ICCS 2

THE INTERNATIONAL CONFERENCE ON CLIMATE SERVICES

Toward a Climate Services Enterprise
Conference Report

September, 5 – 7, 2012

Brussels, Belgium

The Second International Conference on Climate Services:
TOWARD A CLIMATE SERVICES ENTERPRISE

Conference Report

BRUSSELS,
BELGIUM
5-7 SEPTEMBER
2012

Agenda

WEDNESDAY,
5TH OF
SEPTEMBER

08:30 **Registration**

09:00 **Welcome Coffee**

CLIMATE SERVICES: VIEWS AND HORIZONS

09:30 **Greeting messages**
Guy Brasseur, *Climate Service Center Germany/HZG*
Stephen Zebiak, *The Earth Institute at Columbia University*

10:00 **Opening messages**
Andrea Tilche, *Climate Change Unit, European Commission Directorate General for Research & Innovation*
David Grimes, *President of the World Meteorological Organization*

10:30 **Keynote speeches**
The challenge of climate services
John Zillman, *University of Melbourne*

The transition ahead: Informing society for its decisionon mitigation and adaptation
Anders Levermann, *Potsdam Institute for Climate Impact Research*

Adapting to climate change: Challenges for the public and private sector
Nicolas Denis, *McKinsey, Brussels*

11:45 **Panel discussion**
Strategic communications for the Climate Services Partnership
Matt Hirschland, *University Cooperation for Atmospheric Research, USA*
Tom Brookes, *Energy Strategy Center, European Climate Foundation*
Facilitator: Guy Brasseur, *Climate Service Center Germany/HZG*

12:30 **Lunch**

13:00 Side event of the World Meteorological Organization Global Framework for Climate Services
Chair: Filipe Lucio, WMO

CLIMATE SERVICES PARTNERSHIP (CSP): DEVELOPMENT AND ACTIVITIES

14:30 **Introduction and overview**
Stephen Zebiak, *The Earth Institute at Columbia University*

14:50 **Case study: CLIM-RUN**
Paolo Ruti, *Italian National Agency for New Technologies, Energy and Sustainable Economic Development*

15:10 **Case study: Climate Information Portal**
Anna Steynor, *Climate System Analysis Group, University of Cape Town*

15:30 **Case study project: Summary and next steps**
Catherine Vaughan, *International Research Institute for Climate and Society*

15:50 **Coffee Break**

16:20 **Climate information for development: An evaluation of the Mali Meteorological Services' Agrometeorological Program**
Edward R. Carr, *Department of Geography, University of South Carolina*

16:45 **Best practices in climate services: A case study from India**
James W. Hansen, *Climate Change, Agriculture, Food Security Research Program, Consultative Group on International Agricultural Research*

17:00 **Report of the economic evaluation working group**

Survey of climate service studies
Janet Clements, *Stratus Consulting, Boulder/ Colorado*

Valuation of earth observations in support of climate-related health outcomes
Wendy Marie Thomas, *U.S. National Oceanic and Atmospheric Administration/National Weather Service*

Economic valuation working group: Next steps
Glen Anderson, *Engility Corporation, Chantilly/Virginia*

17:55 **Report from the development day (4th of September)**
Maarten Van Aalst, *Red Cross Red Crescent Climate Centre*

18:10 **Next steps**
Stephen Zebiak, *The Earth Institute at Columbia University*

18:30 **Reception Dinner**

THURSDAY
6TH OF
SEPTEMBER

CLIMATE SERVICE AND SOCIETY I: LINKAGES BY SOCIETAL ACTORS

09:00 **How does government support climate services?**
Katrin Ellwardt, *German Ministry of Education and Research*

09:25 **How does science support climate services?**
Ghassem Asrar, *World Meteorological Organization/WCRP*

09:50 **Panel discussion**
Sustained infrastructure to support climate services
Andreas Becker, *The Deutscher Wetterdienst (DWD)*
Rick Crouthamel, *International Environmental Data Rescue Organization*
Daniela Jacob, *Climate Service Center Germany/HZG*
Sakari Uppala, *ex European Centre for Medium-Range Weather Forecasts*
Facilitator: Chris Hewitt, *British Met Office*

10:45 **Coffee Break**

11:15 **How do NGOs support climate services?**
Chris Shore, *World Vision International*

11:40 **What kind of climate service do decision makers need?**
David Behar, *San Francisco Public Utilities Commission*

12:05 **Climate services at the national, provincial and local levels in China**
Guofu Wang, *National Climate Center, China Meteorological Administration*

12:30 **Lunch**

12:30 *Poster presentations*

13:15 *Side event of UNEP FI*
Chair: Peter Höppe, Munich Re

CLIMATE SERVICE AND SOCIETY II: LINKAGES BY SECTOR

14:30 **Working group sessions**

a) Financial services
Chair: Peter Höppe, *Munich Re*
Rapporteur: Butch Bacani, *UNEP FI*

b) Energy
Chair: Jean Yves Caneill, *Electricité de France*
Rapporteur: Aicha Adamou, *Union of Professionals of Renewable Energy, Algeria*

c) Agriculture and food
Chair: James W. Hansen, *Climate Change Agriculture and Food Security, New York*
Rapporteur: Krishna Krishnamurthy, *World Food Programme*

d) Water
Chair: James Arnott, *Aspen Global Change Institute*
Rapporteur: Catherine Nnamani, *Ebonyi University Nigeria*

From 15:30 to 17:00 coffee is available

18:00 *Side event of KfW-Bankengruppe and Climate Service Center Germany/HZG*
Research network management of climate change induced risks
Chairs: Guy Brasseur, Michaela Schaller, Climate Service Center Germany/HZG

18:15 *Side event*
European activities in climate services
Chair: Chris Hewitt, British Met Office

FRIDAY
7TH OF
SEPTEMBER

ROADMAP AND NEXT STEPS

09:00 **Global partnerships in climate information**
Karl Benedict, *Federation of Earth Science Information Partners*

09:15 **Developing networks in climate services**
Dagmar Bley, *European Joint Programming Initiative Climate*

09:30 **Reports of Thursday's working group sessions**

10:30 **Coffee break**

11:00 **Summing up and the way forward**
Lawrence Buja, *National Center for Atmospheric Research, USA*

11:45 **Conclusions and discussion**
Guy Brasseur, *Climate Service Center Germany*
Stephen Zebiak, *The Earth Institute at Columbia University*

12:30 **Farewell Coffee**

Facilitators:
Guy Brasseur, Daniela Jacob, Maria Máñez, Michaela Schaller, *Climate Service Center Germany/HZG*

Stephen Zebiak, *The Earth Institute at Columbia University*

Whitepaper

(Status: 5 September 2012)

In recent years, climate services have been established in many countries of the world. The institutional arrangements may vary from country to country, but all have a common goal: to provide science-based information to an array of stakeholders who will have to cope with climate variability and change. Governments are among the key stakeholders, supporting infrastructure and services critical to public safety and other national needs. Likewise a wide array of private sector players are important stakeholders, serving as the providers of many of the goods and services most citizens depend on for their wellbeing and livelihood. (As an example, the choices and options available to a farming household in Brazil, or in Malawi, will depend importantly on government policies and government sponsored infrastructure, information and advisory services, but will also be determined by the nature of the farm enterprise itself, by actions of agricultural cooperatives, local distributors, banks and financial institutions, and even by global agribusiness and trading markets.) The effective delivery of climate services to societies at large will depend on the engagement and investment of both the public and private sectors, working together synergistically – a climate services enterprise.

A first gathering of representatives and stakeholders of various climate services took place at the first International Conference on Climate Services (ICCS-1), at Columbia University in October 2011. A major outcome of the conference was the implementation of an international Climate Service Partnership that today includes more than 80 members. The partnership provides a platform in which to exchange ideas, experiences and scientific information, and to collaborate in the development of new knowledge, and the establishment of good practices in climate services. It also contributes to the development of the Global Framework for Climate Services led by the World Meteorological Organization, and to other global platforms.

The discussions at ICCS-1 focused primarily on the roles of governmental and other public sector actors in the development and delivery of climate services. The objective of the second International Conference on Climate Services (ICCS-2) is to explore the wider set of issues, opportunities, and challenges around the climate services enterprise concept, both at national and global scales. This agenda will include follow-up and further deliberation on issues raised in ICCS-1, including knowledge capture, evaluation, economic valuation, good practices, and capacity building in climate services. Beyond this, it will address the following key issues:

- Providing trusted, timely and unbiased information
- Communicating climate information, including certainties and uncertainties
- Determining needs and priorities, responsive to local needs and cultures
- Ensuring the highest quality of the science-based products
- Ensuring equitable access to standard information and user-support services
- Establishing a strong and sustained dialogue with the research community
- Establishing a two-way engagement, and sustained interaction with user communities and customers
- Establishing sustainable business models for climate services
- Developing transparent partnerships between the public and private sector

Four economic sectors have been chosen to examine how they could best benefit from public private partnerships in climate services. These include the financial sector, the energy sector, the water sector and the agricultural sector. Discussions will focus on issues such as the role of public and private sectors, of businesses and of customers. The contribution of professional associations, international organizations as well as the scientific and educational communities will also be examined. Questions related to interfaces between these different actors, liability, certification, marketing strategies and formalizing of emerging services will also be addressed.

The Conference will highlight areas for further study, consultation, or collaboration that can be facilitated through the Climate Services Partnership. The deliberations of ICCS-2 are intended to better elucidate the pathway, and catalyze actions to help realize the enterprise vision for climate services.

WEDNESDAY,
5TH SEPTEMBER
2012

CLIMATE SERVICES: VIEWS AND HORIZONS

Greeting Messages

Guy Brasseur, director of Climate Service Center Germany and Stephen Zebiak, director of the Climate Services Initiative at the International Research Institute for Climate and Society welcomed participants and spoke about the outcomes of the ICCS 1 in 2011, including the foundation of the Climate Services Partnership. They explained that the task of the ICCS 2 was to continue to promote the development of provision of climate services, in particular by engaging with and articulating the role of the stakeholders in public and private sectors. As co-heads of the CSP secretariat, Drs. Brasseur and Zebiak also explained that the conference offered opportunities to further develop the Climate Services Partnership.

