

## **Halophyte development in the Gulf Arab countries - UNESCO Doha's activities 2001-2003**

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During the next few years UNESCO's Natural Sciences Sector will pay special attention to water & ecosystem problems. Halophytes, as integral parts of many marine, coastal and terrestrial ecosystems, are believed to play an important future role for biosaline agriculture, aquaculture and habitat restoration. This will help redress the enormous pressure on the existing freshwater reserves via the utilisation of saline water in arid coastal zones. Therefore, halophyte research, conservation and development fits well into UNESCO's mandate. The history of halophyte research and development in the Arabian Peninsula has been documented in numerous publications and reports (Boer & Lieth 1999). Based on a number of impressive halophyte projects which have been carried out and on the establishment of several organisations which are dealing with the subject, the Arabian Peninsula can now be regarded as one of the world's most active regions on biosaline research, saline habitat restoration and experimental farms. In particular the United Arab Emirates deserve special attention and it was due to the attention and generous support of the President of the United Arab Emirates and Ruler of Abu Dhabi, H.H. Sheikh Zayed bin Sultan al Nahyan, that numerous experimental farms were established in the country. One of the foremost international halophyte and salinity research organisations, the International Centre for Biosaline Agriculture (ICBA) is located in Dubai, in the United Arab Emirates. Among many other scholarly researchers, this Festschrift is dedicated to Professor emeritus Dr. Helmut Lieth, who played an enormous role from the aca-

demic point of view, in pushing towards the development of halophytes in the world and in particular in arid coastal zones. Many of the halophyte research and development achievements in the international arena are based on or associated with the pro-active work of Dr. Lieth, who is still one of the leading international academics on the subject.

Furthermore, there are a number of pilot projects currently going on in Saudi Arabia, in Qatar, and in Oman, as well as research which is being conducted in Kuwait and Bahrain.

However, it is now important to direct the overall work into the future and to identify the next important milestones for halophyte development and to research towards the sustainable utilisation of saline water resources, as well as plants and soils. A concerted international action is required in order to pursue science-based coastal environmental management and to develop self-financing models and marketable products. It must at the same time not be forgotten, that some marketable products have already been developed, such as *Salicornia bigelovii* and *Salicornia europaea*, as well as *Aster tripolium* and these products are being sold as vegetable and salad crops on European markets at comparatively high prices. Of much more value in the Gulf Arab region are *Conocarpus erecta* and *Conocarpus lanciofolius*, both which are being used as road-side trees. *Sesuvium portulacastrum* was introduced into the Gulf in 1989 and it is now being widely used within almost each major city in the GCC countries as a salt tolerant replacement for the freshwater dependant bermuda-grass (*Cynodon dacty-*

lon). However, there is currently still a lack of public awareness and scientific documentation regarding successfully established halophytes.

UNESCO has supported projects to enhance the sustainable utilisation of saline water resources for several years. The development of cash crop halophytes, as well as methods for coastal habitat restoration, are believed to play an important role towards sustainable coastal management, biosphere reserves and the development of models for sustainable living. This is especially true in these times of fresh water scarcity, population growth and increased resources consumption.

The following projects are being executed and proposals are currently being developed by the UNESCO Office Doha:

1. The geo-ecological survey of the coastal zones of Ajman, Bahrain, Dubai, Fujairah, Qatar, Ras al Kaimah, Sharjah and Umm al Quwain, with the goal to document the current coastal resources, both natural and man-made, are being planned. These surveys will include data collection on the coastal phyto-geography and data towards science based site-selection for potential sustainable seawater based halophyte plantations. Fact finding missions were conducted into the coastal zones of Sudan.

2. Project documents are being planned and developed towards the establishment of coastal biosphere reserves in Oman, Bahrain, Qatar, Saudi Arabia, Sharjah and Sudan, with important halophyte and aqua-culture aspects.

3. We are investigating the possibilities to support sea-grass mapping and monitoring workshops in Bahrain and Qatar, under consideration of the conservation of the seagrass dependant sea-cow (*Dugong dugong*).

4. Conferences dealing with the subject of halophyte development were and will be supported in China, Egypt, Oman, Pakistan, Qatar and the United Arab Emirates.

5. A project document on how to improve "Cash Crop Halophyte Product Marketing" will be carried out jointly with ICBA in Dubai.

6. A proposal on how to convert coastal sabkha into high productivity man-made seawater irrigated agro-ecosystems will be developed for Sudan. The aim is to establish a pilot farm for the production of mangroves, salt marshes and sea grasses fish and shrimps.

7. A scientific book on sabkha ecosystems has been published with the support of UNESCO, The University of Regensburg, and the Environmental Research and Wildlife Development Agency (Barth & Boer 2002). This multidisciplinary scholarly work will for the first time provide comprehensive information on many ecosystem aspects of over 80.000 km<sup>2</sup> of coastal sabkhat in the Arabian Peninsula region and provide recommendations on science based development and conservation. The volume contains contributions from Bahrain, Djibouti, Egypt, Eritrea, Ethiopia, Iran, Jordan, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, Sudan, United Arab Emirates and Yemen.

The above listed UNESCO supported projects, as well as the halophyte related papers of this volume, will contribute information towards the conservation of indigenous halophytes as well as to the development of marketable halophyte products and by-products. These products are believed to enable several governmental and non-governmental organisations in the world to generate sustainable environment-based future jobs and income for people in arid coastal zones. This is urgently required in view of the world's increasing human population, the tremendous pressure on limited freshwater reserves and the increasing demand of agricultural productivity.

### *Recommendations*

- a. Mapping: For the accurate and science based site selections of protected areas, as well as for halophyte farms and pilot farms, it is absolutely essential to conduct nation-wide coastal resources mapping projects.

- b. Marketing: Research on halophytes, saline soils and irrigation needs to be properly documented and halophyte marketing needs to be developed.

- c. Capacity-building: Halophyte research & development projects need to be exposed to more international co-operation and co-ordination, in order to develop maximum information exchange and capacity on the subject.

- d. A living collection of all halophyte species should be established.

## References

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