REPORT

TOWARDS THE INTERNATIONAL RESEARCH CENTRE for EL NIÑO (IRCEN-CIIFEN)

GUAYAQUIL, ECUADOR

Date: April 29, 2002

Prepared for the:

WORLD METEOROLOGICAL ORGANIZATION

Prepared by:
James P. Bruce
Víctor Magaña Rueda
Elina Palm

TOWARDS THE INTERNATIONAL RESEARCH CENTRE FOR EL NIÑO (IRCEN-CIIFEN) GUAYAQUIL, ECUADOR

Table of Contents

INDEX

SUMARY **Pág.**

CIIFEN (IRCEN) IMPORT (April 29,2002)

a. SUMMARY AND RECOMMENDATIONS

This Report presents an account of a mission to Ecuador, April 7-12,2002, and some conclusions drawn from tile mission, in order to advance the establishment of an international Research Centre for El Niño (IRCEN - CIIFEN in Spanish) in Guayaquil, Ecuador. The mission was organized by the World Meteorological Organization (WMO) with [lie support of the International Strategy for Disaster Reduction (ISDR) in response to UN General Assembly resolution 56/194, of January 2002, and the Memorandum of Cooperation between WMO and the Government of Ecuador signed 19 Sept. 2001.

The three-person mission, James P. Bruce (Canada), Victor Magana Rueda (University of Mexico) and Elina Palm (ISDR-Costa Rica), met with representatives of key International, regional and national institutions based in Quito and Guayaquil. The first meetings were with [lie Under Secretary for Multilateral Relations, Ecuador Ministry of External Relations, and with the office of the President of the Republic. These assured mission members of the high level of commitment to CIIFEN of [lie Ecuador government. Subsequent meetings with Ecuadorian agencies confirmed the commitments and technical capabilities that, when working together more closely, will make CIIFEN a success. Meetings with international and regional organizations such as CPPS and PREANDINO, and pre-meetings with World Meteorological Organization (WMO) and International Strategy for Disaster Reduction (ISDR), Geneva, and with the International Research Institute for Climate Predictions (IRI), Palisades, N.Y. assured the mission of strong international commitment to support of CIIFEN.

Financially, Ecuador in the Memorandum of Cooperation (MOC) with WMO, has committed sufficient funds to initiate the work of CIIFEN. However, multilateral and bilateral prospective donors will have to be approached on an urgent basis to ensure support for a project involving CIIFEN's subsequent development as needed. Several options for accommodation of CIIFEN in and near Guayaquil have been offered by Ecuador institutions.

ClIFEN should be thought of as a means to conduct a regional project which addresses four major needs:

i) Early warning systems for disaster loss reduction,
ii) Adaptation to climate change and variability,
iii) Transboundary water issues (coastal and shared watersheds), and
iv) Sustainable development and institutional capacity building.

There is sufficient support to proceed as soon as possible to begin establishment of CIIFEN in Guayaquil in 2002.

RECOMMENDATIONS:

1. By end of May 2002, the Institutions directly concerned (WMO, ISDR, Government of Ecuador) should adopt this Report, modified as required. These Institutions should, in particular, adopt the concept of CIIFEN and the phased approach along tile lines identified in Section 4, with any agreed modifications.

2. A planning committee be established immediately for the Climate Outlook Forum and CIIFEN initiation workshop to address strengthened responses to ENSO events, and to be held early September 2002. (See Section 8.3 and Annex "B")

3. Before September 2002, the Government of Ecuador should:

   - Establish the Technical Committee required by tile Ecuador-WMO Memorandum of Cooperation (MOC) (Section 5)
   - Select a site for C]IFEN (See Options Section 6) and arrange for building modifications as required.
   - Appoint initial staff members (Section 7, Phase 1)

4. WMO and ISDR should initiate contact with prospective donors to encourage participation in September workshop, and arrange other briefings as required. (Section 8 and Annex A)

5. Before September the International Board should be constituted with a view to having its first meeting at the time of tile September 2002 workshop, and begin international competition for Director. (Section 5.3)

6. WMO to review in 2002 means of improvements in GTS communications and computer facilities, and assist Government of Ecuador in implementation.

7. Develop a Memorandum of Understanding between CIIFEN and IRI, similar to tile]RI-ACMAD MOU, and similarly with INPE (Brasilia). (WMO, Government of Ecuador - See Section 2.5)

8. Government of Ecuador to ensure regular consultations and updates on progress towards CIIFEN with Secretary General of CPPS to ensure full participation.

9. Technical Committee to negotiate regional agreements with CAF-PRFANDINO, and other relevant organizations, with assistance of CPPS. (Section 3.2)

2. REPORT OF MISSION MEETINGS AND DISCUSSIONS

2.1. INTRODUCTION

In agreement with the United Nations General Assembly resolution 52/200 on the international Cooperation to reduce the negative impacts of El Niño phenomenon, the Guayaquil Declaration proposed "Immediate actions to evaluate the feasibility to establish an International Research Centre for the El Niño / Southern Oscillation (ENSO)".

The World Meteorological Organization (WMO) organized a mission to Ecuador to conduct a feasibility study on the establishment of such a Centre January 28 - February 7, 1999. J.P. Bruce reported the results of this mission in a document dated March 1999. Since then, in Sept. 2001, a Trust Fund was created to begin the necessary actions for the creation of the Centre. In view of the time elapsed since tile delivery of the 1999 report, it was necessary to update the findings on feasibility of establishing an International Research Centre for the El Niño (CIIFEN-CIIFEN) in Ecuador and to propose a way forward.

The terms of reference for the Second Mission, conducted from April 7 - 14, 2002 are given in Annex "C". The agenda of the mission appears in Annex "D".

Noting the Memorandum of Cooperation between the Government of Ecuador and the World Meteorological Organization on the Establishment, Operation and Development of CIIFEN. The Task Team, composed of James P. Bruce, Ms. Elina Palm (ISDR) and Victor Magafla, engaged in an analysis of the views of the Ecuadorian participating institutions on the scope of the activities to be undertaken by the Centre and how it might operate effectively. These meeting discussions are outlined in the following Sections 2.2 to 2.5. Conclusions and Recommendations of the Task Team appear in Section 3 to 8 and Annexes "A" and "B".

2.2. MAIN MEETINGS OF MISSION AND DISCUSSIONS

Quito

Ministry of External Relations

The Under Secretary for Multilateral Relations of the Ministry proposed the organization of a Workshop among scientists and representatives from donor institutions in order to promote CIIFEN and obtain financial support for its implementation and operation. In addition, he suggested it would be helpful to have a complete project document ready as soon as possible in order to promote CIIFEN at international fora such as the Johannesburg World Conference on Sustainable Development (Sept. 2002).

In later meetings with key Ecuadorian participants in the CIIFEN initiative, it was found that the capacities of the institutions have been increased. INOCAR for instance, has received a mandate from ERFEN to become an official agency to issue climate predictions and received additional resources (see also page 10). Academic institutions, represented by CONASUP have restated their willingness to participate in CIIFEN. In particular, the University of Guayaquil, the Catholic University of Guayaquil, and the Polytechnic School of Ecuador (ESPOL) will maintain their direct participation in the organization of CIIFEN.

It is desirable and necessary to have further explicit endorsement of the CIIFEN initiative from CPPS. The Under Secretary of Multilateral Relations will take a leadership role in promoting CIIFEN within CPPS.

At the beginning of the mission it was not completely clear among Ecuadorian institutions, what the actual structure of CIIFEN should be. A combination between a "virtual Centre" and an actual facility with international scientists, constructed by phases was proposed as the proper mechanism to establish CIIFEN. A number of specific research activities for a number of specific countries may be desirable in the early stages of CIIFEN. Collaboration with CPPS-ERFEN countries and Bolivia could be the first phase. The scope, goals and numbers of participant countries, would eventually grow.

