

Aammiq Wetland

Introduction

The Aammiq Wetland is the last remaining significant wetland in the country, a remnant of much more extensive marshes and lakes that once existed in the Beqaa valley. It has long been known as an area of unique importance for its wildlife, particularly avifauna. At the same time, it is widely acknowledged that the future of the site is severely threatened by draining and water diversion, and its importance for birds diminished by hunting. The wetland lies on one of the most important bird migratory routes in the Near East, and its demise would create a gap of some 450 km between the nearest suitable feeding and resting grounds for migrating waders: the deltas of southern Turkey and the Hula Lake of Northern Palestine, itself under considerable threat. With Mediterranean wader/waterfowl numbers having declined an estimated 46% in the last 15-20 years, the conservation of Aammiq would make an important contribution to global biodiversity. The challenge that this task represents is, however, a considerable one, given the spatial and seasonal complexity of this ecosystem, and its socio-economic setting.

Description

Geomorphology

The Aammiq Wetland (33° 46'N 35° 46'E) lies 7 km SSW of Qabb Elias in the Beqaa valley, at an altitude of approximately 865 m. The alluvial plains of the Beqaa are virtually flat, being the bottom of an extensive lake in as recently as medieval times. This was eventually drained by the Litani River. The soils are rich and moist, based on sediments of Quaternary age.

The most significant area of reed systems and open pools covers an area of some 280 ha, on the northern side of a raised bank which runs 4.5 km ESE from the foot of the Jebel el Barouk to the Litani River. The wetland is relatively long and thin in shape, taking a similar but meandering course.

The Jebel el Barouk forms part of the Mount Lebanon range. It rises steeply to nearly 2000 m, following the line of the NNE-SSW Yammouneh Fault System., and is underlain by hard pale Jurassic limestones. Between the wetland and the Jebel El Barouk is the major road running along the western edge of the Beqaa valley between Chtaura and Machghara; this forms the western limit of the wetland area.

The geology and hydrology has been investigated by Walley (in prep).

Hydrology

The Lebanon Mountain range creates a rain shadow in the Beqaa Valley, but at Aammiq the average annual rainfall is similar to Beirut at 880mm. The wetland relies for its water supply, however, on springs which drain the slopes of the Jebel el Barouk mountain range, which receives approximately 1500 mm annual rainfall. Of particular note is a spring at altitude 865 m at the base of the knoll of Qalaat el Moudiq. This feeds the El Rhabe stream which meanders through the wetland, and the canalised Riachi stream which takes a straight course along the south edge of the main wetland area. The flow of water of the Riachi is supplemented by a further spring that rises at some distance from the slopes of the Jebel el Barouk. Both streams run into the Hafir River, which immediately joins the Litani River.

West Bekaa casa lot:

Deir Tahnich - 1,4,6
Chouberkieh Ammiq - 1,2,3
Ammiq - 52,54,55,57,58,60
Jurd Ammiq - 1,2,3

Underground flow of water is also to the Hafir and Litani Rivers, either as part of a single aquifer or a number of compartmentalised cells. In February and March, late winter rain and melting snow combine to flood a larger area of cultivated fields.

Vegetation/Habitats

1. Marshes and standing water

The wettest area of the site is composed of a mosaic of *Phragmites-Typha* reedbeds and unimproved pastures. Most of this area is under water through the winter months, but by mid-summer only two small areas of open water remain. These are both excavated depressions, one a narrow, steep-sided pond of less than 1 ha serving a pumping station, and the other a larger (c. 3 ha) pond approximately 2 km south of the wetland. The latter was excavated in 1982-84 during the Israeli occupation and has an established marginal vegetation of reeds. It demonstrates the potential to create further water bodies in the wetland area.

2. Riverine

The site is bordered to the west by the Hafir River and the Litani River into which it runs. The former arises at Qabb Elias and is considerably polluted by domestic wastes at that village, and also by effluent draining out of its landfill site. At Ammiq the river is recharged with unpolluted water from the wetland and the river supports some life (small fish and frogs, *Typha* and some pondweeds in the slower-flowing sections, kingfishers).

On the banks of the Hafir are lines of mature willows and manna ash. The former are coppiced trees of considerable age, providing a large amount of cover over the river and stabilising its banks. Other marginal vegetation included willow-herb (*Epilobium* sp) and *Amaranthus*.

