FEASIBILITY STUDY

EL NIÑO CENTRE, ECUADOR

J.P. BRUCE

1. INTRODUCTION:

In response to Resolution 52/200 of the UN General Assembly (2 March, 1998) on International Cooperation to reduce the effects of the El Niño Phenomenon, a major international Conference was held in Guayaquil, Ecuador, 9-13 November, 1998. The Declaration of Guayaquil arising from this Conference was submitted to the General Assembly, 17 November 1998 by the Ecuadorian authorities. The Guayaquil Declaration called for **"immediate action to assess the feasibility of establishing an International Centre for the Research of the El Niño Phenomenon, in Guayaquil, within the context of the UN Interagency Task Force on El Niño".** The results are **"to be reflected in the report on implementation of UNGA Resolution A/C.2/53/L.30 to the next UN General Assembly, through the 1999 substantive session of ECOSOC".** The World Meteorological Organisation through its Secretary General, Prof. G.O.P. Obasi recognised the urgent need to undertake the requested feasibility study and organised a mission for this purpose, 28 Jan. to 7 Feb. 1999. The mission included consultation with the International Research Institute for Climate Prediction, New York, with institutes and senior officials in Quito and Guayaquil and with relevant international institutions. A summary of the consultations undertaken appears in Annex "A".

This Feasibility Study describes the scientific and organisational context, the scope and functions such a Centre should undertake, a suitable location, staff and equipment needs, and a proposed organisational arrangement. It outlines the probable contributions that would be made by Ecuador, and the magnitude and nature of external resources required.

2. THE GLOBAL SCIENTIFIC AND ORGANISATIONAL CONTEXT:

The 1980s and 1990s have seen a remarkable increase in scientific capability to make predictions of mean climatic conditions a season or longer in

advance. Much of the progress has been due to international co-operation in the World Climate Research Programme of WMO, the Intergovernmental Oceanographic Commission (IOC) and the non-governmental International Council of Scientific Union (ICSU).

The dependence of seasonal and even annual climatic conditions in most parts of the world are now recognised to be strongly influenced by large scale natural modes of ocean-atmosphere interaction. Among them is the ENSO (El Niño-La Nina) phenomenon of the Tropical Pacific, the North Atlantic and North Pacific Oscillations as well as fluctuations in other ocean regions. The most powerful of these that significantly affects many countries is ENSO. The 1997-8 El Niño was the strongest on record, responsible for enormous losses in droughts in the western tropical Pacific and N.E. Brazil and disastrous floods, agricultural and fisheries losses in western South America and elsewhere.

Prediction of seasonal conditions on a world-wide scale requires a global centre with the fastest, most powerful, computers available and highly trained staff to take into account the various atmosphere-ocean modes. Such Centres now exist at the International Research Institute for Climate Prediction, and the European Centre for Medium Range Weather Forecasts in United Kingdom among others. . However, to make global predictions more relevant to users, international regional centres are needed for "downscaling" global predictions to provide outlooks on a much finer scale and to assist in developing appropriate regional response actions in such socio-economic sectors as agriculture, health, water, disaster mitigation, fisheries, and energy production and use. Action towards such centres has been initiated in Africa (Nairobi Drought Monitoring Centre, African Centre for Meteorological Applications to Development, Niamey) and co-operative arrangements including Australia are active in S.W. Pacific.

3. SCOPE OF EL NIÑO CENTRE

It is a matter of urgency that a Centre focussing on the ENSO phenomenon and applications of its predictions, primarily in South America, be instituted. It would work in close co-operation with global centres and other regional Centres.

3.1 Information Products to Meet the Needs

Based on the interviews summarised in the Annex to this Report and assuming that the needs in other countries of the region are similar in nature to those of Ecuador, the Centre should develop the capability to prepare the following types of products:

a.- Research results on "downscaling" techniques for the region.
b.- Research results on sensitivity of various socio-economic sectors to climate variability
c.- Continual up-dating of estimates of the frequency of occurrence of climate-related extremes-heavy rains, floods, drought, high temperatures, etc. for safe and efficient design of bridges, roads, buildings, etc.
d.- "Downscaled" projections on state of ENSO and implication for weather and climate of next 3 to 6 months.
e - Seasonal advisories and warnings directed toward general users issued each month.
f.- Seasonal advisories and warnings tailored to needs of various sector including emergency preparedness, agriculture, fisheries, health, tourism water and energy.