Opening Messages

Andrea Tilche
Climate Change Unit, European Commission Directorate General for Research & Innovation

In his opening address, Andrea Tilche emphasized the importance of the development of climate services in Europe, supporting knowledge for decision-making policies. He stated that the European Commission (EC) welcomes the international initiative to share the effort of meeting the community's commitment with regard to impact of climate change. He stressed that the most important issues that need to be addressed are a) developing the science base; b) developing the research infrastructures; and c) developing the operations with regard to these infrastructures.

The European Union (EU) coordinates and supports the work of the different services in the European Union: With the Seventh Framework Programme for Research (FP7), the EC supports a very powerful group of projects on a stable financial basis, in order to improve the capability of predictions. The successor programme will be the Framework Programme for Research and Innovation „Horizon 2020," running from 2014 to 2020. The EU also supports the development of a Global Earth Observation System of Systems (GEOSS) and the European initiative for the Global Monitoring for Environment and Security (GMES), which provides observational data on land, sea and atmosphere to help deal with a range of disparate issues including climate change and border surveillance.

With regard to the ICCS2, Tilche concluded that the EU initiatives are happy to share their knowledge and experience in the international context.

David Grimes
World Meteorological Organization

In his introduction, David Grimes explained that our understanding of the climate system, including seasonal, interannual, decadal and the long-term changes, is constantly improving. Associated risks and opportunities must be addressed by government, organizations and by every individual. The World Meteorological Organization (WMO), through its international network of national meteorological and hydrological services, has developed a global operational network for observing, forecasting, and operationalizing early warnings for weather-, water-, and climate-related hazards. These services are primarily mandated and regulated by governments.

Grimes stressed that the challenge to improve our understanding of the various complex and interconnected components of the entire Earth system requires a detailed look at physical and chemical processes, and of socio-economic factors. Grimes stressed the extent to which climate services require a broad and multi-disciplinary approach and thus comprise a broad range of entities. Besides federal institutions such as national meteorological services, universities, nongovernmental organizations, and private-sector companies play important roles in developing and delivering climate services. The Climate Service Partnership can contribute to bringing these partners together. A strong collaboration is needed to build greater capacity and manage climate-related risks and opportunities attributed to climate change. Here, global, national, and regional levels have to work together.
The World Climate Conference-3 (WCC-3) held in 2009, in Geneva has established a Global Framework for Climate Services (GFCS), which will „enable better management of the risks of climate variability and change and adaptation to climate change, through the development and incorporation of science-based climate information and prediction into planning, policy and practice on the global, regional and national scale.“ WMO and its partners have defined a detailed implementation plan and governance structure designed to maximize the full potential of the Framework. This will be presented at WMO's Extraordinary Congress in October 2012. Different members of the CSP have been engaged in this implementation plan. Grimes concluded by underlining the need of a close cooperation between WMO and CSP.

The challenge of climate services

John W. Zillman
University of Melbourne

The challenge of providing and using climate information for societal benefit is not new. Building the national climate record and providing climate information for planning and other purposes has been one of the two primary functions of the national meteorological services that have operated in most countries for most of the past century. At the global level, the World Meteorological Organization (WMO) Commission for Climatology has served as the main mechanism for international coordination of the collection, provision and application of climate information since 1929.

The First (1979) and Second (1990) World Climate Conferences led to the establishment and implementation of the World Climate Programme (WCP) and associated activities such as the Global Climate Observing System (GCOS) and the Intergovernmental Panel on Climate Change (IPCC) and great progress was achieved through the 1980s and 1990s in the development of capabilities for climate prediction as the basis for an expanding range of Climate Information and Prediction Services (CLIPS). However, although the IPCC emerged as a powerful foundation for a wide range of climate services in support of both adaptation and mitigation objectives of the UN Framework Convention on Climate Change (UNFCCC), the international efforts to resource the climate monitoring, services and application elements of the WCP through the international "Climate Agenda" did not succeed, and initiatives to convene a Third World Climate Conference in the late 1990s to fast-track the development of climate services in support of sustainable development did not proceed.

Eventually, World Climate Conference-3 (WCC-3) was convened in August-September 2009 with the objective of instituting a new Global Framework for Climate Services (GFCS) to replace the Climate Agenda. The Expert Segment of WCC-3 identified the essential components of the GFCS, and the High-Level Segment decided to proceed with its establishment. It endorsed the appointment of a High-Level Task Force whose 2011 report, Climate Knowledge for Action, provided essential guidance for preparation of a draft implementation plan and governance arrangements for the GFCS for intergovernmental consideration at an Extraordinary Session of the World Meteorological Congress in Geneva on 29-31 October 2012. Many different initiatives are underway around the world, including through mechanisms such as the Climate Services Partnership (CSP) and the series of International Conferences on Climate Services (ICCS) to establish the scientific, technical and economic foundation for implementation of the Framework in ways which will deliver real value to climate sensitive sectors and communities in both developed and developing countries.

Implementation of the GFCS will present many challenges but also many opportunities. The major challenges at the global level will include:

- Establishing a broad understanding of the nature, scope and value of climate services
- Capturing the wisdom from WCC-3 and the High-Level Task Force
- Maintaining the political momentum from WCC-3
- Building interagency partnerships in climate service provision and application
- Restructuring the World Climate Programme (especially the World Climate Services Programme) and ensuring that its components fit together as an effective end to end system
- Re-establishing the international interagency commitment to GCOS and WCRP as essential pillars of the GFCS
- Linking the GFCS effectively with IPCC and UNFCCC mechanisms
- Demonstrating and enhancing the economic and social benefit from the effective use of

climate information
- Institutionalizing an international commitment to free and unrestricted data exchange of climate data
- Achieving closure at the October 2012 Extraordinary Congress
- Funding GFCS governance, secretariat and initial implementation activities; and
- Extending the GFCS to embrace all applications sectors.

The ultimate purpose of the GFCS is to support the more effective provision and application of climate services at the national and local level in both developed and developing countries. The challenges to implementation of enhanced climate services at the national level will include:

- Establishing and strengthening essential national climate observational, research, data management and service provision infrastructure (especially in developing countries)
- Getting agreement on national institutional arrangements for climate service provision (NMS and other)
- Establishing dialogue between climate service providers and major user sectors and organizations
- Building staff capabilities for climate service provision and application
- Linking climate services with national climate change policy mechanisms (mitigation and adaptation)
- Resourcing the public good component (NMS and other) of enhanced climate service information systems
- Establishing/strengthening national consultative and collaborative mechanisms such as National Climate Outlook Forums (NCOFs)
- Building specialized climate services capabilities in the academic and private sectors; and
- Grasping the opportunities provided by the GFCS initiative at the international level.

The transition ahead: Informing society for its decision on mitigation and adaptation

Anders Levermann
Potsdam Institute for Climate Impact Research

Society must decide which path to follow with respect to future climate change. While it is not the role of science to make this decision, science can inform the general debate and democratic process. Levermann spoke about what we know about current climate change and its impacts with certainty – including the Greenland ice melting, sea level rise, glacier melting, ocean warming, and tropical storms. Projections show, for example, that sea level will rise by 2m per degree of warming. Levermann also presented research on coral bleaching, announced by PIK shortly after the conference. The research showed that 1.5 degree warming is already too much for corals.

Global warming leads to more extreme events (more heat waves, more droughts) similar to the the Russian wildfires in 2010, the monsoon rainfall in Pakistan in2010, very cold winters in Europe 2010 and again in 2011, and extraordinary snowfall in Germany which made the transportation system crash twice during the winter of 2011-2012. Levermann described the mechanism that links the cold European winters to a warming climate: Due to melting ice in the Barents sea, a high pressure system is developed, which is sucking arctic air into Europe. From this, it is clear that a warming climate does not only produce rising temperatures.

Levermann also mentioned the topic of carbon capture storage and stressed that if we stay on the business as usual path by 2100 every person on the planet will have to dig 3 t of CO2 every year into the earth to stay below 2 degrees warming. With his speech Levermann made clear, that we will have to adapt to climate change in any means and should try to avoid unmanageable climate change.

Adapting to climate change: challenges for the public and private sector

Nicolas Denis
McKinsey Brussels

Nicolas Denis reported that adaptation in the private and public sector are quite similar. For instance, while private companies look at numbers of natural catastrophes in terms of insured loss and number of victims, governments take into account the extent to which climate change has the potential to significantly increase threats in weather, water, food, nature, social, GDP. Denis showed that climate impact on Caribbean economies today is already equivalent to severe recession. For instances, hurricanes, inland and coastal floodings currently already cost Jamaica 6% of its GDP, Dominica 4%, the Cayman Islands 5%.

McKinsey uses three models to quantify current expected losses and those losses expected to accompany for each climate scenario. First, they use a hazard model, which calculates the severity and frequency of hazards for different climate change scenarios. They next employ a value model, which looks at the geographically distributed value of assets, incomes, and human elements. Finally a vulnerability model is used to understand impacts for different assets based on hazard severity. McKinsey combines the three models to estimate the expected loss; Denis illustrated this method in work in Papua New Guinea.

Adaptation measures are prioritized depending on their cost-benefit ratio. Denis showed cost-benefit ratios related to malaria and coastal flooding on the example of Papua New Guinea. McKinsey uses this methodology when working with governments and companies to determine the type of measures that make sense when adapting to climate change, taking into account not only what works, but the potential loss at stake. By doing so, 40% to 70% of the expected damage from climate change hazards can be averted cost effectively, Denis reported. This is not only interesting for governments, but also for the insurance industry, technical solution providers, and others that are concerned about the protection of their assets against natural disasters, and are willing to insure them.

Panel discussion

Strategic communication for the Climate Services Partnership (CSP)

Matt Hirschland,
UCAR
Tom Brookes,
European Climate Foundation
Guy Brasseur,
Climate Service Center Germany

Laying a background for the discussion, Matt Hirschland, director of communications at the University Corporation for Atmospheric Research and its related National Center for Atmospheric Research in Boulder, Colorado, spoke about the foundation of a brand. He described “brand” as a description of an organization’s attitude and priorities. After showing some examples where branding failed, Hirschland claimed that the term “climate” has been loaded with unhelpful meaning. For the following discussion he asked: How do we want to brand the CSP enterprise?

