



# Piloting Climate Change Adaptation

Dr Gerhard Lichtenthäler  
Advisor  
GIZ ACCWaM  
Egypt

# Adaptation Pilots

## Jordan Solar Energy Farming in the Azraq Basin



## Lebanon How to Prevent Sea Water Intrusion in Coastal Cities – Case Study Beirut



## Egypt Reuse of Agricultural Drainage Water



**POLICY BRIEF**

From Inbred Agriculture to Solar Energy Farming in the Azraq Basin in Jordan  
A Pilot Measure of the Regional GIZ Programme "Adaptation to Climate Change in the Water Sector in the MENA Region (ACCOWAT)"  
Matthias Bärtsch, Gerhard Ullrich/Berliner, Oliver Prinz, Abdullah Doudi

**EXECUTIVE STATEMENT**

- Water is not an inexhaustible resource. Energy storage and further investment should be made in order to reduce the use of fossil fuels for energy generation should be consequently reduced as an economic response to climate change and a solution to the national budget.
- In the long term, the substitution of inbred agriculture with solar energy farming is a promising economic alternative for Jordan, also in view of the positive effect on water supply, in particular in general, but in particular in view of the reduced water use.
- SP is suitable to mitigate climate change and to adapt to the impacts of climate change. It does not require any additional administrative support. If the national, sectoral and institutional pre-conditions for its application are given.

**POLICY BRIEF**

How to Prevent Sea Water Intrusion in Coastal Cities –  
Case Study Beirut, Lebanon  
A Pilot Measure of the Regional GIZ Programme "Adaptation to Climate Change in the Water Sector in the MENA Region (ACCOWAT)"  
Matthias Bärtsch, Puh Inad, Gerhard Ullrich/Berliner, Oliver Prinz, Abdullah Doudi

**EXECUTIVE STATEMENT**

- Seawater intrusion is caused by over-extraction of the coastal aquifer, reduced natural recharge and sea level rise – the latter is a consequence of climate change.
- A holistic approach based on "Integrated Water Resources Management" (IWRM) holds promise to curb seawater intrusion and to contribute to sustainable water resource management as a whole.
- Curbing seawater intrusion means in first instance to reduce significantly water extraction from the local aquifer. In second instance, to prevent water resources in the recharge area from...

**POLICY BRIEF**

Agricultural Drainage Water Reuse in Egypt: Policy Options and Challenges  
A Pilot Measure of the Regional GIZ Programme "Adaptation to Climate Change in the Water Sector in the MENA Region (ACCOWAT)"  
Matthias Bärtsch, Puh Inad, Gerhard Ullrich/Berliner, Oliver Prinz, Dalia Gouda, Abdullah Doudi

**EXECUTIVE STATEMENT**

- (1) The mixing of drainage water with fresh water at branch canal level can be an effective measure to increase irrigation water volume and thus strengthen the resilience of farmers to the impacts of climate change.
- (2) Pre-conditions for water reuse are (a) a reduction of the water pollution level, which harms soil, crops and groundwater and (b) empowerment of farmers' organizations. The employment of mobile pumps is recommended in case of water shortage and desalination (desal) of farmers participate actively in operation and maintenance.
- (3) The identification of the originating of pollution sources, for recommendations on how to better manage water reuse and how to deal with salinity in branch fields.
- (4) A change in water policy from supply management to demand management will help Egypt to improve its resilience against the severe impacts of climate change.

**INTRODUCTION**

Egypt with its growing population is suffering from water poverty and it is anticipated that this trend is to exacerbate in future due to climate change. Measures have been taken to counter such situation among which is the increased use of agricultural drainage water.

