
EIGHTH MEETING OF THE WORKING GROUP
ON SOCIETAL AND ECONOMIC RESEARCH
APPLICATIONS (WG SERA)

UKMO, Exeter, UK

25-26 April 2016

Original: ENGLISH

This report summarizes the items discussed and presentations prepared for the eighth 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 UK Met Office, Exeter, UK 25 – 26 April, 2016

The meeting commenced at 2pm Monday 25 April and closed at 5.45pm Tuesday 26 April.



Members L → R:- Ben Jou; Martin Goerber; Adriaan Perrels; Brian Mills; Joane Robbins; Linda Anderson-Berry (not in photo: Nanette Lomarda; absent: Jane Rovins Aida Diongue-Niang)

1. Welcome & Introductions

Linda Anderson-Berry Chaired the meeting, Nanette Lomarda provided WMO secretariat support. Co-Chair Jane Rovins was unable to travel to the meeting and time differences with New Zealand prevented her from joining the meeting remotely. Linda opened the meeting and welcomed attending participants Adriaan Perrels, Ben Jou, Joanne Robbins, Martin Goeber, David Johnston (former representative of IRDR) and Brian Mills (invited expert and former member). Jan Eichner was also unable to attend the meeting. The challenges of

recording minutes while contributing actively to discussion was noted and members agreed to send any notes to the Chair following the meeting. Once everyone had settled, Linda led a round of introductions welcoming in particular Martin Goeber to his first meeting of WG SERA as a new member and David Johnston who has recently retired as the IRDR representative. Aida Diongue-Niang sent her apologies. Brian Mills advised that although no longer an official WG SERA member he would continue to support the working group when possible and would attend meetings when they coincided with HIWeather Project meetings.

2. Review and Adoption of the Meeting Agenda

The agenda (Appendix A) was reviewed and approved and working arrangements discussed. Amendments to the agenda included the addition of a short HIWeather Project presentation by Brian Golding; Sarah Jones to join the meeting on Day 2 as an observer; and David Johnston to lead discussion in Agenda Items 8 and 9. The need to ensure that adequate time was allowed within the Agenda to discuss the WWRP HIWeather Project and actual SERA plans and priorities was emphasised and agreed.

3. Minutes and Actions

Draft minutes from Key West (Nov 2015) were circulated to members just prior to the meeting. Members reviewed the Minutes and Actions and, due to the short time frame for adequate consideration, agreed to review and provide any updated text to Linda before the close of the meeting. Action items were reviewed. Ongoing actions were discussed within the Agenda.

Particular discussion around action items relating to Impact-based forecasting focussed on the need to consider building greater connection with those at risk. Community-based efforts and the general demand for impact information is rising, this is somewhat a function of our efforts to raise the profile/importance and now societies are asking for the information. The demand for impact and risk based messaging in weather warnings and information seems to be ahead of the capacity of weather services to actually implement (operationalize); training workshop are somewhat useful but the basic systems (for routine weather forecast parameters) are still lacking in many developing countries. Brian Mills agreed to re-send the WMO Multi-hazards Impact Forecasting Guidelines book to members.

As a WG, members acknowledged the need to be careful about how much work we draw to us, noting our limited capacity, especially when the needs are often for local social scientific research and knowledge.

ACTION 1: Brian Mills to re-send the WMO Multi-hazards Impact Forecasting Guidelines book to members.

4. Members' Roundtable

Members presented a a short discussion of current national activities relevant to SERA – the contribution of societal and economic based research to their respective NMHS's in the context of support for warnings services specifically and weather forecast services generally.

Adriaan Perrels (FMI)

Adrian provided updates on FMI and more general EU activities. He noted that as FMI has a relative large R&D division (340 of the 690 employees) it is hard to provide a complete overview. He largely referred to projects in which the FMI Climate Service Centre is involved. A significant part of the projects of FMI CSC are not close to the focal areas of SERA (effectiveness of weather and warning information; DRR related topics), instead deal for

example with forest management and climate change. Projects relevant to SERA are (by funding source):

- **EU**

- **TOPDAD** – Economic evaluation of climate change impacts and adaptation options for energy, transport and tourism in Europe. Parts of the study most relevant for SERA are (1) the assessment of weather/warning information in case of urban downpours, and (2) the role of innovation in weather and climate services and the consequences for evaluation approaches (see: <http://www.topdad.eu/> and especially: <http://topdad.services.geodesk.nl/home>). The project ended 30.9.2015;
- **RAIN** – about the vulnerability of energy, telecom and transport infrastructure with respect to extreme weather; includes risk analyses, and societal implications of infrastructure failure <http://rain-project.eu/> . The project is ongoing
- **iScape** – new EU project dealing with effects of climate change in cities and ecosystem services with special reference to air quality and health (examines both physical and socio-economic effects)