It is clear that the financial resources for CIIFEN should come in significant part from donations from international organizations, but not from loans from international financial institutions to Ecuador. WMO and ISDR should assist in the search for regional and international donors. However, a few other possibilities exist, such as money from projects, fees from participating countries, or fees for special services, to support activities within CIIFEN.

Secretariat of the President of Ecuador

The CIIFEN initiative receives full support from the Ecuadorian President and government. There is a great interest in Ecuador to reduce losses in natural disasters and for that reason, IDB experts and CAF PREANDINO are developing schemes to reduce the risk to natural disasters in this country. In such a context, CIIFEN is considered a priority part of early warning systems. It is also expected to improve efficiency and effectiveness in various socioeconomic sectors.

Timing of the steps in the creation of CIIFEN is crucial, considering presidential elections will take place in October 2002. In addition, several meetings among presidents from the Andean and Latin American region will take place in the coming months, which may be considered opportunities to promote CIIFEN.

Ecuadorian Office of Planing (ODEPLAN)

ODEPLAN, as the planning agency of Ecuador, is vitally interested in the development of CIIFEN. Its potential actions to support CIIFEN include strengthening of technical and scientific institutions through increases in their budget if property justified.

If the Ecuadorian institutions are to benefit from ODEPLAN interest in CIIFEN, a complete project document should be ready by late June 2002, in order to plan expenditures in Ecuador to support institutions involved in such initiatives. ODEPLAN support could even be in the form of financed projects.

In addition, the ODEPLAN representative suggested keeping in mind their role in the management of donations from international organizations supporting initiatives such as CIIFEN.

ODEPLAN is deeply involved in Disaster Loss Reduction Plans in Ecuador in part through PREANDINO. They closely work with this CAF organization on the implementation of strategies in Disaster Loss Prevention through connection with government bodies and the civil society and economic sectors affected by El Niño related phenomena.

Corporación Andina de Fomento (CAF) PREANDINO

CAF maintains a close interaction with regional bodies such as CPPS. In addition, CAF interacts with more than twelve countries in South America, which could participate and benefit from the ClIFEN initiative. Even more, CAF could become a potential donor for CIIFEN.

CAF-PREANDINO representative, Luis Arenas suggested that with a mandate from the Presidents from the member countries, this institution could financially support an initiative as CIIFEN, and would be a valuable partner in ensuring that ENSO advisories are acted upon.

PREANDINO would be an appropriate organization to mobilize disaster mitigation actions in the region in response to advisories and warnings of CIIFEN. Other countries interact with CAF in the context of sustainable development activities. In this way, the international perspective for CIIFEN could be expanded.

The United Nations Development Program (UNDP)

One of the challenges of CIIFEN is to become international. The UNDP representative in Ecuador proposed that an adequate approach to representatives from CAF-PREANDINO and the South Pacific Permanent Commission (CPPS) is necessary to establish regional collaboration. The CPPS will be celebrating its 50th anniversary and this could be a good opportunity to promote CIIFEN within this organization and to the public of the region.

In addition, CIIFEN should become involved in issues of Climate Change interactions with El Niño. The Global Environment Facility (GEF) could be approached in connection with climate change adaptation and transboundary waters and financially support CIIFEN. The joint approach El Niño - Climate Change could also become a mechanism to bring together countries in the region to address cooperation on climate change and related negotiation issues.

UNDP staff agreed that a Climate Outlook Forum, with the participation of scientists, stakeholders and representatives from donor institutions would be a useful mechanism to inform donors of the benefits that would result from CIIFEN. They suggest it is necessary to visit other countries in the Andean region to promote CIIFEN. Otherwise, this report should be distributed among representatives from these countries to encourage involvement.

Civil Defense Office

In view of the El Niño and even non-El Niño flooding in Ecuador, the Office of the Civil Defense has an interest not only in better predictions, but also in specific products that allow them to take preventive actions and better plan for disaster loss reduction, human and economic. Among other things, they maintain statistics at the municipal level on the natural disasters that occur in Ecuador.

An initiative such as CIIFEN could result in better technical information for the Civil Defense office. In exchange, this office could promote CIIFEN through the international agreements they maintain with other countries in the region.

National Institute for Meteorology and Hydrology (INAAMHI)

INAMHI is responsible for most of the national needs in Meteorology and hydrology. Surface water hydrology, underground water and environmental studies are among the areas of major interest for INAMHI.

International collaborations with the Florida State University and French Agencies (on retreating glaciers) are conducted at INAMHI. In addition, they participate in international treaties on transboundary water resources with Colombia and Peru.

The subject of El Niño is highly relevant to INAMHI since they need more accurate climate predictions to produce sector specific products. For instance, long term predictions on streamflow are needed to provide better information to the hydropower sector. This will be possible only if research on this area for the Andean region is developed.

As in several other state agencies, INAMHI is also interested in projects that result in actual income for the institution. This is one way they can promote more studies and support for the network of observation stations

they maintain. INAMHI has prepared a good database for several potential studies on interannual climate variability.

However, if data are not for research or other academic purposes, data will no longer be available without charge. Ecuadorian hydrometeorological data would be freely available for research at CIIFEN. This collaboration would result in benefits for INAMHI and CIIFEN and countries of the region.

CIIFEN, with INAMHI, could respond to the demand for tailored products, such as seasonal streamflow predictions, for countries in the region. The capacity from Brazilian or Colombian scientists could be shared within CIIFEN to help develop technical capacity in Ecuador.

Specifically, INAMHI proposes to have several specialists in the fields of Meteorology, Hydrology and Computer Sciences working in CIIFEN on scientific activities and for processing of information in Geographical Information Systems. In addition, INAMHI has offered to arrange to provide office space in Guayaquil for CIIFEN activities.

National Council on Education (CONESUP)

One very important element for CIIFEN will be the participation of academic institutions from Ecuador. Several universities and polytechnic schools are part of CONESUP, which wish to participate in the development of CIIFEN.

From the point of view of these institutions, CIIFEN should include research on means of applying ENSO predictions. Several Ecuadorian universities could develop studies on health, economics, disaster prevention, agriculture and El Niño. One important aspect to be included in CIIFEN is communication of climate and related information. Experience has proven that communication on El Niño impacts has not been adequate in Ecuador and consequently, it has been difficult to ameliorate the impacts of climate extremes.

CIIFEN could also result in more training and academic interest in fields such as Meteorology and Climate. At present, there are no academic institutions offering degrees in Meteorology. This has resulted in all meteorologists at INAMHI being foreign-trained. The academic sector of Ecuador could also participate in CIIFEN through the involvement of students in research activities, and the building of capacity in areas of climate variability and its applications.

CONESUP could also promote CIIFEN at the international level through academic exchange programs they maintain with regional, Latin American and international universities. Even more, CIIFEN fully meets the objectives of "Science for the Third Millennium" as proposed at the UNESCO conference of this title.

Centro de Levantamientos Integrados de Recursos Naturales (CLIRSEN)

In CLIRSEN, remote sensing activities are conducted through a station in Cotopaxi installed by NASA and in the hands of the Ecuadorian armed forces since 1979.

Images from Landsat, Spot, NOAA; and other satellites are obtained and processed through various software packages and visualized through Geographical Information Systems. The spatial coverage for the images is of the order of 2500 km, including almost 25 countries in the Americas.

Among the technical and scientific capacities in Ecuador, CLIRSEN is important. At present, their images are not widely used. They are not used by many. Ecuadorian institutions, given the high costs of each image. These images could be extremely useful in the determination of extreme rains and extent of flooding, and to determine the potential risks for health of such conditions.

