

Project proposal

CLIMATE INFORMATION TO FOOD SECURITY AND AGRICULTURAL RISK MANAGEMENT IN THE ANDEAN COUNTRIES

This document was prepared by CIIFEN with the guidance and support of the World Meteorological Organization and the contributions from the NMHSs of the Andean Region

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ABBREVIATIONS

CLIPS	Climate Information and Prediction Services
CPT	Climate prediction tool
CPTEC	Center for Weather Prediction and Climate Studies (Brazil)
ECMWF	European Center for Medium-range Weather Forecasting
GIS	Geographic information systems
CIIFEN	International Research Center for the El Niño Phenomenon
IRI	International Research Institute for Climate and Society
IADB	Inter American Development Bank
NMHS	National Meteorological and Hydrological Service
WMO	World Meteorological Organization
UNISDR	United Nations International Strategy for Disaster Reduction

I. EXECUTIVE SUMMARY

Beneficiaries:	Agricultural and food security managers and small and medium size farmers and NMHSs from Venezuela, Colombia, Ecuador, Peru, Bolivia, and Chile.
Executing agency:	International Research Center for the El Niño Phenomenon (CIIFEN) with the collaboration of NMHS of the Andean Region.
Financing:	International Cooperation US\$ 1'032,400 Regional counterpart US\$ 526,000 Total: US\$ 1'558,400
Objectives:	This project will help reduce the socioeconomic impact due to the effect of climate on agriculture and food security in the countries of the Andean region. The purpose is to strengthen a regional climate information system aimed at addressing the needs of NMHSs, the requirements of users, helping the decision making process, and managing agriculture and food security.
Description:	The project will establish a climate information system for the Andean region to benefit the most vulnerable agricultural communities, among others. The project includes: (i) Improvement of the recently implemented database; (ii) To continue the operational phase of regional and national climate and weather models in CIIFEN and NMHSs respectively; and (iii) the definition of vulnerable areas and preparation of climate-food security hazard and risk maps, which will serve as inputs for a geographic information system (GIS) accessible to decision-makers. The information produced will be disseminated by suitable available media means to vulnerable groups of producers and other potential users.
Terms:	Execution period: 24 months
Coordination with other multilateral and bilateral agencies:	This operation is consistent with the World Meteorological Organization (WMO) Climate Information and Prediction Services (CLIPS) program, and the Hyogo Framework for Action (2005). Strategically, it comes under the mandate given to CIIFEN by the Andean Strategy for Disaster Prevention and Relief in July 2004, and operationally, it complements CIIFEN institution-strengthening actions financed by the Andean Development Corporation, and the initiatives of the World Bank. CIIFEN with the support of the Inter American development Bank, and the participation of NMHS from Bolivia, Colombia, Chile, Ecuador, Peru and Venezuela have implemented a climate information system focused on risk management in the agricultural sector and food security. The system involves close coordination at regional and national level with Ministries of Agriculture, local communities and private sectors. CIIFEN with the NHMS of Ecuador also has executed a project

supported by European Commission aimed to establish an early warning system in local communities of Ecuador.

II. BACKGROUND AND RATIONALE

A. Diagnostic assessment of the problem

2.1 Agricultural activity is of significant importance for the economies of the Andean countries, employing 29% of the workforce in Colombia, 32% in Ecuador, 35% in Peru, 43% in Bolivia, 14% in Chile, and 13% in Venezuela¹, for a total agricultural population of close to 28 million in the region². Agricultural land in the region amounts to some 150 million hectares, of which only 3%, is irrigated³ and 97% of crops are rain-dependent. This situation is further aggravated by the recurring effects of the El Niño/La Niña phenomena and the extreme climate events such as flooding, drought, frost, or hail, making the agricultural sector the most vulnerable to climate and climate variability. One of the main social impacts derived of climate variability is concentrated mostly in subsistence crops, therefore food security is essential in order to provide policymakers with the necessary information to mobilize adequate responses at the local, national, regional, and international levels.

