



FAO/UCEA CLIMAGRI^{med}
THE “MEDITERRANEAN” COMPONENT OF
THE CLIMAGRI PROJECT ON CLIMATE CHANGE AND AGRICULTURE
PROTOCOL FOR TECHNICAL COLLABORATION

Project Title:	Development of a regional network in the Mediterranean region on climate change and agriculture.
Regular Programme Activity Title:	Technical Support Services by FAO in the framework of UCEA CLIMAGRI Project on Climatic Changes and Italian Agriculture
Regular Programme Entity:	SDRN/RA251S1001003
FAO Technical Implementing Service:	Environment and Natural Resources Service
Implementing Countries:	Italy and Algeria, Cyprus, Egypt, Libya, Morocco, Turkey
Duration:	18 months
Estimated Starting Date:	1 July 2003
Estimated Completion Date:	31 December 2004
Estimated Cost:	US\$ 58.000
Brief Description:	

An agreement was signed between the Ufficio Centrale di Ecologia Agraria (UCEA, Central Office for Crop Ecology) of the Italian Ministry of Agriculture and Forestry Policies (MiPAF) and the Research, Extension and Training Division (SDR). The agreement covers the financial contribution to the FAO Regular Programme by UCEA to provide technical support in the framework of the national project CLIMAGRI - Climate Change and Agriculture, which has a duration of three years. The activity is co-coordinated by the Agro-meteorology Group of the Environment and Natural Resources Service (SDRN).

The technical support services provided by FAO will allow the transfer of methodologies elaborated under CLIMAGRI to developing countries of the Mediterranean region. FAO will use its competence in order to promote collaboration between Italian scientists and their national counterparts for the application of selected themes of research in their own countries. The final objective of this protocol for collaboration is to establish a technical and scientific network among Italy and several countries in the Mediterranean region to study and exchange data and information on the impact of climate change on the agricultural sector. Such a regional information system in place will provide a permanent links among national meteorological services and agronomic research institutes in order to create the scientific basis for the evaluation of present and future scenarios of climate change having a potential impact on the agricultural system. Due to the limited financial resources, the current protocol will be implemented in one or two countries only. However, the knowledge acquired will serve to prepare a larger project proposal to include all Mediterranean countries and to be submitted to potential donors.

ACRONYMS

CNR	Italian National Research Council
FAO	Food and Agriculture Organization of the United Nations
IBIMET	Institute of Biometeorology
MiPAF	Ministry of Agricultural and Forestry Policies (Italy)
SD	FAO-Sustainable Development Department
SDR	FAO-Research, Training and Extension Division
SDRN	FAO-Environment and Natural Resources Service
UCEA	Central Office for Crop Ecology (Italy)

DEVELOPMENT OF A REGIONAL NETWORK IN THE MEDITERRANEAN REGION ON CLIMATE CHANGE AND AGRICULTURE

COLLABORATION FRAMEWORK

A. BACKGROUND

1. Objective of the CLIMAGRI Project

The **Central Office for Crop Ecology** (UCEA-Ufficio Centrale di Ecologia Agraria, Italy) operates at national level in the field of agro-meteorology in collaboration with various national and regional agencies interested in the subject or active in the field of meteorology in general. Agro-meteorology, as an institutional responsibility of UCEA, supports the development of agriculture and the protection of the agricultural environment. To that end, UCEA provides technical services, manages the national agro-meteorological database and carries out research activities to maintain an adequate position to the level of the requests coming from the agro-meteorological interests.

CLIMAGRI project on Climate Change and Italian Agriculture is an agro-meteorological research having the main goal to constitute the first operational step of a national program of safeguard of the atmosphere. The project is co-ordinated by UCEA, under the Italian Ministry of Agricultural and Forestry Policies (MiPAF). Its most important objective is to obtain a climatic analysis of the national territory, evidencing climatic anomalies and changes in action or hypothesis with a specific impact on Italian agricultural sector. Climatic changes might also have an impact on other socio-economic sectors and, in particular, on the control of water resources. Therefore CLIMAGRI takes in consideration, beyond the agricultural sector in a generalized manner, also some problems of water use and management which are strongly related to climatic variations. Finally, CLIMAGRI project must be considered as a scientific program but with an operational component. It means that it will propose methodologies in order to disseminate, with appropriate modalities, the information and the result in an effective way to various users in the agricultural sector.

