

UNITED NATIONS DEVELOPMENT PROGRAMME

Project of the Government of the Republic of Argentina

PROJECT DOCUMENT

Project Number & Title:	ARG/95/G31/A/1G/99 - Country Study on Climate Change
Duration:	18 months
UNDP Sector:	Global Environment
UNDP Subsector:	Enabling Activities
Government Implementing Agency:	National Commission on Global Change
Executing Agency:	State Secretariat for Science & Technology
UNDP Approval:	September 1995
UNDP/GEF Inputs:	US \$ 1,000,000
Country contributions (in kind)	US \$ 1,472,000 (in-kind)
Estimated Starting Date:	February 1996

Brief Description: The primary objective of this project is to prepare the first National Communication of the Argentine Government in accordance with Article 12 of the United Nations Framework Convention on Climate Change, and to build capacity to prepare such communications on an ongoing basis.

In this regard, the project will provide technical assistance to strengthen institutional capacity to enable Argentina to fulfil its commitments under the Convention. The principal output will be the preparation and publication of Argentina's first GHG inventory and assessment of potential vulnerabilities to climate change. The project will build on and synthesize information from previous and ongoing activities in this area, including assessments of natural gas flaring and carbon sequestration by the IFC and World Bank for potential implementation in 1995. At the same time, the project will collaborate closely with UNEP's proposed programme for the development of guidelines for assessing the impacts of climate change adaptation measures, and is actively collaborating with the US Country Studies Program through participation in regional workshops and information exchange. As well, the project will participate in the informal consultative mechanism being established by the UNFCCC Secretariat to ensure that the project's results and experience are shared among all those involved in climate change research and mitigation activities.

Information from the GHG inventory will be used as input to the production of an initial analysis of potential mitigation measures. This analysis, coupled with the vulnerability assessments, will serve as the basis for the development of a national programme for GHG emissions reduction and adaptation to climate change. By ensuring the participation of a

ARGENTINE COUNTRY STUDY ON CLIMATE CHANGE

INDEX

1.	INTRODUCTION	1
2.	OBJECTIVES OF THE FIRST ARGENTINE COUNTRY STUDY	2
3.	METHODOLOGY	3
4.	ORGANIZATIONS PARTICIPATING IN THE STUDY	3
5.	IMPLEMENTATION, COORDINATION PROCEDURES, REVIEW PROCESSES, SCHEDULE, BUDGET FOR THE PROJECT MANAGEMENT	6
6.	GREENHOUSE GAS INVENTORY	8
7.	VULNERABILITY ASSESSMENT TO SEA LEVEL RISE	22
8.	VULNERABILITY AND MITIGATION RELATED TO GLOBAL CHANGE IMPACT UPON AGRICULTURAL PRODUCTION	27
9.	OASIS VULNERABILITY ASSESSMENT TO DRYER CONDITIONS ON THE HIGH ANDES, BETWEEN 29° S AND 36° S	37
10.	MITIGATION ANALYSIS IN THE G-H-G-EMISSION SECTOR OF THE ECONOMY	47
11.	BUDGET	
11.1.	Budget for of the Five Sub-Projects and the Project Management	52
11.2.	Budget Summary	53
12.	QUALIFICATIONS OF THE PROJECT STAFF	
12.1.	Resumes for key in-Country Project Members	54

ARGENTINE COUNTRY STUDY ON CLIMATE CHANGE

1. INTRODUCTION

1.1. The anthropogenic climate change problem.

The United Nations Framework Convention on Climate Change aims to the stabilization of greenhouse gas concentrations in the atmosphere to prevent dangerous anthropogenic interference with the climate system. Governments of developed and developing countries have agreed to adopt the necessary measures to ensure the timely implementation of the recommendations emanating from the Convention.

In this regard, the Government of Argentina, willingful to assume fully its responsibilities before the international community, has decided to develop a project devoted to the elaboration of a national greenhouse gases emission's inventory. This project will also include three subprojects oriented to assess the vulnerability of natural and man made ecosystems to the effects of the climate change and a fourth one dedicated to mitigation analysis in the Green-House-Gas emission sector of the economy.

The goal of these projects is not only to provide a better insight of the impacts which will result from a global warming of the Earth, but to provide, first to the national and then to the regional and international communities, the evaluation of the impact the expected changes would have on the chosen ecosystem.

In the preparation of its Climate Change Assessment Reports, the Intergovernmental Panel on Climate Change (IPCC), has also developed Technical Guidelines for Assessing Climate Change Impacts and Adaptations. In this connexion, The United Nations Programme on the Environment (UNEP) has plans to undertake national studies to evaluate such climate change impacts.

The information unit on Climate Change, operated by UNEP and WMO (World Meteorological Organization) would also benefit from this Project. In fact, the results of the foreseen vulnerability studies would provide the background information necessary for its dissemination to interested national and private agencies, including participative movements, such as the Non Governmental Organizations (NGO's), to feed their respective national and regional decision levels with information to ensure the further development of their countries in a sustainable manner.

The Argentine Government feels that the undertaking of the action proposed in this project is necessary to make Argentina one of those countries actively working to pursue its development priorities without adversely affecting the global environment. In this context, Argentina wishes to maintain and even improve its position as an international producer and exporter of agricultural products. Inter alia, persuing actions identified in this project will enable Argentina to increase its production of foodstuffs, thereby minimizing the risk of

2. OBJECTIVES OF THE FIRST ARGENTINE COUNTRY STUDY

2.1. General Objective

The general objective of the first Argentine Country Study is to prepare the first National Report of the Argentine Government in accordance with article 12 of the United Nations Framework Convention on Climate Change, and build up capacity for preparing such report on a continuing basis.

2.2. Particular Objectives

2.2.1. To prepare a national inventory of GHG emissions by sources and removals by sinks.

2.2.2. To assess the vulnerability of islands and low coastal areas to sea level rise.

2.2.3. To assess the vulnerability of agricultural production to climate change in the Pampean Region.

2.2.4. To assess the vulnerability of oases in the western region of Argentina (29° S to 36° S) to dryer conditions in the high Andes.

2.2.5. To produce the first mitigation analysis concerning GHG-emissions.

3. METHODOLOGY

As this project will pursue five different avenues of inquiry into the relevance of the FCCC for Argentina, it will utilize the five different, internationally-accepted methodologies for those purposes. For the inventory analysis, the methodologies put forth in the IPCC GHG Inventory Guidelines will be utilized. For the part of the study extending the inventory work to mitigation analysis, the techniques developed by UNEP Collaborating Centre on Energy and the Environment will be utilized, together with the guidelines from the US Country Studies Team. For the vulnerability/adaptation analyses, the IPCC "Preliminary Guidelines for Assessing Impacts of Climate Change" will be used. In each individual assessment, different sector-specific methodologies will be adapted to the Argentine case. For example, the techniques proposed by the IPCC Response Strategies Working Group in May of 1992 ("Global Climate Change and the Rising Challenge of the Sea") will provide the starting point. For the agricultural assessment, various mathematical simulation models of the relationship of climate to crop yields will be utilized. Each of these specific methodologies is discussed in the section of the proposal pertaining to that particular component.

- 4.2.1. Centro de Geología de Costas (Center for Coastal Geology)
- 4.2.2. Comité para el Programa Hidrológico Internacional, CONAPHI (Committee for the International Hydrological Program)
- 4.2.3. Instituto Argentino de Oceanografía, IADO (Argentine Institute for Oceanography)
- 4.2.4. Programa de Política de Ordenamiento Territorial (Territorial Policy Program)
- 4.2.5. Servicio de Hidrografía Naval (Naval Hydrographic Service)

- 4.3. ***Organizations supporting sub-project "Vulnerability and Mitigation related to Global Change Impact Upon Agricultural Production"***
- 4.3.1. Consejo Nacional de Investigaciones Científicas y Técnicas, CONICET (National Council for Scientific and Technical Research).
- 4.3.2. Instituto Nacional de Tecnología Agropecuaria, INTA (National Institute for Agriculture and Livestock Technology)
- 4.3.3. Universidad Nacional de Buenos Aires (National Buenos Aires University)

- 4.4. ***Organizations supporting sub-project "Oasis Vulnerability Assessment to Dryer Conditions on the High Andes in Argentina, between 29 ° S and 36 ° S"***
- 4.4.1. Centro Regional de Aguas Subterráneas, CRAS (Regional Centre for Groundwater)
- 4.4.2. Consejo Nacional de Investigaciones Científicas y Técnicas, CONICET (National Council for Scientific and Technical Research).

5.2.2. *The coordination within a sub-project working group*

These groups are small enough to allow the lead scientist of the group to act as coordinator, except in the case of the Energy group of the GHG sub-project in which additional coordination is necessary.

