

# BIODIVERSITY CONSERVATION OF A NEW PROTECTED AREA 'AL-ARQOUB', SOUTH JERUSALEM HILLS, PALESTINE

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## ABSTRACT

Palestine is part of the Fertile Crescent and known to be rich in faunal and floral biodiversity relative to its latitude. The South Jerusalem hills with their ancient villages (collectively called the Al-Arqoub cluster) provide ideal areas for conservation within the Mediterranean Biodiversity Hotspot. The area was listed on an emergency basis as a UNESCO World Heritage Site in 2014. This study assessed the biodiversity and threats, and the data was used to designate it a protected area by the Environment Quality Authority (EQA). We documented 417 plant species, 15 fungi, 105 birds, 3 amphibians, 12 reptiles and 31 mammals. Threats to this rich biodiversity included harmful agricultural practices, overexploitation, construction of Israeli settlements, urbanisation, habitat loss, land fragmentation and limited enforcement of laws. Management plans were established and began to be implemented for the site with the aim of biocultural conservation. Four marginalised communities around the valley system (Al-Walaja, Battir, Husan and Beit Jala) benefited through: a) environmentally friendly agricultural production for 81 farmers, b) developing and empowering women in eco-friendly production and marketing, c) enhancing ecotourism, d) implementing an ecosystem restoration model and e) education and capacity building leading to behaviour change. Based on IUCN criteria, we consider 'Al-Arqoub' as a vulnerable ecosystem worthy of enhanced protective status and, based on our studies, the EQA designated it as a protected area category VI (protected with sustainable use of natural resources). Protected area management in Palestine follows the new National Biodiversity Strategy and Action Plan (2023–2030) in line with the Kunming–Montreal Global Biodiversity Framework. This grassroots, cross-disciplinary endeavour to protect this area serves as a model for other protections in a region with economic and political instability.

**Keywords:** conflict zones; developing countries; restoration; environmental justice; World Heritage

## INTRODUCTION

Since the Industrial Revolution, human population growth, rampant consumerism and the overexploitation of non-renewable resources have greatly damaged global environments and strained sustainability for both human and natural communities. The UN Sustainable Development Goals and the Aichi targets of the Convention on Biological Diversity (CBD) have attempted to address some of these challenges that are compounded in countries of the global south (Adenle et al., 2015; Allen et al., 2018). The new Kunming–Montreal Global Biodiversity Framework includes four goals and 23 targets. Target 3 calling for the protection of 30 per cent of land and marine areas by 2030 is ambitious

and can only be meaningful and successful if it protects biodiversity while meeting human needs including through ecosystem services (Dudley et al., 2022).

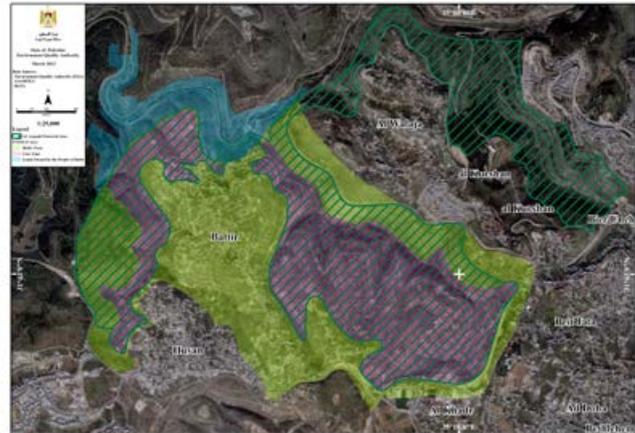
Historic Palestine (now Israel and the Occupied Palestinian Territories) has high biodiversity because of its geography (the intersection of continents) and geology (the Great Rift Valley, the lowest point on Earth, and mountains such as Mt. Hermon/Jabal Al-Shaikh); yet the environment and biodiversity are under severe threat. The threat was first identified as a carrying capacity issue (Ives, 1950). Many global threats (e.g., climate change, habitat destruction, overexploitation, pollution, invasive species) and local threats (e.g. walls,

industrial settlements, bypass roads) have strained the local environment including the areas nominally designated protected areas (EQA, 2021; ARIJ, 2016; Husein & Qumsiyeh, 2022; Qumsiyeh & Abusarhan, 2021; Qumsiyeh & Amr, 2016; Qumsiyeh et al., 2014, 2016). This raises the question of how protection can be achieved considering the unstable political situation and impoverishment of Palestinians living under Israeli occupation, and whether it is possible to support biodiversity conservation while reducing poverty (Sunderlin et al., 2005; Roe et al., 2012).