3.2. Dissemination of product and relationship with NMHSs:
The Centre should enter into formal agreements with each NMHS concerning dissemination of products, division of effort to avoid overlaps, exchanges of data and exchanges of staff. For dissemination of output of the Centre, the following guidelines are recommended:

a.- The main vehicle for dissemination of the Centre products within each country, would be the NMHSs, who would in some cases be able to add value to the regional projections through local knowledge
b.- The Centre would issue monthly bulletins to NMHSs, and an agreed mailing list, and place the bulletin material on an accessible web site.
c.- The centre would disseminate products directly to regional organisations – e.g. UNDP-Disaster Management Program, PAHO, ECLA, etc.

Exchange of staff between the NMHSs and the Centre should be encouraged for training and to ensure good understanding of strengths, limitations and optimum applications of the products.

4. INTERNATIONAL LINKAGES

4.1 Climate Information and Prediction Service (CLIPS - WMO)

This WMO Programme assists countries, through training and information exchange, in applying climate data and predictions to improve economic efficiency and assist actions toward sustainable development. It views climate as both a resource and a hazard. An El Niño Centre in Ecuador could serve as a regional CLIPS office.

4.2 Climate Variability (CLIVAR) of the World Climate Research Program

Special attention to measurement and understanding of ENSO characteristics in the eastern Pacific can make valuable contributions to CLIVAR, the international research project which has followed from the project (Tropical Oceans and Global Atmosphere – TOGA) which led to ENSO prediction capability.

4.3. Framework Convention on Climate Change (FCCC)

Under this Convention, countries have agreed to cooperate in climate science and in actions to reduce greenhouse gas emissions and the harmful effects of climate change and variability (and take advantage of beneficial effects). The financial mechanism under the FCCC is the Global Environmental Facility (GEF) which has been used to assist developing countries to reduce emissions and adapt to climate change, sea level rise and climate variability. A vital current scientific question is whether increased forcing of climate by greenhouse gases is causing and/or will cause an increase in El Niño intensities or frequency. Recent work suggests that El Niño's have been increasing in intensity over the past century as measured by departures from normal sea surface temperatures in the July onset period (J. Shukla, World Climate Research Programme Conference 1997) Fig. 1 Some studies attribute this, at least in part, to greenhouse gas forcing, and

suggest that there will be continued intensification in future. (see for example Knutson & Manabe, J. of Climate, Sept. 1998)

4.4. International Decade for Natural Disaster Reduction (1990-99)

This UN designated Decade has focussed national efforts and international co-ordination on reducing human and economic losses from natural disasters through prevention and preparedness measures. Improved understanding of ENSO is needed to set safe but economic design criteria for heavy rainfalls and floods. This is required in connection with the billions of dollars of reconstruction of bridges, roads and drainage systems underway in Ecuador and adjoining countries. Better and more fine scale predictions of El Niño and La Nina events would contribute directly to better preparedness measures to prevent loss of life and reduce economic losses.

5. REGIONAL LINKAGES

5.1 The Permanent Commission for the South Pacific (CPPS) (Columbia, Ecuador, Peru, Chile)

The CPPS has established a co-operative programme for research on the Phenomenon of El Niño (ERFEN). This links a number of Institutes in the four countries that are studying ENSO and its effects. The Ecuadorian Committee for ERFEN greatly facilitated all aspects of this Feasibility Study.

5.2 Disaster Loss Prevention

A regional office of the United Nations Development Programme (UNDP) is located in Ecuador (Quito), and the Pan American Health Organisation has active disaster mitigation programmes in the region. The IDNDR – PAHO regional office is in Costa Rica. All could benefit from more region specific El Niño and La Nina predictions in assisting national Disaster Management agencies and activities.

5.3 WMO's Region III (South America)

This regional organisation for South America assists in developing, co-ordinating and supporting national efforts to monitor climatic and hydrologic conditions, in communicating information, in training of specialist staff, and in prediction of weather, climate, and hydrologic conditions. Cooperation and support of other countries of South America for this Ecuador initiative might be facilitated by WMO RA III.

It should be recognised that the Brazil Space Agency IMPE, has powerful computer capability and issues some regional forecasts. A co-operative arrangement of an Ecuador Centre with IMPE will be needed.

6. SUMMARY OF THE NATIONAL SITUATION – ECUADOR (See Annex also "A")

In Ecuador the lead ERFEN governmental organisations for El Niño data, research and applications are the Naval Oceanographic Institute (INOCAR), the National Meteorological and Hydrological Institute (INAMHI) and the Institute for Fisheries Research (INP). INOCAR has a small ENSO Unit that publishes periodically an updated forecast of ENSO conditions, on behalf of ERFEN. This unit uses global projections from IRI and elsewhere, and statistical prediction methods (rather than dynamic) for "downscaling". INOCAR operates a large oceanographic research vessel and does hydrographic surveys and mapping. INAMHI has published two valuable volumes on the 1997-98 El Niño, one on meteorological data and its analysis, and the other on hydrologic information. Unfortunately, most of INAMHI's hydrometric stations were lost in the 97-98 floods. INAMHI provides the Secretariat for the national programme on Climate Change that is led by the Environment Department. INP has a modest research vessel and undertakes El Niño related fisheries research. In El Niño conditions, shrimp thrive (third largest export of Ecuador) but fishmeal producers using sardines, etc., nearly collapse. However, storminess limits fishing effort, and damages coastal roads and facilities vital to the industry.