Tom Brookes, head of the communications unit of the European Climate Foundation, later spoke about the challenges of climate communication. Regarding the CSP these challenges include: a large number of institutions, an attitude toward customer service, and the management of failure. Brookes warned that a service like this will come under attack of climate skeptics, particularly in the US. He suggested to get an early version out to see how the market responds. He also stressed the importance of the direct accountability of a person, similarly to private enterprises.

Guy Brasseur, director of the German Climate Service Center, started the discussion with the following question: “Why are there still people who doubt science, data? Why didn´t it work?”

Tom Brookes stressed that the expectations regarding the IPCC process were way too high. “The scientists thought people would read the report and understand, but that was wrong”, Brookes said. He explained this by a certain naiveté regarding the way people behave and the interests of people with contrary professional interests. Brookes stressed that the CSP would do well to talk about what other people think, rather than just what its own members think. As a positive aspect he mentioned the fact, that climate services don´t have to sell a product to the public, which would always involve lots of luck. He also stressed the importance of a joint communication, since it would be very difficult for one organization to get this message out on their own.

Introduction and overview

Stephen E. Zebiak
International Research Institute for Climate and Society

Stephen Zebiak presented an overview of the current activities of the Climate Services Partnership (CSP). Priorities over the past year included knowledge capture and exchange, the generation of new knowledge on critical issues, and foster connections to other programs. Knowledge capture and exchange are supported by an interactive database of current climate services activities, case studies, and evaluations of current of past programs. The CSP is organized by a coordinating group, which holds teleconferences on a monthly basis. The CSP membership definition can be found in the membership statement, available on the web. Zebiak presented the CSP-website www.climate-services.org, which describes collaborations, various case studies, and other issues related to the international development of climate services.

Case study: CLIM-RUN

Paolo M Ruti
Italian National Agency for New Technologies, Energy and Sustainable Economic Development

The CLIM-RUN case studies provide a real-world context for bringing together experts on the demand and supply side of climate services. They are essential to the CLIM-RUN objective of using iterative and bottom-up (i.e., stakeholder led) approaches for optimizing the two-way information transfer between climate experts and stakeholders. The region of interest for CLIM-RUN is the Mediterranean, which is a recognized climate change hotspot (i.e., a region particularly sensitive and vulnerable to global warming) and which does not currently have developed climate service networks such as exist in a number of Central and Northern European countries.

The case studies focus on the energy and tourism sectors, but also include a crosscutting study on wild fires as well as a cross-sectorial integrated case study for the Venice lagoon. They span coastal (e.g., Tunisia and Croatia), island (e.g., Cyprus) and mountain (e.g., Savoie) environments, the eastern (e.g., Greece) to western (e.g., Spain, Morocco) Mediterranean regions, and regional to local foci.

Stakeholder involvement has been critical from the project's start in March 2011, with a series of targeted workshops helping to define the framework for each case study. Two specific workshop objectives were to (i) better understand who are the climate services stakeholders and (ii) what they need/want from climate services (both in terms of data products and broader knowledge). Many of the workshops were held in local languages to maximize stakeholder participation, with expert knowledge provided by the CLIM-RUN climate and stakeholder expert teams (the CET and SET). Following the

workshops, CET members are “translating” the user needs into specific requirements from climate observations and models and identifying areas where additional modeling and analysis are required.

As part of the central co-ordination of the case studies, a perception and data needs questionnaire was produced to solicit information about stakeholder institutions and organizations, risk perception and current use of climate/weather information, perspectives on climate services, data requirements and handling uncertainties. The questionnaire was designed to be used in a very flexible way, adapted to individual case studies. It has been circulated via email, during and after workshops, made available in on-line form, and has provided the basis for structured interviews with stakeholders.

From the preliminary CLIM-RUN work, it is evident that the different sectorial requirements and contexts, including differences in stakeholder expertise and perspectives and the importance of non-climatic considerations in decision-making, support the tailored, bottom-up approach adopted. For instance, the energy sector is more keen to use detailed present climate information, while tourist stakeholders, although less constrained by climate issue, prefer seasonal information. At the same time, these differences provide a challenge in terms of developing common methodologies and identifying priorities for the provision of climate services. Other challenges relate to the differences in stakeholder engagement across the case studies. More information is available on www.climrun.eu

Case Study: CSAG Climate Information Portal

Anna Steynor
Climate System Analysis Group, University of Cape Town

The Climate System Analysis Group (CSAG) at the University of Cape Town is working in collaboration with users of climate information in Africa, to inform the development of the CSAG-hosted Climate Information Portal. The Climate Information Portal goes beyond traditional climate data delivery by providing an integrated delivery of structured guidance text alongside simple but effective visualizations and spatial maps.

The philosophy behind the portal is that climate services go much deeper than supplying information to users. Active communication is two directional within a knowledge network of climate and non-climatic information. Engaging with stakeholders in the co-production of knowledge leads to climate related products that are user-focused and decision-relevant, while engendering a sustainable relationship between science and society. Therefore, user engagement is a mutually beneficial activity for both the users and the producers, presenting a significant opportunity to learn from each other.

The Climate Information Portal development process has brought with it a number of challenges, both in providing information that is decision-relevant for use and in engaging with the users of climate information. The talk reflected on the development of the Climate Information Portal together with the lessons learnt during the process of ongoing user engagement. (There is more information available here: www.cip.csag.uct.ac.za)

Lessons learnt in user engagement are:

- It is difficult to ensure all users are empowered to engage.
- It is tricky to engage appropriate users.
- You must be aware of the sociocultural context.
- There is difficulty engaging users and producers together.
- You have to provide the language in the language, which is spoken in the particular part of Africa.

- The user needs to be recognized early in development.
- There will always be tension between what users want and the limits of robust science.
- It is important to have sustained and effective engagement.

Technical lessons learnt are:

- Internet access in developing countries is very difficult
- Minimize page reloading
- Data compression technologies
- Really difficult to deal with real-time querying and visualization of large data volumes
- New platform to be developed to integrate CMIP5 data

Case Study project: Summary and next steps

Cathy Vaughan
International Research Institute for Climate & Society

Cathy Vaughan presented preliminary findings from the ~30 case studies that had so far been approved for publication by the Climate Services Partnership. The case studies followed the template designed by the CSP in conjunction with the Global Framework for Climate Services; they are drawn from all over the world, cover a range of different sectors and information timescales, and operate on geographic scales that span from subnational to global. The most common challenges described by the case studies are:

1. Challenges in communicating information
2. Challenges in establishing or maintaining a link between information users and providers
3. And a lack of capacity on the part of the provider

From the range of case studies, the speaker identified four lessons that apply to the development of climate services themselves, and another four that described the process of collecting and transferring useful information about climate service development. These lessons are described below. Lessons about the development and provision of climate services:

- Human capacity is key and requires continuous investment
- Bridging & tailoring takes time
- Working with existing infrastructure can be extremely effective
- Climate services are part of a larger risk management package

Lessons about the process of gathering and transmitting useful information about climate services:

- User perspective is difficult to capture
- Hard to define success
- Have to create an environment in which people are comfortable talking about their failures
- Institutional analysis is lacking

CSP case studies are available on the Climate Services Partnership website, www.climate-services.org; the collection will be updated in the year to come and all are welcome to submit to the effort. The CSP secretariat will also produce a more formal synthesis document, taking into account the ~60 case studies produced by the GFCS itself, in advance of the WMO Extraordinary Congress, which will take place at the end of October.

Climate information for development: An evaluation of the Mali Meteorological Service's Agrometeorological Program

Edward R. Carr

Department of Geography, University of South Carolina

Edward R. Carr presented an assessment of the Mali Meteorological Services´ Agrometeorological Program. The project was established in 1982 by the government of Mali with Swiss cooperation. Goals were to improve agricultural outcomes, deliver climate and weather information to farmers, deliver agroecological information and couple all this with local extension/outreach. The initial pilot (1982-1985) included four villages with 16 farmers. The farmers were given agrometeorological trainings, forecast information as well as rain gauges, and information about how much it must have rained before seeding their crops. The results of the pilot phase were very impressive. There were changes in all kinds of agricultural behavior (what was planted, when, etc.) The output was 25-30 % higher in the southern part of the country, 40-60% in the north. Swiss funded the program for nearly 25 years until 2007. Afterwards the government of Mali funded the program.

The program was assessed in December 2011 to identify gaps, learn from Mali's successes for scale-up, and build on the experiences in other countries. There was a problem, however: there was only evaluation information on the pilot phase of the project and the first 700 rain gauges. This meant it was hard to know the impact in a broad number of villages.

Carr presented findings from interviews in one village, where the average farmer had 2.4 hectares of land and younger women had the largest number of hectares (3). While 60% of interviewees had received NGO support, this included 100% of older women, and 0% of older men. Meanwhile, 15% of the interviewees had received farm organization training, including 100% of the young women. At the same time, 75% of the interviewees were aware of the agromet program, but this was 40% of younger women, 100% of older women, 100% of younger men, and 60% of older men. While 25% of the interviewees said they would follow the advice of the agromet program, 100% of younger men said this. The is echoed by the fact that 25% of the interviewees said the agromet program is effective, including 100% of younger men. Thus, only young men thought the program worked.

The survey will be re-run in January and February 2013 to make sure the season was a not anomalous. And it is planned to put researchers into the villages over the summer to watch, how the climate informations are actually used. Carr reported on preliminary lessons, including the fact that is important to differentiate between which information is needed and the kind of information that is provided. Carr also stressed the social context in which information is provided.

Best Practices in Climate Services: A Case Study from India

James W. Hansen
Climate Change, Agriculture, Food Security Research Program
Consultative Group on International Agricultural Research

In partnership with the Indian Meteorological Department (IMD) and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the Climate Change Agriculture and Food Security (CCAFS) assessment of the Integrated Agromet Advisory Services (IAAS) in India defined its overarching goal as the capture of farmer perspectives on the skill, relevance, timeliness and utility of forecast based agro-advisories given to farmers.