Research activities carried out within CLIMAGRI project will create the optimal frame to acquire important knowledge of the physical phenomena which are linked to the climate variability and change and that have a direct influence qualitatively and quantitatively on the agricultural productions and therefore on the emissions of greenhouse gases. The knowledge has a great role to play in the safeguard of the atmosphere and in attaining sustainable development.

The main objectives of CLIMAGRI are:

- ?? Improvement of knowledge of climate change;
- ?? Definition of future climate scenarios;
- ?? Assessment of the impact of climate change on the Italian agriculture;
- ?? Application of weather forecasts to the Italian agriculture: short term and seasonal;
- ?? Analysis of water reserves;
- ?? Exchange information.

The project is grouped around four major components for a total of 19 specific themes of research. The four major components are:

- ?? **Climate analysis and future scenarios**, to acquire knowledge on the reliability upon climate variations and possible future scenarios in Italy.

- ?? **Italian agriculture and climate change**, in order to evaluate the significance of climate change for the Italian agriculture and to develop, if necessary, new strategies.
- ?? **Drought, desertification and management of water supplies**, to improve the knowledge on the impact of climate change to the water supplies.
- ?? **Disseminating and exchanging information.**

2. Objective of the UCEA-FAO Partnership

On February 2002, an agreement was signed between UCEA and the Research, Extension and Training Division of FAO. The agreement covers the financial contribution to the FAO Regular Programme by UCEA to provide technical support in the framework of the national project CLIMAGRI on Climate Change and Italian Agriculture, which has a duration of three years. The UCEA-FAO partnership belongs to the fourth component of CLIMAGRI: Disseminating and exchanging information. This activity is co-coordinated by the Agro-meteorology Group of the Environment and Natural Resources Service (SDRN).

The **Environment and Natural Resources Service (SDRN)**, within the Research, Extension and Training Division, is the FAO focal point for activities linked to international environmental conventions (climate change, combat desertification, biological diversity) and for providing geo-spatial environmental information and services. This refers to the availability of real (static or dynamic) geo-referenced data and information to describe the environment and natural resources. Remote sensing, geographic information systems (GIS), agro-meteorology and other environmental tools support the operational and developmental needs of users, both at FAO and in its Member States. A wide variety of programme areas are covered: they relate to early warning for food security, agricultural production forecasting, natural resources management and disaster reduction, impact assessment and response, coastal zone monitoring, as well as renewable energy.

The final objective of the technical support services provided by FAO is to obtain an ideal synergy between UCEA, the Italian research institutes and FAO for the application of the methodologies developed in the framework of CLIMAGRI in order to be adapted and applied in some developing countries in the Mediterranean area. FAO will use its competence in order to promote collaboration between Italian scientists and their national counterparts for the application of selected themes of research in their own countries. Scientists mainly belong to agronomic research institutes and to agro meteorological services.

B. RATIONALE AND JUSTIFICATION FOR COLLABORATION

1. First Technical Workshop on CLIMAGRI^{med}

The first technical workshop on CLIMAGRI^{med}, the "Mediterranean" component of CLIMAGRI project, held in Rome from 25 to 27 September 2002, has brought together Italian scientists and their national counterparts (mainly from National Agronomic Research Institutes and National Meteorological Services) for the application of selected themes of research in their own countries. The 11 selected themes of research were:

?? **Climate analysis and future scenarios**

☞☞ "Acquisition, analysis of the Italian centennial meteorological series for the determination of the climate variations".

☞☞"Definition of climate change scenarios to evaluate the possible effects on the Italian agriculture".

?? **Agriculture and climate change**

☞☞"Climate and soils evaluation for crop suitability in land assessment".

☞☞"Identification of agricultural areas and crops at high risk, due to climate change".