Three Universities in Guayaquil are also represented on ERFEN and undertake El Niño related research. ESPOL, the Polytechnic Institute has an

active programme in Ecuador and throughout Latin America on El Niño impacts and adaptation to them. It has a special office for international projects "Centre de Prestacion de Servicios" and funding from Inter-American Institute (IAI) for several El Niño related projects. The Catholic University specialises in socio-economic studies and is a key part of a $14 million World Bank study to produce a master plan and set priorities for the more then $ billion road and bridges reconstruction programme (see CORPECUADOR below). The University of Guayaquil (45,000 students) has an active Natural Science programme studying bacteria, benthic organisms, phyto and zooplankton in coastal Ecuador as influenced by ENSO fluctuations. Other important ERFEN committee agencies, or users of their information, are Civil Defense (disaster management – not much prevention), CORPECUADOR which is responsible for the major post-97-98 El Niño reconstruction ($100 mill spent – needs another $1 bill +), Department of Agriculture, Department of Fisheries. All of these institutions except headquarters of INAMHI and the Departments are based in Guayaquil. INAMHI and other Government Department national headquarters are in Quito. They have regional offices in Guayaquil. In short there is a major concentration of El Niño expertise in Guayaquil, which can provide substantial support to CIIFEN.

All senior officers consulted, from the Secretary General of the Vice-President's office to the Minister of Energy (INAMHI) and Sub-Secretaries of Agriculture and Fisheries expressed the government's strong commitment to support of an El Niño Centre in Guayaquil. The Ambassador of CPPS gave assurances that CPPS countries would support the Ecuador initiative.

7. EL NIÑO IMPACTS

This strong support from senior government officers recognises the enormous damage done by the 1997-8 El Niño. It was variously estimated at 3,500 – 4,000 million $US -- 2,000 for roads, bridges, drainage, 1,500 - 2,000 in agricultural crop and fisheries losses. Other countries of the region suffered similarly large losses. A record of malaria incidence in Columbia (Fig.2) shows marked increases in El Niño years one indication that health implications in the region can be severe. With losses of these magnitudes the government officials expressed the view that even a 1 or 2% reduction of losses would pay for a Centre many times over, for Ecuador alone.

8. ORGANISATION OF CENTRE

A suggested organogramme of CIIFEN is given in Fig. 3. It is proposed that the Director be appointed by international competition and selected by the Management and Science Council. He or she would report to a Management and Science Council appointed by the key sponsoring organisations, WMO, IOC, CPPS, ERFEN (international), ERFEN (Ecuador), augmented by country and organisational representatives from major resource contributors. In order to avoid having two management or advisory Bodies, one for Management and one for Science, the above organisations should be encouraged to nominate distinguished scientists to the Council. There could be two nominees from each organisation, one on the management side and one for science. Organisations represented should pay for the travel and other costs of their representatives.

Two main interdisciplinary Divisions would undertake the main scientific work of the Centre. One would be responsible for ENSO research and mathematical modelling to permit downscaling of global predictions. The other Division on Forecasts and Applications would be responsible for outreach activities and production of useable products by the Centre. It would issue regular predictions in forms specially designed to meet the needs of various socio-economic sectors in the region. Initially this could be based on techniques developed at INOCAR and through arrangements with IMPE (Brazil). A staff of sectoral liaison specialists would be charged with maintaining close contacts with their respective sectors in Latin American countries. A small Administration Division would be required and a Communications and Observations Office recommended. The latter would be responsible for ensuring adequate high-speed communication of necessary data and information to the Centre and would establish communication facilities to disseminate CIIFEN information products, including a suitable WEB page. This office would also encourage and co-ordinate the installation, maintenance and standardisation of observational networks needed for the work of the Centre. Such observations would also contribute to improving global predictions

9. STAFFING AND BUDGET

Table 1 describes the staff and equipment initially required. The first two columns show the annual contributions from Ecuador for salaries, services, equipment, facilities and other operation of cost. The total contribution of present and future resources and facilities amount to $ 1'273.00, to cover a continuos operations of the Centre. The next two columns correspond to external funding to cover salaries of a Director and an Executive Assistant, funding for working contracts with other agencies and contribution for training and equipment of CIIFEN. It is to be noted that the host country will cover the maintenance of the equipment. Tables 2A and 2B show the detail of the national counter part contribution of table 1, indicating corresponding institutional participation. Table 2C presents a summary of institutional contributions for the implementation and operation of CIIFEN during the first ten years of operation. Table 2D shows the estimation of international contributions.

