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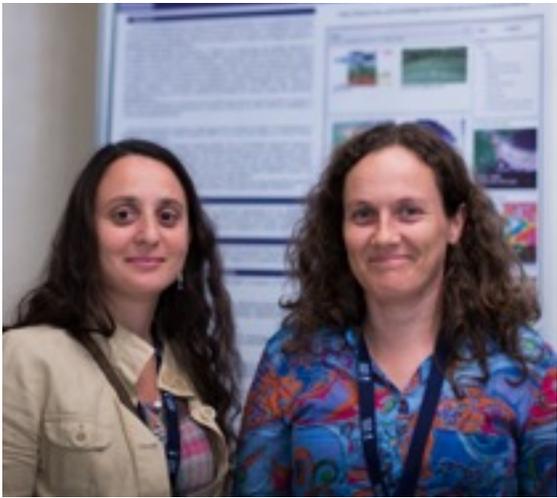


**ICCS** THE INTERNATIONAL  
CONFERENCE ON  
CLIMATE SERVICES

December 10-12, 2014  
Radisson Victoria Plaza Hotel  
Montevideo, Uruguay

<b>Acknowledgements .....</b>	<b>5</b>
<b>Online Resources .....</b>	<b>5</b>
<b>Acronyms.....</b>	<b>6</b>
<b>Opening Ceremony .....</b>	<b>8</b>
Greetings from local hosts .....	8
Climate services for agriculture in Uruguay .....	8
Seasonal prediction, stakeholder interaction, decision & discussion support .....	9
Climate services at the global level: Current status of the GFCS .....	9
Panel on regional climate service networks .....	9
Climate services in Latin America	
Climate services in the La Plata Basin	
Climate services in the Caribbean	
Climate services in the South Pacific	
Climate services in Europe	
Conference roadmap & orientation .....	10
<b>Parallel Sessions by theme .....</b>	<b>11</b>
<b>Climate &amp; disaster risk management .....</b>	<b>11</b>
Disaster-related decision support systems, part I	
Disaster-related decision support systems, part II	
Climate services to advance water & disaster risk management	
Paying for predictions: An interactive experience of climate service challenges	
<b>Climate information to improve public health .....</b>	<b>15</b>
Health-sector response to climate risk	
Practical examples of health responses to climate risk	
Communicating health & climate information needs: Testing tools to identify & communicate needs for climate information	
<b>Climate services for agriculture &amp; energy production .....</b>	<b>19</b>
Climate services in agriculture: applied research	
Tools for climate-informed agricultural decision making in Uruguay	
Climate information for the energy sector	
<b>Evaluating climate services.....</b>	<b>22</b>
Climate service evaluation	
Ensuring evaluability of climate-related programs	
Economic valuation of climate service activities	
<b>Understanding context: building place-based climate services .....</b>	<b>24</b>
Climate services in the La Plata Basin	
What if? (Re-)Building Decision Support Systems in SIDS and LDCS	
Climate services and partnerships in Small Island Developing States	
Developing climate services capacities in national contexts	
<b>Putting the pieces together: understanding components of climate services .....</b>	<b>29</b>
Climate service ethics	
Co-production of knowledge	
Guidance for building, delivering, and using climate services	
Institutional arrangements that support climate services	
Research priorities for climate services	

Hacking for climate services	
Supporting & developing climate service practitioners	
<b>Designing better climate information delivery systems .....</b>	<b>37</b>
Building & delivering early warning systems	
Data-driven climate services	
Human-centered design of financial instruments for adaptation & development	
Decision support systems for designing & managing productive, resilient landscapes	
<b>Synthesis .....</b>	<b>41</b>
Sector-specific lessons .....	41
Opportunities for collaboration on climate services.....	42
<b>Appendices.....</b>	<b>44</b>
Appendix 1: Agenda.....	44
Appendix 2: Participant List .....	46
Appendix 3: Side events.....	52
Bringing Space to Village: Engaging Users with Climate Science Tools for Improved Decision-making	
Latin American Observatory of Extreme Events	
Operational climate services in Uruguay	
Early Career Professionals Network	
Appendix 4: Decision support system showcase.....	54
Appendix 5: Conference feedback.....	57



## ACKNOWLEDGEMENTS

The International Conference on Climate Services is the annual meeting of the Climate Services Partnership. This fourth meeting was held in conjunction with Uruguay's Ministry of Livestock, Agriculture, and Fisheries (MGAP); the National System of Response to Climate Change (SNRCC); the University of the Republic (UdelaR); and the National Meteorological Institute (INUMET). It was generously sponsored by MGAP, the SNRCC, the Climate Change, Agriculture, and Food Security theme of the Consultative Group of International Agricultural Research, the United States Agency for International Development, and the World Bank.

A number of organizations contributed to the conference via their tireless participation on the organizing committee and/or via in-kind donations. This includes: the United States Agency for International Development; the Climate Service Center, Germany; the Caribbean Institute for Meteorology & Hydrology; the World Bank; the Climate Investment Fund; the Catalan Institute of Climate Sciences; the International Research Institute for Climate & Society; and the United States National Center for Atmospheric Research.

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### Citation for this Report

Vaughan, C., Muñoz, Á., Braman, L., da Cunha Rodriguez, E., Garvin, S., Martinez, S., Sharma, M., Ungerovich, M. 2015. Conference report: Fourth International Conference on Climate Services. December 10-12, 2014. Montevideo, Uruguay.

## ONLINE RESOURCES

Conference webpage & blog	Twitter	Climate Services Partnership website	Flickr
<a href="http://bit.ly/ICCS4">bit.ly/ICCS4</a>	<a href="https://twitter.com/#iccs4">twitter.com/#iccs4</a>	<a href="http://climate-services.org">climate-services.org</a>	<a href="http://bit.ly/ICCS4-photos">bit.ly/ICCS4-photos</a>

## ACRONYMS

CariCOF	Caribbean Climate Outlook Forum
CCAFS	Climate Change, Agriculture and Food Security
CGIAR	Consultative Group of International Agricultural Research
CIAT	International Center for Tropical Agriculture
CIC	Intergovernmental Coordinating Committee of La Plata River Basin
CID	Climate Impacts Database
CIIFEN	Center for the Investigation of the El Niño Phenomenon
CIMH	Caribbean Institute for Meteorology and Hydrology
COP	Conference of the Parties, United Nations Framework Convention on Climate Change
CPT	Climate Predictability Tool
CPTEC	Center for Weather Forecasting and Climate Research, Brazil
CRC-NAS	Regional Climate Center for the North of South America
CRC-SAS	Regional Climate Center for Southern South American
CSP	Climate Services Partnership
DSS	Decision Support Systems
DINAGUA	National Water Directorate, Uruguay
ECOMS	European Initiative for Climate Service Observation and Modelling
ECPN	Early Career Professionals Network, Climate Services Partnership
ENSO	El Niño Southern Oscillation
EUPORIAS	European Provision of Regional Impacts Assessments on Seasonal and Decadal Timescales
ENACTS	Enhancing National Climate Services in Africa
FEWSNET	Famine Early Warning Systems Network
GDP	Gross Domestic Product
GFCS	Global Framework on Climate Services
IC3	Catalan Institute of Climate Sciences
ICCS	International Conference on Climate Services
IEDRO	International Environmental Data Rescue Organization
INUMET	National Meteorological Institute, Uruguay
INAMHI	National Meteorological & Hydrological Institute of Ecuador
INIA	National Institute for Agricultural Research, Uruguay
IRI	International Research Institute for Climate and Society
JPI	Joint Programming Initiative
LDCS	Least Developed Countries
M&E	Monitoring and Evaluation
MGAP	Ministry of Livestock, Agriculture and Fisheries, Uruguay
NOAA	National Oceanic and Atmospheric Administration, United States
OLE2	Latin American Observatory
PPCR	Pilot Program for Climate Resilience, World Bank
SCOPIC	Seasonal Climate Outlooks in Pacific Island Countries
SERVIR	Regional Visualization and Monitoring System
SIDS	Small Island Developing States
SIGRAS	Online Geographic Information System
SimSEE	Integrated Electric System Simulator
SMS	Short Message Service
SNE	National Emergency Response System, Uruguay
SNIA	National System of Agricultural Information, Uruguay
SNRCC	National System of Response to Climate Change, Uruguay
SPECS	Seasonal-to-decadal climate Prediction for the improvement of European Climate Services

SPREP Secretariat of the Pacific Regional Environmental Programme  
UdelAR University of the Republic, Uruguay  
UNDP United Nations Development Programme  
USAID United States Agency for International Development  
WIGOS WMO Integrated Global Observing System  
WHO World Health Organization  
WMO World Meteorological Organization

## OPENING CEREMONY

### Greetings from local hosts

#### **Tabaré Aguerre, Ministry of Livestock, Agriculture & Fisheries, Uruguay**

Tabaré Aguerre greeted the conference participants and welcomed them to Uruguay for the meeting. He highlighted Uruguay's recent efforts to improve the use of climate information for societal decision making.

#### **Francisco Beltrame, Ministry of Housing, Planning & Environment, Uruguay**

Francisco Beltrame discussed the importance of environmental information in developing sustainable development projects; he also discussed the importance of collaborations within and between government agencies in order to establish coherent development plans. He mentioned that this conference is particularly timely as there is increasing awareness of the need to address the impacts of climate change and variability in Uruguay and around the world.

#### **Gabriel Pisciottano, Uruguayan National Meteorological Institute**

Gabriel Pisciottano began his talk by mentioning the need for meteorological services to develop good climate information products, which involves improving observational networks and the development of better monitoring and forecasts. Pisciottano also highlighted the need to strengthen the dialogue between climate information providers and user communities in order to ensure the relevance of information provided.

### Climate services for agriculture in Uruguay

#### **Tabaré Aguerre, Ministry of Livestock, Agriculture & Fisheries, Uruguay**

Agriculture, livestock, and related activities make up roughly 25% of Uruguay's economy. The contribution of agricultural activity to Uruguay's exports is also large and growing. In this context, Minister Tabaré Aguerre presented on Uruguay's *AgroInteligente* strategy, which includes:

1. Promotion of competitiveness and international integration
2. Sustainable intensification
3. Adaptation of production systems to climate change
4. Competitive inclusion of family agriculture in value chains
5. Strengthening and integration of relevant institutions

The strategy includes the development of a National System for Agricultural Information, which is designed to integrate the dispersal of agricultural, climate and natural resource management as a public good. The system will improve existing climate and natural resource databases; inform improved seasonal forecast systems, establish Early Warning Systems; improve real-time monitoring of climate and vegetation; and develop simulation models to assess the impact of adopting different adaptation technologies.

## Seasonal prediction, stakeholder interaction, decision & discussion support

**Roger Stone, University of Southern Queensland**

Roger Stone stressed that while it is important to have accurate forecasts, it is equally important to present management options in order for users to take advantage of forecasts. He emphasized that the value of climate forecasting is limited unless it can inform management decisions. Furthermore, Stone highlighted the importance of introducing climate information to the entire value chain, e.g. farmers, millers, transporters, retail representatives, etc. To this end, information needs to be tailored to show economic payoffs, and targeted to this wide variety of audiences.

With these considerations in mind, Stone introduced the concept of “discussion” support systems, which aim to bring together researchers and users in a discussion environment (“kitchen table discussions”), to maintain the relevance of research and enhance uptake of information. E-learning was also suggested as a useful means for enhanced understanding and uptake, facilitating farmer interaction via web-based systems, including avatar farmers.

## Climate services at the global level: Current status of the GFCS

**Filipe Lucio, Global Framework for Climate Services**

Filipe Lucio began his presentation with some general background on the Global Framework for Climate Services (GFCS) and identified four major climate-services needs, including:

1. Users need tailored information.
2. Some countries require capacity development to generate climate services.
3. Observing standards need to be established.
4. There needs to be more integration and collaboration.

To address these needs, the GFCS has approved a compendium of projects worth roughly 140 million CHF. These include, for example, a project in Costa Rica rescuing and digitizing data, and another in West Africa deploying experts to advise on implementing climate services. These projects have taught the GFCS that in order to be successful, various stakeholders from the national level need to be brought together, and that mapping is critical to identify who is doing what, so as to avoid duplication of work.

## Panel on regional climate service networks

### Climate services in Latin America

Antonio Divino Moura, National Meteorological Institute, Brazil

Antonio Divino Moura discussed the Regional Workshop on Climate Services at the National Level for Latin America, held in San José, Costa Rica in July 2014. He also discussed the work of three Regional Climate Centers, including the International Center for the Investigation of El Niño Phenomenon (CIIFEN); the Regional Climate Center for Southern South American (CRC-SAS); and the Regional Climate Center for the North of South America (CRC-NAS). He also described the Regional Climate Outlook

Forums, including the ones held in Central America, which has operated for more than a decade.

### **Climate services in the La Plata Basin**

José Luis Genta, Intergovernmental Coordination Committee of the La Plata Basin

Jose Luis Genta provided an overview of the Intergovernmental Coordination Committee of the La Plata Basin, which is a regional integration treaty with five countries to coordinate the whole basin system. Activities include a program for integrated hydrological resources in the region, establishing networks of monitoring, establishing new equipment / restoring older equipment, and building capacity.

### **Climate services in the Caribbean**

Adrian Trotman, Caribbean Institute for Meteorology & Hydrology

Adrian Trotman discussed the activities of the Caribbean Institute for Meteorology and Hydrology (CIMH), including stakeholder meetings with user communities; the development of new products, including 3-6 month forecasts for rainfall; the dissemination of information via newsletters and a dedicated webpage; and awareness building through training for extension officers.

### **Climate services in the South Pacific**

Elisabeth Holland, University of the South Pacific

Elisabeth Holland discussed climate services in the Pacific Islands, which includes more than 22 countries that are spread out geographically. Recent activities have included creating a panel on climate services, establishing a regional training and climate center, and developing applications that link between climate services and health issues like dengue fever.

### **Climate services in Europe**

Irene Fischer-Bruns, German Climate Service Center

Irene Fischer-Bruns discussed climate services in Europe, including the growing number of institutions that have been created to support climate services and the establishment of new programs, including the European Provision of Regional Impacts Assessments on Seasonal and Decadal Timescales (EUPORIAS), European climate observation and modelling for services (ECOMS), Seasonal-to-decadal climate Prediction for the improvement of European Climate Services (SPECS), Joint Programming Initiative (JPI), Horizon 2020, Copernicus, and the European Climate Services Partnership.

## **Conference roadmap & orientation**

### **Steve Zebiak, International Research Institute for Climate & Society**

Steve Zebiak set the stage for the rest of the conference by presenting an overview of the Climate Services Partnership (CSP) and this year's theme, Decision Support Systems (DSS). Zebiak's talk focused on the need to (1) build useful tools; (2) engage with users; (3) connect to policy; and (4) create appropriate infrastructure. Zebiak provided an overview of the conference agenda, illustrating its wide range and mix of plenary along with targeted parallel sessions.

## PARALLEL SESSIONS BY THEME

### Climate & disaster risk management

#### **Disaster-related decision support systems, part I**

**Session lead:** Richard Choularton, World Food Programme

#### **Integrating climate services into food security & disaster management operations**

Richard Choularton, World Food Programme

Richard Choularton discussed the influence of climate change on food security. He noted that while there have been early warnings of climatic events that affect food production, organizations generally don't use this information to take action to mitigate impacts. The potential for early warnings to be utilized to improve these outcomes remains. Choularton highlighted the need to take action based on climate forecasts and explained that as forecasts continue to be improved they will become more specific and enabling of timely action. Choularton also discussed the need to know who are most vulnerable to changes in climate and who will be most affected by specific events. The need for this type of vulnerability information is growing, as the number of people affected by food insecurity is expected to increase.

#### **Forecast-based financing for risk reduction & climate change adaptation**

Mawanda Shaban, Uganda Red Cross Society

Mawanda Shaban presented a project of the Uganda Red Cross through which disaster response financing is made available based on forecasts. The project is based on improved forecast information and enables a focus on long-term planning; short-term planning is also incorporated into the project as a means to avoid losses. For instance, a forecast for heavy rainfall in the short term would trigger preparations of trained volunteers, including storing food and water and taking measures to prevent the spread of malaria. Shaban suggested that the primary goal of forecast-based decisions is to improve the resilience of the most vulnerable.

#### **Flood early warning systems in Uruguay**

Pablo Brugnoli, National Emergency Response System, Uruguay

Pablo Brugnoli described three types of flooding that take place in Uruguay: riverside, storm, and *sudestada* (i.e., strong winds and persistent rain that comes from the southeast and floods the La Plata river). In each case, different early warning systems are required. The country's National Emergency Response System (SNE, for its initials in Spanish) uses these systems to allow action in advance of the threat. This requires mechanisms for protection, preparation, and response. In this manner, it is important to prioritize certain actions including, for example, establishing evacuation plans in advance of a flood alert. Having the ability to predict these sorts of flooding events enables better decisions; better decisions allow the public to have more faith in the ability of the government to prepare for and respond to flood emergencies.

## **Incorporating risk management into land management: Building the road between the possible & the desired**

Adriana Piperno, National Water Directorate, Uruguay

Adriana Piperno discussed a flood risk management activity of Uruguay's National Water Directorate (DINAGUA, for its initials in Spanish); the first step was to find maps that marked flood zones and to use these maps to create tools for prediction and prevention. As the project evolved, the DINAGUA identified a number of factors that cause areas to flood – and began to integrate risk maps with spatial planning, facilitating the assembly of relocation programs and prevention of land-use planning in new flood zones.

## **UNEP's CLIM-WARN Project**

Asha Sitati, United Nations Environment Programme

ClimWarn, the project presented by Asha Sitati, focuses on identifying the needs of users. The project is based on the premise that communities have different profiles – and therefore different levels of vulnerability, different opportunities for access to information, and different levels of trust in the forecasts. Surveys and focus groups helped to characterize these distinctions, with the conclusion that people need to know not only what will happen, but also what they can do to respond, including what has been done in similar cases and how well it worked. In addition, information users need to know what forecast information means in order to understand why there might be a discrepancy between what was expected and what took place.

## **Disaster-related decision support systems, part II**

**Session lead:** Richard Choularton, World Food Programme

### **Plans, info, funds, action?!**

Pablo Suarez, Red Cross/Red Crescent Climate Centre

Pablo Suarez discussed the fact that disaster preparedness is generally not funded, despite the fact that preparedness activities have the potential to reduce damages in vulnerable areas. Suarez shared his view that people learn about the value of preparedness actions by role-playing in games. Games that teach about using climate forecasts for taking preparedness actions can be both educational and effective. Games can also teach researchers and climate service providers about the communication of information and disaster preparedness plans, helping information users and providers explore the costs of taking (or not taking) action.

