Climate Risk Management in the IRI for Climate and Society:

Bridging the Gap between Science and Applications

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The IRI was established as a cooperative agreement
*Initial (3 year) IRI grant awarded (June, 1996)*

**Forecast of Seasonal Climate Variability**

- **Core Facility**
  - Global Perspective
    - ENSO dynamics
    - Climate forcing factors
  - Forecast
- **Application Center**
  - Regional and Local
    - ENSO dynamics
    - Regional climate influences
    - Socio-economic factors
  - Forecast
- **Decision Makers**
  - Products used as decision making tools
    - Laws, Policies, Strategies, Incentives

**Excellent Science**

**Societal Impact**
Lesson Learned:

In order to achieve Societal Impact / Development:

Work must be
- Demand-driven
- Problem Focused

Excellent Scientific Work
Publishable research (peer-reviewed)

+ Is it Usable?
Is it being Used?

Moved for “Climate Prediction” to “Climate and Society”
Gap between Science and Applications, Society

1. Decision-makers approach problems holistically and often intuitively

2. Science traditional reductionist approach: Create ‘islands of knowledge in a sea of ignorance’
   Plus: Common lack of Synthesis of Socially Relevant Outcomes
   (Meinke et al., 2007; 2009)

IRI’s Lessons for “building bridges between islands”:

• Understand Demands, Problems
• Training/Capacity Building (Researchers, Implementers, Users)
• Interdisciplinary Research

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Specific Case of Climate Science

IRI’s “Gap” Analysis Key Findings (2006)

- With few exceptions climate information is not effectively incorporated into development decisions.
- Problem due to negligible demand coupled with inadequate supply of climate services for development.

IRI’s Role:
- Assist/Inform/Create Demand
- Help to Improve Supply
- Incorporate into Development
The mission of the IRI is to enhance society’s capability to understand, anticipate and manage the impacts of climate in order to improve human welfare and the environment, especially in developing countries.
A "Boundary" Institution (Climate Science and Society)
IRI aims to INFORM / ASSIST Planning and Decision Making (including Policy Making) by Incorporating Climate Risk Management (CRM)

What is CRM?
CRM: Manage the Entire Range of VARIABILITY

Climate related Outcome (e.g., food production)
CRM: Manage the Entire Range of VARIABILITY

Also Critical For Development:
Risk aversion reduces Technology Adoption
Effect on Natural Resources
“Poverty Traps”

Probability (Density)

Climate related Outcome (e.g., food production)

HARDSHIP
e.g., Drought

CRISIS
e.g., Mitch

MISSED OPPORTUNITIES
Climate Risk Management Approach
(from months, through Decades, to Climate Change)

Identify Vulnerabilities and Opportunities in Climate Variability and Change in Collaboration with Users
Which systems, Which components within systems:
Poor farmers, Yield Variability, Health, Food Access, Water Availability

Reduce Uncertainties
(learn from the past, monitor the present, provide relevant info on the future)

Identify Technologies that Reduce Vulnerability
(e.g., water holding capacity, diversification, drought resistance)

Identify Policies and Institutional Arrangements that reduce Vulnerability and/or Transfer Risks
(Index-based Insurance, Credit, EWS)

(Baethgen, 2010)
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Climate Information is Usually not Enough: Needs to be “translated” into Sectoral Information

Need to Embed Climate information (past, present and future) into Products, Information, Tools that are Relevant for Different Socioeconomic Sectors

Example:

Soil Water Balance (crucial for Crop and Pasture monitoring and forecasts)
Soil Water Balance (Historic, Monitoring, Forecast)

Valuable for Agricultural Decisions (irrigation, Yield Forecasts, Feed Availability)
September 2010:

Forecasts (IRI, Uruguayan) issued in September indicated high chance of Low Rainfall in OND, a crucial Season for Agriculture

Minister of Ag recommended several management practices to be better prepared to cope with Water Deficit (“Drought”)

Also created special credit for small water reservoirs
Drought in Uruguay 2010 / 2011:

Forecasts +

Monitoring (Soil Water Balance)

