

BIODIVERSITY CONSERVATION PLAN

Battir World Heritage Property (WHP), “Palestine: Land of Olives and Vines—Cultural Landscape of Southern Jerusalem, Battir, Palestine”

Biodiversity Targets of Conservation Value

31st August 2019



Onosma gigantea
Photo courtesy to Roubina Ghattas



Echium Judaeum



Orchis galilaea



Ophrys sphegodes



Gazella gazelle
Photo courtesy to BU/PMNH, flickr.com and focus-natur.com



Anthus similis



Tapbozous perforatus



Arrhenia rickenii

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Biodiversity Targets of Conservation Value at Battir World Heritage Property (WHP), *“Palestine: Land of Olives and Vines—Cultural Landscape of Southern Jerusalem, Battir, Palestine”*,

INTRODUCTION:

The conservation targets at Battir World Heritage Property (WHP) were identified based on building number of linkages and conducting several analyses linking habitats with species growing or inhabiting the area. This was supported with series of meetings with the experts and technical people who are considered specialist in biodiversity conservation and taxonomy, those who know and worked in Battir WHP and those who have conducted the biodiversity baseline surveys on site. Two meetings were conducted; one on the 19th of August 2019, where number of experts namely Mr. Mohammad Mahassneh from Environment Quality Authority (EQA), Dr. Anton Khalilieh from Nature Palestine Society (NPS), Mr. Adel Abu Ayyash from PCC, Mrs. Roubina Ghattas from PCC, Dr. Mazin Qumsiyeh from BU/PMNH, Mr. Adbelsalam from BU/PMNH, Mr. Elias Handal from BU/PMNH, and Mohammad Abu Sarhan from BU – PMNH staff get together and discussed the potential habitats and species to be identified as conservation targets of priority at Battir WHP. The aim of the meeting is to set the conservation targets of priority at Battir World Heritage Property (Battir WHP). The experts discussed thoroughly the potential targets and later agreed on conservation targets of priority at both habitat and species level. This was done based on presentation of the analysis done by PCC regarding the site and potential sites and based on feedback from BU/PMNH team, NPS expert and EQA expert.

Another meeting took place on the 27th of August 2019, where Dr. Anton Khalilieh, Mrs. Roubina Ghattas and Mr. Elias Handal met and discussed more in depth the habitats and species; specifically those of importance to birds and animals (vertebrates and invertebrates) that shall be considered as conservation targets.

The scientific analysis done to identify the targets and the main outcomes introducing the biodiversity targets at Battir WHP are presented in details in this report.

1. BIODIVERSITY TARGETS OF CONSERVATION VALUE

Al Makhroun valley and its surroundings as a whole was found of high biodiversity conservation value; as reported in the biodiversity baseline survey reports done during the year 2018/2019 on the site. The selected area almost overlaps the core zone of the Battir World Heritage Property (WHP) identified by MoTA (Ministry of Agriculture) in the WHS nomination report for the site¹ (map 1). The valley is also announced as Important Bird Area

¹ Ministry of Tourism and Antiquities (MoTA), 2013. Palestine, Land of Olives and Vines Cultural Landscape of Southern Jerusalem, Battir. Palestine.

(IBAs)² and was designated as a Key Biodiversity Area³ at national and global levels. AL Makhroul valley is in the Mediterranean Forests, Woodland and Scrub biome, one of WWF's Global 200 priority biomes for conservation⁴. The area is also part of Conservation International's Global Biodiversity Hotspot Mediterranean Basin⁵, and of a global Centre of Plant Diversity⁶, two additional designations of global conservation importance.

The Valley and the green area encircling Battir and Husan Villages supports the growth of diverse vegetation cover and plant forms as it falls under the Mediterranean botanical and zoogeographical region⁷ and the Mediterranean biogeographical zone⁸. The green natural areas along the valley are mainly composed of Sclerophyllous oak woodlands on Limestone (*Quercus calliprinos* forest), which is an important ecosystem type of the natural vegetation in the Mediterranean region and of high nature conservation value in the region. As a part of the mosaic-like landscape, old-growth oak forests, in particular, provide a wide range of ecosystem functions and services.

The Oak forests are important ecosystem type of the natural vegetation in the Mediterranean region; providing a wide range of ecosystem functions and services⁹. In the disturbed landscapes occurring in the Mediterranean region, the well-kept areas especially those with woods forms natural base with significant biodiversity elements. Sacred trees, groves and forests such as the evergreen oak forest are found all over the Mediterranean basin. They were established for spiritual and cultural purposes sometimes for centuries¹⁰. This evergreen oak tree; dominantly *Q. calliprinos*, supports the conservation of a great number of associated species¹¹ even small species such as ants, spiders, snails, especially, in hot region by providing suitable habitats and shelter. This is manifested in Palestine in Battir WHP. In conclusion, the evergreen oak forests and their mixed habitats have a high conservation value, because they

² <http://datazone.birdlife.org/country/palestinian-authority-territories> and
<http://datazone.birdlife.org/site/results?cty=240&fam=0&gen=0>

³ <http://www.keybiodiversityareas.org/site/results?reg=8&cty=240&snm=>

⁴ Olson, D. M. and Dinerstein, E. (2002). The Global 200: Priority ecoregions for global conservation. *Annals of the Missouri Botanical Garden* 89(2): 199-224.

⁵ Conservation International (2013). Global Biodiversity Hotspots: Mediterranean Basin. Downloaded from http://www.conservation.org/where/priority_areas/hotspots/europe_central_asia/Mediterranean-Basin/Pages/default.aspx

⁶ WWF and IUCN (1994). Centres of Plant Diversity: a Guide and Strategy for their Conservation. Volume 1: Europe, Africa, South West Asia and the Middle East. Gland, Switzerland and Cambridge, UK: WWF and IUCN.

⁷ Zohary, M., (1973). *Geobotanical Foundations of the Middle East*. Stuttgart: B. Fischer Verlag. 739 pp

⁸ Soto-Berelov, M., Fall, P.L. & Falconer, S.E (2012). A revised map of plant geographical regions of the Southern Levant. *Proceedings of the Geospatial Science Research Symposium GSR2*. Melbourne.

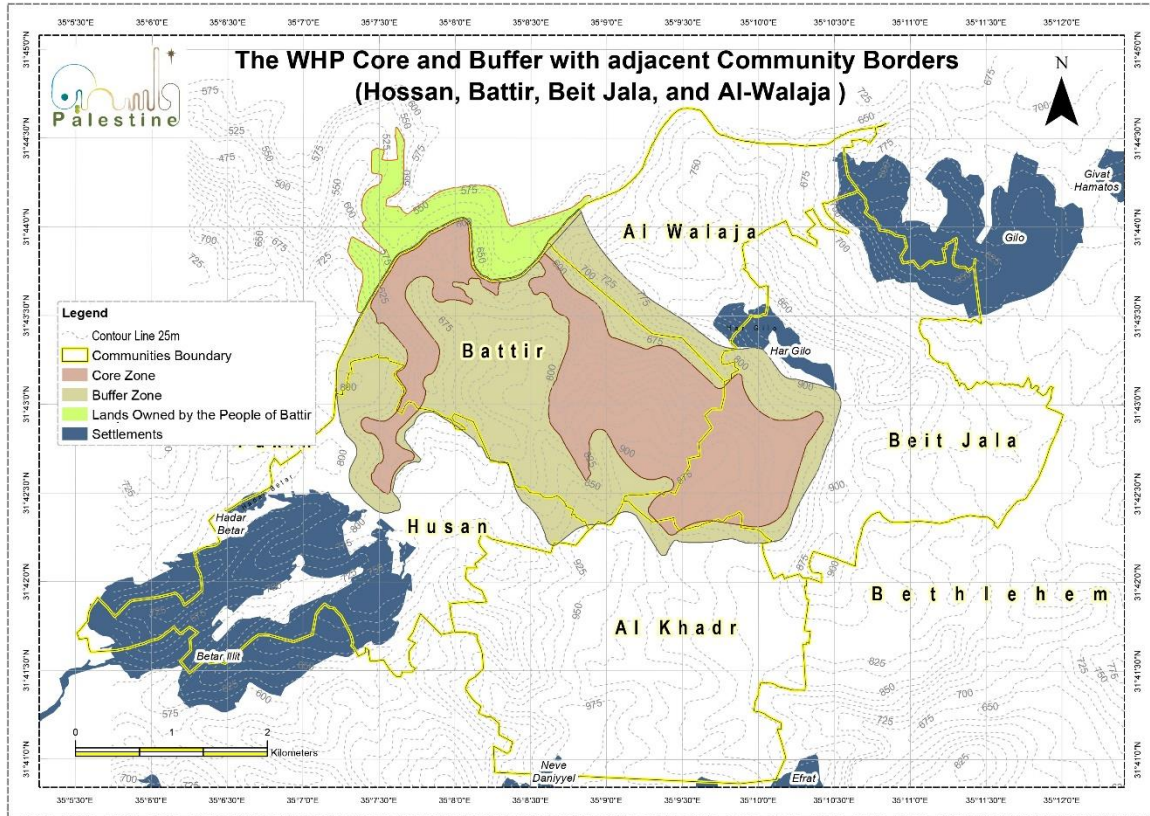
⁹ Westphal C., Von Oheimb G., Meyer-Grünefeld M., Tremer T., Hardtle W., Levanomy T., Dayan T., Assman T., 2009. An old *Quercus calliprinos* forest of high nature conservation value in the Mediterranean region of Israel. *Conservation Studies in Israel*, Volume 57, Issue 1-2 : 13-23.

