturalist trainings;
- Local and international NGOs (non-governmental organizations) could participate in specific projects related to their scopes (species conservation, capacity building, environmental education and awareness). Local NGOs and stakeholders could for instance help with biodiversity surveys depending on their areas of expertise;
- UN agencies and international donors could play a part in building a stronger institutional background for the conservation of environment in the oPT;
- Global environmental NGOs could provide scientific guidance as well as fund for specific protection measures, such as conservation efforts targeting vulnerable species

5.2. Establishing a sustainable resource management and wildlife monitoring strategy

Description of the reserve (lignous density, ground vegetation diversity, limits of agricultural plots) should serve as a state of reference for future monitoring initiatives. Fixed-point photographs and a consistent repetition of these every year will help monitoring the global aspect of the reserve. Limits of agricultural plots should be re-established according to the official Palestinian spatial plan (strong enforcement hypothesis) or fixed to the current state (low enforcement hypothesis), enforcing rules regarding the interdiction of future expansion.

The use of agricultural inputs should be limited on the neighboring plots as well as harmful intensive agricultural practices. Agricultural production coming from the high biodiversity zones or nature reserves of theoPT could rely on higher valuation of this sustainable resource management.

Recreational activities should be encouraged as long as they comply with environmentally sound practices. In that case they would serve as awareness raising and environmental education. Developments towards a more recreational use of the reserve grounds should nevertheless happen in compliance with the conservation objectives by:

- avoiding of new building construction
- limiting competing for space and resources with wildlife
- limiting pollution and disturbance by complying with the existing rules
- not exceeding the capacity of the reserve

In order to respect those factors of sustainable development, monitoring of visitors number and behavior should be implemented in correlation with threats directly linked to the frequentation of the reserve, mainly fire and garbage disposal. Those tasks fall under the responsibility of the ranger.

5.3. Building environmental education and awareness

Through environmental education, people can explore environmental issues and take action towards improving the state of the environment. Understanding these issues and their influence on the daily lives and activities of the people helps making responsible decisions. Education works towards awareness of environmental issues, knowledge, attitudes and behaviors and last but not least skills and participation. Environmental education trains people to make their own choices taking into account environmental factors and consequences. It builds up adhesion to environmentally friendly behavior and consumption choices on a daily basis.

There is a theoretical background to environmental education and awareness, which teachers can use at schools. School programs could incorporate this globally. Nevertheless, awareness has a link to a strong relationship to nature built through field trips, outdoor activities and scientific education. Promoting Umm at-Tut as an environmental education place for inhabitants of the neighboring cities (particularly Jenin) would help moving towards both the conservation objective and the education and awareness objectives. Indeed while teaching students about the environment and biodiversity of the reserve in the field; it would help to build their relationship to nature and awareness about the consequences of their actions on the environment.

Reaching out to schools at all levels and to all education facilities (summer camps, sports club, scouts) beside planning and conducting educational trails, field courses and green camps, would therefore train a generation to question their choices according to environmental considerations.

Environmental education and awareness can be specific to the space where it is taught but also broader. It could be interesting to include more extensive information about environmental protection in the reserve documents (digital information, on-site information) and to use the reserve as an illustration of broader environmental issues (for instance risk of drought under climate change).

5.4. Local community involvement

Local farmers and herders often cross the reserve. They are the populations that are most likely to cause threats but also to protect the area. Including them in the monitoring plans and in the management process will only help if they comply with the rules established within the reserve by authorities. Local populations should be the first to benefit from education initiatives and could help transmitting this to other visitors.

Community consultation regarding future projects or stronger enforcement of existing rules is necessary for the success of the initiative. Working together with local farmers and understanding their needs can be considered as a key element in the conservation of the area.

5.5. Local and regional cooperation

Ideally, nature conservation should not know borders. Wildlife ignores boundaries, and groups of animals and plants have always traveled to meet their adaptation needs. Connectivity of similar and different ecosystems, continuity and margins are part of habitats and repartition areas. Genetics of population are a significant viability factor, optimized by diversity and exchange.

These are some reason why it is good to promote regional cooperation in nature conservation. Nature reserves of the size of Umm at-Tut only make sense as part of a larger conservation plan organized as a mosaic of connected and/or diverse spaces representing habitat types and sheltering wildlife from human activities. Local and regional cooperation can pursue two objectives: knowledge and good practices' exchange, and optimization of wildlife conservation.