- **Finnish Academy**

- **PLUMES** – This project assesses pathways linking uncertainties in model projections of climate and its effects; next to new downscaled projections for Finland it also presents assessments of the contribution of different sources of uncertainty to the overall uncertainty of climate change impacts – with special references to agriculture and human health <http://en.ilmatieteenlaitos.fi/plumes> (ongoing)
- **ADAPT** - projects on forest management and climate change, including damage risks and prevention options <http://en.ilmatieteenlaitos.fi/adapt-project> (ongoing)
- **RECAST** – the study assessed the impacts of climate change induced uncertainty and growth of climate variability on the social and economic coping range of selected infrastructure and real estate, with the aim to generate insights, methods and procedures that enable better adaptation to climate change, i.e. leading to recasting of asset management approaches; also in this study information effect analysis (effects of publication of flood risks maps on real estate prices - <http://link.springer.com/article/10.1007/s11146-015-9530-3>)

- **Nordic Council**

- **NORDRESS** – the acronym stands for Nordic Centre of Excellence for Societal Security regarding Natural Hazards; among others this project looks at innovation and climate in the context of multiple sources of change (e.g. participatory observations/science; open data); it offers a lot of linking opportunities with the HIW programme (I made a separate note for that); in the meantime the NORDRESS coordinator has agreed that cooperation with HIW activities can be sought <http://nordress.hi.is/>
- **ERMOND** - Ecosystem resilience for mitigation of natural disasters; the most interesting part for SERA is the attempt to create a common database of natural disasters in the Nordic region and how ecological restoration actions can be used to mitigate such hazards; <http://ermond.land.is/>

- **Arctic topics**

- **TWASE:** influence of better weather and ice services on development of economic activities in the Arctic (so far mainly a scenario study was conducted;
<https://helda.helsinki.fi/bitstream/handle/10138/160254/2016nro1.pdf?sequence=1>)
- see also <http://polar-meteorology.fmi.fi/projects.html>
- there is a proposal submitted for benefits for mid-latitude areas of improved forecasting in the Arctic, it includes a rating system to guide weather service investment decisions

ERA4CS – (ERANET for Climate Services – EU JPI Climate initiative) This entails a large programme of studies that should support development of climate services; there are two strains of funding:

- “in-cash” EU funding so long as support and co-funding received from national science councils/foundations
- “in-kind” (non-EU) pool as well that has a broad interest in general preparedness and impacts focus (could be relevant to SERA interests) – FMI participates only in this part (but through several consortium applications, often also entailing some kind of societal impact or effectiveness element)

For HIWeather Project and the implementation of the SENDAI Framework for DRR the **EU Critical Infrastructure Program** could be interesting, which aims at systematic inclusion of resilience strategies and action plans for all CI in the EU, and with particular attention to cross infrastructure an cross-border information sharing (which is usually a weak point)

WMO-RAVI – Task Team on Societal and Economic Benefits (TT- SEB) – this is one of the task teams of the Working Group on Service Delivery. This is the second period, in which we are focusing on the assessment of experiences with SEB studies in Europe – i.e. what has been done and how is available work/findings being used. TT-SEB is collecting information from several sources (including UK Met Office). As extension of TT-SEB we are preparing an EU COST action to establish funding for meetings, workshops, papers, and visits (3-4 month duration); some capacity to invite non-EU participants.

Joanne Robbins (UK Met Office)

Joanne reported that The UK Met Office is continuing to work towards increased use of impact and risk-based forecasting and warnings messaging and is increasing its links with the wider disaster risk community. UKMO staff attended the Understanding Risk Forum 2016 and the UNISDR Science and technology conference on the implementation of the Sendai Framework for disaster risk reduction 2015-2030). There a number of projects which are looking at different ways to visualise and use hazard, vulnerability and exposure data for forecasting at different scales. The Global Hazard Map (GHM) is one such project, which aims to forecast the probability of high-impact weather out to 7-days ahead around the globe. Recent collaborations with the Australian Bureau of Meteorology have enabled a global heatwave and coldwave diagnostic to be implemented and over the previous year, this and the whole GHM system have been evaluated. One key feature of impact and risk-based forecasting is the difficult nature of evaluation and therefore, in this evaluation report both traditional verification techniques and a new approach for comparing socio-economic impact information against forecast high-impact weather events have been used. This new approach aims to assess whether GHM is accurately capturing those extreme weather events which lead to impacts. Based on the results it is hoped that improvements in the way hazard, vulnerability and exposure data are visualised could improve risk and impact communication. The full report will be made available shortly.

