Part 3
Findings and reports from working groups and field visit

FINDINGS

One day of the SPUSH Consultation was devoted to group discussions. The participants were divided into three groups and discussed the following issues:

- The nature of the problem, including the extent, causes, distribution and degree of salinity development, the criteria, classification and diagnosis of salt-affected soils applied in participating countries, the availability of information and the importance of geo-referenced data to classify a soil as salt-affected.
- Practical methodologies, which are applied for assessing and monitoring of salt-affected soils, as well as lessons learned at field, basin and national levels, including mapping of salt-affected soils and availability of satellite imagery for mapping salt-affected soils in participating countries.
- Predicting and modelling for salinity/sodicity development. Identifying weaknesses, strengths and opportunities for creating models closer to field conditions.
- Policies and strategies for assessment and monitoring of salt-affected soils
- Main solutions and proven technologies applied in the participating countries to combat salinization/sodication and salinity problems.

Half a day was devoted to participatory group discussions on the way forward for SPUSH. The following issues were discussed:

- Determination of priorities for future activities, research and cooperation between member countries.
- Communication strategies.
- The next Network Expert Consultation.

The following are the findings integrating presentations and discussions from the different discussion groups.

Causes of salinity development in some participating countries

- Climate (mainly low rainfall and high evaporation).
- Improper land use and poor agronomic practices.
- Mineralization of groundwater.
- Natural origin.
- Rise in water table.
- Introduction of large-scale irrigation without proper management.
- Seawater intrusion.
- Use of poor quality water for irrigation without proper soil/water and nutrient management.
- Land tenure systems.
- Poor drainage systems.
- Over-pumping of groundwater for irrigation with low recharge.
- Less coordination between institutions concerned.

- Water-saving strategies.
- Clearance of mangroves, shrimp farming, backflow of seawater during the dry season.
- Seawater spray resulting from breaking of wave crests during typhoon surges.

Assessment and monitoring methods used in some participating countries

- Many countries do not have any programmes for assessing or monitoring salt-affected soils. Some have very old data and no national salinity maps.
- Few countries conducted soil surveys, soil sampling and diagnostics at different scales for the whole country.
- Remote sensing and GIS for assessing, monitoring and quantifying salt-affected soils were used in few countries.
- Satellite imagery can be used successfully where salt-affected soils occur in the topsoil, and it can be cost-effective if good ground truthing methods are available.
- In some countries monitoring programmes only cover monitoring of well water, but not necessarily for the whole country. Very few countries carry out monitoring programmes in the whole country on an annual basis, such as in Hungary, Romania and Tajikistan. In such cases, fixed points (benchmarks) for long-term monitoring should be identified. Proper site selection for effective monitoring is a must.
- In most countries, the soil electrical conductivity of the soil saturated extract is used as an indicator of soil salinity, while the ESP or SAR of the saturation extract is the indicator for sodification. For a large-scale assessment of soil salinity, mobile electromagnetic induction EM38 and EM34 are used for delineating areas of different levels of salinity. However, calibration techniques should be well established.
- Salinity sensors and tensiometers for simulation of salt and water dynamics are used in few countries (e.g. China).

Modelling of salinity and sodicity development

- Models could be of limited use if they are not well designed. Some models can be very vulnerable to particular parameters if not properly developed.
- Comparison of two models (SMSS2 and SMSS3) with reference to irrigation-induced soil and water quality parameters was presented by Morocco. The statistical results from the model outputs supported the reliable use of models. The character of soil physics should be studied for reliable prediction models. The SWAP model has been used efficiently and could be shared with SPUSH member countries.
- Limitation of the use of modelling under saline conditions is due to the dynamic nature of salinity problems which should be clearly understood by model users.

Mapping and interpretation of spatial data

- The spatial assessment of salt-affected soils starts with the systematic mapping of salt-affected areas.
- Some participating countries have standardized mapping protocols that could eventually be shared with other member countries.
- Scales of maps (if available), classification systems and technologies used vary in the different member countries. Presenting salinity in different units and scales in participating countries is a problem for comparison purposes. However, standardizing different criteria and methodologies for salinity mapping is a challenge. This could be a future activity for the SPUSH Network.
- Standards and sampling protocols are needed for different mapping scales. This would be also useful for the production of cost-effective monitoring systems.

Main technological solutions

- Improved irrigation to prevent rise in water table, preventive and effective drainage systems and appropriate land use.
- In general, for sodic soil, chemical amelioration amendments accompanied by suitable crop husbandry constitute the main technological intervention.
- For saline, waterlogged soils, leaching and drainage accompanied by suitable agronomic practices are effective for land reclamation.
- The use of salt-tolerant crops, grasses, trees and halophytes is promising, as demonstrated in some INBA countries.
- Construction of protective embankments with flow-regulating gates.
- Rainwater harvesting and use of water efficient technologies.
- Appropriate management of brackish water for irrigation use.
- Afforestation.
- Biosaline agriculture, including breeding salt-tolerant species can contribute to the improvement of farmers' income.

REPORTS FROM WORKING GROUPS

The following are the reports produced by the rapporteurs and drafting group. They are organized according to the topics discussed.