The documentation of best practices and challenges in the provision and use of agro-advisories will guide further investment and targeted efforts in climate/weather services in India, as well as the rest of South Asia and Africa. The study relies on a mix of quantitative and qualitative data to offer a narrative that helps strengthen evidence and offer transferable lessons in climate/weather services for farmers. In consultation with the IMD, 6 states across the length and breadth of India were chosen for the study. The presentation detailed the history of IAAS in India, the institutional mechanisms through which the advisories are produced and disseminated, the methods used to evaluate the study and some preliminary outcomes from the recently concluded fieldtrip in India.

REPORT OF THE ECONOMIC EVALUATION WORKING GROUP

Survey of climate service studies

Janet Clements
Stratus Consulting

The Economic Valuation Working Group was formed at the first International Conference on Climate Services (ICCS 1). The group is now collaborating on several activities to demonstrate the benefits of climate services and to help providers prioritize opportunities for expanding their use. As part of this effort, the working group initiated a review of literature related to the value of climate services across economic and public sectors. This presentation summarized the findings of the literature review and provides a summary of key issues associated with studies conducted to date.

The literature review included 185 studies related to the use and value of climate services. The majority of studies reviewed estimated the value of climate services in the agricultural sector within both developed and developing countries. These studies generally examine the benefits associated with seasonal climate forecasts (primarily ENSO phase forecasts). The most common type of assessment examines the value of seasonal climate forecasts at the crop/enterprise level, where the value of climate forecasts are estimated assuming changes in management for an individual crop (or group of crops). Several studies also examine aggregate (or sector)-level benefits.

A limited number of studies have focused on the value of climate services within the energy, water management, fisheries, transportation, tourism/recreation, and other sectors. These studies, which have been conducted mostly in developed countries, typically examine benefits at the sector or national level. Studies in sectors other than agriculture include a wider range of forecast lengths, including seasonal forecasts and short-term forecasts of various weather parameters.

Studies conducted to date have provided important insights on the value of climate services, including

an understanding of the factors that influence their use and value. However, there are some limitations and issues that must be considered, including:

- Limited geographic range of the studies
- Limited range of systems considered (e.g., rain fed cropping systems)
- Assumptions of complete adoption of management changes in response to forecasts
- Assumptions that users of climate services have perfect knowledge of historical climate conditions
- Assumptions of completely accurate or perfect forecasts
- Limited set of potential management responses
- Observed data on actual responses to climate forecasts has generally not been incorporated into value assessments
- Limited evaluation of environmental and social benefits and costs of climate services Forecasts reflecting climate change implications have generally not been incorporated

Valuing climate services for health applications

Wendy Marie Thomas
US National Oceanic and Atmospheric Administration

Valuation practices are critical for encouraging the continuity of services within and across disciplines, and moreover, for supporting the advancement of local, national, regional, and international cooperation concerning climate services. Thomas' presentation described the evaluation of climate services for health applications in two case studies: 1) Safe hospitals in the United States; and 2) Climate data for Malaria in Bangladesh. Different methods and approaches for valuation in each situation were discussed at three critical levels:

(1) internally (e.g., within climate services)
(2) extramurally (e.g., partner disciplines, such as public health and medical fields),
(3) nationally (e.g., demonstrating the return of benefit as increased economic productivity)

The chief points of this research include: (1) assessing the extent to which gaps in the service were identified; (2) measuring the use and utility of climate-model-generated "lead times" or "early warning systems" at the field/practitioner level; and (3) understanding where impediments (e.g., unawareness, lack of trust in data, institutional barriers, etc.) to applying climate-based information exist. The work shows the ease and feasibility for climate services to assess its research and operational values to the many (non-climate) experts and disciplines that are engaged at the climate-applications interface.

Economic valuation working group: Next steps

Glen Anderson
Engility Corporation

The Economic Valuation of Climate Services Work Group was formed to facilitate the exchange of experience and knowledge of the benefits of climate services. The Working Group's members represent producers and users of climate services and researchers with interest in conducting studies to value climate services. The presentation described the Working Group's activities in 2012 and next steps during the coming year.

The Working Group has convened meetings of members participating in the American Meteorological Society's Winter Meetings in New Orleans, Louisiana in January 2012 and in conjunction with the European Geosciences Union (EGU) Annual Meeting in Vienna, Austria in April 2012. Working Group members also made presentations on climate services activities at the EGU and participated in a Town Hall Meeting organized by WMO at EGU. USAID has provided support for one of the Working Group's 2012 activities – a survey of articles and reports focused on the value of climate services. This work was conducted by Janet Clements and presented at ICCS 2.

The next steps for the Working Group include: 1) organization of a practitioner's workshop to discuss methodological issues and stimulate research to address gaps and demonstrate new methods; 2) collaboration with authors of climate services case studies to add a valuation component to current cases; and 3) preparation of knowledge management products on climate services valuation such as a primer on understanding climate services benefits and/or designing valuation studies.

Report from Development Day

Maarten Van Aalst

Red Cross Red Crescent Climate Centre

Van Aalst presented the outcomes of Development Day, which took place on 4 September 2012, immediately before ICCS2. About 40 people from development agencies and representatives from local met agencies attended the meeting. The day included insights into how to do good evaluations and the need for a coordinating secretary also for networking purposes. Regarding user engagement, it was clear that is has proved valuable to let people talk about their general needs in their specific situation and environment rather than confronting them with climate change issues directly. The participants agreed to have a follow-up meeting next year. Next steps will be to carry on the evaluation of the case studies and to set up a new website for knowledge exchange. The need for guidance products was pronounced as well as for capacity building mapping in order to better connect the work of the different participants. Please see Appendix I for a full report on Development Day.

Next steps

Stephen Zebiak

International Research Institute for Climate and Society

Stephen Zebiak closed the discussion on the first day with a call for feedback on the usefulness of activities in each institution to support climate services. The call aims to find out, how climate services really function good for the benefit of all.


ICCS 2


CSC
Climate Service Center
Germany
Eine Einrichtung des Helmholtz-Zentrums Geesthacht

THURSDAY,
6TH OF SEPTEMBER
2012

CLIMATE SERVICE AND SOCIETY I: LINKAGES BY SOCIETAL ACTORS

How does government support climate services?

Katrin Ellwardt
German Ministry of Education and Research

Three examples of how the German Ministry supports climate services were given: the German Climate Service Center (CSC) on the national level, the Joint Programming Initiatives (JPI) on the European level and the Regional Science Service Centers (RSSC) in Africa on the international level.

The mission of the CSC is to provide climate knowledge for decision makers. The strategic approach is to work demand oriented, staying close to the science, bundling and communicating the expertise in several fields. The success and credibility of the CSC will be measured in terms of the quality of the products, their relevance for the users and the neutrality of the providers, which should not to be influenced by economic or political interests. The CSC is financed by BMBF for a 5-year-funding period.

The European Commission established 10 different JPI's, one of them being JPI Climate, to tackle the major societal challenges beyond the national level. Thus, the excellent national research programmes took a joint action in specific key areas. JPI Climate aims to provide integrated climate knowledge and decision support services is working together i.e. with JPI Water Challenges, JPI Agriculture and JPI Urban Areas in order to benefit from each other. BMBF is supporting this important European initiative financially.

The establishment of RSSC in Africa helps to create local knowledge based solutions to adaptation issues in order to give advice to politicians or administrations and as well to local farmers and communities.

Some major objectives are capacity development, the provision of career options for local scientists and the cooperation with the existing research infrastructure. Two examples of African initiatives are the West African Science Center on Climate Change and Adapted Land Use (WASCAL) with 10 member countries and the Southern African Science Service Center for Climate Change and Adapted Land Use (SASSCAL) with 5 member countries. The mission of the African Centers are to conduct problem-oriented research (adaptive and sustainable) to give advice for decision makers to improve the livelihoods of people in the region and to establish research infrastructures across regions and countries on the continent. Germany supports the establishment of the African Service Centers through the KfW development bank, research institutes and universities.

How does science support climate services?

Ghassem Asrar
World Climate Research Programme
World Meteorological Organization

A major step toward connecting science with decision makers was to bring four research programmes of several disciplines (Diversitas, IGBP, WCRP and IHDP) together in the Earth System Science Partnership (ESSP). With international cooperation several Earth and ocean observing systems were established and major climate projection experiments (CMIP5, IPCC AR4/5) were conducted. On the part of research, more work is needed on the topics of subseasonal to seasonal projections as well as decadal to centennial projections and i.e. monsoon blocking and investigation of extreme events. To go a step forward, it is important to deliver objective messages and 'actionable' climate information in order to achieve credibility amongst the decision makers. An effective dialogue with the users and a holistic approach are needed, where socioeconomics have to be included in order to understand how humans access and understand the scientific information. Last but not least capacity development is regarded as an important task. Here local met services may contribute. While communicating the uncertainties of climate projections is crucial, dealing with imperfect knowledge is well known in decision-making processes in business.

Panel discussion:

Sustained infrastructure to support climate services

Facilitated by Chris Hewitt,
UK Met Office

Andreas Becker
The Deutscher Wetterdienst, DWD
Rick Crouthamel
International Environmental Data Rescue Organization
Daniela Jacob
Climate Service Center Germany
Sakari Uppala
ex European Centre for Medium Range Weather Forecasts

Andreas Becker stressed that providing data is not enough, but that advice must come with the data for it to be useful. Becker also made a point regarding strengthening existing infrastructures, to ensure that they are reliable and available, and that observations have to be standardized in order to be comparable. On top of that he demanded that climate-relevant data should be freely exchanged internationally.

Rick Crouthamel underlined that good functioning infrastructure is the key to all climate services. Climate service providers like governments, private businesses, research institutes, educational organizations, and NGOs must collaborate and communicate openly with other climate services through the CSP to strengthen the climate service community beyond the framework of the GFCS.

Daniela Jacob stated that although climate modeling has advanced in the past to be ready to use in climate services, another sustained infrastructure is needed in the future. She pointed out, that the big computers that are needed for climate modeling are owned by research institutions and not owned by climate service institutions.