A real involvement of CLIRSEN in ENSO related activities would be extremely useful in the understanding of El Niño impacts in the region and in the development of prevention plans. Although there are no formal limitations to access the images obtained at CLIRSEN, the costs and present management of the information could prevent its wide use among the scientific community.

Guayaquil

Oceanographic Institute of the Ecuadorian Navy (INOCAR)

A large part of monitoring and diagnosis of El Niño in Ecuador is conducted by INOCAR. Their experience and constant improvement of monitoring has led them to design methods of climate prediction with effective skill levels. The recent acquisition of two moored buoys to complement the TAO array, and marine and meteorological stations, including a new Oceanographic Laboratory on Galapagos Islands, will lead them to improve their ENSO early warning system. At a national level, INOCAR has a mandate to prepare climate predictions.

They are involved in diagnostic studies of ENSO from the physical, chemical and biological points of view. Through a statistical model, ENSO predictions are issued every three months, which are used in the definition of strategies within the national and regional CPPS-ERFEN activities. INOCAR conducts periodic (4 months) monitoring cruises in the Ecuadorian seas (Guayaquil - Galapagos) to detect changes, not only in the physical, but also in the biological conditions of the ocean. Cooperative cruises constitute one of the CPPS-ERFEN activities conducted in collaboration with Peru, Chile and Colombia.

Through the years, they have developed with local universities bio-indicators that constitute additional sources of information to determine if El Niño is developing. In conjunction with the National Fisheries Institute (INP), they use bio-indicators to develop long-term predictions and to examine when El Niño conditions begin to appear.

From the point of view of INOCAR scientists, it is necessary to work on communication of ENSO information among sectors of the Andean region. It is thought that inadequate communication of predictions or diagnostics has led to inaction to prevent or ameliorate the negative impacts of El Niño. An end to end project would greatly benefit Ecuador and other countries in Latin America, since through CIIFEN, the use of ENSO predictions could be beneficial to society and the economics.

INOCAR international activities are basically developed through the CPPS. There are also interaction with non-CPPS-EPX-EN countries. There are times when extreme meteorological conditions in other regions may indirectly affect Ecuador. As an anecdote, they noted that Hurricane Mitch affected the investments on aquaculture and bananas of Ecuadorians in Honduras. The tremendous economic losses related to Mitch resulted in part in incapacity of Ecuadorian investors to pay loans to banks and the collapse of many Ecuadorian financial institutions.

INOCAR offers to provide space for CIIFEN activities (see Section 6). Actually, this is a large planetarium that may be adapted for laboratory and office purposes. Remodeling of such space could be ready in a few months but could be costly.

Academic Institutions

1. The University of Guayaquil

At the University of Guayaquil, there exist a number of projects on biological aspects of the Ecuadorian seas. Most studies relate to taxonomy of the various phytoplankton, zooplankton and bottom fauna. Through their participation in INOCAR cruises, samples of various species are collected periodically. Part of their studies is aimed at finding bio-indicators of El Niño.

Other areas of study in this institution involve the analysis of impacts of El Niño in sectors such as health, economy and hydrology. Their basic studies could be enriched through participation in CIIFEN activities and they could assist in developing information products, especially in health.

2. The Polytechnic School of Litoral (ESPOL)

Compared to the University of Guayaquil, ESPOL is a more applications oriented institution. Much of their activities are in research oriented to practical applications of climate information. ESPOL is a modem

institution working in close collaboration with various sectors of the Ecuadorian economy.

ESPOL scientists work on climate variability and ENSO, focused mainly on fisheries and agricultural. Various projects are conducted in collaboration with international institutions using funds from international institutions. Consequently, they are familiar with end to end projects (see Section 3.2e).

ESPOL should be an important participant in CIIFEN and in use of ENSO information. They would benefit from access to more specific output from GCM experiments on El Niño and even numerical predictions of regional climate in the Andean region. They have good connections with IAI, New York, and have developed methods of applying ENSO predictions in agriculture.

Other areas of study of ESPOL, such as in biotechnology, may eventually benefit from research on climate variability within CIIFEN.

National Fisheries Institute (INP)

The INP undertakes studies on the productivity of the fisheries sector in Ecuador. They monitor actual catches in the region and relate fisheries productivity to El Niño and other aspects of climate variability. They have developed knowledge on the use of biological and chemical indicators for El Niño. They participate in the ERFEN committee to issue periodic outlooks on El Niño or non-El Niilo conditions.

As part of the new policies in Ecuador, INP must search for external funds to maintain their work. In their Divisions of basic research and environmental assessments they examine the actual trends in fisheries and aquaculture. An El Niño event may be extremely productive in the shrimp sector with increases in sales of up to 50%. On the contrary, La Niña can have negative impact on the shrimp industry of Ecuador.

It is a matter of concern that catches in Ecuador show a negative trend for the last twenty years, maybe as a result of overexploitation. It will be necessary to determine to what extent changes in climate in the near future may affect the fish populations, and such problems have been posed as an important research topic within CIIFEN.

The potential of INP to monitor the ocean productivity and relate it to fisheries may lead to important international collaboration with similar sectors in other regions. For instance, there is great interest in Central America in examining the impacts of Climate variability in the fisheries sector. CIIFEN could promote such collaboration.

The Permanent Commission of the South Pacific (CPPS)

The CPPS headquarters, now permanently in Guayaquil, is a key organization for CIIFEN. It groups four countries in the Andean region and some others from Latin Americas as observers. CPPS can consequently provide the formal international scope for CIIFEN through the high-level government participation.

For the CPPS new Secretary General, all activities aimed at using climate information to reduce vulnerability are a priority. However, in order to endorse officially CIIFEN activities, ERFEN and other scientific bodies within CPPS should analyze the project.

After such consultation, a formal statement by CPPS in relation to CIIFEN could be provided.

In the following months, CPPS will celebrate its 50th anniversary. This may represent an opportunity to examine the importance of CIIFEN at the Presidential level and incorporate some of its activities more formally within CPPS.

2.3. SUMMARY OF DISCUSSIONS ON SCOPE OF ACTIVITIES TO BE UNDERTAKEN BY CIIFEN

Various activities, mostly related to monitoring and use of ENSO predictions, are being developed in Ecuador. INOCAR, INAMHI, INP and ESPOL may be considered the most important institutions in terms of studies on El Niño. Their main concern is to coordinate better Ecuadorian projects within CIIFEN related activities. This concern may be addressed by an "end to end" project on ENSO and its impacts in particular sectors. In such a project, local institutions may participate with their expertise, which in turn may be complemented by work developed by scientists from the region and international institutions.

There is great interest for CIIFEN to work on those aspects of El Niño related to tailored products for specific sectors and communication strategies for such products. In particular, the Disaster Preparedness sector of the region constitutes a topic in which more multidisciplinary international work could result in new or modified specific information products to ameliorate the negative impacts of El Niño. Until the present, this phenomenon still has severe impacts especially in Ecuador, Peru and Bolivia. The PREANDINO initiative may constitute an adequate mechanism to reach the government officials in the disaster mitigation sector with CIIFEN science.

Operational Activities, Coordination functions, Data services, Training and capacity building.

CIIFEN activities should include interpretation and downscaling of GCM experiments from around the world. In particular, the impacts of global

and regional warming in the coasts of Ecuador and Peru (not necessarily reflecting an El Niño event) may have profound effects on convective activity, heavy rainfall and floods in the region. Studies can be based on detailed information collected during cruises conducted by INOCAR (and other CPPS members) and information from the buoys of Ecuador and Peru to address this issue. The opportunity for collaboration appears to be there.

