

WORLD METEOROLOGICAL ORGANIZATION

WMO RA III Capacity Building Workshop on Impact-based forecast and Warning Services (IBFWS) and on the Common Alerting Protocol (CAP)

Buenos Aires, Argentina

10-14, September 2018



Final Report



1. INTRODUCTION

1.1 WMO RA III (South America) Capacity Building Workshop on Impact-based forecast and Warning Services (IBFWS) and on the Common Alerting Protocol (CAP) first of its kind in the Region, was hosted by the World Meteorological Organization (WMO) and the Servicio Meteorologico Nacional of Argentina (SMN) on 10-14 September, 2018 at the SMN facilities.

1.2 References:

- Decision 4 (EC-69), Impact-Based Decision Support Services which emphasized the importance of Members to implement IBF; the potential to use Regional Training Centres (RTCs) to accelerate acquisition of knowledge and skills; and the need for exchange of digital data to support impact-based forecasting.
- WMO Strategic Plan 2020-2023 (under development).
- WMO Commission for Basic Systems, Management Group, 17th Session, (CBS-MG-17) Final Report.
- Recommendation by the Implementation-Coordination Team on Public Weather Service Delivery (CBS-OPAG ICT-PWSD) meeting (2017, Beijing, China).
- Decision 3 (EC-69) WMO Global Multi-Hazard Alert System (GMAS) and Meeting of the Expert Group on WMO Global Multi-Hazard Alert System (EG-GMAS), (Oct. 2017, WMO), Summary Report.
- CSB-Proyecto de Demostracion de las Predicciones de Fenomenos Meteorologicos Extremos (Paraguay, Oct. 2017).
- WWRP-WG SERA (Working Group on Societal and Economic Research applications).
- Decision 12 EC-70 Symposium to collect Members experiences with IBFWS.
- Decision 13 EC-70 Endorsement of the fundamental WMO Competency Requirements for Public Weather Forecasters, Annex 1. (WMO-No.49, Volume I, Part V)
- (EC-61 Paragraph 3.5.2.7) Endorsement of the Common Alerting Protocol (CAP) standard to improve the effectiveness and efficiency of alerting systems, and consequently encouraged WMO Members to adopt it.

1.3 Dr. Celeste Saulo, Director of SMN and Permanent Representative of Argentina and Ms. Miriam Andrioli, WMO Weather and Disaster Risk Reduction Dept. (WDS) - Service Delivery Div. (SDD) Chief, participated in the opening with welcome speeches addressed to the local authorities and representatives of the participating countries to the workshop.

1.4 The workshop was attended by:

Participants: members of the RAIII WG on Infrastructure and Technology Development or IT specialized designated person; RAIII NMHSs representatives and Disaster

Management / Civil Protection Authorities representatives. Other stakeholders: Media representatives.

Observers: Dr. Seungkyun Park and Dr. Young-Youn Park from the Korean Meteorological Agency (KMA). The representatives expressed KMA's interest in acquiring the necessary inputs in preparation for the 2nd. WMO RA II (Asia) Impact-based forecast workshop to be held in Seoul, Korea, Nov.2018.

The list of participants is contained in **Appendix I** to this report.

2. ORGANIZATION OF THE WORKSHOP

2.1 The Workshop was organized at the invitation of the Government of Argentina following a request and kind offer of venue by the Permanent Representative of Argentina with WMO. WMO CBS/OPAG-Public Weather Services Delivery (PWSD) Programme, WMO Weather and Disaster Risk Reduction Dept./Service Delivery Div. (WDS/SDD) and SMN of Argentina co-organized the Workshop. It was co-sponsored by SMN of Argentina, WMO, USAID and RES through the World Weather Research Programme - Working Group on Societal and Economic Research applications (WWRP - WG SERA). WMO ETR (Education and Training) Programme and the Regional Training Centre (RTC)- SMN-Argentina were also instrumental during the organization and development of the Workshop.