2.2 The National Meteorological Services (NMHSs) are responsible for climate prediction in the region, with differing operational levels in each of the six Andean countries. The NMHSs point to the following as their chief weaknesses: (i) limited primary data processing capacity; (ii) shortage of information technology and human resources for numeric modeling; and (iii) a disconnection between the generated information and the most vulnerable users. Moreover, in collaboration with the NMHSs of Venezuela, Colombia, Ecuador, Peru, Bolivia, and Chile, CIIFEN has been able to develop the capacity to generate seasonal rainfall and temperature forecasts for periods of up to three months for western South America, albeit with limitations in terms of precision and resolution, using a basic network of 169 stations distributed throughout the six countries. Earlier studies have shown that the NMHSs do not meet small and medium-sized rural producers' demand for climate information. (CLIBER 2007).

2.3 The major advantage of this regional system is that the network of participating stations provides acceptable coverage of the different atmospheric systems affecting the climate in these countries. It therefore represents a broader observation platform built with the participation of all to benefit all. Despite these advances, and the regional ongoing project funded by IADB the capacity to make seasonal forecasts for periods greater than three months is still a challenge and, as mentioned above, it is necessary to improve the precision and resolution of the climate information produced, as well as ensure its effectiveness in reaching the final users and becoming a tool for decision-making purposes.

B. Rationale

2.4 Implementation of a new time horizon (3 to 6 months) for climate forecasting and more accurate weather forecast will allow national and sub national governments agencies to work on risk prevention and management policies, in addition to providing adequate emergency response. This clearly reinforces and complements UNISDR priorities with respect to strengthening national risk management systems in the region adopted in recent years.

C. Coordination with other international agencies

2.5 The operation is consistent with the World Meteorological Organization Climate Information and Prediction Services (CLIPS) program, and the Hyogo Framework for Action (2005). Strategically, it is within the mandate, given to CIIFEN by the Andean Strategy for Disaster Prevention and Relief in July 2004, and operationally, it complements CIIFEN institution-strengthening actions financed by the Andean Development Corporation, and the initiatives of the World Bank and the Secretariat of the United Nations Framework Convention on Climate Change in the region. This operation is consistent with the World Meteorological Organization (WMO) Climate Information and Prediction Services (CLIPS) program, and the Hyogo Framework for Action (2005). Strategically, it comes under the mandate given to CIIFEN by the Andean Strategy for Disaster Prevention and Relief in July 2004, and operationally, it complements CIIFEN institution-strengthening actions financed by the Andean Development Corporation, and the initiatives of the World Bank. CIIFEN with the support of the Inter American development Bank, and the participation of NMHSs from Bolivia, Colombia, Chile, Ecuador, Peru and Venezuela have implemented a climate information system focused on risk management in the agricultural sector. The system involves close coordination at regional and national level with Ministries of Agriculture, local communities and private sectors. CIIFEN with the NHMS of Ecuador also has executed a project supported by European

¹ Minutes of the Technical Meeting of Climate Information and Prediction Services for the Andean countries, WMO, 2003.

² FAOSTAT 2006, data updated as of 2000.

³ FAOSTAT 2006, data updated as of 2003.

III. DESCRIPTION

A. Objective

3.1 This project will help reduce the socio-economic impact due to the effect of climate on agriculture in the countries of the Andean region. The purpose is to strengthen the existent regional climate information system aimed at addressing the needs of users, helping the decision making process and managing agricultural sector risk.

B. Specific objectives

3.2 The stated objectives will be achieved through the following components:

- (i) Improve the existent regional climate information and data processing system;
- (ii) Disseminate to users the information generated; and
- (iii) Strengthen the capacity of the NMHSs to handle, manage, and disseminate the products of this operation.

