

WORLD METEOROLOGICAL ORGANIZATION
COMMISSION FOR ATMOSPHERIC
SCIENCES (CAS)

**3rd Meeting of the Societal and Economic
Research and Applications Working Group
of the World Weather Research Programme**

Melbourne, Australia (25-30 July 2012)

CAS/WWRP-WG-SERA-Meeting
3/DOC4.1
(18-March 2013)

Report and Decisions for Third
WG SERA meeting

This report summarizes the items discussed and presentations prepared for the third full meeting of the Societal and Economic Research and Applications Working Group (WG SERA) of the World Weather Research Programme (WWRP), an Open Programme Area Group (OPAG) of the World Meteorological Organization (WMO). The meeting was held at the offices of the Australian Bureau of Meteorology in Melbourne, Australia from 25-30 July 2012, in conjunction with a workshop on *Communicating Risk and Forecast Uncertainty*.

1. ORGANIZATION OF THE MEETING

Brian Mills opened the meeting, welcomed participants (Appendix A), and, once everyone had arrived, led a round of introductions. The agenda (Appendix A) was reviewed and approved and working arrangements discussed.

Nanette Lomarda provided a summary of recent WWRP activities, including the partnership with the Integrated Research on Disaster Risk (IRDR). She noted initiation of new WWRP projects and priorities, such as the Subseasonal-to-seasonal and Polar Prediction Project, and important planned meetings that cut across all components of the WWRP (Summer School in 2013/14, Open Science Conference 2014).

2. REVIEW OF MINUTES AND ACTION ITEMS

The minutes of the second WG SERA meeting in Toulouse, France were reviewed and accepted. An update on the status of decisions and actions from this meeting was provided and reviewed by all participants. Relevant actions from a special SERA side meeting held during the Integrated Research on Disaster Risk (IRDR) Science Conference (Beijing, October/November 2011) and the Fifth Joint Science Committee meeting of the WWRP (Geneva, April 2012) were also reviewed.

3. PROJECT UPDATES AND NEW OPPORTUNITIES – SESSION 1

Working group members provided brief updates on recent research activities and projects either underway or planned for the coming months.

Linda Anderson-Berry

Linda updated the group on the Coastal Inundation Forecast Demonstration Project (CIFDP) which is managed through the Joint WMO-Intergovernmental Oceanographic Commission (IOC) Technical Commission for Oceanography and Marine Meteorology (JCOMM) and WMO Commission for Hydrology (CHy). The intent of CIFDP is to integrate existing storm surge, wave and hydrological models in support of forecasting and developing warning systems for coastal inundation. Case studies have been initiated in Bangladesh and the Dominican Republic with a third location (Fiji) being considered for development. Workshops involving a cross-section of important stakeholders have been held in the Dominican Republic and Bangladesh. As new integrated systems are designed and implemented, there is a great opportunity to become involved in the evaluation aspects of the program. Additional information is available on the CIFDP web site

http://www.jcomm.info/index.php?option=com_content&view=article&id=190).

Linda also discussed activities within the Australian Bureau of Meteorology (BoM). In particular she observed the trend towards “impact forecasting” that also has been gaining traction in the UK and elsewhere. Major reviews associated with the succession of weather-related disasters experienced in Australia over the past few years has led to a much greater focus on actions to promote resilience, which is now a formal policy objective in federal and state/territorial planning. Given the limited ability of governments to solely fund mitigation, preparedness, response, and recovery associated with disasters, a greater emphasis is being placed on individual responsibility and community partnerships.

The ensuing discussion raised the need to involve or consult the broader evaluation research community/literature, the importance of defining appropriate measures, and the potential confounding role of smaller events that do not meet national or international disaster definition criteria in preparedness and vulnerability. ‘System’ and ‘end-to-end-to-end’ perspectives were recommended in evaluating the effectiveness of any new program or forecast product as it is often the weakest link or ‘last mile’ that becomes the problem in fully realizing expected benefits of improved information.

With respect to impact forecasting, issues concerning the need for National Meteorological and Hydrometeorological Service (NMHS) organizations to partner with other agencies, liability concerns as a constraint, and the availability of sufficiently detailed impact data were identified. There is no universal standard or requirement for impact data collection as there is for weather observations and global prediction systems.

Jane Rovins and David Johnston

Jane Rovins provided an overview of the collaborative and multidisciplinary Integrated Research for Disaster Risk (IRDR) program, which is sponsored by the International Council for Science (ICSU), International Social Sciences Council (ISSC) and United Nations International Strategy for Disaster Reduction (UNISDR). She directs the International Programme Office in Beijing which is responsible for funding and coordinating meetings and conferences, promoting and communicating IRDR activities and interests, liaising with key partners, and facilitating the development of research proposals.