### **Fighting fires from space: Using satellite data to detect fires & strengthen response**

Mir Matin, International Centre for Integrated Mountain Development  
Carmen Tedesco, SERVIR Demand Activity

Mir Matin and Carmen Tedesco presented on fire early warning system developed in Nepal. Two thousand forest fires happen in Nepal each year, with most caused by humans or related to cattle grazing. The early warning system developed at the International Centre for Integrated Mountain Development sends an SMS twice daily, with alerts about the fire status, location, timing, and threat level. More information, including land cover, elevation, and distance from communities, is given in a subsequent email alert; more information can be found online. Unfortunately, people still struggle to understand the information distributed as part of this system – in part because the forest managers involved in the production and dissemination of

information do not fully understand users' needs. Better communication at the community level could inform the design of an improved tool.

### **The Caribbean climate impacts database & its role in disaster risk management**

Shelly-Ann Cox, Caribbean Institute for Meteorology & Hydrology

In island communities of the Caribbean, economies, human institutions, and financial capital are all vulnerable to disasters such as drought, flood, tropical cyclones, and heat waves; understanding the impacts of natural disasters can inform preparedness and response management. Shelly-Ann Cox presented the Climate Impacts Database (CID), which collects disaster impacts information with the goal of information disaster risk management in the Caribbean. By gathering crowd-sourced information, the CID documents on-the-ground damages that result from a disaster. The information gathered is specific, reaching from parish to sub-parish levels. Crowd sourcing through the use of hashtags on social media is useful for gathering information from credible people on the ground. Incorporating an RSS-feed tracking system also helps to pull media information about disasters to add to the CID. CIMH has a history with water authorities and stakeholders, so it also contributes to the online tool. An interested user can run a query or a specific date of interest to generate a report. The next step is to incorporate the information into early warning systems generated by CIMH and others.

### **IRI financial instruments for disaster preparedness**

Dan Osgood, International Research Institute for Climate & Society

Dan Osgood highlighted the disaster-preparedness activities of the International Research Institute for Climate & Society, with a focus on the use of forecasts for decision makers to act before a disaster hits. The IRI is investigating the lead times and thresholds at which people make decisions based on forecasts; surveys of disaster risk managers will provide more insight into the decision making process. The end goal is to evaluate the costs of taking preparedness actions and to see how experiences link to the monitoring of precipitation and hurricanes. Examining past disasters and the use of interactive materials are important in this research.

## **Climate services to advance water & disaster risk management**

**Session lead:** Kazi Fateha Ahmed, World Bank

### **Applying disaster & climate risk information in infrastructure development**

Farzana Yusuf-Leon, Water Resource Management Agency, Saint Lucia

Both droughts and floods are reoccurring problems in St. Lucia, a small Caribbean Island. In the past, physical and human infrastructure did not consider natural disasters or climate-related risk. In response, the Water Resource Management Agency is working with partners to develop a web-based geospatial information portal; this portal provides a more cohesive way to address disaster risk management, providing technical assistance for improved infrastructure. The hope is that improved dissemination of climate information will lead to improved awareness of potential risks. The water sector is also working on a watershed level management plan that will examine the current status of water and potable water, develop flood early warning systems, reduce pollution in the water supply, and map existing water supply structure. The group is looking forward to a south-south exchange to increase knowledge and collaboration on this type of activity.

### **Upgrading weather, climate & water information services to enhance food & water security in Yemen**

Hanan Aldobae, National Water Resources Authority, Yemen

Most of Yemen's land is under cultivation, and more than half the population works in agriculture. In this context, seasonal rainfall – key to agricultural production – is also key to economic development. Unfortunately, at present, Yemen's rate of water consumption is higher than its replenishing rate; this is particularly true in coastal areas, which receive less rainfall than mountainous slopes. Climate change further stresses water supplies, including through increasing temperatures and the fact that rain now falls more sporadically. Water stress has led to crop failure, food insecurity, famine, and mass migration; unfortunately, there is a lack of resources to combat the water scarcity and uneven distribution. Better management of water resources, supported by improved water monitoring and information, are needed to improve Yemen's development pathway.

### **Applying climate information to manage water-related disasters in Mozambique**

Anacleto Duvane, National Institute of Meteorology, Mozambique

Mozambique has a long coastline and international river systems, which pose a number of water management issues for the country. In recent years, Mozambique has begun using meteorological information, including three forecast products, to improve water management. Mozambique also participates in the Regional Climate Outlook Forum in South Africa. All past and current outlooks are available online and updated regularly. An early warning system is in place for cyclones and floods, which can help to manage climate- and weather-related risk.

### **Drought risk management from seasonal climate forecasts**

Silvana Alcoz, National Water Directorate, Uruguay

Uruguay has experienced a paradigm shift in recent years, moving from drought crisis management to drought risk management. The Uruguayan water sector now tries to coordinate an equitable distribution of water in each region of the country. This distribution is particularly important as water usage has increased in the last 10 years, while supply has become more fragile. ENSO events also affect water supply, as La Niña causes drought throughout the country. Water sector initiatives are now incorporating stakeholder maps; intake structures; adaptation instruments; capacity building; and drought risk management strategies. Knowledge of river behavior, vulnerabilities, disaster response, emergency response, would be useful to develop surface water risk map as an emergency management tool. More work is needed to improve drought management. The water sector is working to enhance collaboration between agencies.

## **Paying for predictions: An interactive experience of climate service challenges**

**Session lead:** Pablo Suarez, Red Cross Red Crescent Climate Centre

Activities that are intensively interactive help people understand complexities, such as climate services and information. Games and interactive activities, such as the one conducted in this session, can propose, disseminate, and increase understanding of climate risks. Humanitarian workers and other decision makers usually deal with immediate concerns and issues, and are faced with having to make decisions using seasonal forecasts. This game aims to help explain the uncertainty involved in seasonal forecasts and, consequently, the risk involved in making decisions with these uncertainties. One of the main goals of the game is to explain how budgetary decisions are constrained by uncertainty and the trade-off related to making decisions on investment and preparation for possible humanitarian crisis caused by climate change. More information on the game can be found [online](#).

## **Climate information to improve public health**

### **Health-sector response to climate risk**

**Session lead:** Gilma Mantilla, Independent consultant

#### **Building health resilience to climate risks**

Joy Shumake Guillemot, World Meteorological Organization / World Health Organization Joint Office

Joy Shumake Guillemot opened her presentation with a discussion of the ways in which the World Health Organization (WHO) addresses climate issues. This includes: national adaptation plans that mainstream climate information into national disaster planning; 40 pilot projects in different countries that explore health and climate adaptation; and an event at Climate Week NYC in which 600 people came together to send the message that the health sector is a priority climate issue. Guillemot also outlined future priorities for the WHO, which include reducing air pollution, documenting country-specific climate risks to the health sector, and strengthening partnerships needed to translate climate information into regional and national-level plans. Beyond these steps, the WHO is also working to build capacity to incorporate mainstream climate and weather information into health decision making and to establish collaborating centers around the world.

Guillemot highlighted the need to set norms and standards regarding the use of climate information for health-related decision making, stressing that national meteorological services can not be the only actors involved in this work. There is great interest in using social science methods to explore the impacts of vector-borne disease, especially when generating national adaptation plans. While there are many questions regarding how this will be implemented, the goal is to develop an end-to-end process and to use joint programs as a means to enable health communities to resolve remaining challenges.

#### **MERCOSUR's strategy on climate change & health**

Carmen Ciganda, Ministry of Public Health, Uruguay

Carmen Ciganda presented the climate and health strategy of MERCOSUR, a South American trading block that works together to address climate change adaptation. The strategy addresses environmental changes that occur as a result of climate change as

well as those impacts that occur as a result of economic changes associated with the climate; it articulates specific actions in categories including (1) evidence gathering; (2) sensitization; (3) partnership building; (4) resourcing; and (5) adaptation.

Ciganda also discussed existing climate-related challenges in the region (including heat-related morbidity, particularly of young and old people) but stressed that MERCOSUR ministries address these challenges separately, making it difficult to collaborate. Ciganda detailed the MERCOSUR Climate & Health training course in Piriápolis, Uruguay, in 2012 as a means to foster collaboration and cross-country learning. Existing climate and health challenges in the region include: improving monitoring systems; identifying baselines; understanding impacts of climate variability and change, and establishing early warning systems, among others.

### **Climate change and UV solar radiation: synergies & risks for health**

Francisco Chesini, Ministry of Health, Argentina

Francisco Chesini discussed the health impacts of climate change and increased exposure to ultraviolet rays due to a thin ozone layer. Chesini articulated Argentine Ministry of Health goals of strengthening health service distribution and examining the recurrence of waterborne illnesses. To meet these goals, the Ministry of Health is advancing technology, talking to emergency medical technicians, and preparing comprehensive information. In 2008, the Ministry of Health created a subgroup to focus on ozone and related health effects. Since mortality from melanoma is high, efforts have been made to gather information on melanoma risks, especially during the summer months when there is greater exposure to UV radiation.

### **Lessons from the field: Local research & surveillance of climate-sensitive diseases in coastal Ecuador**

Anna Stewart, State University of New York Upstate Medical University

Anna Stewart presented on research regarding the spread of dengue fever in Ecuador. She found that climate conditions affect the prevalence of dengue, but social vulnerabilities influence the range and exposure of dengue in communities. Through disease and mosquito surveillance, early warning systems can be developed. Often, the health community only knows of an epidemic once it has started. If climate and health sectors work together, they can manage and inform decision-making in the event of an epidemic. Stewart, in conjunction with a loose consortium, is developing a research platform to strengthen surveillance systems and enhance spatiotemporal modeling. Incorporating different information flows can create a more comprehensive look as well. Strong institutional partners and a team to facilitate this kind of research across different sectors are needed.

### **An integrated framework for early detection, prevention, and management of infectious diseases**

Yahya Abawi, University of Southern Queensland

Yahya Abawi discussed efforts to develop a framework for an infectious disease early warning system. In his experience, the traditional top-down communication approach that prevails in the health sector is not effective at addressing climate-related health risks: Health education can benefit from being more sensitive to cultural issues, and a web portal can help to integrate information. This web portal associated with this project includes a disease database, climate information, and health information. As the project develops, the accuracy of the climate information itself should be improved, as should the communication and processes of “co-production” in order to better

embed the climate- and health-related information into the culture in question. In the context of this kind of collaboration and shared governance, the web portal will be useful for both the health and climate sectors.

## **Practical examples of health responses to climate risk**

**Session lead:** Holm Tiessen, Inter-American Institute for Global Change Research

### **Climate variability & probable impacts on health in Latin American cities: Buenos Aires, Montevideo, Salto, and Manaus**

Graciana Barboza, Ministry of Public Health, Uruguay

This project is part of the MERCOSUR strategy to protect human health from the effects of climate change. Two groups of diseases (communicable and non-communicable) were categorized and percentiles were calculated for heat waves and cold waves to analyze how these affect each disease group by correlating data from the emergence of diseases with the simultaneous occurrence of climatic events. It was noted that there are difficulties with identifying appropriate health data, since the data is often difficult to standardize and compare with climate data. The project is ongoing.

### **Communicable diseases & climate variability in border cities of Uruguay & Brazil**

Carlos Barboza, Meteorological Institute of Paraná

Climate and health data were sought for the cities of Rivera (Uruguay) and Santana do Livramento (Brazil), which are on opposite sides of the border. In addition, an epidemiological description of the area was conducted. There were difficulties, particularly as there is not a good epidemiological registry in Uruguay. It was found that the city on the Uruguayan side had free access to some information that was underutilized, while on the Brazilian side, permission was needed to access the information, which the authorities were open to providing, but no one had requested. It was concluded that it is necessary to create tools that reconcile different information systems and practices for the use of the information. There is also a need to develop the capacities of local agencies, and the interactions between them, so that there is interest in using available information.

### **The use of climate information to support decision-making in the health sector**

Anselmo McDonald, Gorgas Commemorative Institute for Health Studies

Anselmo McDonald began his presentation by reminding the audience that initial efforts to build the Panama Canal failed due to weather conditions that generated health threats, including malaria. On a second attempt, the Americans were aware of the threats and made different decisions regarding how to structure their work. This example served as a reminder that it is possible to use climate information to advance health measures. McDonald also discussed his recent efforts to build a forecast model that uses climate information for disease prevention. This way, his group has been able to forecast infection rates throughout the country. As weather conditions are a determining factor in the biology and levels of infestation of *Aedes aegypti*, an early warning system could improve disease management. This project is a first step in that direction.

### **Air pollution in Buenos Aires: Advances in the assessment of harmful effects associated with vehicle exhaust**

Laura Dawidowski, National Commission for Atomic Energy, Argentina

The study presented by Laura Dawidowski began with a discussion of the chemical compounds in the atmosphere that affect the climate. An emissions inventory was

undertaken; this calculated the emissions from various factors. Statistical analysis on contamination and the effects on health concluded that controlling the emissions of combustible compounds could mitigate their impact on health. This analysis is something that Europe and the United States have already done but which still poses a significant threat in Latin America.

### **Climate change adaptation in the health sector in Paraguay**

Max Pasten, Directorate of Meteorology & Hydrology, Paraguay

According to Max Pasten, there are several reasons to study the impacts of climate change, including: (1) the fact that Paraguay's economy is dependent on livestock and agriculture; (2) the significant challenges that climate variability and change poses to health; and (3) the challenge of limited data. However, this project focused on the effects of climate change on health at the departmental and district levels. They saw that results were different for each zone and so determined that a vulnerability index should be generated for each of the departments, composed of epidemiological, demographic and economic indicators. This index is still under development.

### **Communicating health & climate information needs: Testing tools to identify & communicate needs for climate information**

**Session lead:** Joy Shumake Guillemot, World Health Organization / World Meteorological Organization Joint Office

Joy Shumake Guillemot began this session by reminding participants how important it is for climate service providers to understand the relationship between climate impacts and specific decisions. She stressed that the public health community would like to use improved knowledge of what's happening with the climate to develop early warning systems that could be helpful to the public health community. Session participants were broken into two groups, with the goal of examining a national health adaptation plan. The next step was to incorporate meteorological information into the adaptation plan in question, with representatives from meteorological services commenting on the availability of certain kinds of information. The final step was to look again at the scope and purpose of the plan and to identify missing information.

The two groups presented their thoughts regarding these issues, some of which are included here:

- Stakeholder engagement was not a big enough part of the plan
- Plans should be more interdisciplinary
- A glossary of terms would help facilitate interdisciplinary communication
- Both the climate & health communities should benefit from the plan
- Monitoring & evaluation is important for both the climate & health communities
- Early warning systems should be based on precise messaging

## Climate services for agriculture & energy production

### Climate services in agriculture: applied research

**Session lead:** Gabriela Cruz, University of the Republic, Uruguay

#### **Validation of essential information to establish an early warning system for heat waves that threaten dairy farms in northern Uruguay**

Celmira Saravia, University of the Republic, Uruguay

Celmira Saravia discussed climate impacts on the dairy industry and presented recent steps toward the development of a climate-informed early warning system. Saravia began by explaining the effect of temperature on milk production; she detailed an effort to develop bio-meteorological indices that describe the ideal conditions for cattle. These indices indicate the critical threshold after which dairy productivity decreases; in Uruguay, such indices have been used to identify regions where dairy production faces temperature-related stress. Saravia aims to analyze severe situations in which milk production is compromised and determine which atmospheric conditions contribute to these situations so that an early warning system can be developed.

#### **Climate-smart agriculture: Reducing uncertainty regarding what & when to grow rice in Colombia**

Camilo Barrios, International Center for Tropical Agriculture

Camilo Barrios presented the International Center for Tropical Agriculture (CIAT)'s work to reduce the uncertainty of rice production given climate variability. Colombia is highly affected by climate variability and largely influenced by temperature changes in the Pacific, which have generated agricultural issues in the country. Rice production has been impacted by this variability, with increases in temperature, radiation, and irregular precipitation increasing costs and decreasing yields by 50%. Using climate, soil and agricultural management information, CIAT has been able to recreate the changes in rice yields. Using agro-meteorological and seasonal climate forecasts, such as IRI's Climate Predictability Tool (CPT) and a rice harvest model, CIAT has classified and identified the zones that are vulnerable. With model outputs, they are able to advise farmers on when and what variety of rice to plant in order to produce the highest yields given expected climate conditions.

#### **The resurgence of crop simulation modeling in the Caribbean: The case of sweet potato, *Ipomea batatas***

Dale Rankine, University of the West Indies

Dale Rankine presented his research on the impact of climate variability on Caribbean agriculture. Caribbean agriculture is sensitive to climate since a significant portion of it is rainfed, with only 6% of small farms irrigated. Rankine identified that climate sensitivity was not captured by existing data. Focusing on the sweet potato, an important crop in the region, Rankine developed an experiment to identify which changes in climate were causing a decrease in production. One challenge this research faced was the low resolution of the climate model versus the farm-level resolution of the crop model. Rankine calibrated the climate model with downscaled data from stations using a weather generator and applied this to the crop model. The result showed that in a warm and dry climate, irrigated production is higher than rainfed production, with the converse also true. This led to identification of a simple model that can be used with sparse data, which is often all that is available in the region.

## **Climate-smart products for agriculture: the Jamaican context**

Glenroy Brown, Jamaica Meteorological Service

Glenroy Brown's presentation introduced the various types of climate information products that the Jamaican Meteorological Service has developed for the agricultural sector. The products aim to help farmer communities enhance productivity, for example through the use of early warning systems. In order to develop useful products, the Jamaican Meteorological Service held meetings with a number of farmer groups to identify their needs in terms of weather and climate services. They also held trainings to educate farmers and extension officers on the use of the products. Communication efforts have been key to the Jamaican Meteorological Service's approach, empowering farmers and extension workers to interpret information and identifying individuals capable of passing down information. They have been able to identify that the most appropriate way to disseminate information in the local context is through SMS. The Jamaican Meteorological Service's experience in developing these products shows that engaging with local communities is key to identifying, generating, and disseminating useful information.

## **Tools for climate-informed agricultural decision making in Uruguay**

**Session lead:** Gabriela Cruz, University of the Republic, Uruguay

### **Environmental monitoring through police precincts**

Adrián Cal, National Institute for Agricultural Research, Uruguay

Adrián Cal presented tools developed by Uruguay's National Institute for Agricultural Research to inform agricultural decision making. They are designed to contribute to understanding of climate risks in decision making by monitoring many climate variables countrywide. For example, the system publishes graphs with soil-cover information, using masks to determine productivity of natural pastures and calculating productivity at 16-day intervals for all administrative units. These tools are used by agricultural communities to inform local-level decisions.

### **SIGRAS online geographic information system**

Guadalupe Tiscornia, National Institute for Agricultural Research, Uruguay

Guadalupe Tiscornia presented SIGRAS, an information system developed by the National Institute for Agricultural Research in Uruguay for different types of users to access and visualize climate information. For example, the product provides monthly climate statistics using agroclimatic characterizations and water balance. Google Maps has been incorporated into the system, to be used with different products and layers of information, making it easier to identify points of interest.

## **Development and adaptation to climate change in the agricultural sector of Uruguay: The National Agricultural Information System**

Mercedes Berterretche, Ministry of Livestock, Agriculture, and Fisheries, Uruguay  
Walter Baethgen, International Research Institute for Climate & Society

Mercedes Berterretche started the presentation by suggesting that successful climate services involve four main activities: generation, translation, transference, and use of climate information. First, appropriate climate information must be generated; this information is then translated into something relevant to society. The translated information is then transferred to the user who needs it, after which it can be used to improve outcomes. Without this chain of events, the information itself is useless.