Most Ecuadorian institutions are committed to support CIIFEN activities by providing data bases and expertise on the interpretation of meteorological oceanographic, chemical and biological parameters. This may assist CIIFEN in becoming a unique Centre in the world, where all of these disciplines combine to examine ENSO and its impacts. CIIFEN could also be a data repository for specialized studies on ENSO, based on non-traditional sources of information.

Developments on downscaling and tailored products may be of great benefit to National Meteorological and Hydrological Services (NMHSs) in the region in order to provide more detailed information to some sectors, such as the hydroelectric industry or the disaster preparedness sector.

Although some El Niño predictions are now prepared through ERFEN, more reliable frequent and specific seasonal information products would be distributed by CIIFEN along with strategies to better interpret and communicate climate information for socio-economic decision making.

Some experience on the interaction with users of climate information exist, but have often not resulted in real action in various sectors. The close collaboration among official (government) agencies and academic institutions through CIIFEN could demonstrate the value of better information products through science.

In Ecuador, Bolivia and some other countries in Latin America there is great need to train specialists on the interpretation of ENSO information. Based on a recent study on the capacity of Latin American and Caribbean countries to interpret ENSO predictions (by WMO for IDB), it was found that there is great need to train people on interpretation of diagnostics and predictions, to translate into sector specific products. CIIFEN can be the Centre to teach and train people from Latin America based on the experience of scientists from Latin America and the rest of the world. Such training courses could be undertaken regularly involving NMHSs and others with the specific goal of using climate predictions in the planning of activities.

2.4. DISCUSSIONS ON HUMAN AND FINANCIAL RESOURCES REQUIRED

After visiting the major Centres where some research and monitoring of ENSO is now conducted, it has been found that CIIFEN may require several international specialist, in an early phase. Monitoring capacity of

INOCAR, INAMHI and INI-I could be complemented with the expertise of a scientist on downscaling and interpretation of ENSO prediction products. The International Research Institute (IRI) for Climate Prediction could provide technical and scientific support. Support from the *Instituto Nacional de Pesquisas Espaciales* (INPE), from Brazil will also be valuable in CIIFEN. Additionally, an expert on Natural Disasters from the Region, interested on the implementation of PREANDINO would benefit the implementation of the sector specific or tailored products. Also the participation of U. Guayaquil, and ESPOL will be necessary. The latter has been involved on projects for the agricultural sector. Finally, economic studies and a professional in communications and outreach would be needed to fill the gaps necessary for an end to end project with specific target sectors. Clearly, the idea of this strategy is to implement a truly multidisciplinary Centre from the very beginning.

The proposed structure for CIIFEN is relatively new in the world and certainly a novel experience in Latin America. The idea is to have tailored products for specific sectors, that may be clearly communicated to decision-makers, whose impacts on the society may be evaluated in an economic and social sense. Most experts, proposed for the first phase, exist in the region and in Latin America, but some international specialist assistance would be necessary.

2.5. DISCUSSIONS ON ARRANGEMENTS FOR HOUSING CIIFEN

The great interest in Ecuador in CIIFEN has led several institutions to offer accommodation. There are advantages and disadvantages to each one of the offers, but several of them could serve well as the first home for CIIFEN. The mission was shown three of the options.

A summary of advantages and disadvantages of these options is given in Section 6, with the final decision being the responsibility of the government of Ecuador.

2.6. DISCUSSIONS OF COLLABORATIVE AGREEMENTS

INOCAR, INAMHI, INP and ESPOL will play a key role in the research and operational activities developed at CIIFEN. The detailed planning of projects for CIIFEN should be further defined mainly by staff of these institutions, combined with sector communication, outreach officers, and international advisors.

Close interaction should be maintained with other NMHSs in the Andean region (Chile, Peru, Colombia and Bolivia) to ensure that projects have a regional perspective. Some of these institutions have significant expertise, which will help to meet CIIFEN goals. Other NMHSs will greatly benefit from having some of their personnel working at CIIFEN and learning from experts from other regions. NMHSs should be a main mechanism for distribution of climate predictions and sectoral advisories, because of their already close connections with the media and users.

NMHSs from the Central America and MERCOSUR regions should also be considered in the early phases of CIIFEN, since they have a great interest in developing applied research related to El Niño's regional impacts.

In addition, CIIFEN should collaborate with IRI, New York and INPE, Brasilia whose work on ENSO prediction and preparation of tailored products should serve as guidance in the Andean region. IRI scientists should be invited to visit CIIFEN and cooperate in some of the proposed projects.

3. MAYOR DEVELOPMENTS SINCE MARCH 1999 FEASIBILITY STUDY, AND THEIR IMPLICATIONS

In March 1999, the initial feasibility study was carried out by the World Meteorological Organization. The report of that study is contained in document A/C.2/54/7. It describes the scientific and organizational context, the scope and functions that such a centre should undertaken a suitable location, staff and equipment needs, and a proposed organizational arrangement. The report also outlines the probable contributions that would be required from the host country, and the magnitude and nature of external resources required. Some significant developments have occurred since March 1999 and are described in this section (3) of the Report. These require modifications to the 1999 Feasibility Study and especially to estimates of costs.

3.1. INTERNATIONAL DEVELOPMENTS:

a. UN General Assembly resolutions concerning El Niño' s negative impacts and their reduction, through a Centre based in Guayaquil, were adopted in 1997, 1998, 1999, 2000 and in January 2002[2]. This latter resolution "Commends the measures adopted by the host country for the establishment of an international centre for the study of the El Niño phenomenon, and encourages the government of Ecuador to continue its efforts aimed at completion of that process". This resolution (56/194) goes on to call upon "UN Organs, funds and programmes..... to support establishment of the above-mentioned research centre at Guayaquil, Ecuador". The UN Secretary General is requested in 7 of this resolution "to report to the 57th session of UNGA" under the topic "Environment and Sustainable Development".

   This mission by World Meteorological Organization (WMO) and International Strategy for Disaster Reduction (ISDR) of 8-12 April 2002, was to respond further to the January 2002 resolution, especially in the light of the Memorandum of Cooperation of 19 Sept. 2001 between the Government of Ecuador and WMO. This MOC commits initial resources to the Centre from Ecuador (see Section 3.3).

[2] GA resolutions 52/200, 53/185, 54/200, 55/197 and 56/194; ECOSOC resolutions 1999/46 and 2000/33

b. In January 2000, the International Strategy for Disaster Reduction (ISDR) was established by the UN General Assembly (Resolution 54/219) and confirmed in December 2001 (Resolution 156/195 as a successor arrangement to the International Decade for Natural Disaster Reduction (IDNDR, 1990-99). The International Strategy for Disaster Reduction is based upon outcome of the IDNDR Programme Forum, which was held in July 1999 in Geneva to lay the foundations of a successor programme to the IDNDR. Subsequently ECOSOC and the General Assembly endorsed the Geneva Mandate and the Strategy for a Safer World in the Twenty-first Century (E/ 1999/63; A/res/54/219).

   With resolution 56/195 of January 2002, the UN General Assembly confirmed these arrangements and decided that the ISDR Secretarial and the Task Force should continue to operate on a permanent basis. ISDR serves as a global framework for action with the aim of building disaster resilient societies and communities, in order to reduce human, economic and social losses from the effects of natural hazards and related technological and environmental disasters. The ISDR involves a conceptual shift from an emphasis on disaster response to the management of risk and reduction of vulnerabilities. The ISDR builds on the experience of IDNDR, the Yokohama Strategy and Plan of Action (1994) and the Strategy. "A Safer World in the 21st Century: Disaster and Risk Reduction" (1999).