¹⁰ Harding J.S., Benfield E.F., Bolstad P.V., Helfman G.S., Jones EBD III, 1998. Stream biodiversity: the ghost of land use past. *Proc Natl Acad Sci*, 95: 14843-14847.

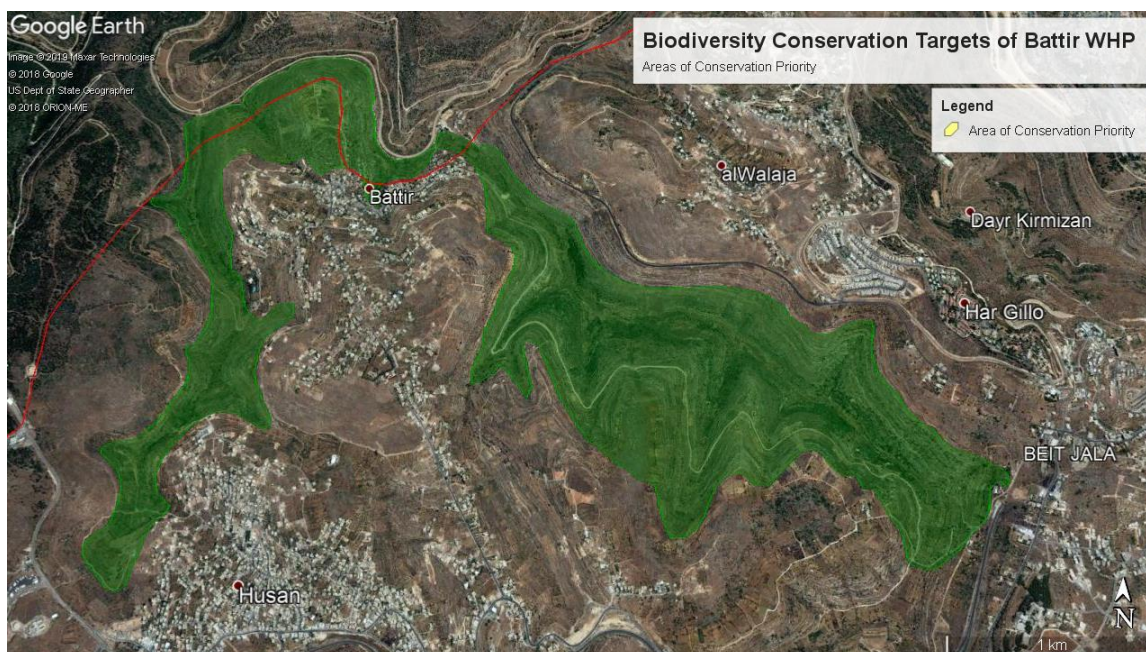
¹¹ Martinez J. and Amar Z., 2014. The preservation value of tiny sacred forest of the oak *Quercus calliprinos* and the impact of livestock presence. *Insect conservation*, 18 (4): 657-665.

are rare examples of intact Mediterranean forests; representing important elements in ecosystems with stable species composition and high cultural values¹².

In conclusion, the area as a whole including Al Makhroul valley itself and the two slopes of hills surrounding the valley from the north and south and the same with the valley enclaving Battir towards Husan village are worth to be identified as an area of conservation value and hence necessary to be conserved for its biodiversity components at Battir WHP. It is the one that encompass the green natural areas as specified in the map2 below.



12 Deil U., Frosch B., Jäckle H., Mhamdi A., Achhal A., 2009. A geobotanical analysis of forest patches on sacred sites in Northern Morocco. Berichte der Reinhold-Tüxen-Gesellschaft, 21: 174-195.



Map 2: Area of Biodiversity Conservation Value at Battir WHP

2. CONSERVATION TARGETS AT HABITATS LEVEL

2.1 Plant Conservation Targets at Habitat Level:

According to the biodiversity baseline surveys done by PCC and BU/PMNH for Battir WHP, “Palestine: Land of Olives and Vines—Cultural Landscape of Southern Jerusalem, Battir, Palestine”, it was found that there are diverse habitats existing at the site that supports that growth and survival of large number and diverse plant and animal species on site. Of the main habitats that were classified on site are the following:

1. Natural Oak forest: Sclerophyllous Broad Leaved Oak Forest and Maquis. This habitat is dominated with *Quercus calliprinos* Oak tree that supports the growth of diverse and dense batha/garrigue plant associations of mainly *Sarcopoterium spinosum*, *Cistus spp.*, *Calicotome villosa*, and *Coridothymus capitatus*. This habitat supports the growth of diverse wild Mediterranean trees such as *Rhamnus lycioides*, *Crataegus aronia*, *Pistacia Palaestina*, and the reseedling of *Pinus halepensis*, and *Pinus pinea*, in addition to diverse shrub and herbaceous species such as *Teucrium divaricatum*, *Teucrium capitatum*, *Fumana arabica*, *Andropogon distachyos* and many others.
2. Mixed natural oak and olive groves: This habitat is dominated with both oak and olive trees. The habitat support the growth of number of trees such as *Arbutus andrachne*, *Pistacia Palaestina*, *Styrax officinalis* and number of shrubs and herbaceous species such as *Pistacia lentiscus*, *Phlomis viscosa*, *Calicotome villosa*, *Cyclamen persicum*, *Smilax aspera*, and many others.

3. Man-made planted coniferous woodland: This habitat is dominant with *Pinus halepensis* cultivated tree and its reseeding plants. This habitat does not support diverse plants but mainly scattered herbaceous species especially at the sides of the habitat where new habitats starts to emerge.
4. Batha and Garrigue habitat: This habitat support the growth of shrub/subshrubs and herbaceous species. Of the main species are *Phlomis viscoa*, *Cistus spp.*, *sarcopoterium spinosum*, *coridothymus capitatus*, *Calicotome villosa*, *Bellis sylvestris*, *Teucrium creticum*, and many others.
5. Fallow lands and olive groves: This habitat is mainly located at the flat lowland valley, where there are wide spread olive groves either cultivated or still taken care of by its owners as those groves are plowed lands or groves that are cultivated and left alone for one or two seasons only, or groves that were cultivated but neglected and only visited for harvesting and here the fallow land appear under or on the sides of the olive grove land. The plant associations in this habitat are *Asparagus aphyllus*, *Andropogon distachyos*, *Calicotome villosa*, *Carlina spp.*, *Arum Palaestinum*, *Malva parviflora* and many *graminae spp.* and *papilionaceae spp.* (to be classified in spring season).
6. Mixed oak and Pine forest supporting batha association, which supports diverse types of plants such as *Pistacia palaestina*, *Rhamnus Lycoides*, *Crataegus aronia*, *Teucrium capitatum*, *Thymus spicata*, *Thymbra spicata*, *Leontodon tuberosus*, and others.
7. The trench of the lowland valley (the deepest point in the valley): This trench is 5-8 meters in width and it supports the growth of all plant forms including trees, shrubs and herbaceous species. Of main plants are *Pistacia palaestina*, *Quercus calliprinos*, *Sarcopoterium spinosum*, *Calicotome villosa*, *cistus spp.*, *Salvia indica* *Daucus carota*, *Phagnalon rupestre*, *Dittrichia viscosa* and many others.
8. Micro-environments that support the growth of specific plant species within the different habitats. This is mainly obvious on terraces (natural and man- made), near the paths, near water collections and on Heaps of small rocks. For example, of the lithophyte species that grow abundantly in the valley are *Cyclamen persicum*, *Umbilicus intermedius*, *Arisarum vulgare*, *Chiliadenus iphionoides (varthemia)*, *Ajuga chamaepitys*, *Eremostachys laciniata* and others which are mainly geophytes. Near the paths and water collection sites there were diverse plants growing such as *Sinapis arvensis*, *Malva parviflora*, *Foeniculum vulgare*, *Nasturtium officinale*, *Verbascum sinuatum*, *Ferula communis* and many others. And there are number of climbing plant species including *Smilax aspera*, *Clematis cirrhosa*, *Clematis flammula*, *lonicera etrusca*

As the Battir WHP encompasses high number of habitats, a set of criteria was necessary to follow in the process of choosing those habitats with high conservation value. Those that were found of high conservation value were chosen in accordance to the following criteria:

- Habitats with high biological diversity (High number of plant, bird and animal species)
- Habitats that supports the growth of endemic and threatened species
- Unique paths and corridors that supports the growth of endemic or threatened species or unique species individuals (species of one or two individuals only growing in one specific site only and not another).