Berterretche also highlighted the two motivations that fueled the development of Uruguay's National System of Agricultural Information (SNIA). The first of these motivations was a desire for a new way of working — and an interest in climate information to inform development, private sector initiatives and government policies. The second was an interest in translating data into actionable information to better inform decision-making processes.

Baethgen began his talk by stressing that the SNIA team recognizes a gap between scientific advances and the information that has been incorporated into society;. It aims to bridge this gap through information and decision support systems. These are tools for discussions that aim to inform different types of decision makers with simple and actionable information at different time scales. SNIA has been able to achieve this through three different areas: institutionalization, research and knowledge generation, and systemizing existing information. SNIA has created standards for what information can be integrated with existing information, given heterogeneous structures and different capacities of the Uruguayan institutions involved. It also aims to work with academia, local and international institutions, and multidisciplinary teams. The involvement of different players has allowed SNIA to become a platform that suits the needs of many sectors of society.

### **Climate information for the energy sector**

**Session lead:** Rafael Terra, University of the Republic, Uruguay

#### **Hydrological forecasting system in Salto Grande Dam**

Nicolas Failache, Joint Technical Commission of Salto Grande

Nicolas Failache began his presentation with an overview of the Salto Grande Dam, the flows to which are drawn from Brazil, Argentina, and Uruguay. The overview included the number and placement of meteorological and hydrological stations and a discussion of basin flow, dam capacity, and energy generation; he also discussed current flow forecasts, produced in order to assist in dam management. In terms of next steps, there is a need to increase the density of meteorological stations and use radar so as to improve information and to develop tools to better manage uncertainty.

#### **Impacts of climate change to energy in Tajikistan**

Zafar Makhmudov, PPCR Secretariat and Climate Change Center, Tajikistan

This presentation detailed a study of available water resources under climate change conditions and the implications of those changes for energy production in Tajikistan. The study was conducted using hazard-impact models, the outputs of which were translated into impact metrics for the energy system before undergoing an adaptation analysis. Water resources were estimated to 2050. Other factors were also explored, including observed changes in temperature and precipitation and existing glacier retreat. With 98% of Tajikistan's energy from hydropower, it is important to understand the implications of climate change on energy; unfortunately, the results of this study were inconclusive, so further studies will have to be conducted.

## **Climate services for wind-farm production: A start-up experience in Argentina**

Jean-Phillipe Boulanger, Ecoclimasol

Jean-Phillipe Boulanger presented Ecoclimasol, an Argentina-based company that provide technological and scientific-based solutions to help manage the impact of climate on clients' activities, allowing them to improve their risk analysis and decision making. Ecoclimasol engages in three main activities: (1) climate services; (2) sustainable development; and (3) research and development. Boulanger also presented private-public consortium that makes wind-farm production forecasts and discussed some of the synergies between public and private actors in this realm.

## **Climate information for the energy sector**

Wilson Sierra, National Energy Directorate, Uruguay

Rafael Terra, University of the Republic, Uruguay

Wilson Sierra of Uruguay's National Energy Directorate began this joint presentation by detailing some challenges to energy production in Uruguay; with no proven reserves of oil, natural gas or coal – and almost no space for new large hydropower activities – Uruguay is highly dependent on imported oil. To reduce energy costs, and to facilitate the reduction of greenhouse gas emissions, the country has implemented a long-term energy policy that stresses the use of renewable energy. As a result, the Uruguayan energy sector is looking to better manage a system with a large amount of “unmanageable” energy and to foster a “renewable energy revolution.”

This second part of the presentation was given by Rafael Terra from the University of the Republic; Terra described the need to explore how climate information is incorporated into energy-related decision-making processes. An electric system simulator (SimSEE) is now used to integrate climate and energy data and to assist in the decision making process. Terra concluded by stressing that challenges and opportunities for climate services in the energy sector change fast and that joint work between climate scientists and technical staff must take place in an environment of trust.

## **Evaluating climate services**

### **Climate service evaluation**

**Session lead:** Edward Carr, University of South Carolina

### **Mid-level evaluation of seasonal forecasts in Kazakhstan**

Glen Anderson, Engility Corporation

Glen Anderson explained that the goal of a “mid-level” assessment is to assess the utility of a specific climate service, including the science, institutions, and uptake of relevant information, at relatively modest levels of investment. The ninth-largest wheat producer in the world, Kazakhstan also experiences high variability in both climate and wheat production. The mid-level evaluation was conducted through a combination of stakeholder workshops, climate services roundtables, independent review by the UNDP, and an analysis of the value chain for climate services to find gaps. In the end, it was determined that forecasts are roughly 60% reliable and are limited in their ability to inform useful recommendations (e.g., planting days). Recommendations for improvement include more observation, better data collection and visualization, and earning growers' trust.

### **Preliminary evaluation of the Latin American Observatory**

Ángel Muñoz, International Research Institute for Climate and Society

Ángel Muñoz presented on a preliminary evaluation of the Latin America Observatory (OLE2). OLE2 is a partnership of 15 countries that has lasted seven years without any donor funding. The evaluation was conducted through case analysis, online surveys, and an analysis of partner interactions. The evaluation found that the observatory has an extremely flexible culture with voluntary sharing. Since there is no funding, a strong interdependence keeps partners working together. Muñoz referred to this phenomenon as a “local funding-dependent growth dynamic,” which relies on social and informal connections. There are no free-riders in the system, as partners that don’t contribute leave the system. The evaluation found that OLE could improve by providing more context along with information to users.

### **Assessment of climate services in Kerala, India**

Shadananan Nair, Centre for Earth Research and Environment Management

Shadananan Nair presented an assessment of climate services in the tropical state of Kerala, India. Kerala is highly vulnerable because of the high population density and because of recent changes in climate including rainfall, soil erosion, temperature, and frequency of intense tropical storms. Nair found that despite this high level of vulnerability, climate change does not rank high for policy makers in the state. Climate services are poorly funded, and are being developed under a fragmented process. To improve the situation, there is a need for better observation methods, a data network, more community involvement, and farmer-focused climate services.

### **Really effective .... for 20% of the men**

Edward Carr, University of South Carolina

Ed Carr presented his evaluation of a long-term agro-meteorological activity in Mali. His team found that there are extremely low rates of climate information used as a result of the project and almost no female participation; he also found that those who did use the information, followed it very strictly. More generally, Carr believes that evaluations of climate services are often indeterminate because there are many things that are outside of the control of farmers. The main point is that evaluators will not be able to control for all factors to assess the impact of climate services; to be successful, they need to look at whether people are using the service and whether it is effective for those that do.

### **Ensuring evaluability of climate-related programs**

**Session leads:** Oleksandr Rohozynsky, SERVIR Demand Activity

Ángel Muñoz, International Research Institute for Climate and Society

The objective of this interactive session was to test guidelines for ensuring evaluability of climate change and variability programs / services. The activity began with a brief introduction to monitoring and evaluation, including defining the difference between outputs, outcomes, and impacts. The moderators then split the session into two small groups (one English-speaking and one Spanish-speaking) to develop a theory of change for test cases and discuss improvements to the approach used. After each group presented, the moderators discussed challenges and further recommendations on how to improve their M&E.

## **Economic valuation of climate service activities**

**Session leads:** Glen Anderson, Engility Corporation

### **Economic valuation of climate services**

Glen Anderson, Engility Corporation

Glen Anderson began the session with a background on the CSP Economic Valuation Working Group, which was started in partnership at ICCS1. Following ICCS1, the group commissioned a literature review of all economic studies, which presented a good overview of the different kinds of benefits. Following the review, Anderson worked with the World Bank and World Meteorological Organization to write a book on the value of climate services. The book is set to be released early in 2015 and will be followed by seminars and training workshops to help meteorological services prepare terms of reference.

### **Economic assessment along the climate service value chain**

David Letson, University of Miami

David Letson began his presentation by posing the question “How much did you pay for your weather forecast this morning?” to show that we take weather services for granted. Letson then went through the climate services value chain illustrating that we often focus on only the last portion, which is service delivery.

### **Enhancing national climate services**

Tufa Dinku, International Research Institute for Climate & Society

Tufa Dinku presented an overview of the Enhancing National Climate Services program in Africa, which combines satellite information with station data in order to develop a more complete climatology. Dinku’s talk began by introducing the many data challenges faced in Africa, including a small number of stations, limited data, and low access to information. The program is working to improve access to data through map rooms and by training and awareness raising. Dinku concluded his presentation by posing a number of questions to the evaluators, including “How can we do economic valuations in Africa?” and “Can we make an argument for making data a public good in Africa?”

### **Climate services in Africa**

James Kinyangi, International Livestock Research Institute

James Kinyangi shifted the focus of the session to users, indicating that forecasts are often hard to understand and poorly disseminated. With that in mind, he asked the evaluators to consider the kinds of metrics that would be included in an evaluation, and how to communicate with users.

## **Understanding context: building place-based climate services**

### **Climate services in the La Plata Basin**

**Session lead:** José Luis Genta, Intergovernmental Coordination Committee of the La Plata Basin

José Luis Genta briefly introduced the session, indicating the importance of climate events for La Plata Basin as one of the regions in the world with the highest agricultural production, high population density, and a variety of socio-economic activities.

### **WIGOS Regional Execution Plan for WMO Region III**

Antonio Divino Moura, National Institute of Meteorology, Brazil

Antonio Divino Moura discussed the WMO Integrated Observing System (WIGOS), including the importance of the continuous observation of different components of the climate system; the different sources and formats of data; and the methods that are used to provide products and applications. He focused on WIGOS' plans and activities for Southern South America, paying special attention to how to integrate the multiple datasets; strengthen collaboration between the three different communities working on the subject (meteorologists, hydrologists, climatologists); take advantage of the capacities already in existence; and respond to the fact that the data quality of stations in the region has increased dramatically in the last 10 years. He indicated that the immediate next steps are to identify the people from national weather services in the region that will be participating in the work team.

### **Regional Climate Center for Southern South America**

Lorena Ferreira, National Meteorological Service, Argentina

Lorena Ferreira described and discussed the goals, structure, and recent advances of the Regional Climate Center for Southern South America, in which Argentina, Brazil, Uruguay, Paraguay, Bolivia and Chile are participating. (Argentina and Brazil are "responsible members," Paraguay and Uruguay are "members," and Bolivia and Chile "associates.") The main goal of the center is to improve predictions, monitoring, and the generation of regional climate products related to rainfall and temperature, including monitoring and forecasting of droughts, heat waves, and floods. At present, the center has data for 338 stations and a detailed quality control and homogenization process is being performed.

### **National System for Meteorological Radars**

Andrés Rodríguez, Argentina Sub-Secretary of Hydrological Resources

Andrés Rodríguez talked about the history, efforts, and lessons learned with respect to the creation of the national network of radars in Argentina. The effort took three decades — and Rodríguez stressed the importance of considering possible delays associated with diverse political and administrative conditions in any project. He reported that several organizations now participate in the radar network; he indicated that different radar technologies and data formats have been successfully integrated, and the data has been freely available via a public web server since 2012. The headquarters are located in the Argentinian National Meteorological Service. Six new radars will be installed soon.

### **Secretaría del Ambiente y Servicios Climáticos en Paraguay**

David Fariña, Environment Secretariat, Paraguay

David Fariña described the general state of the generation and provision of climate services in Paraguay, with particular emphasis on the work of the Environmental Secretariat (Hydrological Resources Division) and the National Meteorological and Hydrological Service. The main climate hazards in Paraguay are related to rainfall extreme events (floods and droughts), both for the Chaco region and the Paraná River. He underscored the importance of the La Plata Basin partnership (CIC) in terms of support of climate service generation and provision in Paraguay.

## **Introducing the Instituto Uruguayo de Meteorología**

Gabriel Pisciottano, Uruguayan National Meteorological Institute

Gabriel Pisciottano discussed the strengths, opportunities, and limitations of the newly launched Uruguayan National Meteorological Institute (INUMET). He reminded everyone of the importance of moving carefully and learning from existing activities when launching new projects. For example, Pisciottano described how different station networks have distinct problems but can also learn from the solutions developed by other networks. Pisciottano mentioned the importance of having a balance between “pure” climate research and efforts to meet the needs of users. He mentioned a number of activities that are being developed in the region — including through the institutional framework of WMO’s Region III and the recent creation of the Regional Climate Center for Southern South America. He stressed that INUMET is committed to continuing these efforts.

## **What if? (Re-)Building Decision Support Systems in SIDS and LDCS**

**Session lead:** Cedric Van Meerbeeck, Caribbean Institute for Meteorology & Hydrology

The session began with a brief discussion of the unique vulnerabilities of small island developing states (SIDS), including climate-related risk, but extending to other kinds of vulnerabilities as well (e.g., volcanoes, etc.). Afterward, participants gathered around a model of an island that contained a volcano, golf course, agricultural area, shopping mall, health clinic, fishing area, and ecotourism center. Cedric Van Meerbeeck, Adrian Trotman, and Shelly-Ann Cox instructed participants to think about rebuilding climate services for the island from the ground up, creating a climate-resilient community on a limited budget, and thinking about the issues specific to SIDS.

In thinking about building climate services, the group discussed placement of a physical building where people might engage in climate service activities. The group considered the topography, economy, energy sources, and infrastructure -- though some participants thought that establishing a building was not necessarily a priority, since in the fictitious island may not have advanced local expertise. In the end, the group decided to invest in evaluating the local capacity of the island and subsequently build the capacity of local institutions. The group decided to improve alerts and communication, and create new roads for evacuation. It was decided that investing in renewable energy, which might help improve the resilience of the community, was not feasible with the budget at hand. The group also proposed a tax on the tourism industry in order to generate additional resources.

The main objective of the exercise was to compel participants, particularly those who were not from small island states, to think about the unique vulnerabilities SIDS face. There is no way to build climate services in an hour, but having limited funds and limited capacity is a reality of the SIDS.

## **Climate services and partnerships in Small Island Developing States**

**Session lead:** Cedric Van Meerbeeck, Caribbean Institute for Meteorology & Hydrology

Cedric Van Meerbeeck began the session by pointing out that while Small Island Developing States (SIDS) are all different, they have certain commonalities, including small-scale infrastructure and limited human capacity. The sustainable, consistent development of climate services may help to address some of these common challenges.

## **Challenges to delivering climate services for small island developing states**

Elisabeth Holland, University of the South Pacific

Elisabeth Holland stressed that one challenge with regional-level implementation of projects, policies, and research in the Pacific is that travel and connectivity is difficult. Fewer than 9 million people live in the vast area and connecting them all is difficult. Climate adaptation challenges are addressed in committees, and water security is of the highest priority. For droughts, there are emergency desalination plants for potable water. Sea-level rise is already at 20cm in Tuvalu. A meter of sea level rise will devastate these islands since it will hit on infrastructure. However, improving climate services and related warnings must be done with caution; scientific knowledge can be seen as an unwanted external force if it is not delivered with the local context in mind.

### **Storm Island**

After Holland's presentation, the group watched a video that addressed climate impacts on SIDS. The video argues that it is better for SIDS to invest money in prevention methods than to spend more money to compensate losses. One challenge is the availability of weather stations. Floods on islands are common, and there is a need for better early warning systems. Cuba has an exemplary hurricane system that can give 120-hour warnings. People are keen to listen to these warnings since they are delivered on the television, and the anchorman is a trusted reporter who has been reporting for a long time. The warning system uses an integrated approach. Actions are first taken in schools. Cuba, even though it is also a SIDS, has critical mass to make this early warning system work. Cooperation is key for making a system like this happen. People also need access to tools to prepare for disasters. Acting now to build these tools is important, otherwise risks and disasters won't be manageable. The video, Storm Island, is available online [here](#).

### **Climate services in small island developing states**

Netatua Pelesikoti, Secretariat of the Pacific Regional Environmental Programme

As part of the Secretariat of the Pacific Regional Environmental Programme (SPREP), Netatua Pelesikoti works throughout the Pacific region; she points out that very few people work on climate services in the region. Partnerships help engage marginalized groups, including women who are underrepresented in the community. Partnerships across regions can also help to contextualize priorities within large-scale adaptation plans. The Pacific Island Framework for Adaptation helps bring local-level links to the regional level. Local context needs to be considered when working with development partners. In a regional disaster, there is usually a global actor, a regional actor, and then a national actor working on preparations and remediation.

### **Climate services for health in small island developing states**

Joy Shumake Guillemot, WMO/WHO Joint Office on Climate & Health

The World Meteorological Organisation and the World Health Organisation have teamed up developing a joint office focused on bringing climate and health together on a regional and international scale. The office stresses that climate change is a health issue and that the GFCS has worked hard to engage with health-related issues. In the Pacific, regional arms bring together different expertise to support projects. So far, 20 islands have adopted this process, bringing in the health community and making solid demands of the meteorological services. Many demands relate to creating a center for early warning services that could bring health expertise to work with meteorological services.

### **Caribbean climate services for small island developing states**

Adrian Trotman, Caribbean Institute for Meteorology & Hydrology

Adrian Trotman stressed that the context of the country drives the desire to develop and focus on climate services. In the Caribbean, for example, the economy is more and more dominated by tourism; countries with few natural resources are not able to capture revenue associated with tourism and see reduced GDP, in comparison to other islands in which tourism is more prevalent. Of course, the tourism industry puts additional stress on water resources in these islands, especially during the dry season.

To help develop climate services that can help to manage the resources, updated information needs to be disseminated effectively. In the past, representatives from the South Pacific have attended the Caribbean Outlook Forum (CARICOF), and there was great collaboration; there is, however, a need for the regions to improve their ability to engage with and learn from one another. Services rendered at CIMH or in the Caribbean will be fruitless without partnerships with the global community. Climate services in SIDS tends to require collaboration with mainland developing locations (IRI, NOAA). Preparedness should not be driven by anecdotes, but by real science.

### **Developing climate services capacities in national contexts**

Caio Coelho, Center for Weather Forecasting and Climate Research, Brazil

### **Climate services for Scottish policy**

Andrew Harding, ClimateXchange, Scotland

After a number of climatic events severely affected Scotland – a country that's economy is greatly dependent on agriculture and the export of whiskey, salmon, and steak, all of which are climate-dependent – the Scottish government created an organisation to generate information about climate events and probable impacts. This organisation has engaged with a number of issues, including climate impacts on housing futures; peatland restoration; blue carbon; current and future windstorms; and a review of adaptation strategies, among other things. ClimateXchange also offers information about potential costs of climate variability; this study concluded that climate services are needed not only to protect the national economy, but also on a global level.