Jane noted major collaborations between the IRDR and regional ICSU project, particularly in Central and South America. At the national level, where much of the necessary research funding will be sought, IRDR committees have been established in Canada, China, France, Germany, Japan, and New Zealand. An IRDR Centre of Excellence has been created in Taipei¹ with additional centres being proposed in the United States and possibly the UK and Germany.

The IRDR science plan was reviewed along with the activities of 4 working groups: Forensic investigations of disasters (FORIN), Risk interpretation and action (RIA), Disaster loss data (DATA), and Assessment of integrated research on disaster risk (AIRDR). Detailed descriptions of each group are found on the IRDR web site (<http://www.irdrinternational.org/>). The SERA working group is listed as a fifth group, however, the connection with WMO and its distinction from the other working groups will need to be clarified in communications.

SERA is most closely aligned with the interests and activities of the FORIN, DATA and RIA working groups. FORIN originated out of a need to explore and uncover the root causes of the disasters, a concept more fully elaborated in a recent IRDR report and Environment Magazine article². A common approach and methodology will be developed and applied in a series of case studies, initially targeting New Zealand and China. A major workshop will be held in December 2012 in California.

The DATA working group is primarily concerned with improving the quality, accessibility and utility of hazard loss data. This has obvious ties with SERA interests in understanding the impact of weather forecast information and the subject of impact forecasting noted previously by Linda Anderson-Berry. Meetings are planned for late October and early November 2012 in Taipei in conjunction with the 23rd CO-DATA International Workshop (<http://www.codata.org/>).

¹ <http://irdr-icoe.sinica.edu.tw/about.html>

² <http://www.irdrinternational.org/about-irdr/scientific-committee/working-group/forensic-investigations/>

The primary focus of the AIRDR working group for the next year is the preparation of a global assessment of published research on disaster risk. This will serve as a baseline for future endeavours and will form the basis of a longer-term science agenda for integrated disaster research.

David Johnston expanded upon Jane's presentation by discussing the RIA working group. RIA is broadly interested in the question of how people (both decision makers and ordinary citizens) make decisions, individually and collectively, in the face of risk. A conceptual framework expanding upon this basic question was presented in a recent paper published in the *International Journal of Disaster Reduction*³ and background IRDR report⁴. It was observed that there were quite a variety of perspectives within 'social science' and that RIA was aiming to break existing silos by bringing multiple disciplines and both theoretical and applied research together. The group will begin identifying particular projects at its next meeting in November 2012 and SERA was encouraged to participate in the discussions.

Kwabena Anaman

Kwabena Anaman provided the group with a presentation on economic approaches to measure extreme events and natural hazards in Ghana. After establishing the social and economic context for Ghana, a fast-growing economy (based largely on oil and other resources) located in West Africa, Kwabena introduced a definition for the extreme events that were the focus of the investigation—direct human suffering, loss of human lives, destruction of plants and animals, and/or damage to infrastructure and equipment that substantially exceeds normal expectations. Extreme events may be classified into 4 groups related to atmospheric/hydrologic (e.g., floods), geophysical (e.g., earthquakes), biological (e.g., disease), and social (e.g., terrorism) processes and impacts may be typed into 4 categories based on valence (positive/negative), duration, tangibility, or causal proximity (direct/indirect).

Economic analysis is used to assign values to impacts relative to a baseline without any extreme event(s)—this is done at both individual and societal levels. A variety of approaches may be used to estimate the value of tangible losses at the individual, household or firm level and these can be scaled up to develop societal values for particular districts, regions, or nations. Two hydrometeorological events were briefly reviewed to illustrate both the types of impacts and intervening role that meteorological information did or could have

³ Eiser, J.R., A. Bostrom, I. Burton, D.M. Johnston, J. McClure, D. Paton, J. van der Pligt, and M.P. White. 2012. Risk interpretation and action: A conceptual framework for responses to natural hazards, *International Journal of Disaster Risk Reduction*, <http://dx.doi.org/10.1016/j.ijdr.2012.05.002>

⁴ See <http://www.irdrinternational.org/about-irdr/scientific-committee/working-group/risk-interpretation-and-action/>

provided: a severe windstorm affecting Accra (May 2012) and a deadly Nigerian Boeing 727-200 cargo plane crash that occurred at the Accra International Airport (June 2012). Recent or planned investments in Ghana for new weather radars, automated weather observation stations, and meteorological sensor installations as part of a vessel traffic management and information system, were identified by Kwabena as examples of how the Ghana government is beginning to improve critical infrastructure required to generate benefits from meteorological applications and services. Cellular technology is viewed as a growing and necessary platform for information delivery and use.