2.1.1 Habitats with High Content of Plant Biological Diversity

Investigating the results of the studied 33 transects that were studied during the implementation of flora baseline surveys during the year 2018/2019, it appears that transects number T10, T26, T12 and T28 are the most diverse in plants; followed by T9, T11, T22 and T29 as they are mainly mixed habitats of natural oak forest and olive groves habitats (almost all mature succession of natural habitats) that encompass high humidity, high humus matter and fertile healthy soils, appropriate rock formations and distribution, elevation and solar radiation that affect positively the survival and reproduction of living organisms. T10 and T26 supports the growth of almost 66 and 65 different plant species, while T12 and T28 supports the growth of almost 61 plant species respectively and so on (Table 1). Analyzing the transects of high diversity, it was found that habitats of high conservation value as a result to high plant diversity are those mixed habitats of oak and man-made pine forests and olive groves.

Table1: Total number of plant species growing at each studied transect during the report period

Transect no.	Habitat	No. of plants species	Transect no.	Habitat	No. of Plant species
T1	Maquis oak forest supporting bath and garrigue association	28	T17	Mixed Olive groves/fallow land, oak forest	47
T2	Mixed habitats of maquis oak forest and olive groves	42	T18	Coniferous man-made forest	10
T3	Olive groves, fallow land supporting batha and garrigue association	34	T19	Olive groves and fallow land	28
T4	Maquis oak forest supporting bath and garrigue association	36	T20	Mixed Oak and Pine forest	39
T5	Maquis oak forest supporting bath and garrigue association	28	T21	Mixed Oak and Pine forest	24
T6	Olive groves, fallow land supporting batha and garrigue association	42	T22	Olive groves and batha association	56
T7	Mature Maquis Oak forest	29	T23	Mixed habitat of oak and Pine forest and olive groves	33

T8	Olive groves, fallow land supporting batha and garrigue association	34	T24	Olive groves and fallow land	21
T9	Mixed habitats of maquis oak forest and olive groves	59	T25	Mixed Oak and Pine forest supporting batha association	14
T10	Mixed habitats of maquis oak forest and olive groves	66	T26	Olive groves supporting batha association	65
T11	Natural Oak forest	56	T27	Olive groves supporting Garrigue- batha association	36
T12	Batha Association (in succession) with scattered Pine forest	61	T28	Mixed habitat of oak and Pine forest and olive groves	61
T13	Mixture of Olive groves, fallow land, and batha association	39	T29	Mixed man made Pine forest and natural oak forest	55
T14	Mixture of Olive groves, fallow land, and batha association	35	T30	Mixed man made Pine forest and natural oak trees	49
T15	Mixed Oak maquis forest and olive groves	52	T31	Oak forest supporting Batha association	32
T16	Batha association	30	T32	Olive Groves and Fallow Land	37
T33	Olive Groves and Fallow Land	31			

2.1.2 Habitats Support the Growth of Endemic and Rare Species:

Studying the status of different habitats, it was found that there are number of habitats that supports the growth of species of high conservation value such as endemic species, rare and very rare species, and those endemic and rare species. Of the studied transects of high importance are T2, T8, T9, T10, T12, T15, T17, T22, T26, and T32. See analysis done below (Table 2). In accordance to the analysis done at the transect level, the habitats that were found of high conservation are those classified as mixed habitats of olives groves and oak forest supporting batha association see maps below.

Table 2: Transects and habitats supporting endemic and rare species

Transect No.	Habitat	Rare & Very Rare species	Endemic species	Total No. of species
1	Maquis oak forest supporting bath and garrigue association	<i>Asphodeline lutea</i> (SA)	--	1
2		<i>Asphodeline lutea</i> (SA)	<i>Bellevalia flexuosa</i> (ES)	

	Mixed habitats of maquis oak forest and olive groves	<i>Erodium ciconium</i> (SA) <i>Verbena supina</i> (R)		4
4	Maquis oak forest supporting bath and garrigue association	<i>Asphodeline lutea</i> (SA) <i>Viola occulta</i> (RR)	---	2
6	Olive groves, fallow land supporting batha and garrigue association	<i>Salvia indica</i> (R) <i>Sisymbrium irio</i> (SA)	---	2
7	Mature Maquis Oak forest	<i>Sisymbrium irio</i> (SA)	---	1
8	Olive groves, fallow land supporting batha and garrigue association	<i>Herniaria glabra</i> (R) <i>Sisymbrium irio</i> (SA)	<i>Bellevalia flexuosa</i> (ES) <i>Chaetosciadium trichospermum</i> (ES)	4
9	Mixed habitats of maquis oak forest and olive groves	<i>Asphodeline lutea</i> (SA) <i>Colchicum hierosolymitanum</i> (R) <i>Erodium ciconium</i> (SA)	<i>Chaetosciadium trichospermum</i> (ES)	4
10	Mixed habitats of maquis oak forest and olive groves	<i>Asphodeline lutea</i> (SA) <i>Erodium ciconium</i> (SA) <i>Nasturtium officinale</i> (SA) <i>Polygonum argyrocoleum</i> (R)	-----	4
11	Natural Oak forest	<i>Anchusa undulata</i> (hybrid) (SA) <i>Erodium ciconium</i> (SA) <i>Polygonum argyrocoleum</i> (R)	----	3
12	Batha Association (in succession) with scattered Pine forest	<i>Colchicum hierosolymitanum</i> (R) <i>Erodium ciconium</i> (SA) <i>Salvia Palaestina</i> (R)	<i>Biarum angustatum</i> (ET) <i>Echium judaeum</i> (ES) <i>Trifolium eriosphaerum</i> (ES)	6
13	Mixture of Olive groves, fallow land, and batha association	<i>Erodium ciconium</i> (SA)	<i>Trifolium eriosphaerum</i> (ES)	1
14	Mixture of Olive groves, fallow land, and batha association	<i>Mentha longifolia</i> (SA)	<i>Trifolium eriosphaerum</i> (ES)	1
15	Mixed Oak maquis forest and olive groves	<i>Asphodeline lutea</i> (SA) <i>Cerastium glomeratum</i> (viscosum) (SA) <i>Mentha longifolia</i> (SA) <i>Polygonum argyrocoleum</i> (R)	<i>Echium judaeum</i> (ES)	5

16	Batha association	<i>Asphodeline lutea</i> (SA)	<i>Echium judaeum</i> (ES)	2
17	Mixed Olive groves/fallow land, oak forest	<i>Colchicum hierosolymitanum</i> (R)		2
		<i>Erodium ciconium</i> (SA)		
20	Mixed Oak and Pine forest	<i>Spartium junceum</i> (SA)		1
22	Olive groves and batha association	<i>Asphodeline lutea</i> (SA)	<i>Alkanna strigosa</i> (ET)	4
		<i>Rumex dentatus</i> (R)		
24	Olive groves and fallow land	<i>Anchusa undulata</i> (hybrida) (SA)	-----	1
26	Olive groves supporting batha association	<i>Asphodeline lutea</i> (SA)	<i>Onopordum carduiforme</i> (EP)	5
		<i>Colchicum hierosolymitanum</i> (R)		
		<i>Erodium ciconium</i> (SA)	<i>Scrophularia hierochuntina</i> (ES)	
		<i>Onopordum carduiforme</i> (R)		
		<i>Scrophularia hierochuntina</i> (RP)		
27	Olive groves supporting Garrigue-batha association	<i>Asphodeline lutea</i> (SA)	<i>Echium judaeum</i> (ES)	3
		<i>Colchicum hierosolymitanum</i> (R)		
28	Mixed habitat of oak and Pine forest and olive groves	<i>Erodium ciconium</i> (SA)	----	2
		<i>Trigonella foenum-graecum</i> (SA)		
29	Mixed man made Pine forest and natural oak forest	<i>Asphodeline lutea</i> (SA)	<i>Crocus hyemalis</i> (ES)	2
30	Mixed man made Pine forest and natural oak trees	<i>Asphodeline lutea</i> (SA)	<i>Crocus hyemalis</i> (ES)	2
31	Oak forest supporting Batha association	<i>Asphodeline lutea</i> (SA)	----	3
		<i>Colchicum hierosolymitanum</i> (R)		
		<i>Erodium acaule</i> (SA)		
32	Olive Groves and Fallow Land	<i>Salvia Palaestina</i> (R)	<i>Salvia hierosolymitana</i> (ES)	4
		<i>Trifolium scutatum</i> (R)	<i>Trifolium scutatum</i> (ET)	
33	Olive Groves and Fallow Land	----	<i>Salvia hierosolymitana</i> (ES)	1

Note: SA= rare species at study area level, R=somewhat rare species, RP=Rare species with 31-100 surviving sites, RR=Very rare species with only 4-30 surviving sites at national level, EP=Endemic to Palestine, ET=Endemic to Palestine and Turkey, ES=Endemic to Palestine and Syria.