Assessment and monitoring of salt-affected soils

A regular monitoring system for salinity assessment at country, regional and global level is essential to convince policy-makers of the threat/impact of salinity, and the opportunities available to tackle problems. It was highlighted that:

- In most of the member countries there was no strategy or policy at national level for assessing, monitoring, and mapping of salt-affected soils. Various countries lack a systematic national system to monitor secondary salinity. Studies were carried out on an *ad hoc* basis and reliable data to establish baseline conditions are also lacking. However, some data were available from sources such as Terrastat, Aquastat, Agenda 21 and State of Environment reports.
- Financial and human resources to monitor salt-affected soils are not easily available in most countries. More efforts to increase human resources and capacity building should be made to strengthen research, technology development and transfer.
- SPUSH member countries should identify hot spots and use them as a benchmark for monitoring. They are also encouraged to adopt early warning systems to prevent more salinization and develop farmer-friendly salinity assessment and monitoring methodologies.
- Countries like India, Tanzania and Romania have up-to-date databases related

to salt-affected soils and poor quality water up to 2006/2007. Other SPUSH countries need to update their databases. This will not only benefit the country but will also facilitate the preparation of a more accurate map of salt-affected soils at global level by FAO, to raise the awareness of the situation and request funds for rehabilitation programmes.

Raising awareness and strengthening coordination at national level

- Member countries are encouraged to publish quality papers on various aspects of soil salinity. This will strengthen the Network already established for this purpose.
- Some countries have standardized assessment, modelling and mapping methodologies and procedures which could be shared with other SPUSH partners to update the knowledge on the extent, distribution, nature and classification of salt-affected soils in member countries.
- Member countries may jointly develop brochures or other material on assessment and monitoring techniques, technologies developed for the reclamation and management of salt-affected soils, and judicious use of poor quality/wastewaters to be shared with other countries.
- As more than one authority or institute in each member country is concerned and has related activities, data, maps, reports, research and development programmes, special institutional arrangements should be made to allow effective cooperation and avoid overlapping of activities at national level.
- The education of the younger generations is important and universities should be encouraged to include salinity issues as part of their education programme on soils.

Standardization of methods

Participants thought there was a need for standard analytical methods as well as terminology, without compromising existing national and international standards. Scientists should recommend how to standardize these methods and terminology, after which correlations with national methods and terminology can be developed. Participants recommended that international institutions coordinate this activity.

With regard to standardization, almost all participants agreed that:

- Soil electrical conductivity of the saturated extract (ECsat) should continue to be used as the indicator of soil salinity, and the exchangeable sodium percentage (ESP) as the indicator of sodication.
- For a large-scale assessment of soil salinity, a methodology based on the EM38 sensor can be used, and maps can be created delineating areas with different levels of salinity.
- Data must be standardized, fit for purpose and stored properly in a format that is easy to access and process. Data that are incorrect, misleading, incomplete and outdated must be cleaned.
- A uniform risk assessment methodology may be developed to rank areas according to the relative probability of being affected by a given level of salinity, sodicity and alkalinity, and use the data to determine whether farming practices increase soil salinity, soil sodicity and soil alkalinity. The data may be converted and expressed in common units/scales.

Modelling for salinity/sodicity development

- Modelling soil-water-salt-plant relationships is important for developing, using and transferring technologies as well as developing decision support systems. Scientists need to consider how models can better represent field conditions, since several factors play significant roles in the behaviour of biological systems

such as agricultural practices. Scientists should consider issues like climate change and its potential impacts in salt-water dynamics under actual conditions.

- Models require very intensive efforts in research and computing which is problematic for most countries. Physically-based models simulating water and solute transport represent an essential tool for predicting soil salinity and/or sodicity. These models allow for comparing different options to develop strategies for sustainable irrigation in the short- and long-term. However, calibration and validation of these models against soil and crop field data are needed to check the accuracy of the predicted values before these models can be used to develop reliable management scenarios.
- The following processes need to be included in models: transient water transport, transient salt transport, ion exchange, precipitation/dissolution index of salts, changing groundwater level, waterlogging, preferential flow (where applicable), freezing/thawing (where applicable), changing irrigation water composition, plant uptake of ions, CO_2 partial pressure and its effects, heat transfer, depth distribution of roots in relation to water uptake from soil and shallow groundwater and solution chemistry, including pH.
- Assessment and monitoring of associated salts/metals like boron, iron, aluminium, manganese, arsenic, selenium, nitrates, etc. should also be considered.

Mapping and interpretation of spatial data

Assessment methods and management techniques to deal with salt-affected soils must take into account economic and social factors. Geomorphology must be the first information source for sampling design. Satellite imagery can be used successfully where salinity occurs in the topsoil, and it can be cost- and time-effective, with good verification prospects. Map coordinates are used for the site location and fixed points (benchmarks) are required for long-term monitoring. The ratio of desired number of samples to associated cost of sampling can be optimized through adequate sampling design.