2.2 Mr. Guillermo Navarro, President of RAIII; Mr. Julian Baez, Director WMO Regional Office for the Americas and Mr. Andres Orias, Programme Officer, Regional Office for the Americas provided their valuable support during the organization process.

2.3 Overall organization: WDS/SDD, WMO ETR (Education and Training) Programme, Servicio Meteorologico Nacional of Argentina and Regional Training Centre (RTC)- SMN-Argentina.

2.4 WMO ETR Programme and RTC-SMN-Argentina's contribution to the Workshop:

WMO ETRP

- Provided visibility among other RTCs and ETR NFPs (National Focal Points);
- Encouraged RTCs future offerings of new versions of the Workshop for other RAs;
- Resources/material captured during the Workshop will be made available through the **Global Campus E-Library** (to be implemented by ETR);
- Development of a dedicated library site cap.wmo.int [here](#) for the availability of CAP modules (in English, Spanish and French languages).

RTC-SMN-Argentina

- Comprehensive RTC-SMN-Argentina site created for the Workshop (link at <https://crf.smn.gob.ar/course/view.php?id=2>)
- CAP Jump Start materials distributed on USB drives during sessions.
- CAP modules in English and Spanish languages available at the ETR dedicated site and linked to the RTC-SMN-Argentina Workshop site.
- RTC-SMN-Argentina translated a CAP Module, lecturers' presentations and related material into Spanish.

Working arrangements and full detailed information of the Sessions are described in the workshop programme, **Appendix II** to this report.

2.5 Moderators to the Workshop:

- **Ms. Julia Chasco (Arg.)**, member Task Team 5: User oriented evaluation. High Impact Weather Project – WWRP and Member of Working Group Societal and Economics Research Application (SERA) – WWRP.
- **Ms. Carolina Cerrudo (Arg.)**, member CBS-OPAG/PWSD ET-IMPACT (Expert Team on Impact of Multi-hazard prediction and Communication).

2.6 Experts' presentations:

- Ms. Andrioli delivered a presentation emphasizing the importance of the NMHSs Service Delivery with a description of its Strategy and Implementation Plan. She highlighted the relevance of the IBFWS as a paramount component of such services and focused on its development and provision worldwide, she also introduced the contents of the WMO Guidelines on Multi-hazard Impact-based Forecast and Warning Services publication (WMO No.1150) to the audience. In addition she pointed out the WMO's role in supporting WMO Members to keep abreast of the new developments and innovations. During the CAP part of the Workshop, Ms. Andrioli delivered a presentation on the CAP implementation status in WMO RA III.
- Ms. Andrioli described the expected objectives of the workshop as recommended by the Implementation-Coordination Team on Public Weather Service Delivery (CBS-OPAG ICT-PWSD) meeting (Beijing, China, 2017) explaining that its outcomes will be considered by both the CBS-OPAG/PWSD Task Teams and the WMO SDD as drivers for their future work.

2.7 CAP Workshop (10-11 September, 2018)

2.7.1 Expert/Lecturer: Mr. Eliot Christian

2.7.2 Base line documentation:

"WMO Report on status of the Common Alerting Protocol (CAP) news feeds on the WMO Register of Alerting Authorities and other sources in WMO RA III" produced by WDS/SDD (2018) [here](#)

2.7.3 Audience:

Day one (Sept. 10th, 2018, full day): IT experts (technical approach).

Day two (Sept. 10th, 2018, morning session): IT experts, NMHSs and EMA's representatives (for a comprehensive, cross-cutting IBF-CAP approach).

2.7.4 Activities during the CAP part of the workshop:

- Presentation on the CAP implementation status in RAIII by WMO representative.

a) CAP Jump Start

- Introducing the CAP standard and the WMO Register of Alerting Authorities;
- Implementing a source of CAP Alerts;
- Publishing a CAP Alert News Feed;

- Practical session: Implementing Freeware (install the CAP Editor freeware) for creating and publishing CAP alerts including steps for implementing CAP locally.

b) discussion on CAP implementation in RAIII Member countries.