The South Jerusalem hills and valleys in the Occupied Palestinian Territories were evaluated by the Palestinian Ministry of Tourism and Antiquities (MOTA) and submitted for emergency consideration as a UNESCO World Heritage Site (MOTA, 2015). This was due to threats to the rich ancient natural and cultural heritage, which includes early human habitation, Canaanitic agricultural terraces and watchtowers and historical heritage (Canaanitic, Roman, Byzantine and Islamic sites). The area endures numerous difficulties, including habitat loss, land fragmentation and challenging economic and political circumstances (Amr et al., 2016; ARIJ, 2016; Husein & Qumsiyeh, 2022; Qumsiyeh et al., 2014). Fifty nominally protected areas in the Occupied West Bank were recently (2022) evaluated by a professional team made up of the IUCN, the Palestine Institute for Biodiversity and Sustainability, the Environment Quality Authority (EQA) and stakeholders. The results, to be adopted/implemented in spatial plans early in 2023, eliminated some areas (many previously designated for political purposes), added others and consolidated others. One of the newly added areas was based on the data collected in this study, and we discuss below designating this as a new IUCN category VI protected area. This paper summarises the findings from the 2018–2021 study and conservation project that focused on the multiple threats to this area and innovative community endeavours to protect and sustain the flora, fauna and human residents of the valley and surrounding area.

## MATERIALS AND METHODS

**Study area.** The core part of the proposed World Heritage Site comprises 2.6 km<sup>2</sup> of land of high conservation value interspersed with agricultural land with an equivalent buffer zone of an area of more than 5 km<sup>2</sup>. These two valleys called Al-Makhrour and Wadi Husan along with a third valley (Wadi Ahmed/Cremisan valley) form a unique ecosystem of Mediterranean forested and maquis habitat with water springs (Fig. 1). It falls into the Mediterranean biogeographical zone



**Figure 1.** UNESCO World Heritage Site core and buffer area map (courtesy of MOTA, 2018). Our study included not just this area but the area to the north called Wadi Cremisan/Wadi Ahmed. Together, the areas in this study were designated a national protected area based on the data presented herein. The tentative borders of the new protected area are shown but may be adjusted somewhat with local participation and input in scheduled hearings soon.

and is an essential part of the hydrological system that replenishes the West Bank's western aquifer. It is an Important Bird Area and Important Plant Area (Radford et al., 2011), and was designated a Key Biodiversity Area by the EQA. Much of the studied area is located in Area C of the occupied West Bank, which means it is under Israeli civil and military control.

Five local communities surround the valley system: Battir, Al-Walaja, Husan, Al-Khader and Beit Jala. Four of the five were intensely worked with on agriculture and conservation during this project. With some other nearby villages, the local communities are collectively known as the Al-Arqoub area.

**Project objectives.** The main project focused on carrying out an inventory and assessment for biodiversity at both habitat and species level including threats leading to a management plan and actions while also providing benefits to people. Utilising the best scientific data to propose monitoring indicators and various conservation management and protection measures within the area of the World Heritage Site (both core region and buffer zone). In 2021, we expanded the scope of the study to include another nearby valley of Cremisan /Wadi Ahmed. We also worked with the local communities: a) working with 81 farmers in the four communities to enhance agricultural production through eco-friendly agriculture, b) working with four women's cooperatives to enhance product development and marketing while minimising human impact on the environment, c) working with key local stakeholders to enhance ecotourism, and d) working with youth in schools to

create environmental clubs and educational programmes to develop empowerment. In this report, we will focus on the biodiversity assessment, threats and lessons learned from this project which eventually led to the area being designated a protected area by the EQA. We will briefly mention but will not detail the economic and other empowerment benefits to the local communities.

