Sector: Irrigated agriculture

Title of the project: Adaptation of irrigated crops in central Tunisia

Intervention zone: Central Tunisia (Kairouan and/or Sidi Bouzid)

Presentation of the problem:
Although irrigated crops cover only 8% of the agricultural area in Tunisia, they provide 30 to 40% of the agricultural production and contribute considerably to employment in agriculture.
The increasing need of water in all the sectors and the expected impact of climate change on water resources require the optimization of crops selection and their management.

Objectives:
Development of an adaptation strategy in the selected irrigated perimeters.

Contribution to the adaptation to climate change:
The impact of climate change on this sector is closely related to both changes in temperature, precipitation, evapotranspiration as well as extreme climate events (drought).
By choosing the appropriate crop systems and technical itinerary, the project should allow a better adaptation and management of the irrigated perimeters to climate change.

Main components of the project:
• Analysis of the present farming systems within the irrigated perimeters
• Identification of the farming systems adapted to climate change (water saving techniques, agricultural techniques, selection of crops,...)
• Implementation of model projects for optimized farming in their irrigated perimeters

PROJECT IMPLEMENTATION

Implementation: MAP
Institutional partners: ME (BG), CRDA, DG/RE, DG/GR, INRAT, INRGREF, GDA
Implementation period: 3 years
Priority of the project: High
Monitoring indicators: the assessment carried out, technical itineraries for adaptation developed

COSTS / BENEFITS OF THE PROJECT

Project costs: 1 to 5 MDT

Risks and vulnerability due to non-action:
• Overexploitation of water resources
• Loss of cropland
• Degradation of the quality and the fertility of irrigated soils
**Sector:** Rainfed agriculture

**Title of the project:** Adaptation of the production systems of mixed farming – livestock farming to climate change in the Kef region.

**Intervention zone:** Governorate of Kef

### PROJECT DESCRIPTION

**Presentation of the problem:**
The Southern part of the governorate of Kef is predominantly a cereal – livestock farming area based on rainfed agriculture and natural precipitation. The sector remains highly vulnerable to climate change. This project aims to better identify farming techniques that may contribute to a better adaptation to climate change and increase the financial return (profitability) of farming in the Kef region.

**Objectives:**
Encourage best practices to ensure a better integration of field crops and livestock farming in the region using field cropping thereby improving the resilience of these production systems to climate change.

**Contribution to the adaptation to climate change:**
A better integration of livestock farming and field crops may be considered as a form of adaptation of these production systems to climate change.

**Main components of the project:**
- Assessment of the present production system and presentation of better adapted farming techniques
- Advisory services for farmers on technical itineraries that may mitigate the impact of drought on these production systems.

### PROJECT IMPLEMENTATION

<table>
<thead>
<tr>
<th>Implementation: MA: DGPA and CRDA of Kef and the concerned GDA</th>
<th>Institutional partners: ESA Kef, GDA and farmers associations, URAP Kef</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation period: 7 years</td>
<td>Priority of the project: High</td>
</tr>
<tr>
<td>Monitoring indicators: developed technical itineraries of adaptation, good practices adopted by the farmers</td>
<td></td>
</tr>
</tbody>
</table>

### COSTS / BENEFITS OF THE PROJECT

<table>
<thead>
<tr>
<th>Project costs 5 MDT</th>
<th>Risks and vulnerability due to non-action:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Reduction of the financial return of agriculture</td>
</tr>
<tr>
<td></td>
<td>- Reduction of grain production</td>
</tr>
<tr>
<td></td>
<td>- Reduction of the return of livestock farming.</td>
</tr>
</tbody>
</table>
**Sector:** Agricultural insurance

**Title of the project:** Introduction of an insurance system against the climatic hazards related to climate change

**Intervention zone:** All the country

### PROJECT DESCRIPTION

**Presentation of the problem:**
Although agricultural policy encourages farmers to subscribe to insurances protecting them against natural hazards, these insurances are not widely used. The national strategy for adaptation of agriculture and ecosystems to climate change has suggested the implementation of a climate risk insurance as a national priority for a better adaptation of agriculture to climate change.

**Objectives:**
The introduction of an insurance system for the main crops (primarily cereals) against the most important effects of climate change.

**Contribution to the adaptation to climate change:**
In Tunisia agriculture has always faced climate hazards, nevertheless by increasing the frequency of extreme events and particularly droughts, CC adds a new dimension to the nature of risks. Therefore, an agricultural insurance system should be introduced to cover farmers against the risks related to CC in order to preserve the agricultural activity.