   The institutional arrangements to facilitate the implementation of the Strategy are an Inter-Agency Secretariat and Task Force. **The Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR), Geneva,** serves as the clearing house on disaster risk reduction, as the focal point within the UN system for the coordination of strategies and programmes for natural disaster reduction, and to facilitate tile implementation of the ISDR mandate. In Latin American and the Caribbean region, ISDR is represented by its regional unit, located in San Jose, Costa Rica.

   The ISDR secretariat also provides support to an **Inter-Agency Task Force for Disaster Reduction (IATF/DR)**, which has tile role of devising strategies and policies for the reduction of natural disasters, identify gaps in disaster reduction policies and programmes and recommend remedial action among relevant international and regional organizations. In addition, the ISDR Secretariat has been entrusted by the General Assembly with the coordination of international cooperation to reduce the disaster impact of the El Niño phenomenon.[3]

c. **WMO** - Warnings and advisories from an El Niño Centre can be valuable in preparing for flood and drought disasters associated with ENSO events. In addition, there are a number of socio-economic

[3] GA resolutions 52/200, 53/185, 54/200, 55/197 and 56/194; ECOSOC resolutions 1999/46 and 2000/33

sectors which, while not suffering disasters, can nevertheless benefit from seasonal climate advisories, including El Niño and La Niña related conditions. These include fisheries, agriculture, construction, water resources, energy production and use, and human health. WMO conducts worldwide activities to improve applications of climate information in these sectors, under their World Climate Applications and Services Programmes, which has been strengthened since 1999. Much of WMO' s activities are conducted through National Meteorological and Hydrological Services (such as INAMHI in Ecuador), and Regional Associations such as Region III for South America.

d. **The International Research Institute** for Climate Prediction (IRI), Palisades, N.Y. supported by U.S. NOAA, moved into its new facilities in 2000 at Lamont-Dougherty Lab. of Columbia University and has expanded its efforts to assist Centres and organizations around the world with El Niño and seasonal climate predictions. For example, IRI and the African Centre for Meteorological Applications for Development have signed a cooperative memorandum of Understanding. Several other international institutes such as the Hadley Centre, UK, have improved their global modelling of ENSO phenomena.

e. **The UNESCO Conference on Science** for the Third Millenium called upon the world community to support more vigorously climate related science activities (see also Section 2.4).

Implications: All of the above international developments greatly strengthen the intent and capability of the international community to support an El Niño Centre in Ecuador.

3.2. REGIONAL DEVELOPMENTS:

a. **The Permanent Commission for the South Pacific CPPS** has membership from the four West Coast countries, Colombia, Ecuador, Peru and Chile. It continues to foster a four country Regional Study of the El Niño Phenomenon (ERFEN) and national ERFEN committees. A major development since 1999 is the move of the Secretary General permanently to Guayaquil. The new Secretary General, from Colombia, is also appointing a scientific advisor who will assist liaison with CIIFEN. Continued commitment of this body to CIIFEN is essential (see Section 2.2 pg. 12).

b. **Regional Programs of Risk Prevention and Reduction**

The devastating El Niño phenomenon of 1997-1998 that devastated the Andean countries, caused economic losses estimated at US$7.5 billion and cost the individual countries between 4.5% and 14.6% of their Gross National Product. It was the severity of this event that motivated the heads of government of these nations to move toward

creation of an El Niño Centre for research and advisories, and to ask the Corporacion Andina de Fomento (CAF) to establish, in late 2000, the Regional Programme for Risk Prevention and Reduction (PREANDINO). This has the objective of promoting and supporting the development of national and sectoral disaster risk prevention and mitigation policies and of new forms of institutional organization aimed at incorporating disaster prevention into development planning. PREANDINO involves the CPPS countries and Bolivia.

At the operational level, the key players in this initiative are National Committees, which include representatives from the Ministries of Planning, Science and Technology, and the Environment, Meteorological and Hydrological Services, as well as of national civil defense or disaster prevention and response bodies. Sectoral Committees have also been appointed. All of these institutions are linked in a network that supported by face-to-face conferences, facilitate the exchange of information and experience, allow participants to share and shape indicators on the effectiveness of disaster management, and simplify negotiations with financial bodies.

Not all Andean countries have the financial resources needed for preventive risk management. Within the PREANDINO framework, opportunities are being sought to establish special prevention funds and making better use of existing sources of financing. In the case of Ecuador, a Risk Prevention and Management Fund is being created with the support of international financial institutions.

In order that disaster prevention becomes a key component of sustainable development initiatives, efforts are underway in the Andean countries to incorporate prevention into national and local development plans and land-use management plans, as well as to establish support mechanisms for planning and decision-making. The development of indicators to assess risk reduction trends is underway, as part of the monitoring tool being developed jointly with ISDR and PREANDINO.

In addition to the above program, several other organizations in Latin America are contributing to El Niño related disaster loss reduction activities including UNDP, PAHO, and CEPREDENAC (Central America).

c. **WMO Region III**, for South America, held its quadrennial meeting in Quito, Ecuador in 2001. The national Permanent Representatives of South American countries supported the actions of Ecuador, WMO and ISDR to establish CIIFEN. The meeting also elected Ing. Nelson Salazar Delgado, Permanent Representative of Ecuador, and Director of INAMHI, as President for WMO Region III for the coming four years period. Through the Hydrology Working Group of Region III, a cooperative project amongst hydrologic agencies has been developed

on Water Resources and El Niño. The project involves exchange of data, and funds are being sought to support the project.

d. **Regional Cooperation in Oceanography**

The Institutes of Oceanography of the CPPS countries have cooperated in a series of scientific cruises covering the coastal regional waters, north and south of the equator. The data collected are beginning to yield new insights into the behavior of coastal waters. The developing spirit of cooperation between these institutes will be a major asset to an international centre such as CIIFEN.

e. **Inter-America Institute for Global Change Studies (IAI, and other organizations)** have funded a number of projects involving countries of the Andean region through IAI Collaborative Research Networks (IAI-CRNs) on topics such as climate variability as related to health and natural disasters. They involve Ecuador and particularly research staff of ESPOL and are funded until 2004. Among those completed since March 1999 or still underway are projects from IAI on:

- Variations in spatial and temporal precipitation patterns in the trade convergence region (I 998-2000)
- Multi-objective study of climate variability for impact mitigation in tile trade convergence climate complex (1999-2003) - involves in addition to ESPOL, University of Guayaquil and INAMHI.

Regional Projects involving ESPOL, funded by other organizations include:

- Regional monitoring of the impact of El Niño events on biological resources and their uses in Latin America (1999-2002) - Organization of American States
- Reducing the impact of environmental emergencies through early warning and preparedness - the case of El Niño-Southern Oscillation (ENSO) (1999-2000)
  - UN Environment Program (Ted Turner Foundation)
- Strengthening the Pan American Climate Studies Sounding Network: (1997-2003) U.S. National Oceanographic and Atmospheric Administration - also involves INAMHI

f. **Developments in other countries -** Peru, partly through World Bank assistance, and Colombia have both developed active ENSO related programs.[4]

[4] See summaries for these countries in "Evaluation of Existing Institutional Capacity and Technical Capabilities in Latin American and Caribbean countries to make use of ENSO predictions"; WMO Oct.2001 for IDB, ATN/ JF6569/RG

Implications

Activities in the Andean region imply a growing capability and sense of cooperation between institutions that suggest that the time is right to establish an institution in Guayaquil that will bring these various activities together in a more formal way. The capability to make productive use of ENSO predications is growing. CIIFEN, and its outreach activities, promise to yield synergies and many benefits for the region.