Decision Support System Provided this Information to Min. Agr. and to National Emergency System (Evolution of the Drought)

December 2010: Official Declaration of Emergency Based on this Information

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Based on “embedded” Climate Information: Emergency, Response, Policy

Result: Improve Climate Risk Management

IRI has been asked to lead the Establishment of a National Information System for the Agricultural Sector

(With INIA, University, Weather Service, others, Funded by World Bank + Uruguayan Government)
Reduce Uncertainties: Provide RELEVANT information of Future

IRI’s Current Efforts

1. Forecast Verification, Dynamic and Statistical Downscaling, “weather-within-climate” IRI is a key reference for the world in SCF (RCOFs)

2. Communication, Formats, “Translation”: Moving from Terciles to Full Probabilities

3. Demands from Decision Makers / Policy Makers: Move Beyond the Seasonal Scale Adaptation to Climate Change. Most Users: Expected impact on Variability, Extremes (Vs 2070-2100)

The information must be embedded into Decision Systems Where climate is linked to:

Crop/Pasture simulation models, Health models, Hydrological models, etc.
Changes in PRECIPITATION (% change) in the last 80 years

January – February - March

Climate Change? Decadal Variability? Both?

Expansion of the Agricultural Frontier (IDB)
Chains of Information

Danger:
All can give you
Answers
(Especially
if you ask)

Research in
Electronics
(Basic)

Challenges:
Who asks the question?
Who do they ask to?
Who is willing to answer?
What do users do with
the answer?

Not all answers are possible in the
shape that are needed

Users may need to develop
capacities to use information

CAT Scanner
Developer
(Applied)

Doctor:
CAT-Scan
Interprets
Recommends Action

Take action (or not)

CAT Scan
Technician
(Implementer 1)

Headache
Science and Society: Information Chains

Knowledge Generation

Knowledge "Translation", "Tailoring" (Boundary Organizations)

Knowledge Application
• Operation
• Policy

New Research Questions

New Knowledge Demands

Take Advantage of Existing Information Chains: Example in Agriculture

International Research Institute

Local University

Agricultural Research Institute

Extension Service, NGO

Farmer

VAMOS: What Climate Information? To Whom? Where in the Chain?

When the Links / Chains are not present: Create them
The solution is not to “skip links”, but to create/strengthen the links

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Early Warning and Response: Malaria in Africa, Colombia

Drought Early Warning and Response in Agriculture SE South America

Optimizing Water Management in Multipurpose Reservoirs in Philippines, Brazil, Ethiopia, Chile

Index Insurance for Farmers in Africa, Central and South America
Bridging the Gap between Science and Society:

Need to Integrate Climate Information, Agronomic/Water/Health Information at different Scales (Temporal, Spatial)

and

Produce Information that is UNDERSTANDABLE and USABLE for Planning, Decision-making, Policies

Approach and Tools for Climate Risk Management (CRM)
Climate Risk Management Approach and Tools:

(Applied Systems Analysis Approach)

Information and DECISION SUPPORT SYSTEMS
Different Spatial Resolutions: Region → Country → Provinces, counties → Users

Different Temporal Resolutions: Seasons → Decades → Climate Change

Easily Understandable: Inform Decisions, Planning, Development

Include UNCERTAINTIES (communicate, educate)
Final Comments: Climate Science and Society

Evolve from “Science Supply” Orientation to Understanding Needs, “Translating” and Integrating Results into Decision Systems

Identify/Strengthen/Create “Information Chains” and identify Where and How the Climate Information is needed to Inform Decisions, Policy

Approach Adaptation to Climate Change as a problem of “Today” (in 2100 may be worse): Consider Relevant Information that Triggers Action Today:

a. Improve Adaptation to Current Climate Variability and Extremes (better prepared for the future)
b. Consider “Near-term climate change” (10-30 years)
c. Longer-term for Coastal, Glaciers, Ecosystems

Use Climate Risk Management Approach and Tools that Integrate Information and makes it Understandable, Usable (Applied Systems Approach, IDSS)