☞☞"Impact of climate change on frost risk (early and late frosts) and on chilling unit accumulation for fruit crops".

☞☞"Active role of agriculture in the mitigation processes of global climate change".

☞☞"Analysis and inventory of long-term agronomic trials on productivity and carbon cycle".

?? **Drought, desertification and management of water supplies**

☞☞"Agricultural drought monitoring system and desertification processes in Southern Italy".

☞☞"Water management and climate change".

☞☞"Impact of climate change on agricultural systems and definition of indicators of drought tolerance".

?? **Disseminating and exchanging information**

☞☞"Improvement of meteorological forecast provided by the Limited Area Model (DALAM) to be used for agro-meteorological applications".

Scientists were representing: Algeria, Cyprus, Egypt, Lebanon, Libya, Morocco, Syria, and Turkey. During the meeting, Italian scientists presented detailed information on the selected themes of research with particular attention to: state-of-the-art on theme of research, objectives, innovative aspects, technical-scientific/economic/social consequences, dissemination of data and results, technical work plan. The presentations facilitated the understanding of the scope of CLIMAGRI and its various sub-topics and provided an overview of the activities carried out in the field of climate change and agriculture by non-European countries.

2. Conclusions from the Workshop

Three working groups, according the main sub-topics of research, namely: (i) **Climate analysis and future scenarios**, (ii) **Agriculture and Climate Change**, and (iii) **Drought, desertification and management of water supplies**, discussed technical details of potential collaboration between scientists from national institutions of "Mediterranean" countries and those from Italy participating in CLIMAGRI. No collaboration was foreseen under the fourth component "Disseminating and exchanging information". The Working Groups concluded that:

☞☞ Considerable information exists on the impact of climate change and variability for temperate regions, but there is a lack of information and studies on the Mediterranean area.

☞☞ Data shown during the Workshop confirmed that similar and consistent precipitation and temperature trends during recent decades in the Mediterranean basin. The increasing temperature and decreasing precipitation trends may lead to severe problems for agricultural activities in the Mediterranean area, which can be faced up only at a regional level.

☞☞ From a regional viewpoint, it is critically important to have a wide range of observations and data to increase our comprehension of processes related to climate variability, to calibrate and validate models, and to refine methods and extend their validity at different scales in space.

☞☞ The Italian component of CLIMAGRI believes it is important, from a scientific point of view, to expand their studies to other Mediterranean countries. On the other hand, the other Mediterranean components think it is useful to extend this type of project to a wider area.

Participants in the workshop share similar environments and the same environmental emergencies, so that they need to contribute and integrate data, experiences, and methods to find and disseminate solutions to problems.

3. Overall Objective

The overall objective of this protocol for collaboration is to develop a network among the scientists from Italy and the Mediterranean countries participating in the CLIMAGRI*med* initiative with the aim to establish a common scientific framework to study the impact of climate change on agriculture. The list of participating countries, national institutes and responsible persons for implementing the four proposals is in Annex III. The Agro-meteorology Group of FAO will coordinate the inter-regional partnership while the other components will be developed by specific Italian institutes. The drafting of the larger project proposal will be a collaborative effort among all participating countries and coordinated by FAO.

To achieve the overall objective, four technical components are defined: (i) establishment of an inter-regional networking for information exchange and data sharing; (ii) drafting of a larger project proposal to include all Mediterranean countries and to be submitted to potential donors on the basis of the information acquired during the implementation of technical activities; (iii) quality and homogeneity of meteorological datasets for construction of climate change scenarios; (iv) development of a land evaluation system useful for defining climatic risk for agriculture due to climate variability and climate change in the Mediterranean area at local and national scale.

Due to the limited financial resources available, the last two components are meant to orient the scientific collaboration and to initiate technical activities and will be implemented in one or two countries only. For the same reason, it could be possible that those partnerships are not necessarily implemented in the same country.

4. Inter-Regional Networking

This component represents the core of the entire collaboration as it is essential to initiate in first instance a network linking national institutes. In principle, the network has been already established during the first workshop on CLIMAGRI*med* but it needs to be formalized by defining technical objectives to orient the future activities. The network, coordinated by FAO-SDRN, will be used as a platform for the regional partnership.