To better understand the value these investments and other interventions, a research proposal was developed and submitted in June 2012 to the National Disaster Management Authority (NADMO), the body in charge of disaster monitoring and management in Ghana, for a joint project to estimate costs of natural hazards and measures to reduce impacts. Some data on extreme events in Ghana have been gathered from both local sources and Munich Reinsurance Company. While meetings have been held with the State Insurance Company, the leading insurance company in Ghana on the project related to fire and related perils insurance, the proposal requires start-up funding on the order of US\$50k for a research assistant to be assembling and processing the data.

Discussion subsequent to the presentation touched on the methods and data used in the economic analysis (Input-Output modelling; compilation of a database of historic events), the use of local insurance to mitigate the impacts of extreme events in Ghana, and the cost justification/planning of government-purchased radar (i.e., did it include operational and maintenance expenses over the life cycle). Results from other projects in Africa (e.g., Meningitis-climate project involving Jeff Lazo) may be useful in the Ghana economic impact study.

Eugene Poolman

Eugene updated the working group on three key activities: Thorpex Southern Hemisphere Regional Committee, African Severe Weather Forecast Demonstration Project (SWFDP), and the South African Flood Forecasting Guidance project.

Thorpex is a 10-year international research and development programme within WWRP that aims to accelerate improvements in the accuracy of one-day to two-week high impact weather forecasts for the benefit of society, the economy and the environment. Scheduled to end in 2014, it is composed of working groups and Regional Committees (RCs) supported by an International Programme Office in Geneva. Eugene described his involvement with the Thorpex Southern Hemisphere RC and the considerable effort that went into producing its science

and implementation plans⁵, in particular the 3 SERA projects envisioned for the RC below:

- Inventory of high-impact weather forecast opportunities in the Southern Hemisphere
- Facilitate transfer of THORPEX advances to operational forecast offices in support of end user requirements
- Research on user requirements and potential benefits

Progress has been made on the first project with international disaster data from CRED/EM-DAT⁶ being complemented with information, in some cases derived from analyses of media records, from individual nations (e.g., South Africa, Australia). Basic summary statistics permit comparisons regarding the frequency and impact severity of disasters over several countries covering a substantive portion of the SH.

Although not a Thorpex activity, the African Severe Weather Forecast Demonstration Project (SWFDP) is consistent with the second area highlighted by the Thorpex SH. The WMO initiated the SWFDPs as a relatively cost-effective way to address the increasing technology gap between NMHSs in developed and developing countries in weather forecasting with an emphasis on early (i.e., up to 5 days) warnings of high impact events. Making this technology and global NWP information available through regional centres (e.g., Regional Specialized Meteorological Center Pretoria, South Africa) and building local capacity to apply and utilize it within developing country weather service operations and important local users (e.g., emergency and disaster management authorities) and media outlets are primary objectives of the SWFDP.

On-going projects exist for Southern Africa, Eastern Africa and the South Pacific Islands with plans for additional demonstrations in Southeast Asia and the Bay of Bengal region. A number of benefits have been realized to date, including the facilitation of communication between national weather services and disaster managers. Eugene provided a detailed account of the Southern Africa SWFDP and noted the need in Phase 4 to encourage and ensure the longer-term sustainability of the project. Also he emphasized the need to better utilize social science to formally evaluate the benefits of the projects—a clear role for SERA WG.

Eugene described efforts initiated by WMO to improve regional flash flood forecasts at the regional scale, the Southern Africa Region Flash Flood Guidance (SARFFG) system, and a national system developed by the South African Weather Service (SAFFG). Both systems make use of hydrologic models and expertise from the U.S. Hydrologic Research Center⁷. The former makes use of satellite and rain gauge information to compensate for limited radar coverage and has been shown to be useful especially at large catchment scales. The SAFFG is

⁵ See the Southern Hemisphere RC web site (<http://thorpex.cptec.inpe.br/>)

⁶ <http://www.emdat.be/>

⁷ See <http://www.hrc-lab.org/index.php>

focused on smaller watersheds within and adjacent to major urban centers and made significant efforts in understanding the forecast needs of emergency and disaster managers. Case studies based on recent tropical cyclone and flooding events were used to illustrate the benefits of the system. Lessons learned in engaging users will be carried into the 7-country roll-out of the SARFFG system which will make use of the SWFDP framework noted previously.

Longer-term it is hoped that a seamless system incorporating seasonal, daily and hourly scale prediction/warning products will be developed, with applications extending into other sectors (e.g., agriculture), and with greater attention to local user needs and communication. Discussion following Eugene's presentation highlighted the potential to involve SWFDP sites in SERA activities, particularly where they have well-established networks with emergency management organizations. The challenges faced in developing countries in communicating warning information, including multiplicity of languages, were noted by several members; low-tech, inexpensive options seemed to be preferred.