5.2.3. *The coordination of the GHG sub-project*

In this case five teams can be identified: Energy, Agriculture, Livestock, Forestry and Land Use Change and Waste Management. For these already a coordinator is acting in both, technical and administrative aspects. Details figure in 6.4.4. and 6.5.4.

5.2.4. *The relations to the UNDP*

The relations to the UNDP will be carried out by the project-director in close cooperation with the Subsecretariat for International Cooperation of the Argentine Foreign Office.

5.2.5. *The members of the Stirring Committee.*

Chairman:	Project-Director
Vice-Chairman:	Representative of the National Commission on Global Change
Members:	Directors of the five sub-projects. Representative of the Environmental Unit of the Argentine Foreign Office Project-Coordinator

5.2.6. *The members of the Advisory Committee.*

Chairman:	Representative of the National Commission on Global Change
Vice-Chairman:	Representative of SECYT
Members:	Representative of UNDP Representative of US-Country Study Support Representative of University of Buenos Aires Representative of Ministry of Economy Representative of State Secretariat for Natural Resources and Human Environment Representative of Business Council on Sustainable Development

5.3. *Review Processes*

Contracts	24.000	
Salary		63.000
Travel	2.000	2.000
Equipment	5.000	
Supplies	2.000	2.000
Other	24.800	22.400
TOTAL	57.800	89.400

Other: Workshop-Meetings-Seminars-Experts visits-Unforeseen

6. **GREEN HOUSE GAS INVENTORY**

6.1. **Introduction**

As already has been pointed out in 1.3., for developing a national program to reduce emissions of greenhouse gases, it is necessary to know quantitatively the emissions by sources and removals by sinks. For this purpose the Methodology adopted by the INC-IX will be applied. It requires abundant statistical material of the different economic sectors, dispersed in many governmental and non-governmental organizations. Data gathering is thus a very important task, perhaps the most important one.

Considering that the accuracy of the GHG Inventory (GHGINV) will be a function of the quantity and quality of the data available and taking into account that the access to these very dispersed data is difficult, it has been considered that the most convenient solution of this basic problem will be to integrate the GHG Working Group (GHGWG) with specialists of different areas, who have relative easy access to the respective data sources; for this reason, the GHGWG has a comparatively large number of members.

The specialists integrating the energy sector of the GHGWG already have accumulated experience in preparing GHGINV, as may be seen in their curricula.

6.2. **Objectives**

6.2.1. To produce the inventory for Carbon Dioxide (CO₂), Methane (CH₄), Nitrox Oxide (NO₂), Nitrogen Oxides, (NO_x), Carbon Monoxide (CO) and Non-Methane Volatile Organic Compounds (NMVOC) corresponding to the different economic activities as indicated in the IPCC GHGINV Reporting Instructions (Annex 1) and the IPCC GHG Workbook (Annex 2), for 1990, with extension to the past as far as possible, at least for CO₂.

6.2.2. To prepare the National GHGINV report which has to include information on estimation

6.3.2. *Institute for Energy Economy*

The Institute for Energy Economy (Instituto de Economía Energética, IDEE) of the Bariloche Foundation (Fundación Bariloche, FB), has also analyzed CO₂ emissions within the energy sector of the period 1970-1990 and considered, in base of different scenarios, the prospective evolution up to 2010.

These studies have been carried out within the framework of an Agreement of Cooperation between UNEP Collaborating Center on Energy and Environment, RISO National Laboratory of Denmark and the IDEE/FB, concerning project collaboration on National Energy - Environment Policy Studies: "The Argentine case". Reports were presented in 1993 and 1994.

IDEE/FB: "Energy and Environment in Argentina. Past and Prospective Evolution". Serie Informes. Lic. Graciela Díaz de Hasson, Ing. Carlos E. Suárez y Lic. Héctor Pistonesi. Buenos Aires, marzo de 1994.

This research has been done under Contract with UNEP Collaborating Centre on Energy and Environment, RISO National Laboratory, Denmark.

This paper states the resulting facts of the analysis covering past and prospective evolution of Argentina's Energy System and its main environmental impacts specially underlining the impact of air emissions.

It is assumed in the analysis of the development of the Argentine Energy System, that its environmental impacts will be strongly determined by the domestic and international economic context and by the strategies defined by the new energy operators to insert themselves in this framework. Based on this assumption, two scenarios have been analyzed. The pessimistic scenario assumes an international context highly unfavourable for the economic development of the Country, whereas the optimistic one implies a loosening of external restrictions on economic growth.

Finally, this analysis compares the environmental impacts of both Scenarios.

Among the main analyzed conclusions it can be pointed out:

- 1) CO₂, SO₂ and NO_x emissions resulting from the Argentine Energy System experienced a growth during the 1970s in spite of a significative reverse trend of the specific emission coefficient due to the energy sources substitution process. Structural changes in electricity generation (substituting fossil-fuelled generation by hydro and nuclear power, as well as petroleum products and coal by natural gas) led to abatement of air emissions in the industrial sector. Households and services consumption have also beneficial consequences on the environment, as natural gas and electricity substituted other energy sources, basically petroleum products.
- 2) Total gas emissions growing was then basically due to the sustained economic

Regulación de Energía, ENRE) started a program for emission studies, on a monthly basis, of those gases in thermal power stations. The results may be used in further National Reports.

One of the duties in charge of the Ente Nacional Regulador de la Electricidad -ENRE- (National Electricity Regulation Agency) is the control of environmental impacts concerning thermal electricity power generation plants. This responsibility firmly focusses on air emissions. Therefore, each of the electricity generating plants must effect continuous and discontinuous air emission measurements according, to their respective size. Besides, ENRE is obliged to carry out periodic environmental air emission tests. The results of these tests covering the first six-month period of 1994 were as follows:

SO₂ 11.800 Tons.
 NO_x 17.700 Tons.
 VP 3.200 Tons.

Finally, and only for comparative purposes, some values (thousands of Tons) for other countries, of the first six-month period of 1994 are shown:

	SO ₂	NO _x
Belgium	265	55
Denmark	165	62
Germany	2.500	500
Greece	151	18
Spain	1.145	184
Holland	150	61
United Kingdom	1.941	508

6.4. Organization and personnel participating in the GHG Inventory Project (Postal adress, telephone, and fax in Annex A)

6.4.1. Energy, Industry, Mining, Transport and Residential Sectors.

6.4.1.1. Governmental Organizations and Lead Personnel

ENTE NACIONAL REGULADOR DE ELECTRICIDAD, ENRE
 (National Regulation Agency for Electric Power)
 Ing. José M. Chenlo, Environmental Unit

SECRETARIA DE ENERGIA
 (Energy Secretariat)
 Lic. Cristina Massei, Head Environmental Unit

6.4.3. *Waste Management*

NATIONAL CORDOBA UNIVERSITY

Dr. Pedro Depetris, Professor and Research Scientist of CONICET

Facultad de Ciencias Exactas, Físicas y Naturales (School of Exact, Physical and Natural Sciences)

BUENOS AIRES UNIVERSITY

Lic. Ricardo Vicari, Professor

Dto. de Biología (Dpt. of Biology, School of Exact and Natural Sciences)

6.4.4. *Coordination Procedures*

The general aspects of coordination have been described in point 5.2.; the specific tasks of the GHGWG coordinator⁽¹⁾ will be.

- 6.4.4.1. To facilitate relevant information on GHGINV Methodology
- 6.4.4.2. To inform the GHGWG on decisions of the Intergovernmental Negotiating Committee (INC) and, later on, of the Conference of the Parties (COP), about any methodological problem referring to the preparation of inventories, as well as the reporting procedures.
- 6.4.4.3. To receive the suggestions and problems of the GHGWG.
- 6.4.4.4. To enforce schedules
- 6.4.4.5. To arrange meetings
- 6.4.4.6. To deliver progress reports to the corresponding authorities
- 6.4.4.7. To prepare the final GHGINV report jointly with small editor staff ad hoc.

(1) As coordinator, designated by the National Commission on Global Change-SECYT, is already acting Dr. José A. J. Hoffmann, Senior Research Scientist of the National Council for Scientific and Technological Research, CONICET.

6.5.2.4. *Data collection in forestry and land-use change*

This requires not only data collection but also "in situ" inspection and assessment of satellite information.

6.5.3. *Data processing*

Former studies have shown that there is a need for consistency controls and assessments of the data quality. A very particular problem represent the data gaps. It is felt that technical assistance for data processing and the development of a data base could be provided by IPCC.

6.5.4. *Technical Coordination*

General considerations on coordination have been exposed in 5.2. Coordination procedures for the GHGWG have been indicated in 6.4.4.