2.1.3 Summary for Habitats of High Conservation Value for Plant Biodiversity

The habitats that were found of high conservation value for Plant Biodiversity are diverse, located at different altitudes, and supported with different soil types. The habitats were also selected in accordance to the availability of high diversity of plant species and those that support endemic and rare/very rare plant species. See summary in table 3 and maps 3, and 4.

Table 3: WHP habitats of high conservation value by type, physical characteristic and value

Habitat	Transects	Conservation Value	Altitude (meters)	Soil type	Slope
Mixed oak forest and olive groves	T2 – Northern Mountainous slope – Beit Jala side	Rare and endemic species	771-781	Rendzina	Steep
	T9 Southern Mountainous slope- Beit Jala side	Rare, endemic and key stone species High plant diversity	769-770	Dark Rendzina	Steep to moderate steep
	T10 Southern Mountainous slope- Beit Jala side	Rare and key stone species High Plant Diversity	764-769	Dark Rendzina	Very steep (v.steep)
	T15 Southern Mountainous slope – Mid AL Makhour Valley	Rare, endemic and key stone species	791-792	Dark Rendzina	Steep
	T17 Southern Mountainous slope – from Battir side	Rare, very rare, vulnerable, and endemic species	640	Light Rendzina	V. steep
Oak forest and batha association	T4 Northern Mountainous slope – Beit Jala side	Rare and very rare species, and key stone species	748-760	Rendzina	Moderate steep
	T11 Southern Mountainous slope – Beit Jala side	Rare and key stone species High plant diversity	759	Dark Rendzina	V. steep
	T31 The hill north west Battir Village	Rare species	565-569	Mixed Terra Rossa & Rendzina	Steep
Olive groves and fallow land	T6 The valley of AL Makhrou- from Beit Jala side	Rare and key stone species	710-712	Brown Rendzina	Flat
	T8 The valley of AL Makhrou- from Beit Jala side	Rare, endemic species and key stone species	708-712	Rendzina	Flat

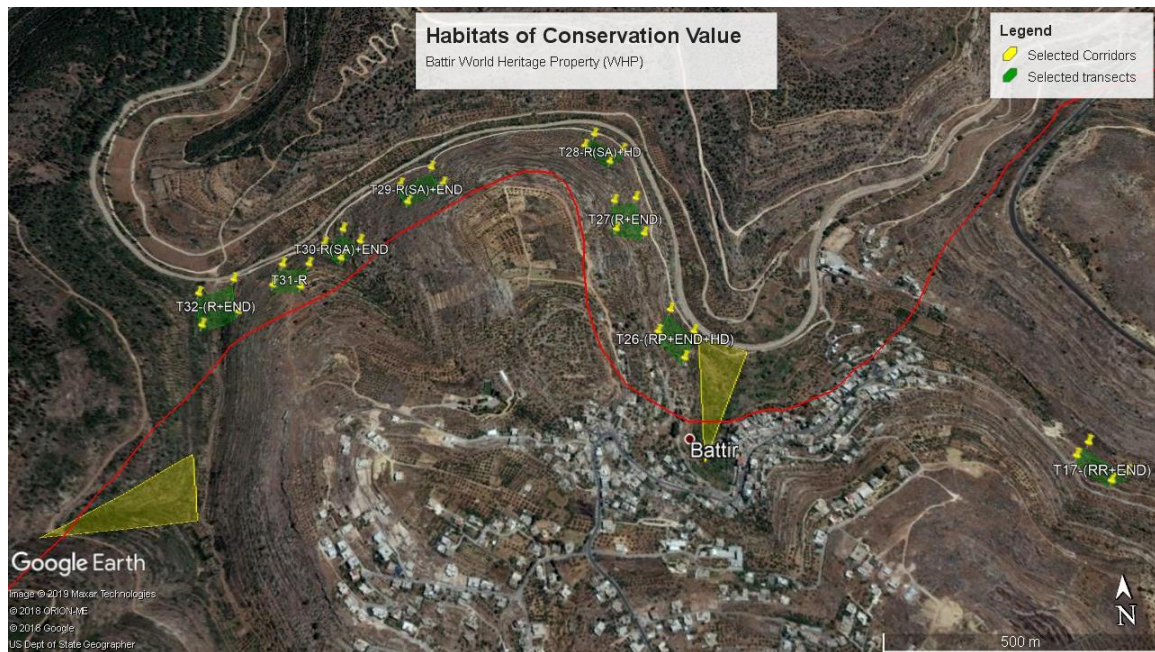
	T32 The cultivated valley behind Battir village – North west Battir	Rare and endemic species	550	Terra Rossa	Flat
	T33 The cultivated valley behind Battir village – west Battir	Endemic species	551	Terra Rossa	Flat
Olive groves and batha association	T13 Southern Mountainous slope – Beit Jala side	Endemic and key stone species	775	Light Rendzina	Fore Slope - steep
	T14 Southern Mountainous slope – Beit Jala side	Endemic species	784-792	Light-brown Rendzina	Moderate to steep
	T22 At Al Kulieh Rock – AL Makhroul Valley	Rare, very rare, vulnerable, and endemic species High plant Diversity	657-659	Rendzina	Flat to Steep
	T26- The valley and mountain range enclaving Battir Village from the north	Rare, very rare, and key stone and endemic species High plant Diversity	584-597	Terra Rossa	Steep
	T27 The valley and mountain range enclaving Battir Village from the north	Rare, and endemic species	601	Mixed Terra Rossa & Rendzina	Steep
Mixed pine and oak forest	T28 The valley and mountain range enclaving Battir Village from the north	High Plant Diversity	584-593	Terra Rossa	Steep
	T29 The valley and mountain range enclaving Battir Village from the north	Endemic and key stone species High plant Diversity	579-586	Mixed Terra Rossa & Rendzina	Steep
	T30 The valley and mountain range enclaving Battir Village from the north	Endemic and key stone species	579-582	Terra Rossa	Steep
Batha association	T12 Southern Mountainous slope – Beit Jala side	Rare, endemic and key stone species High plant Diversity	802-805	Light to Brown Rendzina	Moderate Steep
	Corridor	High Plant Diversity			

Paths and corridors	Links T14 and T23				
	Corridor Links T15 and T21	High Plant Diversity			
	Path Below T4 and T5 – and trench below T7	Rare species (<i>Salvia indica</i> , <i>Ophrys iricolor</i>) and sole species (<i>Orchis galilaea</i>)			
	Path below T20 and T21 And near E'in A'mdan	Rare species (<i>Iris vartanii</i> , <i>Vagaria parviflora</i>) and sole species (<i>Pyrus communis</i>)			

For key stone species see section 3.1.1



Map 3: Habitats of Plant Conservation Value at Battir WHP – Beit Jala side towards Battir Village