Joanne Robbins

Joanne Robbins described projects underway in the UK and Papua New Guinea to develop and apply hazard impact models. The Natural Hazard Partnership is a joint project of several UK government and research council agencies designed to improve the delivery of natural hazard management by public sector bodies. A steering group oversees the activities of 4 working groups dealing with products and services, scientific review, communications, and stakeholder advice.

Hazard Impact Model (HIM) development is a major project component to be tested and implemented over the 2012-15 period. Initially models will be developed for the following hazards: heavy rain and surface water flooding; wind; rainfall-induced landslides; and snow and ice. Other hazards such as drought may be considered in later phases. The primary benefit is the integration of disparate sources of information that are required to understand and manage risk. A cloud concept will be adopted to exchange data and information on multiple models, in part to facilitate participation from agencies outside the UK Met Office; the various elements will be linked through a Hazard Impact Production System (HIPS) that will integrate various environmental datasets and impacts and vulnerability information, execute multi-modelling algorithms and perform routine mapping for products. Over the next year demonstrations and case studies will be conducted for 3 hazards focused on road network impacts. Local Resilience Forums (LRF) are used to obtain and exchange information with users of HIM output to ensure that products and services reflect their needs and concerns.

Joanne showed samples of integrated risk products (hazard, vulnerability, exposure) and case studies at various stages of development, including a

rainfall-induced landslide model (with British Geological Survey) and the wind damage/vehicle overturning risk model that she led at the UK Met Office. Recent improvements in high resolution modelling at UKMO may facilitate examination of ensemble risk analysis at scales more closely reflecting those of impacts. Joanne also highlighted potential uses of social media, both as a platform for distributing hazard and risk information but also to collect observations of impacts in real-time (i.e., by 'scraping' social media)⁸.

Joanne also gave a brief update on research that she is completing in Papua New Guinea as part of her PhD studies. The work is aimed at developing and evaluating the efficacy of a forecast model for landslide risk to aid mitigation and disaster prevention. With pilot research now completed, the next steps involve development of a UK Met Office product. Joanne expressed interest in linking the activity with the Pacific Islands SWFDPP and extending the analysis to a larger part of Southeast Asia.

4. COMMUNICATING RISK AND UNCERTAINTY WORKSHOP

Linda and Brian led a discussion concerning the expectations, objectives, and format of the Communicating Risk and Uncertainty Workshop. The WG members were encouraged to actively engage in the discussions and help foster debate in their roles as session chairs.

5. DAY 1 WRAP-UP AND DISCUSSION

A brief review of the day was conducted with an opportunity for members to reflect on the activities discussed. The challenge of integrating on-going member activities into specific SERA projects was noted and was generally tabled as an item for discussion on the final meeting day following the workshop.

MONDAY, JULY 30

6. COMMUNICATING RISK AND UNCERTAINTY WORKSHOP REVIEW

The members reflected positively on the workshop, and elaborated on a few of the several important messages and themes that were summarized from the discussions:

- i. Integration of knowledge across disciplines, players (including media, insurers), perspectives and sources (indigenous, local, expert) is needed

⁸ See NASA Space Apps Challenge entries <http://spaceappschallenge.org/challenge/hazardmap-real-time-hazard-mappingscraping-social/solution/33>

- ii. Language
- iii. Importance of processes of engagement, relationship/trust-building relative to the specific forecast, product, recommendation, specific information
- iv. Tailoring information and methods to audiences and their contexts/situations/technical capacities/preferences
- v. Role of insurance and insurers
- vi. Ethical aspects and issues
- vii. Communities as a focus of investigation and target of communication

Regarding language, and extending this to symbols and definitions of risk and uncertainty, much more can be learned from literature and other humanities disciplines. It's clear that messages do not translate consistently across users, cultures, contexts, hazards, etc.

Another theme that members emphasized in the wrap-up comments was the role of relationship building (across all elements of the production, communication, use and evaluation of information). It was generally felt that such "process-oriented" outcomes were more valuable than any specific product (or products).

In terms of SERA, discussion seemed to recommend an emerging role in developing guidance or guidelines for better communication practices and approaches to develop, measure and evaluate the communication activities of NMHSs. Such guidance should reflect on previous WMO and NMHS efforts, lessons from IRDR and other risk communication contexts (e.g., health, transportation), and be flexible to address the capacities of less developed NMHS organizations.

7. PROJECT UPDATES AND NEW OPPORTUNITIES – SESSION 2 (1100-1400)

The member updates continued from the first session (item 3).

