Mangrove study yields new information on fish breeding

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An intensive study into the wildlife of natural forests of mangroves (Avicennia marina) along the Arabian Gulf shoreline of the United Arab Emirates has yielded important new information into the role the forests play in providing habitat and food for a wide range of the country's marine and bird life, according to the study's director, Dr Saif Al Ghais, head of the marine section at the Desert and Marine Environment Research Centre of the Al-Ain based Emirates University.

The study has received a grant from Shell Gas Abu Dhabi and the Dubai-based Shell Markets Middle East, as part of a series of contributions made by the Shell group, a major share-holder in Abu Dhabi’s main onshore oil company, to environmental protection and research in the United Arab Emirates.

Dr Al Ghais, who gained his Ph.D. in marine biology at Liverpool University in the UK, designed his study as a means to monitor the health of the UAE's Arabian Gulf mangroves. The objective, according to a report submitted to Shell, was “to identify and characterise various physical, chemical and biological components of mangrove eco-systems in the United Arab Emirates, and to assess the impact of the deteriorating marine environment on this natural asset.”

On the country's Gulf of Oman coast there is only one mangrove forest, lining the creek at Khor Kalba, which is the home of the only endemic sub-species of bird yet identified in the UAE: Halcyon chloris kalbaensis, a subspecies of the white-collared kingfisher.

Along much of the UAE's 450 kilometre long Arabian Gulf coast however, mangroves can be found from the north, near Ra's al Khaimah, westward to the Sila'a Peninsula, adjacent to the Khor al Odaid, as well as in sheltered waters around many of the country's over 200 offshore islands, the bulk of which lie in the waters of the largest Emirate, Abu Dhabi. On the instructions of UAE President, Sheikh Zayed bin Sultan al Nahyan, existing mangrove forests are protected, and, during recent years, large areas of inshore tidal flats have been successfully planted.

One of the key purposes of the University's study was to evaluate the health of the mangroves themselves, which are sensitive to environmental pollution. Apart from some damage near an industrial centre at Khor Khuwair, in the northern emirate of Ra's al Khaimah, Al Ghais found the mangroves to be in generally good health along the remainder of the coastline.

Investigations in the past into mangroves, albeit carried out by amateurs rather than qualified scientists, have suggested that they are important breeding grounds for many of the species of fish which are commercially caught in the Arabian Gulf. In recent years, as the number of commercial fishermen in the UAE has rapidly increased, the average catch per fisherman has steadily declined, and Al Ghais has been in the forefront of officials and scientists warning of possible irreversible depletion of fish stocks.

Dr Al Ghais began his study by selecting a number of field monitoring stations in areas of mature mangroves, stretching from Khor Khuwair in the north-east to the lagoon of Khor al Beida, in Umm al Qaiwain, and then to the east of the island of Abu Dhabi. These were visited at regular intervals in order to net fish and other small marine fauna, and to collect water samples. Access to the sites, most of which cannot be reached by land, was facilitated by the UAE Coastguard, the first time that the force has become involved in a scientific study of this nature.

In thirty-two different catches made with beach seine nets on the edge of the mangroves, Al Ghais and his colleagues caught a total of 10,600 fish. Identifying a sample of the catch to the level of family and genera, Al Ghais identified a total of 29 different forms with the catch dominated by two distinct species, the Arabian killifish, Aphanus dispar, and the slender spine mojarra, Gerres oyena. Of these the killifish was found at all stages of development, indicating according to Dr Al Ghais, that the
species most likely spends its entire lifecycle among the mangroves. Whilst it has no commercial value in its own right it serves as a prey species for other food fishes that hunt among the mangroves.

The mojarra, a member of the sand perch family, is of commercial importance, although only one of the three species known from the Arabian Gulf was collected. The slender spine mojarra grows to a length of around 32cms but the maximum length of those collected in the study was around 10cm, suggesting that the mangroves serve as a nursery for this species.

Other commercially important fish to be found, again in the form of juveniles, included snappers, of which the most abundant was Lutjanus fulviflamma; mullets represented by Liza macrolepis; sea breams, represented by Sparus sarba; and flatfish represented by Pseudobobia javanicus. "Many of these commercial species are predatory," says Al Ghais. "It appears that they find the mangroves and associated creeks an ideal nursery ground for their development."

On occasion a large catch of Clupeidae, ( herrings and sardines) was made in the seine nets. More commonly associated with the open sea, these relatively small fish feed upon zooplankton, and the abundance of this food source in and near the mangroves may account for their presence, Al Ghais believes.

"It is obvious from the initial work undertaken on the fish population of the UAE's mangroves that these areas provide an important habitat for various stages in the life-cycle of a large number of fish" says Al Ghais.

The study also examined the phytoplankton composition of the water samples collected in and around the mangroves. A total of 43 species were identified, a majority of which, as expected, were diatoms, with the dominant order, Centrales, providing 23 species.

Besides the task of studying the fish population of the mangroves of the UAE coast, Al Ghais has also examined the population of crabs. Two species were found to be most common, the blue crab, Portunus pelagicus, and the fiddler crab, Uca lactea annulipes. Other species collected included Metopages messor, Macrocheira depressus, and Sesarma (Parasesarma) plicatum, with a single specimen of Thalamita crenata being collected at one of the stations in Umm al Qaiwain, but nowhere else.

Water and sediment samples collected in the various stations were also analysed for salinity content, and for a number of other parameters, including the presence of phosphorus and petroleum hydrocarbons. While the work on the presence of hydrocarbons is still to be completed, the results so far have indicated, according to Al Ghais, that the water samples from the mangrove ecosystems generally have a higher salinity than the average value from nearby creeks.

Al Ghais's study is one of a series of investigations currently being undertaken into the health and wildlife of the UAE's mangroves. Ever since an oil spill in the early nineteen eighties, the Abu Dhabi Company for Onshore Oil Operations, ADCO, in which Shell has a minority shareholding, has carried out twice-yearly monitoring in a number of coastal areas to assess the health of the mangroves, while bodies like the Abu Dhabi-based National Avian Research Centre are collecting information on the migrant and resident birds to be found breeding in, or feeding near, the mangroves.

Unlike mangroves in many parts of the world, those in the UAE do not face a major threat from fire-wood collection by local inhabitants, while the extensive Government-backed planting programme has meant that the total area of inter-tidal flats now covered by mangroves is presently increasing, rather than declining.

The University study by Al Ghais and his colleagues, however, has provided the first scientific evidence of the important role that the eco-system of the mangroves plays in ensuring the continued health of the country's fish-stocks.