Exchanging experiences and knowledge with other differently (or similarly) managed protected areas can give good insights. Longer monitored reserves can give insights on best methodologies and problems when designing monitoring techniques. Looking into similar areas' strategies in the region (Jordan, Israel and Lebanon) can help adapt general methodologies to local seasonality and conditions. For specific wildlife protection initiatives, a regional monitoring is necessary. Exchanging information about traveling animals, building a network of reserves with a comparative follow-up on species population, and working together on territorial connectivity are measures significant to efficient wildlife conservation. Training of rangers also gains from being transboundary.

Experiences in other areas can nurture institutional schemes. For instance, local NGOs are managing nature reserves in Lebanon, leaving more flexibility to the implementation of local conservation measures and daily management of the reserve but with a weak enforcement of national strategies.

5.6. Local, national and international marketing for ecotourism

Ecotourism is part of the sustainable use of resources' objective as it aims at promoting responsible travel to natural areas while sustaining the wellbeing of local people and nature.

At a local scale, communication should limit the impacts of visitors on the reserve and at building environmental awareness. Marketing directed towards the local community should therefore stress

the benefits of the reserve for local landscape and agriculture and incorporate them in the process of protecting the area.

At the national scale, Umm at-Tut is a good example of a space threatened by human activities that shows high conservation value and an interesting natural heritage. Challenges are therefore major in the area to succeed in conserving the landscape of Umm at-Tut despite growth in agricultural lands' demand and scarcity of resources.

At the international scale, Umm at-Tut, although attractive in terms of landscape and accessibility, needs cleaning to meet international standards for outdoor activities. Advertising towards travel agencies and tour companies could help include a nature component to travels in the oPT. Excursions and discovery hikes should also target foreign residents in the territory. The trained ecotourism guides could be part of developing such hikes.

5.7. Making recreation and protection compatible within a nature reserve – discussion about stakes, issues and potential solutions

Recreation and protection tend to be contradictory objectives when looking at traditional nature reserves that exclude human activities from their ground in order to evolve towards a higher level of wilderness (meaning here distant from human intervention). The model on which the consultant based this management plan works towards making both protection and recreation compatible seeking fulfillment of objectives regarding both wildlife and human activities. The interdependence of these objectives is the keystone of the model implemented: Users will accept the reserve if it is valuable for them and this value in turn gets its foundation in the success of wildlife and ecosystem protection. Enforcing rules with not only sanctions but also education should meet such objectives. Using the beautiful natural landscape at hand to build up visitors' environmental awareness is one strategy: From the positive experience of their visit, they should start wanting to protect the area to be able to enjoy it in the future. Highlight the consequences of environmentally harmful practices for educational reasons. Relying on local community, adherence to the protection of the area is another argument, working towards protecting and valuing its own heritage.

Community events will help to build up commitment into conserving the area, e.g. community cleaning or participatory monitoring, training. The Hanns Seidel Foundation has already organized several field trips educating local people about nature conservation and the richness of the local nature reserves. These events also reached out to institutions in charge of the management of the spaces and were a success in terms of raising awareness. Scientific knowledge also helps to advocate both objectives as it reveals new arguments for conservation and improves wildlife population management.

The Umm at-Tut reserve is too small and shelters long existing human activities that prevent the creation of a strict protection area. It therefore is a space of cohabitation between wildlife and humans. The expansion of human activities must nevertheless be regulated (or prevented) to avoid increasing pressure on natural resources (refer to section 3.1 for more information about threats).

Sustainable use of natural resources associated with environmentally sound practices adopted by visitors (developed through education) should definitely make recreation and protection compatible in the area.

6

THE IMPLEMENTATION OF THE MASTERPLAN – TIMEFRAME AND STRATEGY

All these actions need implementation in time with clear deadlines and intermediary objectives. Building up an effective sustainable management will require a long-term strategy, an evaluation process and some evolution as it goes. The present plan presents a two to three year timeframe, dependent on the time needed to mobilize the necessary resources. It will then need evaluation and modifications to work towards a longer timeframe.

