UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION
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I.C.T.P., P.O. BOX 586, 34100 TRIESTE, ITALY, CABLE: CENTRATOM TRIESTE

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"Workshop on El Niño, Southern Oscillation and Monsoon"
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"Applying Seasonal-to-Interannual Climate Forecasts: Tomorrow's Opportunities & Today's Challenges"

E. SHEA
CARE/IGES
Calverton, MD
USA

Please note: These are preliminary notes intended for internal distribution only.

Applying Seasonal-to-Interannual Climate Forecasts: Tomorrow's Opportunities and Today's Challenges

Presented by
Eileen L. Shea

Workshop on
El Niño, Southern Oscillation and Monsoon
25 July 1996
ICTP/Trieste, Italy

Seasonal-to-Interannual Climate Forecasting State of the Science

The tropical oceans and atmosphere behave as a coupled system. El Niño-Southern Oscillation (ENSO) cycle in the tropical Pacific plays a dominant role in influencing year-to-year climate variability

Models are now able to simulate correctly the major large-scale features of ENSO and, more remarkably, to **usefully predict** the future state of ENSO from information about the current state of the ocean.

Seasonal-to-Interannual Climate Forecasting Emerging Opportunities

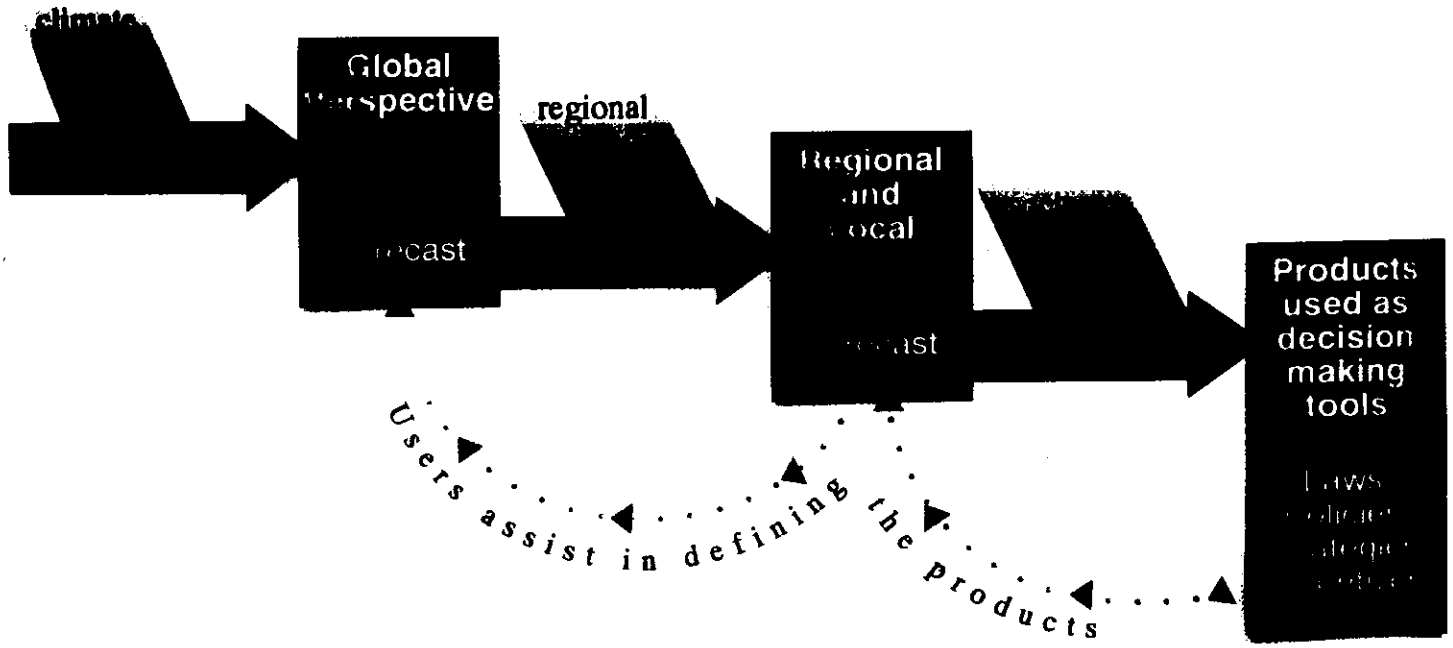
- Public Health and Safety
  - reduce vulnerability to climate-related natural disasters such as floods, droughts, tropical storms, and extreme seasonal events
  - anticipate spread of vector-borne infectious diseases affected by climate (e.g. cholera)
- Agriculture and Food Security
  - crop selection, planting, irrigation, harvesting
  - famine relief and mitigation
  - international trade and foreign aid
- Support Decision Making in Climate-Sensitive Sectors
  - water resources
  - utilities
  - transportation and construction
- Advance Scientific Understanding in Oceanography, Meteorology, Hydrology, Land Surface Process

Guiding Principle

An end-to-end climate research and prediction program involves:

- integration of observations, experimental forecasting, assessment and applications
- research on critical Earth system process, including ocean-land-atmosphere interactions
- transformation of global-scale forecasts and analyses into tailored information products
- continuous interactive dialogue between scientific community and users to define needs and evaluate products

Forecast of Seasonal Climate Variability



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What is Meant by "Application" of Climate Forecasts