Jeff Lazo

Jeff provided the group with an overview of the National Center for Atmospheric research (NCAR) Societal Impacts Program (SIP) and research activities related to SERA dealing with communication, economic valuation, decision making, and societal relevance⁹. The WAS*IS program fit within the latter research thrust and was the victim of recent budgetary decisions in NOAA. Several 8-10 day workshops involving early career scientists from a variety of disciplines have been held since 2005 in Boulder, Colorado with additional sessions in Oklahoma,

⁹ NCAR SIP <http://www.sip.ucar.edu/>

Puerto Rico, and Australia. Spinoff forms of WAS*IS have since taken root, for example Integrated Warning Team and other NWS workshops.

Jeff highlighted several large research projects, including a study published in BAMS¹⁰ evaluating the sensitivity of the U.S. economy to changes in temperature and precipitation indicators. They estimated that US GDP varies by roughly 3.4% in response to variation in weather. An expanded study involving primary data and possible connections to the Canadian economy are being considered.

Another study supported by the US National Science Foundation (NSF) and National Oceanic and Atmospheric Administration (NOAA) is underway to understand the communication of hurricane information. The research, set in Miami and Houston/Galveston study areas, will examine 3 sets of actors (broadcast media, emergency managers, forecaster), their varying contexts (objectives, resources, constraints), and between-actor relations (interactions, impediments, opportunities).

NCAR SIP is also involved in an evaluation of the US National Weather Service's (NWS) "Forecast at a glance" product and "point and click" channel as a means of communicating information about weather-related threats including important temporal and spatial dimensions. Another project aims to study public awareness and understanding about storm surge and the potential need for and utility of specific NWS storm surge information products.

Jeff noted three aspects of NCAR SIP activity for which he was seeking some feedback, specially: 1) would it might be feasible to broaden the Overall US Sector Sensitivity Study internationally; 2) would SERA be interested in picking up production of an international version of the Weather & Society Watch newsletter (now an unfunded outreach activity in NCAR); and 3) potential interest in a newly developed World Bank project to examine the economic value of weather services in Mozambique (a potential SERA demonstration project).

Paul Kovacs

Paul described new and on-going activities of the Institute for Catastrophic Loss Reduction (ICLR)¹¹, a Canadian research organization funded largely by the insurance industry and dedicated to loss prevention and risk reduction. The context for the discussion included the global increase in insured losses due to weather-related events and concerns over longer-term climatic change which will likely raise loss potential through changes in the frequency and/or severity of extreme events.

¹⁰ Lazo, J.K., M. Lawson, P.H. Larsen, and D.M. Waldman, 2011. U.S. economic sensitivity to weather variability, *Bulletin of the American Meteorological Society*, 92(6):709-720.

¹¹ For more information on ICLR, see <http://www.iclr.org/>

ICLR's focus and that of its associates in Canada is on urban flooding and severe wind hazards—these particular perils have replaced fire as the largest source of home insurance claims in Canada. Regarding the latter, a new wind tunnel laboratory has been constructed at Western University in London, Canada to evaluate full scale building and infrastructure designs. ICLR adopts a multi-disciplinary approach in its research, is very active in collaborating and engaging with decision makers in industry and government, and promotes and shares significant research findings with homeowners and other members of the public through demonstrations and a variety of targeted communications.

Paul highlighted three priority areas—basement flooding; information for home owners, and engagement of the home building industry—where ICLR is actively working to apply its scientific knowledge. Particularly important was the identification of relatively simple actions that could be taken by individual home owners and builders with modest costs and great gains in safety and durability. For example, strapping roof trusses to walls, better attachments to the roof deck, and constructing shorter homes with hip roofs yielding a reduced profile, could be accomplished with existing technology and building practices. The result would be a home much more resilient to severe wind. Paul acknowledged that making weather resilience a home construction 'standard' will take time and borrowed an analogy from home energy efficiency which took about 35 years to become a basic expectation in new construction in North America.

Discussion following Paul's presentation focused on the relationship between National Meteorological and Hydrometeorological Service (NMHS) organizations and the insurance industry. Somewhat like NMHS relations with broadcasters/media, interactions with the insurance industry can be tenuous at times especially when public and business priorities conflict (e.g., dilemma of providing information to insurers that could be used for declining insurance to certain segments of the population). While the UK Met Office have insurance agencies and reinsurers as clients, and thus have a fair degree of knowledge about their use of weather information (e.g., in claim verification), there is a general dearth of information concerning the extent and nature of interactions in most regions. This was seen as something for SERA to explore with input from the IRDR who are also engaging insurance industry representatives.