3.3. NATIONAL DEVELOPMENTS:

a. **A Memorandum of Cooperation** between the Republic of Ecuador and the WMO for the establishment, operation and development of CIIFEN was signed in September 2001. This MOC was signed by the Secretary General of WMO and the Minister of Foreign Affairs of Ecuador in the presence of the President of the Republic of Ecuador and other high officials. It establishes a **Trust Fund** and a Technical Committee consisting of representatives of relevant Ecuador institutions "in charge of operational activities" which is to determine acquisitions and expenses, in conformity with the Feasibility Study, to be financed by the Fund. The Fund provided by Ecuador as "contributor" is $385,000 US, held by WMO as the Trustee. The Trustee is required among other things to keep the Technical Committee informed of the status of the Fund, to ensure payments are made and to assist in international resources mobilization for the Centre.

b. In addition to the Funds committed in the Memorandum of Cooperation, the government of Ecuador has moved to strengthen the capacity of national institutions. In particular, INOCAR (the Oceanographic Institute of the Navy) was supported to increase coastal observation networks, to install two moored buoys, in the coastal area and near Galapagos Islands and to install an Oceanographic Laboratory on the Galapagos. A total of $5.1 million US was committed and this will reduce capital requirements for CIIFEN identified in the 1999 Feasibility Study. In addition, INOCAR, in cooperation with INP, University of Guayaquil and ESPOL has further developed use of biological indicators for detection of onset of El Niño and other oceanographic conditions. INAMHI has been able to restore much of the hydrometric and climatological networks destroyed in the 1997-98 El Niño.

c. The National Committee on Climate Change completed Ecuador' s First National Communication to the UN Framework Convention on Climate Change. This identifies many of the Republic' s vulnerabilities to both climate change and variations such as those associated with ENSO events. INAMHI provides the technical Secretariat for the National Committee.

3.4. SCIENTIFIC DEVELOPMENTS:

a. **The Third Assessment Report (2001)** (TAR) of the Intergovernmental Panel on Climate Change (IPCC) addresses the likely interactions between greenhouse gas-induced climate change, and ENSO events. The Technical Summary states: "Many models show a mean El Niño-like response in the tropical Pacific, with the central and eastern equatorial Pacific sea surface temperature projected to warm more than the western equatorial Pacific, and with a corresponding mean eastward shift in precipitation". The science remains somewhat uncertain about future frequency and amplitude of ENSO events in the ocean. However, "global warming is likely to lead to greater extremes of drying and heavy rainfall and increase the risk of droughts and floods that occur with El Niño events in many regions". (IPCC-TAR) In other words, more severe meteorological effects of El Niño events even if the events are unchanged, are to be expected with global warming in the CPPS region, and other neighboring countries.

b. **Models of the global climate system** developed at a number of centres are showing increasing skill at simulating the ENSO phenomenon. However, further improvements are needed. Some of these models are used both to project future climate conditions, decades to centuries in the future with greenhouse gas forcing, and to provide predictions a few months or a season in advance, closely tied to ENSO and other natural modes of the climate system. The relationship between the state of the ENSO, and the Pacific Decadal Oscillation of the North Pacific is also being explored and better understood. However, much remains to be learned **through regional research** about the relationship between anamolously high sea surface temperatures (SST) in mid-Pacific (Niño 3 and 4) and the near-shore SST conditions (Niño 1 and 2). Anomalous convective activity and heavy rains associated with these conditions need more regional research in order to produce reliable predictions.

c. **The IRI (Palisades, N.Y.), WMO,** and several regional centres have developed initial techniques for tailoring ENSO predictions in the form of advisories to various economic sectors and in disaster mitigation for other regions of the world.

Implications - In short, the scientific developments indicate that enough is known to provide useful advisory services, but that further research at CIIFEN would be valuable both locally and globally. Global warning will exacerbate El Niño and La Niña effects but adaptation to ENSO events will be a major step towards adaptation to anthropogenic climate change in the CPPS region. In the future, countries of the region may wish to coordinate their climate change responses through a Centre such as CIIFEN.

4. SCOPE OF CIIFEN

4.1. CONCEPT OF CENTRE – CIIFEN will be a Centre taking its place among similar institutions around the globe, but must at the same time provide substantial economic benefits to the countries of western South America.

a. With greater scientific capability of producing useful forecasts a season or more in advance, in areas affected by the ENSO phenomenon, a number of institutions around the globe have been established or modified to take advantage of this capability. Some use global modeling and provide outlooks on a global basis (e.g. International Research Institute for Climate Prediction, Palisades, N.Y., and European Centre for Medium Range Weather Forecasts, U.K.). Others have a more regional scope such as the African Centre for Meteorological Applications to Development (ACMAD), Niamey, the Drought Monitoring Centre, Nairobi, INPE in Brazil and specialized Centres in Singapore for SE Asia, and Darwin for SW Pacific. Such Centres exchange information on their research results and operational predictions. To date, there has been no international centre with a focus on the region where El Niño effects are most severe - the eastern equatorial Pacific and the countries of the West Coast of South America.

   CIIFEN is thus conceived as a centre with global connections to other centres in the world, but with a special focus on eastern equatorial Pacific and tile western countries of South America.

b. CIIFEN is also designed to have direct social and economic benefits in the CPPS countries and adjoining areas through transferring scientific knowledge into action. These benefits will derive from seasonal forecasts and El Niño - La Niña warnings and advisories. To be of maximum benefits these warnings and advisories must be converted into **information products** designed to be of use for disaster loss reduction, and in key socio-economic sectors, public health, agriculture, fisheries, water management, energy production and use. CIIFEN is being planned to meet these needs through a core Centre, augmented by research and outreach components in affiliated institutions and with a strong public information component through creation of a network of information specialists. The initial geographical scope of these special services would be to the CPPS countries and Bolivia.

   The Centre would thus address four main global and regional concerns:

   i) Early warning systems for disaster loss reduction

   ii) Adaptation to climate change and variability

iii) Management of transboundary waters, and

iv) Capacity and institution building for sustainable development

The Centre would be developed in phases:

4.2. PHASE I: from 2002 to mid 2003, would be the CIIFEN initiation phase. This would involve:

i) Selection by the government of Ecuador of accommodation facilities at a location in Guayaquil (see Section 6),

ii) Initial core staff from INOCAR and INAMHI designated and several additional staff members recruited,

iii) The International Board would be formed and would recruit a Director for the Centre, through international competition,

iv) Communication systems to CIIFEN would be confirmed or installed in cooperation with WMO, including effective high-speed connections to the Global Telecommunications System carrying World Weather Watch information. This would probably require a connection between Brasilia and INAMHI in Quito with onward transmission to Guayaquil. In addition, assured high speed Internet connections are required,

v) To celebrate initiation of CIIFEN, to alert the region to El Niño prospects over the November 2002 to April 2003 period, and potential responses, and to outline requirements for contributions from multi-lateral and bilateral donors, a major event is suggested for early September 2002. An initial outline of a program for such an event appears in Annex "B" of this report. This could also be the occasion for a meeting of the International Board (see Section 5),

vi) The Technical Committee, International Committee and Director (see Section 5) should negotiate cooperative arrangements with other Centres. In particular, it is suggested that a memorandum of understanding (MOU) with the IRI be developed, similar to the existing MOU between IRI and ACMAD. This provides for a number of cooperative activities and for the IRI Director to be a member of the ACMAD International Board and vice versa (copies of the ACMAD-IRI MOU are available). A similar Agreement is needed with INPE (Brasilia),

vii) Initiate or continue research on application of seasonal forecasts in various economic sectors by University of Guayaquil, ESPOL, INAMHI and INP,

viii) Appoint an information and communication officer to ensure optimum wording and distribution of advisories and warnings and close liaison with NMHSs and national sectoral groups.