Affecting decisions based on incorporation of probabilistic, early-warning information:

- Understanding the decision-making framework; addressing challenges to incorporating forecast information
- Creation, interpretation and dissemination of forecast information

Converting Physical Predictions into Usable Forecast Information

Recognize and accommodate regional differences:

- relevant physical processes (e.g. ENSO and monsoon)
- physical, ecological and socio-economic impacts
- relative vulnerability of communities, economic sectors, and development activities
- scientific, technical and institutional challenges and opportunities

Converting Physical Predictions into Usable Information

Conduct a focused program of regional applications, education & training activities complemented and supported by a targeted program of social science and economics research organized around specific needs and opportunities within individual regions and key sectors

Human Dimensions and
Applications Program

Targeted Social Science and Economics Research
Key Objectives

- Clarify & describe regional climate variability impacts and socio-economic implications

- Characterize the vulnerability of communities & key economic sectors & industries

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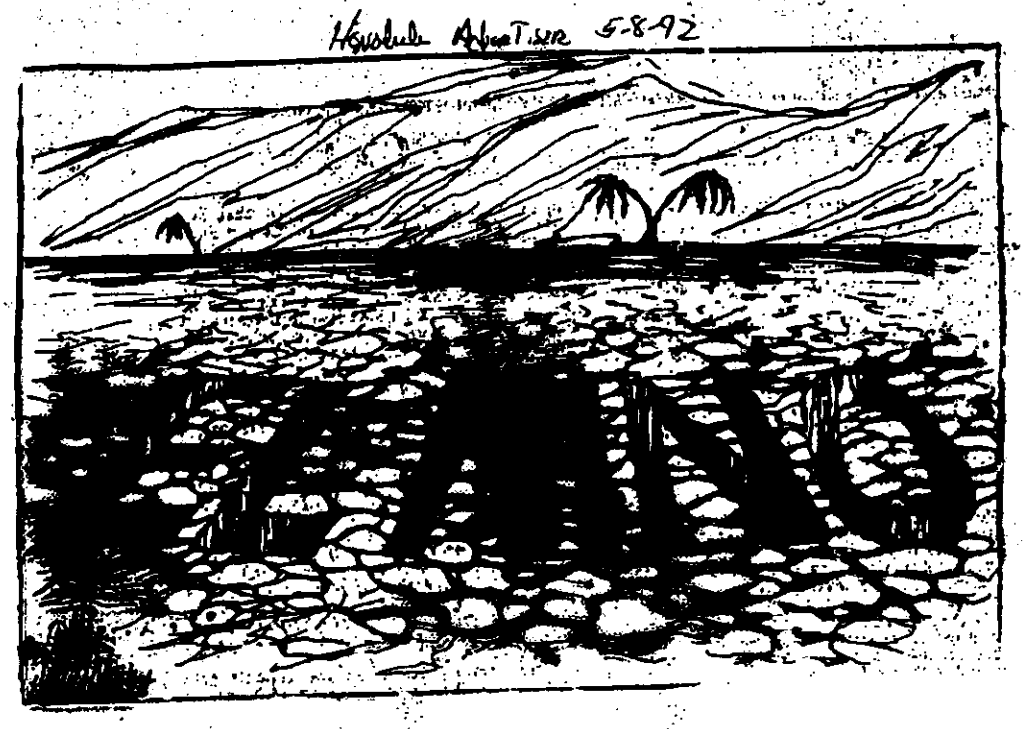
Human Dimensions and
Applications Program

Targeted Social Science and Economics Research
Key Objectives

- Delineate relevant information needs and identify opportunities to improve existing decision-making processes

- Develop & implement mechanisms to support continuing evaluation of the effectiveness of information products, and systems for obtaining regular feedback from users



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Human Dimensions and
Applications Program

Pacific ENSO Applications Center Experience:
Lessons Learned

- Interactive dialogue with users is essential
- Start where predictability is high & applications obvious then expand into other areas as needs are identified & skills demonstrated
- Users often interested in continuum of forecast guidance from weather to climate
- Collaboration with national meteorological and hydrological services can be highly beneficial

Human Dimensions and Applications Program

Pacific ENSO Applications Center Experience: Lessons Learned

- Regional development and environmental organizations (e.g. SPREP) help identify users and expand access to information to broader community
- Individual nations & user communities differ widely in the capacity to produce & use new forecast information
- There are significant interdisciplinary research requirements for both extending predictability and guiding future applications

Human Dimensions and Applications Program Getting Started

- **Leverage existing programs, institutions and capabilities:**
  - national, regional and international research programs (WCRP/CLIVAR/GOALS, IRI, HDP, IGBP, START, IAI, APN, ENRICH, etc.)
  - regional environmental and development organizations (e.g. SPREP, ACMED)
  - national meteorological & hydrological services and related government agencies
  - local universities and research institutions
  - scientific, technical and support organizations in affected sectors and industries

Human Dimensions and Applications Program Getting Started

- **Establish interactive dialogue with users**
  - ➡ Identify key sectors , decision makers and information needs
  - ➡ Maintain a process for continuous feedback from users
- **Begin dissemination of prototype forecasts and information products**
  - ➡ Target high-skill areas and sectors with appropriate infrastructure initially
  - ➡ Remain flexible and allow products to evolve
  - ➡ Asses forecast effectiveness -- jointly with users