Note: Mr. Eliot Christian's Report on the CAP part of the workshop included (See **Appendix 3**)

2.8 IBFWS Workshop (11-14 September, 2018)

2.8.1 **Experts/Lecturers:** Mr. James Taylor (BoM), Ms. Adriana Cuartas (CEMADEM), Ms. Joanne Robbins (UK Met Office), Ms. Anne Charlat-Abeille (Meteo France), Civil Defense of Argentina, Mr. Pedro Lohigorry (SMN, Argentina), Ms. Miriam Andrioli (WMO), Dr. Young-Youn Park (KMA), Mr. Eliot Christian (on CAP-IBFWS linked matters); Ms. Julia Chasco and AccuWeather representatives Mr. M. Alto and Mr. E. Michielli.

2.8.2 Base line documentation:

Outcomes of the "Virtual Workshop: Meteorology in the context of Disaster Risk Reduction"(RTC-SMN-Argentina, 2017) [here](#)

2.8.3 Activities during the IBFWS part of the workshop:

- Lectures were provided on the following subjects throughout the sessions:
 - The WMO Public Weather Services Programme and the WMO Guidelines on Multi-hazard Impact-based forecast and Warning Services (WMO No.1150) by WMO representative.
 - Impact analysis: types and formats of information sources, data bases integration, data validation.
 - Australia's experience (BoM)
 - Official information on IBFWS relevant to EMAs, (Arg. Civil Defense)
 - Building an IBF data matrix.
 - Developing thresholds in accordance to impacts.
 - IBF and temporary scales.
 - Vulnerability, exposure and impact integration into forecasts.
 - Post event verification and evaluation. Real time verification method using social media (Argentina's experience).
 - The paradigm shift
 - Channels of communication of IBFWS. Public private partnerships (AccuWeather)
 - Korea's experience (KMA).
 - Open debate.

In Addition,

- Presentation on Servicio Meteorologico Nacional of Argentina's support to the Olympic Committee, Youth Olympic Games 2018. [here](#)

3. REVIEW OF THE CURRENT STATE, OUTCOMES, THE WAY FORWARD

3.1 Members' representatives provided a comprehensive overview on the current state of the alerting system and/or IBFWS in their respective countries followed by discussions on challenges and on relevant topics.

3.2 Presentations of the 12 (twelve) WMO RAIII Members available [here](#). (A joint NMHS-EMA presentation was delivered in most of the cases).

3.3 Current state and challenges by country

Argentina

- Related National legislation: "Sistema Nacional para la Gestión Integral del Riesgo (SINAGIR)" (2016).
- A joint work is performed among 3 Institutions: Servicio Meteorológico Nacional (SMN) of Argentina, the Secretaria de Protección Civil (Ministerio de Seguridad) and Defensa Civil.
- SMN of Argentina has a "Meteorology and Society" Dept. within its structure, its regular staff is composed by Sociologists, Anthropologists and Geographers. It assists the Forecasting Dept.'s activities on daily basis.
- SMN of Argentina currently issues Weekly outlooks on severe weather phenomena, this product will be enhanced shortly to include Phenomena description, Instructions to the population and expected Impacts. In addition, Severe weather short-term warnings are issued regularly.
- SMN of Argentina also issues EWS bulletins on Heat waves and Health (SAT-OCS).
- A real time verification method using social media is in place (data mining).
- SMN adheres to the user-focused perspective and fit for purpose principle of the WMO Strategy for Service Delivery (WMO No.1129).
- A bilateral protocol on Response to emergencies and disasters is currently being developed between the SMN of Argentina and Oficina Nacional de Emergencia (ONEMI) of Chile.
- Dissemination/communication methods: Mobile App "Alertamos" in Google Play, social and traditional media, official web page, etc.
- Identified weakness:
 - It was stated that coordination agreements with all Argentina's neighbour countries should be developed including on hydrometeorological related issues.