Component 1. Climate information and data processing system

3.3 The purpose of this component is the implementation of an integral system which improves the regional climate data base, statistical and dynamic modeling for climate weather forecast, and climate risk maps generated by GIS and applied to agricultural sector.

- (i) To increase the climate information records within the existent regional climate database using historical series from 169 climate stations in the region;
- (ii) To improve the existent national capabilities on statistical and dynamic modeling — for weather and seasonal forecasting in the Andean countries, using the currently operational database;
- (iii) To prepare maps of climate hazards to agriculture that incorporate information on the probability of the occurrence of rainfall and maximum and minimum temperatures; and
- (iv) To develop a geographic information system that can be linked to the data produced by the models, to the land use information from the most vulnerable areas identified in each country, and to satellite information acquired at a scale of 1:50,000, in order to generate climate risk maps.

The list of activities to be carried out under project Component 1 are:

- (i) Development of operational dynamic models for weather (24 hours to 15 days) and climate forecast (1 to 6 months);
- (ii) Support to NMHSs and CIIFEN on improving agricultural and food security climate risk maps;
- (iii) Digitilization of climate information deemed relevant to the database;

The project team will implement the agricultural and food security climate risk maps in coordination with relevant public institutions, such as ministries of agriculture, other public related offices, and the NMHS counterparts. A geographic information system will be used to prepare these maps, making it possible to link:

- (i) The regional database;
- (ii) The climate hazard maps generated by the pilot statistical and dynamic model;
- (iii) Land use information gathered in the areas deemed most vulnerable in each country based on economic importance, vulnerability, and number of existing climate stations;
- (iv) Satellite data gathered at a scale of 1:50,000. The methodology, together with the cartographic, socioeconomic, food security and agricultural information, and the definition of all vulnerability patterns, will be validated in the field by the consultants and the NMHSs representatives, and transferred to the NMHSs for application in their respective countries.

Component 2. Information dissemination system.

3.4 This component consists of improve the existent information dissemination system that includes:

- (i) Mapping and identification of key stakeholders;
- (ii) Strategic institutional partnerships with rural communication media (radio and newspapers), community networks, and businesses linked to the agricultural sector and food security. This system will give priority to the agricultural communities deemed most vulnerable based on petitions assessed through a participatory process and their socio cultural profile, including ethnic and gender variables. Financing will also be provided to organize local and national workshops, and for field work to collect data, prepare the baseline by administering a detailed survey to a representative sample of beneficiaries defined using the information generated by the risk maps, and validate the system.

3.6 The information generated under component 1 will be converted into relevant outputs for each user group, such as:

- (i) Comprehensive bulletins drafted in straightforward language, with easy-to-understand color risk maps;
- (ii) Messages of climate early warning and their potential impact in food security by region;
- (iii) More detailed climate risk maps for decision-makers, and simple maps without any text, for layman users, that can be interpreted without having to read.

3.7 Stakeholders, identified in the distribution network, will be contacted to provide feedback on the climate information provided. That information will be refined with this feedback, and classified to target different types of users before distribution.

Consulting services will be hired to work in close coordination with the NMHSs to perform and validate the aforementioned tasks.

3.8 The information generated by the system will be integrated into CIIFEN with support from a consultant and the Project coordinator. Consultants will be hired in each country to update the map of relevant stakeholders and identify local distribution networks for climate information. The local consultant, assisted by the focal point and the NMS technical counterpart, will establish institutional and strategic partnerships with:

- (i) The private sector;
- (ii) The media;
- (iii) Community networks. Local workshops will be organized with the relevant stakeholders in the areas designated as priority, in order to develop and validate the dissemination system.

3.9 The information generated will be converted into relevant outputs for each group of users, and the consultants will develop the distribution mechanisms in close collaboration with the NMHSs and identified relevant stakeholders, as well as with their validation of the outputs and mechanisms. The distribution mechanisms could include radio, printed material, the press, mobile telephony messages, and possibly TV stations, with the primary goal of reaching small farmers and flower growers. In addition, graphic messages will be printed in graphic format to reach the indigenous populations in the mountains either directly or through community networks.