### **Climate services, food security and drought**

Jacqueline Spence, Meteorological Service of Jamaica

Jamaica's agriculture sector and its economy depend heavily on rainfall. Climate change increases the vulnerability of producers and puts food security at risk. Starting from this premise, the Jamaican Meteorological Service began to develop products that support agricultural producers. The main challenges was to develop better methods for disseminating information obtained with these products and to work with technicians and producers to identify the ways in which specific kinds of information could fit into their decision cycle. For Jacqueline Spence, intervention at the policy level is key to creating research strategies and tools for impact assessment. Over time, the public has improved their perception about the products that have been developed, are more aware of climate change, and seek answers to what can be done to mitigate its effects.

### **Strengthening climate info networks in Niger**

Ousmane Baoua, National Meteorological Service, Niger

The main climate risk in Niger is drought, as the country experiences ten months without rain. Other climate-related hazards include sandstorms, floods, plant disease, and parasites. The main goal of current climate service activities in Niger is to develop information useful for the agricultural sector, which is the foundation of the national economy; agricultural producers have said they would like to know when the rainy season will start in order to plan their work. To this end, the first step in strengthening climate services in Niger was to analyze rain patterns from June to September over the past 30 years. It is also important to consider the involvement of stakeholders and the ultimate dissemination of information. The project is currently managing both of these processes through research institutes with private and public funds; these organisations send the products of the national weather service to the end user to inform decisions.

### **Enhancing national climate services in Africa (ENACTS)**

Tufa Dinku, International Research Institute for Climate & Society

Many parts of Africa do not have an adequate number of weather stations; the weather stations they do have are often in cities or along major roads. Tufa Dinku has worked to improve the quality and accessibility of data; he has also trained people to use that data through a product called Enhancing National Climate Services in Africa (ENACTS). To accomplish this task, Dinku works with national meteorological services in different countries to develop a merged product based on satellite and station data; they also engage users in a long-term process designed to build capacity. At the end of the project, each country will have 30 years of climate data, made accessible through the Data Library. In the future, the project will seek to add more climatic variables, including seasonal forecasts and other information relevant to specific sectors (health, agriculture, water, disasters). Increasingly, the project involves users in the design of map rooms.

## **Putting the pieces together: understanding components of climate services**

### **Climate service ethics**

**Session lead:** Steve Zebiak, International Research Institute for Climate & Society

#### **Toward an ethical framework for climate services**

Robert Wilby, University of Loughborough

Robert Wilby introduced the white paper written by the Climate Service Partnership working group to propose an ethical framework for climate services, with the message that the community is delivering the best it can. There is a need for an ethical framework that is workable, not only theoretical, and that can function as a set of principles that would be applied across sectors and cultures. For example, the paper discusses the importance of developing a vocabulary, drawing on words currently used by different communities to mean different things. As articulated in the paper, the core values of the climate services ethical framework include: integrity, transparency, humility, and collaboration. This was the first attempt to develop such a set of ethical principles, which are mostly focused on open communication between users and suppliers of climate services.

### **Climate service ethics: World Vision's perspective**

Laura Fontaine, World Vision International

On behalf of World Vision, Laura Fontaine provided feedback to the white paper, taking into particular account the perspective of small-holder farmers and the need for long-term resilience. Fontaine's four main suggestions to improve the white paper were: (1) emphasize the need to focus climate services on the most vulnerable people; (2) emphasize equity, as climate services should be available and accessible in equitable manner, particularly with regards to gender and geography, among other things; (3) include learning mechanisms that would form part of an implementation framework to capture lessons learned; and (4) include practical examples to help the reader understand the issues at hand.

### **A donor's perspective on climate service ethics**

John Furlow, United States Agency for International Development

John Furlow, who also provided comments on the white paper, made the following suggestions for improvement: (1) include the responsibility of climate services to protect and save lives through the generation and dissemination of knowledge and information; (2) propose the development of a mechanism to receive feedback on the utility of public goods (i.e., how to receive market signal while providing a public good); (3) explore whether a user-led ethical framework could improve quality or suppress availability of information; and (4) broaden the paper's point of view to aim not only at climate service providers but also to explore how they should work with clients, rather than partners.

### **Ethical climate services: A health perspective**

Joy Shumake Guillemot, WMO/WHO

Joy Shumake Guillemot used the four core tenets of public health ethics to analyze the paper and provide feedback on the white paper. These core tenants are: respect for autonomy, beneficence, non-maleficence (i.e., "do no harm") and justice. In her perspective, end users should be part of the definition of climate services and the discussion should be fully driven by the user. With respect to beneficence, climate services should act in a way that protects the largest number of people. Regarding the importance of doing no harm, climate services must discuss how to partition useful science and explain the risk to the user communities. To address justice, resources should be distributed with preference to the more vulnerable communities.

### **Interactive activity on ethics**

Pablo Suarez, Red Cross Red Crescent Climate Centre

Pablo Suarez led an interactive activity to explore two main points of climate service ethics. First, Suarez stressed that it is important to define how ethics and climate services directly link to actions and consequences, particularly as climate services providers don't have the capacity to provide 100% accurate forecasts and may be held accountable for actions taken based on that information. Second, it may be necessary to agree on a set of principles even when some members of the community don't necessarily agree with the entirety of the framework.

## **Co-production of knowledge**

**Session lead:** Ed Carr, University of South Carolina

### **Co-exploration in developing countries**

Anna Steynor, Climate System Analysis Group

Anna Steynor presented a new approach used to “co-explore” the development of useful scientific information with users in developing countries. The approach is marked by the following components. It is (1) co-exploratory in nature; (2) facilitates decision-making through a socioeconomic framework; and is (3) place- and (4) developing-country based. This approach has been developed based on the recognition that current paradigms for using climate information in decision making are not optimal; rather than user or provider led, the approach allows users and providers to work together to explore what might work best. The approach is similar to co-production, but doesn't presuppose a product; it is explicitly directionless and results from a critical dialogue of equals. The approach has been tested in workshops in South Africa, Tanzania, and Ghana, leading the Climate Systems Analysis Group to articulate a number of lessons learned, including (1) user engagement workshops are often extractive; (2) one-off workshops are limited and potentially harmful; (3) learning in workshops has limited potential for uptake in the real world; and (4) long-term engagement based on trust relationships are very powerful.

### **Integrating user perception into climate based research, how Caribbean farmers drive climate research**

Teddy Allen, University of Miami

Teddy Allen presented work that began with a series of interviews to ascertain the perception of Jamaican farmers on climate change. He found that perceptions vary by region, age, and even gender. He concluded that it is necessary to obtain qualitative information, communicating with producers to identify valuable information to guide climate information providers in making decisions. He further argued that users can become providers of information since they have a more direct way to check reality.

### **Advancing preparedness and adaptation through collaborative processes**

Jorgelina Hardoy, International Institute for the Environment & Development, Latin America

Jorgelina Hardoy explained that the aim of the Riberas project was to raise awareness and build capacity of local governments to include information on climate variability and change in local planning and action. The project was based in Carmelo, Juan Lacaze, Tigre, and San Fernando, which are cities that continually suffer *sudestada* flooding. It was conceived as a territorial project to generate and validate information and to identify appropriate adaptation actions. The project sought to identify potential responses, based on people's perceptions and needs. The project resulted in local scenarios, an evaluation of damages to local homes, and the development of an early warning system for climate variability, among other things. There are many existing challenges, including identifying appropriate mechanisms to share and co-produce knowledge.

## **The rugged path to effective decision support**

James Arnott, Aspen Global Change Institute

The Aspen Global Change Institute engages the gap between theory and practice, particularly by considering the different obstacles faced by the use of information. James Arnott articulated these challenges and an approach to overcoming them; he also discussed a transatlantic dialogue on adaptation to climate change in coastal and mountain areas, which included participants from Aspen, Colorado; Timmendorfer Strand, Germany; Virgen, Austria; and the Outer Banks, North Carolina. Arnott boils the lessons learned from this activity down to (1) things your mother told you; and (2) things your professor told you. He also presented existing challenges and ideas for the CSP to continue to build its community of practice.

## **Co-production with whom?**

Edward Carr, University of South Carolina

Climate services need to be designed for specific needs; in order to understand those needs, providers must listen to users. However, co-production does not absolve service providers from identifying those needs or from producing information for an undifferentiated mass of users. In a study conducted in Zambia, it was determined that while the problems were the same for different kinds of people (periodic floods, poverty, dependence on land and animals), vulnerabilities were different based on access to water and/or capital. Carr stressed that it is important to identify these different needs as part of the co-production process.

## **Guidance for building, delivering, and using climate services**

**Session lead:** Steve Zebiak, International Research Institute for Climate & Society

The objective of this session was to review and consider various forms of guidance and training to support climate services implementation. Evaluations have indicated that users should be more aware of services and that extension agents need training and capacity building. The agenda of this session was to think about what current initiatives are out there to address these gaps and what else is still needed.

## **Communicating with the VIA community: A guidebook on climate scenarios**

Diane Chaumont, Ouranos

Diane Chaumont kicked off the session with a brief overview of Ouranos and then described their new guidebook on climate services. The guide was designed to facilitate knowledge transfer from producers of climate information to the users of climate information; it also has the goal of increasing the capacity of decision-makers to include information in an adaptation framework. The target audience for the guide is decision makers and climate service providers; information is structured in terms of basic, intermediate, and detailed categories. The guide book also includes a number of lessons learned, including: (1) a new way to structure the way data is provided; (2) the identification of difficulties in separating and characterizing categories; and (3) the need to identify the correct level of language used.

### **Introducing the Earth Academy**

James Arnott, Aspen Global Change Institute

James Arnott spoke on behalf of Guy Brasseur to describe a new initiative called the Earth Academy. The goal of the Academy is to develop capacity through the co-development of knowledge and enhancement of the ability of young scientists and policy makers to address problems facing the planet. The academy will use summer programs, e-learning modules, and formal networks of fellows to foster relationships among a young group of scientists and policy leaders.

### **E-learning platform on weather and climate services**

Kazi Fateha Ahmed, World Bank

Kazi Fateha Ahmed presented a World Bank e-learning platform on weather and climate services designed to reach project managers for weather and climate programs, government counterparts, and other development practitioners. The training has four modules, including an introduction to weather and climate services and, more specifically, integrating climate services into the project cycle. Ahmed was interested in soliciting real-time feedback from the ICCS community and welcomed the group to test the full training online.

### **Confronting climate change through extension services**

Emilio Ruz, Cooperative Program for the Development of Agri-Food and Agri-Business in the Southern Cone

Information about climate change and its impacts is currently available at multiple levels and with varying levels of veracity; in some cases, it can be difficult to determine which information is credible and relevant. This project attempted to address this situation by engaging with experts in climate, agriculture, extension, and communication in order to develop resources that could help extension officers communicate with producers regarding climate change, its possible impacts, and methods to adapt. The resulting manual, targeted toward extension officers and related professionals, provides a conceptual framework for climate change and its impact on the productive system; it allows for the development of participative strategies for adaptation. The manual came together through three participatory workshops that engage family farmers, and other experts, from countries in the Southern Cone.

### **Institutional arrangements that support climate services**

**Session lead:** Cecilia Hidalgo, University of Buenos Aires

#### **Strengthening climate services in Haiti**

Ernso Thomas, Ministry of Agriculture, Haiti

Ernso Thomas presented on the institutional arrangements for disaster risk management in Haiti. After the 2004 hurricane season, the government decided to create a national early warning program, which has since created a network of 150 stations and a strong hydrological network. Thomas noted that for climate services to be successful, permanent consultation with all stakeholders – including government, private sector, international agencies, etc. – is necessary. Exchanges between institutions also helps to avoid duplication of work.

## **Information & institutions to confront climate change in the Southern Cone**

Fernanda Vila, Inter-American Institute for Cooperation on Agriculture

Fernando Vila provided an overview of the role of institutions in decision making in the context of climate change in the Southern Cone. In general, the countries within the Southern Cone have regulations that respond to climate change, but there is a high degree of complexity in institutional designs. The challenge is to integrate the different stakeholders to make progress in adaptation policy. Mr. Vila added that climate is the first cause of variability in the agriculture sector, but that there is a large disconnect between gathering information and disseminating it. His recommendations are to 1) strengthen agriculture policies in the six member countries; 2) increase the network of the met agencies in individual countries to improve regional coverage; and 3) conduct training to enrich decision making with the private sector.

## **National climate change variability response system**

Jorge Rucks, Ministry of Housing, Territorial Planning, & Environment, Uruguay

Jorge Rucks presented on Uruguay's National Climate Change and Variability Response System (SNRCC) — a horizontal coordination framework between public and private institutions that work on climate change issues. The group consists of technical staff from academia and research institutions; it meets two or three times a month to identify and address priorities of the country. An example of a project that demonstrates this kind of collaborative approach to addressing climate change adaptation is vulnerability mapping for the coastline, which has been underway in Uruguay for the past year.

## **Collaborative research as a social process**

Cecilia Hidalgo, University of Buenos Aires

Cecilia Hidalgo described institutional structures and partnerships relevant to climate services in Southeast South America. Hidalgo stressed the importance of collaborative networks and inter-disciplinary research work to produce new types of knowledge. These kinds of networks help address the knowledge gap between what scientists think they are responsible for and what the public needs. She pointed to some of the challenges of regional cooperation such as lack of regular communication and missing partnerships between institutions of different backgrounds. Despite these challenges, Hidalgo concluded by saying the creation and maintenance of interactive spaces have influenced the creation of great climate services.

## **Research priorities for climate services**

**Session lead:** Lawrence Buja, National Center for Atmospheric Research

### **CSP research priorities group**

Lawrence Buja, National Center for Atmospheric Research

Lawrence Buja gave a detailed introduction to the session, reminding everyone of the main goals of the Climate Services Partnership research priorities working group. He indicated that research still needs to be aligned to support networks and projects; he also stressed that although great work is being done in this direction, there is still a need to involve more end users in the design and development of climate services. Other activities of interest include: the collection and synthesis of research priorities in key sectors; the identification of research priorities not being addressed; the connection

with international groups to address such priorities; the increase of awareness of new science; and the communication on new science.

Buja stressed that it is important to generate, analyze, and communicate products more effectively, by understanding data and tools in terms of scales (time and space), precision, credibility, and trust, institutional challenges, needs and data scarcity. The feedback is always important to inform new research in the field. It is key to identify research questions that entrain regional scientists, to engage regional climate centers, develop networks that link the “climate service chain,” involve the climate service business sector. Buja also outlined the initial outlines of the CSP research priorities survey, for which a publication is forthcoming.

### **Research priorities for policy needs**

Andrew Harding, ClimateXchange

Andrew Harding began his presentation with a description of the complexities related to policy generation: monitoring and evaluation, agenda setting, policy formulation, decision-making process, policy implementation, and starting the process again. He also discussed factors that could introduce failures into the policy generation processes. He indicated that all the GFCS pillars need to be robust, reliable, accompanied by meta-data, and easily accessible. There is an increased emphasis on co-production, and there is an important niche for climate services to guide the development for long-term utility.

Harding indicated that it is important to help projects adapt to changing needs through partner involvement and milestone deliverables. It is also key to ensure that government and donors avoid funding the same thing twice over; he also pointed out that information can be useful even if it doesn't have the full uncertainty range (e.g., decision makers tend to need the ‘the best we have’ and ‘best and worse case’). Harding suggested that there is a need for modeling of highly regionalized local change and impacts, assessment of communications, needs, and evaluation of climate services. The responsiveness of the media, capacity building for human resources, and climate service coherence across sectors and time-scales are also key.

### **Research priorities for climate services in Latin America**

Raul Mejia, National Meteorological & Hydrological Institute, Ecuador

Raul Mejia discussed key research priorities based on his experience at the Ecuadorian National Meteorological & Hydrological Institute of Ecuador (INAMHI) and the Latin American Observatory and the engagement of these organizations with decision makers in different sectors and countries. He indicated that there is a need to improve the network of stations and availability, quality control, and homogenization of climate data. To address the problem of data scarcity, he suggested the use of satellite information calibrated with quality-controlled data from local stations. This will improve climate monitoring activities and the availability of better early warning systems.

Mejia emphasized the key role the community plays is the design and creation of climate services: The stakeholders must be involved from the very beginning of the process, and the scientific community must work with the stakeholders, not for them. Users are requiring information and tools at sub-seasonal scale, so the scientific community must address this issue urgently. Finally, he indicated that decision-makers work better with dynamic decision support systems that provide clear information about the possible risks; this format is preferable to static rainfall or temperature maps that don't include information on the associated vulnerabilities.

## **Research priorities for climate and health**

Anna Stewart, State University of New York Medical Campus

Anna Stewart discussed the relevance of climate services in the global health agenda, addressing questions like “How do climate services contribute to managing a health crisis?” She indicated that it is important to have useful tools to make decisions at different time scales and to bear in mind where and when to strengthen the health system that is already in place. Stewart suggested that since there are not a lot of funding agencies for work related to climate and health, it is key to create the link between these activities. Stewart indicated that there are important opportunities for the climate and health sector in the context of disease surveillance, and the use of climate information into epidemiological surveillance studies; areas related to climate change and health are considered to have less traction. Finally, she underlined that climate is not the only driver of disease outbreaks; it is an important component, but not the only trigger.

## **Hacking for climate services**

**Session Lead:** Ana María Loboguerrero, International Center for Tropical Agriculture  
Pablo Suarez, Red Cross Red Crescent Climate Centre

Ana María Loboguerrero discussed the interest of CCAFS in translating and disseminating climate information in a way that is useful for decision-making at the local or national level by the private sector or farmers: Information must be organized in a way that is accessible for users. She also discussed a hackathon event organized by CIAT during the COP, which challenged groups of different types of experts to develop an application that helps decision-makers use existing information. This initiative highlights the need to identify mechanisms that increase the interaction of different expert groups such as scientists and hackers, to develop tools that promote the use of climate information.

Pablo led an interactive activity to generate discussions around the potential value of the interaction between climate services and hackers. Hackers were defined as someone with a solid understanding of informatics tools and programming that can take advantage of vulnerable pathways to execute their objective. Hackers could help identify weaknesses in climate services systems and bring-in innovation by identifying potential channels for efficient communication. Additionally, participants were given the opportunity to pitch an idea that could use the skills of hackers in climate services. For example, developing early warning systems for flood through SMS technology and educational games on climate forecasts and variability.

## **Supporting & developing climate service practitioners**

**Session leads:** Anna Steynor & Ross Blamey, Climate Systems Analysis Group

### **Climate information across timescales**

Lisa Goddard, International Research Institute for Climate & Society

Lisa Goddard discussed climate information available at different time scales. She underscored the importance of considering the interaction of both climate variability and change signals for establishing resilience, informing management, and for planning. Although decadal predictions are not yet ready for use by decision-makers, Goddard argued that useful indications of decadal-scale risk can be provided by analyzing past observations.

### **From climate science to climate services**

Ross Blamey, Climate Systems Analysis Group

Ross Blamey described the background, challenges, products, and approaches to the generation and provision of climate services. He indicated that identifying the attributes and skills of well-rounded climate service providers is still a challenging task, and that there is a need to support and develop these practitioners. He also explained that there is a need to provide guidance to institutions currently or intending to provide climate services, especially regarding the skills required, codes of conduct, ethics, and responsibility.