The inter-regional networking will be facilitated throughout the Internet webpage dedicated to the CLIMAGRI*med* component and implemented under the FAO server. The webpage will serve for information exchange and data sharing.

Such a network will allow to collect all needed information for drafting a larger project proposal to include all Mediterranean countries and to be submitted to potential donors. While FAO will coordinate this activity, it remains a collaborative effort among all participating countries.

5. Quality and Homogeneity of Meteorological Data for Construction of Climate Change Scenarios

A good expertise is developed within the CLIMAGRI project in data recovering and homogenising. This expertise can be put at disposal in order to set up a multi-national Mediterranean data set of high quality daily homogenised meteorological records. Such a data set would allow to participating countries to assess the signals related to the recent warming.

Upon completion of the data revision phase, their analysis should consider the following objectives: (i) calculating spatially averaged series grouped by temperature and rainfall since the existence of the station up to today and the analysis of such series (these average series should represent climatically homogeneous areas, and their calculations will be made monthly); (ii) locating trends, cycles and change points for the parameters in order to evaluate possible climatic changes.

The verified meteorological dataset will be used to create, organize and distribute the scenarios related to the climatic change foreseen at various spatial resolutions, determining uncertainties associated with it. What we mean by scenario is the result of analysing all factors pertinent to the national territory, relative to the climatological situation foreseen according to possible variations of the concentration of greenhouse gas.

These activities will be technically supervised by the Institute of General Applied Physics of the University of Milan (Italy) and by the Italian Institute of Biometeorology, Laboratory for Applied Meteorology and Climatology of the National Research Council (CNR-IBIMET).

6. Land Evaluation System

The component of CLIMAGRI project on Italian Agriculture and Climate Change includes a very wide spectrum of studies. They range from climate and soils evaluation for crop suitability to the impact of climate change on frost risk, from the climate risk assessment for agricultural areas and crops to the analysis and inventory of long-term agronomic experiments on productivity and carbon cycle and so on.

This activity includes the following CLIMAGRI research activities: (i) climate and soils evaluation for crop suitability in land assessment; (ii) identification of agricultural areas and crops at high risk, due to climate change; and (iii) impact of climate change on frost risk (early and late frosts) and on chilling unit accumulation for fruit crops.

Land evaluation is internationally recognised for providing qualitative information about land, such as its cropping potential or land degradation risk. It comprises a range of methods developed to enable the assessment of land in terms of either capability for general land use (agriculture, forestry) or suitability for specific crop types (wheat, barley, etc.). Land evaluation systems were developed firstly in USA (Klingebiel and Montgomery, 1961) and subsequently by FAO (FAO, 1984) for application mainly in Africa.

In general, the systems use a range of land qualities, derived from measurable land characteristics, to classify land. One of the main issues associated with the application of land evaluation is the conversion of land qualities derived from measurements of dynamic variables (e.g. temperature) to static variables.

For example, temperature measurements are converted to land qualities such as length of growing period or accumulated temperature summed over a growing period. These land qualities, derived for a single seasonal cycle, are then summarised over a sequence of consecutive years, generally using robust statistics. A key weakness in using summarised land qualities is that by treating dynamic variables in a static way much of the variability that is an essential property of the land is removed.

Farmers do not manage average landscapes under average climatic conditions. For land management decision making it may be more useful to have information on variability from which climate change and climate variability risks may be assessed.

Climate variability is particularly important in determining agricultural planning and resources management. Climatic risk assessment was largely estimated and great effort was put in large-scale studies and general circulation modelling. Parry and Carter (1988) and Rosenzweig (1982) showed how difficult is to assess climate risk for agricultural areas and crops at local scale. In addition there is a lack of information on the potential effects of climate variability and changes on the Mediterranean area.

These activities will be technically supervised by the Italian Institute of Biometeorology, Laboratory for Monitoring of Agro-ecosystem of the National Research Council (CNR-IBIMET).