4.3. PHASE II (mid 2003 to 2005): This will be the operational and development phase of the Centre. It is proposed that at monthly intervals climate predictions be issued for the following four to six months. Tailored advisories should be issued for disaster mitigation use for the PREANDINO region and for use in other economic sectors, initially in Ecuador and later in other CPPS countries and Bolivia. This will require:

a. Initiation of program for scientists and applications specialists from other countries of the region (especially Peru and Colombia) and other international institutions to work as visiting specialists at CIIFEN, for agreed periods of time,

b. Continue support initiated in Phase I for research on methods of tailoring advisories to meet the needs of various economic sectors, Suggested arrangements would be with:

- Disaster mitigation - PREANDINO and ISDR
- Agriculture - ESPOL
- Fisheries - INP
- Health - University of Guayaquil and PAHO
- Water resources and Hydro-power - INAMHI and Hydrology Working Group of WMO Region III.

c. Special advisories to the various sectors would be issued by CIIFEN in collaboration with the institutions undertaking the research for that sector (as above). Dissemination of advisories through NMHSs would take advantage of their already close connections with the media and public.

4.4. PHASE III (mid 2006 -)

This phase would see full-scale advisories issued to countries and sectors in the region as outlined under Phase 2 and to other countries as arranged. Research would be resulting in papers suitable for international journals on the factors affecting sea surface, temperature changes in regions Niño 1 and 2, near the west coast of South America, and on more detailed information on the relationship between SST anomalies in this area and meteorological conditions in adjacent land regions. Also research on design of advisories and applications in various economic sectors should be published. International exchanges of staff would

continue to enhance the capabilities of CIIFEN, and its outreach to countries of Latin America.

4.5. REGIONAL CLIMATE AND HYDROLOGIC DATA

It must be noted that data collection and management by INAMHI and other NMHSs lit the Region will be an essential support to CIIFEN activities. It was beyond the scope of a short mission to one country, Ecuador, to evaluate (lie need for additional assistance for these vital activities.

5. MANAGEMENT STRUCTURE

5.1. Director and Management Staff. Day to day management of CIIFEN will be undertaken by the Director in cooperation with the Finance and Administration Manager and other senior staff.

5.2. The Technical Committee, with duties as outlined in the Annex to the Memorandum of Cooperation between Ecuador and WMO, will advise the Director on operations. It has particular responsibilities concerning expenditures from the Trust Fund, which Ecuador has provided to WMO as Trustee. The Technical Committee will consist of members appointed by Ministry of External Relations, Ecuador, including INOCAR, INAMHI, INP, ESPOL, the University of Guayaquil and the Catholic University of Santiago de Guayaquil. The CIIFEN Director should be an ex officio member of this committee, which must meet at least quarterly, more frequently in Phase I, and as otherwise needed by the liost country for the Centre.

5.3. An International Board will consist of representatives of WMO, ISDR, CPPS, Ministry of External Relations, Ecuador, cooperating Institutions (e.g. IRI), donor agencies, and key scientists with appropriate knowledge and experience, with the Board having up to 15 members. It would have the following responsibilities:

- Arrange for an international competition for a Director and selection of the Director,
- Seek and secure support from bilateral and multilateral donors, with the assistance of the Director and Government of Ecuador,
- Provide general scientific direction to the work of the Centre,
- Promote and agree to international cooperative arrangements within the WMO Region III (South America) and with other Centres and Institutions elsewhere,
- Provide guidance, as otherwise needed, to the Director and Technical Committee.

The International Board will meet in early September 2002 (see Section 4.2) and initially every six months or as otherwise determined by the Board. In most cases the Institutions represented on the Board will pay expenses of their Members. External Scientific experts must have their expenses covered by CIIFEN funds or other donors.

6. ACOMMODATION FOR CIIFEN

The Task Team (Bruce, Magaña, Palm) visited potential sites in and near Guayaquil for accommodation of CIIFEN that could be made available by the Government of Ecuador or one of its Institutions. It was expected, but not confirmed that services (lights, air conditioning, local telephones, etc.), would be provided by the Ecuador government or its institutions. The final decision on location of CIIFEN, in or near Guayaquil, rests with the Government of Ecuador. Some criteria that should be considered are:

- Adequate space including office space for a staff of up to 25 including visiting scientists
- A room suitable for computer facilities
- Feasible access to high-speed communication links
- Ease of physical access and adequate parking space
- In a separate building, identified as an international centre (CIIFEN) rather than as part of the host institution
- Access to a moderate size conference room, and board room-meeting facilities

The three potential sites considered by the mission team and their perceived advantages and disadvantages are as follows:

i) An empty Planetarium building of INOCAR (they are building a new one closer to the city centre)

Advantages:

a) More than adequate gross space for all aspects of CIIFEN

b) Some distance (estimated 15 min. drive) from city centre, but with more than adequate parking

c) Readily designated and signed as an international centre

d) Land to build accommodation for visiting scientists. Who would pay ?

Disadvantages:

a) Substantial interior renovation required to produce enough offices and other rooms for CIIFEN, and have them close enough together for inter-action amongst staff. Would INOCAR or Ecuador pay for this?

b) All offices so created be interior space - no outside windows

c) Close to heavy truck traffic to and from Guayaquil's busy port.

ii) A floor in the Ministry of Agriculture building in downtown Guayaquil

Advantages:

a) Walking or easy bus and taxi access to downtown hotels

b) Co-location with lNAMHI' s regional office for Guayaquil and with some Ministry of Agriculture staff concerned with applications of climate predictions.

Disadvantages:

a) Somewhat old and dusty building (long lineup for the one elevator that was working when visited)

b) No parking facilities

c) Not readily identifiable as an International Centre.

iii) A building or space in a building on the very large (760ha) campus of ESPOL

Advantages:

a) Spacious campus and relatively new, functional buildings

b) Adequate parking space

c) Communication facilities excellent

d) Co-location with some of leading ENSO researchers in Ecuador

e) Visiting scientists could be readily accommodated.

Disadvantages:

a) Some distance (25 min) from city centre

b) Special efforts would be needed to have a building designated and recognized as an international Centre, rather than as part of ESPOL.

A further alternative for the Government to consider could be to rent a suitable building or house in Guayaquil, which could be designated as an International Centre.

7. RESOURCE REQUIREMENTS BY PHASE:[5]

With the modifications needed as a result of activities since 1999 (Section 3), and the phases of development of CIIFEN outlined in Section 4, significant revisions are required to resource requirements as outlined in the Feasibility Study of March 1999. In addition, it is assumed that a 5% increase in salaries must be introduced to cover the three-year interval since the original estimates.

The basic organizational structure of the Centre would remain the same as earlier proposed except for the Applications and Outreach component and research on application techniques in various sectors, which are now proposed to be undertaken in a distributed fashion by other institutions but linked to CIIFEN. However, the proposed Research and Modeling Division, the Seasonal Forecast Division (but not Applications) and the Administrative and Finance Division would remain as before.

Phase I to mid 2003

It is assumed that mainly through INOCAR and INAMHI, two Oceanographers and two Meteorologists plus one Modelling and Data Management expert would be provided to the Centre in initial stages, beginning as early as September 2002. One of each discipline, plus the data management expert, would begin the work in Research and Modelling, and one of each would be devoted to preparing the operational ENSO and seasonal predictions. One of these five officers should be appointed as **Interim Director**. An officer for Finance and Administration and one for Telecommunications and Observations would be required from the beginning as well as an Information Outreach officer. It is assumed that a Centre Director would be recruited by international competition and could begin duties starting sometime in the first half of 2003. The Director would then take the lead in recruiting the remainder of the needed staff.

In the following table, salary costs in Phase I are estimated on an **annual** basis. They would have to be pro-rated to the time the staff members occupy the posts:

[5] Note: These resource requirements are in addition to those needed by INAMHI and others NHMSs in the Region to improve climate and hydrometric data management and provision, as well as data rescue activities. These where beyond the range of the mission to Ecuador only and should be assessed by WMO.