Components of the strategy:

- following the state of the environment
- assessing the species' populations dynamics throughout time
- improvement of work and installation of furniture and signs.
- popularity: gathering the number of visitors (and origin), follow-up of each activity (satisfaction, durability of trails and information, updates)
- impacts on local communities' livelihoods through interviews and meetings
- statistics on education and awareness activities

This plan is for two to three years:

YEAR 1 will focus on establishing governance structures (administrative and scientific institutions). These will be able to start working straight ahead concentrated on mobilizing resources (funds, knowledge and people). From then on, an agenda can be established putting timeframes on monitoring and surveys. Efforts should meanwhile focus on the reduction of threats and clarification of property titles and rules within the reserve. The role and actions of the ranger should be clear as soon as possible.

YEAR 2 should be used for building on previous actions. Following up on surveys and monitoring, those data will start the environmental education within the reserve. The implementers can draw first conclusions on the state of the local environment and develop indicators to assess the progress relying on two years of data collection.

YEAR 3 should see the continuation of monitoring data collection while starting to reflect on previous actions. Both the scientific and administrative committees should highlight results and conclusions in order to start preparing a management plan for the coming years. The new plan should focus on a 5-year implementation period, following up on existing data and going into details about wildlife populations and specific conservation objectives concerning high conservation value species.

7

ADMINISTRATION AND STAFF MANAGEMENT

7.1. Personnel need

7.1.1. Existing positions and external resources

An interview at the Jenin branch of the Ministry of Agriculture revealed that a ranger position covers the protected area of Umm at-Tut and the surrounding woodland. The ranger is supposed to walk around every day from 8am to 3pm to prevent harmful practices and degradation of the reserve grounds. This position is insufficient for the monitoring of the territory and for the prevention of all kind of degradation happening beyond the working hours of the ranger. The ranger has never been seen on the reserve grounds during the field work and lives some kilometers away from the reserve, which makes him a very limited resource in case of suddenly occurring problems. His position could evolve towards checks that are more random and monitoring of the area instead of fixed hours of presence on site (that are apparently not covered). The branch of the Ministry of Agriculture in Jenin calls for more funds to help financing more ranger positions to monitor Umm at-Tut. The consultants' recommendations do not support this orientation. The use of existing resources could be more efficient in terms of environmental conservation without added funds.

Following the recommendation of this plan, MoA should create and adopt the ranger Terms of Reference (ToR). This ToR should include the following:

- **enforcement of rules, with support from the local police:**
He is the one who prevents fires and alarms in case of fire within the reserve. He is the one who interacts with visitors regarding their activities' accordance with the reserve's rules. He prevents grazing and woodcutting, illegal fires and smoking in forbidden areas. The ranger is responsible for preventing littering within the reserve.
- **monitoring of habitat change:**
By his presence and activities in the reserve, the ranger is able and encouraged to notice and record changes and unusual events (fires, drought, global aspect of woodland). He can be in charge of annual photography monitoring.
- **trails checking and maintenance:**
As he works inside the reserve, the ranger hikes the trail regularly. He has to maintain the paths, means keeping them open and ensuring the visibility of signs, the accessibility of the path (cutting and removing vegetation that might cover them), and erosion. There should be a record for the necessarily conducted activities for evaluation every season (and especially following the rainy season).
- **education and sensitization:**
As the only person working on the ground up to this day, the ranger is the reference regarding rules and their enforcement within the reserve. He should therefore be available to answer visitors' questions. He could also lead basic educational hikes to explain the rules and vulnerability of the space. He must look after recreational activities on the ground and explain the importance of monitoring fires and respecting the rules of garbage disposal.
- **monitoring of visitors' numbers and assessment of maximum capacity and troubles encountered as figures go up**

This extended ranger mission might require to second him with a trainee or assistant. Another ranger or the assistant should cover periods of absence. Later, a scientific technician could take over some of these tasks and organize the monitoring campaigns.

The different types of hikes (educational, recreational) will require guides with different training. Some guides already received an ecotourism training and are familiar with the trails in Umm at-Tut. A list of these should be available to visitors on the *mahmiyat.ps* website. Free monthly educational hikes can be part of an education project.

The need for scientific research requires the recruitment of teams to establish the research and monitoring protocols and to train locals to implement the chosen methodologies. Researchers do not need to be employed as part of the reserve's personnel but can be consultants or in an ideal scheme part of a research project working on the reserve while being funded from other sources.