WWRP Research and Forecast Demonstration Projects (Nanette, Brian, Linda)

Brian Mills and Nanette Lomarda briefly reviewed the following on-going, recently endorsed, or planned research and forecast demonstration projects of the WWRP:

- Typhoon Landfall Forecast Demonstration Project (WMO-TLFDP)
- Sochi 2014 Winter Olympic Games (see *Doc 3.1, sect.4.1*)

- Integrated Nowcasting for Central Europe Area (INCA-CE) project (see *Doc 3.1, sect.4.1*)
- La Plata Basin (S. America) proposal (see *Doc 3.1, sect.4.3*)
- HyMEX (see *Doc 3.1, sect.3.2.7*)
- WWRP/World Climate Research Programme/THORPEX Sub-seasonal to Seasonal Prediction Project (see *Doc 3.1, sect. 3.2.9; and Doc 3.3.*)
- WWRP/World Climate Research Programme/THORPEX Polar Prediction Project (see *Doc 3.1, sect. 3.2.8*)

Documentation describing the projects was provided with the background meeting materials (referenced above, in red) and each has been encouraged to develop a SERA component or element. Recognizing the limited capacity of SERA members to actively participate in each WWRP project, the WG has agreed to develop a document for guiding proponents in the design, costing and implementation of SERA elements of WWRP project proposals. As noted by Linda, this document needs to direct WWRP project principal investigators to ask questions about stakeholder/user involvement and potential benefits in advance of conducting the project—not as an afterthought. It should also encourage (and financially accommodate) more than one SERA person, typically known as ‘the social scientist’, to become involved.

Understanding the societal and economic dimensions of weather-related warning systems: A SERA Research Demonstration Project (RDP) (Brian)

Brian Mills confirmed the status of the SERA RDP first introduced at the Toulouse meeting. A draft research and application framework is in development and will be finalized for presentation at the next WWRP JSC meeting (2013). Included in the draft will be an overview scan of current NMHS warning systems. Specific studies will be identified and developed within the framework taking advantage of new and on-going SERA member, WMO-sanctioned, IRDR, and NMHS projects (e.g., SWFDPs; JCOMM/CHy Coastal Inundation FDP; MeteoAlarm; South African Flood Forecast Guidance (SAFFG) Project; impact forecasting projects; La Plata Basin proposed RDP; Integrated Nowcasting for Central Europe Area (INCA-CE) project; Shanghai Multi-hazard Early Warning System; IRDR forensic case studies). Integration with other WMO activities, particularly within the Disaster Risk Reduction (DRR) and Public Weather Services (PWS) programmes, is actively being sought.

8. MEMBERSHIP REVIEW, PLANS & PRIORITIES

Insufficient time was available to adequately address membership issues and these will be taken up via e-mail discussions in subsequent months. Plans and priorities are reflected in earlier sections of the report and the action/decision items.

9. REVIEW OF ACTIONS AND DECISIONS

Draft action and decision items were reviewed.

10. CLOSURE OF MEETING

The meeting was closed with a heartfelt acknowledgement of the BoM hosts and key staff (Bronwyn Brown, Don Anderson, Shannon McNamara, Tamsin Achilles) whose tremendous effort made the workshop and meeting possible. The location and timing of the next meeting will be set once WWRP funding and administrative constraints are assessed.

11. ACTIONS/DECISIONS

List of Decisions and Actions

1. Decision/Action: Provide members with additional information on the proposed WWRP Open Science Conference planned for 2014 and potential SERA role (*Nanette*) (*October 2012*).
2. Decision/Action: Suggest potential contributions from SERA WG to support the JCOMM/CHy Coastal Inundation FDP in Bangladesh and Dominican Republic (*Linda with input from members*) (*October 2012*).
3. Decision/Action: Identify 1-2 SERA WG members (depending on available WMO funding) to participate in the next IRDR Risk Interpretation and Action (RAI) working group meeting November 2012 in China to identify specific opportunities for collaboration (*David, Brian*) (*September 2012*).
4. Decision/Action: Add SERA WG members to IRDR RIA and FORIN WG distribution lists (*IRDR IPO/Jane*) (*September 2012*).
5. Decision/Action: Review and amend as necessary wording and reference to SERA WG on IRDR web site (*Brian, Jane*) (*September 2012*).
6. Decision/Action: Canvass and evaluate the level of involvement and interaction between NMHSs and insurance industry representatives/clients, starting with UK Met Office and Environment Canada (*Paul, Brian, Joanne*) (*January 2013*).
7. Decision/Action: Confirm interest among SERA members and capacity within WMO to take over and broaden the Weather & Society Watch newsletter formerly prepared and distributed through the Societal Impacts Program of NCAR (*Nanette, Jeff*) (*November 2012*).
8. Decision/Action: Scope out, and follow-up with Haleh Kootval (WMO-PWS) and other partners (e.g., World Bank), the development of a country-level primer on the economic impacts of weather services building on existing tools and case studies/demonstrations (e.g., SWFDP or South African Flood Forecast Guidance products) (*Eugene, Jeff, Kwabena*) (*February 2013*).
9. Decision/Action: Develop an inventory of examples of weather-related risk communication and product development processes/experiences that were deemed successful or unsuccessful (*all members*) (*May 2013*).
10. Decision/Action: Obtain and circulate detailed survey instruments and designs used in the Typhoon Landfall Forecast Demonstration Project (TLFDP) and resulting data/analyses/papers (*Nanette*) (*November 2012*).

