IRRIGATION AND DRAINAGE:
WATER MANAGEMENT IN SALINE AGRICULTURE

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ICID Webinar: Water Management in Saline Agriculture
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International Commission on Irrigation and Drainage
The 24\textsuperscript{th} June 2020 was the 71\textsuperscript{st} year of Foundation of the International Commission on Irrigation and Drainage
The main mission is to promote ‘Sustainable agriculture water management’ to achieve a ‘Water secure world free of poverty and hunger through sustainable rural development’.
For the more than 75 countries that represent more than 90% of irrigation agriculture, it gives us the opportunity to dedicate ourselves to our mission.

http://www.icid.org/nc1.php
ICID Vision 2030
Organisation Goals

1. Enable higher crop productivity with less water and energy
2. Be a catalyst for change in policies and practices
3. Facilitate exchange of information, knowledge and technology
4. Enable cross disciplinary and inter-sectoral engagement
5. Encourage research & support development of tools to extend innovation into field practices
6. Facilitate capacity development
Goal A: Enable higher crop productivity with less water and energy

Strategies

A1: Modernization of irrigation systems
A2: Improving O&M of Irrigation Systems
A3: Implementing water saving techniques and technologies
A4: Promoting Institutional Reforms
A5: Supporting water productivity enhancement
A6: Improving performance of irrigation systems
A7: Using wastewater or poor quality water for irrigation
A8: Encouraging participatory management of irrigation systems
Africa in figures
There are 54 African countries and it can be grouped into seven regions based on geographical and climatic homogeneity.

1,216,129,815 inhabitants representing about 15% of the world’s population.
• 3,930 km³ (9% of world) of renewable resources

• Over 60 Shared international water basins

• Water Use:
  86% for agriculture
  10% for domestic
  4% for industry.
• Over 42.5 million ha of irrigation potential

• Only 13.4 million ha is under irrigation

• Only 7% of arable land is irrigated
The annual average precipitation in Africa is 678 mm or about 20 360 km³ with the driest country Egypt with 51 mm/year on average and with Sao Tome and Principe with 3 200 mm/year.
The total dam capacity is 798 km$^3$ of which 726 km$^3$ relates to the capacity of 53 large dams build in 22 river basins.
Water Management in Salt affected agriculture
The most thoughtful quotation about water and soil is the following:

We do not inherit water and soil from our ancestors, we borrow it from our children.
In soils with a high content of salts, the value and yields are significantly reduced, causing severe socio-economic and environmental problems in the long term.
The accumulation of salts from improper soil and water management is a serious problem worldwide and according to the FAO the global cost of irrigation-induced salinity is equivalent to an estimated US$11 billion per year.
Integrated management of salt effected soils

To stop the loss of arable land due to salt accumulation it is necessary to use appropriate soil and water management practices.

Hydraulic:
- Flushing
- Leaching
- Improving irrigation/drainage
- Safe disposal of saline waters

Physical or mechanical:
- Scraping
- Land levelling
- Subsoiling
- Sanding
- Improving planting techniques

Chemical:
- Amendments
- Soil conditioning
- Mineral fertilization

Biological:
- Organic matter application
- Mulching
- Green manuring
- Tree plantation
- Blue-green algae
- Biosaline agriculture

Other considerations:
- Legal and environmental aspects
- Socio-economic aspects
- Capacity of extension services
- Operation and maintenance
The objective of the Webinar is the understanding of the most important aspects regarding salinity and the role that advanced soil management and irrigation techniques can play in ensuring food security in such areas.
The spectrum of agricultural water management

- Purely rainfed
  - Field conservation practices
  - Water harvesting
- Supplemental irrigation
- Groundwater irrigation
- Surface water irrigation
- Fully irrigated
- Drainage
Water dependant

Rainfed agriculture
1233 million ha

Irrigated Agriculture,
300 million ha
1 533 Mha – Total world Agriculture Area
300 Mha – Currently under Irrigation
Irrigated area only 20% of total agricultural land area but supplies about 40% of the world’s food
Challenges

Demand for food
1 billion people are threatened by hunger
2 billion people can not afford healthy diet

Additional drivers
+population increase
+additional demand for food
due to increased income

Food production need to increase
+42% until 2030
+ 70% until 2050
The Food and Agriculture Organization for the United Nations (FAO) and World Water Council (WWC) predict that the world needs to produce an estimated 60 percent more food by 2050 to ensure global food security, and it must do so while conserving and enhancing the natural resource base.
What is needed to sustain food production?

Annual increase rates need to double

Game-changing solutions are needed to produce “more with less”
The success of irrigation
Soil health and productivity can be obtained through well-drained soils and efficient irrigation.

Artificial drainage in agriculture is a practice to improve the natural drainage conditions and has been practiced for many years in the world.
500 000 ha of the total world’s agricultural land are being lost out of production every year due to poor drainage.
The extent of cultivated area worldwide is 1533 million ha, out of which about 390 million ha are said to be provided with sustainable water management systems, being irrigation, drainage, or both.

Drainage plays an essential part to sustain food production.
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Region</th>
<th>Arable land and permanent crops (million ha)</th>
<th>Total drained area (million ha)</th>
<th>% drained area</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Developed Countries</td>
<td>759.016</td>
<td>102.689</td>
<td>13.529</td>
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<tr>
<td>2</td>
<td>Emerging/Developing Countries</td>
<td>1008.030</td>
<td>90.787</td>
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<td>3</td>
<td>Least Developed Countries</td>
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<td>0.430</td>
<td>0.883</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>1815.756</strong></td>
<td><strong>193.906</strong></td>
<td><strong>10.679</strong></td>
</tr>
</tbody>
</table>
Management of salt-affected soils

Management of salt affected soil can be divided into different aspects:

- Leaching requirements
- Selection of salt tolerant crops
- Irrigation practices
- Fertilization
- Planting techniques
In closure
Collaboration is needed more than ever among governments, private sector, and civil society organizations for joint responses, building on respective strengths and learn from each other how to manage salt affected areas because “We do not inherit the earth from our ancestors; we borrow it from our children”