**Main components of the project:**
- Feasibility study on the introduction of an insurance system against climate risks. This study should clarify both the nature of the risks to take into account and the way these risks will be covered by insurance.
- Step-by-step introduction of an insurance system against climate risks considered best adapted to the economic situation of Tunisia and the agricultural sector.

### PROJECT IMPLEMENTATION

**Implementation:** Ministry of Finance in association with the banking and insurance system

**Institutional partners:** MAP (DGEDA, DGFIOP); ME, insurance companies, etc.

**Implementation period:** 2 years for the study and the progressive introduction of the insurance system

**Priority of the project:** High

**Monitoring indicators:** the feasibility study carried out, the insurance system introduced

### COSTS / BENEFITS OF THE PROJECT

**Project costs**
0.4 MDT

**Risks and vulnerability due to non-action:**
- Reduction of the financial return of agriculture
- Limited capacities to manage extreme climate situations
- Loss of farmland (floods, sea level rise)
**Sector:** Agriculture and Energy

**Title of the project:** Equipement program of water points with photovoltaic energy for irrigation and pastoral watering

**Intervention zone:** The South and the irrigation zones for small agriculture: regions of Sidi Bouzid, Kairouan, North of Gafsa

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**PROJECT DESCRIPTION**

**Presentation of the problem:**
The use of solar energy in its different forms is being more and more encouraged in Tunisia. This energy mainly used for household water heaters, is increasingly considered as a possible source of energy for other purposes. In the agricultural sector, the use of photovoltaic energy for irrigation or for the pastoral watering systems is still limited in Tunisia, except for a few initiatives where water points in the Dahar rangeland have been equipped with PV.

**Objectives:**
Reduce the consumption of fossil energies, improve the income of small farmers by reducing the costs for water pumps used in irrigation and allow a homogenous use of rangelands in the South by installing PV at water points.

**Contribution to the adaptation to climate change:**
In the rangeland, this type of energy has the advantage of being flexible; it helps to solve the energy supply problem in relatively isolated zones. The project supports two national strategies: the promotion of renewable energies and the mitigation of greenhouse emission by the reduced use of fossil energies.

**Main components of the project:**
- Technical and feasibility studies
- Project to install PV-water pumps in some wells or drillings for watering of livestock in the rangeland of the South or to irrigate small size perimeters.

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**PROJECT IMPLEMENTATION**

**Implementation:** DG/GR MA  
**Institutional partners:** STEG, ANME  
**Implementation period:** 3 years  
**Priority of the project:** High  
**Monitoring indicators:** The number of wells equipped with photovoltaic energy

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**COSTS / BENEFITS OF THE PROJECT**

**Project costs:** 2 to 4 MDT  
**Risks and vulnerability due to non-action:**
- Small farmers may give up irrigation because of the high pumping costs
- High costs and reduction of economic profitability of the farmlands
- Increase of greenhouse emission gases
**Sector:** Agriculture, ceral genetics and agronomy

**Title of the project:** Conservation and valorization of the genetic heritage for the adaptation of cereal crops to CC

**Intervention zone:** The grain growing areas in the semi-arid regions of Le Kef, Siliana, Zaghouan

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**PROJECT DESCRIPTION**

**Presentation of the problem:**
Tunisia presents an important varietal heritage. Research helped Tunisia to develop a very valuable germplasm collection. However, research carried out in this field further needs to take into account the needs of the farmers to adapt to the main effects of climate change. This project helps to better identify the local varieties showing a high resistance to drought and to make a better use of them to improve crop yields in the higher semi-arid regions of Tunisia.

**Objectives:**
Characterize the genetic heritage and valorize its potential within adaptation to climate change programs.

**Contribution to the adaptation to climate change:**
The project provides answers to expected effects of CC and value the work carried out by the National Gen Bank and other partner institutions through the selection of varieties and identification of optimal technical decisions for farming.

**Main components of the project:**
- Research component focused on the characterization of existing varieties and the identification of technical itineraries adapted to climatic stress;
- Test plots among farmers, in partnership with Agricultural Development Groups (GDA), to study the behavior of the identified varieties
- Publication of results, awareness-raising campaigns.