11. Decision/Action: Draft and circulate to members a new version of the SERA Warning Demonstration Project concept paper that includes a SWFDP component/case. Draft to be discussed during the IRDR Risk Interpretation and Action working group meeting in November (*Brian, Eugene, Linda*) (*early October 2012*).
12. Decision/Action: Provide additional information and solicit member input and interest in recently initiated or proposed WWRP project: Integrated Nowcasting for Central Europe Area (INCA-CE) project, La Plata Basin (S. America) Research Demonstration Project proposal, WWRP/World Climate Research Programme/THORPEX Sub-seasonal to Seasonal Prediction Project, and WWRP/World Climate Research Programme/THORPEX Polar Prediction Project (*Brian, Nanette*) (*August 2012*).
13. Decision/Action: Prepare a draft set of guidelines for incorporating SERA elements into WWRP FDP/RDPs for the next WWRP Joint Science Committee meeting (*Brian with input from members*) (*September 2012*).
14. Decision/Action: Solicit additional references and contributions (annotations, editing suggestions) from members for the *Applications of seasonal to sub-seasonal weather and climate predictions: An annotated bibliography* (*Brian with input from members*) (*October 2012*).
15. Decision/Action: Prepare a working list of internal WMO contacts/divisions that are responsible for or actively pursuing SERA-related activities. Expand this list to include SERA representatives for each WMO member country (*Nanette, Haleh, Brian*) (*January 2013*).
16. Decision/Action: Prepare and circulate a standard WWRP-SERA WG powerpoint deck defining the goals, objectives and primary activities of the WG (*Brian, Nanette*) (*October 2012*).
17. Decision/Action: Coordinate SERA activities with the WMO Disaster Risk Reduction (DRR) programme (*Brian, Nanette*) (*October 2012*).
18. Decision/Action: Prepare, review and edit *Communicating Risk and Uncertainty* workshop report (*Bronwyn and other BoM staff, Linda, Brian, Nanette with input from members*) (*August/September 2012*).
19. Decision/Action: Review membership and identify potential co-chair from IRDR (*Brian with input from members and IRDR*) (*November 2012*).

Acronym

Description

CHy

Commission for Hydrology

FDP	Forecast Demonstration Project
FORIN	FORensic INvestigation of disasters
IOC	Intergovernmental Oceanographic Commission
IRDR	Integrated Research on Disaster Risk (a programme supported by International Council for Science, International Social Science Council, United Nations International Strategy for Disaster Reduction)
JCOMM	Joint technical Commission for Oceanography and Marine Meteorology
NCAR	National Center for Atmospheric Research (U.S.)
NMHS	National meteorological and hydrometeorological service
PWS	Public Weather Services (section within WMO)
RIA	Risk Interpretation and Action
RDP	Research Demonstration Project
SERA	Societal and Economic Research and Applications
SWFDP	Severe Weather Forecast Demonstration Project
WG	Working Group
WMO	World Meteorological Organization
WWRP	World Weather Research Programme

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WORLD METEOROLOGICAL ORGANIZATION
COMMISSION FOR ATMOSPHERIC
SCIENCES (CAS)
**3rd Meeting of the Societal and Economic
Research and Applications Working Group
of the World Weather Research Programme**

Melbourne, Australia (25-30 July 2012)

CAS/WWRP-WG-SERA-Meeting
3/DOC1.1
(updated 19-July 2012)

Item: Final Agenda,
Documentation Plan, Participants
list

LOCATION

Bureau of Meteorology
700 Collins St
Docklands
Level 6, Conference Room 2

The main entrance to the Bureau is level 5 of the building and entrance to Level 6 is via the low-rise lifts on Level 5. To access these, go through the doors to the left in the foyer.

DOCUMENT LIST

- 1.1 WWRP-WG-SERA-Mtg3-Melbourne_Doc1.1_AGENDA.pdf
 - 1.2 ACTIONS-status_Jul-25_WG-SERA-meeting3.pdf
 - 1.3 MunichRe Topics-Geo_2012_302-07225_en.pdf
 - 1.4 IRDR-Annual-Report-2011.pdf
 - 2.1 WWRP WG SERA Workshop Agenda - Final Draft.pdf
 - 3.1 WWRP JSC 5 Draft Report_040612.pdf
 - 3.2 SERA Warning Research Demonstration Project proposal_draft-v-1.doc
 - 3.3 DRAFTv1_Seasonal-subseasonal_AnnotatedBibliography_November2011.pdf
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AGENDA