**Research methods.** The steps engaged in this study to assess biodiversity and threats included:

1. Desktop study and 70 individual interviews covering private and public sectors using questions from Sutherland et al. (2009) to implement a SWOT (strengths, weaknesses, opportunities and threats) analysis to evaluate the degree of sustainability of the Palestinian sustainable environment.
2. Threat analysis was also guided by individual interviews with stakeholders and the EQA, and using the IUCN Threat Classification Scheme.<sup>1</sup>
3. In the target area, the Palestine Institute for Biodiversity and Sustainability of Bethlehem University conducted biodiversity (habitats, fauna, flora) studies and assessed key areas of concern using standard field methodologies such as RSCN (2005) and the Braun-Blanquet methodology (Wikum & Shanholtzer, 1978). We focused on rare plants as they serve as indicators (Al-Sheikh & Qumsiyeh, 2021).
4. We used the WWF's RAPPAM methodology (Rapid Assessment and Prioritisation of Protected Area Management). The RAPPAM methodology (Ervin, 2002) enabled identifying and analysing the scope, severity, prevalence and distribution of a variety of threats and pressures as well as identifying areas of high ecological and social importance and vulnerability. This assessment was performed through a participatory approach where an interactive workshop was held with policy makers, local authorities, local farmers and representatives, analysing the services provided on site, and identifying subsequent next steps and priorities.
5. The biodiversity management plan for the valley with conservation frameworks and restoration schemes for selected habitats used the Conservation Measures Partnership (CMP) (2013) model, IUCN guidelines and GIS/RS analysis.
6. After local consultation, the team decided to restore a 3-dunum area (1 dunum is 1000 square meters) with native trees and engaged in clean-up efforts for plastic and other waste produced in the whole valley. Awareness programmes and active outreach and communication strategies involving schools, farmers and women's cooperatives in the four communities were integral to this project.
7. We established long-term monitoring plans based on points 1 and 2 and on key expert evaluations. Monitoring was done on year 1 and selected faunal and floral indicators were assayed in year 3. Focus groups helped estimate threat levels to habitats and livelihoods on a scale of 1 to 5 (see Table 1 for description of threat levels with 5 being the highest).
8. Experts in areas such as permaculture and marketing supported the Al-Walaja, Battir, Beit Jala and Husan communities through sustainable agriculture, community empowerment, women's cooperatives and ecotourism. They also engaged in threat analysis.

## RESULTS AND DISCUSSION

### Inventory and assessment of biodiversity at species and habitat level

We leveraged research and close community relations to assess biodiversity levels for the purpose of management and conservation efforts. After an initial desktop study and focus group meetings of experts and stakeholders, extensive fieldwork was conducted over a period of one year and more selective fieldwork was conducted in the third year for comparison. We began publishing some of the data on the rich biodiversity of the valley (Handal & Qumsiyeh, 2019; Pahl & Qumsiyeh, 2021; Thaler et al., 2020). We documented more than 417 vascular plants, 15 fungi (Thaler et al., 2020), 105 birds, 3 amphibians, 12 reptiles, 31 mammals and hundreds of invertebrate species, and noted many rare plant species, such as *Carduus australis*, *Colichium hierosolymitanum*, *Herniaria glabra*, *Nonea philistaea*, *Onopordum carduiforme*, *Reseda alopecuroides*, *Salvia indica*, *Verbena supina*, *Viola occulta*, *Gypsophila pilosa*, *Polygonum argyrocoleon*, *Portulaca oleracea*, *Populus euphratica*, *Rumex dentatus*, *Cephalaria syriaca*, *Lactuca undulata*, *Onosma gigantea* and *Turgenia latifolia*. The work was later extended to two nearby valleys (Wadi Fukin to the southwest and Wadi Ahmed/Cremisan to the northeast) which added additional rare plant and animal species. For example, camera traps recorded wild cats, hyenas, porcupines, jackals, foxes and gazelles. Comparison of animals and plants seen in 2018 and 2020 showed no change but that is likely due to the interval being only two years.<sup>2</sup> The initial data acted as a baseline for the second and third years of monitoring and is important for future studies of temporal changes.

### Threats to the biodiversity of the area

Table 1 lists the main threats to biodiversity documented over the three-year period of study of the project.