Sakari Uppala quoted the example of data assimilation systems, which are used in medium range weather forecasting, as being a strong infrastructure system. They have developed an improving skill up to now.

Discussion

A participant from Brazil pointed to the question of providing the data to the user. In some regions, Internet capacity needs to grow by orders of magnitude to allow data exchange.

- Another participant addressed the financing of data and/or trainings, and suggested involving the private sector, as this would raise money.
- The panel outlined three steps: to convince funding agencies of the new task; to train young scientists to work with data and serve as an interface between science and service; and to learn to work with data of different disciplines. Local capacity building efforts like SASSCAL are important steps forward. The issue of digitalizing data from paper was also raised.

Guy Brasseur claimed that the discussion focused on the providers and reminded to refocus on the needs of the users, who would benefit from a "translation infrastructure." He indicated that people must tailor the information for the customers and asked about the infrastructure for users to get tailored data and access to scientists.

- The panel discussed different aspects of this question: On a national level in Germany, the DWD provides some climate services (agriculture, water). This should be transferred onto the international level.
- As technical aspects of data provision new technologies like DOI's (digital object identifier, a data referencing mechanism) have been suggested as well as web services to provide data.
- The idea of sending climate service practitioners into businesses, in order to explore their needs, was discussed as an example of a win-win situation for both sides.

Another aspect raised the issue that climate services themselves need more guidance in working with the data. Products like numbers and figures contain a lot of information that needs to be translated for the users.

- It is important to build up business relations because of the specific information that is needed in each case, which might even include the generation of new parameters. This collaboration needs both, trust and guidance.

The last comment pointed to the fact that up until now no social or economic benefits were discussed during the evaluation of climate services – only natural science excellence was taken into account.

- The panel agreed, but claimed that insurance companies already looked into this aspect. It was stated that showcases are needed to document that society, not only businesses, does benefit from climate services.

How do NGOs support climate services?

Chris Shore

World Vision International

Shore stated that climate change and adaptation are relatively new topics to NGOs. However, in 2005, World Vision started to explore the carbon markets and their understanding of climate-related topics increased. Soon carbon projects involving reforestation and the use of effective cook stoves were started.

World Vision is a Christian relief, development and advocacy organisation dedicated to working with children, families, and communities to overcome poverty and injustice. Operating in almost 100 countries, World Vision focuses on the well being of children and working with the world's most vulnerable people and communities, local authorities, governments and markets. A central question in their work is the resilience of smallholder farmers to drought, environment variability, and food security shocks.

Today, World Vision is delivering, for example, long-term strategies for building resilience to climate variability, based on long-term climate predictions, and early warnings, for example on the El Niño-Southern Oscillation (ENSO) cycle from seasonal forecasts. NGOs are supporting and appreciating climate services; NGOs can and will deliver climate services and can act as important data collectors and be an effective mechanism for the feedback on the stakeholder's needs.

With regard to the next ICCS, he emphasized the importance of involving more NGOs and suggested that small incentives could help them to join the process. A joint workshop could be a beginning.

What kind of climate service do decision makers need?

David Behar

San Francisco Public Utilities Commission

As a service institution of the San Francisco Public Utilities Commission, the San Francisco Water Power Sewer has been dealing with questions of climate change related to issues of water/clean water/drinking water for a long time.

In January 2007, the San Francisco Public Utilities Commission hosted the first national Water Utility Climate Change Summit, which was attended by more than 200 water and wastewater utility executives, government officials, climate change experts and environmental leaders. The aim of this meeting was to help participants to better understand the impacts of climate change on water-related infrastructure and water resource supplies. Shortly after the summit, the Water Utility Climate Alliance (WUCA) was formed. Part of WUCA's mission statement is "to seek to enhance the usefulness of climate science for the adaptation community and improve water management decision making in the face of climate uncertainty," which also led to increasing interest in climate services.

Behar explained the chain of models, operated by climate scientists, water managers and water utility planning experts, which plays an important role in his business. In particular, he stressed the importance of learning about each others' expertise and of co-producing knowledge across the different disciplines. A further noticeable statement was that the community should improve the existing decision making tools.

One of Behar's key messages was that the need for climate services is far greater than their supply. His sector urgently needs "organized information" on climate change questions and databases of downscaled information. Here the availability is poorly understood. Another need is to better understand, how uncertainty impacts decision-making.

Climate Services at the national, provincial and local levels in China

Guofu Wang
National Climate Centre China

There are three independent but interrelated climate service efforts in China; these are aimed at national, provincial and local governments and users in China.

The National Climate Centre focuses on major national projects, climate change adaptation, forecast of rainfall and temperature in river basins and national seasonal forecasts, which impact national development or need regional coordination. Most NCC products are free and open to the public. Provincial climate centers are responsible for provincial government and some large enterprises. Provincial centers products include local prediction, assessment on wind energy, advice on agriculture activities, and so on. Products commended by enterprises are charged and most of the left are open to public. At the local level, there are more varieties services according to the need of local government and peoples. For example, the forecast of degree-day associated with air condition, the growing season key variables forecast, local season forecast for local shop which can affect the sales of some commodities and so on.

Most of the demands come from governments at all kinds of level. The design and production process are introduced. Usually the users order climate products and Chinas national climate center provides the related information. And now, the tailored climate service is also designed to target customers with more and more communications. But there are still many problems. For example, the development of climate services in China is inadequate and the accuracies of some products are less than needed. Several plans are set up to alleviate those symptoms.

Though we have done some work, we need to do more to:

(1) provide timely, accurate and tailored climate services for the safety and well-being of the people.
(2) deliver the most trustworthy predictions of how climate may vary and change over the coming weeks and decades.
(3) interpret those predictions in terms of the risks of severe weather and climate extremes
(4) provide products and advice to help society plan for and adapt to climate variability and climate change.

On Thursday afternoon participants of ICCS 2 discussed the needs of different sectors regarding climate services. Reports of these discussions are found below.

Climate Services in Agriculture and Food Security

Chair: James W. Hansen
IRI and Climate Change Agriculture and Food Security (CCAFS), New York
Rapporteur: Krishna Krishnamurthy
World Food Program

Overview

The discussion within the Food Security and Agriculture Working Group session can be summarized in seven key messages to the broader climate services community.
First, the climate information and services needed by food security and agriculture are highly varied and context-sensitive. The agriculture and food security sectors are heterogeneous, involving a wide variety of stakeholders who make decisions at a range of spatial and temporal scales.
Second, historic observations warrant investment as a free public good. Many promising opportunities (e.g., locally relevant forecasts, advisories, early warning; weather index insurance; analyzing suitability of crops and production technology to local conditions; early season crop and rangeland forecasting for food security management) to improve the security and livelihoods of vulnerable rural communities depend on historic observations, and can be hindered by gaps in availability and access.
Third, invest in "value-added" climate information. Climate information can be made much more valuable for food security and agricultural decisions by translating it into impacts on agricultural production, management advisories, or decision support tools. This requires expertise that typically resides outside of the climate community, which suggests the next point:
Fourth, climate services should build on and integrate existing agricultural advisory systems, and the technical capacity within the agricultural and food security research communities.
Fifth, climate services should be coordinated with other agricultural investments and strategies. The value of climate-related information depends on a range of other conditions, investments, interventions.
Sixth, agricultural users, particularly farmers, need to have an effective voice in the design, implementation and evaluation of climate services that are meant to benefit them. This will ensure the salience of the information and legitimacy of the services.
Finally, the potential for climate services to improve the lives of poor and vulnerable smallholder farming communities in the developing world justifies significant public investment.

The heterogeneity of the food security and agriculture sectors complicated the task of discussing user needs for climate services, and answering the questions given to working groups. To give focus to the analysis and context for answering questions, the working group identified four relevant examples of climate service users: (a) smallholder farmers dependent on rainfed agriculture; (b) larger farmers with access and ability to invest in agricultural inputs; (c) global food markets (including trade and futures markets); and (d) the food security humanitarian community.

1. Can you characterize what aspects of climate are most important for your sector (e.g., long-term trends, variability, extreme events, spatial scales, etc)?
The food security and agriculture sector is extremely heterogeneous and it is therefore difficult to generalize the specific aspects of climate that are most important. Some of the key aspects, which are important across the four types of users identified include:

- Seasonal variability
- Historical trends
- Extreme weather and climate events
- Seasonality of climate
- Risk and uncertainties
- Contextualization of climate risks within a wider risk environment

Requirements in temporal and spatial resolution are also heterogeneous. For example, smallholder farmers may be more interested in services that can provide information about local climate variations

and their impacts for the relevant growing season. In contrast, humanitarian organizations can use a variety of coarse and fine resolution data to better understand trends and inform operations.

In terms of lead-time, user requirements also vary as highlighted above. However, climate information beyond the next 20 years does not provide relevant information for most actors involved in the decision-making process. All shorter lead times are relevant to agriculture.

2. What are the central issues for your sector in responding to a changing climate (e.g. forecasts, projections, impacts, vulnerability, resilience, adaptation, mitigation)

Climate is only one of several factors affecting food security globally. While forecasts and projections may provide information about vulnerabilities as well as adaptation options, climate should be understood within the wider risk context. Climate change acts as a hunger risk multiplier, exacerbating factors that cause food insecurity: crop losses, rising food prices, destruction of crops due to extreme weather and climate events, displacement of populations.

3. What kind of information does your sector need? Where do you currently get this information?

Information needs vary across different users in this sector. Some of the information that is often used includes real-time monitoring of climate variables (precipitation, WRSI, NDVI) to trigger interventions, seasonal forecasting to anticipate potential risks, historical trend and variability analysis to identify emerging risks. These services are provided by a variety of organizations including national meteorological services, FEWS NET, and humanitarian organizations.

One of the suggestions of the working group is that better integration with existing advisory groups, agricultural research systems, and extension services is needed combined with a training package to interpret these.

4. How do you see the role of climate services? What does your sector expect from climate services?

Climate information is a key factor influencing decision-making in the food security and agriculture sector, and it is already being used in this context. Therefore, the development of climate services should make use of existing infrastructure, services, and relevant organizations (advisory groups) to maximize impact. In other words, as climate services are being developed for food security and agriculture decision makers, a concerted effort to mainstream them into existing services should be made.