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**PROJECT IMPLEMENTATION**

**Implementation:** National Gene Bank / La Banque Nationale des Gènes

**Institutional partners:** l’Institut National des Grandes Cultures and INRAT

**Implementation period:** 5 years

**Priority of the project:** High

**Monitoring indicators:** Number of characterized varieties, number of varieties recognized as adapted to CC

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**COSTS / BENEFITS OF THE PROJECT**

<table>
<thead>
<tr>
<th>Project costs</th>
<th>3 MDT</th>
</tr>
</thead>
</table>

**Risks and vulnerability due to non-action:**
- Reduction of financial return in agriculture
- Loss of local genetic potential
- Reduction of cereal production.
**Sector:** Agriculture and environment

**Title of the project:** Introduction of a payment system for environmental services in agriculture

**Intervention zone:** To be defined during the first phase (mountain zones, oasis, etc.)

## PROJECT DESCRIPTION

### Presentation of the problem:
Agricultural activity creates negative but also positive externalities, which are rarely taken into account in the production costs or the value of the agricultural production. In order to encourage preservation practices and ensure an income to farmers who take into account the positive externalities, it would be appropriate to study the possible implementatin of a system of payment for environmental services that farmers are likely to produce.

### Objectives:
The objective of the project consists on proposing a strategy for the introduction in Tunisia of a system of payment for environmental services likely to be produced by agriculture by proposing the appropriate rational to facilitate the adoption of such a system by public authorities. This rational has to be based on advantages in terms of environmental best practices that the payment system may introduce in agriculture and the impact of these practices in terms of mitigation and adaptation to climate change.

### Contribution to the adaptation to climate change:
Today’s agricultural policy encourages certain practices to combat the degradation of natural resources (water and soil conservation, water saving, biological agriculture, etc.) but has not yet introduced practices that help to adapt and to mitigate the effects of CC. However, some of these practices may have positive externalities for the environment without having an impact on the earnings from agriculture, therefore encouraging these practices by a payment system will facilitate the adoption of such practices.

### Main components of the project:
- A study phase which will identify the services and the negative externalities of the agricultural activity. This phase should include a benchmarking based on the analysis of the policies used for environmental payment services in Mediterranean countries or other countries.
- During the pilot phase, certain zones should test the environmental payment services.

## PROJECT IMPLEMENTATION

### Implementation:
- **MA:** DG/FIOP

### Institutional partners:
- MA (IRESA, DGEDA, ...); ME; Ministry of Finance; MICI, MDRP etc.

### Implementation period:
1 year for the study plus 3 years for the introduction of the payment system.

### Priority of the project:
High

### Monitoring indicators:
the study carried out, the payment modalities of the environmental services for the agriculture introduced.

## COSTS / BENEFITS OF THE PROJECT

### Project costs
- 0.5 MDT for the study
- 4 MDT for the pilot phase

### Risks and vulnerability due to non-action:
- Degradation of the environment
- Loss of farmlands
- Loss and non-rational use of water resources
**Sector:** Agriculture and environment

**Title of the project:** Introduction of a climate monitoring and early warning system

**Intervention zone:** All the country

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**PROJECT DESCRIPTION**

**Presentation of the problem:**
Climate change will lead to major climate transformations e.g. a considerable increase in temperature and a reduction of precipitation. These impacts are foreseeable particularly in the Southern most regions of Tunisia highly and increasingly sensitive to desertification and drought.

This climate trends will be accompanied by a large variability of climate and more frequent extreme climate events (droughts, floods, …).

The study on the national strategy of the adaptation of Tunisian agriculture and ecosystems to climate change therefore suggested the definition of a strategy for climate monitoring and early warning as an integral part of the national adaptation strategy.

**Objectives:**
This project aims at preparing the conditions for the creation of an institution that will be responsible for the collection, the analysis and the publication of information related to climate change. One of its main objectives will be to improve the integration and the coordination of existing institutions responsible for the management of natural disasters and to help them to develop an early warning system.

**Contribution to the adaptation to climate change:**
The increase in the frequency of extreme climate events is one of the expected effects of climate change. The introduction of an effective and reactive early warning system will help to reduce the risks for the population, the infrastructure and the agricultural sector.

**Main components of the project:**
- Set-up of an early warning system.
- Improvement of the institutional framework and the human capacities for the collection and the analysis of data and their publication as well as their use by actors.