Regarding administrative personnel needs, the recruitment will depend on the administrative scheme chosen by the authorities in charge.

7.1.2. Administration

A strategic and a scientific committee needs to administer the reserve. Both committees should promote public participation of local communities in major decisions through consultation, especially regarding access restriction, use of resources and other conflictual topics.

The strategic committee should bring together institutions in charge of the reserve's management, independent figures and donors: Ministry of Agriculture, EQA, municipalities, donors, etc. Those will provide orientations for the future of the reserve in terms of spatial planning, projects, and human resources. The committee should promote interaction with other institutions on education and awareness raising activities in the reserve and help with fundraising. The strategic committee should agree on the creation of a management scheme for the Umm at-Tut nature reserve depending on available funds and possibilities. Choices are creating an ad-hoc institution made of a director and multiple staff (for instance rangers, project coordinators), building on existing organization to manage the reserve (such as local NGOs) or any other general scheme adapted to the local context.

The scientific committee should be in charge of organizing, following and interpreting the scientific data gathered in the reserve and making decisions about what to change and what to keep in terms of monitoring methodologies. They should therefore meet at least twice a year after each main monitoring campaign (spring and autumn). It should gather researchers and scientific personalities according to their specialty and involvement in the Umm at-Tut reserve monitoring. In two or three years from the start of the implementation of the management plan, the scientific committee shall publish a new one relying on and referring to results and evaluation of the present plan.

Participation in the committees should be part of normal not paid activities of the designated members. Cost of transportation to and from the meeting place can be covered with limitation of expenses.

7.2. Expected budgetary needs

The budget will need to cover the operational and maintenance costs as well as a set of initial investments.

Operational and maintenance costs will depend on the chosen administrative scheme and the number of employees. As stated before, efficiency can be highly improved relying on the existing means of operation (ranger position). Those costs can therefore be low.

Initial investments will need to cover equipment and installation such as permanent furniture, setting of signs and maps, and marking of the trails. A small rehabilitation project as joint initiative between the ministries of tourism and agriculture, the EQA and the municipality of Jenin, could be enough to establish an attractive ecotourism site within Umm at-Tut.

Researchers will need funds but these do not need to be included in the reserve's budget, as budgets for universities can be used.

7.3. Possible funding sources

A long-term assessment will show the ecological gain of a nature reserve. Funding must therefore be secured in the long term taking into account exceptional expenses (establishment of facilities, early-on trainings, offsets and diversification for local communities) and long term frequent funds (monthly, annual) covering administrative, running and maintenance costs.

Possibilities for funds:

- International and regional funds for the protection of the environment such as the Global Environment Fund, the Green Climate Fund, LifeWeb, UNESCO subsidies for the conservation of cultural and natural heritage, HIMA Fund.
- Bilateral donors involved in the development of the West Bank and state building of the State of Palestine (such as Belgium, Sweden, Japan, Turkey etc...).
- National funds: The management of the Umm at-Tut reserve appeals to three national organizations that are the Ministry of Agriculture, the Ministry of Tourism and the Environmental Quality Authority. The latter being the focal point for the implementation of all environmental conventions the Palestinian Authority is part. The absence of direct funds makes the participation of these institutions possible only in terms of human and organizational resources and strategic expertise.
- NGOs: Local and international NGOs can help fund specific programs for the conservation of nature, environmental education and awareness, and rehabilitation and improvement of on-site installations. NGOs can use specific funds by presenting specific project proposals on topics such as bird conservation, trail marking, management facilitation, outreach, etc.
- Research funds: Specific research funds and organizations are closely addressed to the Mediterranean region (EnviMed, IFPO for instance). Teaming up with such organizations can help secure scientific funds for ecological monitoring and general environmental conservation
- Private foundations and individual donors financing environment protection such as the Zennström Philanthropies, the Gordon and Betty Moore Foundation, the William and Flora Hewlett Foundation, the Lawrence Foundation, Environmental Funders Network, and the Oak Foundation.
- Decentralized cooperation between local entities in Europe and the local municipality in the West Bank.

A funding strategy should be established for each donor working in the West Bank and other donors not yet working in the area but interested in environmental conservation (foundations, funds and decentralized cooperation).

8

RECOMMENDATIONS

This paragraph aims at summarizing the different actions, which are part of the timeframe of this plan and the priorities. Thereafter the consultant is quoting the recommended actions in the order of recommended implementation, each section independent from the other one.

