Aquatic invertebrate studies at Aammiq Marsh, 2002-2003

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Introduction

Invertebrates are often overlooked in conservation projects as they are usually smaller and considered less attractive than vertebrates. However, their importance should not be underestimated. Their diversity far exceeds that of vertebrates (for example, 75% of all animal species are insects), and they include some fascinating and beautiful creatures such as the butterflies and dragonflies, making them worthy of conservation for their own sake. Furthermore, invertebrates are extremely important ecologically, providing a food source and many of the ecological functions that the vertebrates and other organisms need to survive. They are also sensitive indicators of ecosystem health, and can provide important data for ecological monitoring.

In Lebanon, one of the main barriers to conservation of freshwater organisms and habitats is the lack of current and complete data sets. In introducing its publication "Etude de la diversite biologique du Liban", the Lebanese Ministry of Agriculture states that "the lists included in this work are no longer up to date; it is urgent to undertake new studies to have complete information on the current state of the Lebanese freshwater fauna." (translated from Ministry of Agriculture, Volume 6: "L'Etat actuel de nos connaissances sur le peuplement dulciaquicole au Liban"). Lebanon's National Biodiversity Strategy and Action Plan states that "research….. and studies on freshwater biodiversity should be expanded and supported", and aims to "establish a database system for freshwater richness and endangered species." The Aammiq Marsh in the Bekaa Valley, the focus of A Rocha Lebanon's work, has been thoroughly surveyed in terms of its vertebrate fauna over a period of 6 years. However, Aammiq, like other freshwater habitats in Lebanon, still suffers from a lack of data on its aquatic invertebrate communities. Thus, certain spectacular groups such as the dragonflies remain under-appreciated, and the importance of Aammiq Marsh for aquatic invertebrate biodiversity across the Middle East remains unknown.

Furthermore, the management plan for Aammiq, recently been prepared by A Rocha Lebanon, is presently limited by lack of aquatic invertebrate data. The marsh, rather than being a uniform habitat, is better regarded as a mosaic of many kinds of habitats, including reed beds, flooded meadows, open water, flowing springs, small isolated pools, permanent and temporary waters. Management of the marsh involves management of these different habitat types, possibly increasing the extent of some at the expense of others. Management therefore involves some important questions, for example, should we dig pools to create permanent water in an area that presently dries out for several months of the year? Should we attempt to isolate certain pools or parts of the marsh from fish predators such as the introduced *Gambusia*? Because presently we know little about the diversity and abundance of the fauna that exist in the different habitat types, we don't yet have a good basis for making such management decisions. Invertebrates are an important component of the fauna, and since they represent the base of the food chain, they also affect other components. Thus they can tell us a great deal about the value of the different habitats in supporting wildlife, and inform our management practices.

For these various reasons, A Rocha Lebanon is undertaking surveys of the aquatic invertebrate community and of adult dragonflies in Aammiq Marsh. Specifically, the aims are:

1) To identify endangered, rare or endemic invertebrates in Aammiq Marsh, Bekaa Valley, Lebanon.
2) To determine which habitat types within the marsh area support the greatest diversity and abundance of aquatic invertebrates. Especially:
    a) To determine whether aquatic invertebrates are more abundant and diverse in pools isolated from fish predators, especially introduced mosquito fish (*Gambusia affinis*).
    b) To determine whether aquatic invertebrates are more abundant and diverse in permanently flooded pools than in areas that dry out seasonally.
3) To identify the entire range of dragonflies and damselflies inhabiting Aammiq Marsh and nearby aquatic habitats.

Relationship to previous work:

For Aammiq marsh there is only one previously-published study of aquatic communities (El Hage, 1979). This study provides good coverage of molluscs, but records only 4 species of Arthropod, all of which are crustaceans. "Etude de la diversite biologique du Liban" (Ministry of Agriculture) mentions that Aammiq contains 4 endemic species of aquatic invertebrate, but does not name them.

For dragonflies, there are studies in other Middle eastern countries, including Lebanon's neighbours, but Lebanon itself has been covered only lightly in one publication (Dumont, 1975). Furthermore, Lebanon's freshwater habitats have suffered significant degradation since this study was completed, therefore the data may no longer be current. The IUCN Red List includes 6 species of dragonflies for countries surrounding Lebanon, suggesting that dragonflies may be at risk in the region, but there are no data for Lebanon itself.

The difficulty in finding records for many taxa from this geographical region presents a significant problem in identifying the specimens collected.

Methods:

1) Aquatic invertebrate sampling:
Sampling was conducted at the following sites within the marsh area:

Small isolated pools: 5 pools * 3 replicate samples/pool
Main marsh: a) reedbed edge: 6 replicate samples
b) inner reedbed: 6 replicate samples
c) flooded grassland: 6 replicate samples
d) submerged macrophytes: 6 replicate samples
Flowing water springs: 9 replicate samples
Permanent pool: 3 habitat types (reedbed edge, inner reedbed, submerged macrophytes) * 3 replicate samples.

For each habitat type, sampling sites were spaced as widely as possible within the marsh boundaries, to maximise the chance of collecting the full range of species. Samples were taken where water was 20-30 cm deep, by isolating 0.5 m^2 of water and vegetation using a "barrel sampler." The water depth, temperature, oxygen, were measured, and the sampling location recorded using a global positioning system (GPS). Then all water and vegetation were removed from inside the barrel sampler, and invertebrates were separated from water and vegetation using a 250 µm mesh net. In the "lab," invertebrates were separated from remaining organic fragments and will be identified using a range of different keys and references.

2) Dragonflies: adult dragonflies and damselflies will be collected on weekly field excursions to various parts of Aammiq Marsh, and nearby ponds and streams in the West Bekaa throughout the spring and summer of 2003. If possible, the survey will also extend to the marshes at Aanjar, East Bekaa, the other wetland of significant size in the Bekaa. Information recorded will include date and location of observation, numbers seen, species, sex and life stage of individuals collected. Collected specimens will be pinned and stored.