Project

Climate Change Adaptation Solutions for the Green Sectors of Selected Zones in the MENA Region

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Introduction

• There are approximately 537.2 million hectares of agricultural land in the Arab region, of which 57.6 million are arable land. Therefore, it is imperative to focus concentration toward agriculture sector especially in context of climate change.
Climate change may affect agriculture due to changes in temperature, precipitation, soil moisture, an increase in the probability of extreme events such as droughts, extreme heat waves, heavy rainfall, cyclones, flooding of the coastal areas, erosion etc.
Climate Change Adaptation Solutions for the Green Sectors MENA Region

• This project will be implemented in a partnership among GIZ, FAO, ACSAD, and ESCWA
Objective

- provide adaption measures for the green sectors to include cropping, forestry, rangeland, and fishery production systems derived for selected ‘zones’ of the Arab region

- Upgrading the RICCAR framework for an improved performance of climate change impact assessment in the agricultural sector and on food security by adopting innovative platform to include FAO AquaCrop
Targeted beneficiaries

• The project will target water, agriculture and environment institution, and primary water-agriculture, forestry and fishery related ministries of the Arab region with special focus on, but not limited to pilot countries of ACCWaM, i.e. Egypt, Jordan, and Lebanon
• The project will be implemented in a partnership with the GIZ program ACCWaM and complements the partner initiative of ESCWA on RICCAR.
This output data of RICCAR project will be used as input to the project specially for Aquacrop model.
Example of RICCAR outputs

• **Change in Temperature**: daily temperature for three Rcp4.5 and RCP8.5 projection

• **Change Precipitation**: daily precipitation for three Rcp4.5 and RCP8.5 projection
Example of RICCAR outputs

- **Change in RUNOFF**: daily RUNOFF for three Rcp4.5 and RCP8.5 projection
- **Change in Evapotranspiration**: daily Evapotranspiration for three Rcp4.5 and RCP8.5 projection
the climate change impacts on agriculture sector

• The whole impact assessment will be applied at two levels
  1) country level,
  2) regional level
I-Country-level work

AquaCrop model will be applied to project crop yields and water demand under climate change in the following three pilot Area
Pilot Area

- North Delta of Egypt, Irrigated agriculture zone
- Karak governorate of Jordan, Rainfed agriculture
- Orontes watershed-Lebanon, Mixed agriculture
Several crops will be considered as the most important to evaluate within the study area.
The required data for the model will include:

- **Climate data:**
  - Change in precipitation
  - Changes in temperature
  - Changes in ET
  - Changes in CO2
• Crop Parameters:
  – Planting date;
  – Plant density;
  – Maximum canopy cover (CCx);
  – Time to crop emergence, flowering, start of canopy senescence and to maturity (length of crop cycle);
  – Maximum effective rooting depth (Zx) and time to reach Zx
- Soil parameters
  - Soil physical parameters: Soil water content (θ) at saturation, field capacity, and permanent wilting point;
  - Saturated hydraulic conductivity (Ksat);
  - Depth of layer restricting root deepening
• Parameters describing field management practices:
  – Maximum relative dry aboveground biomass that can be expected in a fertility-stressed environment compared to stress-free conditions
  – Cover and type of soil mulches;
  – Height of soil bunds;
  – Surface runoff: ON/OFF
• Parameters describing Irrigation management practices:
  – Irrigation method;
  – Application depth and time of irrigation events; Salinity of the irrigation water.
  – Parameters describing initial conditions at start of simulation period:
    – Initial soil water content and soil salinity at various depths in the soil profile
Due to time and resources limitation, detail analysis to determine the impact of climate change impact on agriculture sector in the Arab region using the AquaCrop model can only be applied to relatively few sites and crops.
Therefore, the regional level study will be achieved in two steps.

I- identification of climate change potential impact hotspots will be determined. The “hotspot” approach provides a scientific basis for the selection of focal areas for detail analysis using crop model
Potential impact of CC on Agricultural sector

To determine the potential impact of CC on Agricultural sector, we look at exposure to climate change and sensitivities to those changes.
Exposure:
- Change in Precipitation
- Change in temperature
- Change in Evapotranspiration
• **Sensitivity**: The following indicators were considered for the sensitivity of agriculture sector in the Arab region:
  - Degradation of vegetation cover
  - Cultivated areas
  - Soil type
  - Total renewable water available per capita
  - Livestock density
• Population density or rural population density
• Crop diversification index
• II- the AquaCrop model will be applied in the hotspot area on selected crops
• provide adaption measures for Agriculture sector
Thanks