Bolivia

- Related National legislation: "Ley de Gestión de Riesgos"; and "Sistema Nacional de Alerta Temprana de Desastres (SNATD)" (on EWS related issues) involving several national institutions.
- A robust EWS is in place.

- The Servicio Nacional de Meteorología e Hidrología utiliza a modern system for EWS, the Smart Met (Finland), visualization platform DEWETRA Delft – FEWS and WINGRIDDS to analyze the GFS numerical model.
- The “Boletín de Alerta de Amenaza” is issued when required and distributed within the country at Departmental and Municipal levels.
- Dissemination/communication methods: Red Privada Virtual (VPN), Mobile App, official web page, traditional and social media.

Brazil

- Brazil is very well experienced in the use of IBF for the generation of Hydrogeological warnings.
- Three national organizations are articulated for this purpose: INMET, CENAD and CEMADEN. INMET issues special meteorological alerts, CEMADEM develop hydrometeorological alerts (flooding, landslides) and CENAD aggregates the information and issues the corresponding warnings.
- CEMADEM focuses on the hazards that might affect the population aggregating short-term meteorological hydrological and geological information. The exposure component is addressed with risk mappings developed by the Servicio Geológico Brasileiro for geohydrological risk areas. The vulnerability is addressed by crossing risk mapping information with demographic data to quantify the degree of vulnerability of a given population. The procedure is applied for the most usual meteorological risks in the country such as hail, tornados, heavy rain, etc.
- Brazil currently uses the Alert-AS platform as a tool to produce and issue special meteorological warnings. It aggregates an estimation of the risk, quantified by historical records of registered disasters and numerical model outputs. The platform utilizes the CAP standard format resources.
- Dissemination/communication methods: Mobile App, Google, paid TV networks, etc.
- Identified weakness:
 - It was stated that to efficiently achieve the above described procedures it would be necessary to enhance the national observation system and forecasting services.
 - Non-existent severe meteorological phenomena nowcasting at federal level.

Chile

- The Dirección de Meteorología de Chile (DMC) works jointly with the Servicio de Geología y Minería (SERNAGEOMIN) and the Oficina Nacional de Emergencia (ONEMI) in order to compile historical and statistic information on disasters and impacts related to meteorological phenomena and thus complying with the Warning National System.
- DMA has already included the IBFWS concept in the daily work of the Forecasters staff, as well the probability concept and the development of risk matrixes.
- DMA will work in the development of polygons to depict the potentially affected areas.
- DMA overcame a deep credibility problem by implementing a strong and continuous strategy during the last years.
- Identified weakness:
 - need of a larger network of meteorological Radars for nowcasting purposes.

Colombia

- IDEAM has a well-established and complete EWS in place which assists the “Sistema Nacional para la Gestión del Riesgo (SNGRD)”.
- Meteorological, hydrological and climatological hazards are under the mandate of IDEAM. Other hazards of national interest (Volcanic Ash, earthquakes and tsunamis) are managed by other relevant national institutions.
- Dissemination/communication methods: Mobile App “Mi Pronostico” for forecasts and alerts w/GIS via Google, official website, social media (Twitter, Facebook, YouTube, etc.).
- Identified weakness:
 - Need to collect data on meteorological and hydrological events at national level.
 - Need to better define roles, functions and responsibilities for NMHSs and EMAs.

Ecuador

- INAMHI has a well-developed IBFWS implemented. The institutional focus is on IBF further development.
- There’s a strong and well-articulated relation with EMAs.
- The dissemination/communication of IBF related products is comprehensive and effective.

Guyana

- The Hydrometeorological Service of Guyana has IBFWS is in place.
- Improved dialogue and articulation with EMAs is in process.
- Identified weakness:
 - Necessity to improve research methods to enable the identification of vulnerable areas.
 - Extensive work is required with the traditional media due to: a) delay in the broadcasting of warnings (TV networks tend to wait for prime time news shows for releasing warning information to their audiences); and, b) terminology provided by NMHS is not respected by the media; the subsequent change of meaning results in a population’s response which is different to the expected.