Another critical issue is that, because this sector includes some of the most vulnerable populations, climate services should be considered a public investment rather than a commercial one.

Importantly, too, climate information on its own does not seem to be most important element in agriculture and food security decision-making. Therefore, value-added climate services (i.e. climate services that focus on translating climate data into information about potential impacts) should be developed.

5. What should be the roles of public and private players in climate services for your sector?

The specific roles of public and private players are not clear given the heterogeneity of the sector. Further discussions and evidence are needed to identify these roles.

6. What challenges do you see in implementing climate services in your sector? What can you do to address these challenges?

One of the key challenges in implementing climate services relates to enhancing communication. Better communication infrastructure and delivery systems are needed to ensure successful implementation of climate services. For instance, provision of climate services in local languages can ensure better implementation.

An inter-related issue is that of training and supporting users in the interpretation of the climate services being provided. Any climate service that is eventually developed needs to include a training component. Dialogue between users and providers would also ensure that the information or services provided are more useful.

Another challenge relates to the issue of technology. Especially in developing countries, technology to manage, store, and analyze climate information becomes outdated – and replacing it is highly expensive. Efforts to subsidize or transfer this type of technologies (as well as appropriate training for their use) are required as well.

7. Do you regard the international networking of climate services as an important requirement and for which purpose?

Enhancing the international networks of climate services is critical. Given that a large proportion of the potential users includes poor smallholder farmers, enhanced networks can fulfill two inter-related roles:

- Training on the interpretation and use of climate services to enhance resilience and food security outcomes (ideally this would involve a two-way dialogue where users identify the types of risks and decisions they are interested in, and providers identify the types of services that can be delivered to address theses). A constant dialogue can ensure that climate services are being used to their maximum potential.
- Technology and knowledge transfer. Better international networks can ensure that the most vulnerable populations have access to the latest available methods, knowledge and technology to implement climate services effectively.

Climate Services in the Energy Sector

Chair: Jean-Yves Caneill
Electricité de France (EDF)
Primary rapporteur: Aicha Adamou
Union of Professionals of Renewable Energy, Algeria
Secondary rapporteur: Meredith Muth
US National Oceanic and Atmospheric Administration (NOAA)

Relevant activities that are related to climate services in the energy sector:

- An Energy and Meteorology Conference was held in Australia last year, which was composed largely of users of climate information. There is an interest to align with the ICCS/CSP. The next biannual conference will be in France in 2013. This is an ideal venue to collaborate with on climate services for the Energy sector.
- Geospatial communities such as GEO has focused on social benefit analysis that includes energy, and has organized workshops and products/papers. They have also focused on the entire continuum of energy development, transport and delivery. There is a need for a better alignment with CSP and the geospatial community.

Feedback from different countries and organizations on the impacts and concerns experience:

- Some countries have their own information and observations, and are interested in building relationships between climate services and the energy sector
- Some others are going through a transition to renewable energy and but it is not straightforward. Climate services could help to build a dialogue, which could make use of renewable energy easier.
- Some countries are fossil fuels and/or brown coal energy based. Mitigation policies can involve carbon emission trading and transition to renewable energy, but progress is slow for a number of reasons. There are some good examples of how tailored climate information is being used in the energy sector, but the government, academia and private sector have to be all involved on these questions. One challenge is obtaining information across all time scales for the various interests in the energy sector.
- Examples of work were given by others on how to employ a wind atlas that can be used for any company which can be used to identify areas to build projects, using reanalysis to identify low and high level wind, identify areas to build power stations and nuclear plants, plans to respond to extreme events. The political challenge is what energy type should be emphasized. A systematic approach is needed across different time and geographical scales.
- Many participants showed interest in using climate information to determine future energy needs and identify where they should invest in (such as offshore versus inshore wind farms).
- It was emphasized that in many developing countries there is a big concern on wind power and biofuels. Each country needs to develop its strategic plans that will balance benefits and problems/impacts/consequences of different energy uses. There is a challenge of in-

tegrating data with international, regional and national efforts. One needs to be careful in taking models from developed countries to developing countries because they have different geopolitical and context situations. Improvements must not only rely upon renewables, which is what much of Europe is focusing on. Number one challenge for these developing countries are not how shift to renewables, but rather how to increase access to electricity since so many live off the grid. Also, the primary source of energy for most of these countries is biomass derived (wood, charcoal, biomass, etc.) and this is not usually considered when discussing climate services for the energy sector.

- A report from 25 electricity utilities was developed last year on "resilience and adaptation to climate change" for the power sector. Classical weather forecasts, if they can be used appropriately, are not enough; longer time scales are needed to take into account particularly future trends and climate change. There is a need to invent new mathematical methodologies, especially to depict future extreme events.

Five main elements can be taken off from the whole discussion as a synthesis:

1. Climate Services could serve as a tool to support decision facing problematic of energy transition. So it makes sense to ask the question to what extent climate services could contribute to building energy strategies resilient with climate in the perspective of sustainable development and green economy?
2. It might be crucial to identify the respective competencies and areas of action of weather services and climate services. What is the content of each of them? What are their leviers of action and how they have to interact between each other?
3. While users find difficulties to express their needs in terms of climate services, climatologists look for how can they develop (valorize) their information. There is a real expression of needs to be organized together with an appropriate valorization of climate information. It has been very often identified that scientific community and energy sector work separately
4. There is a difference in the perception of Climate Services concept between developed countries and developing countries. While developed countries seem familiar with climate services concept, many developing countries do not know it yet
5. Climate data are dispersed: although climate information and/ or data exist, the latter are dispersed, making their use difficult. There is also a lack of human competencies, mainly in developing countries able to formulate the needs, exploit and interpret climate data that could be provided by climate services.

The following recommendations were agreed to by the participants:

1. The Climate Services Partnership should better develop the climate service concept.
2. A better understanding of the interaction between climate services and energy is needed.
3. It should be important, right at the beginning, to develop partnership between developed countries and developing countries; this could therefore help to develop capacity building in terms of expression of needs, exploitation of climate information and its interpretation.
4. The partnership should elaborate a guide to help to diffuse the concept of climate service terminology and overall concept
5. Creating synergies between scientific and energy communities is in itself an important issue. In that respect it should be helpful to organize a workshop with scientific and energy communities based on concrete examples together with the presentation of new scientific challenges



Climate Services in Financial Services

Chair: Peter Hoeppe
Munich Re
Rapporteur: Butch Bacani
UNEP-FI

Financial services comprise a diverse field of business models. This includes banks, lending money to people and companies, insurers as risk takers, and investors, asset managers, and brokers dealing with the risks. These different business models produce a need for a wide spectrum of climate service needs.

The Working Group had lively discussions, in four different subgroups. There were eight representatives of the financial industry in the groups, two in each of the four groups, one representative of the insurers and one representative of the banks. There wasn't strong representative selection of insurance and banks because most of the insurers represented large reinsurers and insurers. There hasn't been a representative of a small insurance company. So the results are not representative for the whole industry.

No industry besides the insurance industry is more directly affected by climate volatility and climate change. Because insurers, must pay for increasing losses caused by more weather extremes information is needed on how these hazards are changing.

The banks may be affected by loan defaults, which can be caused by weather-related natural catastrophes. But in many cases these losses are covered by the insurers, so it's not the banks who pay for the risks in their portfolio, it's the insurance companies.

Investors may lose money, if they invest into the "losers" of climate change, branches, which will see disadvantages either by the effects of climate change itself or accompanying regulatory reactions. So also investment banks and other large investors have a need for information in changes in the economic assessment of certain industries.

The levels of services needed by the different parts of the financial industries are quite divers. There are some, which would need information on changes in temperature (investors in utility companies, banks selling weather derivatives) others, who are only interested in changes of return periods of certain extreme events (insurance companies). For strategic planning a time horizon of such information for the next 1 to 30 years is most important. For the reinsurers e.g. it is most important to learn what is expected to happen next year, because they renew their contracts every year. For the investors on the other side changes expected within the next 30 years may be of interest, especially if a potential long term investment like for a solar power plant has to be assessed.

Concerning climate change and its potential effects, there is a much different level of knowledge in the different branches of the financial industry. There are some companies like the large reinsures, who can handle meteorological raw data and derive their own conclusions for their business. But there are smaller enterprises in the financial industry, which need support to properly interpret the meaning of the results of climate research for their own specific business model. They even may need some help to derive the respective necessary decisions.

For both insurers and banks it would be desirable to get information with a high regional resolution, best on a local level. In the best case climate science should be able to provide information on what is going to happen weather wise at a certain latitude and longitude in the next year or in the next two years. It is clear, that climate science will never be able to reach this level, but as more and more regional climate models are developed, at least on a regional level there will be increasing information available.

Another interesting aspect of climate change with implications also for the financial industry may become liability questions. There are more and more law suits especially in the US with large emitters of green house gases as defendants and people affected negatively by global warming effects as plaintiffs. Representatives of the financial industry are getting more and more interested in advice what kind of liability issues may come up in the next years in the context of climate change.

Most important information, however, will be what kind of impacts due to climate volatility/climate change can be expected in the near future. Climate Services in general are regarded as very useful and their implementation has been fully supported by all of the representatives of the financial industry in

the workshop. There has been a consensus that Climate Service Centers at least to some part should be funded by public money - they should not be purely commercial enterprises. One reason for this is, that at least partly publicly funded Service Centers will have better access to public climate data and also to research groups at universities or other scientific institutes. There has also been the expectation that climate service centers organized this way will provide a higher quality of the services. There has been a consensus that the financial industry would be ready to pay for climate services. This is certainly an important information for the decision makers who are setting up climate services in many countries these days.

In the discussion at the workshop two challenges have been detected. One challenge is the different expectations on each side, the provider of the services and the recipients. So both sides should talk more with each other. In order to better communicate there has been a suggestion that it would be helpful, if the staff of a climate services organization would spend some time in companies of potential branches of future clients. The staff thus could learn more about the mindset of such companies and their needs. The second challenge is the lack of awareness. In many companies in the financial industry there still is no awareness at all that climate change has and will have even more effects on their business. Some of the primary insurance companies e.g. in the US even today still do not think, that climate change is real. So they do not see a need to get advice on changes, which in their minds do not exist.