The coordination within the 5 sub-groups integrating the GHGWG will be carried out by the lead scientists of the team, whose names are in 6.4.1. to 6.4.3. Only in the case of the Energy Group, composed by members of governmental and non-governmental organizations, an additional coordination is necessary. This will be done by Lic. Cristina Massei (6.4.1.1.), who has already acted in the past as coordinator in this subject.

6.5.5. *Anticipated products and achievements*

6.5.5.1. An Inventory of Greenhouse Gases for the Argentine Republic for 1990 and information on GHG-emissions in the past, at least for CO₂. The results achieved will be included in a National Report which has to be prepared in accordance with the UNFCCC ratified by the Argentine Government. Such report will include information on estimation procedures and the corresponding uncertainties.

6.5.5.2. A national data base, at least in a decentralized form.

6.5.5.3. Formulation of steps which should be taken to reduce data defficiencies, to adjust emission factors to regional or national conditions and to improve calculations for CO₂ removal by sinks.

6.5.5.4. Actions (Workshops, documents, etc.) to build up and improve capacity for GHGINV and to disseminate results among concerned organizations (national, international, NGOs, etc.).

6.8.4. Training in the field of GHG inventories.

6.8.5. Publication of study results.

6.9. **Budget Sub-Groups of GHGWG**

6.9.1. Sub-Group of GHGWG: Energy

Funding by Source in US Dollars

EXTERNAL SUPPORT	ARGENTINE GOVT.
<i>CONTRACTS</i> \$ 132.350	
10 months research scientist from IDEE/FB \$ 7.125 per month including technical personnel infrastructure and general office expenses \$ 71.250	\$ 4.800
6,75 months research scientist for the Energy Secretariat, \$ 4.000 per month: \$ 27.000	\$ 200/month, 10% dedication 24 months
6 months technical personnel for the Energy Secretariat, \$ 2.000 per month; \$ 12.000	
13 months Research Assistant \$ 1.700 per month \$ 22.100	
<i>Salary</i>	\$ 147.300
<i>Travel</i>	
<i>Equipment</i> \$ 10.000	
One computer and printer \$ 6.400	
One personnel computers \$ 3.600	
<i>Supplies</i> \$ 8.400	\$ 5.000
Fax, mail, etc. (\$ 8.400)	
<i>Other</i> \$ 7.525	\$ 66.000
Use of infrastructure, general expenses, etc.	
TOTAL FOR 2 YEARS \$ 158.275	223.100

6.9.2. Sub-Group of GHGWG: Agriculture

Funding by Source in US Dollars

EXTERNAL SUPPORT	ARGENTINE GOVT.
<i>CONTRACTS</i> \$ 8.400	
Secretary work, data collection, data base, 30% dedication. \$ 350. 24 months.	\$ 4.800
<i>Salary</i>	\$ 4.800
	\$ 200/month, 10% dedication 24 months
<i>Travel</i> \$ 2.800	
8 trips, \$ 350/trip	
5 for National Workshops and meetings	
3 for data collection	

6.9.4. Sub-Group of GHGWG: Forestry and Land - Use Change

Funding by Source in US Dollars

EXTERNAL SUPPORT	ARGENTINE GOVT.
<p><i>CONTRACTS</i> \$ 29.500</p> <p>a) Technical personnel (\$9.000) Task: Provide information from different states and information processing</p> <p>b) Technical personnel (\$9.000) Task: Provide information from fieldwork and remote sensing processing. Studies include native forest, cultivated forests, grasslands, degraded forest and abandoned areas.</p> <p>c) Forest workers (\$ 11.500) Task: collect field information</p>	
<p><i>Salary</i></p>	<p>\$ 39.940</p> <p>a) Project leader (20% dedication) 22 months-\$597 (\$13.140).</p> <p>b) Forestry inventory expert (30% dedication) 22 months-\$305/month (\$6.700)</p> <p>c) Remote sensing expert 30% dedication. 22 months-305/month (\$6.700)</p> <p>d) Agroforestry expert (30% dedication) 22 months-\$305/month (\$6.700)</p> <p>e) Geomorphology expert 30% dedication. 22 months-305/mont (\$6.700)</p>
<p><i>Travel</i> \$ 11.100</p> <p>a) Fuel and lubricants for fieldwork (30.000 km) 350 liter of fuel (\$3.000)</p> <p>b) Lodging and meals for fieldwork. Government rate \$ 81/day-100 days (\$8.100)</p>	
<p><i>Equipment</i> \$ 40.000</p> <p>a) 10 landsat tape in cartridge tape cost \$4.000 each (40.000) Cars</p>	<p>\$ 102.000</p> <p>a) 2 all terrain vehicles (60.000 km - \$0,7/km) \$42.000</p> <p>b) Use of remote sensing equipment (20 landsat tapes) \$30.000</p> <p>c) Use of various laboratory facilities of the Facultad de Ciencias Forestales (drugs included) \$ 30.000)</p>
<p><i>Supplies</i> \$ 5.000</p> <p>a) Office materials (\$ 500)</p> <p>b) Cartographic materials (\$ 750)</p> <p>c) Drawing materials (\$ 750)</p> <p>d) Aerial Photography copies (\$ 2.000)</p> <p>e) Landsat imagery prints (\$ 1.000)</p>	
<p>TOTAL FOR 2 YEARS \$ 85.600</p>	<p>\$ 141.940</p>

6.10. BUDGET SUB-PROJECT GHG INVENTORY (SUMMARY)

Funding by Source in US Dollars

BUDGET ITEMS	EXTERNAL SUPPORT						ARGENTINE GOVT.					
	ENERGY	AGRICULTURE	RUMINANTS ANIMALS	FORESTRY LAND-USE	WASTE MANAGEMENT	TOTAL	ENERGY	AGRICULTURE	RUMINANTS ANIMALS	FORESTRY LAND-USE	WASTE MANAGEMENT	TOTAL
Contracts	132.350	8.400	12.000	29.500	16.200	198.450	4.800					4.800
Salary							147.300	4.800	30.000	39.940	28.800	250.840
Travel		2.800	2.500	11.100	7.600	24.000						0
Equipment	10.000			40.000	4.790	54.790			3.000	102.000		105.000
Supplies	8.400	1.440	3.000	5.000	1.552	19.392	5.000					5.000
Other	7.525	1.200			870	9.595	66.000					66.000
TOTAL	158.275	13.840	17.500	85.600	31.012	306.227	223.100	4.800	33.000	141.940	28.800	431.640

7.3. *Objectives*

The general objectives of the Vulnerability Assessment (VA) to Sea Level Rise (SLR) to the Argentina coast are:

- 7.3.1. To provide to the nation's decision makers with an adequate insight into the vulnerability of the Argentina coast in order to anticipate the need for action;
- 7.3.2. To provide a premier description, in terms of vulnerability profiles, of the country's coast and to help to identify specific area in which in depth analysis shall be applied, and
- 7.3.3. To develop an integrated coastal zone management programme which will take over the responsibility to assess decision makers about all possible activities along the coast.

7.4. *Proposed Methodology*

To adequately address the vulnerability issue for the Argentina coastline it is necessary to deepen the gathering of available data in many different agencies, universities and research institutions from the country, but also from international agencies as NOAA, NASA, US EPA, etc. In conjunction with the data previously obtained by the SLRWG and applying the IPCC WG II Common Methodology (Annex 3), the proposed project plans prepare a detailed assessment of the vulnerability of the Argentine coastline.

The foundation of data gathering and communication system has been already developed by the SLRWG, and that will be presented in a preliminary report in October 1994. This preliminary study was conducted for more than one year without any outside funding neither any field work.

To build a scientific credible assessment, the SLRWG preliminary results clearly show the need to establish a monitoring program at 6 sites along the pilot area. These sites are identified based on geomorphologic and oceanographic characteristics and the probable impact on the socio-economic aspects of the community. Although it is considered that field data is a major requirement, the collection of data from different organizations will insure a minimum assessment.

The data to be gathered include: a) near shore dynamics including sediment transport processes, b) climate, c) tidal level, d) coastal and near-inland geomorphology, e) land use and f) socio-economic characteristics. Variables a) through d) are going to be determined by deploying instrumentation (i.e., wave and tide gages, current measurements), periodic beach and coastal surveys, visual observations, comparison with historical data, and remote sensing information and variable e) through the use of census data and other secondary sources, remote sensing and field work. Finally, variable f) can be gathered through census data and field work.

The proposed instruments are required in order to obtain on site data that can complement

7.7. *Schedule*

- 7.7.1. First half of 1995: First National Workshop: Assessment of data sources and identification of required complementary information; drafting a detailed workplan.
- 7.7.2. Sea level rise and socio-economic development scenarios for the area consistent with IPCC estimates. Issue of a short report.
- 7.7.3. June 1996: Local workshop. Beginning of integrated assessment.
- 7.7.4. December 1996: Local workshop. Integrated assessment conclusions, draft of the final report.
- 7.7.5. January through April 1997: Peer review of different sections of the report
- 7.7.6. April 1997: Final National Workshop: Discussion of the results and approval of the final National Report.
- 7.7.7. July 1997: Dissemination of the National Report.