PHASE I INITIAL COSTS ($000 US)	Ecuador Annual Costs	International Annual Costs	International Capital Costs
Research and Modelling Division			
1 Metereologist	25		
1 Oceanographers	25		
1 Modeling and Data Mgt. Expert	25		
Forecast Division			
1 Oceanographers	20		
1 Metereologist	20		
Applications Studies			
4 Initial contracts (Health, University of Guayaquil Agriculture, ESPOL, Fisheries, INP, Water and Energy, INAMHI)	60		
Administration and Finance			
Manager	17		
Telecommunications and Observation Officer	17		
Annual communications cost	40		
Information, outreach and liaison office	20		
Support for IRI, New York for Training and Scientific Exchanges		70	
Capital Costs			
Central Computer, Powerful Work Station and P.C.s			500
Telecommunications, GIS Access, Internet			100
Provision and Refurbishment (as needed) of CIIFEN Acommodation			(Ecuador ?)
TOTAL	242	70	600

PHASE II ($000 US) By late months of Phase I and in Phase II (2003 - 2005) Begin issuing tailored advisories	Regional Annual Costs	International Annual Costs	International Capital Costs
Director, CIIFEN		100	
Research and Modelling Division 2 Metereologist 2 Oceanographers 1 Data Management and Modelling Expert 2 Assistants – Technicians	 44 44 25 13		
Forecast Division 1 Oceanographer 1 Metereologist 2 Outreach and Liaison Officer with Contacts in Economics Sectors and Liaison with PREANDINO Applications Contracts (as in Phase I)	 20 20 40 80		
Administration and Finance Manager and Accounts Officer (2) Telecommunications and Observations (1) Annual Telecommunications cost	 32 17 40		
Additional Computers (Desk and Lap-top)			50
Visiting Scientists and IRI exchanges costs	20	100	
Travel (liaison, scientific meetings)	25		
TOTAL	430	200	50

PHASE III (2006-) ($000 US) Full scale operational phase: Extension of tailored advisores and warnings to all western South American countries, publication of research results, etc.	Regional Annual Costs	International Annual Costs	International Capital Costs
Costs: as in Phase II plus:	430	200	50
1. Enhanced exchanges with scientists of region and with International Centres		50	
TOTAL	430	250	50

Ecuador Funding

It well be noted that the Funds in Trust, $385.000, which the government of Ecuador deposited with WMO should cover some or perhaps all of initial costs in Phase 1, to mid 2003, except for major capital costs. Some indications from the government of Ecuador, concerning continuing ability and willingness to provide support costs in subsequent years, should be determined.

International Funding

Under the phased development as outlined above, (lie securing of international funding is urgent. Capital Funds are required as soon is possible and operating funding beginning mid-2003. This requires early action by WMO, ISDR and the government of Ecuador. It should be noted that World Bank requires long approval processes, and while sometimes eventually rewarding, it would be unlikely that funds could be made available until 2004 at the earliest. Bilateral donors and IDB may be the best possibilities for early funding. The phased approach outlined suggests the possibility of seeking three to five year project funding at first, with the concept of a second similar tranche to be sought for the last half of the current decade, once CIIFEN has demonstrated its value.

8. STRATEGY FOR SECURING EXTERNAL FUNDING

8.1. MULTILATERAL

a. **World Bank:** The Bank could be approached in several ways. One would be through the Institutional Development Fund (IDF) which can provide about $200.000 for assisting new environmental and

sustainable development institutions. This would have to be through a request directly from the government of Ecuador.

The Global Environmental Facility (GEF) is another option. It could be approached either through its funding for **climate change adaptation** planning initiatives and/or **international waters** of eastern Pacific bordering Colombia, Ecuador, Peru and Chile, and transboundary watersheds between Ecuador and adjacent countries. The attached generic project document (ANNEX "A") was written with these possible funding objectives in mind. It should be noted that Climate Change funds tend to be more over-committed than those for Transboundary Waters.

The World Bank also funds Large Marine Ecosystem (LME) projects in the Pacific. One for the Humboldt Current is underway ($15mill) and one for tile West Coast current off the Americas north of the equator is being developed. Whether these could assist in providing support, especially to oceanographic and fisheries components of CIIFEN needs further investigation.

It should be noted that World Bank staff advise that except for IDF, it would be better to seek funds for a "project" not a "centre" although a centre could be identified as needed to carry out a project. This has also been reflected in Annex "A".

b. **Inter-American Development Bank (IDB)** has already demonstrated much interest in better responses to ENSO events. They have funded studies by WMO on "Prediction and amelioration of socio-economic impacts of El Niño/Southern Oscillation (ENSO) in Latin America and the Caribbean". This has resulted in several reports including, "Framework for a National ENSO Early Warning System" IDB ATN/JF-6569RG, Jan. 20, 2001 and "Evaluation of Existing Institutional and Technical Capabilities in Latin America and the Caribbean Countries to Make Use of ENSO Predictions: (same number) October 2001". Follow-up activities by IDB to these reports, to address some of the problems identified in them, could well include funding for aspects of CIIFEN related projects.

c. **Inter-American Institute for Global Change Studies (IAI)**

The IAI Board includes most countries of North and South America. IAI headquarters is in Brazil and funding is mainly from U.S. National Science Foundation. IAI funds research projects, frequently through Universities, a number related to El Niño-La Niña (see Section 3.2). Some of the research efforts on tailoring predictions to meet socio-economic needs, as well as that needed for seasonal climate predictions could well be supported by IAI. This would require development of specific research proposals by CIIFEN and its partners. ESPOL has been successful in securing IAI support.

d. **Other Possibilities**

The Organization of American States, and the United Nations Development Program have modest funding for projects in the region. However, they more frequently are executing agencies for projects funded by other institutions. Nevertheless, approaches to these two organizations, with support of their offices in or near Ecuador could yield some positive results. The Economic Commission for Latin America and the Caribbean, with headquarters in Santiago, Chile is also a potential source of funds for individual sub-projects associated with CIIFEN.

8.2. BILATERAL

A number of bilateral donors and cooperating agencies have supported projects related to early warning systems, disaster mitigation, climate change adaptation, capacity building for sustainable development and projects related to ENSO events. Among the most promising may be Federal Republic of Germany (especially for early warning systems), the European Union, U.S. Aid, Canadian International Development Agency, Swedish and Finnish International Development Agencies.

In addition, some national scientific organizations such as U.S. National Oceanographic and Atmospheric Administration' s Office of Global Programs, and the Hadley Centre for Climate Modelling, U.K. have outreach cooperative programs that could assist CIIFEN with training and some specific projects.

8.3. FOLLOW-UP STRATEGY

The following steps are suggested to begin mobilizing international support:

- Informal contact with prospective donors by WMO, ISDR, and government of Ecuador to begin immediately.

- Hold Climate Outlook Forum and CIIFEN initiation workshop in Guayaquil (or Quito) in early September 2002, along the lines outlined in ANNEX "B". To plan this event, **an organizing committee should be formed immediately**. Locally, in Ecuador, this should have representation from Ministry of External Relations, ESPOL, INOCAR, and INAMHI, and should involve WMO, ISDR, and IRI.

- Hold special briefing sessions and follow-up meetings in U.S.A, Geneva, Ottawa for donors either showing interest in supporting CIIFEN activities at the September workshop, or those unable to participate in that workshop. These should be organized by WMO,

ISDR and Undersecretary of Multilateral Relations, Ministry of External Relations of Ecuador.

The generic project document (Annex "A") will need tailoring to meet the specific interests of individual donor agencies. These modifications should be made through arrangements between WMO, ISDR and Ministry of External Relations, Ecuador.