Climate Service Centers thus should translate the information of basic climate change research so that it becomes understandable also to lay people and should proactively spread this in the financial industry. This can be supported by representatives from companies in the financial industry which already have been active in this field for some time, and have created valuable information.

Among the workshop participants there has also been consensus that an international network of the Climate Service Centers is very important. Exchange of information on an international level makes their services more valuable. Another reason for the necessity of such networks is that most of the companies in the financial industry are international or even global companies, which need information from more than one country, if not a global picture of the changes and of the volatility of climate conditions, which may affect their business.

The data, which are used most often by companies in the financial industry are data from NOAA. NOAA is a quite important data source, because of the free accessibility of the data. Some of the representatives of financial firms in the workshop, however, take their information from secondary sources like Reuters and Bloomberg. Such providers definitely are no primary source of specialized climate information. They get their information from other services. The risk of misinterpretation of information is quite high. There has been a clear consensus in the workshop that such information should come from the real experts, i.e. the official public or public/private climate service centers. These centers should promote their services and secure that they become the prime source of climate information.

In essence the workshop has shown that climate services are important for the financial industry. The workshop has been able to elaborate the most important characteristics of these services and the desired organizational structures.

Climate Services in the Water Sector

Chair: James Arnott
Aspen Global Change Institute
Rapporteur: Catherine V Nnamani
Ebonyi State University Nigeria
Secondary rapporteur: Catherine Vaughan
International Research Institute for Climate & Society

The Water Working Group convened at ICCS 2 to discuss the components of climate services for the water sector. The first part of the discussion focused primarily on problem areas or critical gaps in the delivery of usable climate information for users in the water sector. The second part of the discussion focused on solutions to those problems and gaps and included discussion on issues relating to climate services beyond water. Here we review input from the group provided on key questions as well as summarize action-oriented solutions which could be pursued by the Climate Services Partnership and its members.

Information needs and delivery in the water sector

Multiple areas of demand for climate information from water. In the discussion, two main areas of climate information were identified for the water sector: 1) information in response to too much water and 2) information in response to too little water. Water resource managers and related users on the one hand require water related information to plan for extreme events such as flash floods during heavy rainfall and runoff events and on the other, information to manage for droughts (meteorological and hydrological) and their associated impacts. Within each of these main areas, the group recognized the wide variety of user of climate information and noted that climate services for water cannot be considered a single product but instead a wide range of products tailored to different types of users and contexts.

Specific needs vary by user. Specific pieces of climate information such as minimum and maximum temperatures, solar radiation, and evapotranspiration were identified as crucial for water management planning. While some users need this type of information at higher spatial scales than current GCMs provide, access to even existing products can be challenging for users who are unfamiliar with the landscape of data and model output providers. Therefore, one of the central issues for users in this sector is in identifying the location where crucial decision-relevant information is accessible.

A new approach suggested. In the discussion, it was suggested that the traditional questions about information should be reframed to focus on impacts rather than specific sources of climate variability. The rationale for this is that the primary focus of the user is in response to climate impacts (e.g. drought conditions) rather than climatic phenomenon (e.g. reduced precipitation). In pursuing this approach, contributions of knowledge from integrated risk management could be better incorporated, and the solution is put front and center of the provider-user interface.

The role(s) of climate services

Guidance for users. One role for climate services mentioned repeatedly was the need to provide users in the water sector (and other sectors) with guidance in the use of climate information for decision-making. Part of this guidance involves the improved communication by providers of the capabilities and limitations of climate information products they produce. For instance, describing the physical limitations of models to provide information at the level of detail demanded by users/decision-makers. Another important communication role for climate services is the clarification of uncertainty embedded within climate information.

Incorporation of users. A frequent refrain in the discussion was the need to include the prospective users in the design of services; in fact this incorporation of user input is a central feature of climate services. Moving forward, there is a need for better mechanisms to involve users in the formulation of climate services.

Case studies helpful. Another issue for both providers and users of information is having access to case studies and other literature that articulates the needs of users and examples of practices about how those needs have been provided. There is a need to go beyond peer reviewed literature for access to and dissemination of case studies and some helpful case studies may go entirely unpublished. There-

fore, a more innovative approach to literature is required, and interactive online platforms (see below) may be a useful tool in getting useful information from case studies out to the widest range of users and providers.

International networking

International networking and partnerships were discussed as a crucial component of the development of climate services moving forward. Moreover, many of the solutions and action items brainstormed during the working group necessitate the existence of international networks to be successful.

Possible solutions

Engagement with user community

- Enable sustained outreach by CSP to user community in order to foster additional participation in partnership activities. This could be made more effective by coordinated personal outreach of CSP members to users within their regions or intimate networks (i.e. invitations to participate from partnership members with personal relationships with the user community.
- Create a categorization (or typology) of users within the water sector (and other sectors) so that the broad range of user types is clearly identified

Innovative products for climate services to provide

- Side by side comparison of costs and benefits of climate response options (e.g. in the style of McKinsey cost curves)
- Checklist of climate services products (ranging from basic to sophisticated) to be used water sector users as guidance throughout projects (i.e. what are the range of available climate services relevant to building a dam)

Disseminating knowledge on what works

- Develop a more innovative and proactive approaches to literature to identify and disseminate knowledge of what works and does not work in climate services delivery and application. A broader review of case studies in both peer reviewed and non-peer reviewed (i.e. grey) literature is needed as well as identifying lessons from examples not reported on in any formal literature. Thus, it is suggested to develop an interactive, online database that provides providers and users alike access to information of and contact to what works (and what doesn't) vis-à-vis climate services.

Side Events

Thursday featured side events from UNEP FI; KfW-Bankengruppe and the Climate Service Center Germany; and on European activities in climate services (see Appendix 2 for a detailed report)

FRIDAY,
7TH OF SEPTEMBER
2012

ROADMAP AND NEXT STEPS

Global partnerships in climate information

Karl Benedict

Earth Science Information Partnership

The Federation of Earth Science Information Partners (ESIP) is a broad-based, distributed community of science, data and information technology practitioners that coordinate interoperability efforts across the Earth and environmental science communities. Participation in the ESIP Federation is beneficial to individual members by providing an intellectual commons to expose, share and enhance their own in-house capabilities in support of their organizations mandate. By virtue of working in the community, ESIP members experience the network effect, enabling more coordinated interoperability efforts across domain-specific communities.

The ESIP Federation has a 14-year track record of success and continued growth using this community-based, discipline and agency neutral approach. These efforts catalyze connections across organizations, people, systems and data allowing for improved interoperability in distributed systems. Two ESIP Federation case studies: Data Publication and Citation and Decision Support Tool Catalog for Alternative Energy Site Assessment will be discussed. The ESIP Federation is managed by the Foundation for Earth Science, a 501(c)3 tax-exempt organization. The Foundation for Earth Science provides management, logistical, and operations support to the ESIP Federation, and is open to providing services to other Earth and environmental science research and education organizations.

Developing networks in climate services

Dagmar Bley

Project Management Agency at German Aerospace Center

The climate science community finds itself increasingly confronted with specific demands for climate-related information from different sectors. As a result, many countries are currently developing Climate Services capacity, producing knowledge-based information about projected regional and sectoral Climate Changes and impacts. Currently, each provider uses its own methods/approaches for data and information, even though all services are actually based on the same core information (climate models, climate observations, climate scenarios etc.). Contrary to much of the climate research that generally involves a lot of international cooperation, the work on Climate Services is generally organized on a

national level. Hence, we find duplication of efforts and a significant degree of inconsistency. Consistency on a larger e.g. European level would be relevant with regard to data availability, improved tools/ methods and for cross-border issues (e.g. management of river basins, mountain areas or coastlines). In the context of the above the Joint Programming Initiative Climate (representing research funding institutions of 13 European member countries and several observers) aims to improve the efficiency of the planning, development and quality of Climate Services in Europe as well as enhancing consistency in the methods used in order to avoid duplication of efforts.

JPI Climate Module 2 aims at researching and advancing Climate Services by assessing the quality of Climate Services, improving its effectiveness, and developing standards and good practices. Networking with Climate Services communities will be intensified. Priority is seen in enhancing Climate Services quality, building up network of Climate Services providers, understanding users´ needs and improving the interface between Climate research and its application. A mapping and analysis of Climate Service providers and users' requirements in Europe is planned and community building will be developed, supported by a virtual platform and through conferences for Climate Services providers and users.

As other international networks and initiatives have emerged during the last year´s early consultations, alignment and a coordinated mechanism are necessary to work complementary together in order to support the global community to better adapt to the grand challenges of Climate Change.

Summing up and the way forward

Lawrence Buja
US National Center for Atmospheric Research

Buja provided a fast-paced summary of the conference, beginning with the poster session – which included presentations on a range of different topics and from locations all over the world – and continuing throughout the three days of the conference. He highlighted certain topics including:

- the need to better define climate services
- the need for partnerships to facilitate the creation of climate services and the Global Framework for Climate Services
- the need for effective, committed leadership to move this idea forward
- the need to better understand the various roles of the public and private sector, and to effectively make use of both of them
- the need to take advantage of existing efforts
- the fact that data is not information, but it's difficult (and critically important) to engage with user groups
- the experience that working with existing infrastructure can be extremely effective
- the need to identify good practices and minimum standard
- the need to bring more members of the humanitarian community to ICCS 3

Buja ended with a quote "Technology is not enough ... faster, thinner, lighter – those are all good things. But when technology gets out of your way, everything becomes more delightful, even magical. That's when you leap forward." While this quote originally described the Apple iPad, it also accurately sums up the challenge of climate services.

Conclusions & Next Steps

Stephen Zebiak,
International Research Institute for Climate & Society

The second International Conference of Climate Services (ICCS2) brought together the members of the Climate Services Partnership (CSP) a diverse group of experts and practitioners, and other participants from public and private sectors. The conference aimed to:

1) Take stock of the CSP's activities over its first year of work.
2) Foster dialogue and learning between organizations and areas of expertise in the development of climate services.
3) Develop guidance and actions for the CSP for the next year.

