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**First PROSUR thematic workshop on  
Human Dimensions of Floods in the PROSUR area.  
Buenos Aires, February 27<sup>th</sup> and 28<sup>th</sup> 2001  
REPORT**

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by  
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and  
Claudia Natenzon**

## **Introduction**

This workshop has been organized to develop a Human Dimensions component of PROSUR ('Development of a Collaborative Research Network for the Study of Regional Climate Variability and Changes, their Prediction and Impacts in the MERCOSUR Area', CRN 055, PI: Dr. Mario Nuñez, supported by Inter-American Institute for Global Change Research - IAI) in which scientists from the MERCOSUR countries and USA are involved. Dr. Silvina Solman and Dr. Matilde Rusticucci have integrated the organizing committee. Dr. Claudia Natenzon has strongly collaborated during the preparation and development.

In this context, an interdisciplinary meeting has been organized in order to contact social and natural scientists to create an interdisciplinary framework to evaluate the socio-economical vulnerability of climate variability in the PROSUR region. The workshop has been focused on *Human Dimensions on Floods in the Mercosur Area.*

The aim of this meeting was to involve social and natural scientists and policy makers to discuss about the issues that should be considered in the elaboration of a Human Dimension Proposal, intended to be developed through a one year Start- up project, supported by PROSUR. This effort would conclude in the elaboration of a proposal to be presented to any International Agency.

More than fifty participants from Argentina, Brazil, Paraguay, Uruguay and USA, from different disciplines: sociology, economy, geography, climatology, health, hydrology, agronomy and from different professional profiles: institutional management, demand-side perspectives on climate services, science administrators and research. The list of participants is at the end of this document.

This report includes the main topics covered by this Workshop: a summary of the institutional and scientific presentations, the general concepts emerging from them, the conclusions of the working groups and the general final discussion. Finally,

## Summary of the presentations

### *Session I*

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#### **Welcome and Introduction**

by Dra. Silvia García (Directora Nacional de Coordinación Institucional, Secretaría para la Tecnología, la Ciencia y la Innovación Productiva, SETCIP, Argentina).

*Dr García points out the relevant relationship between man and climate, their dangers and preconcepts. She remarks that the 50% of external commerce in Argentina is due to Agriculture, and the 50% of energy production is hydro electrical. These aspects enhance the relevance of the climate studies. The secretariat will support the research projects related to Climate and Human Dimension.*

#### **Background of PROSUR**

By Dr. Mario Nuñez (PROSUR PI)

*PROSUR is a Collaborative Research Network (CRN) to promote research into the causes of climate variability in the Mercosur region of South America. Scientists from the Mercosur countries (Argentina, Brazil, Paraguay, and Uruguay) lead the effort, and scientists from the United States also participate. (<http://www-cima.at.fcen.uba.ar/prosur>)*

#### **PROSUR Paraná-Plata basin Pilot Project**

By Dr. Vicente Barros (PROSUR co-PI)

*The objective of this pilot project is to assess the impact of climate variability on surface runoff and stream flow for the Paraná-Plata Basin (Cuenca del Plata) and its sub-basins. The topics covered by this project are: the floods characterization in terms of hydrology, socioeconomic impacts and climatic forcing. Development of a Hydrological Budget operational, based on Meteorological observations. This project is planning to be finished by July 2002.*

*For more details: (<http://www-cima.at.fcen.uba.ar/prosur>)*

#### **NOAA Perspectives on Human Dimensions**

By Lisa Farrow, (Program Director for Latin America and the Caribbean, and Program Development/Office of Global Programs/ National Oceanic and Atmospheric Administration, US Department of Commerce.)