WEDNESDAY, JULY 25

1. ORGANIZATION OF THE MEETING (0900-0930)

- Opening of the meeting, welcome and introductions
- Adoption of the agenda (*Doc1.1*)
- Working arrangements for the meeting and workshop
- WWRP Secretariat update

2. REVIEW OF MINUTES AND ACTION ITEMS (0930-1030) (*DOC 1.2*)

- SERA WG Meeting #2 (Toulouse)

- Integrated Research on Disaster Risk (IRDR) and Science Conference side meeting (Beijing)
- WWRP Joint Science Committee meeting #5 (Geneva)

Break (1030-1050)

3. PROJECT UPDATES AND NEW OPPORTUNITIES – SESSION 1 (1050-1420)

- Systematic assessment of direct losses in international disaster databases (*Doc 1.3 in lieu of presentation by Angelika*)
- South Pacific Severe Weather Forecast Disaster risk reduction Demonstration Project (SWFDDP) and recent flood experience in Australia (*Linda*)
- Integrated Research on Disaster Risk (IRDR) (*Jane Rovins/IRDR-IPO*) (*Doc 1.4*)
- Economic approaches to measure the impacts of extreme weather events and Thorpex Africa (*Kwabena*)

Lunch (1230-1330)

- African Severe Weather Forecast Demonstration Project (SWFDP), South African Flood Forecasting Guidance project, Thorpex Southern Hemisphere Regional Committee (*Eugene*)
- Development and application of hazard impact models: An update on projects in the UK Met Office and Papua New Guinea (*Joanne*)
- Societal Impacts Program at NCAR (*Jeff*)
- Activities of the ICLR and Canadian/International Insurance Industry (*Paul*)

Break (1420-1500)

4. COMMUNICATING RISK AND UNCERTAINTY WORKSHOP (1500-1600)

- Review of session outline, goals, objectives, and roles
- Logistics

5. DAY 1 WRAP-UP AND DISCUSSION (1600-1630)

THURSDAY, JULY 26 & FRIDAY, JULY 27

WWRP SERA WG WORKSHOP ON COMMUNICATING RISK AND UNCERTAINTY (*DOC 2.1 - AGENDA*)

Workshop objectives:

- understand and improve the use of weather and related risk and impact information in decision making
- understand and improve the communication of weather and related risk and impact forecast uncertainty
- examine and assess the role of disaster loss and hazard impact data in support of the previous objectives with a focus on the Australasian region

Primary elements of workshop:

- Welcome and opening remarks
- Context and background presentation and discussion
- Theme 1: Disciplinary perspectives on risk and uncertainty
- Theme 2: Functional, organizational, and user perspectives on risk, uncertainty, decision-making, value, and successful communication
- Theme 3: Integrated Research on Disaster Risk (IRDR)
- Synthesis and closure

SATURDAY, JULY 28

Facility tours and informal discussion/networking:

- State Control Centre (morning)
- Huntsville Sanctuary (afternoon)
- Social and barbeque (evening)

SUNDAY, JULY 29

Open/self-organized outings (discover Melbourne and surroundings)

MONDAY, JULY 30

6. COMMUNICATING RISK AND UNCERTAINTY WORKSHOP REVIEW (0900-1030)

- General discussion
- Outcomes and actions requiring follow-up

Break (1030-1100)

7. PROJECT UPDATES AND NEW OPPORTUNITIES – SESSION 2 (1100-1400)

- WWRP Research and Forecast Demonstration Projects (*Nanette and Brian*)
 - Typhoon Landfall Forecast Demonstration Project (WMO-TLFDP)
 - Sochi 2014 Winter Olympic Games (see *Doc 3.1, sect.4.1*)
 - Integrated Nowcasting for Central Europe Area (INCA-CE) project (see *Doc 3.1, sect.4.1*)
 - La Plata Basin (S. America) proposal (see *Doc 3.1, sect.4.3*)
 - HyMEX (see *Doc 3.1, sect.3.2.7*)
 - Understanding the societal and economic dimensions of weather-related warning systems: A SERA Research Demonstration Project (RDP) (*Doc 3.2*)

Lunch (1230-1330)

- WWRP/World Climate Research Programme/THORPEX Sub-seasonal to Seasonal Prediction Project (*Brian*) (see *Doc 3.1, sect. 3.2.9; and Doc 3.3.*)
- WWRP/World Climate Research Programme/THORPEX Polar Prediction Project (*Brian*) (see *Doc 3.1, sect. 3.2.8*)
- SERA Guidance document (for other WWRP WGs)
- Other (*all*)

8. MEMBERSHIP REVIEW, PLANS & PRIORITIES (1400-1530)

Break (1530-1545)

9. REVIEW OF ACTIONS AND DECISIONS (1545-1630)

10. CLOSURE OF MEETING (1630)