An expert group needs to be constituted within the SPUSH Network to address issues of:

- Perfection of GIS and remote sensing methodologies to delineate waterlogged saline soils from waterlogged soils. However, from a crop production/soil salinization point of view, waterlogged soils are those with water table within 2 m from ground surface.
- Dependence of appearance of salt crust on accumulation of hygroscopic versus non-hygroscopic salts that may affect the remote sensing data.
- Presence of salts in sub-surface layers and presence of associated toxic salts such as aluminium, selenium, etc.

Saline agriculture

- In many areas, there is a need to adapt to salinity. Several countries under the SPUSH and INBA umbrella have identified promising germplasm of trees, bushes/ grasses/crops, as well as their varieties, and fish, which need to be shared with other partner countries.
- Developing joint network projects/programmes addressing the issues of utilization of salt-affected soils and saline water with the objective of sharing information and regional coordination and of monitoring and assessment could be effective to improve efficiency and share costs.
- Reclamation of salt-affected land is largely attempted through high cost input technology. However, in certain situations, growing salt-tolerant plants (crops/ pasture/trees) may be more cost-effective for rehabilitation of such lands. Therefore, programmes aimed at screening and developing plant varieties with

high salt-tolerance should be put in place. Any alternative varieties selected for inclusion in a diversification programme should have satisfactory salt-tolerance, and be economically worthwhile.

- A strong extension programme would also be required. Exchange of salt-tolerant germplasm between member countries could have immediate impact. A seed bank in FAO may have a role in facilitating the exchange.

Management strategies

- To facilitate technology-sharing and ensure that it reaches farmers, farmer associations and field technician services, research and policy making should be strengthened in the member countries.
- Strengthening the capacity of field technicians is critical if the technologies are to be disseminated to the target groups. There are various ways of strengthening technology sharing, such as specialised training, farmer field schools, volunteer soil doctor, model farms and information campaigns.
- Farmers should be active participants in the development of the appropriate management systems for salt-affected soils, for which appropriate training is needed.
- The Network should develop guidelines and a database on resource surveys and management practices and make this available to those involved in land use planning for irrigated agriculture, extension officers, other advisors to farmers, and farmers. This database must be maintained and updated regularly.
- Although the definition of salt-affected soils in relation to nature and quantity of salts in soils and water is clear, guidelines need to be developed by Network members to choose management strategies that reflect local conditions, such as:
  - agro-climatic zone
  - soil texture and drainage characteristics
  - rainfall patterns
  - distribution of salts in the soil profile
  - other associated salts/metals
  - expected land use
  - level of management/cultivation practices
  - quality of irrigation water
- Promoting water use efficiency, affecting control over water tables and preventing salinization are major objectives of the management strategies. While much can be achieved through improved management, special attention should be given to communal drainage networks, on-farm drainage and preventing leakage from irrigation channels.
- Issues of property rights should be addressed, in collaboration with the World Intellectual Property Organization (WIPO), so that the member countries can shre knowledge while developing new technologies to address salt-affected soils.
- Various technologies were presented during the Expert Consultation. It is recommended that member countries share technologies developed for reclamation, management, assessment, monitoring and mapping of salt-affected soils and judicious use of poor quality/waste waters. Human resources development/capacity-building initiatives should be encouraged to strengthen research development and technology transfer systems between participating countries.

FIELD VISIT

On 29 November 2007, three hours were devoted to visiting ICBA facilities and learning about their programmes and activities.

ICBA is a scientific research institution with a unique focus on developing and promoting systems that facilitate agricultural production in areas characterized by saline water or soils. It has modern facilities dedicated solely to the development of saline agriculture. The Center was established in September 1999 with its headquarters in Dubai, UAE, and funded by the Islamic Development Bank, the OPEC Fund, the Arab Fund for Economic and Social Development and the Government of the United Arab Emirates. When the Center became operational, it focused on research that would directly benefit agriculture in the six Gulf Cooperation Council (GCC) countries. The Center extended its work to the members of the Islamic Development Bank and gradually broadened its activities, including regional projects, to cover other countries where farmers cultivate their crops in saline soils or irrigate them with saline water.

Its mission is to demonstrate the value of saline water resources for the production of environmentally and economically useful plants. It actively ensures that the results of the research are of interest to those countries using salt-affected soils and saline water for agriculture and wishing to preserve fresh water resources by growing salt-tolerant forage species in marginal areas.

In order to become acquainted with the field activities undertaken by ICBA and to see the facilities of the Center, the participants, accompanied by technical staff, visited its experimental farm. It has a 100 ha research farm, of which 35 ha is developed (14 blocks of 2.5 ha each) and already under research and experimental programmes and the other 65 ha is under construction, rehabilitation and development. The farm has two sources of water for irrigation: groundwater of 30 dS m^{-1} and Ein Municipal water of only 3 dS m^{-1} to be blended to obtain three levels of saline water (5–15 dS m^{-1} for crops and forages, 15–20 dS m^{-1} for halophytes and >20 dS m^{-1} for halophyte and mangroves) for irrigation, mainly using sprinkler or drip irrigation systems. It also has a large tank for seawater of 40 dS m^{-1} as a third source of irrigation water. The farm is under a tile drainage system to draining into two evaporation ponds. This water is also used for irrigation and growing mangroves. The Center has four air-conditioned greenhouses and a large shadehouse providing climate-controlled conditions for a wide range of experiments. These facilities also ensure a secure environment for the production of seeds adapted to saline environments. In addition, the Center has a computer controlled irrigation system to allow precise control of the amount and salinity of irrigation water. It has a well-equipped laboratory for each facet of scientific investigation and a weather station and also 75 lysimeters of 70 cm depth which are used for growing *Leptochloa fusca*, *Conocarpus lancifolius* and *Atriplex canescens*.