Anna Steynor led a discussion activity in which two groups were asked the same kind of questions. First, participants were asked to define climate services within their institutions, including what is currently working well, what are the barriers, and what can be done to improve current activities. Second, the group explored what participants would consider best practice as steps to follow in the project.

## **Designing better climate information delivery systems**

### **Building & delivering early warning systems**

**Session lead:** Andrew Hoell, University of California, Santa Barbara

#### **Early warning systems in Zambia**

Kalisto H. Khumalo, Zambia Meteorological Department

Various parts of Zambia are prone to droughts and floods, which are expected to increase in severity and frequency as a result of climate change. A main limitation of the Zambian Meteorology Department is that there are stations in only a few areas. This means that it is impossible to produce information that can inform adaptation activities at either the short- or long-term. The information that is produced is disseminated through the media (press, internet, etc.), but in some cases information delivery fails; this is especially the case in places where people are particularly vulnerable and in need of early warning information. To improve the situation, the World Bank Pilot Programme on Climate Resilience will support social marketing campaigns, strengthen early warning systems, and establish an open data platform.

#### **Early warning systems for flood forecasting in Durazno city in Uruguay**

Luis Silveira, University of the Republic, Uruguay

This research was triggered by two unusual floods that affected Uruguay's city of Durazno in May 2007 and February 2010; in both instances, 20% of the population had to be evacuated. As a way to better manage these kinds of threats, climate model data were used to feed into a hydrological model, which ultimately connected to a land management model to produce forecasts of water level. This system inform more orderly evacuations, with more time and less resources, mitigating the impact of more recent floods, in relation to that experienced in 2007 and 2010, respectively.

## **The Famine Early Warning Systems Network monthly forecast review for food security analyses**

Andrew Hoell, University of California, Santa Barbara

Andrew Hoell began his presentation by describing the organizations involved in the Famine Early Warning Systems Network (FEWSNET) and the countries with which it engages, many of which are in Africa. Hoell also described FEWSNET objectives, which include assessment and monitoring of (1) weather, climate, and crops; (2) food markets and trade; (3) sub-national livelihoods; and (4) health and nutrition, with the goal of aiding the development of agro-climatology assumptions used by food security analysts. Hoell also talked through the process of developing and revising such assumptions.

## **A decision support system for drought monitoring and early warning in the South-West Pacific**

Yahya Abawi, University of Queensland

Yahya Abawi began his presentation by reviewing the Seasonal Climate Outlooks for the Pacific Island Countries (SCOPIC). He detailed climate drivers in the Pacific and discussed how analysis of these drivers resulted in an improved understanding of predictive skill. This skill was then applied for rainfall prediction and for drought monitoring and forecasting in the Pacific. Abawi concluded the correlation between ENSO and drought can be used to develop drought early warning systems in the Pacific. Due to direct impact of drought on water, agriculture, health, and renewable energy sectors, a drought early warning system could assist in mitigation of adverse impacts in the most vulnerable countries.

## **Data-driven climate services**

**Session lead:** Anna Steynor, Climate Systems Analysis Group

### **Historic hydrometeorological data most useful to a user may not yet be available**

Richard Crouthamel, International Environmental Data Rescue Organization

Richard Crouthamel's presentation was based on the idea that without the user knowing that certain information is available, there is no way that the user can use it appropriately. IEDRO's efforts focus on locating and digitizing data, as well as educating the user community on uses of data and value added products that can be derived from it. Many user communities don't know what kind of data is already digitized and available; they are even less aware of the paper data that may be available but must be digitized, nor of the data that could be available in the future. With the use of correct and updated sources of information many humanitarian issues, such as hunger and epidemics, could be avoided. With existing technology, it has become much faster to digitize data and offer it in useful formats, working with many different partners to use this new information.

### **Climate services for fragile data-poor states**

Simon Mason, International Research Institute for Climate & Society

Simon Mason discussed the process and purpose of generating data in states where there has been no functioning meteorological services at times. Combining information from periods with good data with global datasets, satellite or remotely sensed information, we can develop a climatology of a region, allowing us to observe how the climate of a region varied during conflict periods. These products can help fill

the gaps of missing climate information or different information sources can be combined to develop better estimates of past observations. Because each country faces unique issues, collaboration with local experts is essential to identify the most useful data for each situation.

### **Developing climate monitoring services to address challenging users questions**

Caio Coelho, Center for Weather Forecasting & Climate Research, Brazil

There is a wide range of users looking for answers to climate-related questions, including the general public, media, applied sectors and the government. To address the needs of these various groups, Caio Coelho has been using historical data records with basic scientific knowledge to create tailored graphic responses that are available on the web for the different range of users. For example, these graphs provide an estimate on how well below the mean the current year is, and also regarding the recurrence of drought years. This tool allows users to put the current year in context with the historical records to understand how abnormal this year might be.

### **Ancient weather prediction in decision making for agriculture**

Alfredo Veizaga, Agua Sostenible

There are many climatic challenges in the Bolivian altiplano; overtime, farmers have developed ancient knowledge that they use to predict climate variability. For example, they use bio-indicators that inform them of when and what type of crops to plant. Alfredo Veizaga's research studied four municipalities in Bolivia, where interviews were conducted with key informants and participatory workshops were held. These ancient predictions help producers manage the risks of the climatic conditions in the region. Some of the bio-indicators have become obsolete, and it would be useful to validate which of these are viable and have scientific reasoning, using weather station information.

## **Human-centered design of financial instruments for adaptation & development**

**Session Lead:** Dan Osgood, International Research Institute for Climate & Society

### **Index insurance as a climate service for development purposes**

Daniel Osgood, International Research Institute for Climate & Society

Dan Osgood discussed the use of participatory processes to inform a product's design. The IRI's Financial Instrument Sector Team implements and designs index insurance products. Index insurance is a tool that depends on climate information to determine payouts for farmers, protecting farmers during bad years. The design of these indexes is led by the experiences of the farmers, so that they are relevant to a specific risk that farmers face. Through participatory activities such as interactive exercises or educational games, those developing the indexes are able to enhance their understanding of stakeholder capacity and end users gain more information about the index insurance product. In this way, insurance helps to manage risk.

### **Index Insurance in Uruguay**

María Methol, Ministry of Livestock, Agriculture, and Fisheries, Uruguay

María Methol of the Ministry of Livestock, Agriculture and Fisheries in Uruguay talked about the current status of index insurance projects in Uruguay. She described a project to create an index for the dairy sector. that is currently being developed with

the IRI. She also described how part of the meat industry is protected through other projects that protect grassland. Horticulture is protected from excess rainfall in a different project. In the future, MGAP hopes to have an insurance product to protect grapes and citrus from frost. Farmer participation is integral to design, but so is the involvement of the relevant actors such as the meteorological institute.

### **Index Insurance in Honduras**

Ana María Loboguerrero, International Centre for Tropical Agriculture

Ana María Loboguerrero contributed her experience of an index insurance project in Honduras. CIAT is interested in providing people with what is useful. The process only when works there is engagement between public and private sectors. The question for climate services, is how do we ensure that climate information is useful and relevant to the insurance process? The involvement and support of the government is also important for the success of the project, which hinges on a process that brings people together. Having strong partnerships between sectors and people on the ground is important in continued success of projects.

### **Index Insurance in the Dominican Republic**

Sofía Martínez, International Research Institute for Climate & Society

Sofía Martínez discussed an index insurance project in the Dominican Republic, where dairy farmers are vulnerable to climate risk. Through field work conducted in the country, the IRI has helped to gather information on risk-taking habits of local dairy farmers, with the goal of designing an index insurance product. A controlled test of the insurance product was conducted this past year; the experience was valuable for gaining feedback from end users on how to better tailor the product.

### **The use of human-centered processes to ensure end-user demand**

Samantha Garvin, International Research Institute for Climate & Society

Samantha Garvin of the IRI led an interactive activity to explore the decisions that the end users face when choosing to take a productive risk, buy insurance, or stay with lower-risk strategies of production. Some participants offered feedback on the language and the game instruction.

## **Decision support systems for designing & managing productive, resilient landscapes**

Erick Fernandes, World Bank

Erick Fernandes provided opening remarks on the last day of ICCS4. He began with an overview of the major climate impacts the World Bank has been closely following, including changes to coral ecosystems, hurricanes, and grain production. Climate change may also be impacting the El Niño phenomenon. Fernandes then went through a number of World Bank tools to address these problems, including a framework for landscape planning, dynamic infrastructure, and earth system models. He concluded by saying that these frameworks are important decision support tools for government and policy makers and that the Bank is providing technical assistance to countries developing their own frameworks.

## SYNTHESIS

### Sector-specific lessons

#### **Advancing climate services for agriculture**

Mercedes Berterretche, Ministry of Livestock, Agriculture, and Fisheries, Uruguay

Mercedes Berterretche summarized conference discussions regarding the use of climate information for agriculture. While she recognized that there were many activities described at the conference, she identified some common lessons, including (1) the importance of building services one step at a time; (2) making sure information is clear and simple; (3) generating confidence among the users before adding more complexity; and (4) repeating the process.

Key challenges identified by Berterretche include the need to (1) increase the density of meteorological stations; (2) better communicate with policy makers and political authorities; and (3) strengthen networks that include meteorological services and public and private sector actors around the world. Berterretche also reminded the audience that it is important to consider a holistic vision for the use of climate information in different sectors; everything is related.

#### **Climate information for energy**

Rafael Terra, Universidad de la Republica, Uruguay

Rafael Terra summarized the variety of talks on climate services for the energy sector that were presented at the conference. He stressed that energy-related climate services generally involve tailored products, developed in one-on-one relationships with partners. Terra also highlighted the extent to which energy-sector service providers must work with users to produce tools that are actionable and relevant. He also pointed out that many of the ethical dilemmas poised by climate service provision disappear when climate service users and providers work together to co-produce solutions and have “shared skin in the game.”

#### **Improving the use of climate information for public health**

Gilma Mantilla, Independent consultant

Gilma Mantilla reviewed the health-related sessions of the conference and discussed the ways in which the climate and health community is currently trying to engage with policy, including through the global health policy agenda, regional summits of ministers of health, and national-level adaptation plans. Mantilla also talked through the work plan of the World Health Organization, which includes (1) strengthening partnerships to support health and climate; (2) awareness raising; (3) promote and guide the generation of scientific evidence; and (4) providing policy and technical support to the implementation of public health responses to climate change.

Mantilla talked about how the climate and health community was engaging with users, and creating an appropriate infrastructure to support climate services, including through the climate and health office of the GFCS, and through environmental health commissions at the regional and national levels. She also presented the climate and health training curriculum and the health exemplar of the

GFCS as useful resources in further developing capacity to build useful climate services for health.

Mantilla's take-home lessons included: (1) climate information is not an end in itself, but for sustainable health and economic development; (2) decision making requires climate information at different spatial and temporal scales; and (3) capacity building and the development of interdisciplinary teams are essential to the development of climate services.

### **Toward useful and useable climate-informed disaster risk management tools**

Pablo Suarez, Red Cross Red Crescent Climate Centre

Pablo Suarez led the audience in a game called Snap! to get a sense of how people's impressions of climate services had changed as a result of the conference and discussed the role of climate information in the disaster community.

## **Opportunities for collaboration on climate services**

### **Executive order on climate & development**

John Furlow, United States Agency for International Development

John Furlow opened the second day of the conference with an overview of US President Obama's executive order on climate and development. The principles of the potential partnership include: (1) increasing climate resilience and development; (2) making tools and services more available; (3) working to link research among partners; (4) developing a global community of practice; and (5) advancing the goals of the global framework. Furlow asked the participants to think critically about the current activities of the CSP (monthly calls, case studies, and ICCS events) and articulate what the Climate Services Partnership might engage with moving forward, especially in the context of the president's new partnership. Furlow mentioned that the executive order issued a request for information, open until the end of December, and that USAID would like to collect information before further designing the new partnership. To this end, Furlow asked the group to think about what they have heard and learned and how the community of practice could be further developed in the future.

### **Potential collaboration between GFCS and CSP**

Filipe Lucio, Global Framework for Climate Services

Filipe Lucio from the Global Framework for Climate Services briefly presented a perspective on the nature of the GFCS and CSP initiatives and their complementarities. He then presented potential areas of collaboration between the CSP and GFCS, which include: (1) developing more case studies; (2) creating a catalogue of tools/methodologies for the development of tailored climate services; (3) writing a white paper on ethics of climate services; (4) further exploring the economic valuation of climate services; (5) further development, testing, and refinement of assessment methodologies for climate services; (6) development of good practices guidance in climate services provision; (7) providing training to expand development and application of climate services worldwide; and (8) project based collaborations in supporting climate services implementation.

## Opportunities for future collaboration

Haresh Bhojwani, International Research Institute for Climate & Society

The last session of the conference focused on the future directions of the Climate Services Partnership. Haresh Bhojwani introduced the session by recalling the primary considerations in restructuring the CSP, including (1) the emergence of major climate services programs, such as the GFCS; and (2) the current need for new sources, and perhaps new modalities, of financial support for the organization and functions of CSP.

To inform the future planning process, Bhojwani facilitated an open discussion among conference participants, asking them to reflect on a few targeted questions: what are seen as particularly valuable activities or outputs of the CSP to date; which of them could be improved, and how; what organizations or programs have or could benefit from CSP activities/outputs; and what is missing – what new ideas are there for valuable contributions appropriate for CSP to undertake.

Main messages of the discussion are as follows:

Regarding activities and outputs to date, there is appreciation for the **networking and community building dimensions** of CSP, including cross-disciplinary and transdisciplinary exchange opportunities created through the ICCS process, working groups, and partnership communications. Collaborative projects and working group activities are valued by some in the sense of moving beyond discussion to concrete actions and outputs. Case studies were cited as a valuable community resource as well. There is strong support for new investments to sustain and further develop these activities.

In terms of improvements, there is desire for a **more inclusive ICCS and CSP process**. Geographically, the community would like to see greater engagement with Asia and small island states. Programmatically, they would welcome more engagement with private sector actors, as well as policy communities. Topically, they would like to see increased attention to demonstration of benefits of climate services in specific sector contexts, and also to highlighting innovations and solutions.

Whereas there has been some interaction between CSP and major climate services related programs to date, it is recognized that there is far greater **potential from a deeper engagement**. The GFCS can benefit from the learning about good practices that CSP offers. CCAFS (CGIAR Program on Climate Change Agriculture and Food Security) can draw on partnership with CSP to assist in meeting its ambitious targets of enabling climate-smart agricultural practices at scale, globally.

**Education related to climate services** is seen as a major gap area that CSP could address in the future. In particular, CSP could make a valuable contribution in helping to coordinate and support tertiary education programs and curricula to train the professionals needed in the translation and uptake of climate information services. Another perceived growth area for increasing impact of CSP is to foster partnership networks at national or regional levels that can engage greater numbers of stakeholders and build local capacity.

In closing the session, Bhojwani thanked the participants for their input, and advised them of follow-up actions that the CSP Secretariat is planning, including a wider survey of the CSP community on the same questions, and subsequent program development and resource mobilization efforts.

# APPENDICES

## Appendix 1: Agenda

Wednesday, December 10th				
8:00-8:30	<b>Registration</b>			
8:30-8:40	<b>Welcome and introduction</b>			
8:40-9:00	<b>Greetings from local hosts</b> Gabriel Pisciotto, Uruguayan Meteorological Institute Carmen Ciganda, Ministry of Health Francisco Beltrame, Ministry of Housing, Planning and Environment			
9:00-9:30	<b>Climate services for agriculture in Uruguay</b> Minister Tabaré Aguerre, Ministry of Livestock, Agriculture, & Fisheries			
9:30-10:00	<b>Seasonal prediction, stakeholder interaction, decision and discussion support</b> Roger Stone, University of Southern Queensland			
10:00-10:30	<b>Climate services at the global level: Current status of the GFCS</b> Filipe Lucio, Global Framework for Climate Services			
10:30-11:00	<i>Coffee break</i>			
11:00-11:45	<b>Panel on regional climate service networks</b> Antonio Divino Moura, José Luis Genta, Adrian Trotman, Elisabeth Holland, Irene Fischer-Bruns			
11:45-12:00	<b>Conference roadmap and orientation</b> Steve Zebiak, International Research Institute for Climate & Society			
12:05-14:00	<b>Lunch/Side event: DSS showcase</b>			
14:00-15:30	<b>Disaster-related decision support systems, part I</b>	<b>Health-sector response to climate risk</b>	<b>Climate services in agriculture: applied research</b>	<b>Climate services in the La Plata Basin</b>
15:30-16:00	<i>Coffee break</i>			
16:00-17:30	<b>Disaster-related decision support systems, part II</b>	<b>Practical examples of health response to climate risk</b>	<b>Tools for climate-informed agricultural decision making in Uruguay</b>	<b>Climate information for the energy sector</b>
17:30-17:35	<b>Close of day 1</b>			
18:00-20:00	<b>Reception and poster session</b>			

Thursday, December 11				
8:30-08:55	<b>Opening comments</b> John Furlow, United States Agency for International Development			
9:00-10:30	<b>Climate services to advance water &amp; disaster risk management</b>	<b>Data-drive climate services</b>	<b>Climate service evaluation</b>	<b>Developing climate service capacities in national contexts</b>
10:30-11:00	<i>Coffee break</i>			
11:00-12:30	<b>Co-production of knowledge</b>	<b>Innovative solutions to decision support</b>	<b>Guidance for building, delivering and using climate services</b>	<b>Human-centered design of financial instruments for adaptation &amp; development</b>
12:30-14:00	<b>Lunch/Side event:</b> CSP Early Career Professionals Network			
14:00-15:30	<b>Institutional arrangements that support climate services</b>	<b>Research priorities for climate services</b>	<b>Hacking for climate services</b>	<b>Climate services and partnerships in Small Island Developing States</b>
15:30-16:00	<i>Coffee break</i>			
16:00-17:30	<b>Ensuring evaluability of climate-related programs</b>	<b>Building &amp; delivering early warning systems</b>	<b>Climate service ethics</b>	<b>What if? (Re-) Building DSS in SIDS and LDCs</b>
Friday, December 12				
8:30-8:55	<b>Opening comments</b> Erik Fernandes, World Bank			
9:00-10:30	<b>Communicating health &amp; climate information needs</b>	<b>Paying for predictions: An interactive experience of climate service challenges</b>	<b>Supporting and developing climate service practitioners</b>	<b>Economic valuation of climate service activities</b>
10:30-11:00	<i>Coffee break</i>			
11:00-11:40	<b>Sector-specific lessons</b> Joy Shumake Guillemot, WMO/WHO Joint Office			
11:45-12:15	<b>Opportunities for collaboration on climate services</b> Steve Zebiak, International Research Institute for Climate & Society			
12:15-12:30	<b>Closing statements</b> Walter Baethgen, International Research Institute for Climate & Society			