Component 3. Institution-strengthening.

3.10 This component will finance the instruction and training to strengthen then participating institutions, to ensure that the system remains operational into the future, as well as the procurement of equipment. Financing will also be provided to purchase satellite map data on land use and socioeconomic data for each country. The list of equipment to be acquired, presented in the

itemized cost table (Annex II), includes computers, workstations, geographic information systems (GIS), software, and servers.

3.10 The instruction and training plan includes:

- (i) Workshops and training course on use and application of statistical modeling;
- (ii) Training workshops on dynamic downscaling of weather and climate models;
- (iii) Training workshop on agricultural and food security climate risk mapping;
- (iv) Training workshop on data processing;
- (v) Training workshop on grid application;
- (vi) IRI-ECMWF-CPTEC and other centers internship to train a critical mass of regional experts who will then replicate the training thus ensuring an effective and efficient transfer of technology on statistical modeling, dynamic modeling, and dynamic downscaling in international excellence centers. During the work sessions planned in each country, training will be provided to trainers to promote climate information resources among farmers. Trainers will be given the appropriate teaching materials. Several itinerant training sessions is also planned.
- (vii) Conference attendance and exchange of experts;
- (viii) National workshops.

3.11 Institution-strengthening will be achieved through the following actions:

- (i) Procurement and installation by CIIFEN of the equipment needed to achieve the project objectives;
- (ii) Realization of five training workshops for NMHS representatives—one will address statistical modeling, two dynamic modeling, one for agricultural and food security risk maps, one for data processing and one for grid application;
- (iii) Short visits to international excellence centers;
- (iv) Attendance to relevant conferences and events related with climate forecast and climate applications;
- (v) Three coordination meetings (opening, medium term and closing) to follow up the project.

3.12 **Expected outcomes.** The following outcomes are expected to be in place at the end of the project:

- (i) An improved regional climate database;
- (ii) Operational dynamic and statistical weather-climate prediction system, feeding data into the regional database;

(iii) Climate hazards and agriculture and food security risk maps for the region and for each Andean country;

(iv) Multimodal climate data distribution network comprising local stakeholders, the media, community networks, and the private sector.

IV. EXECUTION

A. Executing agency

4.1 The International Research Center for the El Niño Phenomenon (CIIFEN), headquartered in Guayaquil, Ecuador, will be the project executing agency in close collaboration with the Meteorological Services of Bolivia, Colombia, Chile, Ecuador, Peru and Venezuela.

CIIFEN has the capacity and experience to execute the project. CIIFEN has been executing similar projects and activities on a regional scale, financed by the Andean Development Corporation, the World Meteorological Organization, the United Nations Development Programme, the U.N. International Strategy for Disaster Reduction, the European Commission and the Inter American Development Bank. The Center also has vast experience in interagency and interregional coordination in matters relating to applied weather and climate predictions. CIIFEN will assign three professionals to this operation as counterparts responsible for oversight and monitoring of project activities, physical infrastructure, instruments, and secretariat, accounting, and administrative resources.

B. Execution mechanism

4.2 CIIFEN staff will be solely responsible for all administrative tasks and hiring consultants. Nonetheless, three full-time consultants will be engaged to provide coordination and execution support. One consultant will serve as general technical coordinator for the project and technical leader of component 2, under close supervision by CIIFEN. The other will work as administrative – financial assistant to the general coordinator and the third will provide technical support for developing and implementing the climate information system described under component 1. At the end of the execution period, the CIIFEN counterpart professionals will be fully trained and ready to take over the duties of the two consultants.

4.3 **National focal points.** To facilitate project execution, CIIFEN will work with one NMHS designated focal point in each beneficiary country. The focal points will essentially coordinate with the relevant institutions, with local consultants, and with the specialists assigned as counterparts at each NMHS.