The work of ICBA falls into four main areas:

- plant genetic resources – collection and characterization of germplasm; maintenance of a gene bank for salt-tolerant crops; and exchange of genetic resources;
- sustainable production and management systems – identification of effective irrigation systems and methods; evaluation and selection of field and forage crops and halophytes that can flourish under saline conditions;
- information management and networking – development of collaborative research networks, dissemination of technology and information on saline irrigated agriculture, creation of biosaline agriculture information networks;
- extension and training – publication of bulletins, brochures and newsletters; holding workshops, seminars and conferences; provision of opportunities for the on-the-job training and convening field days and open days.

During the visit, participants held comprehensive discussions and shared views on the possible future activities of the SPUSH Network and exchanged experience on the available methodologies and technologies on assessment, monitoring and modelling of salt-affected soils.

Possible ways of collaboration between the International Center for Biosaline Agriculture and its Inter-Islamic Network on Biosaline Agriculture (INBA) and the FAO Global Network (SPUSH) were discussed.

ANNEX I
Information on the networks

THE GLOBAL NETWORK ON SALINIZATION PREVENTION AND PRODUCTIVE USE OF SALT-AFFECTED HABITATS (SPUSH)

The SPUSH Network is a neutral forum to connect research institutions, land users and policy makers. The Network aims at disseminating and exchanging information; facilitating the application of technology; contributing to the design of relevant policies and promoting focused scientific research. The main topics covered by the Network include:

- assessment and monitoring tools,
- extent and types of salt-affected soils,
- impact of salinization, sodication and waterlogging on agricultural production, ecosystems and ecosystem services,
- effects of salinization, sodication and waterlogging on other factors related to agricultural production (e.g. nutrient uptake, diseases, pests),
- management practices to prevent salinization, sodication and waterlogging,
- management practices to increase the productivity of salt-affected habitats, including biosaline agriculture,
- practices for the rehabilitation and reclamation of salt-affected habitats,
- linkages between climate change and salinization, sodication and waterlogging.

These topics consider primary (of natural origin) and secondary (human-induced) salinization, sodication and waterlogging; salt-affected habitats in rainfed, irrigated and coastal areas; and technical and socio-economic aspects linked to management of salt-affected habitats.

THE INTER-ISLAMIC NETWORK ON BIOSALINE AGRICULTURE (INBA)

The Inter-Islamic Network on Biosaline Agriculture (INBA) is a non-political, non-profit, independent and autonomous body promoting biosaline agriculture under the auspices of the Organization of the Islamic Conference (OIC) Ministerial Committee on Scientific and Technological Cooperation (COMSTECH). It was established in 2002 at the 10th General Assembly meeting of COMSTECH.

The Inter-Islamic Network on Biosaline Agriculture aims to provide a forum for collaborative action and networking activities that stimulate and strengthen national and international institutions and aid agencies. Members include the Ministries of Agriculture and Water Resources, universities, national, regional and international agricultural research and development agencies, extension services, and end-users, including farmer groups and non-governmental organizations (NGOs).

ANNEX II

SPUSH expert consultation and INBA meeting programme

Monday, 26 November 2007

08:00–09:00	Registration
09:00–10:00	Inaugural Session
	Welcome address by Dr. Shawki Barghouti, Director General ICBA
	Address by **Mr. Fawzi AL-Sultan**, Chairman ICBA BoD
	Address by **Mr. Kayan Jaff**, FAO representative in the UAE
	Address by **Dr. Amin Mohamed Mashali**, FAO
	Address by **Mr. Mohammad Tourie**, IDB
	Address by **Dr. Anwar Nasim**, COMSTECH
	Address by **Prof. Dr. Faisal Taha**, Director Technical Programme ICBA
10:00–10:20	Tea / Coffee Break
10:20–10:50	Introduction to the SPUSH Network and the Expert Consultation **Dr. Amin Mohamed Mashali**, FAO
Session 1	Assessment and monitoring of salt-affected soils (at field, landscape and irrigation district levels)
	Chairperson: **Dr. Jorge Batlle-Sales**, Spain
	Rapporteur: **Dr. Abdullah Dakheel**, ICBA
10:50–11:20	Assessing and monitoring the risk of salinization in a Sicilian vineyard using the Geonics EM38 **Dr. Giuseppina Crescimanno, UNESCO and Dr. Kenneth B. Marcum, USA (Keynote presentation)**
11:20–11:40	Use of an above-ground electromagnetic induction meter for assessing salinity changes in natural landscapes and agricultural fields **Dr. Janette Arriola-Morales**, Mexico and **Dr. Jorge Batlle-Sales**, Spain