## Appendix 2: Participant List

Last name	First name	Organization	Country
ABAWI	YAHYA	UNIVERSITY OF SOUTHERN QUEENSLAND	Australia
ABBOUD	NAZARIO	MVOTMA-DINAGUA-RRHH	Uruguay
ACOSTA	PATRICIA	MGAP-DGDR	Uruguay
AHMED	KAZI	WORLD BANK GROUP	United States
ALCARRAZ	FERNANDO	CTM- SALTO GRANDE	Uruguay
ALCOZ	SILVANA	MVOTMA-DINAGUA-RRHH	Uruguay
ALDOBAEE	HANAN	NATIONAL WATER RESOURCES AUTHORITY	Yemen
ALLEN	TEDDY	INTERNATIONAL ENVIRONMENTAL DATA RESCUE ORGANIZATION	United States
ALMIRON	SANDRA	MINISTERIO DE SALUD PUBLICA	Uruguay
ALVES	RICARDO	MGAP - CAMARÓGRAFO	Uruguay
AMILCAR	HELLIOT	NATIONAL COORDINATOR OF EARLY WARNING PROGRAM, MINISTRY OF AGRICULTURE	Haiti
ANDERSON	GLEN	EGILITY CORPORATION	United States
ANTUNES	ALICE	CLIMATE INVESTMENT FUNDS	United States
ARNOTT	JAMES	ASPEN GLOBAL CHANGE INSTITUTE	United States
ARRIGHI	JULIE	AMERICAN RED CROSS	Kenya
AYALA	MARTA	PROGRAMA MARCO CUENCA DEL PLATA	Paraguay
BACCINO	ALBERTO	MVOTMA-DINAGUA-RRHH	Uruguay
BAETHGEN	WALTER	INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE & SOCIETY	United States
BANCHERO	LUJÁN	MGAP-DGDR	Uruguay
BANZE	HELIO	DIRECÇÃO NACIONAL DE ÁGUAS / NATIONAL DIRECTORATE OF WATER	Mozambique
BAOUA	OUSMANE	NATIONAL METEOROLOGICAL DIRECTORATE	Niger
BARBOSA SANCHES	MARCOS	INTITUTO NACIONAL DE PESQUIÇAS ESPACIAIS	Brazil
BARBOZA	GRACIANA	MINISTERIO DE SALUD PUBLICA -- SALUD AMBIENTAL	Uruguay
BARBOZA	CARLOS	MINISTERIO DE SALUD PUBLICA --EPIDEMIOLOGÍA	Uruguay
BARCA	ISABEL	MGAP-SNIA	Uruguay
BARREIRO	MARCELO	FACULTAD DE CIENCIAS, UNIVERSIDAD DE LA REPUBLICA	Uruguay
BARRIOS PEREZ	CAMILO	INTERNATIONAL CENTER FOR TROPICAL AGRICULTURE	Colombia
BELTRAME	FRANCISCO	MVOTMA-MINISTRO	Uruguay
BERMÚDEZ	ALICIA	MGAP-DIGEGRA	Uruguay
BERTERRETICHE	MERCEDES	MGAP-SNIA	Uruguay
BHOJWANI	HARESH	INTERNATIONAL RESEARCH INSTITUTE. FOR CLIMATE & SOCIETY	United States
BIANCHI	FABIANA	AUCI-MEDIO AMBIENTE	Uruguay

BIDEGAIN	MARIO	INUMET-SECRETARIO TÉCNICO	Uruguay
BLAMEY	ROSS	CLIMATE SYSTEM ANALYSIS GROUP, UNIVERSITY OF CAPE TOWN	South Africa
BONTEMPI	MARÍA EUGENIA	SERVICIO METEOROLOGICO ARGENTINO	Argentina
BORGGIO	FERNANDO	MGAP-SNIG	Uruguay
BORUS	JUAN	INSTITUTAO NACIONAL DEL AGUA	Argentina
BOULANGER	JEAN-PHILIPPE	ECOCLIMASOL	Argentina
BROWN	GLENROY	JAMAICA METEOROLOGICAL SERVICE	Jamaica
BRUGNONI	PABLO	SINAE-TECHNICAL	Uruguay
BUIZER	JAMES	UNIVERSITY OF ARIZONA	United States
BUJA	LAWRENCE	NATIONAL CENTER FOR ATMOSPHERIC RESEARCH	United States
CABALLERO	NATALIA	INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE	Uruguay
CAL	ADRIAN	UNIDAD GRAS - INIA URUGUAY	Uruguay
CARR	EDWARD	UNIVERSITY OF SOUTH CAROLINA	United States
CASTILLO CIERICI	ANA MARIA	PROGRAMA MARCO CUENCA DEL PLATA	Paraguay
CHAMORRO	LUCAS	ENTIDAD BONACIONAL YACYRETA	Paraguay
CHAUMONT	DIANE	OURANOS	Canada
CHESINI	FRANCISCO	MINISTRY OF HEALTH, ARGENTINA	Argentina
CHOULARTON	RICHARD	WORLD FOOD PROGRAMME	Italy
CIGANDA	CARMEN	MINISTERIO DE SALUD PUBLICA -- SALUD AMBIENTAL	Uruguay
COELHO	CAIO	CPTEC/INPE, BRAZIL	Brazil
COFFEY	KEVIN	INTERNATIONAL RESEARCH INSTITUTE. FOR CLIMATE & SOCIETY	United States
COX	SHELLY-ANN	CARIBBEAN INSTITUTE FOR METEOROLOGY AND HYDROLOGY	Barbados
COY	ANDRE	UNIVERSITY OF THE WEST INDIES	Jamaica
CROUTHAMEL	RICHARD	INTERNATIONAL ENVIRONMENTAL DATA RESCUE ORGANIZATION	United States
CRUZ	GABRIELA	FACULTAD DE AGRONOMÍA	Uruguay
CUPPETT	DONA	INTERNATIONAL ENVIRONMENTAL DATA RESCUE ORGANIZATION	United States
DA SILVA	CRISTIAN	MINISTRY DE GANADERIA, AGRICULTURA Y PESCA	Uruguay
DANAO-SCHROEDER	NOEMI	DAI/SERVIR DEMAND	United States
DAWIDOWSKI	LAURA	COMISIÓN NACIONAL DE ENERGÍA ATÓMICA, ARGENTINA	Argentina
DE VERA	ALEJANDRA	FACULTAD INGENIERIA	Uruguay
DELGADO	SILVANA	MINISTRY DE GANADERIA, AGRICULTURA Y PESCA	Uruguay
DINKU	TUFA	INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE & SOCIETY	United States
DUPUY	LAURA	MRREE-Dirección de Medioambiente	Uruguay

DUVANE	ANACLETO	NATIONAL INSTITUTE OF METEOROLOGY	Mozambique
ECHAVARRIA	CAROLINA	CUENCA DEL PLATA	Uruguay
ECHEVERRÍA	GERMÁN	MGAP-DGDR	Uruguay
EDMOND	SILVANA	MGAP-SNIA	Uruguay
ELHORDOY	JUAN ANDRÉS	MINISTRY DE GANADERIA, AGRICULTURA Y PESCA	Uruguay
ENRICH	NORA	MGAP-DIGEGRA	Uruguay
FAGUAGA	PABLO	MGAP-DGSSAA	Uruguay
FAGUNDEZ	DARDO	MGAP-RENARE	Uruguay
FAILACHE	NICOLAS	CTM- SALTO GRANDE	Uruguay
FARIÑA	DAVID	SECRETARÍA DEL AMBIENTE	Paraguay
FERNANDES	ERICK	BANCO MUNDIAL	United States
FERREIRA	LORENA	SERVICIO METEREOLÓGICO NACIONAL	Argentina
FIONDELLA	FRANCESCO	INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE & SOCIETY	United States
FISCHER-BRUNS	IRENE	CLIMATE SERVICE CENTER 2.0	Germany
FLORENCIA	HASTINGS	MVOTMA-DINAGUA-RRHH	Uruguay
FONTAN	SILVIA	MINISTERIO DE SALUD DE LA CIUDAD DE BUENOS AIRES	Argentina
FRANKEL-REED	JENNY	UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT	United States
FURLOW	JOHN	UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT	United States
GABRIEL	MAUTONE	MGAP-DGSG	Uruguay
GARCÍA PRECHAC	FERNANDO	MGAP - SNIA	Uruguay
GARVIN	SAMANTHA	INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE & SOCIETY	United States
GENTA	JOSÉ LUIS	CIC - PROGRAMA MARCO CUENCA DEL PLATA	Argentina
GIMENEZ	AGUSTIN	UNIDAD GRAS - INIA URUGUAY	Uruguay
GIRAUT	MIGUEL	PROGRAMA MARCO CUENCA DEL PLATA	Argentina
GODDARD	LISA	INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE & SOCIETY	United States
GONIADSKI	DORA	INSTITUTAO NACIONAL DEL AGUA	Argentina
GONZALEZ	DANIEL	MVOTMA-DIRECTOR NACIONAL DE AGUAS	Uruguay
GRASSI	BENJANMIN	UNIVERSIDAD NACIONAL POLITECNICA	Paraguay
GUEVARA	ROCÍO	CIRCVC	Uruguay
HALL	MARTIN	WORLD BANK	United States
HARDING	ANDREW	CLIMATEXCHANGE	United Kingdom
HARDOY	JORGELINA	INTERNATIONAL INSTITUTE FOR ENVIRONMENT & DEVELOPMENT	Argentina
HENNEMUTH	BARBARA	CLIMATE SERVICE CENTER 2.0	Germany
HIDALGO	CECILIA	UNIVERSITY OF BUENOS AIRES	Argentina
HOELL	ANDREW	UNIVERSITY OF CALIFORNIA SANTA BARBARA	United States
HOLLAND	ELISABETH	UNIVERSITY OF THE SOUTH PACIFIC	Fiji

JUNIOR	VASCO	NATIONAL INSTITUTE OF METEOROLOGY	Mozambique
KHALED	MOHAMMED SAEED	MINISTRY OF PLANNING & INTERNATIONAL COOPERATION	Yemen
KHUMALO	KALISTO	ZAMBIA METEOROLOGICAL DEPARTMENT	Zambia
KINYANGI	JAMES	CCAFS EAST AFRICA	Kenya
KRISHNAPILLAI	SHADANANAN	CENTRE FOR EARTH RESEARCH AND ENVIRONMENT MANAGEMENT	India
LACAL	JULIA	PROGRAMA MARCO CUENCA DEL PLATA	Argentina
LETSON	DAVID	UNIV MIAMI/RSMAS	United States
LETTIERI	IGNACIO	MGAP-SNIA	Uruguay
LOBOGUERRERO	ANA MARÍA	CIAT - CCAFS	Colombia
LUCIO	FILIFE	GLOBAL FRAMEWORK FOR CLIMATE SERVICES	Switzerland
MAHMOUDOV	ZAFAR	PPCR SECRETARIAT AND CLIMATE CHANGE CENTER	Tajikistan
MANTILLA	GILMA	INDEPENDENT CONSULTANT	Colombia
MARIO	CAFFERA	UNIVERSIDAD DE LA REPUBLICA	Uruguay
MARQUEZ	LORENA	AECID-CAMBIO CLIMÁTICO	Uruguay
MARTIN	ANDREA	CASCADIA CONSULTING GROUP	United States
MARTÍN	DAHIANA	MGAP-DIEA	Uruguay
MARTIN FONTAINE	LAURA	WORLD VISION INTERNATIONAL	Switzerland
MARTINEZ	MATIAS	MINISTERIO DE SALUD PÚBLICA	Uruguay
MARTINEZ	JUAN PABLO	MVOTMA-DINAGUA-IDU	Uruguay
MARTÍNEZ	DANIEL	MGAP-DIGEGRA	Uruguay
MARTINEZ SAENZ	SOFIA	INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE & SOCIETY	United States
MARTINO	ANA LAURA	PROGRAMA MARCO CUENCA DEL PLATA	Uruguay
MARTINS	ALICIA	MGAP-STC	Uruguay
MARZAROLI	JORGE	MGAP- PROYECTO DACC	Uruguay
MASON	SIMON	INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE & SOCIETY	United States
MATHURIN	CHERYL	DEPARTMENT OF PLANNING AND NATIONAL DEVELOPMENT, MINISTRY OF FINANCE	St. Lucia
MATIN	MIR	INTERNATIONAL CENTRE FOR INTEGRATED MOUNTAIN DEVELOPMENT	Nepal
MAWANDA	SHABAN	UGANDA RED CROSS SOCIETY	Uganda
MAYEREGGER	EDGAR	MINISTERIO DE AGRICULTURA Y GANADARIA	Paraguay
MC DONALD	ANSELMO	INSTITUTO COMEMORATIVE LAS GORGAS	Panama
MEJIA	RAUL	INSTITUTO NACIONAL DE METEOROLOGÍA E HIDROLOGÍA/ ECUADO	Ecuador
MENDEZ	LUCIO	ASOCIACIÓN INTERNACIONAL DE PRENSA	Uruguay
MENDLER	JANOT	RED CROSS	United States
METHOL	MARÍA	MGAP-OPYPA	Uruguay

MINUTTI	GUILLERMO	FACULTAD DE CIENCIAS, UNIVERSIDAD DE LA REPUBLICA	Uruguay
MOHEDSI	ANDREA	MGAP-SNIA	Uruguay
MOIZO	PAUL	MVOTMA-ASESORÍA MINISTERIAL	Uruguay
MOTA	JORGE	MSP - DIRECCIÓN DEPARTAMENTAL DE SALUD	Uruguay
MOURA	ANTONIO DIVINO	INMET	Brazil
MUKUMWA	JEAN	INTERIM CLIMATE CHANGE SECRETARIAT	Zambia
MUÑOZ	ÁNGEL G	COLUMBIA UNIVERSITY	United States
NDUNGU	LILIAN	REGIONAL CENTRE FOR MAPPING OF RESOURCES FOR DEVELOPMENT/SERVIR	Kenya
NICASSIO	GASTÓN	MGAP-SNIA	Uruguay
OHIRA	MARCELLA	INTER-AMERICAN INSTITUTE FOR GLOBAL CHANGE RESEARCH	Uruguay
ORTEGA	LEONARDO	MGAP-DINARA	Uruguay
OSGOOD	DANIEL	INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE & SOCIETY	United States
PASTEN CASTILLO	MAX	DIRECCION DE METEOROLOGIA E HIDROLOGIADE LA ANAC	Paraguay
PATEL	KARISHMA	DAI/SERVIR DEMAND	United States
PELESIKOTI	NETATUA	SPREP	Samoa
PEREIRA	GUSTAVO	DOCENTE INVESTIGADOR FAC. SICOLOGÍA	Uruguay
PETRAGLIA	CECILIA	MGAP-RENARE	Uruguay
PIPERNO	ADRIANA	MVOTMA-DINAGUA-IDU	Uruguay
PIRIZODA	JALIL	AGRICULTURE AND ENVIRONMENT DEPARTMENT	Tajikistan
PISCIOTTANO	GABRIEL	INUMET	Uruguay
QUINTANS	DOMINGO	MGAP-OPYPA	Uruguay
RAFAELLI	SILVIA	PROGRAMA MARCO CUENCA DEL PLATA	Argentina
RANKINE	DALE	UNIVERSITY OF THE WEST INDIES	Jamaica
REMEDI	JUAN ANTONIO	CIC	Uruguay
RENOM	MADELEINE	UNIVERSIDAD DE LA REPÚBLICA	Uruguay
RESENDE	EMERSON	GIZ	Brazil
RODRIGUEZ	ANDRÉS	SUBSECRETARIA RECURSOS HÍDRICOS	Argentina
RODRÍGUEZ	OTILIA	MINISTRY DE GANADERIA, AGRICULTURA Y PESCA	Uruguay
RODRÍGUEZ	GERMÁN	MGAP-SNIA	Uruguay
ROHOZYNSKY	OLEKSANDR	SERVIR DEMAND ACTIVITY AT DAI	United States
ROTH	ELLINOR	CLIMATE SERVICE CENTER 2.0	Germany
ROUX	JEAN-PIERRE	SOUTHSOUTHNORTH	South Africa
RUCKS	JORGE	MVOTMA-DIRECTOR NACIONAL DE MEDIO AMBIENTE	Uruguay
RUZ	EMILIO	PROCISUR	Uruguay
SABAJ	VIVEKA	MVOTMA-DINAGUA-RRHH	Uruguay
SÁNCHEZ	GABRIELA	MGAP-RENARE	Uruguay
SANCHO	DIEGO	MGAP-OPYPA	Uruguay

SARAVIA	CELMIRA	FACULTAD DE AGRONOMÍA	Uruguay
SCAGLIA	CARLOS	MGAP-DGF	Uruguay
SCAVARELLI	PAULA	MGAP - ORGANIZACIÓN	Uruguay
SHARMA	MUKUL	EGILITY CORPORATION	United States
SHUMAKE-GUILLEMOT	JOY	WHO/WMO	United States
SIERRA	WILSON	MIEM-DNE-ER	Uruguay
SILVEIRA	LUIS	UDELAR-FING-IMFA	Uruguay
SITATI	ASHA	UNITED NATIONS ENVIRONMENTAL PROGRAMME	Kenya
SOLIS	ALEJANDRO	CATIE-DAI-PRCC	Costa Rica
SOUZA	JULIETA	MINISTRY DE GANADERIA, AGRICULTURA Y PESCA	Uruguay
SPENCE	JACQUELINE	JAMAICA METEOROLOGICAL SERVICE	Jamaica
STEWART	ANNA	UPSTATE MEDICAL UNIVERSITY	United States
STEYNOR	ANNA	CLIMATE SYSTEM ANALYSIS GROUP, UNIVERSITY OF CAPE TOWN	South Africa
STONE	ROGER	UNIVERSITY OF SOUTHERN QUEENSLAND	Australia
SUAREZ	PABLO	RED CROSS RED CRESCENT CLIMATE CENTRE	United States
TEDESCO	CARMEN	DAI/SERVIR DEMAND	United States
TERRA	RAFAEL	FACULTAD DE AGRONOMÍA	Uruguay
THOMAS	ERNSO	NATIONAL SERVICE WATER RESOURCE MANAGEMENT	Haiti
THOMISEE	JAYNE	USAID	United States
TIESSEN	HOLM	INTER-AMERICAN INSTITUTE FOR GLOBAL CHANGE RESEARCH	Uruguay
TISCORNIA	GUADALUPE	UNIDAD GRAS - INIA URUGUAY	Uruguay
TRODELLO	MONICA	CANCILLERÍA	Argentina
TROTMAN	ADRIAN	CARIBBEAN INSTITUTE FOR METEOROLOGY AND HYDROLOGY	Barbados
VAN MEERBEECK	CEDRIC	CARIBBEAN INSTITUTE FOR METEOROLOGY AND HYDROLOGY	Barbados
VAUGHAN	CATHERINE	INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE & SOCIETY	United States
VEIZAGA	ALFREDO	AGUA SUSTENTABLE	Bolivia
VILA	FERNANDO	INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE	Uruguay
WALTER	OYANTCABAL	MGAP-OPYPA	Uruguay
YUSUF-LEON	FARZANA	WATER RESOURCE MANAGEMENT AGENCY	St. Lucia
ZEBIAK	STEPHEN	INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE & SOCIETY	United States

## Appendix 3: Side events

### Bringing Space to Village: Engaging Users with Climate Science Tools for Improved Decision-making

Wednesday, December 9, 12:30 - 4:00 PM

#### Session leads:

Noemi Danao-Schroeder, SERVIR Demand Activity  
Mir Martin, International Center for Integrated Mountain Development (ICIMOD)  
Lillian Ndungu, Regional Centre for Mapping of Resources for Development (RCMRD)  
Carmen Tedesco, SERVIR Demand Activity  
Oleksandr Rohozynsky, SERVIR Demand Activity  
Jenny Frankel-Reed, United States Agency for International Development

#### User Engagement Lessons from SERVIR

The session began with a brief video introduction and overview by SERVIR chief of party, Noemi Danao-Schroeder. The objective of the session was to share lessons learned from SERVIR specifically around enhancing uptake of climate services. The SERVIR Demand Activity is a program that started in 2012 to support engaging new users, assessing impact, and sustaining and communicating results from SERVIR. Following the introduction, a panel consisting of members of the SERVIR team answered questions regarding programmatic challenges and successes as well as what they hoped to learn from the ICCS4 community.