Other threats are noted in the area. Climate change represents the major threat for the Occupied Palestinian Territories (UNDP, 2010). Climate-related hazards, such as rainfall patterns, heatwaves, dry spells, frost, floods, sand- and windstorms are projected to become



**Figure 2.** Drone image of a destructive local practice in a rich biodiversity area in which bulldozers imported stone and soil to construct poorly engineered terraces and roads that blocked the natural flow of water in the valley.



**Figure 3.** A new Israeli settlement outpost recently started in the buffer zone of the World Heritage Site and within the protected area boundary.

more frequent and severe. According to the National Adaptation Plan<sup>3</sup>, in a mid-range scenario, should emissions continue increasing along recent trends, increasing temperatures and decreasing rainfall amounts are likely. Agriculture, agro-biodiversity and plant biodiversity in the country are highly vulnerable to climate change (EQA, 2021). Climate shocks undermine vulnerable farmers’ capacity to cope and adapt to maintain their livelihood. Climate change in this area has started to affect sensitive species, such as land snails

**Table 1** Summary of pressures posing threats to biodiversity in the study area. Threat levels are listed on a scale of 1–5 with 1 being minimal or no threat, 2 low threat, 3 medium, 4 high and 5 very high.

Pressure	Threats/notes	Threat level	Impact	Permanence
Habitat fragmentation	Encroachment (Figures 2 and 3)	4	Severe	Permanent (>100 years)
Agricultural practices	The use of fertilisers, pesticides and other chemicals (e.g., impact on pollinators)	3	Moderate	Medium (5–20 years)
Israeli occupation activities	The Separation Wall and land degradation (Husein & Qumsiyeh, 2022)	4	Severe	Permanent (>100 years)
Overexploitation of resources	Cutting trees and overgrazing. Steeper slopes more protected (Thaler et al., 2020). Gathering of wild plants in decline (e.g., in Artas, see Mourad Hanna et al., 2021)	3	Moderate	Medium (5–20 years)
Solid waste	Pollution impacts on wildlife (clean-up efforts underway)	4	High	Medium (5–20 years)
Invasive alien species	The Tree of Heaven ( <i>Ailanthus altissima</i> ) and two invasive insects have also been recorded in this area (Handal, 2017; Handal & Qumsiyeh, 2019), and the Myna Bird <i>Acridotheres tristis</i> is widely present (Handal & Qumsiyeh, 2021)	3	Moderate	Medium (5–20 years)
Increased local and international tourists	New less damaging hiking paths and trained tour guides can minimise threats	2–3	Moderate	Medium (5–20 years)
Feral/stray dogs and cats	Disruption in species numbers	3	High	Short (<5 years)
Climate change	Desertification resulting in changed habitats and loss of Mediterranean species	4	High	Medium (5–20 years)

(Amr et al., 2018) and amphibians (Salman et al., 2014). Many of the threats discussed above along with others (noise pollution, air pollution) could also be addressed through educational campaigns, legislation and campaigns on the ground involving local people. This is recommended both in the new National Biodiversity Strategy and Action Plan and in the new Protected Area Network published by the EQA in 2023. The Palestinian Institute for Biodiversity and Sustainability and many non-governmental organisations as well as the EQA are working on these aspects.

### Intervention and conservation efforts

An understanding of the threats has enabled the authors to create a science and community-based conservation management plan for a new protected area and begin to implement it to promote eco-agriculture (81 small farm beneficiaries) and ecotourism, to work with the four communities located in the World Heritage Site to create eco-friendly village business plans and promote women's cooperatives in eco-friendly production and marketing. A plan to restore 3000 m<sup>2</sup> of key habitats was implemented by cultivating natural native trees in degraded or abandoned lands in areas of high conservation value.<sup>4</sup>

Consultants and experts helped produce a biodiversity management system<sup>5</sup> that was adopted by the major stakeholders (EQA, Ministry of Tourism and Antiquities (MOTA), Ministry of Agriculture (MOA) and local councils and was incorporated into the overall management plan for the World Heritage Site. End of project evaluations were conducted demonstrating uneven progress with improvements in selected localities and setbacks elsewhere.<sup>6</sup>

The notable habitat heterogeneity in the valley was considered when assessing threats. For example, plant cover and animal biodiversity on the southwest-facing slopes of the valley differed significantly from those on the northeast-facing slopes or in the bottom of the valley. This necessitated diverse approaches to managing threats in different areas (see below). Based on intensive habitat, faunal and floral surveys, five areas were selected as priorities for conservation with the total area evaluated (Fig. 3).

