

Salt marshes



Ghadira

Salt marshes are wetlands characterised by brackish water (i.e., water having a salinity intermediate between that of seawater and fresh water). Such habitats are found at the opening of river valleys into open sea - i.e., where there is an admixture of water of opposite salinities.

Environmental conditions in salt marshes are highly rigorous. The first hurdle to be surpassed is that of high salinity. In places like Ghadira, this may even reach benchmarks of 30-35 psu (values equalling that of seawater) during the hot summer months, due to the bolstered rate of evaporation of water.

Plants inhabiting such an environment need to be halophytes - i.e., they are capable, through a concoction of adaptations, to bear the brunt of the high salt load. Such adaptations include:

- 'succulent' tissues which have a high water content to dilute the incoming salts;
- 'salt glands', usually located on leaves, to excrete excess amounts of salt from the plant;
- leaves that are usually thick and waxy to prevent excessive loss of fresh water, while stomata (minute pores on the leaf's underside) are sunken into grooves for the same purpose; and
- tolerance and burrowing- some animals living in salt marshes, especially snails, are highly tolerant of high salt loads, while others, such as beetles, burrow into the sediment to allay rapid changes in salinity (e.g., after heavy rainfall).

Yet another kink to be ironed out by biota living in salt marshes is the anoxic (i.e., lacking in oxygen) sediment, which tinges the sediment with a hallmark dark black colour just under the surface. Besides being deficient in oxygen, such a sediment would also be imbibed with many toxic substances, such as sulphides

Plants overcome this moray in a two-pronged strategy. First, their roots are concentrated very near the surface where there is some oxygen. Secondly, they allow some oxygen to leak out from the root tissues, oxygenating the soil and the dangerous chemicals too. Some snails are able to breathe air through modified gills which act as fully-fledged lungs.

Flagship plants of salt marshes include the twiggy glasswort (*Salicornia ramosissima* - Almeridja), with its characteristic segmented and succulent stems; the smooth-leaved saltwort (*Salsola soda* - Haxixa ta' I-Irmied); the perennial *Arthrocnemum glaucum* and the widespread Golden Samphire (*Inula crithmoides* - Xorbett).

Plants living with their roots directly immersed in water (contrary to the emergent plants mentioned earlier) include the tassel pondweed (*Ruppia maritima* - Ruppja); the rushes (*Juncus* spp.) and the common reed (*Phragmites australis* - Qasbet ir-Rih).

A fish species which surely acts as the stalwart of our salt marshes is the killifish (*Aphanius fasciatus* - 'buzaqq'). The fish (the only one to inhabit brackish waters in our islands) owes its not-so-decorous Maltese name to the pronounced belly of specimens. Its specific name is due to the colourful red and green striations on the back of the male.

The importance of the killifish is even more acute when considering that the Maltese race is probably endemic. Although highly numerous at Simar and Ghadira, the killifish is extremely localised in isolated populations due to the restricted nature of its habitat, making its conservation a priority. The killifish is, however, highly resilient, and is known to live in both seawater and freshwater.

Although salt marshes do not enjoy a quantum amount of human appreciation, environmentalists have several cards up their sleeve to clamour for their conservation. First of all, salt marshes harbour plants and animals restricted strictly to this unique habitat.

Secondly, salt marshes act as nursery grounds for a wide variety of fish and shellfish. Thirdly, they also act as buffers against erosion of the land by the sea and provide areas where storm surges can be safely dissipated.

In the United States, the ecological importance of salt marshes has been widely embraced. In fact, a policy of 'No net loss of habitat' or 'Quid pro quo' has been developed, whereby the creation of an equivalent area of similar habitat elsewhere gives the green light for development, entailing the destruction of an area of habitat, such as a salt marsh.

Current status

As evident from Cassar's Medical History of Malta, salt marshes were always conceived to be a health hazard, places where water-borne diseases, such as malaria, were fomented. This led to such habitats bearing the brunt of human disturbance and manipulation, especially in Mediterranean countries.

Mussolini was highly lauded for his draining of the extensive marshlands surrounding Rome during the 1930s, campaigns dubbed in Italian as "bonifiche". Despite this, Tunisia and, especially Spain, can still boast several hundreds of square miles of salt marshlands, namely at Andalucia in the provinces of Cadiz and Malaga.

On our islands, as with all other esoteric habitats, such as sand dunes, salt marshes have verged on the brink of complete extinction and the final remnants bear many scars of human disturbance. The State of the Environment Report (1998) classifies salt marshes in our islands as follows: extant (9), engineered (4), vestigial (6) and extinct (9) marshlands in the Maltese Islands. There were previously two large marsh areas in Malta - Burmarrad (at the mouth of Wied il-Ghasel) and Marsa (at the mouth of the largest river valley system in the Maltese Islands, extending right to Mqabba) - and these were mainly freshwater marshes.