7.8. *Key Personnel and Institutions (Postal address, telephone and fax in Annex B)*

- 7.8.1. Comité para el Programa Hidrológico Internacional, CONAPHI
(Committee for the International Hydrological Program)
Ing. Mario Fuschini Mejía, President, Lic. M Josefa Fioriti, Secret.
- 7.8.2. Instituto Argentino de Oceanografía (IADO) (Argentine Institute for Oceanography)
Dr. M. Cintia Piccolo, Head Physical Oceanography Dept. and Executive Secretary of the SLRWG. Dr. Gerardo M. E. Perillo, Dept. Director of the SLRWG and Leader Subgroup III
- 7.8.3. Servicio de Hidrografía Naval (Naval Hydrographic Service)
Lic. Miguel Clements, Head Oceanography Dept. and Leader Subgroup
- 7.8.4. Centro de Geología de Costas (Center for coastal Geology)
Dr. Federico I. Isla, Senior Researcher and Leader Subgroup II

8. VULNERABILITY AND MITIGATION RELATED TO GLOBAL CHANGE IMPACT UPON AGRICULTURAL PRODUCTION

8.1. Background

Cereal and oil crop production is critical for Argentina economy. Grain exports, representing almost half of national grain volumes, are a significant contribution to the commercial balance of the nation. Of the overall production 90% is concentrated in the Pampean region. The area of the "Pampas" is 60,000,000 hectares, from 31° to 39° South latitude and from 57° and 63° West longitude, with wheat, corn, soybean, sunflower, grain sorghum, flax and oat as the main crops.

Weather conditions are variable. Mean annual precipitation decreases from 1200 mm in the east to 500 mm in the west, while thermal difference between northmost and southmost weather stations (Reconquista and H. Ascasubi) reaches 6° C. Accordingly Molisols are the dominant soil order, ranging from typic Argiudols in the east to typic Haplustols in the west. Interannual variability of crop yields follow the noticeable short term oscillations in weather patterns.

Global change may cause detrimental effects demanding further knowledge in the adaptation mechanisms of crops and pastures (Rodriguez and Magrin, 1993). Preliminary studies by Rodriguez and Fernández (1993b), with locally-adapted models (Magrin et al., 1991), point to a 15% average decrease in corn grain yields as Pampean climate change is coupled to a CO₂ doubling. According to Díaz et al. (1993) a 10-40% degradation in soil organic matter may partially explain corn yield decreases under low-input management in the Rolling Pampas. Similar findings were reported for wheat as yields are expected to be lower than actual in entic Hapludol and vertic Argiudol soils and increase in typic Argiudols (Rodriguez and Fernández, 1993a).

8.2. Objectives, Methodology, Activities and Products

The research is aimed at predicting the impact of climate change on agricultural production in the Pampean Region of Argentina as well as selecting the best management strategies for mitigating such impact in the next 25 and 50 years.

I. With regard to vulnerability assessment.

8.2.1. Objective 1

To evaluate the effects of rainfall, air temperature and CO₂ changes upon cereal (wheat, corn), oil crop (soybean, sunflower) and forage productions under current low-input management level in the Pampean region.

8.2.1.1. Activities

1a) To update weather, including daily temperatures, radiation and rainfall, database for 50 weather stations in the region.

C.I.R.N. Centro de Investigaciones para Recursos Naturales (Research Center for Natural Resources)

8.2.2. Objective 2

To improve prediction accuracy by substituting global change coefficients for the Pampas with reliable regional parameters generated by well established local and/or foreign research groups.

8.2.2.1. Activities

2a) To research and do a consistency analysis for up-to-date parameter information generated by different sources, with emphasis in locally-developed parameterization.

2b) To evaluate the effect of regional change upon crop production by using already tested crop simulation models.

8.2.2.2. Methodology: - - -

8.2.2.3. Products

2a) Suitable parameters for regional change assessment.

2b) Mapping and reports on improved estimates of future crop and forage production by year 2050.

8.2.2.4. Responsibility: Departamento de Ciencias de la Atmósfera, Facultad de Ciencias Exactas (National University at Buenos Aires) in the coefficient generation and the Instituto de Clima y Agua, INTA-C.I.R.N. in model predictions.

II. *With regard to evaluating technical adaptation options.*

8.2.3. Objective 3

To identify areas outside the Pampean region that may become suitable for cropping or forage production due to modifications in their physical environment.

8.2.3.1. Activities

- 4c) To estimate ranges in planting dates and the length of crop growth period per subregion.

8.2.4.2. *Methodology*

We shall resort in the management strategies analysis built into DSSAT (Decision Support System for Agrotechnology Transfer) program to select the best management operations such as cultivar selection, planting date, irrigation and fertilization for the future environment. In addition changes in genotype characteristics will be screened with DSSAT in order to assist future breeding programs to developed materials adapted to the future combination of weather factors and CO₂.

8.2.4.3. *Products*

- 4a) Identification of management components for single crop and forage species.
- 4b) Report on the most suitable agrotechnology packages to mitigate the detrimental effects of regional change.
- 4c) Mapping of the boundaries in planting dates and crop lifetime. Report on the identification of best adapted genotypes.

8.2.4.4. Responsibility: Instituto de Clima y Agua, INTA-C.I.R.N.

IV. *With regard to both vulnerability assessment and evaluating technical mitigating options.*

8.2.5. *Objective 5*

To evaluate historical and future temporal modifications on soil quality properties and land degradation rates as effected by regional change and their impact on the future grain and dry matter production interacting with feasible management strategies in two of the highest crop yielding areas of Argentina (Rolling pampas and southeast sector of Buenos Aires province).

8.2.5.1. *Activities*

- 5a) To update soil physical and chemical properties to reflect actual soil quality level.

5e) Report and mapping of the boundaries in planting dates and crop lifetime.

8.2.5.4. *Responsability: Instituto de Clima y Agua, INTA-C.I.R.N.*

8.4. Time Frame

OBJECTIVE	ACTIVITY	FIRST YEAR				SECOND YEAR			
		I	II	III	IV	V	VI	VII	VIII
I	a		*	*	*				
	b	*							
	c		*	*	*				
	d			*	*				
II	a	*	*	*	*				
	b					*	*	*	*
III	a	*	*	*	*				
	b			*	*	*	*	*	*
	c					*	*		
IV	a			*	*	*	*	*	*
	b			*	*	*	*	*	*
	c			*	*	*	*	*	*
V	a	*	*						
	b			*	*				
	c	*	*	*	*				
	d					*	*		
	e							*	*

8.5. Technical assistance

* Dr. Allan C. JONES, Blackland Research Center, Temple, TX.
Subject: Modelling the effects of CO₂ increases on crop physiological processes.

* Dr. Jim KINIRY, Blackland Research Center, Temple, TX.
Subject: Modelling corn growth and development.

* Dr. Cynthia ROSENZWEIG, Goddard Institute for Space Studies (GISS), NASA.
Subject: Global change.

* Dr. Joe RITCHIE, Michigan State University.
Subject: Modelling soil water budget under cropping.

* Dr. Jim JONES, Florida State University.
Subject: Modelling soybean growth and development.

* Dr. David SCHIMMEL, NCAR, USA.
Subject: Modelling climate change effects on pastures.

Scientists are subject to change depending on U.S. advice and/or acquisition of new information.

NOTE: Travel and lodging expenses for participating in scheduled workshop activities were NOT included.

8.6.3. *Contribution from INTA per year*

Annual expenditures for 10 researchers.....	300.000
Hardware equipment and associated technology.....	50.000
Operational costs associated.....	100.000
TOTAL ANUAL CONTRIBUTION FROM INTA.....	450.000

8.7. *Project Leaders*

Dr. Raúl DIAZ, Director
Dr. Graciela MAGRIN, Vice-Director
Instituto de Clima y Agua
INTA-C.I.R.N.
1712 Castelar (B)
Argentina
TE: 54-1-(621)-0125
FAX: 54-1-(481)-3032

8.8. *References*

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Baethgen W.E., Magrin G.O. 1992. Assessing the Impacts of Climate Change on Winter Crop Production in Uruguay and Argentina Using Crop Simulation Models. Anales del Congreso Anual de la Sociedad de Agronomía, Simposio sobre el Cambio del Clima en Agricultura. Octubre 1992, Minneapolis, Minnesota. (in press).