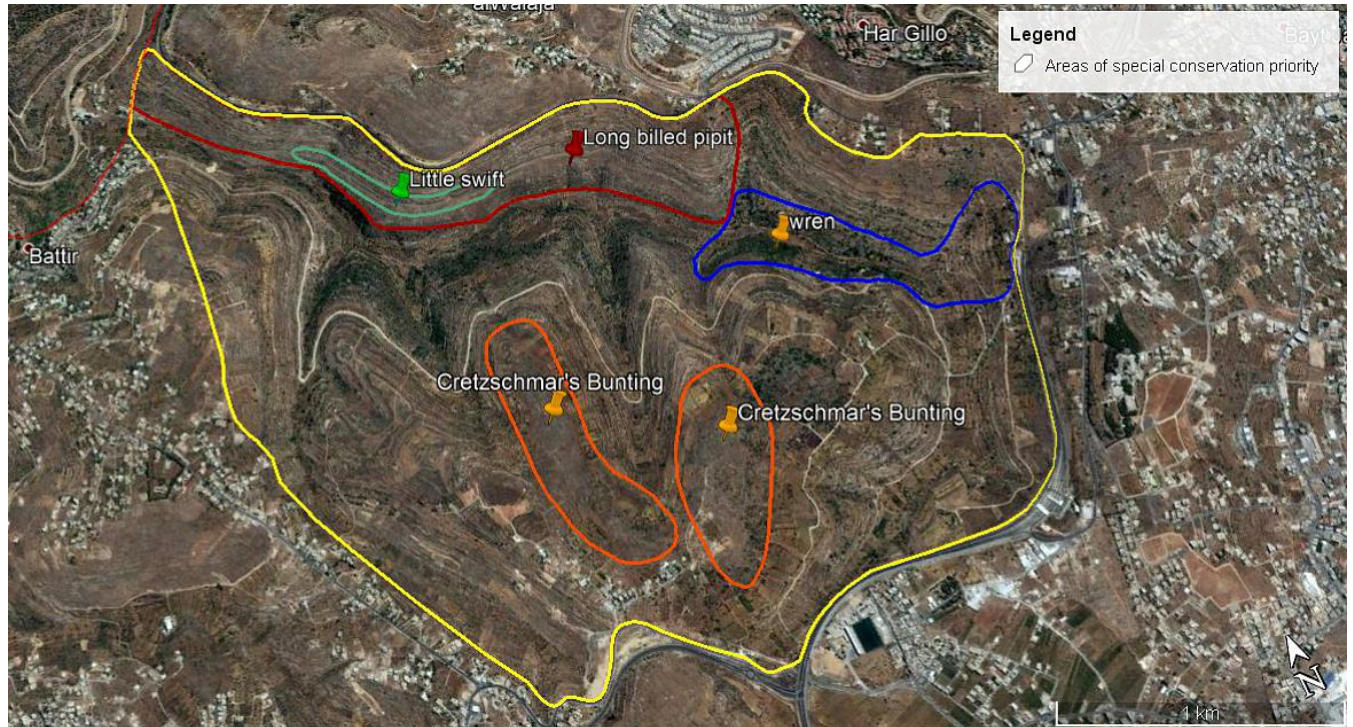
Map 4: Habitats of Plant Conservation Value at Battir WHP- Battir Village and Surroundings

2.2 Animals Conservation Targets at Habitat Level:

2.2.1 Conservation Targets for Birds:

As noted during the birds baseline survey done by Dr. Anton Khalilieh that AL Makhroul Valley and its surroundings is in general belongs to the Mediterranean mountain range; slopes covered with different size patches of maquis, garrigues, and batha vegetation types, in many cases mixed with orchards (or cultivated areas), and different type of scattered coniferous trees. The study area also include exposed rocky sites and cliffs, mainly at the center-northern part of the valley. In addition, several small spring are located at different areas within the site. All this formed a based to support the occurrence of diverse bird species including number of conservation value at national and international level. It supports the occurrence of resident and summer breeding birds and migrant and vagrant birds.

The habitats that found of conservation value for bird species and supports the occurrence of species of conservation value are those specified in map 5.



Map 5: Habitats of Conservation Value for Bird Species at Battir WHP

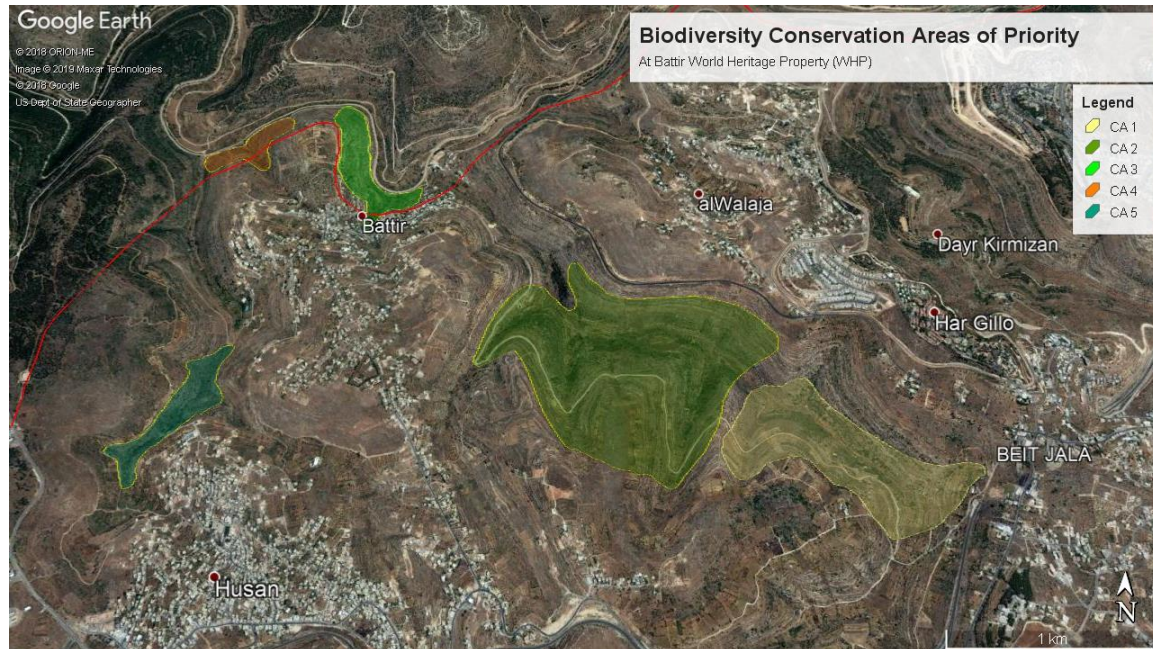
2.2.2 Conservation Targets for Mammals, Reptiles, Amphibians and Invertebrates:

According to the fauna surveys done at Al Makhrouf Valley during the field trips that PMNH team did throughout the year 2018\2019, the team was able to highlight some important habitats that supports the growth of species need to be conserved covering range of groups including vertebrates, some invertebrates and mushroom. For example, Mountain gazelle *Gazella gazelle*, was found mainly on mountainous slopes of hills where transect 1 and 2 are located and also at the mountainous cliffs located below Transect 15 and 16. Another important habitat the area of Ein A'mdan where Transects 20 and 21 are located. This area support wide range of threatened amphibians, reptile, and mammals such as Long-eared bat *Plecotus christici*, Levant water frog *Pelodytes bedriagae*, and many others see section 3.2.2.

2.3 Selected Habitats of High Conservation Value at Battir WHP for Flora, Fauna and Avi-Fauna

Reviewing the habitats that were selected solely as habitats of conservation value for plants, and those for animals and for birds and so on, enabled the experts to select and delineate number of areas of high priority for conservation (see map6). Each conservation area has

certain biological and ecological feature that distinguished the area and put it in the context of one of high priority areas for biodiversity conservation at Battir WHP.



Map 6: Biodiversity Conservation Areas of Priority at Battir WHP

Conservation Area 1: This area extends from Beit Jala city western borders towards almost the middle part of Al Makhroul Valley. It is known to support three types of habitats in mixed or pure stands; mainly maquis oak forest, olive groves, and batha/garrigue association with some scattered pine trees. Plant diversity ranges between 40% to 90% and soil type is mainly light Rendzina. The elevation is also diverse ranges from 709 to 805 meters above sea level. The northern hills are composed of high rock content and less plant density while the valley and the southern slope has more fertile soils with lots of Humus and support the growth of more plant density. Two water sources exist in this areal one is E'in Kapryanous and the second is E'in Dar Saliba. Both are important sources of water for birds and animals. In this area the Mountain Gazelle was found. The gazelle is globally threatened mammals and its conservation is a must in this valley. Another two threatened reptiles were also found in this area. The area supports the growth of 7 rare plant species such as *Salvia Indica*, *Verbena supina*, and *Viola occulta* and 5 endemic species to the Fertile Crescent Region such as *Echium judaeum* and *Trifolium eriosphaerum* (Table 4).