C. DEVELOPMENT OBJECTIVE

A technical and scientific network among Italy and several countries in the Mediterranean area to study and exchange data and information on the impact of climate change on the agricultural sector.

D. INTERMEDIATE OBJECTIVE

An effective and efficient regional information system in place to provide permanent links among national meteorological services and agronomic research institutes in order to create the scientific basis for the evaluation of present and future scenarios of climate change having a potential impact on the agricultural system.

E. IMMEDIATE OBJECTIVES, OUTPUTS AND ACTIVITIES

Immediate Objective 1. Inter-regional networking for information exchange and data sharing.

Output 1.1 Institutional network established to include the national institutions such as the Meteorological Services and the Agronomic Research from all Mediterranean countries.

Activities

1.1.1 Activation of the Internet CLIMAGRImed website for information exchange and data sharing.

1.1.2 Coordination of collaboration between scientists from Italy and the other countries for an effective transfer of the methodologies elaborated under the national CLIMAGRI project.

1.1.3 Definition of a common and standard database, including meteorological and agronomic data.

1.1.4 Presentation of activities to other Mediterranean networks.

Output 1.2 Larger project proposal prepared to include all Mediterranean countries.

Activities

1.2.1 Collection of information acquired during the implementation of technical activities.

1.2.2 Drafting of a project proposal.

1.2.3 Submission of the proposal to potential donors for suitable financing.

Immediate Objective 2. Quality and homogeneity of meteorological data for construction of climate change scenarios.

Output 2.1 Meteorological datasets collected and analyzed.

Activities

2.1.1 Calculating spatially averaged series grouped by temperature and rainfall since the existence of the station up to today and the analysis of such series (these average series should represent climatically homogeneous areas, and their calculations will be made monthly).

2.1.2 Locating trends, cycles and change points for the parameters in order to evaluate possible climatic changes.

Output 2.2 Climate change scenarios prepared.

Activities

2.2.1 Create, organize and distribute the scenarios related to the climatic change foreseen at various spatial resolutions, determining uncertainties associated with it.

Immediate Objective 3. Land evaluation techniques for the assessment of climate variability risk in agriculture at different scales (from local to national).

Output 3.1 Application of methods for the analysis and interpolation of bioclimatic data at national and local scales;

Activities

3.1.1 Development of standard procedures for obtaining agro-meteorological digital maps from meteorological station data;

3.1.2 Adaptation of interpolation models in relation to the available information layers and characteristics and climate conditions of the studied areas;

3.1.3 Development of methods for dividing the study areas into regions with similar bioclimatic characteristics and identify important agricultural resources within each region;

3.1.4 Development of a methodologies for assessing climatic risk for agriculture based on bioclimatic indexes which incorporate weather variability and obtaining maps of climatic risk for agriculture;

3.1.5 Quantification of the direct effects of climate change and variations on critical species over the Mediterranean area;

Output 3.2 Development of an agro-meteorological information system for evaluating climatic risk for agriculture activities and crops and planning agricultural systems.

3.2.1 Integration of the results from Output 3.1. to obtain an agro-meteorological information system useful for evaluating climatic risk for agricultural activities an crops and planning agricultural systems.

3.2.2 Comparison of the results with those from similar studies to identify needs for future research and policy development.

F. PROJECT INPUTS

1. Government Inputs

~~///~~ Staff

At least one staff from each of the national institutions will be assigned to collaborate under the present protocol for collaboration. The provisional Terms of Reference for the Italian scientists in in Annex II, while for the scientists from all other countries is in Annex III.

2. FAO inputs

An indicative budget under FAO support is provided in Annex I.

~~///~~ Official duty travel

Support cost relates to travel and DSA (Daily Subsistence Allowance) only of national staff. No reimbursement is allocated to cover staff time. For each partnership, two missions of a duration of one week each are planned to be performed by national staff either from Italian and overseas Institutes.

~~///~~ Implementation of website

Staff time is allocated to perform additional work to the CLIMAGRImed website and for translation of official documents.