3. Woodland/avenue

In 1905, two avenues of manna ash *Fraxinus ornus* were planted on raised banks on either side of the Riachi stream. The trees were pollarded. Only one of the avenues now remains, with the majority of the trees of the second one having been lost. The trunks of the former have begun to hollow out in their maturity, and such hollows are used as sites for barbecues by picnickers. Some trees have been killed or considerably damaged by such actions and gaps are now appearing in the remaining two lines of trees. An elm tree which is rare in the Middle East, *Ulmus sterile* c.f. *canescens*, was identified in the avenue by F.N. Hepper.

At the western end of the wetland an area of pollarded ash, poplar and willow trees existed near the spring below Qalaat el Moudiq. All these trees have now been cut down.

On the slopes Aammaiq estate is an open woodland dominated by umbrella pine *Pinus pinea*, and Himalayan Cedar. Soil cover is low and the understorey sparse, consisting of a garrigue of *Poterium spinosum* with occasional small trees and shrubs of *Quercus calliprinos*.

4. Pastures and cultivated land

The fields around the wetland area are intensively cultivated and grazed. To the south of the Riachi stream the land is divided into 25 ha square parcels, delineated by drainage ditches. These are regularly dredged improve the drainage, but where left support belts of reed. The stubbles and fallows provide grazing for goats, but there is no permanent pasture.

To the north of the Riachi the fields arranged less regularly around the wetland area. The wetland provides grassland and reed pastures. Burning of the reeds is carried out in the summer to provide new reed growth suitable for grazing.

5. Maquis/garrigue

On the SW facing slopes of the Jabal el Barouk the woodland cover which would have once existed has been seriously degraded. Clearance would have been the result of wood cutting for fuel and construction material, and the creation of terraced cultivated lands. Regeneration is hindered by goat grazing, continued wood collection for making charcoal, periodic fires and the loss of soil due to the original clearance of vegetation cover.

The original woodland climax is uncertain, but remnants of maquis on some of the less-accessible slopes indicate a Mediterranean woodland formation dominated by sclerophyllous evergreen trees and shrubs, but also with some deciduous species. Of particular note in relation to Aammaiq is a slope at an altitude of approximately 960-1050 m to the west of Qalatt el Moudiq where a tall (c. 4m) maquis is dominated by the evergreen oak *Quercus calliprinos* and Tabor oak *Q. ithaburensis*, and includes the following tree and shrub species: *Crataegus*, *Cistus salvifolius*, *Rhamnus*, *Spartium junceum*, *Phlomis* spp, *Amygdalus*, *Pistacia palaestina* and a climbing *Clematis*.

6. Orchard

A small area of deciduous fruit orchards (c. 100 ha) is present at Haouch Aammaiq. In large areas of these orchards the trees appeared to have died; elsewhere the orchard has the appearance of being overgrown, with tall grassland swards and some shrubby vegetation.

Existing land uses

The fields surrounding the Aammaiq Wetland are intensively cultivated with winter cereals and irrigated crops such as potatoes, cucumbers, tomatoes, sugar beet and cabbage. Sheep and goat grazing takes place on the cereal stubbles, fallows, potato and sugar beet fields, as well as the rough pastures that form part of the Aammaiq Wetland. Herds are largely owned by Syrian nomads, who rent parcels of land in the summer months (El Hassan, 1995).

Of secondary importance in the area are the activities of bee-keeping, stud farming (at Haouch Aammaiq) and fish farming (one fish farm being located on the Aammaiq Estate). The area has considerable recreational value, particularly for picnicking and hunting (see threats, below).

Biodiversity

Avifauna

The Aammaiq Wetland is best known for its avifauna. It is designated as an Important Bird Area in the Middle East (Birdlife International, 1994) and included in the Directory of Wetlands in the Middle East (IUCN, 1995). Although considerably reduced in extent it

continues to be important as a staging and wintering area for migratory waders and waterfowl. Key species of the area are Corncrake *Crex crex*, a globally threatened species, Black-winged Pratincole *Glareola nordmanni*, which is largely restricted to the Middle East, and the following regionally threatened/declining species: Bittern *Botaurus stellaris*, Ferruginous Duck *Aythya nyroca*, Honey Buzzard *Pernis apivorus*, Lesser Spotted Eagle *Aquila pomarina*, and Great Snipe *Gallinago media*, the latter a regular passage migrant. Its value for breeding bird and summer residents has been diminished by hunting, but nevertheless a number of species do breed with some success. These include Moorhen, Coot, Reed Warbler and Great Reed Warbler. Some 81 species were recorded on a number of visits between January and October 1996, including 16 raptors (Naylor, 1996, see Appendix 3). The total bird list for the area is likely to be in excess of 200.