11:40–12:00	Primary soil salinity, sodicity and alkalinity status of different water management areas in South Africa **Dr. J.P. Nell, South Africa**
12:00–12:40	Discussions
12:40–13:40	Prayer and Lunch break
Session 2	Assessment and monitoring of salt-affected soils at national and regional levels Chairperson: **Dr. Giuseppina Crescimanno**, UNESCO Rapporteur: **Dr. Shoaib Ismail**, ICBA
13:40–14:00	Advances in assessment of salt-affected soils for mapping, monitoring and management strategies in India **Dr. Gurbachan Singh**, India
14:00–14:20	Salt-affected soils in Thailand: Assessment and monitoring of salinization **Dr. Rungsun Im-Erb**, Thailand
14:20–14:40	An overview of salinity problems in Iran: Assessment and monitoring technology **Mr. Y. Hasheminejhad**, Iran
14:40–15:00	Advances in assessment and monitoring of soil salinization for managing salt-affected habitats in Egypt **Dr. Mohammed H. Gomaa**, Egypt
15:00–15:20	Tea/Coffee Break
Session 2	Assessment and monitoring of salt-affected soils at national and regional levels (continuation) Chairperson: **Dr. M. Qadir**, ICARDA/IWMI Rapporteur: **Dr. Mahmoud Abdelfattah**, ICBA
15:20–15:40	Recent evolution of soil salinization in China and its driving processes **Dr. Jingsong Yang**, China
15:40–16:00	Assessment and management of salt-affected soils of Sudan **Dr. Abdelmagid Ali El-Mobarak**, Sudan
16:00–17:00	Discussions

Tuesday, 27 November 2007

Session 3	Modelling for Salinity/Sodicity Development. Chairperson: **Dr. Anwar Nasim**, COMSTECH Rapporteur: **Dr. Nurul Akhand**, ICBA
08:30–09:00	Overview on salinity modelling approaches at different spatial-temporal scales **Dr. Jorge Batlle-Sales, Spain (Keynote presentation)**
09:00–09:20	SMSS a soil-plant model describing impact of irrigation on salinity of soil and run-off water. **Dr. Mouanis Lahlou**, Morocco
09:20–10:00	Discussions
10:00–10:20	Tea / Coffee Break
Session 4	Mapping and interpretation of spatial data Chairperson: **Dr. Kenneth B. Marcum**, USA Rapporteur: **Dr. Shabbir Shahid**, ICBA
10:20–10:50	Emerging challenges addressing the characterization and mapping of salt-induced land degradation **Dr. M. Qadir, ICARDA/ IWMI (Keynote presentation)**
10:50–11:10	Monitoring, predicting and quantifying soil salinity, sodicity and alkalinity in Hungary at different scales. Past experience, current achievements and outlook with special regard to European Union initiatives **Dr. Tibor Toth**, Hungary
11:10–11:30	Salinization and sodication on irrigated soils in Eastern Kenya **Dr. Patrick Gicheru**, Kenya
11:30–11:50	Nature and distribution of salts in the upper Ruvu-Wami plains, Morogoro, Tanzania: implications for land management **Dr. Method Kilasara**, Tanzania
11:50–12:10	Salt-affected soils in Romania **Dr. Elisabeta Dumitru**, Romania
12:10–12:30	Extent and utilization of salt-affected lands: Biosaline agriculture and marginal resources in Tajikistan **Dr. Sanginov Sanginboy**, Tajikistan
12:30–13:00	Discussions

13:00–14:00	Prayer and Lunch break
Session 5	Expert rounds on the use of assessment and monitoring tools for management of salt-affected areas
14:00–17:30	Participants will be divided into three working groups to provide guidelines and recommendations on the following topics: Assessment and monitoring of salt-affected soils; modelling for salinity/sodicity development; mapping and interpretation of spatial data.

Wednesday, 28 November 2007

Session 5	Expert rounds on the use of assessment and monitoring tools for management of salt-affected areas (continuation)
08:30–11:30	Continuation of expert rounds discussions - Session 5
11:30–12:00	Tea / Coffee Break
12:00–13:00	Presentation of Reports, discussions and recommendations - Session 5
	Chairperson: **Dr. Amin Mohamed Mashali**, FAO
13:00–14:00	Prayer and Lunch break
14:00–15:00	Presentation of Reports, discussions and recommendations - Session 5 (continuation)
15:00–15:20	Tea / Coffee Break
Session 6	The way forward for SPUSH
	Chairperson: **Dr. Amin Mohamed Mashali**, FAO
	Rapporteur: **Dr. Nanduri Rao**, ICBA
15:20–18:00	Determination of priorities for future activities, research and cooperation between member countries**.**
	Communication strategies.
	Next network expert consultation**.**
	Conclusions and recommendations.