INDICATIVE BUDGET

Protocol for collaboration

Title:

“Development of a regional network in the Mediterranean region on climate change and agriculture”

Year	2003	2004	Total
Description	US\$	US\$	US\$
Consultants – Objective 1			
Staff time	5,000	5,000	10,000
Consultants – Objective 2			
Travel + DSA for 2 partnerships	6,000	18,000	24,000
Consultants – Objective 3			
Travel + DSA for 2 partnerships	6,000	18,000	24,000
Total	17,000	41,000	58,000

**FAO/UCEA CLIMAGRI^{med}
PROTOCOL FOR COLLABORATION**

**Development of a regional network in the Mediterranean region
on climate change and agriculture**

International Consultant on Climate Change Impact Assessment

Terms of Reference

Duration: 2 weeks in two missions

Language: English, French

Duty Station: One or two among: Algeria, Cyprus, Egypt, Libya, Morocco, and Turkey.

Qualifications:

The Consultant should hold a university degree in Meteorology/Climatology or in Agricultural Sciences or in Geographic Information System (GIS) with a strong experience in the analysis of data for climate change impact assessment. The consultant is part of one of the research topics teams of CLIMAGRI project. Good communication skills are essential. Ability to write technical reports is required. Fluency in English or French is essential.

Duties:

Under the overall coordination of the Agrometeorology Group of the FAO Environment and Natural Resources Service (SDRN) and in close collaboration with other scientists working under the research topics team of CLIMAGRI project, the Consultant will:

~~///~~ During the first mission

1. Evaluate the existing situation of the meteorological or agronomic sector in terms of available data, methodologies for analysis, logistic infrastructure;
2. Identification of a suitable counterpart for an effective transfer of methodologies;
3. Propose a detailed workplan and schedule of activities for the entire duration of the collaboration;
4. Identification of datasets to be analysed or collected and propose suitable methodologies;
5. Propose activities to be completed before the first mission of the counterpart;

~~///~~ During the second mission

6. Evaluate the preliminary results and propose further analysis;
7. Provide technical guidelines to achieve the first results;

8. Propose activities to be completed before the second mission of the counterpart;

~~8.8~~ At the end of the collaboration

9. Evaluate the overall activity and supply a suitable report in hard copy as well as in electronic format (Microsoft Word) containing information to be used for the drafting of a larger project among all Mediterranean countries, such as actions to be undertaken and factors which could hamper implementation of activities, conclusions and recommendations.

**FAO/UCEA CLIMAGRI^{med}
PROTOCOL FOR COLLABORATION**

**Development of a regional network in the Mediterranean region
on climate change and agriculture**

National Consultant on Climate Change Impact Assessment

Terms of Reference

Duration: 2 weeks in two missions

Language: English, French

Duty Station: Italy.

Qualifications:

The Consultant should hold a university degree in Meteorology/Climatology or in Agricultural Sciences with a strong experience in the analysis of data for climate change impact assessment. The consultant is well aware of technical activities carried out under the research topics of CLIMAGRI project. Ability to write technical reports is required. Fluency in English or French is essential.

Duties:

Under the overall coordination of the Agrometeorology Group of the FAO Environment and Natural Resources Service (SDRN) and in close collaboration with his/her counterpart, i.e. the Italian scientist part of one of the research topics teams of CLIMAGRI project, the Consultant will:

~~///~~ During the first mission

1. Evaluate first results of data collection and analysis carried out after the first mission of his/her counterpart;
2. Identification of steps to be undertaken to achieve the final completion of the collaboration;
3. Propose a detailed workplan and schedule of activities for the rest of the collaboration;
4. Identify activities to be completed before the second mission;

~~///~~ During the second mission

5. Evaluate the final results and define the structure of the final report;

~~///~~ At the end of the collaboration

6. Provide a technical report in hard copy as well as in electronic format (Microsoft Word) containing technical description of the activities carried out and final results, as well as further actions to be undertaken, including factors which could hamper implementation of activities, conclusions and recommendations.

PARTICIPATING COUNTRIES AND INSTITUTES***✍* Inter-regional Networking****ALGERIA**

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~~///~~ Land Evaluation System

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