As part of this discussion Jenny Frankel-Reed of USAID indicated “success would be creating a standard set of tools that can be used by multiple projects.” Some of the major challenges identified by the project team were ensuring that the government agencies take the SEVIR tool and work with the local community on uptake, collecting monitoring and evaluation results from stakeholders, having the demand activity start two years later than the original SERVIR program and the associated challenges of bringing the two programs together.

#### Table Topics: User engagement, communications & outreach, monitoring & evaluation

For the table topics session the group was split into three smaller groups that were divided between three topic areas: user engagement, monitoring and evaluation, and communications. Each group was tasked with answering a series of questions around their topic and then switching to the next table before sharing lessons learned at the end of the session. The following questions were discussed at each table:

- **User engagement:** How do you define a user? What does it mean to engage users? What challenges have you had with user engagement? What would you do differently if you could?
- **Monitoring & evaluation:** What kind of M&E does your program use? When should M&E typically start and end for a climate change program? Who should be responsible for collecting this information? What kinds of challenges have you had?
- **Communications:** Who is your audience? What methods are you using to communicate with that audience? What has been successful and what has been challenging?

At the end of the table discussions the group came together to discuss reemerging themes that came up with each group. In terms of user discussion, each group

identified that there are many different kinds of user groups and that engagement efforts have to be tailored accordingly. Trust also came up as a crucial element of successful user engagement. On M&E all groups identified limits including project time, resources, and getting the right local groups to help collect this information. Finally, under communications it was agreed that audiences are broad and we have to be creative to really communicate effectively with user groups including sometimes through the use of incentives.

## **Latin American Observatory of Extreme Events**

Thursday, December 11, 6:30-7:30 pm

Ángel Muñoz, International Research Institute for Climate & Society

The Latin American Observatory Members' Meeting had participation of representatives from national weather services and research institutes from Ecuador, Paraguay, Uruguay and Venezuela, and international observers from the Caribbean (CIMH), Colombia (CIAT), Brasil (CPTEC) and USA (IRI-Columbia U and SUNY). The meeting discussed the preliminary evaluation of the partnership, advances of seasonal predictability of rainfall and temperature in Uruguay, Colombia, Ecuador, Venezuela and Central America. Most importantly, it was discussed and approved a new proposal for studying the sub-seasonal predictability of climate variables in the region, and explore the possibility of providing climate services that consider simultaneously the available information at multiple time and spatial scales. The work plan for 2015-2018 will maintain key activities from the previous one but will focus efforts on the sub-seasonal scale.

## **Operational climate services in Uruguay**

Thursday, December 11, 5:30-6:30 pm

Mario Bidegain, Uruguayan Institute of Meteorology

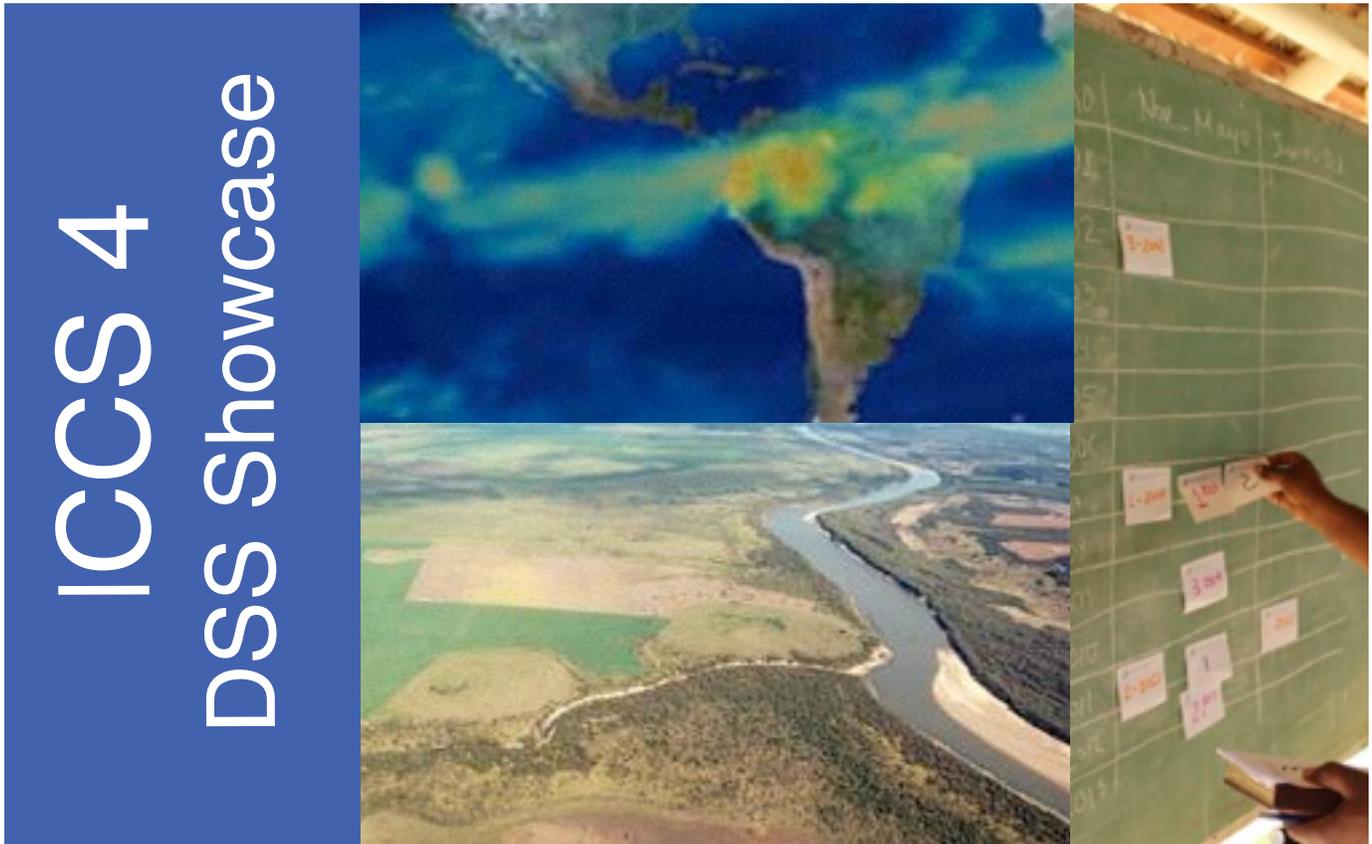
Mario Bidegain held a side event to present some of the climate service products offered by the newly created Uruguayan Institute of Meteorology (INUMET). This work has involved collaboration with a number of other organizations, including INIA, UTE, MGAP, ANTEL, DINAGUA, and UdelaR. INUMET also participates in the National System for Response to Climate Variability and Change and the Regional Climate Center for Southern South America. Climate service projects include: Flood early warning in Durazno and Artigas; index insurance for excess water for horticulture crops; index insurance for hydroelectric power generation.

## **Early Career Professionals Network**

Thursday, December 11, 12:00 pm - 2:00 pm

The first face-to-face event of the Climate Services Partnership Early Career Professionals Network was held on Thursday, December 11. The session began with a talk by Andrew Harding of the ClimateXchange, who articulated why such a network was useful and how he saw it contributing to the development of individual careers and the field as a whole. Anna Stewart and Ángel Muñoz also talked about their recent collaboration and how networking has increased their perspective and led to several publications. The group then engaged in speed-dating activity before meeting up with mid- to late-career professionals for lunch.

## Appendix 4: Decision support system showcase



### **The Fourth International Conference on Climate Services (ICCS 4) features a Decision Support System Showcase**

The Decision Support System (DSS) Showcase provides conference participants with an opportunity to learn about a range of decision support systems and tools being used and developed within the climate services community.

The DSS Showcase will begin with a series of short presentations by tool experts. While brief, these presentations will highlight the specific tools in question and provide an overview of their current and potential application. Presentations will take place in small groups organized thematically into two groups; participants will rotate among the groups in order to engage with the various presentations of interest to them.

After this series of presentations, the tool experts will hold an evening poster session, where they will be able to answer questions and further engage in discussion with participants who may like to know more about their specific decision support system. Posters and e-posters will be on display throughout the conference.

The DSS Showcase will also inform a Decision Support System Repository, where participants can share their perspectives on the sorts of systems that exist, how they are used, and how they might be able to be improved.

This guide can be used to learn more about the event and navigate the two sessions.

## Renoir Room: Decision support tools for agriculture (12-12:30 / 12:30-1)

### **System of Information and Support for Decision Making (SISTD)**

Agustín Giménez, [agimenez@inia.org.uy](mailto:agimenez@inia.org.uy)  
National Institute for Agricultural Research, Uruguay

**About:** The GRAS unit (Agroclimate and Information Systems) at Uruguay's National Institute for Agricultural Research (INIA) develops and makes available to a range of users in near-real time a series of tools and information which together make up the System of Information and Support for Decision Making (SISTD) for the managing of climate-related risks in agricultural production. The products available include: vegetation monitoring, a nationwide estimate of available soil water, estimates of pasture and crop productivity, current and historical information on climatic variables, wheat yield forecasting, and others.

**Web link:** <http://www.inia.uy/investigación-e-innovación/unidades/GRAS/>

### **SNIA Livestock Early Warning System**

Mercedes Berterretche, [mberterretche@mgap.gub.uy](mailto:mberterretche@mgap.gub.uy)  
Ignacio Lettieri, [ilettieri@mgap.gub.uy](mailto:ilettieri@mgap.gub.uy)  
Ministry of Livestock, Agriculture, and Fisheries, Uruguay

**About:** As part of Uruguay's National System for Agricultural Information (SNIA), this shows a Data Library map room for livestock drought monitoring to help decision makers develop updated contingency plans to support farmers through actions in the field. The map room integrates NDVI, water balance, drought severity index, land cover-land use, rangeland net primary production, livestock inventory data, rain seasonal forecast and a drought-livestock risk. The tool helps to characterize production and to develop updated contingency plans to support farmers through actions in the field.

### **SNIA Forest Monitoring Map Room**

Gastón Nicassio, [gastonnic@gmail.com](mailto:gastonnic@gmail.com)  
Carlos Scaglia, [cscaglia@mgap.gub.uy](mailto:cscaglia@mgap.gub.uy)  
Ministry of Livestock, Agriculture, and Fisheries, Uruguay

**About:** Complementing other efforts in Uruguay's National System for Agricultural Information (SNIA), a Data Library map room was developed to monitor local forests. The map room integrates cartography, inventory and infrastructure data, and seasonal forecast data; it is used to anticipate fire risk and assist in fire management in Uruguayan forests.

### **Informing decisions with bio indicators**

Alfredo Veizaga, [alfredoronaldo1@gmail.com](mailto:alfredoronaldo1@gmail.com)  
Agua Sustentable

**About:** In the Bolivian highlands, farmers use ancient climate predictors (i.e., bio indicators) for planning when and what kind of crops to sow. Through interviews with key informants and three community workshops, more than sixty bio indicators have been identified as useful to plan crop sowing. Though bio indicators have been used for centuries to predict weather, younger farmers are using this knowledge less frequently due to migration and lack of communication with older generations. Recovering these indicators can improve agricultural decision making.

### **Land use plans as a tool for soil protection and crop forecasting**

Gastón Nicassio, [gastonnic@gmail.com](mailto:gastonnic@gmail.com)  
Gabriela Sánchez, [gasanchez@mgap.gub.uy](mailto:gasanchez@mgap.gub.uy)  
Ministry of Livestock, Agriculture, and Fisheries, Uruguay

**About:** The Livestock, Agriculture and Fisheries Ministry of Uruguay implemented land use and management policies to protect the soil. This policy compels farmers to plan crop rotation years in advance, taking into account the erosion control through the universal soil-loss equation. These plans are useful for crop forecasting through the integration of climate data and crop simulation models and help decision makers to foresee the storage and transport of agriculture production.

## Picasso Room: Climate-informed DSS from days to decades (12-12:30 / 12:30-1)

### Monitoring and Forecast System at OLE2

Raúl Mejía, [raulmejia@yahoo.com](mailto:raulmejia@yahoo.com)  
Latin American Observatory (OLE2)

**About:** The Monitoring and Forecast System of the Latin American Observatory provides weather and climate products to help evaluate associated impacts in Latin America. The system offers a canvas where users can find different products, from regional to sub-national level, from weather to seasonal information. **Web link:** <http://www.ole2.org>

### Seasonal Climate Outlook for Pacific Island Countries (SCOPIC)

Yahya Abawi, [yahya.abawi@usq.edu.au](mailto:yahya.abawi@usq.edu.au)  
University of Southern Queensland

**About:** SCOPIC is designed to provide timely climate prediction services to people in climate-sensitive industries in the Pacific Islands, including drought analysis, rainfall and streamflow prediction and spatial evaluation of forecasting skill. **Web link:** <http://www.bom.gov.au/cosppac/comp/scopic>

### Frost Monitoring and Forecasting in Africa

Lilian Ndungu, [Indungu@rcmrd.org](mailto:Indungu@rcmrd.org)  
RCMRD/SERVIR

**About:** The Frost Monitoring and Forecasting application uses satellite datasets to provide a daily map of frost potential. The application provides morning updates to users in the Kenya Ministry of Agriculture and Kenya Ministry of Water and Irrigation as email links, so they can see current and previous datasets. Using near real-time nighttime land-surface temperature datasets from NASA's satellites, the Frost Monitoring and Forecasting application maps and displays areas affected by frost. These capabilities could be extended to incorporate additional datasets such as crop-specific warnings or targeted geographic areas. Adding more data, such as wind speed, will provide greater predictive ability and accuracy to local agencies on the danger of frost occurrence. Forecasting capability will incorporate near real-time ground temperature data and a pilot wireless sensor network with a numerical prediction model to map areas of potential frost three days in advance. **Web link:** <http://41.206.34.124/frostmaps/>

### Climate Impacts Decision Support Tool (CIMPACT-DST)

Andrea Martin, [andream@cascadiaconsulting.com](mailto:andream@cascadiaconsulting.com)  
Cascadia Consulting Group

**About:** CIMPACT-DST is an Excel-based tool that provides a framework for local governments and planning agencies to identify and consider climate change impacts and adaptation options in their decision-making. The tool works by compiling multiple sources of locally-relevant information—including reports, policies, and maps—and filtering it based on simple user inputs. Users enter simple specifications on the type, lifespan, and location of an urban planning or infrastructure project, and the tool provides climate impact and guidance summaries specific to the project sector (such as transportation or water supply), geographic area, and risk profile.

### Information system for water resources in Andean basins

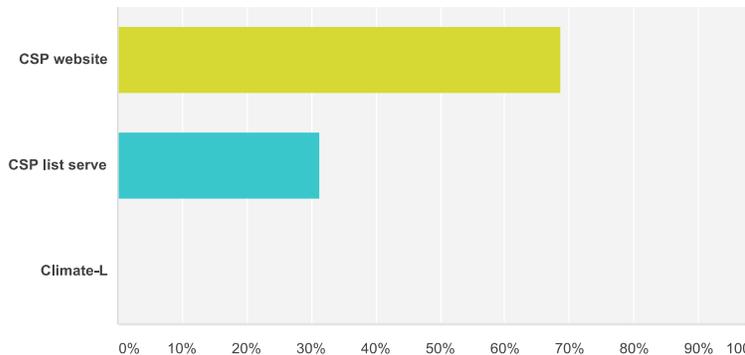
Ángel G Muñoz, [agmunoz@iri.columbia.edu](mailto:agmunoz@iri.columbia.edu)  
Centro de Modelado Científico (CMC)  
Fondo Nacional del Agua (FONAG - Ecuador)

**About:** The system provides a set of tools for evaluation of water availability in Ecuadorian Andean basins for the present and near-term future, through a characterization of the variability of precipitation, vegetation changes, streamflows and population activities in the last 30 years. It presents information about the present supply and demand for each one of the stations belonging to the hydrological network in the Andean basins, and also provides products that report the hydrological stress in each one of the stream flows of those basins. **Web link:** <http://infoagua-guayllabamba.ec/visor/index.html>

## Appendix 5: Conference feedback

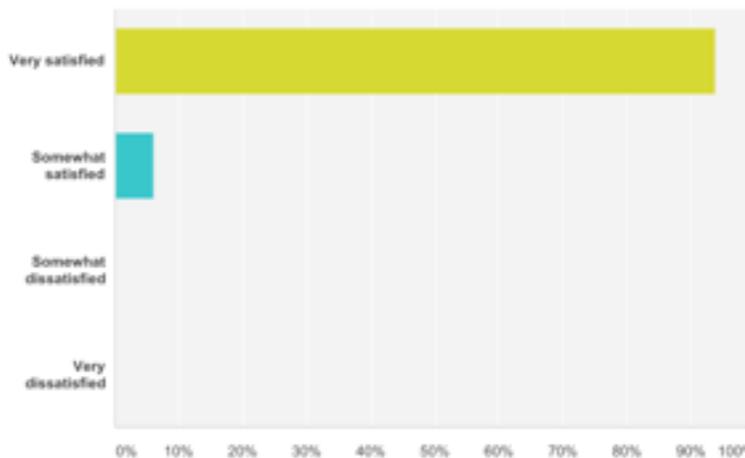
The following information is drawn from the ICCS 4 survey; 35 responses were recorded.