*Since late'90, the issue of how the climatic information may be used for the society became relevant to NOAA. They included this perspective through different research application programs, in order to construct a hybrid regional framework, which includes the following issues, initially focused on ENSO:*

- *Multidisciplinary and applications efforts*

- *Natural hazard preparedness*
- *National, regional and international partners*

*In this framework, the efforts should be Problem driven. For example:*

- *Trans boundary water*
- *Exploration of issues related climate and ethics/ equity (food security, human health)*
- *Dialogue with decision makers.*

### **IAI Perspectives on Human Dimensions**

By Dr. Armando Rabuffetti (Director of Interamerican Institute for Global Change Research, IAI)

*One of the objectives of IAI is to promote integrated assessments, human dimensions and applications. Human Dimensions include sustainability, ecosystems, socioeconomic conditions and information for decision makers. IAI promote the inclusion of a Human Dimension component that should provide information to policy and decision makers.*

*Indicators of success should be:*

- *Achievement of interdisciplinary.*
- *Achievement of information exchange.*
- *Improvement of human resources.*
- *Information to and interaction with decision makers.*
- *Generation of new financing sources.*

*PROSUR was encouraged to include social scientists to develop a Human Dimension component, and this Workshop is the start of this objective.*

## ***Session II: Presentation of the main topics to be considered in the discussions.***

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### ***Scales of atmospheric processes causing floods: definition of working groups.***

By Dr. Walter Vargas (PROSUR co-PI). Climatologist

*Dr. Vargas pointed out the characteristics of interrelationship between climatic and social processes throughout different scales focusing on floods. This is a hybrid problem emerging from the combination of systems involved by the human culture. It is a complex problem with restrictions where the climatic variability interacts and feedback with the social variability. Impacts and responses are generated then in the population, the activities and the regions.*

*In order to make an organization of the discussions of this workshop, three space-time scales were chosen: Meteorological or Synoptic, Climatic variability and Climate Change. At the present, the first two scales have more information and the third one is more speculative.*

*Nevertheless there are many others scales that could be considered related to the flood problems: El Niño, warm episodes, large droughts, precipitation regime variability, extratropical cyclones, fronts, storms, tornadoes.*

### ***Triggering questions for a sociological study of floods.***

by Lic. Ignacio Llovet (Universidad de Belgrano) Sociologist.

*Catastrophic events evidence several aspects of the social system. A catastrophic flood breaks the ordinary norms of the macro society. Society generates a variety of responses against a catastrophic event. The quality of this response depends on intellectual and material resources available to face the extraordinary and unexpected event. The low quality responses are those that we should be more interested on, as they are the most problematic and conflictive. Once the catastrophic event occurred, it triggers different levels of social conflicts. One of them faces the civil society against public institutions because of a bad management and anticipation of the crisis situation. Other conflict deals with the rivalry between public institutions. A third conflict is related to the civil society itself. Nevertheless beyond the conflict the actors try to go back to the normality, this is the situation previous to the catastrophic event, what conspires to a sustained policy that involves similar future events. An example of a catastrophic flood has occurred recently in Buenos Aires city, related to this, some triggering questions has been formulated:*

- *If the National Weather Service had announced a Storm Alert, the government of Buenos Aires city, could have taken any action to avoid the damages?*
- *What was the information needed to adopt the correct actions?*
- *An accurate forecast would generate different social and institutional responses?*
- *If the information is given in a different way, will the decision-making responsibility move?*
- *What are the causes that people affected by the flood has not been insureded?*
- *What is the risk perception of our society?*

### **Economical issues of catastrophic floods.**

by Gabriel Parellada (INTA/IES) Economist

*The exposition was concentrated in the economical impacts on agricultural activities. Two aspects were considered: a) What things should be taken into consideration for the evaluation of losses?*

- *The time when the event occurs should be evaluated. The impacts on agriculture are different depending on the season.*
- *The differences between the agricultural and livestock should be differentiated. The livestock not only dies, but also the pasture could be lost.*
- *The financial capability of the region to face the catastrophe.*

*b) The economical relevance of forecasts: 90% of the agricultural production depends on climatic conditions. A climatic forecast could bring relevant information about the technology that should be applied in the next season. The risk that producers take includes the climate. This risk could be minimized by climate insurance. This kind of insurances also needs an adjusted knowledge of climate.*

### **Social vulnerability of catastrophic floods in Argentina**

by Dr. Claudia E. Natenzon (Universidad de Buenos Aires) Geographer

*The geographer Claudia E. Natenzon explains some results of the Research Project “Risk, disasters and uncertainty. Floods at the estuary of the La Plata River and its littoral”, developed during 1998/2001 at PIRNA - Programa de Investigaciones en Recursos Naturales y Ambiente, Facultad de Filosofía y Letras, UBA.*