Conservation Area 2: This area extends from the middle part of Al Makhroul Valley reaching the last cliff south East Battir. It is known to support four types of habitats in mixed or pure stands; mainly maquis oak forest, olive groves, pine woodlands and batha/garrigue association. Plant diversity ranges between 52% to 80% and soil type is light to dark Rendzina. The elevation ranges between 640-701 meters above sea level. The northern hills are composed of

high rock content and less plant density while the valley and the southern slope has more fertile soils with three moderate to high steepy cliffs that work as corridors between the bottom of the valley and the upper parts of the southern mountainous range hills. The cliffs supports the growth of diverse and dense plant cover and the rocky cliffs supports the occurrence of number of birds and animals in the area. One water source exist in this area namely E'in E'mdan spring, which forms relatively medium sized pool located in valley surrounded by two mountainous hills. It is an important source of water for birds, amphibians and animals. **The *Hyaena hyaena* was found in this area and it is globally threatened mammals and its conservation is a must in this valley.** In this area two endangered frogs and 8 threatened/endangered mammals were found in this conservation area mainly near or at E'in E'mdan spring (Table 4). It also support the occurrence of three vulnerable birds namely *Emberiza caesia*, *Anthus similis* and *Apus affinis*. The area supports the growth of 3 rare plants and 3 endemic plants to the Fertile Crescent region (Table 4).

Conservation Area 3: This area extends from Battir village agricultural terraces until the middle part of the valley that enclave battir from the north western side. It is known to support four types of habitats in mixed or pure stands; mainly maquis oak forest, olive groves, batha and garrigue association and agricultural terraces. Plant diversity ranges between 60% to 82% and soil type is a mixture between Rendzina and Terra Rossa soils. The elevation range is between 584-601 meters above sea level. This area is in general lower in elevation and enjoys higher temperature than CA 1 and CA 2. This favors the growth of different vegetation cover especially among the herbaceous species. Of the plant species that was found in this area and not in CA1 and 2 is *Pistacia lentiscus* (except in one site near entrance path towards AL Makhrou Valley from Beit Jala Side, near T2). The valley along the train railway and the southern hills supports the growth of diverse plants, and the occurrence of animals. In addition, the area encompasses a unique water aqueduct that takes the water form Battir Spring throughout the agricultural terraces. It is an important source of water for birds and animals. Hence, several important plant species were found growing in Battir village but not in the valleys surrounding it such as *Arum hygrophilum* (NT), *Populus euphratica* (R), *Arum dioscoridis* (SA) and *Rhamnus alaternus* (SA). The area supports the growth of 3 rare plants and 3 endemic plants to Palestine and the Fertile Crescent region (Table 4). *Onopordum carduiforme* (R/EP) and *Scrophularia hierochuntina* (RP/ ES) are of high conservation importance as they were found threatened and endemic plants (Table 4).

Conservation Area 4: This area extends from the middle part of Battir Valley that enclaves Battir village from north western side reaching the bridge which crosses Battir agricultural lands and the train railway. It is known to support three types of habitats in mixed or pure stands; mainly maquis oak forest, olive groves, and batha/garrigue association. Plant diversity ranges between 57% to 80% and soil type is mix soils of Rendzina and Terra Rossa and pure

soil of Terra Rossa. The elevation range is between 550 and 586 meters. The area is lowest among the previous conservation areas. The area changes its habitats from mixed olive groves and oak maquis forest to totally agricultural lands at T32 and T33 and with the curved hills between T30 and 31 and the possibility for the collection of some water on the rocks, the area forms special environment for the growth of diverse herbaceous species. The area supports the growth of 2 rare plants and 3 endemic plants to the Fertile Crescent region (Table 4).

Conservation Area 5: This area is located to the north west of Husan village and encompasses E'in Al Haweh. It is known to support three habitats of oak maquis, olive groves and some batha and garrigue association. It is famous for the natural spring that exists there forming a relatively medium sized pool where birds, and animals drink from. It is a good habitat for number of plants such as orchids, and animals such as geckos, and solitary bees. (This area will be given more attention in the coming few months to highlight the important species found there).

Table 4: Flora, Fauna and avifauna species supports under the selected Conservation Areas (please refer to Map5)

Conservation Area of Priority	Plant Species of Conservation Priority	Animal Species of Conservation Priority	Bird Species of Conservation Priority
CA1	<i>Verbena supina</i> (R)	<i>Gazella gazelle</i> (EN)	<i>Troglodytes troglodytes</i> (Eco-health indicator)
	<i>Viola occulta</i> (RR)	<i>Ptyodactylus guttatus</i> (NE)	
	<i>Salvia indica</i> (R)	<i>Chalcides ocellatus</i> (NE)	
	<i>Herniaria glabra</i> (R)		
	<i>Colichium hierosolymitanum</i> (R)		
	<i>Polygonum argyrocoleum</i> (R)		
	<i>Salvia Palaestina</i> (R)		
	<i>Bellevalia flexuosa</i> (ES)		
	<i>Chaetosciadium trichospermum</i> (ES)		
	<i>Biarum angustatum</i> (ET)		
	<i>Trifolium eriosphaerum</i> (ES)		
CA2	<i>Polygonum argyrocoleum</i> (R)	<i>Crociodura leucodon</i> (NT)	<i>Apus affinis</i> (VU)
	<i>Colichium hierosolymitanum</i> (R)	<i>Pipistrellus kublii</i> (NT)	<i>Emberiza caesia</i> (VU)
	<i>Rumex dentatus</i> (R)	<i>Hypsugo savii</i> (EN)	<i>Anthus similis</i> (VU)
	<i>Alkanna strigosa</i> (ET)	<i>Pipistrellus pipistrellus</i> (EN)	
	<i>Echium judaeum</i> (ES)	<i>Plecotus christici</i> (EN)	
	<i>Trifolium eriosphaerum</i> (ES)	<i>Rhinolophus ferrumequinum</i> (EN)	

		<i>Tadarida teniotis</i> (NT)	
		<i>Tapbozous perforates</i> (EN)	
		<i>Hyaena hyaena</i> (EN)	
CA3	<i>Colichium hierosolymitanum</i> (R)		
	<i>Onopordum carduiforme</i> (R/EP)		
	<i>Scrophularia hierochuntina</i> (RP/ ES)		
	<i>Echium judaeum</i> (ES)		
CA 4	<i>Salvia palaestina</i> (R)		
	<i>Trifolium scutatum</i> (R)		
	<i>Crocus hyemalis</i> (ES)		
	<i>Salvia hierosolymitana</i> (ES)		
	<i>Trifolium scutatum</i> (ET)		

It is expected to collected more data to add to this section during the development of the plan!

3. CONSERVATION TARGETS AT SPECIES LEVEL

In summary, the analysis done on all plant, animal and bird species that inhabit Battir WHP, it was found that 14 plant species (Table 6) and 9 key stone species, 11 birds (Table 7), 10 mammals (Table 8), 6 Reptiles and amphibians (Table 9), and 3 invertebrates. The details and results for the species of conservation value are all summarize in section 3.1, 3.2 below.

3.1 Plant Species of Conservation Value

A total of 427 vascular plant species were recorded of the flora survey at MKV (AL Mkahour Valley and hills behind Battir towards Husan village); of which 98 plants were recorded during the flora surveys done at Battir village alone. This number of plant species forms almost 20% of total plant species growing in the West Bank region and Gaza Strip (which is estimated at 2076 plant species¹³). The area clearly hosts high number of vascular plants; as a result to the diverse habitats and physical conditions, which forms a supporting environment for the growth of diverse plant species. The valley supports the growth of 63 plant families; most dominantly are Compositae, Papilionaceae, Labiatae, Graminae and Cruciferaceae. The total number of tree species surveyed at the valley is 19 trees, it also encompasses 48 shrubs and sub-shrubs, 2 aquatic plants, and 358 herbaceous plant species.