**Conservation Area 1:** This area supports three types of habitats in mixed or pure stands, namely maquis oak forest, olive groves and Garrigue association. The soil consists mainly of light rendzina, plant cover ranges from 40–90 per cent, and the elevation ranges between 709–805 m. This area is an essential habitat for vertebrates such as Golden Jackals, Red Foxes, Badgers, Porcupines and Mountain Gazelles, a globally threatened/ endangered species, which we found in groups of three to

eight. The region is a host for numerous plants, including rare species, such as *Salvia Indica*, *Verbena supina* and *Viola occulta*.

**Conservation Area 2:** This area supports four types of habitats in mixed or pure stands, mainly Maquis oak forest, olive groves, pine woodlands and Garrigue Plant cover ranges between 52–80 per cent, and soil is light to dark rendzina. The elevation ranges between 640–701 m. This is a crucial area for birds, amphibians, mammals and invertebrates. We also reported on presence of *Hyaena hyaena* (see Handal et al., 2019). The area supports three vulnerable birds, namely *Emberiza caesia*, *Anthus similis* and *Apus affinis*, and the growth of rare plants, such as *Cephalaria syriaca*, *Lactuca undulata*, *Onosma gigantea* and *Turgenia latifolia*.

**Conservation Area 3:** This area supports four types of habitats in mixed or pure stands, namely Maquis oak forest, olive groves, Garrigue association and agricultural terraces. Plant cover ranges from 60 per cent to 82 per cent, and the soil is a mixture between Rendzina and Terra Rosa. The elevation is between 584–601 m. Plant species found in this area include *Pistacia lentiscus*. The area encompasses a unique water aqueduct that takes the water from Battir Spring through the agricultural terraces. Several vital plant species, including *Arum hygrophilum*, *Populus euphratica*, *Arum dioscoridis* and *Rhamnus alaternus*, were observed. *Onopordum carduiforme* and *Scrophularia hierochuntina* are essential to conservation because they are threatened and endemic to Palestine and the Fertile Crescent region.

**Conservation Area 4:** This area supports three types of habitats in mixed or pure stands, mainly Maquis oak forest, olive groves and Garrigue association. Plant cover ranges from 57 per cent to 80 per cent, and the soil is a mix of Rendzina and Terra Rosa. The elevation is the lowest among the conservation areas and ranges between 550 and 586 m. Its habitats of mixed olive groves and oak maquis forest and agricultural lands contain less biodiversity than the other conservation areas but nonetheless support the growth of rare plants and form an environment for the growth of diverse herbaceous species.

**Conservation Area 5:** This area supports three habitats: oak Maquis, olive groves and Garrigue association. It is famous for the natural spring that forms a medium-sized pool from which birds and animals drink. It is a typical habitat for many plants species, such as orchids, and animals, such as geckos, bats, birds, and bees.

After the first survey study, we selected some species to survey again during the third year of the project from both plants<sup>7</sup> and birds<sup>8</sup>. The data indicated



**Figure 4.** Key biodiversity conservation areas identified from fieldwork on fauna and flora. Conservation Area 1 is the first shaded area located on the right of the map, and Conservation Area 5 is the least shaded area located on the left of the map.

improvements in habitat availability for some species (e.g., gazelles) and declines in others (e.g. some of the birds). The baseline and follow-up data were used in conjunction with the threat analysis to better manage the area. According to the IUCN Ecosystem Criteria (IUCN, 2016), this area may be classified as either a vulnerable ecosystem (VU) or even endangered ecosystem (EN). Specifically, we note declining distributions (e.g., of orchids), restricted distribution, degradation of the abiotic environment and altered biotic interaction (see Amr et al., 2016).