Thursday, 29 November 2007

Meeting on 'Status and Progress of Biosaline Agriculture'

08:30–10:00	Visit to ICBA: On-going programmes, activities and facilities
10:00–10:30	Tea / Coffee Break
Session 7	Sustainable Biosaline Agricultural Systems
	Chairperson: **Prof. Dr. Faisal Taha**, ICBA
	Rapporteur: **Mrs. Carla Mellor**, ICBA
10:30–11:00	Biosaline Agriculture: Prospects and potential within global and regional context **Dr. Shoaib Ismail and Prof. Dr. Faisal Taha, ICBA (Keynote presentation)**
11:00–11:20	Greywater use for irrigation of home gardens in peri-urban areas of Jordan **Dr. Murad Bino**, Jordan
11:20–11:40	Saline agriculture: Pakistan scenario **Dr. Riaz H. Qureshi**, Pakistan
11:40–12:00	Extent of salt-affected land in Central Asia: Biosaline agriculture and utilization of salt-affected resources **Dr. Kristina Toderich**, Uzbekistan and **Dr. Shoaib Ismail**, ICBA
12:00–12:15	Short break
12:15–12:35	Necessity of Biosaline agriculture and irrigation management for sustainable agriculture **Dr. Ali A. Aljalod**, Kingdom of Saudi Arabia
12:35–12:55	Salinity problem in the Sultanate of Oman: Past, present and future perspectives **Mr. Salim Ben Abdullah Rashid Al-Rasbi**, Sultanate of Oman
12:55–13:15	Water shortage in Western U.S. and saline recycled water use for urban irrigation **Dr. Kenneth Marcum**, USA
13:15–13:35	Discussions
13:35–14:35	Prayer and Lunch break

Session 8	Future Strategies for Sustainable Biosaline Agricultural Systems
	Chairperson: Dr. Riaz H. Qureshi, Pakistan
	Rapporteur: **Dr. Shoaib Ismail**, ICBA
14:35–16:30	Discussions
	Recommendations
16:30–16:45	Tea / Coffee Break
16:45–17:15	Closing Session
	Concluding Remarks by IDB/COMSTECH
	Concluding Remarks by INBA/ICBA
	Concluding Remarks by FAO

ANNEX III

List of participants

Dr. Mahmoud ABDELFATTAH
Soil Scientist on Secondment, ICBA
P.O. Box 14660, Dubai, UAE.
Tel: +971 4 3361100
Fax: +971 4 3361155
Mobile: +971 50 693 8412
E-mail: m.abdelfattah@biosaline.org.ae
www.biosaline.org

Dr. Ali A. AL-JALOUD
Soil Science and Fertilizer Use Specialist,
King Abdulaziz City for Science
&Technology, Natural Resources &
Environment Research Institute, P.O. Box:
28322, Riyadh, Kingdom of Saudi Arabia.
Tel: +966 4883555/4813610
Fax: +966 4813611
Mobile: +966 5549044
E-mail: aljaloud@kacst.edu.sa

Dr. Ahmed AL MASOUM
Deputy Director General, ICBA,
P.O. Box 14660, Dubai, UAE.
Tel: +971 4 3361100
Fax: +971 4 3361155
Mobile: +971 50 643 6568
E-mail: a.masoum@biosaline.org.ae,
www.biosaline.org

Mr. Salim Ben Abdullah Rashid AL-RASBI
Head of Biosaline Research Laboratory,
Ministry of Agriculture and Fisheries
PO Box 467 – Postal Code: 113, Muscat,
Sultanate of Oman.
Tel: +968 4696280 / 24696367
Fax: +968 24605304
E-mail: agricop@omantel.net.om,
salrasbi@yahoo.com, www.maf.gov.om

Dr. Fawzi AL-SULTAN
Chair of the Board, ICBA
P.O. Box 14660, Dubai, UAE.
Tel: +971 4 3361100
Fax: +971 4 3361155
E-mail: fawzi@fandnconsultancy.com,
www.biosaline.org

Dr. Shawki BARGHOUTI
Director General, ICBA, P.O. Box 14660,
Dubai, UAE.
Tel: +971 4 3361100
Fax: +971 4 3361155
Mobile: +971 50 655 6022
E-mail: s.barghouti@biosaline.org.ae,
www.biosaline.org

Dr. Jorge BATLLE-SALES
Departamento de Biología Vegetal, Facultad de Farmacia, Universitat de Valencia, Estudi General, Avda. Vicent Andres Estelles, 46100 Burjasot, Valencia, Spain.
Tel: +34 96 3544289
Fax: +34 963864289
Mobile: +34 653411584
E-mail: Jorge.Batlle@uv.es

Dr. Murad Jabay BINO
Executive Director, Inter-Islamic Network on Water Resources Development & Management (INWRDAM), P.O. Box 1460, PC 11941 Jubieha, Amman, Jordan.
Tel: +962 6 5332993
Fax: +962 6 5332969
Mobile: 079 5545311
E-mail: inwrdam@nic.net.jo, muradinw@nic.net.jo