Other vertebrates

Mammals which are still known to occur in the area include Common Vole *Microtus arvalis*, Jackal *Canis aureus*, Red Fox *Vulpes vulpes*, Wild Boar *Sus scrofa* and Common Hare *Lepus capensis*, but the Common Otter *Lutra lutra*, which once occurred in the wetland, is now locally extinct.

A provisional list of reptiles and amphibians by Dr Sadek is given in Appendix 6. Further records from the Station Biologique de la Tour du Valat (1996) include a soft-shelled turtle *Trionyx* sp., Whip Snake *Coulber gemonensis*, Grass Snake *Natrix natrix*, Fire-bellied Toad *Bombina* sp., and Painted Frog *Discoglossus* sp. Fish include *Phoxinellus libanicus* and the globally threatened *Cobitis levantina*, which is endemic to Aammiq (Station Biologique de la Tour du Valat, 1996).

Invertebrates

Molluscs are abundant, notably *Melanopsis* sp., *Limnaea* spp., *Bithynia tentaculata*, *Neritina fluviatilis* and *Planorbis* sp. The site is likely to be rich in invertebrates; 25 species were recorded by a Université Libanaise study (El Hage, 1979).

Flora

The flora of the Aammiq area is covered by Mouterde's 1970 flora of Lebanon. An analysis of the Aammiq flora from Mouterde's work is being undertaken by F.N Hepper of the Royal Botanic Gardens, Kew, London. Monocots alone number over 80 species, including 7 species of orchid and 16 members of the family Liliaceae. A collection made rapidly by F.N. Hepper in May 1996 indicated that new species were still to be discovered in the area. El Hage (1979) recorded 26 vascular and non-vascular species. The majority of these were emergent or submerged/floating hydrophytes and so will have a very restricted inland distribution in Lebanon.

Threats

The principle threats to the habitats, flora and fauna of Aammiq are the drying out of the habitat due to drainage and water diversion, unsustainable grazing and associated practice, recreational use (including hunting), and pollution.

1. Water diversion and drainage

The wetlands of Aammiq have been in a process of decline because of water diversion and drainage.

The former has taken four forms. Firstly, its water sources have been reduced by abstraction for irrigation. At least five bore holes are in operation in or adjacent to the wetland and are used for irrigating the surrounding cultivated land. A total of 12 wells with a cumulative output of 3,500 cu m/hour and an average depth of 45 m are present in the area

as a whole (Skaff, 1996). Secondly, one of the main aquifers feeding the wetland area was tunnelled and intercepted in the 1950s, again for the purposes of irrigation and drinking water supply. This is the Ain Aabed which has an output of 350 cu m/hour. Thirdly, the Hafir River, which once flooded large areas of Aammiq, was banked at its confluence with the Litani, thereby stopping another water source (but also a source of pollution). Finally, vegetation loss on the slopes of the Jabal el Barouk has led to increased runoff and therefore reduced recharging of the aquifers.

Drainage operations designed to create cultivatable land date back over at least the second half of this century. In the 1970s, a project, aided by the FAO, aimed to complete the drainage of the remaining 280 ha of marshy vegetation and open pools, but was halted in 1975 by the Civil War (IUCN, 1995). The drainage ditches drain the water to the Hafir and Litani Rivers.

The potential effects of the marsh drying out include soil subsidence, subsurface combustion, and the leaching out of nitrates accompanying the rapid decomposition of dry peat. The absence of surface water in the dry season can affect freshwater invertebrate diversity, hindering the recovery of populations in the wetter months, and therefore the food availability for birds and other wildlife of higher trophic levels.

2. Grazing

The marsh vegetation of Aammiq is intensively grazed by herds of sheep and goats in the summer months. The herds are owned by nomadic shepherds, who rent the land and therefore have less interest in its sustainable use for this purpose than resident shepherds. Grazing creates disturbance to the resident birds, and can decrease the plant diversity of the sward and its invertebrate and other animal populations. The reedbeds are burned by the shepherds in the summer months to create new growth of the reeds for pasture, and this may have serious deleterious effects on the soils and reedbed community structure.

Overgrazing of the shrublands and woodlands of the Aammiq Estate and Jabal el Barouk has created large areas of denuded vegetation cover and soil erosion. The goat herds favour the shrubs and low trees and can prevent natural regeneration of these plant communities.