The Met Office has also been involved in a number of research proposals submitted to the Science for Humanitarian Emergencies & Resilience (SHEAR) international research programme (<http://www.nerc.ac.uk/research/funded/programmes/shear/>). This is jointly funded by the UK's Department for International Development, NERC and the Economic & Social Research Council. The overall SHEAR programme focuses on four areas: disaster risk assessment (mapping and analyses), sub-seasonal to seasonal forecasting, disaster risk monitoring, and the integration of these into practical decision making. The programme is targeting lower to middle income countries across sub-Saharan Africa and south Asia, focusing on the co-production of knowledge using a multi-disciplinary and problem-centred approach. We are awaiting decisions on the proposals submitted through a number of consortia. Some of the research aims and techniques outlined in these proposals could feed into the WMO HiWeather project. '

Ben Jou (ACTS)

Ben explained the relationship and partnership between APEC Center for Typhoon and Society (ACTS), the Philippines Department of Science and Technology (DOST)-PAGASA and Taiwan Ministry of Science and Technology (MOST). He noted the 2015 Annual APEC Typhoon Symposium (APTS) was held in UP-Institute of Environmental Science and Meteorology (IESM) Auditorium, Manila. The sub-title of the symposium was: Lessons learned from disastrous typhoons. Three major fora have been progressed, including typhoon meteorology, hydrology/flood, and impacts of typhoon on society. The symposium was also looking at flood resilience/food security issues in Thailand; USAID and The World Bank has expressed interest. Speakers included Administrator of PAGASA, who talked about the typhoon emergency response in the Philippines and the role of PAGASA; Dr. Vijay Tallapragada of NOAA talked about the current capability of HWRF; and Professor Michael Bell of Hawaii University talked about polarimetric radar application on model validation. In addition, Prof. Juan Pulhin of UP Los Banos talked about the socio-economic impacts of the 2004 typhoon disaster in Eastern Luzon. 2016 APTS is to be held at Taipei on late May.

Other institutions ACTS works closely with include:

- National Centre for Disaster Reduction (NCDR) -
 - Code web-based WATCH system of warnings and knowledge transfer/interpretation functions to enhance decision-making processes by local and central government.
- Taiwan Typhoon and Flood Research Institute (TTFRI)
 - Focus on typhoon track and rainfall prediction uncertainty study (WRF based experimental ensemble forecasting systems).
- Ben explained general interactions between Central and local government agencies. Traditionally two separate systems but now the Central authority is requiring local governments to submit their information.

Martin Goeber (Hans Ertel Centre for Weather Research)

Martin has recently joined the WG SERA and brings with him the value of his experience of his work in the verification working group (JWGFVR) over the past several years. His work at the Hans Ertel Centre involves a range of projects that focus on societal/user aspects of weather related research. There is a research emphasis on the communication and use of forecasts; impact-based forecasts and evaluation.

Behavioural aspects are examined in cooperation with MPI researchers. A major study involves introducing uncertainty information to forecasts/advice used by Fire Brigade emergency response system and examining the extent of the use of the new information.

Research activities are supplemented with communication and behavioural experiments and surveys - he advised that data will eventually be made available.

Linda Anderson-Berry (Australian Bureau of Meteorology)

Linda provided detail of the progress of the Australian National Resilience Framework. A program of linked nationally funded projects that aims to deliver a 'Resilient Australia' with a focus on building capability in national risk assessment measurement and mitigation; community engagement; recovery and capability development.

The Bureau of Meteorology is slowly working towards developing an impact based forecasting and risk based warnings capability. Linda noted that her program within the Hazard Prediction Branch has been renamed Hazard Risk and Resilience and the strategic priorities of the work program is to be redefined to support impact and risk based service development and delivery.