*The conceptual framework used at the Project included definitions of “disaster”, “risk” and “vulnerability”. A disaster is a problem where population is involved in an extreme situation that shows preexistent socioeconomic characteristics. It is a functional disorder in the general development process. The risk appears when uncertainty can be quantified. It is an unexpected result as consequence of our own decisions and activities, and not due to acts of God, fortune or fatality.*

*The Project focused on the vulnerability perspective. In common sense, somebody or something is vulnerable when can be heart, wounded or injured, unprotected and exposed to danger or attack. In Social Sciences, vulnerability is the state of each social group that can be measured, as a sum of socio-economical, sanitary, housing, nutritional, psychosocial and environmental factors. Considering vulnerability into disasters process, it is the characteristics of a person or group of persons that determine their capacity to anticipate, survive, resist and recover from a disaster impact. Vulnerability always implies a determinate vulnerability in front of a particular hazard. A qualitative and quantitative diagnostics of vulnerability allows the identification of heterogeneities and, as a consequence, to design actions for each stage of the disaster as a “continuous”.*

*A first approach of a vulnerability index was done for the research area (16 administrative unites of Buenos Aires Province over the Paraná and de la Plata Rivers, and Buenos Aires City). In our case it include 12 indicators taken form public information like the 1980 and 1991 National Census. The indicators selected are demographic and about life conditions. This index was calculated for each administrative unit considering a qualitative rank from 1 to 5. All the selected indicators have a direct relation with the degree of vulnerability. The results were tested in four different distributions, and the chosen test was the one that showed bigger heterogeneities.*

### **Floods management.**

by Eng. Victor Pochat (Hydrological Resources Secretariat - Argentina) Hydrologist.

*The reservoir managers are highly concerned with floods control and mitigation of impacts under different flooding events, such as:*

- *Swell of rivers, such as Paraná, Uruguay, Paraguay.*
- *Local rainfall over slow slope regions*
- *Torrents or rapid streams over mountain regions (North Western Argentina: Salta, Tucumán, Catamarca, Northern Córdoba)*
- *Intense rainfall over medium slope basins (Cañada de Gómez)*
- *Intense rainfall over urban areas*
- *Structural failure of protection constructions (dams)*

*Questions made by decision makers related to natural phenomena producing floods:*

- *Enhancement of the frequency of strong swell of main rivers*
- *Large period with rainfall above normal: a tendency or a cycle?*
- *Many torrent phenomena in the last years over mountain regions and over medium slope basins.*
- *Apparent enhancement of the frequency of floods over urban regions*

*These questions are related to two main issues that are important for structural measurements:*

- *Are we facing an above than normal precipitation condition period that will be followed by a drier period?*
- *Is there a tendency of enhanced rainfall?*
- *Is there any relationship of these phenomena with the El Niño event?*

*Responses to mitigate damage produced by floods:*

#### *1. Structural measurements*

*Defense, retention and drainage constructions*

#### *2. Non-structural measurements*

- *Territorial arrangement: Zoning of land-use, depending on human activities and risk.*
- *Hydrological Warning*
- *Assessment of risk areas*

*Actions currently taken by the Hydrological Resources Sub-Secretariat – Argentina.*

1. *Flood programs / international credits*  
*Regulating Organization of dam security*
2. *Hydrologic warning*
  - *Del Plata basin (INA)*
  - *Snow spilling prediction (EVARSA)*
  - *Prediction over Uruguay river (EVARSA)*

***Demand-side perspectives on climate applications: developing a problem-driven research program***

By Andrea Ray (NOAA-CDC) Geographer

*Focused on what is known about climate that might address reservoir management decisions, the following issues emerged:*

- *Forecast in boreal fall of winter snow pack accumulation, which relates to subsequent boreal spring runoff in April – June.*
- *Winter (January – February – March) forecasts of snow pack and runoff to more accurately plan ‘‘start of fill’’ target.*
- *By late June, boreal summer season forecasts of temperature and precipitation for forecasting irrigation demands.*
- *Improved forecasts of volume and timing of spring peak flows would improve potential to augment the peak, but longer lead time forecasts of spring peaks would also improve floods mitigation.*
- *Forecasts of rainy periods would improve hydropower generation and irrigation scheduling, as well as flood mitigation.*