Díaz, R.A. 1993. Simulating the effect of tillage equipment on soil roughness, crop residue, hydrology and nutrient cycling. Final Report to comply with the FAO Agreement CMT 56128. 34 pp.

Díaz, R.A., Di Giacomo, R.M. 1994. On the comparison of measured and EPIC simulated soil fertility losses in the Rolling Pampa of Argentina. XV World Congress of Soil Science Trans.: 229-230. Acapulco, México, July 10-16.

Díaz, R.A., Di Giacomo, R.M., Moscatelli, G. 1993. Efecto del cambio global sobre la fertilidad y productividad de los suelos en la pampa ondulada argentina. Simposio Internacional sobre Aspectos Ambientales de la Cuenca del Río de La Plata. Instituto ACQUA. Foz do Iguazú, Paraná, Brasil, 7-11 de diciembre de 1993.

Jones, C.A., Kiniry, J.R. 1986. CERES-Maize: a simulation model of maize growth and development. Texas A&M University Press. College Station, TX, USA.

and 36° S, shows the peculiarity of numerous oases, some of them bearing quite an important economic value, for the almost 1.000.000 people living in that area of the country. The flourishing agroindustries depending on these oases water supply, has also led to the development of important human settlements, to such an extent that about a half of this population is established in a dozen of well developed towns. It could be remarked that this region encompasses three Argentina's provinces - Mendoza, San Juan and La Rioja - which have made important progress in the recent decades and have plans for further improvements.

These oases and the local climate conditions have enabled the development of foreign plant species and varieties. The products are the kernel of important national industries, with definite impacts on the Argentina international commerce. The most remarkable crops are those of:

- grapes (90% of the national production)
- olives (70%)
- peaches (40%)
- beans (9%), etc.

It goes without saying that these and other fruit and vegetables grown in this area, as well as the fulfillment of water requirements for human and industrial uses, including meat production, rely on the water supply deriving from the snow and ice field melting in the high Andes, which mean elevation, between the latitudes involved, is of about 5.000 meters.

Regarding rainfall in the oases area and the eastern foothill of the Andes up to 2.000 meters, precipitation show a normal summer season regime with generally heavy showers, producing in most cases more damage than benefits, due to hail storms and landslides from the neighboring hills. These phenomena originate quite a number of disaster situations, affecting the safeguard of the communities in the vicinity of such hills.

In addition to these scourges, the yearly precipitation reaches, on average, only the amount of 200 millimeters, representing one fifth of the potential evapotranspiration. This means that these precipitations produce no direct economic benefits. They reflect in poor, low scrub vegetation, defining the local ecosystems outside of irrigated areas.

However, above 2.000 meters, the precipitation regime is opposite, being characterized by dry summer and humid winters, with relatively intense winter precipitation, generating the snow fields which are in the fact the water reservoirs of the oases in the flatlands. These reservoirs release their water slowly, during the growing season and, in some sectors, allow for irrigation up to a distance of 125 kilometers from the foothill of the Andes.

Therefore, a change to dryer conditions in the high Andes would bring ever shortcomings to all the flourishing socio-economic situation enjoyed nowadays in this prosperous oases area. The impact would be felt also in the damming of water for irrigation and hydroenergy production purpose. In this regard, it should be mentioned that these oases provide water for the operation of eight hydroelectric power stations, while the rest of the energy requirements call only for three thermal power stations of about the same

performance of vulnerability studies, including the potential extreme cases leading to water deficiencies even larger than those registered in 1970.

- 9.2.2.6. At the light of the IPCC methodologies, to evaluate which might be the adaptation and mitigation strategies to reduce or even cancel the impacts of dryer conditions, as stemming from different possible scenarios.
- 9.2.2.7. To submit, to the governmental levels of Mendoza, San Juan and La Rioja, the results achieved with the proposed vulnerability study as well as the resulting adaptation and mitigation measures, for due consideration at the corresponding official decision levels.
- 9.2.2.8. To publish the study and the proposed strategies for public information purposes and, in particular, to give access to the NGOs involved in this type of problematic of all the results and the background information from which they came out.

9.3. *Other Studies*

Although the Project involves three Andean provinces, the large majority of the oases, in the region under consideration, are in the Province of Mendoza, where about 66% of them is located. Due to the oases cropping characteristics, also a similar mathematical relation holds for the crop percentages, excepting the cases of peaches and beans productions, for which Mendoza counts for 36% (out of the regional total of 40 %) and the whole 9% , respectively.

It is therefore quite clear that this province should, as it in fact is, be very active in promoting research activities associated to the various sciences involved. This is a requirement emerging from the rationale of its economic and social development.

Therefore, the project proposed shall in addition to the above mentioned geophysical sciences and socio-economic aspects, also involve the consideration of environmental, engineering and technical sciences and cultural aspects.

Last but not least, this study is closely associated to the sustainable development philosophy, becoming now the leit-motiv of the governments in different parts of the world.

Consequently, the proposed vulnerability study shall undoubtedly find immediate repercussions from the decision levels in the provinces concerned, particularly in Mendoza. The official and the private groups concerned will, no doubt, be more than simply interested in the achievement of adaptation and mitigation strategies, for the sake of the welfare of its community. Therefore it should be expected that will adopt the outcome of this Project for their future planning and development actions. In this connexion, the performance of a workshop with the participation of government representatives and NGOs, will permit to make them conscious of the importance and value of these matters, in connexion with the medium and long term planning actions.

9.4.1. *Personnel*

Dr. Osvaldo E. Canziani
CONICET Researcher
Director of IEIMA
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+ 54-1-374-2951
email: root @ ieima.org.ar

9.4.2.

Dr. Maria del Rosario Prieto,
CONICET's Researcher
Casilla de Correo 131
5500 Mendoza
Phone:
+54-61-24-0939
+54-61-24-0314
Fax: +54-61-38-0370

9.4.3.

Dr. Walter M. Vargas
ditto under Canziani

9.4.4.

Ing. Juan Carlos Eder or
CRAS

9.4.5.

Lic. Albina Lara
Programa de Política de
Ordenamiento Territorial.
Presidencia de la Nación.
Av. J. A. Roca 782, 7°
Buenos Aires
Phone and Fax:
+54-1-345-1390
+54-1-345-1375

9.4.6.

Lic. N. Prieto
ditto under Dra. Prieto

be made by Dr. María Prieto, who has already developed an important data base at CRICYT (Regional Center for Scientific and Technological Research, of the National Council of Scientific and Technological Research, CONICET).

After the checking of the available information, action would be for the completion of the available data series, through the acquisition of the further data required within the above mentioned centers and agencies. The contribution of NGOs will be mostly in the area of socio-economic and cultural data.

9.5.3. Data Processing

9.5.3.1. The working team will develop the mentioned data base and proceed to consistency analysis and quality control of the data coming from the various observational information supply units. Further, with the use of GIS methodologies will be undertaken the combined analysis of geophysical and other data as well as the quality control of proxy data, stemming from the careful checking of newspapers, available research papers, natural disasters reports, etc.

9.5.3.2. The feeding-up of newly collected data will also be subjected to the same screening techniques.

9.5.3.3. All available statistical analysis techniques will be applied to find out the potential relationship of the various biogeophysical and socio-economic variables. Appropriate regional climate models, if timely available, and the population and economic trends, as foreseen by UN agencies, will be used to define the potential future scenarios which will be the basis for assessing the impact of climate change on the oases region, and for developing the corresponding adaptation and mitigation strategies.

9.5.4. Expected Products and Achievements

9.5.4.1. Completion of the vulnerability studies and submission of the corresponding reports plus a set of the resulting adaptation and mitigation technologies to the Governments of the provinces involved in this case study.

9.5.4.2. Dissemination of overviews and reports for the building-up and improvement of the community actions vis a vis of the scourges which may result from the expected impacts of climate change on the sustainability of the present oasis's regimes, in the area under study. The recipients of such an action will be all the organizations concerned, including also the NGOs which aims include the defense of these natural resources and promotion of the community's sustainable development.

analyses.

- April-May: Convening of the technical conference for official and private agencies' representatives.

- July-December: Definition of thresholds and possible future scenarios, for convenient planning periods, i.e. from July 1997 to the years 2010, 2020 and 2030 (these intervals will be adjusted at the light of the result achieved in the first four months of this semestre.

Application of UNEP/IPCC methodologies for impact assessment and mitigation options.

9.6.3. *Year 1997*

- January: Organization of a Seminar for Provinces' officials and private groups, on the outcome of the Project and the associated recommendations.

- January-April: Continuation of Project activities. Participation in the final workshop of the country study project.

- April: Convening of Seminar

- Mar-June: Preparation of Final report, with recommendations, and distribution.

Preparation of a report for the IUCC Dossier on Climate Change.