A National Review of Warnings and Information (NRWI) to investigate, across a multi-hazard and national sphere, how warnings and information are provided to the community has been completed. The review was prompted by what was considered to have been a series of warnings failures in major flood and fire events over a two to three year period. Throughout the review it became evident that there is confusion among all involved in providing emergency warnings messages about the roles and responsibilities of various agencies and that there is not a shared understanding of what constitutes a 'warning'. The Review identified a number of themes, ranging from policy and governance, the use and uptake of technology and to workforce management. The outcome has been the identification and the agreement of a need for a national approach in the provision of warnings and information in emergencies, and the desirability of national consistency across both policy and process. A national working group has been formed and funding is being sought for a project of national significance that will deliver a single national doctrinal publication articulating how warnings are constructed and disseminated for any nominated hazard. A series of supporting doctrinal publications including Good Practice Guides for Warnings is to be produced - These technical guides will be used by practitioners to better inform warning practice at an agency/jurisdictional level. A set of National Warnings Principles will be agreed and a nationally consistent warning framework, for multi-hazards is to be developed.

Brian Mills (Environment and Climate Change Canada)

Brian continues his personal research on understanding the impact of weather and climate on surface transportation/mobility and the use, effectiveness, and value of weather-related risk information in affecting decisions and behaviours. The scale of his work ranges from whole cities to individuals.

He is currently developing proposals to apply the WMO (2015) "*Valuing Weather and Climate: Economic Assessment of Meteorological and Hydrological Services*" guidelines to a possible "whole-of-service" or sector-specific study with ECCC (Meteorological Service of Canada and Science and Technology Branches).

He noted several efforts with the Meteorological Service of Canada (MSC) to re-engineer warnings, evaluate and further develop vigilance-based warning systems, develop risk-based warnings and decision support for heat and air quality hazards. He noted in particular the move to involve risk communication experts.

The research funding situation, while improving, is being directed towards Climate Change activities. Weather-focused work must show its relevance to the longer-term and bigger picture (e.g., NMHS and support services as a fundamental response to reduce risk associated with climate change; demonstrate the value of adopting a 'seamless' approach to prediction across ALL scales).

David Johnston (Massey/NZGS)

David advised that he is no longer a co-Chair with IRDR and that he has recently accepted the offer to co-Chair the WWRP HIWeather Project. He noted that Sally Potter now has a permanent position at Massey University and is continuing work on evaluating forecasts systems with the NZ Met Service. His student (Emma Hudson-Doyle) is researching the communication of uncertainty (quake aftershocks) and terminology across hazards and he is in discussion with NEWR (NZ equivalent to NOAA) about an MOU with Massey University to better link research on flooding and flood-related impacts. His colleague Julia Becker is conducting research in NZ, U.S., and Australia focussing on behaviours in response to flood warnings.

He noted the important role of IRDR and other international, high-level bodies studying risk and hazards. He commented that he has observed that generally there is limited social science capacity within NMHSs and that this is forcing relations with the university community

He further commented on the importance of social media and organized 'informal' sources of information (this participatory element is also coined 'citizen science').

5. WMO Activities Outcomes of recent WMO meetings

Nanette provided a report on two WMO meetings of note since the last SERA meeting in Florida:

a. WWRP Scientific Steering Committee (SSC)

Jane Rovins attended WWRP SSC and provided a written summary. In representing WG SERA She recalled that the primary purpose of the SERA working group is to advance the science of the social and economic application of weather-related information and services. She advised that in the past year, the group had moved beyond simply providing a liaison or "advisory" service to WWRP activities and is now focused on the development of specific research studies within the context of the three major WWRP research projects: PPP, S2S and HIWeather. She presented an overview of the status and accomplishments of the group this past year, which included: The successful User, Application and Social Science programme during the 2015 World Weather Open Science Conference (WWOSC 2014 Montreal); involvement with the 3 major WWRP legacy Projects: Brian Mills former chair of the WGSERA is currently a member of the SERA sub-committee of the PPP which had its inaugural organizing meeting in Ottawa, Canada (12-13 March, 2015. Joanne Robbins of the UKMO acts as the Liaison of the WGSERA to the S2S project. David Johnston, former representative to IRDR to the SERA working group is the new co-chair of the HIWeather project with Brian Mills taking the lead in the Vulnerability and Risk Theme of

the project. The issue of membership was discussed noting that two new members had been proposed and plans are to recruit four more including a representative of the ICSU/ISSC/UNISDR Integrated Research on Disaster Risk. The presentation and subsequent discussion underlined a central theme: that the progress so far achieved and the work still to be done by the WG SERA required collaborative effort across a number of disciplines and such activities are increasing in scope especially when dealing with the various WWRP RDP-FDP and its 3 major research projects.