*Decisions within multipurpose reservoir operations could use a spectrum of both climate and weather information and forecasts to improve the efficiency of reservoir operations. Improved information on how climate influences weather and extreme events is likely to be useful. The users view weather and climate events as a continuum, supporting the need to develop a truly ‘seamless suite’ of forecasts and a staged forecast strategy connecting forecasts of seasonal risks, threats assessments and weather forecasts.*

*Applying this experience to a problem-driven research for the La Plata basin would include:*

- *Determine a calendar of key reservoir management decisions, such as, flood control and mitigation efforts that may begin weeks to months before a high flood risk; hydropower optimization during droughts – power planning and reservoir conservation that might begin ahead of a dry season.*
- *Focus on what is known about climate that might address reservoir management decisions, for example, half year lag between precipitation anomalies and lower Paraguay stream flow; North-South progression of the ENSO signal; studies of river response to ENSO.*

*In this context is recommended to:*

- *Design a Pilot project related to a strong ENSO anomaly during PROSUR for sub regions with strong climate signals: if wet, one set of problems (floods mitigation, agriculture), decisions and target users; if dry, other problems, decisions, some of the same users, but perhaps different people at the same agencies (e.g. hydropower, agriculture); in summary, use the climate event as an opportunity for a human dimensions experiment, but plan ahead.*
- *Study the impacts and implications of decadal variability: the Upper Paraná has been wet and agricultural areas have been expanded. What will happen if there is a shift towards drier conditions?*
- *Include longer-term planning, in particular for navigation.*
- *Potential to manage hydropower reservoirs for power by understanding how much water is likely to be available in a year, either for 'peaking power' now that there are more thermal plants, or potential to minimize use of the thermal plants to avoid air quality problems.*
- *Develop a plan for which users to target depending on whether El Niño or La Niña conditions occur over the next several years of the PROSUR program for sub regions with strong climate signals.*
- *Suggest 'outlook fora' targeted at a specific set of users in a region with predictability.*
- *Continue to build partnerships with specific sets of users.*

## General concepts emerging from presentations.

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- ❖ The countries involved have a prevailing agricultural production, which is highly dependent on climatic factors.
- ❖ The same happens to the hydroelectric production.
- ❖ The complexity of the atmospheric phenomena brings some uncertainty in the decision-making, not recognized by the civil society neither by the institutions.
- ❖ A pilot project on human dimensions represents a good opportunity to interact between different disciplines.
- ❖ The risk is a process. This does not include only impacts but also preexistent situations (social, economic, cultural and natural).
- ❖ The design of the project should achieve:
  - Interdisciplinary.
  - Exchange of information.
  - Improve human resources.
  - Inform to the decision makers.
  - Generate new financing sources.
- ❖ The civil society tries to overcome the catastrophic situation and go back to the normality, this is the situation previous to the catastrophic event, this become an obstacle for the implementation of non structural actions.
- ❖ Lack of methodologies to evaluate financial losses.
- ❖ Relevant results should be produced and communication tracks should be established with decision makers.

## Conclusions of the Working Groups

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Working group's definition: Human Dimensions of floods associated to Short-term synoptic systems, Climate Variability and Climate Change.

*In the plenary session after the working groups partial achievements, these general points were agreed:*

- ❖ Diagnostic of social and economical factors tending to reduce or aggravate the floods effects.
- ❖ Interdisciplinary diagnostic focused in the following axis of human dimensions:
  - Administration and management systems.
  - Public Health, focused on epidemic.
  - Social communication.
  - Economical productive processes.
  - Characterization of social vulnerability.

- ❖ Analysis of the climatic records and its relationships with the evolution of the socioeconomic impacts, with the aim of developing an integrated historical knowledge useful to provide information to decision makers.
- ❖ Design of a risk map of floods by regions, including physical and social risks.