### Designating a new protected area

Based on the totality of data above (flora, fauna, habitats, threats) and further analysis at IUCN regional headquarters in Amman, and in comparison with other local areas evaluated by our team (Palestine Institute for Biodiversity and Sustainability, EQA, stakeholders), the area was officially proposed and then recognised by the EQA as a new protected area to be called Al-Arqoub Protected Area. The information submitted was essentially the data described above including threats, designated conservation areas, proposed management plan, and feasibility of management. The area was further designated by the EQA as IUCN category VI because it contains natural areas where biodiversity conservation is linked with sustainable use of natural resources, which is incompatible with other IUCN categories. There were other side benefits to the work with EQA besides those mentioned above. With the cooperation of the EQA, we mapped an ecotourism pathway and installed signs to highlight what hikers might notice in terms of geology, flora and fauna and threats. We also developed a brochure in both English and Arabic for international and local visitors. Data reveal an increase in eco-friendly practices resulting in a 40 per cent average increase in agricultural production

from the targeted farmers. Four women's cooperatives in the four communities were trained in eco-friendly production practices and the development of marketing plans for their products and connected to marketing outlets. Prior to COVID-19, a large festival was held to market products from approximately 25 local family vendors, and agreements were made with four large supermarkets to install shelves to market products. With the support of the project team, the four communities developed business plans to brand their communities and encourage eco-, cultural and agricultural tourism. Such tourism can help biodiversity conservation if structured well.

The information outlined above provided significant baseline data that helped designate the area as a protected area based on IUCN criteria in 2022 (to be incorporated in spatial plans in early 2023). But it also provided a model for working to bridge the science–policy–practice gaps noted earlier in protected area management (Qumsiyeh & Amr, 2016) by working with the communities in areas like sustainable agriculture, environmental education/awareness and demonstration of restoration potential. The results summarised above demonstrate that advancements can be achieved despite difficult circumstances. Ecotourism is increasing on the hiking path but this needs more regulation and education. Our work with women's cooperatives and schools in the area to increase awareness reduces human negative impacts on the environment. It was clear from working with 81 farmers in the area that it is possible to achieve biodiversity conservation while enhancing farmer production using permaculture and other eco-friendly practices. Ideally, our continuing work should allow for maintenance of a balanced mix of farmers' use and ecosystem conservation (Fig. 5).



**Figure 5.** An example of a balanced mix of natural conservation and agricultural areas

The World Heritage Site is in the Occupied Palestinian Territories, where, contrary to the Fourth Geneva Convention, Israeli settlements are being built. According to the Oslo Accords, most of the area is designated area 'C', where the Israelis have military and civil control. The team working on this project has challenged these activities by writing to UNESCO. Palestinian farmers and inhabitants of the valley have complained about the demolishing of farmhouses, burning of structures and confiscation of lands. Limitations on movement and work are evident. Efforts were exerted by the project team, farmers and communities to address and transcend these challenges. The wall causes the fragmentation of farms, forests and grasslands, affects water flows, and prevents access to and the use of lands and natural resources (Husein & Qumsiyeh, 2022). Furthermore, the restrictions on movement imposed on the Palestinian population by the walls and checkpoints impede necessary access to protect rich biodiversity areas (Qumsiyeh & Amr, 2016; Qumsiyeh & Abusarhan, 2021, 2022; Qumsiyeh & Albardeiya, 2022).

Many more successes than those noted above could occur if we address the imbalance of power (EQA, 2021; Qumsiyeh & Albaradeyia, 2022) and incorporate environmental justice issues in ecosystem services. Israel is expanding its segregation wall in the area around the site. Human rights organisations and the International Court of Justice have asserted that this wall is illegal (Kattan, 2007). The area was afforded some protection by being designated a UNESCO World Heritage Site, being one of fifteen Key Biodiversity Areas (KBAs), one of five Important Bird Areas, and one of the Important Plant Areas in the State of Palestine (Radford et al., 2011), and as a result of our work a protected area category VI. Although these multiple levels of protection led to improvement, much more could be done when peace is implemented and local people reclaim their sovereignty.