Issues and questions arising from the discussion included comment that for WG SERA to be more relevant to NMHS's it needs to have more diverse representation of the social sciences and other disciplines. Currently half of the group members are physical scientists. The importance of active involvement of the working group in all WWRP projects was stressed and that the active involvement of young scientists in its work should be explored. The benefits of working with WCRP was highlighted, particularly with GEWEX which together with the research programme "International Human Dimensions of Global Environmental Change" (IHDP) is working to foster high quality research aimed at describing, analysing and understanding the human dimensions of global environmental change which considers not only the physical science but also societal aspects and economy information.

A recorded action arising from the meeting was that WG SERA consider social scientists either from Latin America or the Caribbean to augment their current membership.

Ms Celeste Saulo (PR Argentina) was designated the WWRP SSC focal point for WG SERA.

b. Meeting of Presidents of WMO Technical Commissions (PTC-2016)

During the meeting, the presidents of the commissions underlined the importance of research and development (R&D) in determining what kind of observations are needed and concluded that there is a need for WMO Members to invest in R&D initiatives.

The Commission for Atmospheric Sciences and the other technical commissions of WMO were tasked to prepare a set of essays addressing emerging data issues including big data, social media etc. This essays may include topics on the a) relevance of, and issues encountered (or perceived) with respect to, managing big and non-conventional data b) Issues encountered (or perceived) with respect to working with non-conventional sources c) Challenges, opportunities, risks, and benefits.

Nanette noted the preparation of the essays on the above issues and discussion considering how WMO can advise on the state of indicators which reflect the availability, accessibility, and use of weather and climate services.

6. WGSERA activities in on-going WWRP and other WMO projects

PPP-SERA (Brian Mills)

The PPP-SERA subcommittee is composed of social and interdisciplinary researchers or subject matter professionals with experience in polar regions. Drawn largely from the climate adaptation field, the group met for the second time in New Zealand in April 2016 to further develop an action plan and begin crafting a scoping document that will detail important research and application issues and gaps and suggest how they should and will be addressed. Writing tasks were included in the meeting agenda as were interviews with actual polar stakeholders representing information users in the fishing, tourism, and expedition research sectors (this model might work well for future WGSERA meetings). The group is now co-chaired by Jackie Dawson (Canada), Machiel Lamers (Netherlands), and

Daniela Liggett (New Zealand). The meeting reports and additional documentation are available on the Polar Prediction Project web site (<http://polarprediction.net/>). WGSERA might consider this pool of experts when developing membership renewal plans.

Subseasonal to Seasonal (S2S) Prediction Project (Joanne Robbins)

For the benefit of newer members to the group Joanne reiterated that the main goal of the WWRP/THORPEX/ WCRP joint research project is to improve forecast skill and understanding on the subseasonal to seasonal timescale, and promote its uptake by operational centres and exploitation by the applications community. Specific attention will be paid to the risk of extreme weather, including tropical cyclones, droughts, floods, heat waves and the waxing and waning of monsoon precipitation. Work is guided by a steering group that is working in conjunction with appropriate WMO bodies and other relevant structures.

She noted that the 4th Steering Group meeting had been held 6 November 2015 – hosted by ECMWF (minutes are available <http://s2sprediction.net/>)

She further noted that S2S Extremes Workshop 2016 (*Workshop on Sub-Seasonal to Seasonal Predictability of Extreme Weather and Climate*) will be held at Monell Building, Columbia University at Lamont-Doherty Earth Observatory Campus, 61 Route 9W, Palisades, NY 10964-8000 from 6 to 7 December 2016, hosted by the [International Research Institute for Climate and Society \(IRI\)](#), the [Extreme Weather & Climate Initiative \(Extreme Weather\)](#), and the [WWRP/WCRP Sub-Seasonal to Seasonal Prediction Project \(S2S\)](#).

CIFDP

Linda has represented WG SERA on the Coastal Inundation Forecasting Demonstration Project steering group since 2009. The project aims to assist countries to manage issues of coastal inundation from oceanographic and/or hydrological phenomena or resulting from severe hydro-meteorological events and, to operate and maintain a reliable forecasting system that helps the national decision-making for coastal management. The project began as a concept that was to be tested through two case studies – Bangladesh and Dominican Republic and over time, and with success, has grown to a concept that is being delivered through a number of sub-projects. Current projects are in Bangladesh, Fiji, Indonesia, and the Caribbean (expanded from Dominican Republic). Planned future sub-projects are Shanghai and South Africa. The CIFDP steering group met in Florida following the WGSERA meeting in 2015 the status of all sub-projects was reported. Bangladesh is the most advanced, now being in the final phase, Fiji is back on track with funding support secured from Korea and Jamie Rhome from the US National Hurricane Centre will lead the Caribbean sub-project. The next steering group meeting is planned for late 2016.