### Methodology

- ❖ Define a common methodology to evaluate the impacts of floods in order to compare results between disciplines.
- ❖ During the project design process, define the key questions on human dimensions.
- ❖ Issue to be analyzed: there is no agreement between social and natural sciences about scales.
- ❖ Natural science contributions: where and how floods hazardousness should be characterized.
- ❖ Social science contributions: evaluate the social response and the prevention in terms of territorial planning and vulnerability (cultural, socioeconomic and institutional).

### State of the art

- ❖ Natural processes and social dynamics are treated separately.
- ❖ Communicational problems between decision makers, scientists and citizens. Possibilities and limitations of diagnostic and prediction for meteorological and hydrological systems are unknown by the society and decision makers.
- ❖ Difference between natural system uncertainty and lack of knowledge is not clear for the society and decision makers, what is taken as a responsibility problem.
- ❖ The territorial planning does not take into account risk hypothesis.
- ❖ The risk is considered as a product and not as a process.
- ❖ Technical norms related to the mitigation of floods should be improved and complemented by the existent scientific knowledge.
- ❖ Water management is dominated by searching of individual and disarticulated solutions.

<b><i>GENERAL CONCLUSION</i></b>
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## **Research Plan for an Integrated Human Dimensions Pilot Project in the La Plata basin.**

### ***Preparatory efforts:***

- 1- Identify existing efforts in the region, including research in the physical, social and natural sciences, and explore potential collaborations.
- 2- Explore interest within various research and policy communities.
- 3- Establish multilateral Steering Committee of experts charged with leading the development and implementation of the project (multinational, multidisciplinary).

The efforts to design the basis of the project on Human Dimensions should focused on:

- ❖ To identify the existent efforts in the La Plata Basin region, including results from natural and social sciences.
- ❖ To establish vacancy areas.
- ❖ To identify and to incorporate the demand-side, institutional decision makers, and civil society requirements that contribute to the agenda design.

### **Objectives**

- ❖ Preliminary identification of the social impacts.
- ❖ Social vulnerability.
- ❖ Communication tracks.
- ❖ Strategies to mitigate impacts.

*These main objectives should be developed through the following tasks:*

#### **1. Assessment of impacts**

- Identify the priority socio-economic impacts of water resources and climate variability in the basin, interacting with local and national decision makers.
- Identify potential causes (e.g. Climate variability across multiple time scales, development and economic aspects)
- Participation of multiple disciplines.

#### **2. Vulnerability**

- Explore and describe the socio-economic factors, which influence vulnerability (e.g. International trade, demographics of the region, institutional barriers and opportunities for utilizing scientific research finding and emerging technologies, etc), and their relationship with physical factors.
- Participation of multiple disciplines.

#### **3. Adaptation/Application**

- Identify and develop methods for using information from integrated research for fostering improved (and more sustainable) decision making
- Participation of multiple disciplines and decision makers

#### ***Following steps:***

On the basis of the previous discussion, it was recommended to follow two parallel tracks:

The first one oriented to design a Pilot Project focused on Floods over the La Plata basin, to be developed during two years, which would integrate the existent resources on social and natural information. This Pilot Project will be elaborated by a steering committee formed by social and natural scientists from Argentina, Brazil, Uruguay, Paraguay and USA. This committee will take a period of 6 to 8 months to elaborate a Proposal.

The second one includes a wider range of inquires discussed during the meeting and other that overcomes the Pilot Project and would include a more complete integrated agenda on Human Dimensions for the region.

## **Pilot Project on Human Dimensions**

Coordinator: Dr. Claudia Natenzon

Co-coordinators: Dr. Silvina Solman, Dr. Matilde Rusticucci

### **Steering Committee**

*Argentina:* Dr. Graciela Caputo  
Dr. Claudia Natenzon  
Dr. Matilde Rusticucci  
Dr. Silvina Solman

*Brazil:* Prof. Alfio Branderburg  
Dr. Luci Hidalgo Nunez

*Uruguay:* Ing. Diego Piñeiro

*Paraguay:* Ing. José Luis Ávila Rodas  
Ing. Edgar Mayeregger.

*USA:* Dr. Andrea Ray.