3. Hunting and other recreational use

Hunting is the most severe threat and disturbance to both resident and passage birds at Aammiq. Along with Aeon El Sima in the north of the Beqaa Valley, Koura in the north, and the southern part of the country in the Spring, Aammiq is one of the main hunting areas in Lebanon. The legislation passed on 16 March 1993 banning all hunting between 15 March and 14 September is not enforced. Little discrimination is made between protected and more common species. Hides beside some of the pools have been constructed, and duck decoys are used in one place. Illegal trapping is also known to occur. The National Hunting Council estimates that uncontrolled hunting results in the shooting of more than 10 million birds a year. It is estimated that more than 500,000 persons hunt in Lebanon, 40% of whom fail to obtain a licence from the NHC (World Bank, 1995).

The Aammiq site, particularly the avenue of trees along the bank of the Riachi canal, is also well frequented for picnicking. This creates litter, but a more serious problem is the use of the hollows in the trunks of the ash trees for barbeques. This burns and eventually kills the trees, and gaps are appearing in the avenue. This valuable landscape feature is therefore severely threatened.

4. Pollution

Pollution threatens the water, land and air quality of Aammiq and is derived from three main activities:

Agrochemical use

Pesticides and fertilizers used on the cultivated land create a hazard to wildlife. Poisoning, and eutrophication of the water is a consequence of run-off into the wetland, streams and rivers. Unsafe disposal of used or semi-used containers has been witnessed and is of concern.

Empty containers of insecticide (Zadin and Carbatox) and full ones of rodenticide (Klerat) were recently seen dumped at close enough proximity to the Hafir River to be a pollution hazard. The fact of there being a rodent problem requiring chemical control is indicative of the hunting of raptors upsetting the equilibrium of the ecosystem.

Waste and effluents

The Hafir River runs through the village of Qabb Elias and is polluted by domestic wastes and rubbish at this point and by effluents from the landfill site.

The Litani River is polluted by:

- discharges from food processing plants, wineries, paper and tanneries into the Berdowni River tributary
- discharges from the sugar beet plant at Anjar (World Bank, 1995).

Dumping and littering also occur at Aammiq itself, as areas of it have easy access from the road.

Air pollution

A further consequence of the proximity of the road is the air pollution resulting from the combustion of unleaded fuels. Particulate pollution of the atmosphere is created by rock-crushing at a new limestone quarry on the slopes of the Jabal el Barouk between Qabb Elias and Aammiq.

Erosion

The same ash trees are also threatened by the erosion of soils around their roots. This occurs in the winter months when the Riachi canal is at its fullest and the water flow most rapid. Soil erosion is also likely to occur on the marsh where severe overgrazing occurs.

5. Deforestation

The slopes of the Jebel el Barouk have been considerably deforested by the cutting down of trees for firewood, charcoal and other uses. It is estimated that 65% of the trees were lost between 1982 and 1990 (Skaff, 1996). Regeneration of the woodland is prevented by grazing and continued cutting. Many trees in the valley bottom have been lost as well, and the remaining ones are being killed by burning (see above).

6. Building development

Ribbon development along the Chtaura to Machghara road has been expanding south of Qabb Elias in recent years. Without official protection, the Aammiq Wetland could be placed under increased pressure if the development approaches further.

Conservation Strategy

The threats to the Aammiq Wetland and its surrounding habitats are considerable, but so are the opportunities for a nature conservation initiative based around the creation of a protected zone.

- The water resources are relatively abundant, and the control of them achievable.
- Although some areas are relatively accessible, and therefore disturbed, others are more isolated, particularly in the period of greatest inundation. These therefore have the potential to become important safe havens for wildlife.
- A range of different habitats within close proximity (marsh and pools, streams and rivers, pastures, maquis, woodland) creates an area of considerable potential for ecological education and training through a programme of field studies and environmental studies.
- The closeness of the Barouk Cedar conservation programme provides an opportunity to include Aammiq in an extended zone of protection and habitat management, linking the habitats and increasing their viability as important refugia and centres of biodiversity.

Given these opportunities, the following should be conservation priorities for Aammiq:

- To restore and maintain the wetland ecosystem of the Aammiq Wetland.
- To integrate the wetland area in a zone of agricultural and semi-natural habitats managed for to enhance their conservation value and incorporating both the Beqaa Valley and Jebal el Barouk mountain environments.