9.7. *Follow up Activities*

9.7.1. Monitoring of geophysical variables in the High Andes, encompassed between 29 S and 36 S, by CRICYCT and the corresponding scientific and technical bodies of the provinces of Mendoza, San Juan and La Rioja.

9.7.2. Analysis of the applicability to other regions, in Argentina, of the vulnerability assessment procedures developed under this project.

9.8. *Technical Assistance Required*

The external assistance required stems from the lack of local financing to complement the available economic sources to further studies already initiated in connexion with the climate change. Such an external complementation is necessary to proceed to the evaluation of climate change impacts and the definition of strategies which would be adopted by the governments of the Provinces of La Rioja, san Juan and Mendoza to reduce the adverse effects of climate change which, as it has been shown during the 1970 crisis, might adversely affect the economic development of these provinces and of other provinces of Argentina, as well as its exporting capacities. Such financing is reflected in the Project's budget, as shown below.

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- Hoffman J.A.J., 1975, South América Climate Atlas, published by the WMO. -UNESCO-Cartographia Budapest.
- Hoffmann J.A.J. 1991: De las variaciones de la temperatura del aire en la Argentina y estaciones de la zona Sub-Antártica adyacente desde 1903 hasta 1989 inclusive.
- Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial. Buenos Aires, 30 de julio al 4 de agosto de 1990.
- Hoffman J.A. J. et al, 1972, Guía Climática para el Turismo, Servicio Meteorológico Nacional, Argentina.
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- Historia del Clima de la Región Cuyana. Aproximación Metodológica. Cuadernos del CEIFAR, N° 9, Mendoza. Geocta, Buenos Aires, 1985.
- Historia de la Ocupación del Espacio y el Uso de los Recursos del Piedemonte de Mendoza, Curso Latinoamericano sobre Desertificación, 1989.
- Perturbaciones Climáticas en el Area Andina sudamericana y planicies adyacentes, durante el Siglo XVIII, Universidad de Sevilla, España, 1991.
- Determinación de posibles cambios climáticos mediante la comparación del régimen de precipitaciones de los siglos XVI, XVII y XVIII, en Mendoza, Geoacta, Buenos Aires, 1985.
- Pearman G.I. Greenhouse. Planning for Climate Change, CSIRO.
- Pittock A.B. et al. Climate Change and variability-A Southern Hemisphere Perspective, C.U.P.
- Schwerdfeger W, editor. Climates of Central and South America. Elsevier.
- World Weather Records, USGPO.

10. MITIGATION ANALYSIS IN THE G-H-G-EMISSION SECTOR OF THE ECONOMY

as well.

- 10.2.6. To identify new technologies which could contribute to mitigation, in a medium term.
- 10.2.7. To evaluate attitudes of public and private actors in front of political measures or technologies which could contribute to emission abatements.
- 10.2.8. To begin designing database which will make possible to continue with the impacts analysis and their evolution, at emission source levels, and which can be used also to elaborate alternative political mitigation stages.
- 10.2.9. To identify schedule components for training public sector and private sector actors who have to design, to evaluate and to adopt mitigation policies.

10.3. Methodology

Basically, there will be applied the methodological features which are used in mitigation studies produced in the IPCC framework, complemented with RISO methodology and "The Guidance for Mitigation Assessments: Version 1.0; may 1994. In specific topics (as Rational Use of Energy or energy sources penetration analysis and energy sources substitution) we will use the methodologies elaborated by IDEE/FB in the Network of COPED Centres framework with the European Union. To identify attitudes private and public sector actors, it will be developed a series of interviews. Moreover, the methodologies used in the Integral Energy Studies developed by IDEE/FB will be included in these methodological features.

10.4. Organizations and Personal Participating in the Mitigation Analysis

10.4.1. Non-Governmental Institutions and Lead Personnel

FUNDACION BARILOCHE (FB), (BARILOCHE FOUNDATION) -
INSTITUTO DE ECONOMIA ENERGETICA (IDEE), (INSTITUTE FOR
ENERGY ECONOMICS), both non-profit private scientific Institutions.

Lic. Daniel Bouille (Director of the Project)
Piedras 482 2° H
(1070) Buenos Aires
Tel: (541) 331-1816
(541) 331-1649
Fax: (541) 334-4717

10.6. Schedule

- 10.6.1.** First half of 1995: Initiation of the project. First national workshop. Drafting a detailed workplan.
- 10.6.2.** September 1995: Workplan adjustment.
- 10.6.3.** August-october 1995: Data and information collection
- 10.6.4.** August 1995-January 1997: Activities in accordance to the objective. Assistance to Project meeting, seminars, etc.
- 10.6.5.** January-March 1997: Preparation of final report. Extended Report. Report Synthesis. Executive Summary.
- 10.6.6.** April-June 1997: Final workshop. Report discussion. Printing Dissemination.

12. *QUALIFICATIONS OF THE PROJECT STAFF*

12.1. *Resumes for Key in-Country Project Members*

These may be estimated in the abbreviated CURRICULA of the following members.

12.1.1. *Sub-Project GHGINV*

Ing. Carlos E. Suárez (F.B.)

Place and Date of Birth: Paraná, Entre Ríos Province, Argentina, April 6, 1936.

Nationality: Argentine

Marital Status: Married, two children

Degree: Chemical Engineer, 1961. Chemical Engineering Faculty
Litoral National University, Santa Fé, Argentina.

Postgraduate
Activities: 1963: Course on Economic Development
1964: ILPES Course. Industrial Planning. Santiago de
Chile
1965: Energy Legislation, Catholic University, Buenos
Aires
1968: Operative Research I, Catholic University, Buenos
Aires
1973: Modern Mathematics, Grenoble University, France
1974: Course on Economic Policy and Economy for
Engineers, Grenoble University, France

Positions Held: 1989-1990 Member of the Latin American and the
Caribbean Commission on Development and Environment.
Our own agenda, New York, UNDP/IDB

1989-1990: Member of the scientific advisory council of
the National Science and Technology Secretary.

1988-1989: Bariloche Foundation Representative at IFIAS

1988...: Bariloche Foundation Executive President

1988...: President of the Bariloche Foundation Board of
Directors.

1987-1988: Executive Vice-President of Bariloche
Foundation in charge of the presidency.

1986-1990: President of ALAPE (Latin American
Association of Energy Planners)

BORN: January 29, 1951 in Buenos Aires, Argentina

Married, 2 children

Instituto Argentino de Oceanografía
Av. Alem 53
(8000) Bahía Blanca
TEL: 5491-23555
Fax: 5491-553933

Education: 1975 Licenciado en Ciencias Geológicas, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Argentina.

1981 Doctor of Philosophy in Oceanography. Department of Oceanography Old Dominion University, Norfolk, Virginia, U.S.A.

Languages: Speak, read, write and translate: Spanish, Italian, English and French.

Academic

Experience: 1982-1989 Assistant professor. Departamento de Ciencias Naturales, Física and Geología, Universidad Nacional del Sur.

Has directed and presently directs four PHD dissertations and three Master Thesis.

1989-1994 Coordinator and professor of seven Post graduated courses on Geomorphology and dynamics of estuaries and dynamics of sediment transport given in Bahía Blanca, Buenos Aires, Trelew, La Plata, Río Gallegos, Valdivia (Chile) and Montevideo (Uruguay).

1991-1992 Invited professor of Geological Oceanography, Department de Oceanographie, Universiti du Quebec a Rimouski, Canada.

1992-1995 Joint professor Departement de Oceanographie, Universite du Quebec, a Rimouski, Canada.

Since 1992 Joint professor, Departamento de Oceanografía, Universidad de Concepción, Concepción, Chile.

Professional

experience: 1974-1982 Assistant research oceanographer, Servicio de Hidrografía Naval.

1976-1978 Assistant research geologist, Departamento de Ciencias Geológicas, Universidad de Buenos Aires.

1978-1981 External fellow (CONICET) Department of Oceanographie, Old Dominion University, Norfolk, Virginia, U.S.A.