The proposal for Ecuador resource support assumes that all essential staff be hired by the Centre However countries in Latin America and outside may well be willing to second specialists to the Centre for varying periods of time. This could either augment the core staff listed, or could be used to fill one of the identified core staff positions listed in table 1, thus reducing requirements from the host country.

It is recommended that the Centre be accommodated in a building that is only partly used at present, on the campus of INOCAR, Guayaquil. The area consists of four rooms of 80 sq. m. each, which could be subdivided, and a much larger room now set up as an auditorium but with a flat floor. The space is air-conditioned, and equipped with washrooms.

It is anticipated that much of the Education and Training could be accomplished through the support of IRI New York, and the regular budgets of WMO and UNESCO (IOC), making use to a significant extent, of the Universities and Educational institutions in Guayaquil.

10.- DURATION OF THE PROJECT

The initial operation period of CIIFEN is ten years. After this period, CIIFEN should be able to operate funding from Peruvian private sector and by the Centre itself.

11.- THE NEXT STEPS

This Feasibility Study is just the first step in a series of actions needed to bring CIIFEN to reality. An outline of key actions leading to the ECOSOC session in July and UNGA review of a plan in its autumn 1999 session, is given below, with a time frame indicated.

10.1 Time Frame

By	
Feb. 26	Review and translation of Feasibility Study Report by WMO Secretariat and Region III office and referral of revised study to Ecuador Permanent Representative and other authorities and to CPPS for comment
Wk of Mar. 8	Meetings between WMO and UNDP Geneva staff to discuss strategy for seeking external resources. Discuss with Secretariat of other UN Agencies and IDNDR.
March	Submission by WMO to UN Interagency Task Force on El Niño.
March	Ecuador to obtain concurrence of and begin to develop co-operative arrangements with other countries in the Region through special El Niño meeting for WMO Region III (South America) in Lima, Peru and through CPPS.
April/May	WMO and Ecuador with CPPS to prepare detailed project document suitable for seeking firm resource commitments.
July	Presentation of proposal to ECOSOC meeting Geneva, by WMO and Interagency Task Force, CPPS, and Ecuador senior officials.

10.2 Potential International Resource Support

International organisations that could be approached to provide support of various kinds to CIIFEN could include:

UNDP and especially its Disaster Management Programme, GEF,
Economic Commission for Latin America,
Organisation of American States,
Inter-American Institute for Global Change Research
International Research Institute for Climate Prediction (NOAA Office of Global Programs).

National donors and foundations could also be encouraged to contribute in various ways.

ANNEX: REPORTS ON INDIVIDUAL CONSULTATIONS (Chronological)

1. **International Research Institute for Climate Prediction, Palisades, New York, 28, 29 January, 1999.**

Antonio Divino Moura, Director, Phillip Arkin, Deputy Director and other staff of IRI provided a valuable briefing on development of IRI and the types of products, training and support they could provide to an "El Niño Centre" in Ecuador. Their Web page bulletins provide global overview predictions and an indication of possible departures from normal climate and some potential impacts on a broad geographical scale. Their training and workshop programme could be of major benefit. Divino Moura indicated that IRI would be very supportive of a centre in Ecuador that would focus on downscaling ENSO predictions and developing applications of predictions to major socio-economic sectors in South America Initial work is underway on the new $10million building overlooking the Hudson River, to house the IRI

2. **First Meeting with WMO representatives of Co-ordination Committee for Ecuador of ERFEN (Regional Study of the El Niño Phenomenon, at headquarters of INAMHI (Institute Nacional de Meteorologia and Hydrologia), Quito, 31 Jan.**

Executive Director of INAMHI, Ing. Nelson Salazar Delgado and his Deputy, Ing. Carlos Lugo Freise welcomed the Committee and WMO representative to INAMHI's headquarters. Members of the Committee briefed the WMO representatives on their progress. WMO representatives outlined the nature of the Feasibility Study being prepared through this mission, and a discussion of the schedule of visits took place Salazar presented the Committee's proposed concept of a Centre for consideration by the WMO consultant. They proposed a title (Centre Internacional de Investigaciones del Fenomeno de El Niño (CIIFEN). While some Committee members still had in mind a global Centre, after some discussion, they agreed on a scope that would focus on downscaling ENSO predictions for application in South America. Some recent scientific results linking ENSO intensity increases to greenhouse forcing was seen to lend urgency to action on a Centre.