8.1. Recommendations regarding the reserve's grounds

- limiting agricultural expansion within the reserve by enforcing the rules and monitoring practices showing early stages of land use change (trees and shrubs uprooting, opening of spaces, delimitation of plots)
- renewing signs on the grounds (in both English and Arabic) including a sign to the parking lot, the start of the trail and an information and rules panel at the entrance of the reserve
- creating a new, longer hiking path under professional advice; considering the type of ecosystem. The most interesting option would be to connect the paths of the reserve to a broader hiking area in order to prevent disturbance of wildlife and vegetation. NGOs such as Walk the Masar can be interesting partners in such an endeavor. The environmental aspects of the nature reserve nevertheless need to be the top priority over leisure activities.

8.2. Administrative scheme

- sign a protocol to secure cooperation between the MoA, the EQA and the municipality establishing the strategic committee and adjusting the frequency of meetings and responsibilities
- creation of the scientific committee with relevant scientific staff and institutions. This committee should include the people working on nature conservation in the occupied Palestinian Territories (Palestinian Museum of Natural History; the main universities including Jenin, Birzeit, Bethlehem, Al Quds; specialists coming from the MoA and the EQA; optionally experts from neighboring countries)
- modification of the ranger's Terms of References according to the proposition given in section 7.1.1 of this document to meet enforcement needs within the reserve grounds
- decisions about recruitment and personnel needs within the reserve
- fund raising activities led by the strategic committee

8.3. Scientific protocols

- establish a fixed photography monitoring scheme from the two points given in this plan with a one year period
- get local birdwatchers and botanists to identify species according to point counts methodologies and transects
- implement basic monitoring connected to the ranger's activities (trail maintenance and observation, yearly photographs of the reserve)
- record unusual events (strong winds and damages they may cause, extreme drought, fires)

- mobilize scientific teams through projects' proposals
- implement monitoring schemes for protected species of plants (...) and tortoises present in the reserve
- seek funding for nature conservation following the results of the monitoring (specific species or habitats)

8.4. Beyond this plan

- implement evaluation of both the administrative scheme and scientific actions after the two to three years period
- encourage and monitor the creation of a new plan for the Umm at-Tut nature reserve building up on the results obtained through this one

9

GLOSSARY

EQA	Environmental Quality Authority
IUCN	International Union for the Conservation of Nature
MoA	Ministry of Agriculture
oPT	occupied Palestinian Territories
ToR	Terms of Reference

Appendix 1: **List of nature reserves in the occupied Palestinian Territories**

Al-Hashmee	Deir Ammar	Ein Darra
Fahmeh	Jabal-Alkabeer	Jerusalem Wilderness
Sheikh Katrwany	Sheikh Zayed	Shoubash
Sirris	Tammoun	Tayysir
Umm at-Tut	Wadi Al-Dilb	Wadi Zarqa Al-Elwey
Al-Qarn	Deir Razeh	Ein Al-Uja
Suba	Um Al-Saffa	Wadi Al-Quff
Wadi Al-Qilt		

Appendix 2: **1995 Interim Oslo Agreement on nature reserves and Palestinian environmental law**

Nature Reserves:

1. Powers and responsibilities in the sphere of Nature Reserves in the West Bank and the Gaza Strip will be transferred from the military government and its Civil Administration to the Palestinian side and shall be assumed by it, including, inter alia, the establishment, declaration, administration, supervision, protection and preservation of Nature Reserves and of animal species, natural assets and plants.
2. In Area C, powers and responsibilities related to the sphere of Nature Reserves will be transferred gradually to Palestinian jurisdiction that will cover West Bank and Gaza Strip territory except for the issues that will be negotiated in the permanent status negotiations, during the further redeployment phases, to be completed within 18 months from the date of the inauguration of the Council.
3. The Palestinian side shall safeguard and preserve the Nature Reserves in accordance with established scientific standards.
4. The two sides shall agree on methods of cooperation regarding the protection and preservation of Nature Reserves, through a Joint Committee of Experts from the two sides. This cooperation shall include exchange of information and data regarding issues such as animal and plant diseases, pests, and scientific research.
5. The two sides shall each take appropriate measures in order to protect Nature Reserves, Protected Natural Assets and species of animals, plants and flowers of special breeds, as well as to implement rules of behavior in Nature Reserves.
6. Each side shall enforce, within the areas under its responsibility, the regulations pertaining to hunting, and in particular the prohibition on hunting of protected and endangered species.