HIWeather Project (discussion deferred to Agenda 10)

7. WWRP Strategic and Implementation Plan

Nanette reviewed the four societal challenges of the WMO Strategic Plan (urbanizations, new technologies, climate and weather extremes and water) and then provided specific comments and directions for SERA that stemmed from the 2015 WWRP Scientific Steering Committee meeting.

She noted a recommendation for closer collaboration with the DAOS WG. This could mean involvement in designing Observation Simulation Experiments (OSEs); examining how

SERA research could direct future weather science; the use of non-meteorological observations (crowdsourcing, citizen science, etc.); and, guidance for formatting and archiving impact and other non-met data.

ACTION 2: Nanette to discuss with DAOS and provide a recommendation to SERA members on a path forward to better define needs.

Sarah Jones joined the meeting and advised of the progress of the WWRP IP. She acknowledged SERA input to date and agreed that the contribution was necessarily high level. Neil Gordon is finalising the draft Implementation Plan and is now preparing Booklet 1 and Booklet 2" which will define project work in support of WWRP Strategic Plan It is expected that these will be updated in four years for the 2020-2027 timeframe.

Members workshopped final SERA input to the IP and for Booklet 1 throughout the meeting and agreed to provide input for Booklet 2 following the meeting.

The intention to have an *annual* compilation of the next level of detail "Booklet 3" that will focus in more detail on activities to support the 8-year plan for the next two years was noted.

ACTION 3: Members to review the WWRP-IP and Booklets 1 and 2 and respond with comments to LAB/JR

8. Sendai Framework

David Johnston led discussion. He distributed a Sendai Framework for DRR review paper that provides a very salient and concise synthesis of Sendai outcomes (Appendix 2). It was noted that the Framework could be used to situate the HIWeather Project and raise the profile of potential benefits/contributions.

It was acknowledged that the WMO DRR program will support delivering WMO Sendai commitments, including standardizing the characterization and cataloguing of extreme events. Planned discussion on WMO Disaster Risk Reduction (DRR) Program was deferred as the new Chief Alastair Hainsworth was not available to attend the meeting.

9. IRDR

The WG SERA / IRDR working relationship was discussed at length. It was acknowledged that collaborative arrangements set up under the current MOU had never been fully enabled and with the departure of David Johnston the current IRDR membership position on WG SERA is now vacant. The high mutual value of a strong collaboration between both groups was agreed. David Johnston led discussion reviewing IRDR context and history and provided detail on activities of its four thematic working groups and International Centres of Excellence. He noted that a new IRDR Science Committee is in place and a call for a new director has been issued. There is now an opportunity to review and renew the relationship. He advised that WG SERA would be invited to its next meeting, currently proposed for May 6th 2016, in Paris. Members agreed that Ben Jou, with the support of Adriaan Perrels would represent WG SERA and manage the SERA / IRDR working relationship

ACTION 4: Summary of WG SERA working arrangements and minutes of Exeter meeting to be Tabled at the next appropriate IRDR meeting.

10. HIWeather Project

Brian Golding joined the meeting and provided an overview of current status of HIWeather Project planning. He highlighted aspects of the HIVR, Communication, and Evaluation Task Teams of the project where WG SERA involvement is needed. (Appendix 3) **attach workshop presentation**. WG SERA continues to take an active role in the HIWeather Project with David Johnston the newly appointed co-chair of the project and all current and several past members actively participating in specific themes. WG SERA members identified additional roles within HIWeather Project ensuring there is representation and support in all task teams.

The members provided comment relating to transferring new science on effective communication, including appropriate strategies for different societies, into operational weather forecasting. Discussion ensued about what is meant by 'effective', the relative importance of capacity to use information compared to impact of better (more precise, accurate, etc.) information, mismatches between the scale of available information and the scale of response/decisions, and the general roles for both "evidence-based practice AND practice-based evidence" in these studies/discussions.

11. Future Plans (Events/Publications/Outreach/Joint Activities with other WWRP Working Groups & Projects)

Time was allowed for extended discussion on determining a process for how WG SERA can contribute in a more tangible and concrete way specifically to WWRP working groups and projects and more generally across the greater WMO community. It was acknowledged that the group has a powerful social science capability, both individually among the members and collectively. WG SERA is cross-cutting and is in a unique position to provide social science capability and support. However, the group is small, has limited funding and meets face-to-face just once annually. After much discussion it was agreed that members would continue to individually represent the group in WWRP legacy projects and all HIWeather task teams.