Dr. Giuseppina CRESCIMANNO
Head of Science, UNESCO-BRESCE in Venice and Professor at Palermo University, Dipartimento d'Ingegneria e Tecnologie Agro-Forestali ITAF,
Viale delle Scienza, 09128 Palermo, Italy.
Tel: +39 091 7028109
Fax: +39 091 484035
E-mail: gcrescim@mbox.unipa.it, g.crescimanno@unesco.org, gcrs@hotmail.com, gcrescim@unipa.it, http://portal.unesco.org/en/

Dr. Abdullah DAKHEEL
Field and Forage Crop Scientists, ICBA
P.O. Box 14660, Dubai, UAE.
Tel: +971 4 3361100
Fax: +971 4 3361155
Mobile: +971 50 623 6580
E-mail: a.dakheel@biosaline.org.ae, www.biosaline.org

Dr. Elisabeta DUMITRU
National Research and Development Institute for Soil Science, Agricultural Chemistry and Environment (ICPA)
Bucharest Bulevard Marasti Nr. 61;
Romania.
Tel: +40 21 318 4349 / 4458
Fax: +40 21 3184348
E-mail: office@icpa.ro, elisa_dumitruu@yahoo.com

Dr. Abdelmagid Ali EL-MOBARAK
Researcher, Agriculture Research Corporation, Land and Water Research Center, P.O. Box 388, Wadi Medani, Sudan.
Tel: +249 51 143035
E-mail: melmobarak@yahoo.com, melmobarak@maktoob.com

Dr. Patrick GICHERU
Director, National Agricultural Research Laboratories, Box 14733, Nairobi, Kenya.
E-mail: cdnarl@iconnect.co.ke

Dr. Mohammed H. GOMAA
Tel: +2 02 3372441
Fax: +2 02 3373048
Home: +2 02 6708394
Mobile: +2 0102891442
E-mail: gomaa_1999@yahoo.com

Mr. Y. HASHEMINEJHAD
Chairman Sector Land Reclamation, Ministry of Agriculture and Land Reclamation, Nady Al-saaed street, Dokki, Giza. National Salinity Research Center, Iran.
Tel:+98 351 7212311
Fax:+98 3517212312
E-Mail: cheraghi@insrc.org

Dr. Rungsun IM-ERB
Chief Soil Salinity Section, Land Development Department, Ministry of Agriculture and Cooperative, Phahonyothin Road, Chatuchak, Bangkok 10900, Thailand.
Tel: +66 2 579 5546/0111 ext.1217
Fax: +66-2-5620312
Home: +66 2 5891172
Mobile: +66 011736371
E-mail: rungsuni@hotmail.com, rungsun@ldd.go.th

Dr. Shoaib ISMAIL
Halophyte Agronomist, International Center for Biosaline Agriculture, ICBA, P.O. Box 14660, Dubai, UAE.
Tel: +971 4 3361100
Fax: +971 4 3361155
Mobile: +971 50 5385952
E-mail: s.ismail@biosaline.org.ae, www.biosaline.org

Mr. Kayan JAFF
Programme Officer/FAO Representative, UNDP UAE
Box 3490 United Arab Emirates, UN House, Baniyas Street 18/2 Plot 86 Abu Dhabi, UAE.
Tel: +971 2 4493248
Fax: +971 2 4495112
E-mail: FAO-AE@fao.org

Dr. Method KILASARA
Department of Soil Science, Sokoine University of Agriculture, P.O. Box 3008 Morogoro, Tanzania.
Tel: +255 732930160
Mobile: +255 754 493668
E-mail: mmkilasara@yahoo.com

Dr. Mouanis LAHLOU
IAV Hassan II, P.O. BOX 6202, Rabat-Institute, Rabat, Morocco.
Tel: +212 37 7717 58/59/45
Fax: +212 37 778135
E-mail: m.lahlou@iav.ac.ma, mouanis.lahlou@gmail.com

Dr. Clemencia LICONA MANZUR
Soil Reclamation and Development Officer, Agriculture Department, Food and Agriculture Organization of the UN, Viale delle Terme di Caracalla, 00153 Rome, Italy
Tel: +39 06 570 55044
Fax: +39 06 570 56275
E-mail: Clemencia.LiconaManzur@fao.org, http://www.fao.org

Dr. Kenneth B. MARCUM
Dept. of Applied Biological Sciences, Wanner Hall, Arizona State University, East Campus, 7001 E. Williams Field Rd., Mesa, AZ 85212, U.S.A.
Tel: +1 480 727 1213
E-mail: Kenneth.Marcum@asu.edu, http://ctas.poly.asu.edu/marcum

Dr. Amin Mohamed MASHALI
FAO Consultant
Viale delle Terme Di Caracalla-00153 Rome, Italy.
Tel: +39 06 57053806
Fax: +39 06 57056275
Home: +39 06 51957805
E-mail: amin.mashali@fao.org

Mrs. Carla MELLOR
Librarian, ICBA,
P.O. Box 14660, Dubai, UAE.
Tel: +971 4 3361100
Fax: +971 4 3361155
Mobile: +971 50 256 1018
E-mail: c.mellor@biosaline.org.ae, www.biosaline.org