The Israeli side shall coordinate with the Palestinian side activities in Area C outside settlements and military locations, which may change the existing status of this sphere.

According to the Palestinian environment law number (7) for a year 1999:

Article (40) 'the ministry, in cooperation with competent authorities, shall designate bases and criteria to maintain natural reserves and national parks, supervising, announcing and demarking them'.

Article (41) 'it shall be banned to hunt, kill or catch land birds, land and maritime animals and fish itemized in the executive list of this law. It shall be prohibited, too, to own, transfer, wander with or display such birds and animals either dead or alive; their nets and eggs shall not to be destroyed.'

Article (42) 'the ministry shall designate necessary conditions to maintain vital variety in Palestine, in collaboration with competent authorities.'

Article (43) 'The ministry, in coordination with competent authorities, shall undertake setting sufficient fundamentals and criteria to itemize plants, forest and land trees that cannot be cut, cultivated, damaged, either temporarily or permanently to guarantee their continuity and perpetuity.'

Article (44) 'anyone shall be banned to do any activities and behavior leading to endangering natural preserves, forest areas, public parks, historical and archeological sites or affect aesthetic level of such areas.'

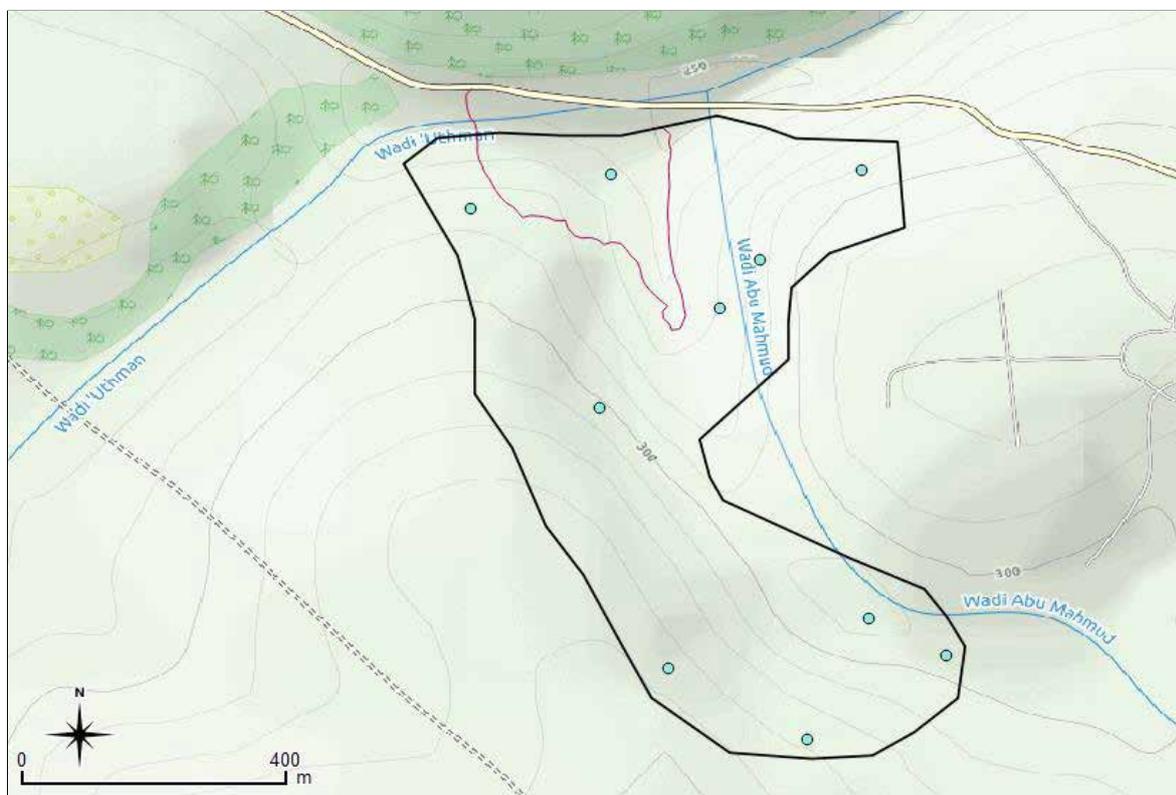
Article (72) 'Anyone who violates provisions of article (44) of this law shall be punished by a fine not less than twenty Jordanian dinars (JD) but not more than two hundred dinars (JD) or their equal in the legally active currency or jail for not less than three days but not more than one month or by one of the two penalties.'