3.1.1 Plant Key Stone species:

13 Ghattas R., 2008. Plant Biodiversity in the Palestinian Territory. This Week in Palestine. 118, 22-26. And ARIJ 2015. Status Of Environment In Opt 2015 (But Actually Published In 2016)
[Http://Www.Arij.Org/Latest-News/779-The-Status-Of-Env-2015-2016.Html](http://Www.Arij.Org/Latest-News/779-The-Status-Of-Env-2015-2016.Html)

Studying the WHP natural habitats and the plant species that it encompasses, it was possible to specify the stone species of each habitat. In summary the dominant species on site are Oak trees *Quercus calliprinos*, Aleppo Pine trees *Pinus halepensis*, and Olive trees *Olea europea*. But of those that are considered as key stone species on site are Oak trees *Quercus calliprinos*, Pistachio trees *Pistacia palaestina*, Strawberry trees *Arbutus andrachne*, Carob trees *Ceratonia siliqua*, Hawthorn Azarole trees *Crataegus aronia*, snowbell bush trees *Styrax officinalis*, Syrian Pear *Pyrus Syriaca*, Sumaq tree *Rhus coriaria*, Euphrates Poplar *Populus euphratica*, as trees growing in the area. Those important woody species; *Quercus calliprinos*, the Palestine oak, in particular, are typically Mediterranean tree species of the maquis of the region and the major evergreen elements in the *Q. Calliprinos* - *Pistacia palaestina* association of Mediterranean region. Those key stone species are necessary for long-term maintenance of a viable forest population. Hence, habitats and populations of those species shall be adequately represented and conserved in the area to ensure their long-term survival and thus the maintenance of the ecological processes related to them. The habitats that supports the growth of those species are already considered of conservation in section 2.1.3.

3.1.2 Endemic Plant species:

The valley supports that growth of a representative number of endemic species to Palestine and to the Fertile Crescent that are distributed along the valley. It supports the growth of 26 endemic species (3 were found in Battir village); mostly endemic to Palestine and Syria, which are all of conservation value. Of the endemic species that were found of high conservation value are those three endemic species to Palestine only; specifically *Nonea philistaea*, *Onopordum carduiforme* and *Reseda alopecuroides*. And those five species found also as threatened species including *Onopordum carduiforme*, *Reseda alopecuroides*, *Colchicum hierosolymitanum*, *Trifolium scutatum*, *Scrophularia hierochuntina* (Table 5). Two species; specifically *Onopordum carduiforme* and *Reseda alopecuroides*, overlaps between being endemic to Palestine and of threatened status and hence shall be given attention while implementing the conservation plan.

Table 5: Endemic species found at MKV and their abundance

Family	Species name	Endemism	Abundance at local level	Abundance (IUCN Red List)	Occurrence
Amaryllidaceae	<i>Vagaria parviflora</i> (<i>Pancratium parviflora</i>)	ES	F	LC	Path after T20 (along the stairs)
Araceae	<i>Biarum angustatum</i>	ET	F (LD)	-	T12
Boraginaceae	<i>Alkanna strigosa</i>	ET	C	-	T22
	<i>Echium judaeum</i>	ES	CC	-	T12, T15, T16, T27
	<i>Nonea philistaea</i>	EP	C(LD)	-	Path behind Battir Village towards T26
Campanulaceae	<i>Campanula hierosolymitana</i>	EL	C(LD)	-	Path Below T14
	<i>Campanula stellaris</i>	EL	C(LD)	-	Path Below T14

Colchicaceae	<i>Colchium hierosolymitanum</i>	ET	R	-	Path towards T17 on left side of the path there are high rocks with microenvironments for lithophyte plants
Compositae	<i>Anthemis bornmuelleri</i> (<i>Anthemis galilaea</i>)	ES	CC	-	On the way downhill from Beit Jala side
	<i>Calendula palaestina</i>	EL	C(LD)	-	In agricultural Lands of Battir Village above rail way
	<i>Centaurea cyanoides</i>	ES	C(LD)	-	Path between T26 and T27
	<i>Onopordum carduiforme</i> (<i>Onopordum telavivense</i>)	EP	RP	-	T26
Iridaceae	<i>Crocus hyemalis</i>	ES	C	LC	T29, T30, on the path towards T17 on the rock side of the path
Labiatae	<i>Salvia hierosolymitana</i>	ES	C (LD)	-	T32
	<i>Salvia judaica</i>	ES	C	-	Path between T28 and T29
	<i>Salvia pinnata</i>	ET	C (LD)	-	Path between T28 and T29
Liliaceae	<i>Bellevalia eigii</i>	EE	F	-	T4 and T8
	<i>Bellevalia flexuosa</i>	ES	CC	-	T2, T8 and on path above T19
Papilionaceae	<i>Trifolium eriosphaerum</i>	ES	C	-	T12, T13, T14
	<i>Trifolium erubescens</i>	EL	C(LD)	-	path before T26
	<i>Trifolium scutatum</i>	ET	R	-	T32
	<i>Trigonella berythea</i>	ET	F	-	On path towards T22
Resedaceae	<i>Reseda alopecuroides</i>	EP	R	-	After T20 towards Battir village
Scrophulariaceae	<i>Scrophularia hierochuntina</i>	ES	RP	-	T26
	<i>Scrophularia rubicaulis</i>	ES	F	-	On the way towards T26
Umbelliferae	<i>Chaetosciadium trichospermum</i>	ES	CC	-	T8 and T9

- Plants shaded in green color are those found endemic and threatened species
- Plants shaded with brown color are those found endemic to Palestine

- Ad1 (abundance at local level, according to Checklist and Ecological Database¹⁴): CC=Very common species, C=Common species, F=Frequent species, R=somewhat rare species, NR= Not Registered in the study area before but found during surveys, (LD)= species with limited distribution
- Abd2 (abundance at global level, according to IUCN RED List¹⁵): LC= Least Concern, VU= Vulnerable - decreasing
- End= Endemism, EP=Endemic to Palestine, ET=Endemic to Palestine and Turkey, EL=Endemic to Palestine and Lebanon, ES=Endemic to Palestine and Syria

3.1.3 Threatened and Endangered Plant Species

The valley including Battir village supports that growth of a relatively large number of threatened species that are distributed along the valley. It was found 35 rare and very rare plant species where 14 are very rare species at local level (forming 3.7% of total number of plant species growing on site) and 45 LC species, and 1 NT (Near Threatened) species at global level according to IUCN Red list. The threatened species are mainly found among 9 families of which are orchidaceae, polygonaceae, solanaceae, verbenaceae, and violaceae¹⁶.

Of those found of conservation value are the following plant species that were found growing at WHP and their status is very rare; *Onosma gigantea*, *Gypsophila pilosa*, *Spergularia bocconeii*, *Lactuca undulata*, *Cephalaria syriaca*, *Onopordum carduiforme*, *Salvia ceratophylla*, *Salvia palaestina*, *Ophrys iricolor*, *Tetragonolobus requienii*, *Turgenia latifolia*, *Viola modesta*, *Viola occulta*.

Of the plant species that were found only in Battir Village alone and found of conservation value are: Italian buckthorn (*Rhamnus alaternus*), water arum (*Arum hygrophilum*), spotted arum (*Arum dioscorides*), Poplar tree (*Populus euphratica*); which are all rare / v. rare plants. *Arum hygrophilum* is of high importance as it was found near threatened according to IUCN RED List.

2.1.4 Plant Wild Relatives:

The wild relatives that are growing at MKV are also of high conservation value are as following wild relatives of wheat (*Ageilop spp.*), lettuce (*Lactuca spp.*), pear (*Pyrus syriaca*), green Pistacio (*Pistacia palaestina (terebinthus)*), barley (*Hordeum spontaneum*), fennel (*Foeniculum vulgare*), thyme (*Majorana syriaca*), cauliflower (*Brassica nigra*), fenugreek (*Trigonella foenum-graecum*), peas (*Pisum sativum*), vetch (*Vicia sativa*) and others.

2.1.5 Summary of Plant species of conservation value

14 Ori F., Uzi P., David H., Avi S. (1999). Checklist and Ecological Data-Base of the Flora of Israel and its Surroundings. Hebrew University, Jerusalem.

15 <http://www.iucnredlist.org/search>

16 Ghattas, Roubina, Abu Ayyash, & Adel, Rishmawi, Marian, 2019. Plant Biodiversity Inventory Report at Al Makhrou Valley: Autumn, Winter and Spring 2018/2019 Seasons. Consultancy for Palestine Museum of Natural History (PMNH) - Bethlehem University. Bethlehem. Palestine.

As a conclusion the following 21 Plant species were found of high conservation value and need immediate intervention for their conservation (Table 6).