It was further agreed that the group would prepare a discussion paper considering the discovery, accessibility and utility of a range of databases and datasets that are supportive of impact based forecasting and risk based warnings decision making. The vast majority of this data has been collected and is managed for non-meteorological purposes. The paper will open a discussion on the challenges of how such data can be made available and accessible for meteorological decision making purposes.

ACTION 5 – Scope and commence development of a discussion paper focussing on the challenges around the discovery and application of non-meteorological data in support of the weather services move towards the development of impacts forecasting and risk- based warnings services.

12. Membership

The meeting noted the current membership remains low as recently retired members have not yet been fully replaced. Members agreed with the deliberations at WWRP SSC and acknowledged that there is an imbalance between social and physical science skill in the current makeup of the working group. The need for diversity in both skill and national representation was noted. It was agreed that greater representation from Latin America would be preferred - particularly early career social scientists (acknowledging the challenge of balance with experience).

NAME	AFFILIATION	COUNTRY	EXPERT CONTRIBUTION
Linda Anderson-Berry (co-Chair)	Bureau of Meteorology (Australia)	Australia	Social scientist; Risk communication; Risk perception, Warnings vulnerability / resilience
Jane Rovins (co-Chair)	Consultant expert	International	Risk science policy
Vacant (David Johnston recently retired)	IRDR	International	Integrated disaster research
Joanne Robbins	UKMO	UK	Scientist – meteorology and earth sciences
Jan Eichner	Munich-Re	International	Economist
Adriaan Perrels	FMI	Finland	Economist – support focal point IRDR
Ben Jou	PSA	Taiwan	Atmospheric scientist; focal point for IRDR
Martin Goeber	DWD	Germany	Meteorologist; Atmospheric scientist; focal point verification group
Aida Diongue-Niang	ANACIM	Senegal	Meteorologist; Atmospheric scientist; focal point on African projects
VACANT			
VACANT			

Members were invited to nominate appropriate social scientists for consideration for SERA membership agreed to provide suggestions of names of suitable candidates for possible membership.

[ACTION 6: Members to provide details of prospective SERA members to Co-Chairs](#)

SERA alumni

To retain access to the skill and experience of former WG SERA members it was agreed at the Florida meeting that a WG SERA alumni be established. Former members have been contacted and several have agreed to become part of the alumni, often expressing appreciation for the opportunity to remain involved. Current (confirmed) alumni includes Eugene Poolman, Kwabena Anaman, Jeff Lazo and Brian Mills.

13. Review of Action Items of the Meeting

Nanette recorded Action Items as they arose. However, due to extended planning discussion these were not reviewed before the meeting closed. It was agreed that Actions will be sent to members for review with the draft

ACTION 6 List of Action Items arising from the meeting to be circulated to Members for review and inclusion in the Draft Meeting Minutes

14. Next meeting

The next meeting is planned for Cancun Mexico in May 2017 concurrent with the 5th Global Platform for Disaster Risk Reduction.

Meeting closed 5:45 pm. Members were thanked for their concentrated efforts and contribution throughout the meeting. All were invited to participate in the HIWeather workshop over the following three days.

**ACTION SHEET (WGSERA annual meeting)
(Exeter, UK, 25-26 April 2016)**

Subject Area	Decision/Action Required	Responsible	Deadline	Focal Point/Remarks/ Status of Action
Outstanding action items from last meeting (Key West, Florida, 10-11 Nov 2015)				
WMO meetings/events	Update on Madrid Action Plan (2007) and information on planned Madrid + 10 conference	Secretariat	ASAP	Available at Exeter meeting but was not able to discuss so Nanette will provide info to SERA members by posting in google drive
WMO meetings/events	NL to liaise with Aida DN and propose her to be the SERA representative (in an advisory capacity) to the proposed IRI project with NERC on Africa flooding and drought	Secretariat	ASAP	Aida DN agreed pending approval of project. In the meantime, the group was informed that Joanne is already involved with the said project in her capacity as UKMO staff and so it was more practical that she be the SERA representative to the said project instead of

Subject Area	Decision/Action Required	Responsible	Deadline	Focal Point/Remarks/ Status of Action
				Aida
IRDR Data Project	SERA members to be provided Data Project Report No. 2: Guidelines on Measuring Losses from Disasters	Jane	ASAP	Done
	To coordinate with IRDR re: data loss	Jane	ASAP	ON-GOING
South Africa Flood Forecasting System Project	SERA to review report	Linda	ASAP	Linda to request report from Eugene Poolman Nanette to follow-up
Extreme Forecast Index (EFI)	SERA to help or provide guidance in developing an "impact-based metric that would better capture a more complete account of event risk and thus complement the existing EFI.	ALL	ASAP	Joanne (S2S connection)