The sobering reputation enjoyed by salt marshes, coupled with the need for irrigation water, led to the drainage of Burmarrad around the 16th century and then at Marsa in 1866 to make way for the Marsa Sports Ground.

However, while the latter was properly drained, with the only remnants being a heavily polluted watercourse passing through an industrial area, the former was not and its opening into the sea at Salini is still Malta's largest extant salt marsh.

Other more modest salt marshes which have simply faded into oblivion include the former ones at St Julian's, Ta' Xbiex and Balluta. Still extant salt marshes which are beyond recovery include the ones at Delimara and Marsascala (known as 'il-Magħluq').

While the former known as Ras ic-Cagħaq was largely degraded by the power station construction and from which a large population of *Halimione portulacoides* (a common marshland shrub common on the continent but rare over here) was transplanted to Ghadira, the latter has largely been reshaped by man with the ill-fated introduction of ducks and the dumping of copious amounts of waste.

An undescribed probably endemic species of sea lavender (*Limonium* sp.) was also smothered at the Delimara marsh. All tangible remains of salt marshes from Gozo have been obliterated and the last dying embers (exhibited as 'relict' vegetation - i.e., sprouts persistently in isolated pockets from time to time) can be found at Marsalforn (drained for touristic purposes) and Dwejra.

Ironically enough, three of the best-preserved salt marsh habitats in Malta are those associated with man-made coastal lagoons. These are Ghadira in Mellieħa, is-Simar in St Paul's Bay and il-Magħluq in Marsaxlokk, all of which are nature reserves.

The nature reserve situated at Ghadira, which covers just six hectares, occupies the flood plain between the two ridges of Marfa and Mellieħa, and is situated just 100 m away from the popular sandy beach of Ghadira.

It is a brackish pool of water whose salinity depends on the season and the amount of rainfall. The depth of the pool ranges from a maximum of 2m in winter to about 1m in summer.

On flooding in winter, excess water is allowed to flow to the sea through an outflow canal. Besides, excess vegetation, such as reeds, must regularly be removed so as to prevent the drying up of the pool and to attract insects, the mainstay of many bird species.

Examples of plants found at Ghadira include the common reed, golden samphire, twigg glasswort and the sea daffodil. Ghadira is also the last stronghold in the Maltese Islands of the lesser tassel-pondweed, which grows submerged in seawater.

Ghadira was Malta's main salt producer in the 16th century, before salt production was shifted to the Salina area. After that plans to build a road through the site were alienated and the area was declared a bird sanctuary in 1978.

With the help of WWF donations and RSPB expertise, the pool was enlarged and the bird sanctuary was officially opened in 1988. Today, the reserve is managed by a local NGO -

Birdlife.

Is-Simar's history is much more recent than that of its larger counterpart Ghadira, with the former being modelled by anthropogenic interference, such as the dumping of earth and the opening of drainage channels in the early 1990s while is-Simar was officially opened in 1996 on the former site covering circa five hectares of a very neglected and degraded marshy piece of land at the mouth of Pwales Valley. In fact the site was previously used mainly as a playground, a car-park and a dumping site for rubbish and rubble.

There is evidence that il-Magħluq was a marsh already in the Middle Ages - it was then 'domesticated' to be used as fishponds, which fell in disrepair, and the last marsh embers could start their convalescence quite recently with Nature Trust's intervention. Besides fully fledged salt marshes, a microcosm of such a habitat is also mirrored when pools of brackish water are found in coastal areas - these are known as transitional coastal wetlands.

Typical examples include I-Ghadira is-Safra near Ghallis Tower in Bahar ic-Cagħaq and at the tip of Ramla Valley in Gozo, where a brackish water pool occurs perennially and opens into the sea after some deluge in winter.

The former, covering just 0.8 ha near Ghallis Tower in the North-East of Malta, is one of the few sites where the living fossil (i.e., an organism which remained unaltered over millions of years as if its evolutionary process stalled) the tadpole shrimp (*Triops cancriformis*) has been recorded. Il-Qaliet on the northern coast of Malta is a similar site characterised by dense growths of the rush *Juncus acutus*, where, together with Ghadira s-Safra, the fairy shrimp *Branchipus visnyai* was recorded.

Two other pockets of such a habitat in our islands include the one at il-Qammiegh (behind the Red Tower in Mellieħa) and il-Qattara at Dwejra in Gozo which are more freshwater in character than other sites mentioned - in fact, the former is endowed with the freshwater green alga (*Tolypella nidifica*).