Our applied research in restoring land and educational components strengthened the capacity of local communities and related organisations to revive traditional farming techniques and safeguard their cultural and natural landscapes. Science–policy connectivity was enhanced through regular work with the EQA and all stakeholders that continues on a monthly basis especially as we prepared the NBSAP 2023–2030 in line with the Kunming–Montreal Global Biodiversity Framework. The Palestine Institute for Biodiversity and Sustainability that led this project was also selected to lead the production of the sixth national report for the CBD and to create a new national biodiversity strategy and action plan for the State of Palestine. As part of the latter work, more than 450 stakeholders convened

weekly to build capacity and strengthen collaboration. For local people, motivation has increased through the use of human rights language (our rights to the land, work in permaculture as a form of resistance) and cultural heritage issues. Farmers' motivation increases as their nostalgia for their parents' and grandparents' practices and connectivity to the land are revived as was shown in a nearby area in Palestine (Mourad Hanna et al., 2021) and as is recognised globally (Berkes et al., 2000). The integrated conservation of biocultural diversity while taking care of people's needs was recognised in the recent COP15.

The Plan of Action of the Ministry of Tourism and Antiquities (2015) promotes and facilitates the private activation and utilisation of historical, natural and cultural sites. Tourism, mostly religious tourism with limited local tourism of all types (Tabash, 2017; PCBS, 2019), contributes significantly to Palestine's GDP. Yet, alternative forms of tourism, including ecological tourism are evolving and increasing in Palestinian areas. More than 29 hiking paths were established, including one in the study's target area (Qumsiyeh and Amr, 2019). Taking into account the baseline biodiversity studies, the authors collaborated with the Ministry of Tourism and the Environment Quality Authority to improve the path in Al-Makhrour. When COVID-19 prevented international tourism, local tourism, including hiking, increased in the study area (Qumsiyeh & Abusarhan, 2022).

## CONCLUSION

Rich fauna and flora characterise a newly designated protected area (a candidate UNESCO World Heritage Site) in the occupied State of Palestine. It is possible to enhance ecosystem services and preserve habitats despite serious pressures and threats that can cause habitat loss and a decline in biodiversity. We demonstrate some success in working with the communities in a project to promote environmentally sound and sustainable development while restoring and conserving a rich natural system. Further work is needed to expand this pilot project to restore more habitats and enhance community appreciation of the intertwined cultural and natural heritage of Palestine. There remain, of course, the challenges of occupation and restriction of movement and a system of making local Palestinians dependent on Israeli occupiers. However, this study demonstrates biodiversity conservation even in a conflict zone aided by two aspects: scientific knowledge and promoting the well-being of local people.

## ENDNOTES

- <sup>1</sup> <https://www.iucnredlist.org/resources/threat-classification-scheme>
- <sup>2</sup> <https://www.palestinature.org/conservation/Monitoring-indicators-Makhrour.pdf>
- <sup>3</sup> [https://unfccc.int/files/national\\_reports/non-annex\\_i\\_parties/application/pdf/national\\_adaptation\\_plan\\_\\_state\\_of\\_palestine.pdf](https://unfccc.int/files/national_reports/non-annex_i_parties/application/pdf/national_adaptation_plan__state_of_palestine.pdf)
- <sup>4</sup> Restoration scheme can be found here <https://almakhrour.palestinature.org/wp-content/uploads/2020/05/Annex-10-Habitat-Restoration.pdf>
- <sup>5</sup> Management scheme found here <https://almakhrour.palestinature.org/wp-content/uploads/2020/05/Annex-8-Biodiversity-Conservation-Plan.pdf>
- <sup>6</sup> <https://www.palestinature.org/conservation/Plant-Biodiversity-End-line-Report.pdf>
- <sup>7</sup> <https://www.palestinature.org/conservation/Plant-Biodiversity-End-line-Report.pdf>
- <sup>8</sup> <https://www.palestinature.org/conservation/Bird-Survey-at-Al-Makhrour-Valley-and-its-vicinity.pdf>