### How did you hear about ICCS?



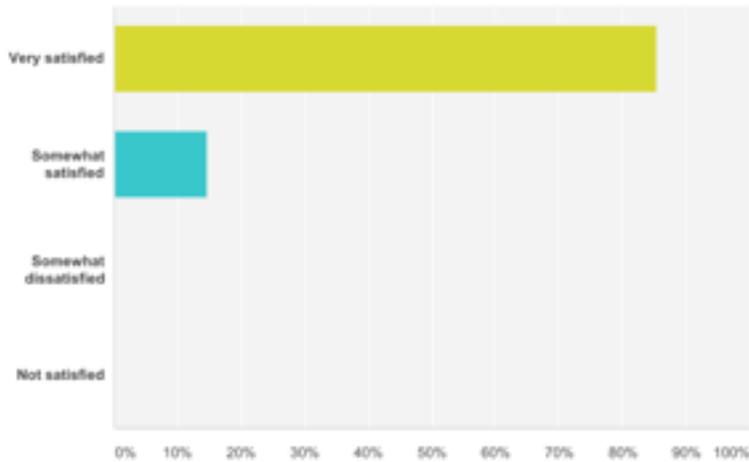
**Other responses:** SERVIR | SERVIR USAID | colleagues | direct contact with Catherine Vaughan | a colleague (my boss) | MGAP – SNIA | Livestock & Agriculture Ministry | IRI | mail from SNIA | a partner from the World Bank | from my work | a través de un colega | attendance at past ICCS conferences | World Bank colleague | member of CSP and emails | email | MGAP

### How satisfied were you with the ICCS 4 registration process?



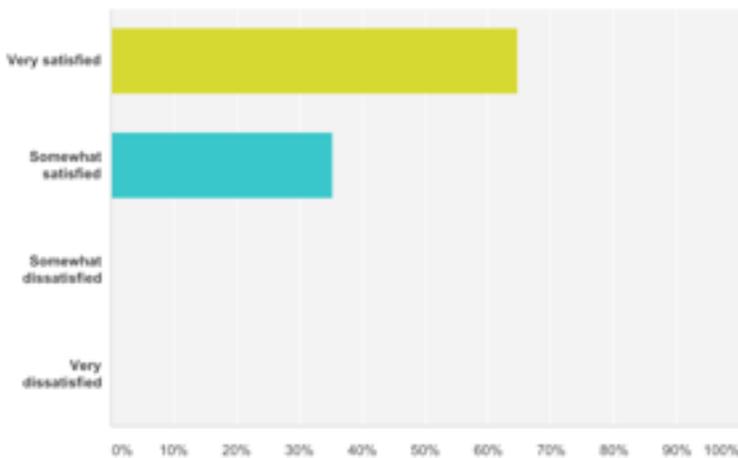
**Comments on registration:** Very efficient | Organisers supported my registration | easy! | No problems | Excellent | The team tried to put all their efforts in making process as smooth as possible. | Was easy! | Fue muy rapido con la ayuda del Banco Mundial (CIF) | It was well organized | Prefer badges being fastened by pins/magnets rather than lanyards. Seems our names were always facing our shirts.

### How satisfied were you with the ICCS 4 venue?



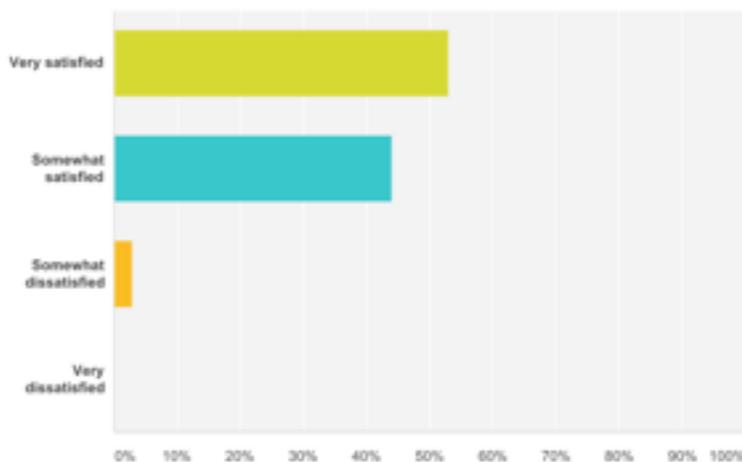
**Comments on the venue:** Good | It was a nice place. | The rooms for the sector's discussion were very small and hot. The AC was off most of the time. | Well chosen and central. | Visa acquisition for participants from Africa was challenging but finally made it. Need to start visa acquisition much earlier. | I liked the idea of having a novel location like montevideo. The meeting facilities and hotel was adequate, but I wouldn't go so far as to say it was invigorating or inspiring. | Excellent. | It is stressing to have activities superimposed with lunch time. | Very good. | Very satisfied; every thing was good. | the food was amazing....! | Considerar lugares con luz natural. | The Radisson was very nice. Perhaps keeping the coffee out longer could be a good idea. | The conference facilities were a bit primitive...laptops and LCD projectors were not up to standard. | El sitio fue muy agradable y adaptado. | The place was great, the food delicious. | Would have liked to stay at the Radisson but room costs over \$200/night were prohibitive...we found an acceptable hotel for \$60/night. | Excellent!

### How satisfied were you with the ICCS agenda?



**Comments on the agenda:** It was very useful | Presentations should be synchronised between streams, allowing people to move from one to another. | Very limited time for feedback and interaction. | The agenda was pretty good. The individual sessions always depend on the facilitation of the organizer and it would have been good if session organizers were more coordinated so that each session had dialogue as a focus alongside just presentations. | It is stressing to have activities superimposed with lunch time. | I liked so much financial presentations and the last summary. | Pablo Suarez is great. | Suggestions for next year: A session on communicating climate information, more interactive sessions. | The conference agenda was varied, covering many sectors, thus bringing in different people from various background working for the common goal. | it was very good because it includes different topics but one or two presentations was with out translation. | I was impressed with the number of interactive presentations. If possible, I will try to apply that style to future presentations. | Las presentaciones que involucran mayor participación de la audiencia levantan la dinámica. Una mayor descripción previa de las presentaciones ayudaría a poder elegir sesión, especialmente cuando en paralelo hay varias interesantes. | Fascinating topics of discussion! I really enjoyed the game led by Pablo Suarez on the morning of the last day. | It was difficult to keep switching between Spanish and English, and the whole first day opening was in Spanish with no translation which was problematic for those people who don't speak Spanish. | Too many sessions. Organizers have to learn that "less is more" and sessions involving well selected plenary 'big picture' speakers supplemented by panels w specialists (detailists) is a powerful format. In addition more group discussions with reporting back to plenary is another way to increase interactions from the participants. | It was well organized. I learn a lot of climatic services, but I could not attend all the presentation. | We appreciated the simultaneous translations but wished they were available for the opening remarks. | Although it was great having so many break-out sessions to choose from I found some of the sessions had too many breakouts and I wanted to attend more than 1. | I propose Climate working groups and projects in the different regions of the world.

**How satisfied were you with the structure of the agenda?**



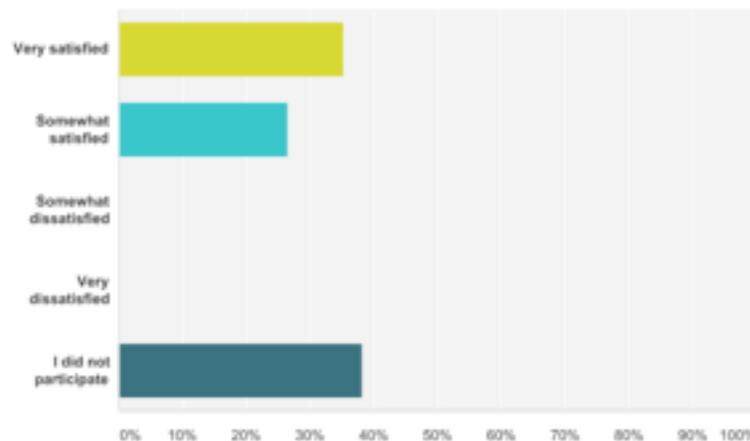
**Comments on the structure of the agenda:** Very good | I think it would be more useful to work on some questions in each sector to advance in what to do next. For example the questions asked at the end of the conference could be the ones to be addressed during the conference so at the end of the conference the organizers could have a tangible

product to use to get the funding required to continue with the CSP. | I liked the opportunity to be in the plenary sessions. However, there weren't many terrific or relevant presentations in the plenary. Would recommend trying to make better use of plenary time. Plenary discussion on last day was good! | presentation on time, very good translations | I prefer the parallel sessions. Some of the plenaries feel more obligatory than useful. | 4 parallel sessions is probably too much, chances of missing on something is too high. | It was difficult to choose which presentations to go to! | Fue un poco intenso. | It was ok. | We appreciated the interaction among presenters and audiences during the parallel sessions and wished there was more time for Q&As. | For the same reason as above. | I suggest more plenary sessions.

### Were your expectations for the conference met?

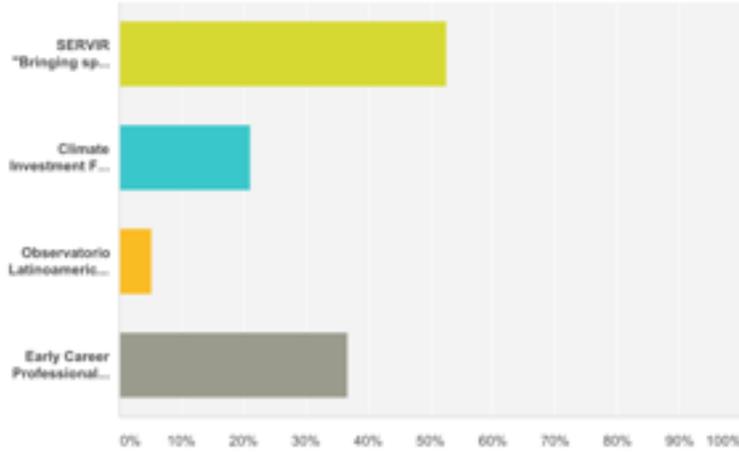
**Responses:** Yes, Am working on an agricultural based project, so everything was useful It was also good to hear from other sectors. | Yes. Most useful was to meet with various climate service practitioners. | Yes. For the first time we had the opportunity to know what is going at the global level and some experience at regional and national level. We need to prepare better for the practical session. Unfortunately in the practical session the facilitator didn't have the skill to lead the session. | All expectations met. Well run conference. | Knowing that young professionals could have an opportunity to network. | I work on climate and health, the meeting was very interesting! | Yes! It's great to see the progress of the CSP community, even if we are still struggling to find our way (and find funds). | Yes. I could get a lot of information on climate services provided in different parts of the world. | There is nothing not useful, but I missed some good presentations as there were in parallel sessions at the same time.

### Did you participate in the DSS Showcase? If so, how satisfied with the DSS Showcase were you?



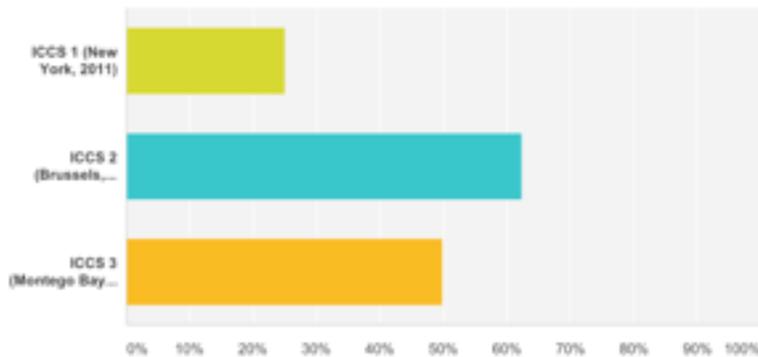
**Comments on the DSS Showcase:** Longer allocation of time | Balance between application and design | I have participate in DSS showcase for the first time and am not properly able to judge if it was the best or not. But it was good and useful. | too short / fast | I had trouble knowing where the DSS showcase was. | el tiempo demasiado corto. | It was well organized. I learn a lot of climatic services. I learn experiences of other countries.

### Which side events did you attend?

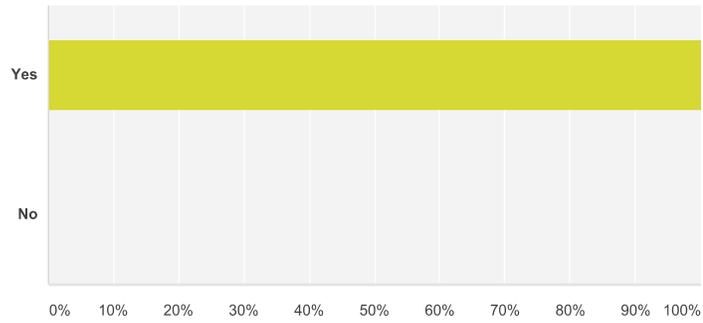


**Comments on side events:** Very satisfied | I was part of the organising team. We were happy to get feedback from the participants. | It seems to me that it didn't have a previous preparation and the facilitators were not in the same page. | Less time for interaction and feedback. | Both SERVIR and early career professionals event was very good. Wish the early career event was on the first day instead of second, however. | Next time give to this event more time. | Yes. | Somewhat satisfied. | Somewhat satisfied, because the themes of the conference were intense and side-events had to talk place in parallel with lunch or be delayed or replaced it has lost some of its audience. | I was satisfied. | It was a pleasant surprise to be paired to a senior scientist during the ECPN lunch. | Lovely, both of them! | Satisfied. Useful information provided.

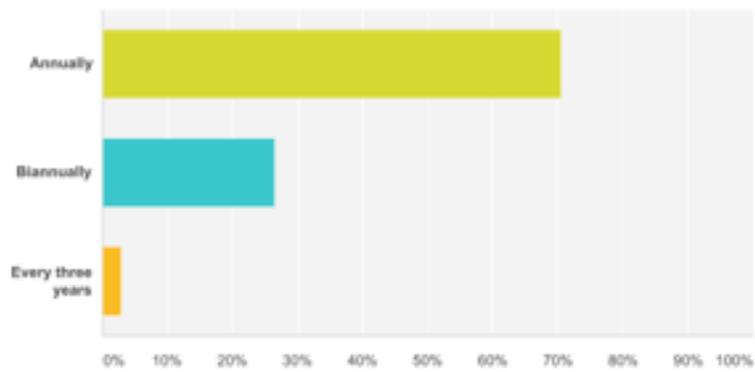
### Have you attended previous ICCS events?



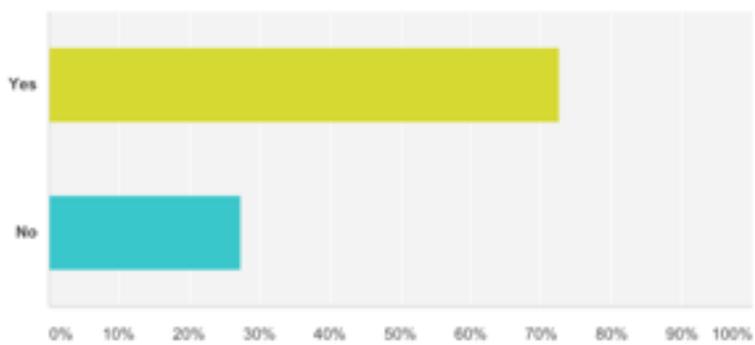
### Would you consider attending ICCS 5?



### How often do you think ICCS should be held?



### Were you familiar with the Climate Services Partnership before the conference?



### How useful would you consider the following CSP activities?

	Very useful	Somewhat useful	Not useful
<b>Working groups</b>	90.63%	9.38%	0.00%
<b>Case studies</b>	87.10%	12.90%	0.00%
<b>Webinars</b>	36.67%	56.67%	6.67%
<b>Newsletters</b>	37.50%	56.25%	6.25%
<b>Early Career Professionals Network</b>	44.83%	51.72%	3.45%
<b>International Conference on Climate Services</b>	96.77%	3.23%	0.00%

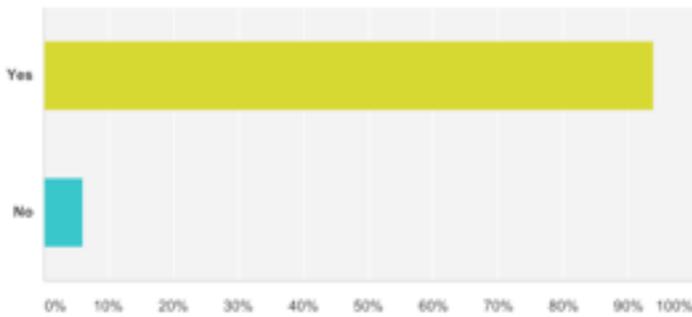
### How could the CSP best support your own activities?

	Very useful	Somewhat useful	Not useful
<b>Access to technical experts</b>	72.41%	27.59%	0.00%
<b>Practical workshops on specific problems</b>	78.13%	21.88%	0.00%
<b>Information on innovation &amp; new approaches</b>	72.41%	27.59%	0.00%
<b>Training materials, events</b>	63.33%	33.33%	3.33%
<b>Mechanisms for cross-institutional learning</b>	63.33%	36.67%	0.00%
<b>Establishments of standards and best practices</b>	50.00%	50.00%	0.00%
<b>Engagement with GFCS</b>	63.33%	33.33%	3.33%
<b>Coordination on specific projects</b>	53.33%	40.00%	6.67%

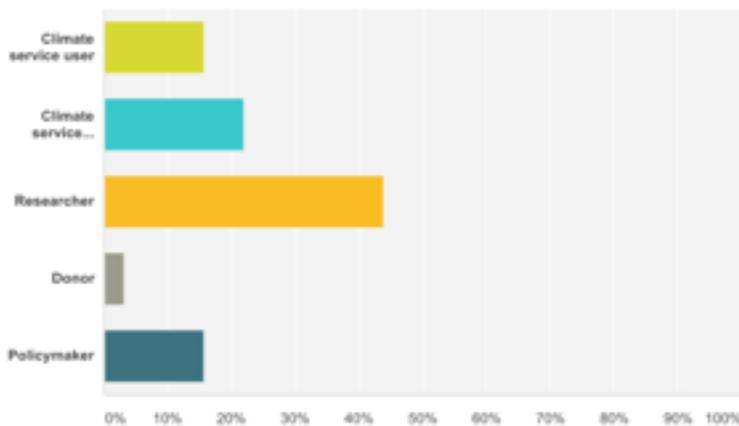
What activities could best build the CSP community of practice?

	Very useful	Somewhat useful	Not useful
Engage/attract new people from different disciplines and organizations	87.50%	12.50%	0.00%
Work at regional scales and on regional issues	65.63%	28.13%	6.25%
Engage the private sector	65.63%	31.25%	3.13%
Foster interdisciplinary work	74.19%	25.81%	0.00%
Engage policy makers	80.65%	19.35%	0.00%
Work with the tertiary education community	35.48%	58.06%	6.45%

Would you consider getting more involved in the Climate Services Partnership in the future?



How would you describe your affiliation?



Please provide any other comments you may have on the ICCS 4 or CSP here.

**Comments:** Regional balance in participation. more local community level practitioners. | Think about engaging with Future Earth. Maybe contact Denis Ojima to figure out in roads. | Thank you, Cathy Vaughan. | The invitation of the participant must be earlier to give the chance for making visas. | The timing was not great. It would be better to hold the conference at a different time of year. December is very bad - and with the COP, it makes it much harder. | ICCS espacio muy util para desarrollar el tema servicio climatico. | Congratulations for the ICCS 4. | Absolutely great job folks!