Table 6: Plant species found of high conservation value and the reason for their conservation

Family	Species name	Endemism	Wild Relative	Abundance at local level	Abundance (IUCN Red List)
Araceae	<i>Arum hygrophilum</i>	-	-	F (BO)	NT
Boraginaceae	<i>Nonea philistaea</i>	EP	-	C(LD)	-
	<i>Onosma gigantea</i>	-	-	RR (LD)	-
Caryophyllaceae	<i>Gypsophila pilosa</i>	-	-	RR (LD)	-
	<i>Spergularia bocconeii</i>	-	-	RR (LD)	LC
Colchicaceae	<i>Colchium hierosolymitanum</i>	ET	-	R	-
Compositae	<i>Onopordum carduiforme</i> (<i>Onopordum telavivense</i>)	EP	-	RP	-
	<i>Lactuca undulata</i>	-	-	RR (LD)	-
Cruciferae	<i>Brassica nigra</i>	-	WR	F (Rare in study area)	-
Dipsacaceae	<i>Cephalaria syriaca</i>	-	-	RP	-
Labiatae	<i>Salvia ceratophylla</i>	-	-	RR (LD)	-
	<i>Majorana syriaca</i>	-	WR	-	-
Papilionaceae	<i>Trifolium scutatum</i>	ET	-	R	-
	<i>Trigonella foenum-graecum</i>	-	WR	F (Rare in study area)	-
	<i>Pisum sativum</i>	-	WR	F (Rare in study area)	-
Resedaceae	<i>Reseda alopecuroides</i>	EP	-	R	-
Rosaceae	<i>Pyrus syriaca</i>	-	WR	F (Rare in study area)	LC
Scrophulariaceae	<i>Scrophularia hierochuntina</i>	ES	-	RP	-
Umbelliferae	<i>Turgenia latifolia</i>	-	-	RR	-
Violaceae	<i>Viola modesta</i>	-	-	RR	-
	<i>Viola occulta</i>	-	-	RR	-

Note: species shaded in light green are very rare species, shaded with dark brown are endemic to Palestine, light brown plant wild relatives found rare at study area and species shaded in light pink are rare species found in Battir Village only.

3.2 Animals and Birds of Conservation Value at Species Level

3.2.1 Bird Species of Conservation Value

According to the surveys done by Palestine Nature Society (PNS), a total of 63 species of birds were recorded at Al Makhroun area and its vicinity during the spring season of 2019. A total of 33 bird species were recorded breeding at the study area, while the other 30 species are classified as migratory species. Out of the recorded breeding birds, 26 of them are considered as resident breeders while the other 7 recorded species are classified as summer breeders. The long legged Buzzard (resident breeder) and the Short-towed Eagle (summer breeder and passage migrant) were both recorded at the site and both showed breeding signs. Five of the recorded birds are classified as threatened species at the national and regional level, which include Long-billed pipit, Black-eared Wheatear, Long-legged Buzzard, Cretzschmar's Bunting and Little Swift¹⁷.

Hence, of the bird species that were identified as species of high conservation value are 11 bird species listed in table 7. The reason for choosing them as priority conservation value is mainly because they are either threatened at national or international levels, or reflects on the health of the Maquis habitat or found breeding on the site and not in another surrounding the site.

Table 7: Bird Species of High Conservation Value at Battir WHP¹⁸

Species	Scientific name	Status	IUCN / National Status	Occurrence
Cretzschmar's Bunting	<i>Emberiza caesia</i>	sb, PM	Least Concern/ Vulnerable	Uncommon
Little Swift	<i>Apus affinis</i>	sb, PM	Least Concern/ Vulnerable	Common
Long-legged Buzzard	<i>Buteo rufinus</i>	rb, RD	Least Concern/ Near Threatened	Rare
(Eurasian) Eagle Owl	<i>Bubo bubo</i>	rb	Least Concern	Rare
Barn Owl	<i>Tyto alba</i>	rb	Least Concern	Rare
Long-billed Pipit	<i>Anthus similis</i>	RB	Least Concern/ Vulnerable	Uncommon
(European) Pied Flycatcher	<i>Ficedula hypoleuca</i>	PM	Least Concern	Rare
Lesser Spotted Eagle	<i>Aquila pomarina</i>	PM	Least Concern	Rare
Semi-collared Flycatcher	<i>Ficedula semitorquata</i>	PM	Least Concern	Rare
(Winter) Wren	<i>Troglodytes troglodytes</i>	RB	Least Concern	Common

3.2.2 Animal Species of Conservation Value

3.2.2.1 Vertebrates:

¹⁷ Anton, Khalilieh, 2019. Bird Survey at Al-Makhroun Valley and its Vicinity. Palestine Nature Society. Ramallah Palestine.

¹⁸ ibid

A study done by BU/PMNH team using different methods to collect data on vertebrates covered the following groups (mammals, reptiles and amphibians). Of the most important species and their status globally and specific to Historic Palestine are recorded under the following animal groups.

Mammals:

A list of 30 species of mammals were found in Al Makhroul Valley and the following species shows significant important (Table 8).

Table 8: Species of mammals of conservation value found at Al Makhroul area and their local and global conservation status¹⁹.

English Name	Scientific Name	Global Status	H. Palestine Status	Found
Bicolored Shrew	<i>Crocidura leucodon</i>	LC	NT	Near E'in E'mdan
Kuhl's pipistrelle	<i>Pipistrellus kuhlii</i>	LC	NT	E'in E'mdan
Savi's pipistrelle	<i>Hypsugo savii</i>	LC	EN	E'in E'mdan
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	LC	EN	E'in E'mdan
Long-eared bat	<i>Plecotus christici</i>	DD	EN	E'in E'mdan
Great horseshoe bat	<i>Rhinolophus ferrumequinum</i>	LC	EN	E'in E'mdan
European free-tailed bat	<i>Tadarida teniotis</i>	LC	NT	E'in E'mdan
Egyptian tomb bat	<i>Taplozous perforatus</i>	LC	EN	E'in Emdan
Mountain gazelle	<i>Gazella gazella</i>	EN	VU	CA 1 – Near T1 and T2 (Near Nicola Khamis Land and mid of down pathway) and cliff between T15 and T16 (near eagle owl nest)
Striped Hyaena	<i>Hyaena hyaena</i>	NT	EN	Near E'in E'mdan

For more explanation on the abbreviations that used see Dolev and Perevolotsky, 2004²⁰.

Reptiles and amphibians:

A 14 species of reptiles and amphibians (12:2) were found in Al Makhroul Valley as a result to the survey done by BU/PMNH team 2018/2019. Six species of them including the two

¹⁹ Meiri, S., Belmaker, A., Berkowic, D., Kazes, K., Maza, E., Bar-Oz, G. and Dor, R., 2019. A checklist of Israeli land vertebrates. Israel Journal of Ecology and Evolution, 65(1-2), pp.43-70

²⁰ Dolev, A. and Perevolotsky, A. eds., 2004. The red book: Vertebrates in Israel. Israel nature and parks authority. (link for the book: <https://www.teva.org.il/?CategoryID=942>).

amphibian species need to be protected, according to Meiri et al., 2019. Both amphibians found in Al Makhroul are NT and EN (Table 9).

Table 9: List of Reptiles and Amphibians found at Al Makhroul Valley and their Status.

English Name	Scientific Name	Global Status	H. Palestine Status	Found
Variable green toad	<i>Bufo variabilis</i>	DD	EN	T20 and T21 E'in E'mdan
Levant water frog	<i>Pelodytes bedriagae</i>	LC	NT	T20 and T21 E'in E'mdan
Sinai fan-fingered gecko	<i>Phyllodactylus guttatus</i>	NE	LC	Along the Valley
Elegant snake-eyed lizard	<i>Ophisops elegans</i>	NE	LC	mid of Al Makhroul Valley
Ocellated bronze skink	<i>Chalcides ocellatus</i>	NE	LC	Different part of the Valley
Eastern Montpellier snake	<i>Malpolon insignitus</i>	NE	LC	-

3.2.2.2 Invertebrates:

Some groups of invertebrates were studied in Al Makhroul Valley including insects, snails, arachnids and other small groups. Some of them shows important and significant indicator in Al Makhroul Valley.

Insects:

This is the first time the invasive Western conifer seed bug *Leptoglossus occidentalis* Heidemann, 1910 (Hemiptera, Coreidae) is recorded from geographic Palestine representing its Southern Most record in Asia. *L. occidentalis* is a significant pest on pine trees and an invasive species to the Mediterranean region from western North America²¹.

Land Snails:

21 Handal, E.N., and Qumsiyeh, M.B. 2019. First Record of the Western Conifer Seed Bug *Leptoglossus occidentalis* Heidemann, 1910 (Hemiptera, Coreidae) from Palestine. Jordan Journal of Biological Sciences, 12, In Press).

The species *Monacha crispulata* is a species found in Al Makhroun need a specific habitat with a dens oak trees, and the only distribution for this species is (Palestine, Lebanon and Jordan).

Mushroom:

Arrhenia rickenii (Hora) Watling (1989), the samples were found on moss-covered limestone gravel. Originally described in Europe, the range of this species was first recorded in Turkey by Kaya (2009). This is the first record of this species in Palestine.

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