Appendix 3: Distances measured between randomized points and the closest ligneous individual

Points	Distance measured (m)	Comments
1	0.23	
2	2.10	
3	0.00	
4	8.65	
5	0.60	
6	1.10	
7	No distance could be measured	Within an agricultural plot
8	0.01	
9	No distance could be measured	Within an agricultural plot
10	0.55	
11	0.66	
12	1.00	
13	0.65	
14	No distance could be measured	Within an agricultural plot
15	No distance could be measured	Within an agricultural plot
16	0.50	
17	No distance could be measured	Within an agricultural plot
18	No distance could be measured	Within an agricultural plot
19	No distance could be measured	Within an agricultural plot
20	No distance could be measured	Within an agricultural plot
21	3.22	
22	No distance could be measured	Within an agricultural plot
23	3.60	
24	0	
25	1.99	
26	1.20	
27	0.05	

28	1.15	
29	1.50	
30	0.66	
31	0.81	
32	1.71	
33	0.42	
34	1.25	
35	No distance could be measured	Within an agricultural plot
36	0.90	
37	0.50	
38	0.22	Higher than 3m
39	1.10	
40	1.22	

Appendix 3bis: Botanical quadrats' location and results



- Quadrat 1: 23 species
- Quadrat 2: 25 species
- Quadrat 3: 7 species
- Quadrat 4: 27 species
- Quadrat 5: 23 species
- Quadrat 6: 13 species
- Quadrat 7: none as the soil was just plowed
- Quadrat 8: 13 species
- Quadrat 9: 8 species
- Quadrat 10: 18 species

Appendix 4: Example of a bird observation form

Common Name:	Scientific Name:
Observation Date:	Time(s):
Distance from bird:	
Light Conditions:	
Optical Equipment:	
Notes made at time of sighting:	
Date report prepared:	
Location of observation (if following a marked point count, give the ID of the point or its coordinates):	
Weather at time of observation:	
Prior weather (how many days since last change?):	
Enter number of birds/plumage(s):	
PHOTO/DRAWING:	
Description of bird: include all field marks YOU ACTUALLY OBSERVED - including details on size, shapes, colors, bill, feet, eyes, plumage, etc.	
List similar species and describe how or why you eliminated them.	
Describe the behavior of this bird. Other species seen with this one(s)?	
Any interaction between birds?	
What is the habitat at this location? Adjacent or nearby habitat?	
Describe the bird's song, calls, or other vocalizations. How was the call perceived? (from a perch, in flight, etc.)	
References used for identification:	
Reporter's name, address, and phone number:	

Appendix 5: Rules for the reserve. Signs should display them.

There are two ways to display rules for the public: putting the stress on the positive behavior (YES) or on the interdiction (NO). Here are some examples:

YES	NO
<ul style="list-style-type: none"> • Stay on the trails • Stay near the guide • Keep nature clean • Keep relatively quiet (no loud music) to prevent disturbance of animals • Respect instructions • Enjoy the scenery • Keep your dog on the leash • Pick up your trash 	<ul style="list-style-type: none"> • Hunting • Flower and plants picking • Woodcutting • Smoking or fire lighting outside of the designated areas • Off paths walking

SAFETY RULES:

- Always bring water with you
- Do not remove rocks or lift logs, reptiles might be hiding underneath
- Do not pick up wounded animals

Examples of signs:



Appendix 6: Context of the writing of this plan

The present plan was written by Christelle Bakhache, Msc. Ecology and political science, external consultant specialized in nature conservation, between February and May 2017. Fieldwork happened between the 10th and 31st of March and was completed thanks to the help of Mariana Odru, Msc. in agronomy.

This plan relies on pre-existing literature, collection of field data, and interviews. Interviews were held with:

- Dr. Issa Mussa, Program Officer at the EQA
- Municipality of Jenin
- Jenin Governorate branch of the Ministry of Agriculture



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