The above conservation priorities are best addressed by a system of zonation, with specific tasks relevant to each zone, as follows (see map 2):

Priority Nature Reserve - Zone A (Aammiq Wetland)

Tasks:

- Restore water levels to seasonal levels that optimise the biotic diversity, and manage them at these levels.
- Protect the plant and wildlife from disturbance, in particular grazing, burning, hunting and other recreational use.

Environmentally Sensitive Area - Zone B (Valley cultivated land and pasture)

Tasks:

- Create a zone of controlled hunting, grazing and agrochemical use, thus buffering the Priority Zone A from detrimental effects.
- Include the Hafir and Litani rivers in the area of study and protection.
- In the longer term, explore the possibility of setting aside land for wetland recreation, thus extending the area of the wetland.

Hillside management Area - Zone C (Hillside of the Jabal el Barouk, including the Aammiq Estate)

Tasks:

- Encourage a succession to maquis vegetation on the slopes, in order to improve the soil conditions and water catchment, and recreate an area of nationally important and biodiverse vegetation type.
- Seek to create a physical link with the cedars of Ain Zahlta (the most northern of the Jebal Barouk cedar woods, providing a continuum of protected grading habitat/vegetation types typical of the region. This will have great benefit in terms of mammal conservation, with the potential to help several species in decline, for example hyena, badger and wild cat.

Implementation

In order to achieve a sound basis for this project, research into three key areas is needed, upon which the best decisions regarding the technologies for the protection of Aammiq can be made.

Hydrology

It is necessary to study further the water economy of the Aammiq area in order to find the most effective and practicable option for creating an appropriate amount of open water area in the dry season. Options might include restricting water abstraction, filtering the polluted waters of the Hafir River and diverting them into an enclosed part of the wetland, excavating new lakes, moating the wetland area to retain water, and in the longer terms instituting measures to improve water catchment and groundwater recharge of the Jabal el Barouk. The priority is to see that a mosaic of open areas of water and marshy vegetation are maintained throughout the dry season, and that soil structure is not allowed to deteriorate further by drying out. Detailed studies of the resident and passage birds and their habitat requirements (see below) can feed information into this work.

Habitat requirements of birds and other taxonomic groups

Birds are the best indicator species for the general health of the ecosystem and quality of its environment. They are remarkable for their sensitivity and mobility which makes it possible for them to react quickly to changes in the environment. Synthesis of Aammiq bird records and further detailed observation is required in order to determine how best to increase the carrying capacity of the wetland habitats for breeding, wintering and migrant species. The end results will enable more effective and finely-tuned habitat management, with respect to water levels and vegetation cover, optimising opportunity for undisturbed nesting, feeding and roosting.

Studies of other animal and plant groups should not be overlooked, however, and the habitat preferences of particularly rare and threatened species need to be ascertained. For many groups, an initial survey is required, as they have been little studied in the area and information predating the civil war may no longer be relevant. Such surveys can also contribute to the understanding of national biodiversity. For example, only moths of agronomic importance have been well-studied in the country.

Once inventories have taken place, monitoring is required to ensure that the creation of the protected area is meeting its objectives. It also has a function in detecting potential problems when they arise, for example the invasion of a non-indigenous and potentially damaging species. Suggested methods include breeding bird surveys, wader counts, moth trapping and pit trapping of invertebrates, butterfly transects, Longworth trapping of small mammals, and permanent quadrats for recording the flora.

A PC-operated Geographical Information System (GIS) would be required for the storage and processing of survey and monitoring data. This is a powerful tool for dealing with spatially varied data and facilitates decision-making based on a sound awareness of the whole protected zone and the changes taking place within it.

Agricultural extension work

Certain traditional agricultural and pastoral practices may represent the most sustainable and effective means of maintaining the biodiversity of the Aammiq area. One example is controlled grazing, where studies have shown that a certain level can keep the floral diversity of a grassland sward at its highest, keeping competitive coarse grasses and woody

species from taking over (Naveh & Whittaker, 1979). Selective cutting of reeds on a careful rotation may also have a function in encouraging regeneration of the reed beds. Research needs to be undertaken of such practices in Mediterranean regions in order to draw up an effective management plan for the area.

These three areas, together with the enforcement of the hunting ban, and the development of opportunities for environmental education, represent the foci for the implementation of a protected area at Aammig.

Criteria extracted from text : 1d, 2a, 2c, 2d, 3b, 4a

Wetland types extracted from text : M, O, Tp, Ts, Xf

14/09/99, EH.