4.4 **Country participation and consensus building.** The NMHSs will actively collaborate on the project, and consensus will be built on the various elements of the project through a series of regional and national workshops and technical meetings. Details on these are provided in the following paragraphs.

C. Project readiness

4.5 From the outset, CIIFEN will prepare the Plan of Operations for the project. The existing institutional arrangement for project execution is appropriate, and the public institutions involved in and benefiting from, the execution of this operation have sufficient technical capacity to provide the technical counterpart for the planned consulting services. The terms of reference for consultant services will be prepared and discussed with CIIFEN.

D. Execution and disbursement schedule

4.6 The project has a 24-months execution period.

E. Procurement

4.7 Fourteen individual consultants and 12 technicians will be hired, and the equipment described in Annex V will be procured. All bidding for and procurement of goods and services will be in accordance with the established procedures.

V. COST AND FINANCING

A. Budget

(removed for confidentiality)

B. Sustainability

5.2 The operation's sustainability is based on:

- (i) Government support for the NMHSs under the premise that the incremental cost for system maintenance is low and easily absorbed by the regular budgets;
- (ii) Rural communications media's stated interest and willingness to transmit at no cost the information produced;
- (iii) Private farming sector involvement (points of sale for agricultural inputs) allowing for national workshops and the dissemination of printed information to continue over time;
- (iv) Existing partnerships and those being forged with community networks (indigenous and non indigenous) ensuring there are ties to the sub national governments;
- (v) The possibility of offering specialized services to the power, water resources, and agro industrial sectors, and to insurance and financial agents. Mention should be made that CIIFEN and the NMHSs receive continuing institutional support from the World Meteorological Organization.

VI. MONITORING AND EVALUATION

A. Monitoring

6.1 **Monitoring:** CIIFEN will be responsible for monitoring and evaluating the project implementation in each NMHS. The monitoring will be periodic, with coordinated supervision and guidance actions. The technical team will meet at least twice a year to review operation progress, based on the progress reports received by CIIFEN. These periodic meetings will also serve to update the information, and coordinate with complementary activities and operations.

6.2 **Monitoring and evaluation:** There will be two external evaluations of the operation: a midterm evaluation (50% of resources disbursed), and one prior to completion of the operation. These evaluations will be conducted by specialized external consultants using project resources. CIIFEN will also provide for an independent audit.

6.3 **Progress and final reports:** On May 31st and November 30th of each year, CIIFEN will submit progress reports, covering:

- (i) Physical and financial progress of activities;
- (ii) Fulfillment of the logical framework indicators;
- (iii) Proposals for addressing any problems identified;
- (iv) Work plan for the following six-month period.

The final report will be submitted three months after the date of project completion, and will include the results of the evaluation contracted for this purpose.

VII. BENEFITS

7.1 **Benefits.** The project will directly benefit the most vulnerable small farmers of the countries involved, by providing information about the climate risk associated with agriculture and food security.

7.2 **Beneficiaries.** The beneficiaries will be the end users of the information:

- (i) Small and medium-scale farmers in the beneficiary countries, who will have a tool to plan and manage climate risk;
- (ii) Public institutions responsible for natural disaster planning and prevention, who will have an early warning tool;
- (iii) Private insurance companies, who will have a database allowing them to improve their climate risk management products;
- (iv) Agriculture and food security managers.

VIII. ENVIRONMENTAL AND SOCIAL IMPACT

8.1 The operation will have no adverse environmental or social impact. On the contrary, the operation will generate significant positive environmental and social impacts by strengthening the countries' capacity to forecast extreme climate variations and manage risk for food security and agriculture through the procurement of equipment, development of climate prediction models, training staff in the use of the equipment and techniques, and making the information generated by them available to users in easy-to-understand language that takes into account ethnic and gender considerations. The capacity to prevent natural disasters and minimize damage to crops will be promoted, benefiting lower income populations in particular.