Salt Ponds in the Caribbean

By Jo-Anne Nina Sewlal
Dept of Life Sciences, University of the West Indies
St Augustine, Trinidad

Mangrove forests have received much attention as a wetland habitat in terms of conservation. However, another such habitat that deserves some publicity is salt ponds. Salt ponds are viewed as both good and bad in that they are classified as having high ecological values but low economic values. Because of this they are viewed as expendable in the name of progress exemplified by the choice to build houses for a growing population or satisfy the demands of hotels or other businesses over those of the ponds.

What are salt ponds? Salt ponds can be described as bodies of water that occur within coastal mangrove wetlands. Most salt ponds do not exceed a depth of one metre and depending on their degree of isolation from the sea, vary in their salinity content. However, most salt ponds are regarded as being hypersaline, that is, they contain water with a salinity over 300 parts per thousand (ppt, also denoted by '‰'–the permille symbol). This means that every 700 particles of water contain 300 particles of salt, so the higher the number the more saline the water. This salinity is very high when compared to ordinary seawater which has an average salinity of 35 ppt.

Salt ponds can be placed into two broad categories: permanent and temporary. Permanent ponds can have either a direct or indirect sea connection. In the latter case, the pond is supplied by seawater which seeps through a channel. With regards to temporary ponds, sea connection can either be direct, in which case the connection is periodic in nature or there may be no surface sea connection at all. Hence, some salt ponds do evaporate during the dry season. Nevertheless, although some ponds may have no direct sea connection, they can receive water via rainfall and surface runoff.

Salt ponds possess some economic value as some are used in commercial salt production.This practice occurred in many Caribbean islands. One such island is Anguilla, which has almost no naturally-occurring source of freshwater, but does have 17 salt ponds. These ponds are extremely salty, so much so that one can see balls of salt on the surface. The earliest report of salt production on the island was in 1769. Trinidad, Grenada's closest neighbour in the south, was one of the biggest importers of Anguillan salt until 1985, when the devaluation of the Trinidad and Tobago dollar made this activity uneconomical. Moreover, nearby St. Kitts also has 17 salt ponds, some of which are used for salt production and aquaculture.Another Caribbean isle with many salt ponds is St. Maarten. The Arawaks who inhabited the island from the

"Salt lakes and salt ponds, the former being a larger body of water, are ideal for this type of study as they are regarded as simple, that is to say these ecosystems have a low level of biodiversity."

mazon called it 'Sualouiga' or 'Land of Salt', ecause of the abundance of salt pans there.

These wetlands provide valuable ological services that include shoreline stabili- tion, erosion control, nutrient and sediments tention leading to land development, flood itigation, protection from storms and habitat rovision for their resident and migratory birds. he last point is especially true for Grenada's own lt pond at La Sagesse which attracts a variety of ird species such as the Caribbean Coot (Fulica ribaea), the Northern Jacana (Jacana spinosa) nd the Little Blue Heron (Florida caerulea). Also, he importance of these ecosystems is unfortu- ately not recognised in their role of collecting nd filtering rainwater which could cause severe amage to other ecosystems like coral reefs and ea grass. The vegetation around the shores of salt onds is referred to as 'basin mangrove forests' nd comprise mostly of three mangrove species: ed mangrove (Rhizophora mangle), White angrove (Avicennia germinans) and Black angrove (Laguncularia racemosa). Buttonwood Conocarpus erectus) also makes up the majority of he shoreline vegetation. However, it is not consid- ered a true mangrove because of its limited olerance to salinity and the absence of such eatures as pneumatophores, prop roots and seeds which germinate on the tree).

So, what animals live in or depend on a alt pond to survive? A survey, led by Professor eter Bacon of the Department of Life Sciences at he University of the West Indies (St. Augustine ampus), was conducted in 1967 based on one salt ond and Chacachacare (Trinidad and Tobago- T&T). This salt pond is existent on the tiny island of Chacachacare off the north-western coast of Trinidad (Trinidad and Tobago does not have any alt ponds on the main islands). The pond has a constant supply of sea water and it can best illustrate the range of organisms and their distribu- tion. The survey revealed that Land Crabs (Cardisoma guanhumi) and Ghost Crabs occupy he sand bar bordering the sea side region of the pond. As one moved closer to the ponds, animals such as Fiddler Crabs (Uca sp.) were found to burrow on the shore of the pond, while molluscs belonging to the genera Cerithium and Tellina make their home in the soft black sulphurous mud at the bottom of the pond.

This preliminary survey also provided some. insight as to the microscopic fauna of the pond. It showed that it contained mites and beetles along with their larvae and nematodes, but mostly copepods (small crustaceans) were present. These organisms attain lengths of 1-2mm and have teardrop-shaped bodies with large antennae. Each one has a single eye in the centre of its head which is usually bright red in colour. Another feature is the presence of an armoured exoskeleton which is characteristic of crustaceans. However, they appear almost transparent due to their small sizes, bodies and exoskeletons. This survey revealed 955 organisms in 57 litres of water, which can be extrapolated to infer that each cubic metre of water in the salt pond contains approximately 17,000 organisms.

In temperate countries work has been done on these hypersaline environments (for example, the Great Salt Lake in the United Stated of America). This work can be

related to our salt ponds in the Caribbean. It is expected that organisms that occupy these ecosystems evolve very quickly because of the mutagenic effects of the environment, such as high salt concentrations and ultraviolet (UV) radiation.

Hypersaline bodies of water may be of low economic value but they hold great scientific value. Subscribers to the Convention on Biological Diversity agreed to a goal of reducing biodiversity loss by the year 2010. However in order to evaluate biodiversity at any level, that is, at a genetic or ecosystem level, one must first understand how the components of an ecosystem both biotic and abiotic interact. Salt lakes and salt ponds, the former being a larger body of water, are ideal for this type of study as they are regarded as simple, that is to say these ecosystems have a low level of biodiversity. Therefore, they make monitoring of key species easier as well as understanding of ecosystem dynamics, such as how the components of the ecosystem interact. Hypersaline ecosystems are also easier to monitor compared to almost all other systems, including freshwater.

As discussed earlier through the survey of our own salt pond, although there are a great deal of organisms, species richness would be low as very few organisms can tolerate such high salinities. As salt crystals grow, small amounts of brine become trapped within the salt structure, which usually concentrates in the centre. This fluid may trap viable halophiles or 'salt-loving organisms'. These microbes are known from waters that have a salinity exceeding 3.5%. Therefore they may be present in ponds which were used or are currently being used in salt production, for the reason that the crystals produced are quite large.

Therefore, these high salinity environments are not as barren as they look and should not be regarded as useless marshlands and wastes of space just waiting to be removed for a concrete structure to be put in their place. These simple ecosystems may provide us with minor economic benefits but provide major contributions to the environment and for this reason are of great scientific value.

Reference

Bacon, P.R. 1967. The Salt Pond, Chacachacare Island. Trinidad Field Naturalists' Club Journal: 40-44.