3. **UNDP, Quito, 1 Feb.**

Ms. Anse Smedler, Resident Representative, and Jose Vicente Troya R met with the two senior INAMHI staff and WMO reps. Unfortunately, Mr Mena of the regional Disaster Management Programme office had been co-opted by the Columbian earthquake disaster The UNDP reps expressed much interest in an Ecuador based ENSO Centre because of the potential for reducing enormous losses in infrastructure, fisheries, agriculture, etc However, they were non-committal

about financial support, but did want to receive the Feasibility Study and keep in touch with development of the proposal

4. **Secretary General of Permanent Commission for the South Pacific (four West Coast countries) CPPS (parent body of ERFEN), Quito, 1 Feb.**

Ambassador Fabian Valdivies and staff gave assurances that the four CPPS countries support the Guayaquil Declaration and an International Centre in Guayaquil He too envisaged a truly global centre but after discussion of developments in IRI, ECMWF, and DMC, Nairobi, he too was prepared to accept more limited geographical scope but with strong emphasis on socio-economic impact reduction in CPPS countries and their South American neighbours. He expressed great satisfaction concerning WMO and Secretary General Obasi's rapid response to the Guayaquil Declaration and UNGA Resolution, in launching this Feasibility Study.

5. **Minister of Energy, Quito, 1 Feb.**

Ing Patricia Ribadeneira, Minister of Energy is in charge of the Ministry that includes INAMHI He stated that the Government of Ecuador is strongly committed to support a Centre of international scope. He was particularly interested in the potential value of ENSO predictions to achieve efficiencies in a possible integrated hydro-electric grid between Columbia, Ecuador and Peru. 65% to 90% of Ecuador' electricity is hydro – the variation being between dry and wet periods

6. **Vice-President's Office, Quito, 1 Feb.**

The Secretary General of the Vice President's office, Ivan Viteri Miranda also gave strong assurances of the government's interest and willingness to support, but noted that Ecuador is having serious budgetary problems. He wanted to know how much of Ecuador's contribution might come from existing resources or might require new resources It was indicated that the Feasibility Study would provide initial estimates of requirements for support from Ecuador in either form, and support from external sources He wished to arrange a meeting for the Vice-President with INOCAR and INAMHI representatives to discuss the matter within two weeks or so. (INOCAR is the Naval Oceanographic Institute in Guayaquil, and the logical location for a Centre. Its Director is Chair of ERFEN)

7. **Technical Staff of Emergency Management Group in Civil Defense, Quito**

Nelson Valquez of this Group provided an overview of national and regional disaster preparedness activity There is not much emphasis on prevention in advance, but active public information programmes are undertaken to encourage preparedness They welcome and support an El Niño Centre initiative

In Guayaquil

8. Naval Oceanographic Institute (INOCAR)

This well equipped Institute, with about 200 staff, directed by Capt. Fausto Lopez Villega (Chair of ERFEN), is located with the Ecuador Navy establishment in Guayquil. They operate a major research vessel in "Orion" and several smaller vessels for nearshore studies and hydrographic surveys Most of this work is in Ecuadorian waters but there are periodic Orion cruises to the Antarctic. INOCAR already operates an El Niño office in which global predictions are downscaled statistically for an El Niño bulletin and Web page Their cruises sample physical, chemical and biological conditions and are augmented by some seven coastal water level and meteorological stations They are gradually automating hydrographic charting. One of the buildings on their campus is only partially occupied and 4 – 80m^2 rooms and a large conference room, all with air conditioning and other facilities could be made available for the international El Niño Centre.

A Web page is updated with data from Oceanographic and Coastal Stations as well as from out-of-the-region data. A monthly Climatic Warning Bulletin is produced based on institutional and regional data (from Members of CCPS)

9.- Fisheries Research Institute

This Institute, founded with FAO assistance in 1960, has since 1967 been operated by about 110 Ecuadorian staff only They undertake research in:

a) aquaculture
b) basic population studies and evaluation of future resources.- The Institute researches on hydrological resources at a national level. Oceanographic parameter and its relationship with the availability of fishery resources are observed regularly through research oceanographic cruises
c) environmental pollution in coastal areas

They also undertake as a service function the quality control of products for export. They operate a moderate size research vessel for sampling, primarily biological and chemical. Shrimp (Camarones) are Ecuador's second or third largest export (after oil and sometimes bananas), and aside from physical damage to aquaculture, dock and coastal roads, tend to thrive in El Niño conditions. Fish meal products from sardines suffer serious losses and only one or two larger species remain during El Niño for small scale artisanal fishers INP is active in ERFEN They suffer financial difficulties because funds earned from the private sector for quality control inspections are not returned Similar problems exist with INAMHI