Subject Area	Decision/Action Required	Responsible	Deadline	Focal Point/Remarks/ Status of Action
S2S database	To provide SERA with links to S2S database for socio-economic analysis	Joanne	ASAP	
Membership	Co-chairs to invite former SERA members to SERA alumni group	Co-chairs	ASAP	To follow-up: Eugene – Linda Paul – Brian
IRDR	SERA to receive update on IRDR activities	David	ASAP	Provided during Exeter meeting
Sendai Framework for DRR 2015 – 2030	SERA members to provide information on national activities related to the Sendai Framework	ALL	ASAP	Provided during Exeter meeting (see minutes)
Regular conference calls	To schedule conference calls (WebEx) during the year ideally on a quarterly basis	Secretariat	ASAP	ON-GOING
New Action Items				
Citizen Science: empowering communities	SERA to receive copy of review article: Risk Interpretation and Action: a conceptual framework for responses to natural hazards	David	ASAP	Done

Subject Area	Decision/Action Required	Responsible	Deadline	Focal Point/Remarks/ Status of Action
	SERA to receive link to project website	Martin	ASAP	
WWRP Implementation Plan	Review comments made during Exeter meeting on the draft implementation plan	ALL	6 May 2016	Nanette to follow-up
	SERA to discuss with DAOS proposed collaboration on “future coupled multi-scale systems ensembles and running ensemble data assimilation coupled system	Co-chairs	ASAP	Nanette to follow-up
	Provide input on item “transfer new science on effective communication, including appropriate strategies for different societies, into operational weather forecasting”	ALL	6 May 2016	Nanette to follow-up
	Provide next 2 years (2016-2017) Gantt Chart	ALL	6 May 2016	Led by co-chairs Nanette to follow-up

Subject Area	Decision/Action Required	Responsible	Deadline	Focal Point/Remarks/ Status of Action
	Provide input to education, training or capacity building activities for 2016-2023	ALL	6 May 2016	Led by co-chairs Nanette to follow-up
WWRP/SERA and IRDR	Provide IRDR Science Committee (SC) meeting with summary report of Exeter meeting	Linda & Nanette	Before 5 may IRDR SC meeting	Nanette to send report to IRDR IPO Ben designated SERA focal point on IRDR matters assisted by Adriaan
	Seek ways to revitalize relationship between WWRP/SERA and IRDR	Secretariat & co-chairs	ASAP	Secretariat to follow-up
Impact Based Forecasting	SERA to critique/review WMO publication: (# 1150): WMO Guidelines on Multi-Hazard Impact-based Forecast and Warning Services	ALL	ASAP	Nanette to post on google drive

Subject Area	Decision/Action Required	Responsible	Deadline	Focal Point/Remarks/ Status of Action
HIWeather Project	SERA Members to join HIWeather task teams	ALL		Multi-scale forecasting – Ben Vulnerability & risk – Brian & Joanne Communication – Linda Evaluation – Martin & Adriaan
	SERA to prepare a discussion/review paper on data management (with focus on non-met data set) as contribution to HIWeather	All	6-12 months	Co-chairs to lead
Future Plans	SERA to organize a scientific meeting with WGTMR sometime in 2017 to discuss a planned workshop as recommended by IWTC8 to focus on societal impacts for the purpose of advancing the Total Warning System concept and for the sharing of relevant experiences	Secrariat & co-chairs	Before annual meeting of WGTMR in Oct 2016	Nanette to follow-up
	JWGFVR and SERA to design an assessment project around TC forecasting that addresses	SERA & JWGFVR	Before annual meeting of JWGFVR in Sep 2016	Nanette to coordinate and request volunteers from each group on

Subject Area	Decision/Action Required	Responsible	Deadline	Focal Point/Remarks/ Status of Action
	<p>not only user needs for warning information but also research questions about the accuracy and effectiveness of the forecasts and verification. The group will liaise with the appropriate WWRP & CBS groups at all stages of the work.</p>			<p>who will work on this project</p>
	<p>Organize next annual meeting of SERA preferably jointly with WGTMR and a DRR and/or activity</p>	<p>Secretariat & co-chairs</p>	<p>ASAP</p>	<p>One possibility is the 2017 Global Platform (22-26 May, Cancun, Mexico)</p>