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**PROJECT IMPLEMENTATION**

**Implementation:** INM plus a national coordination structure

**Institutional partners:** MA, ME,..

**Implementation period:** 2 years

**Priority of the project:** High

**Monitoring indicators:** a partnership between the operators is formalized and operational

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**COSTS / BENEFITS OF THE PROJECT**

**Project costs:** 2 MDT

**Risks and vulnerability due to non-action:**
- Damage to infrastructure and negative impacts on health and human lives
- Considerable impact on economic activities (tourism, agriculture)
**Sector:** Agriculture

**Title of the project:** Updating the agricultural map including the impacts of climate change

**Intervention zone:** All the country

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**PROJECT DESCRIPTION**

**Presentation of the problem:**
The project on the establishment of an agricultural map of Tunisia finalized in 2004 for all the governorates of the country helped to introduce a geographic information system (GIS) in all the Regional Commissariat for Agricultural Development (CRDA).

However, the agricultural maps are not updated regularly by all the regions, making its use difficult especially with regard to rapid changes of the national and international context.

**Objectives:**
Introduction of a continuous updating system of the data included in the agricultural map in order to maintain its credibility. This adaptation should also integrate the parameters inherent to climate projections for 2020 and 2050.

**Contribution to the adaptation to climate change:**
Climate change will modify the results of the map including changes concerning the distribution of crops and the possible introduction of irrigated crops. The update will allow re-evaluating the agricultural potential by taking into account the rise in temperature and the reduction of rainfall, thereby contributing to a better adaptation to CC.

**Main components of the project:**
- Updating the agricultural map taking into account implication of CC on agrosystems.
- Introduction of irrigated crops and manangement of irrigation under water stressed conditions.

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**PROJECT IMPLEMENTATION**

<table>
<thead>
<tr>
<th>Implementation</th>
<th>Institutional partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA (DGEDA)</td>
<td>ME, CRDA, CNCT</td>
</tr>
</tbody>
</table>

**Implementation period:** 3 years

**Priority of the project:** High

**Monitoring indicators:** updated agricultural map, taking into account the impacts of CC

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**COSTS / BENEFITS OF THE PROJECT**

<table>
<thead>
<tr>
<th>Project costs</th>
<th>Risks and vulnerability due to non-action:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 MDT</td>
<td>• Loss of financial return due to non-action</td>
</tr>
<tr>
<td></td>
<td>• Soil degradation</td>
</tr>
</tbody>
</table>
**AGR ÖSYSTEMS**

<table>
<thead>
<tr>
<th>Sector:</th>
<th>Agriculture – field crops</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title of the project: Development of innovative systems for field crops</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Intervention zone:</strong> Different regions in the North and the Center of Tunisia</td>
<td></td>
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</tbody>
</table>

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**PROJECT DESCRIPTION**

**Presentation of the problem:**
Agriculture is one of the activities that contribute to global warming through the emission of greenhouse gases, the consumption of fuels, and the mineralization of organic material leading to the emission of CO₂.

Field crops are also the main consumers of nitrogenous fertilizers a part of which is lost as N₂O, a gas responsible for global warming.

**Objectives:**
Promote conservation agriculture and the association of graminaceous and leguminous plants for the different bioclimatic sections of Tunisia to facilitate the carbon sequestration and reduce greenhouse emissions.

**Contribution to the adaptation to climate change:**
The development of innovative crop systems based on direct seeding techniques (conservation agriculture) has opened up new possibilities for the sequestration of carbon in the soil (between 0.5 and 1 ton/ha/year) also saving an average of 30% of fuel as compared to a conventional system.

Furthermore, the development of crop systems based on graminaceous and leguminous plants in recent years has shown that it is possible to reduce the amount of synthetic nitrogenous fertilizers without harming the crop production.

**Main components of the project:**
- Introduction of technical itineraries which correspond to innovative crop systems and the quantification of the reduction of greenhouse gas emissions obtained;
- Support in the development of a training center for technicians in the field of conservation agriculture
- Support of the implementation of a system of payment for environmental services for farmers.

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**PROJECT IMPLEMENTATION**

<table>
<thead>
<tr>
<th>Implementation: MA, INGC, DGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Institutional partners:</strong> agricultural research structures (IRESA), development structures (DGPA, INGC) and professional structures (associations and groups of farmers and NGOs).</td>
</tr>
<tr>
<td><strong>Implementation period:</strong> 4 years</td>
</tr>
<tr>
<td><strong>Priority of the project:</strong> High</td>
</tr>
</tbody>
</table>

**Monitoring indicators:** evolution of crop surfaces through innovative systems, number of persons receiving training

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**COSTS / BENEFITS OF THE PROJECT**

<table>
<thead>
<tr>
<th>Project costs 5 MDT</th>
</tr>
</thead>
</table>
| **Risks and vulnerability due to non-action:**
  - Risk of soil degradation
  - Increase of greenhouse gas emissions |