# Jordan: Solar Energy Farming (PV)



**\$ 200 / year / 1000 m<sup>2</sup>**



**\$ 1000 / year / 1000 m<sup>2</sup>**



**saves drinking water for 200 families**

## A Triple-win Nexus

- Water Security
- Energy Security
- Food Security

# Jordan: Lessons

- **Water Security:** reduces the further lowering of the **groundwater** table of the aquifer
- **Food Security / Livelihood:** offers a source of **income** to farmers as a water-friendly alternative to agriculture
- **Energy Security:** generates **electricity** (Jordan has a high energy import bill for energy - oil and gas)
- **Climate Change:** contributes to increase the share of renewable energies, hence reducing **CO2 emissions**

## Preconditions

- **Network (Electricity)**
- **FiT (Feed-in-Tariff)** Contracts between the grid operator and the farmer
- **Information** on the pros and cons of Energy Farming
- **Access to loans** (bank security, land ownership)
- **Access to technical services** for implementation and maintenance (training)

# Lebanon: Managed Aquifer Recharge

## How to Prevent Sea Water Intrusion in the Beirut Area

### Upper Watershed

- Unplanned settlements - Deforestation – Surface sealing
- Reduced aquifer recharge

### Beirut Area

- Overexploitation of coastal aquifer > Seawater intrusion
- Deteriorating water quality
- Flash floods
- Feasibility of MAR (Managed Aquifer Recharge)



# Lebanon: Lessons

- **IWRM:** solution needs many different types of interventions
- **NEXUS:** MAR needs **holistic approach** (state/non-state/research/public)
- **Urgency:** the progressing **impacts of climate change**, including the **rising sea levels**, will aggravate the already existing problems
- **Scope:** needs **large area** in order to be efficient



# Lebanon: Transferability

- **IWRM approach** can be transferred to other densely populated coastal areas in MENA region
- **High costs** involved calls for the involvement of an international donor
- **Complexity of an IWRM** approach and the general paucity of relevant data demand inputs by scientists of numerous disciplines





- **Nile Delta**  
High demand for irrigation water > tail enders > limited freshwater - especially in summer
- Farmers use **drainage water** directly from the drains to irrigate their lands, unaware of **potential harms**
- **Climate change** exacerbates vulnerability



# Egypt: Lessons

- **National Policy:** reuse of agricultural drainage water
- **Mixing** fresh irrigation water with drainage water under controlled conditions
- **Mobile Pump Unit**  
cooperation of MWRI & WUA
- Increases water supply and safeguards **water quality**
- improves water use **efficiency**  
reduces **energy** consumption



# Egypt: Transferability

- **Legal framework**  
guidelines to be developed and complied with
- close partnership between **national and local-level water institutions** > operation and maintenance of the system
- acceptable **quality of drainage** water  
+ **quantity** of irrigation water
- Regular **monitoring**  
water & soil quality  
training (farmers/operators)



**giz ACCWaM**

## LIST OF PUBLICATIONS AND THEIR LINK TO THE SDGs

For questions and queries please contact: Dr. Gerhard Lichtenhaefer (ACCWaM) – gerhard.lichtenhaefer@giz.de

### Topics

- ACCWaM Programme
- ACSAD | ESCWA
- League of Arab States
- Mainstreaming
- Learning – Knowledge - Institutions
- Nexus
- Pilots
- Reports (Management & Steering Committee)



The icons next to each publication indicate their link to the Sustainable Development Goals (SDGs). Keywords of SDGs and their targets are selected here on the basis of their relevance to the publications. For the complete list of the SDGs and their key targets see last pages. And also: <https://sustainabledevelopment.un.org/ldg>

### ACCWaM Programme



2016 Bartels / Lichtenhaefer

#### German Development Cooperation in Times of Crises and Uncertainty

This programme brief describes some of the particular challenges faced by the **giz** regional programme *Adaptation to Climate Change in the Water Sector in the MENA Region (ACCWaM)* during and following the Arab Spring, 2011 – 2015.

Read more [here](#). (Pages: 5)



Keywords of SDGs:  
strategy | planning | equity building | cooperation

# ACCWaM Reports with Relevance to SDGs

Download file here  
[www.accwam.org](http://www.accwam.org)