225231

Piccolo, M.C.; Perillo G.M.E. and Daborn G.R., 1993 Soil temperature fluctuations on tidal flat in Minas Basin Bay of Fundy, Canada. ESTUARINE COASTAL AND SHELF SCIENCES 35: 345357

Perillo, G.M. E., Drapeau, G. ; Piccolo, M.C. y Chaouq, N. 1993. Tidal Circulation pattern on a tidal flat, Minas Basin, Canada. MARINE GEOLOGY 112(3/4): 219236

Pino, M.; Perillo G.M.E. and Santamarina, P. 1994 Residual fluxes in cross section of the Valdivia River estuary, Chile. ESTUARINE COASTAL AND SHELF SCIENCES 38(In press)

Perillo, G.M.E: and Piccolo, M.C., 1994 Joint international program for oceanography in developing countries: A proposal. PROCEEDINGS IAPSO SIMPOSIUM PS5 (in press)

Gomez, E.A. and Perillo, G.M.E., 1994 Submarine outcrops underneath shoreface connected sand ridges, outer Bahia Blanca estuary, Argentina. QUATERNARY OF SOUTH AMERICA AND ANTARTICA PENINSULA (In press)

Piccolo M.C., and Perillo, G.M.E., 1994 Geomorfología e hidrografía de los estuarios de la República Argentina. In: El mar argentino y sus recursos pesqueros. INIDEP, Mar del Plata (In press)

Perillo and Piccolo, M.C., 1994. Methodology to study estuarine cross section REVISTA GEOFISICA (In press)

Perillo, G.M.E., 1995, Geomorphology and sedimentology of estuaries. An introduction. In: Perillo and Long: GEOMORPHOLOGY AND SEDIMENTOLOGY OF ESTUARIES, EL SEVIER PUB. COMPANY, Amsterdam, (In press)

Perillo G.M.E: , 1995 Definition and Geomorphologic classifications of estuaries. In: Perillo and Long: GEOMORPHOLOGY AND SEDIMENTOLOGY OF ESTUARIES, EL SEVIER PUB COMPABY, Amsterdam, In press.

14.1.3. *Sub-Project Agricultural Production*

14.1.3.1. Dr. Raúl Díaz (INTA)

Professional Experience: Researcher in Simulation of Farming Systems. Instituto de Agua y Clima, Centro Nacional de Recursos Naturales (IAC CIRN) Instituto Nacional de Tecnología Agropecuaria (INTA)

Participation at 15 regional or national meetings, including 6 of them abroad.

Consulting agent to the Oficina Regional de FAO (November 1992) and Blackland Research Center de Texas A&M University System (march and april 1993)

Realted
Articles:

Droughness, crop residue, hydrology and nutrient ciclying, Final Report FAO Agreement CMT 56128.34pp.

Diaz, R.A., Di Giacomo, R.M., Moscatelli, G. 1993. Efecto del cambio global sobre la fertilidad y productividad de los suelos en la pampa ondulada argentina. Simposio Internacional sobre Aspectos Ambientales de la cuenca del Río de la Plata, Instituto ACQUA. Foz de Iguazu, Paraná, Brasil, 7 al 11 de diciembre de 1993.

Diaz, R.A., Di Giacomo, R.M., 1994. On the comparison of measured adn EPIC simulated soil fertility losses in the Rolling Pampa of Argentina. XV International Congress of Soil Science. Acapulco, Mejico. 12 al 16 de julio.

14.1.3.2. *Dr. Graciela Magrin (INTA)*

Professional
Experience:

- Researcher in Crop Modelling. Instituto de Clima y Agua. Centro Nacional de Recursos Naturales (IAC-CIRN). Instituto Nacional de Tecnología Agropecuaria (INTA). Subsecretaría de Agricultura, Ganadería y Pesca. Since 1990.

- Area coordinator of Agricultural Meteorology in the IAC-CIRN. Since 1990.

- Professor in Crop Modelling at the Master of Science Program in Crop Breeding. Universidad Nacional de Buenos Aires. Since 1992.

- Professor in Crop Physiology at the Master of Science Program in Crop Breeding. Universidad Nacional de Rosario. Since 1992.

- Researcher in Crop Physiology. Área de Ecofisiología. Estación Experimental Pergamino. INTA.

Education:

Agricultural Engineering. Facultad de Agronomía. Universidad Nacional de Buenos Aires. Argentina, 1979.

radiación solar global en los pronósticos de cosecha. Actas de la 16 Reunión de trabajo de la Asociación Argentina de Energías Renovables y Ambiente y 7mo. Congreso Latinoamericano de Energía Solar. La Plata, Buenos Aires, Argentina.

MAGRIN G.O., TRAVASSO M.I. 1993. Evaluación de riesgos en Sistemas Agrícolas. I) Fertilización Nitrogenada en Trigo. (aceptada en RIA).

14.1.4. *Sub-Project Oasis Vulnerability*

Dr. Osvaldo F. Canziani (IEMA)

Date of Birth: 18-04-23

Place: City of Buenos Aires, Argentina

Widow Passport N°: 2.008.585

Mail address: Casilla de Correo 141 Sucursal 5 - 1405, Buenos Aires, Argentina.

Office: Instituto de Estudios e Investigaciones sobre el Medio Ambiente, IEIMA
Calle Alsina 1816 - (1090), Buenos Aires, Argentina

Tel: (54-1)476 1850

Fax: (54-1)476-1850

Home Address: Calle Dr. Juan F. Aranguren 342 (1405), Buenos Aires, Argentina.

Languages: Spanish, English, French, Italian and Portuguese.

Degrees: 1944: Professor of Physics, Buenos Aires.

1945: Meteorological Inspector, Buenos Aires.

1948: Diploma of the Imperial College (DIC), University of London, United Kingdom.

1948: Master of Science (Meteorology) University of London.

1953: Doctor in Meteorology, University of Buenos Aires.

Present Positions: 1981-Present : Researcher of the National Council of

Previous Positions: 1942-1946: Professor of physics, mathematics and technical subjects for meteorologists.

1949-1955: Professor of physics at the Atmosphere and Meteorological Instruments, Chair of Meteorology, FCEN/UBA and professor of General Meteorology in the Escuela Superior Técnica del Ejército.

1951-1955: Head of the Department of Meteorology, Argentina Air Force.

1955-1960: Chief of the ICAO Technical Assistance Mission, in Paraguay.

1957-1960: Professor in Meteorology, Mechanics and Optics, in the University of Asunción and the UNESCO's Institute of Mathematics, Physics and Chemistry, Asunción, Paraguay.

1958-1960: UNDP Resident Representative (ad interim), Paraguay.

1960-1968: Technical Officer (Meteorology), ICAO South American Regional Office, Lima, Perú.

1966-1968: Organization of Training Courses for Meteorological Personnel and lecturing on Meteorology, in the Agrarian University of La Molina, Perú.

1968-1981: WMO Regional Representative for Latin America and the Caribbean (1968-1975), in Geneva, Switzerland until 1978, then in the region, Asunción, Paraguay.

1968-1981: Organization of training seminars, technical conferences, simposia and workshops, sponsored by the WMO and the UNDP in different countries in Latin America and the Caribbean.

1968-1981: Organization of the Regional Association III (South América) and Regional Association IV (Central and North América) Sessions in Bogotá, Guatemala, Mexico, Brasília, Buenos Aires, and Habana.

1968-1981: Participation, as regional director, in the sessions of WMO Congresses VI, VII, and VIII; and the annual meetings of The WMO Executive Committee.

1972-1981: WMO representative before Interamerican Development Bank.

sobre Medio Ambiente.

1992: New York Academy of Sciences.

Other:

1960-1981: Decorations and awardings, from various Latin American Countries.

1984-1987: Direction of fellowships-holders.

1986-present: Jury of Doctorate Thesis and Selection Committees, in Universities of Argentina.

producción agropecuaria" -1984/85 - Colaborador en el equipo de estudio

- Comunidad Económica Europea (DGXVII)-IDEE- "Métodos de análisis y proyección de los requerimientos energéticos" - 1984/85 - Colaborador en el área Balances Energéticos.
- Instituto Nacional de Energía (Ecuador)-CEE- "Posibilidades de penetración de energía solar en uso calentamiento de agua en la ciudad de Quito (Ecuador)". - 1985/86 - Responsable del Desarrollo metodológico.
- International Development Research Centre (Canadá)- "Evaluación de alternativas de abastecimiento eléctrico para áreas rurales- Metodología y Estudio de Caso" - 1985/86 - Responsable metodología. Responsable diagnóstico socio-económico y evaluación económica y financiera.
- Comunidad Económica Europea (DGXVII) - "Estudio Integral de Planeamiento Energético- Región NEA".- 1986 -. Miembro del equipo de trabajo Área 1-Diagnóstico Socio-Económico.
- Banco Interamericano de Desarrollo (BID)- "Precios y Tarifas. Análisis de las propuestas Neoclásicas". -1986 - Colaborador en el equipo de investigación.
- Parques Nacionales (Argentina)- "Estimación de requerimientos de energía eléctrica de empleados de los parques Nacionales Lanín y Nahuel Huapi" Convenio Instituto Solar Arquitectura Buenos Aires - 1987 - Responsable estimación requerimientos y evaluación económica de alternativas de abastecimiento.
- International Development Research Centre (Canadá)- "El proceso de difusión de Microcentrales hidroeléctricas" - 1987/1989 Responsable desarrollo metodológico, en colaboración. Responsable área financiamiento y aspectos institucionales.
- Comunidad Económica Europea (DGXVII) - "Estudio Integral de Planeamiento Energético- Región NEA".- 1989 -. Miembro del equipo de trabajo Área Energética- Responsable Estudio de Sustitución
- International Development Research Centre (Canadá)- "Abastecimiento de Energía a Áreas Rurales: La Difusión de Micro Centrales Hidroeléctricas" - 1989-90.Responsable Metodología.
- Banco Mundial-Secretaría de Energía - "Estudio de Costos y Tarifas para el Sistema Eléctrico Argentino - Etapa Mayorista" - Miembro del equipo de trabajo - 1990-91.
- Comunidad Económica Europea (DGXVII) - "Estudio Energético Integral de la Provincia de Buenos Aires".- 1991 -. Miembro del equipo de trabajo - Responsable Metodología de Sustitución y Infraestructura informática