10. Sub-Secretary of Agriculture and CLIRSEN

This most senior official of Department of Agriculture in the coastal provinces of Ecuador, estimated that agricultural sector losses in the 1997-8 El Niño were about $1 5 billion He is very concerned about being better prepared next time and sees the international Centre as key to this. He promised strong support for any request to the Ecuador government He offered to assist in seeking financial support for the Centre from agriculture industry and cooperatives CLIRSEN is part of the Department of Agriculture and we were briefed on its capabilities by Ing. (Ms) Pilar Icaza This Centre's role is to study natural resource issues through use of remote sensing. They have facilities for receiving, analyzing and reproducing images from Landsat, SPOT and NOAA polar orbiters. Losses of forests in the Amazon basin in Ecuador, and of mangroves on the coast are being monitored. CLIRSEN has provided special images and analyses to CORPECUADOR (see #11) for planning reconstruction of roads and bridges

11. CORPECUADOR

This is a special agency created for post El Niño reconstruction of roads, bridges and drainage facilities. The design criteria and priorities for this total $1.2 bill program, of which $100 mill has been spent, is the subject of a World Bank financed $14.5 mill study being undertaken by the Catholic University and foreign consultants. Unfortunately, CORPECUADOR had been unaware of the excellent hydrologic study of the 97-8 floods done by INAMHI, but as a result of our visit, Director Nelson Salazar was invited to meet with the consultants to provide input. While, at present, they are reconstructing to accommodate floods of the 1997-8 magnitude, they are worried about the possibility of ENSO intensification with increased greenhouse gas forcing.

12. Catholic University

The President Ing Jorge Toa Miranda is also a vice-president of CORPECUADOR. As noted above this University is heavily involved in the World Bank study, especially on socio-economic aspects, and in priority setting. Their work generally emphasises the social vulnerability aspects of disasters and re-construction and they bring this perspective to ERFEN

13. Sub-Secretary of Fisheries Resources

Ing. Luis Torres Navarette, senior adviser to the Sub-Secretary noted that 25% of Ecuador's coastal population is engaged in fishing or fish products A new fisheries law is under consideration that will give greater emphasis to environmental protection He was at the Guayaquil El Niño Conference in November and thinks that his Department and the fishing industry would provide resources to support an international El Niño Centre in Guayaquil

14. Polytechnic Superior School on Coastal Zone (ESPOL) and Centre for Scientific and Technical Investigations (CICYT)

Dr. Jose Luis Santos D, Director of CICYT and Maria Pilar Cornejo, a well known physical oceanographer (she is chair of the WMO-IOC-ENSO Panel) described the extensive work of ESPOL. Many members of the scientific staff of INOCAR have been trained at ESPOL. Their scientific projects cover the geographical area from Cuba to southern South America, several funded by the Inter-American Institute They have excellent computer training facilities, have developed an expert system for reducing agricultural losses from El Niño, and a GIS system for designating flood plains (vulnerability charts). They issue a monthly ENSO bulletin especially tailored to needs of agricultural and other users. They are active members of ERFEN

15. University of Guayaquil

This is a large institution with 45,000 students, some 1,000 or more in the Faculty of Natural Sciences (Geol Rafael Emilio Valdez Requena, Sub-Dean). Their research and related teaching is concentrated especially on marine coastal areas. There, they are studying El Niño effects on toxic chemical concentrations (pesticides, trace metals), on bottom fauna, on bacterial populations and on primary biological production. They too actively participate in ERFEN and have trained a number of INP and INOCAR staff members.

16. Final session with Ecuador ERFEN Committee

At this session, the consultant outlined the main topics that would be covered in the Feasibility Study and, with the WMO staff member, provided a summary of next steps There was special discussion of the steps Ecuador must take to secure regional support for a Guayaquil Centre. The organisational structure of the Centre was discussed and generally agreed. Staffing and equipment requirements were discussed and estimates made of the contributions Ecuador institutions could make to the Centre These would be from existing resources or might be secured through a submission to government and to the private sector in agriculture and fisheries for additional resources These estimates are shown in Table 1.
This session of ERFEN was most impressive as it demonstrated a very strong commitment of all of the agencies to work together to make a success of the proposed new El Niño Centre.

CUADRO 1

ESTIMACIONES INICIALES DE LAS NECESIDADES EN RECURSOS DEL CIIFEN CENTRO INTERNACIONAL PARA APLICACIONES E INVESTIGACIÓNES SOBRE EL NIÑO

Fuente de recursos miles $ EE.UU.