Dr. Anwar NASIM
Advisor Science, COMSTECH
COMSTECH Secretariat, 3-Constitution Avenue,
G-5/2, Islamabad 44000, Pakistan.
Tel: +92 51 9220681/3
Fax: +92 51 9211115/9220265
E-mail: anwar_nasim@yahoo.com, comstech@isb.comsats.net.pk, www.comstech.org.pk

Dr. J.P. NELL
ARC-Institute for Soil, Climate and Water, Private Bag X79, Pretoria 0001, South Africa.
Tel: +27 12 310 2600
Fax: + 27 12 323 1157
Mobile: 082 772 6914
E-mail: pnell@arc.agric.za

Dr. Manzoor QADIR
IWMI-ICARDA Joint Appointment
Marginal -quality Water Resources
Management and Salt-prone Soils,
International Center for Agricultural
Research in the Dry Areas (ICARDA), P.O.
Box 5466, Aleppo, Syria.
Tel: +963 21 2213433
Fax: +963 21 2213490
E-mail: m.qadir@cgiar.org,
http://www.icarda.org

Dr. Riaz H. QURESHI
Advisor (QA & LI), Higher Education
Commission, Sector H9, Islamabad,
Pakistan.
Tel: +92 51 4444676
Fax: 051-9258744
Mobile: +92 300 5071063
E-mail: rqureshi@hec.gov.pk,
www.hec.gov.pk

Dr. Nanduri RAO
Plant Genetic Resource Scientist, ICBA
P.O. Box 14660, Dubai, UAE.
Tel: +971 4 3361100
Fax: +971 4 3361155
Mobile: +971 436 3929
E-mail: n.rao@biosaline.org.ae,
www.biosaline.org

Dr. Sanginov SANGINBOY
Tajikistan Academy of Agricultural Sciences,
21a Rudaki Prospect, Dushanbe 734025,
Tajikistan.
Tel: +992 372 271979
Fax: +992 372 213207
Mobile: +992 93 5700710
E-mail: soil@tajik.net

Dr. Shabbir SHAHID
Salinity Management Scientist, ICBA,
P.O. Box 14660, Dubai, UAE.
Tel: +971 4 3361100
Fax: +971 4 3361155
Mobile: +971 50 413 4149
E-mail: s.shahid@biosaline.org.ae,
www.biosaline.org

Dr. Gurbachan SINGH
Director, Central Soil Salinity Research
Institute (CSSRI), Indian Council of
Agricultural Research. Zarlfa Farm,
Kachhwa Road, Karnal – 132001, India.
Tel: +91 184 280801
Fax: +91 184 280480
E-mail: director@cssri.ernet.in

Dr. Faisal TAHA
Director Technical Programme ICBA
P.O. Box 14660, Dubai, UAE
Tel: +971 4 3361100
Fax: +971 4 3361155
E-mail: f.taha@biosaline.org.ae
www.biosaline.org

Dr. Kristina TODERICH
Plant Scientist, ICBA. 6 Murtazaeva Street,
PO Box 4564, 700000 Tashkent, Uzbekistan.
Tel: +998 71 1372130
Fax: +998 71 1207125
E-mail: k.toderich@cgiar.com
ktoderich@yahoo.com

Dr. Tibor TOTH
RISSAC (Research Institute for Soil Science and Agricultural Chemistry of the Hungarian Academy of Sciences, MTA TAKI, Herman Otto ut 15, Budapest, H-1022 Hungary.
Tel/Fax: +36 1 1558839
Telex: 227223 AGROK-H
E-mail: h3700tot@ella.hu

Eng. Mohamed Ali TOURE
Acting Director & Senior S&T Expert
Science & Technology Office, Islamic Development Bank, P.O. 5925, Jeddah 21432, Saudi Arabia.
Tel. +966 2 6466935
Fax: +966 2 6467828
E-mail: MToure@isdb.org,
http://www.isdb.org

Dr. Jingsong YANG
Head of Soil Physics and Soil Salinity Division, The Institute of Soil Science, Chinese Academy of Sciences, 71 East Beijing Road, P.O. Box 821, 210008 Nanjing, Jiangsu, China.
Phone: +86 25 86881222
Fax: +86 25 86881000
E-mail: jsyang@issas.ac.cn

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WORLD SOIL RESOURCES REPORTS

Advances in the assessment and monitoring of salinization and status of biosaline agriculture

Report of an expert consultation held in Dubai, United Arab Emirates, 26–29 November 2007

The causes of salinity and sodicity, which vary between countries and regions, need to be identified, assessed and monitored carefully so that they can be managed and controlled. There is a need for practical and cost-effective methodologies for assessing, monitoring and mapping the extent and distribution of salt-affected soils; for identifying the causes and sources of the problem; and for choosing management options and evaluating the effectiveness of those options. The objective of the Expert Consultation on Advances in Assessment and Monitoring of Salinization for Managing Salt-affected Habitats was to exchange experiences with data collection and analysis for the assessment and monitoring of salinity and sodicity, with particular emphasis on practical applications at local, national, regional and global levels. The Meeting on the Status and Progress of Biosaline Agriculture of the Inter-Islamic Network on Biosaline Agriculture was an opportunity to present the work of the hosting institution and to exchange information between the two Networks.

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