- Universidad de Buenos Aires/Instituto del Petroleo- "Curso de postgrado Ingeniería en petroleo" -1986/87/88/89/90-. Profesor Titular de la materia Economía de la Energía.
- IDEE- "Curso Latinoamericano de Economía y Planificación Energética" -1987-. Profesor titular de las materias Elementos de Economía, Evaluación de Proyectos y Economía de la Energía. Profesor Adjunto de las materias Modelos de Requerimientos, Economía de las Nuevas Fuentes y Trabajo Práctico de Planificación Energética.
- Instituto Balseiro-Universidad Nacional de Cuyo- "Carrera Ingeniería Nuclear" - Profesor invitado, Elementos de Evaluación de Proyectos - 1987-1988-1989-1990-1991.
- Instituto Balseiro-Universidad Nacional de Cuyo- "Carrera Ingeniería Nuclear" - Director de tesis del Ing. Daniel Carnevali -Tema: "Análisis de factibilidad de la utilización de Uranio enriquecido en la Central Nuclear de Atucha" -1987/1988-.
- Programa de Naciones Unidas para el Desarrollo (PNUD)/Secretaría de Planeamiento República de Paraguay- Dictado del curso Elementos de Evaluación de Proyectos. Agosto 1987.
- IDEE- "Curso Latinoamericano de Economía y Planificación Energética" - 1985-1986-1987-1988-1989-1990-1991-1992. Vice-director del Curso.
- IDEE- "Curso Latinoamericano de Economía y Planificación Energética" -1988-1989-1990-1991-1992. Profesor titular de las materias Elementos de Economía, Evaluación de Proyectos y Economía de la Energía. Profesor Adjunto de las materias Modelos de Requerimientos, Economía de las Nuevas Fuentes y Trabajo Práctico de Planificación Energética.
- Universidad Católica Argentina- Profesor Invitado - Seminario sobre Economía de la Energía - 1991.
- Universidad Católica Argentina- Postgrado -Curso de especialización en petroleo y gas natural - Profesor de la materia Economía de la Energía - 1993.

PUBLICACIONES

- "Alternativas de Planeamiento energético para Argentina en el período 1974/1990"- Fundación Bariloche. 1974
- "Análisis crítico de la Metodología de los Balances Energéticos Argentinos"- Fundación Bariloche. 1975
- "Los criterios de evaluación de proyectos y el medio ambiente. Una introducción al tema"- Fundación Bariloche. 1977

- "El estado del arte en la Evaluación de Proyectos" - Paper presentado al Seminario desarrollado en Argel en Mayo 1990.
- "Economía de la Energía" - IDEE 1990
- "Sistema de costos y tarifas del sector eléctrico. Aspectos conceptuales y metodológicos de los sistemas de costeo" - En colaboración - 1991.
- "Análisis de los costos de generación y su relación con los precios del mercado mayorista del sistema eléctrico" - En colaboración - 1991.
- "Régimen de costos y tarifas para el sistema eléctrico Argentino. Los mercados eléctricos minoristas - En colaboración - 1991.
- "Análisis de la contribución de la biomasa forestal a la producción de energía en América Latina" - En colaboración - 1991.
- "El desempeño del sistema eléctrico en Argentina" - En colaboración - 1991.
- "Integrated Energy Planning in countries with highly skewed incomes and inequal access to basic energy services" - 1992 - Paper presentado en South African Energy Policy Research and Training Project: Launching Workshop. Ciudad del Cabo - Julio 1992.
- "Análisis prospectivo de la demanda de energía eléctrica en el mercado integrado de MERCOSUR" - En colaboración - 1992.
- "Strategies of Rational Use of Energy in Developing countries: evaluation and prospects - Argentine Report - Marzo 1993.

REUNIONES Y SEMINARIOS NACIONALES E INTERNACIONALES

Asistió a 26 eventos de este tipo.

CARGOS

- Instituto de Economía Energética. Cargo Académico: Investigador Asistente, hasta Mayo 1984; Profesor Adjunto, desde Junio 1984; Profesor Asociado desde Julio 1987.
- Instituto de Economía Energética. Miembro de la Comisión Revisora de Cuentas, hasta Enero 1987. Miembro de Comisión Directiva, Vicepresidente, desde Febrero 1990.
- Asociación Latinoamericana de Planificadores Energéticos (ALAPE) Secretario Ejecutivo.

- Past Activities: 1957-1986: Director of Climatology of the Meteorological Service
- 1960-1961: Member of the International Antarctic Analysis Center, Melbourne, Australia.
- 1966-1973: Director of the Department of Meteorology -University of Buenos Aires.
- 1961-1986: Member of Commissions of WMO and UNEP
- Present Activities: Senior Research Scientist of the National Council for Scientific and Technological Research (CONICET).
- Chairman of the Commission for Hydrological and Atmospheric Sciences Institutes of CONICET
- Coordinator of the Greenhouse Gas Working Group of the National Commission on Global Change.
- Rapporteur for the Climate Atlas of South America (WMO).
- Decoration: 1964: "DISTINCION AL MERITO AEREO ANTARTICO (Merit for Antarctic Aeronautic Activities), according to order Nro. Op64-42, October 30, 1964, Air Force of Argentine.
- Distinction: 1992: Member of the Geographical National Academy (November 18, 1992).
- Prizes: 1993: KONEX Award "Earth Sciences"; June 9, 1993.
- 1993: Platinum KONEX Award, September 22, 1993.
- Related Publications: 1991: De las Variaciones de la Temperatura del Aire en la Argentina y Estaciones de la Zona Subantártica Adyacente, desde 1903 hasta 1989 inclusive. Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial. Buenos Aires, 30 de julio al 4 de agosto de 1990.
- 1994: Temperature, Humidity and Precipitation Variations in Argentina and Adyacent Subantartic Region During the Present Century. Presented to "Meteorologische Zeitschrift (Germany-Austria-Switzerland) in 1994.

ANNEX 3

Global Climate Change
and the Rising Challenge of the Sea

Appendix C: A Common Methodology for Assessing Vulnerability to Sea Level Rise

IPCC, 1992

COUNTRY : | DATE PRINTED: 07/12/95 | PAGE 2 |

PROJECT NUMBER : ARG/95/G31/A/1G99 | SHADOW BUDGET | LAST REV: 07/12/95 |

PROJECT TITLE : Country Study on Climate Change

PROJECT BUDGET COVERING UNDP CONTRIBUTION (in U.S. dollars)

PROJECT COMPONENTS	TOTAL AMT M/M	1995 AMT M/M	1996 AMT M/M	1997 AMT M/M
*020 SUBCONTRACTS				
021 001 Inventories/Mitig./Vulnerab.	125,000		62,500	62,500
021 002 Public Information	24,000		12,000	12,000
029 COMPONENT TOTAL (**)	149,000		74,500	74,500
*030 TRAINING				
032 001 Workshops	54,000		36,000	18,000
039 COMPONENT TOTAL (**)	54,000		36,000	18,000
*040 EQUIPMENT				
041 001 Inventories Equipment	56,680		56,680	
041 002 Equipment Agric. Prod.	23,390		12,000	11,390
003 Tide/Wave Sea-Level Monitor	28,890		28,890	
004 Equipment Oasis Vuln.	15,890		7,890	8,000
041 005 Project Management	6,890		6,890	
049 COMPONENT TOTAL (**)	131,740		112,350	19,390
*050 MISCELLANEOUS				
051 001 Reports	30,000		16,000	14,000
051 002 Photocopies, Mail, Doc. Prep.	59,311		32,655	26,656
054 001 Support Costs	30,000		16,545	13,455
059 COMPONENT TOTAL (**)	119,311		65,200	54,111
099 BUDGET TYPE TOTAL (***)	1,000,000		572,774	427,226
	176.0		91.0	85.0
999 UNDP TOTAL (***)	1,000,000		572,774	427,226
	176.0		91.0	85.0