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## RESUMEN

Palestina forma parte del Creciente Fértil y es conocida por su rica biodiversidad faunística y floral en relación con su latitud. Las colinas del sur de Jerusalén, con sus antiguas aldeas (denominadas colectivamente agrupación de Al-Arqoub), ofrecen zonas ideales para la conservación dentro del punto caliente de biodiversidad del Mediterráneo. La zona fue inscrita con carácter de emergencia como Patrimonio Mundial de la UNESCO en 2014. Este estudio evaluó la biodiversidad y las amenazas, y los datos se utilizaron para designarla zona protegida por la Autoridad de Calidad Ambiental (EQA). Se documentaron 417 especies de plantas, 15 de hongos, 105 de aves, 3 de anfibios, 12 de reptiles y 31 de mamíferos. Entre las amenazas a esta rica biodiversidad se encontraban las prácticas agrícolas perjudiciales, la sobreexplotación, la construcción de asentamientos israelíes, la urbanización, la pérdida de hábitats, la fragmentación del terreno y la escasa aplicación de las leyes. Se establecieron y empezaron a aplicar planes de gestión para el lugar con el objetivo de la conservación biocultural. Cuatro comunidades marginadas de los alrededores del sistema de valles (Al-Walaja, Battir, Husan y Beit Jala) se beneficiaron de: a) una producción agrícola respetuosa con el medio ambiente para 81 agricultores, b) el desarrollo y la capacitación de las mujeres en producción y comercialización respetuosas con el medio ambiente, c) la potenciación del ecoturismo, d) la aplicación de un modelo de restauración de ecosistemas y e) la educación y la capacitación conducentes a un cambio de comportamiento. Basándonos en los criterios de la UICN, consideramos que “Al-Arqoub” es un ecosistema vulnerable merecedor de un estatus de protección mejorado y, basándose en nuestros estudios, la EQA lo designó como área protegida de categoría VI (protegida con uso sostenible de los recursos naturales). La gestión de áreas protegidas en Palestina sigue la nueva Estrategia Nacional de Biodiversidad y Plan de Acción (2023-2030) en consonancia con el Marco Global de Biodiversidad de Kunming-Montreal. Este esfuerzo popular e interdisciplinar para proteger esta zona sirve de modelo para otras protecciones en una región con inestabilidad económica y política.

## RÉSUMÉ

La Palestine fait partie du Croissant fertile et est connue pour être riche en biodiversité animale et florale par rapport à sa latitude. Les collines du sud de Jérusalem et leurs anciens villages (collectivement appelés le groupe d'Al-Arqoub) constituent des zones idéales pour la conservation au sein du point chaud de la biodiversité méditerranéenne. La région a été inscrite d'urgence au patrimoine mondial de l'UNESCO en 2014. Cette étude a permis d'évaluer la biodiversité et les menaces, et les données ont été utilisées pour désigner la zone protégée par l'Autorité de la qualité de l'environnement (AQE). Nous avons recensé 417 espèces de plantes, 15 espèces de champignons, 105 oiseaux, 3 amphibiens, 12 reptiles et 31 mammifères. Les menaces qui pèsent sur cette riche biodiversité sont notamment les pratiques agricoles néfastes, la surexploitation, la construction de colonies israéliennes, l'urbanisation, la perte d'habitat, la fragmentation des terres et l'application limitée des lois. Des plans de gestion ont été établis et ont commencé à être mis en œuvre pour le site dans un but de conservation bioculturelle. Quatre communautés marginalisées autour du système de la vallée (Al-Walaja, Battir, Husan et Beit Jala) ont bénéficié : a) d'une production agricole respectueuse de l'environnement pour 81 agriculteurs, b) du développement et de l'autonomisation des femmes dans la production et la commercialisation respectueuses de l'environnement, c) du renforcement de l'écotourisme, d) de la mise en œuvre d'un modèle de restauration de l'écosystème et e) de l'éducation et du renforcement des capacités conduisant à un changement de comportement. Sur la base des critères de l'UICN, nous considérons “Al-Arqoub” comme un écosystème vulnérable méritant un statut de protection renforcé et, sur la base de nos études, l'AQE l'a désigné comme une zone protégée de catégorie VI (protégée avec une utilisation durable des ressources naturelles). La gestion des zones protégées en Palestine suit la nouvelle stratégie et le plan d'action nationaux pour la biodiversité (2023-2030), conformément au Cadre mondial pour la biodiversité Kunming-Montréal. Cet effort local et interdisciplinaire pour protéger cette zone sert de modèle pour d'autres protections dans une région en proie à l'instabilité économique et politique.