RECURSOS	País sede (*1)		Internacional	
Parte "A" - RECURSOS HUMANOS	Corrientes	Equipos	Asesorías-Anual	Equipos
Dirección del CIIFEN				
Director (concurso internacional) y asistente Ejecutivo			95	
DIRECCIÓN DE INVESTIGACIÓN Y MODELIZACIÓN				
INVESTIGADORES LOCALES: Meteorólogos principales y asociados	60			
Oceanógrafos principales y asociados	84			
Experto en modelización y gestión de datos			24	
Ayudantes	108			
DIVISIÓN DE PREDICCIÓN Y APLICACIONES				
INVESTIGADORES LOCALES: Meteorólogo y oceanógrafo	84			
Expertos en aplicaciones en 5 campos			90	
DIVISIÓN DE ADMINISTRACIÓN Y FINANZAS				
Director	18			
Contador	12			
Secretaria	12			
Parte "B" - EQUIPO E INSTALACIONES				
Equipo informático				
Computador central, estación de trabajo grande, PC (*2)				500
Instalación de recepción por satélite				100
Telecomunicaciones – acceso al SMT, sitio Web	80			100
SISTEMAS DE OBSERVACIÓN				
Estaciones automáticas costeras (8)				120
Boyas a la deriva (50)				500
Boyas fondeadas (5)				1000
SERVICIOS ESPECIALIZADOS – INFORMACIÓN	280			
INSTALACIONES Y FUNCIONAMIENTO				
Instalaciones y servicios	170	38		
FONDOS PARA FORMACIÓN Y CONTRATOS			200	
NECESIDADES NACIONALES DE EQUIPO (ECUADOR)				
Estaciones hidrométricas automáticas (60)*2				400
TOTALES	888	38	409	2720
COSO TOTAL DEL PROYECTO-AÑO DE INSTALACIÓN				4402

*1 Contraparte Nacional para el año de instalación.

*2 Sobre la base de la contribución de ayuda estadounidense al CMD de Nairobi.

*3 Estas estaciones se perdieron con El Niño 1997-1998 y son necesarias para sacar provecho del CIIFEN.

CUADRO 2-A

ESTIMACIONES DE LOS APORTES DE INSTITUCIONES NACIONALES AL CIIFEN CENTRO INTERNACIONAL PARA APLICACIONES E INVESTIGACIÓNES SOBRE EL NIÑO

Fuente de recursos miles $ EE.UU.

RECURSOS	CONTRAPARTE NACIONAL	
ASIGNACIONES PRESUPUESTARIAS	Gastos Corrientes	Gastos de Inversión
INSTITUTO OCEANOGRAFICO DE LA ARMADA - INOCAR		
INVESTIGADORES LOCALES: Oceanógrafos –Principales y Asociados	60	
Ayudantes	24	
Administración, Finanzas y Secretaria	42	
Servicios básicos	12	
Servicios especializados – Información y Laboratorios	70	
Suministros y Materiales	15	
Movilización y Transporte – Cruceros de Investigación	50	20
Instalaciones – Oficinas		50
Adquisición de Equipos especializados		50
SUMAN	**273**	**120**
INSTITUTO NACIONAL DE METEOROLOGI E HIDROLOGIA – INAMHI		
INVESTIGADORES LOCALES: Meteorólogos – Principales y Asociados	60	
Ayudantes	24	
Servicios Administrativos		
Servicios Básicos		
Servicios Especializados – Información	50	
Suministros y Materiales	10	
Movilización y Transporte	20	
Instalaciones – Red de Monitoreo Hidrometeorológico	20	20
Adquisición de Equipos especializados		50
SUMAN	**184**	**70**
INSTITUTO NACIONAL DE PESCA – INP		
INVESTIGADORES LOCALES: Oceanógrafos	44	
Ayudantes	12	
Servicios Administrativos		
Servicios Básicos		
Servicios Especializados – Información y Laboratorio	40	
Suministros y Materiales	15	
Movilización y Transporte – Cruceros de Investigación	40	20
Instalaciones		20
Adquisición de Equipos especializados		50
SUMAN	**151**	**90**

CUADRO 2-B

ESTIMACIONES DE LOS APORTES DE INSTITUCIONES NACIONALES AL CIIFEN CENTRO INTERNACIONAL PARA APLICACIONES E INVESTIGACIÓNES SOBRE EL NIÑO

Fuente de recursos miles $ EE.UU.