Taking stock. The conference featured presentations on various climate service programs and activities, including many that had been the focus of the case studies, evaluations, and working group activities captured over the past year. The case studies are the product of coordination and collaboration amongst partners – especially the World Meteorological Organization. Through the presentations and case studies, the beginnings of a body of evidence to support the development of good practices guidance are becoming visible. They also draw attention to a need to better capture the user voice in climate service assessments.

Over 30 case studies are freely available to the global community at www.climate-services.org. They aim to help the efforts of national governments, the United Nations, and others in the implementation of the Global Framework for Climate Services and other climate relevant activities. In the last year, CSP working groups and members implemented new activities and fostered relationships that led to advances in the evaluation of the impact of climate services on lives and livelihoods, and to the integration of work plans. The CSP was able to inform policy and scientific forums over the year – including through side events at the UNFCCC meeting in Durban, the American, and European Geophysical Unions – and through other formal and informal meetings and policy dialogues.

Discussions and exchange. Wide participation in ICCS2 demonstrated growing interest and engagement in climate services on the part of many communities including: financial services, development agencies, local governments, NGOs, and public health practitioners. Participants expressed interest in working within the CSP in order to exchange knowledge and plan collaborative initiatives. Discussions at ICCS 2 made it clear that sector-focused representatives saw value in climate information and in the use of targeted climate services within their domains; they also support an international network to underpin climate services. All communities recognized the need for capacity building and training in order to deliver practical benefits associated with climate services. There is strong interest in providing more analysis and guidance to inform the development of public-private partnerships in climate services. It is recommended that CSP address these needs in its future work.

The future. As a new endeavor, the CSP has gained active participation and support from a diverse and growing group of climate service researchers, providers, users, and funders. In order to best serve its constituency and the broader community, it will be helpful for the CSP to make further efforts to articulate its mission, objectives, and plans; to identify its niche; and to engage other platforms and programs that will play an important role in the delivery of climate services capabilities worldwide.

Emerging from ICCS2 there is a growing list of proposed activities that build on recent experiences:

- Develop a better understanding of user perspectives including through our case studies.
- Synthesize the case studies.
- Collaborate toward developing guidance for good practices and minimum standards in the

implementation of climate services.

- Enable dialogues to start addressing the questions of equity, access and ethics implicit to climate services.
- Collaborate toward consistent and scientifically sound training and education.
- Promote widespread access to historic climate information.
- Provide access to technical backstopping of climate services investment and implementation.
- Foster collaboration toward climate services implementation in specific locations/countries.
- Organize meetings by theme or sub-region to foster knowledge exchange and a better understanding of gaps and opportunities.

The government of Jamaica generously offered to host the next ICCS. Several CSP members saw this as an opportunity to co-ordinate work plans and to use the intervening year to develop and demonstrate a climate services initiative that meets the needs of a broad range of actors in Jamaican society. The choice of a developing country as host for ICCS3, it was felt by many participants, offers us the opportunity to move quickly toward implementing the relevant items of our list of action areas in partnership and in support of its society.

Appendix 1: Report from Development Day, 4 September 2012

Development Day was held in recognition of the special conditions affecting the implementation of climate services in developing countries. The approximately 40 people who participated in Development Day could broadly be described as practitioners in implementing, funding or providing climate services in developing countries. Development Day was made up of four separate discussion sessions, which are detailed below:

1. What have we learned over the past year?

Session 1, facilitated by Stephen Zebiak (CSP Secretariat), focused on reporting the knowledge capture and knowledge management efforts of the last year and on seeking guidance on the forward direction of this effort. Last year's output included:

1. Common case study template with WMO/GFCS for case studies.
2. Twenty-eight case studies developed and available on CSP website, approximately 60 more being developed by the WMO
3. Two evaluations/assessments in progress (Mali and India), collaboration between USAID and CCAFS.
4. Website www.climate-services.org

Recommendations for the CSP that emerged from group discussion:

1. Perform more assessments of climate service activities
2. Develop a summary analysis for GFCS and other processes
3. Mine the case studies for valuable information and experiences
4. Develop methodologies to assess value of services
5. Better define baselines, what success is, and when it is achieved
6. Need to use case studies to identify "minimum standards."

2. How can we invest in climate services for climate-smart development?

Session 2, facilitated by Haresh Bhojwani (IRI), explicated priorities for investing in Climate Services for Climate Smart Development. The discussion revealed that there is growing demand for climate services, as major development gains can be lost through climate shocks. Other conclusions from the session:

- Climate services must be communicated to governments in the context of development planning.
- There are increasing amounts of data but – access is difficult due to bandwidth problems, use restrictions, policies, etc.

Conclusions regarding the process of providing climate services are:

- Boundary institutions and individuals are critical – need to identify and support
- Low-cost/High-impact results are possible through sustained collaboration.
- Need to understand the chain of information and actors, fund the interactions.

Regarding decision support systems, there is a need to:

- Understand the limitations; reconcile contradictions, resolve robustness.
- Understand strength of message, message defensibility, actionability.
- Consider ethical implications: do no harm, understand thresholds, engage users in understanding their leading vulnerability, limitations of information, etc.

3. How can development agencies collaborate to support climate services for climate-smart development?

This third session, facilitated by Michael Hoppe (GIZ), focused on development agencies their planned actions and the potential for collaboration in support of climate services.
Regarding co-location of activities, the discussion revealed that there is a willingness to co-locate and

coordinate in principle, though in practice this discussion needs to involve the other partners and actors. There is clear interest in learning from each other's efforts. Recommendations and issues from group discussion:

- The difference between weather and climate services is that in the latter we are trying to operationalize research while research is still being done – we need to know what is the limit to research.
- GFCS is the structure that is intended to bring the pieces all together.
- CSP can offer partners guidance through working on tools (e.g. checklists, guidebooks, minimum standards)
- CSP should do a detailed inventory of the needs in different sectors so that we are not just offering things when we don't know what the needs are.
- Important to link CSP to Climate Knowledge Brokers and CDKN initiatives – next meeting is in Washington.

4. Agenda setting

In this session, participants tried to lay out how the Climate Services Partnership might contribute to the meeting some of the recommendations and needs discussed in earlier sessions. These discussions can be summarized in three main topics:

Guidance: Organizations, from multilateral institutions to communities, are requesting robust guidance for the implementation of climate services. Several institutions are working to develop their own guidance tools. Coordination in the development of these materials would allow us to be more effective and to make the best ideas available to all. The CSP assessments and case studies can provide important inputs into these guidance materials. Partners can provide practice and science based expertise.

Actions:

1. Share guidance materials already developed.
2. Literature review to better ground our efforts in the available knowledge.
3. Coordinate work co-development of guidance material.
4. Mine case studies for guidance relevant information and experiences.
5. Identify topics and areas where guidance is needed.
6. Identify and explore ethical questions and technical limitations to the elements within the guidance materials (e.g. decision support systems, checklists, etc.).

Capacity: Information providers, practitioners, users, and policy makers need to develop greater expertise in climate information and services. Greater capacity throughout the relevant communities will greatly increase the effectiveness of climate services and minimize mistakes, unintended consequences, and wasted efforts. The capacity building materials should be developed in a way that is consistent with the evolution of the guidance materials and tools.

Actions:

1. Share and review training materials being developed.
2. Literature review for better ground our efforts in the available knowledge.
3. Coordinate co-development of training material where relevant.
4. Identify and catalogue capacity development needs.
5. Identify other capacity building efforts that can be leveraged or learned from.

Assessments: We have a lot to learn about how to better serve climate services' customer base and users. We should continue to assess impacts, economic value, and effectiveness of climate services. We also need to use this knowledge in the development of the two activities above.

Actions:

1. Mine case studies for more information.
2. Literature review.
3. Connect with activities of evaluation working group.
4. Extend case studies to capture more assessment information from different perspectives.
5. Prepare summaries and documentation based on these materials – make these available to the WMO Extraordinary Congress/GFCS and others.

Appendix 2: Side event on European climate services activities

The meeting was held as a Side event at the second day of ICCS 2 in Brussels. It started with short introductions of different European activities in Climate Services focusing on different projects and initiatives such as (ECLISE, Impact2C, JPI, Circle-2 EUPORIAS etc.). The event revived the discussion of a meeting on European activities towards Climate Services, which was held on May 24, 2012 at the Climate Service Center Germany in Hamburg. During the meeting in Hamburg the idea arose to establish an association of European Climate Services. The participants of the side event in Brussels discussed about what the association should be.

- It was stated that the establishment of the association is agreed and is open to organizations willing to join.
- The association could function as an umbrella to collect the manifold activities that are ongoing in Europe and to reduce duplication of efforts targeting similar objectives.
- It should be broad and should not be restricted to providers of climate information only but should also involve users of that information. In addition to this also adaptation services should be included.
- Sharing a common interest, information and tools, establishing and maintaining networks could be objectives of the association.
- Discussing methodologies and establishing certifications might be additional topics of occasional meetings.
- The association could be a framework in support of joining efforts to advertise the field of Climate Service in an inter- and trans-disciplinary manner.
- The association could function like many other associations e.g. in the private sector where they are a place to build trust among the community although members are competitors at the same time but would still be willing to share information.
- Being a member would increase credibility of affiliates.
- The association could represent a community voice to the European Commission and to overarching initiatives such as JPI, CSP and the global community as such.
- The idea of the association could come along well with the philosophy of the upcoming EU program HORIZON 2020 which is envisioned to start with a launch of a number of coordination efforts which would last throughout the entire program.

Further question to be discussed:

- Should the association be labeled?
- What should the vision be?
- Should it be a place where definitions of Climate Services should be discussed?


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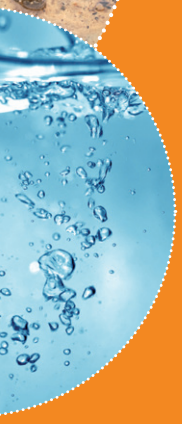

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