RECURSOS	CONTRAPARTE NACIONAL	
ASIGNACIONES PRESUPUESTARIAS	Gastos Corrientes	Gastos de Inversión
ESCUELA SUPERIOR POLITECNICA DEL LITORAL – ESPOL		
INVESTIGADORES LOCALES: Meteorólogos, Oceanógrafos	45	
Ayudantes	12	
Servicios Administrativos		
Servicios básicos		
Servicios especializados – Información e Investigación	30	
Suministros y Materiales	10	
Movilización y Transporte	10	
Instalaciones – Oficinas		
Adquisición de Equipos especializados		20
SUMAN	**1086**	**20**
UNIVERSIDAD CATOLICA SANTIAGO DE GUAYAQUIL		
INVESTIGADORES LOCALES: Meteorólogos, Oceanógrafos	24	
Ayudantes	12	
Servicios Administrativos		
Servicios Básicos		
Servicios Especializados – Información, Laboratorios e Investigaciones	30	
Suministros y Materiales	10	
Movilización y Transporte	10	
Instalaciones		
Adquisición de Equipos especializados		20
SUMAN	**86**	**20**
UNIVERSIDAD ESTATAL DE GUAYAQUIL		
INVESTIGADORES LOCALES: Meteorólogos, Oceanógrafos	24	
Ayudantes	12	
Servicios Administrativos		
Servicios Básicos		
Servicios Especializados – Información, Laboratorios e Investigaciones	30	
Suministros y Materiales	10	
Movilización y Transporte	10	
Instalaciones – Laboratorios		15
Adquisición de Equipos especializados		50
SUMAN	**86**	**65**

CUADRO 2-C

CONTRAPARTE NACIONAL

ESTIMACIONES DE LOS APORTES DE INSTITUCIONES NACIONALES AL CIIFEN
CENTRO INTERNACIONAL PARA APLICACIONES E INVESTIGACIÓNES SOBRE EL NIÑO

Fuente de recursos miles $ EE.UU.

APORTE PARA EL AÑO DE INSTALACIÓN

RESUMEN APORTES INSTITUCIONALES	Gastos Corrientes	Gastos Inversión	TOTAL
INSTITUTO OCEANOGRÁFICO DE LA ARMADA	273	120	393
INSTITUTO NACIONAL DE METEOROLOGIA E HIDROLOGIA	184	70	254
INSTITUTO NACIONAL DE PESCA	151	90	241
ESCUELA POLITECNICA DEL LITORAL	108	20	128
UNIVERSIDAD CATOLICA DE SANTIAGO DE GUAYAQUIL	86	20	106
UNIVERSIDAD ESTATAL DE GUAYAQUIL	86	65	151
TOTAL	888	385	1273

APORTES ANUALES PARA EL CENTRO

APORTES INSTITUCIONALES	Gastos Corrientes	Gastos Inversión	TOTAL
INOCAR	160	36	196
INAMHI	110	21	131
INP	76	27	103
ESPOL	50	6	56
UNIVERSIDAD CATOLICA DE GUAYAQUIL	80	6	86
UNIVERSIDAD ESTATAL DE GUAYAQUIL	60	20	80
TOTAL	516	116	632

CONTRAPARTE NACIONAL PARA EL CIIFEN
PERIODO DE OPERACIÓN: 10 AÑOS

APORTES	Gastos Corrientes	Gastos Inversión	TOTAL
Año de instalación	888	385	1273
Operación del Centro – Periodo 9 años	4644	1044	5688
TOTAL	5532	1429	6961

CUADRO 2-D

APORTES INTERNACIONALES

CENTRO INTERNACIONAL PARA APLICACIONES E INVESTIGACIÓNES SOBRE EL NIÑO

Fuente de recursos miles $ EE.UU.

APORTE PARA EL AÑO DE INSTALACIÓN

RESUMEN DE APORTE	Asesoría	Equipamiento	TOTAL
RECURSOS HUMANOS			
Director	95		95
Experto en Modelación y Gestión de Datos	24		24
Experto en Aplicaciones en 5 campos	90		90
FONDO DE FORMACION Y CONTRATOS	200		200
EQUIPAMIENTO			
Equipo Informático		700	700
Sistema de Observación		1620	1620
Estaciones Hidrométricas Automáticas 50		400	400
TOTAL	409	2720	3129

APORTES ANUALES PARA EL CENTRO

APORTES	Asesoría	Equipamiento	TOTAL
RECURSOS HUMANOS			
Director	95		95
Expertos en varios campos	50		50
TOTAL	145		145

RESUMEN APORTE INTERNACIONAL PARA EL CIIFEN
PERIODO DE OPERACIÓN: 10 AÑOS

APORTES	Asesoría	Equipamiento	TOTAL
Año de instalación	409	2720	3129
Operación del Centro por el resto del Período			
Directo – 9 años	855		855
Asesorías – 5 años	250		250
TOTAL	1514	2720	4234

Figura 3

ORGANIZACIÓN PROPUESTA