Paraguay

- IBFWS are not in place.
- Related National legislation: “Politica Nacional de Gestion y Reduccion de Riesgos de Desastres”, an over reaching umbrella for the different governmental, civil and academic related organizations including the private sector. The national legislation is complemented by the “Plan Nacional de Cumplimiento del Marco Sendai”.
- The Secretaria de Emergencia Nacional and Direccion de Meteorologia e Hidrologia works in line with such national policies. Both Institutions have a fluid communication through a well-established protocol (Protocolo de Transmision de Informacion). The roles of both Institutions are well defined by the related Legislation.
- Identified weakness: (for both institutions mentioned above)

- Need of integration of vulnerability and exposure information in relation to hydrometeorological hazards.
- Need to raise Public awareness and education.
- Need to improve EWS with emphasis on the Legal, Scientific-technical and Capacity development (education, training) aspects.

Peru

- Related National legislation: "Sistema Nacional de Gestion del Riesgo de Desastres (SINAGERD)".
- A national network on EWS is currently in place (Red Nacional de Alerta Temprana –RNAT-) which coordinates the work of public and private institutions through collaboration protocols to articulate the scientific and social activities focused on the monitoring of risks and hazards and on the study of risk scenarios.
- Identified weakness:
 - SENAMHI issues forecasts based on meteorological variables but not on impact components. The inconsistency in the methodology is reflected in the results (e.g. accurate red colour warning with no subsequent impact given the low vulnerability of the area affected).
 - No Radars available.
 - Better knowledge of tropical phenomena is required.
 - Hydraulic modelling is scarce particularly in areas prone to flooding.
 - Deficient Dissemination and communication methods.
 - Outflow of talented staff due to underpay.
- SENAMHI suggests ancient knowledge of local communities should be taken into consideration into the scientific evaluation of IBF.

Suriname

- It was expressed that collection of Impact data is efficient and Doppler Radar is an effective tool.
- Identified weakness:
 - Lack of hydrological models including earth surface aspects (e.g. flooding cause major impact on areas with saturated soil)
 - Shortage of staff, due to underpay.
 - Deep lack of credibility among general public and users.
 - Lack of communication with EMAs/risk management stakeholders.
 - National level: need to increase model resolution.
 - Regional level: Coordination protocols on Transboundary hydrometeorological issues should be promoted (e.g. behaviour of the Inter Tropical Convergence Zone –ITCZ-) and sharing of the derived analysis of such cross border systems via an arranged web site.
 - Development of numerical weather prediction models or modification of the existing ones to include local effect circulation.

Uruguay

- INUMET has no IBF implemented.
- It has been stated that IBF should be encouraged at National level.

- INUMET is currently working on the optimization of the data processing, which will constitute a solid base for the future IBF implementation.
- Identified weakness:
 - Better interaction is required between INUMET and the related national institutions for vulnerability analysis, development of impact matrixes and risk maps.
 - The paradigm shift should be incorporated among the Forecasters' staff.
 - INUMET requests capacity development support for the operational implementation of IBF and CAP.

Venezuela

- Related National legislation: "Ley de Administración de Riesgos y Desastres". However the "Plan Nacional de Riesgo" is not in force yet, what weakens EWS.
- The Instituto Nacional de Meteorología e Hidrología (INAMEH) works in a coordinated manner with governmental institutions on risk reduction matters.
- INAMEH developed and use hydrological and climatological indexes and indicators to monitor impacts, both positive and negative, for different application sectors such as agriculture, energy, water, health, biodiversity, etc.
- The information is published on the INAMEH's website and disseminated among the related organizations.
- Identified weakness:
 - Vulnerability and risk mappings have not been developed yet.
 - EMAs' low response capabilities and weak dissemination/communication methods.

3.4 Inputs were provided by the participating countries on the following issues:

3.4.1 Common Alerting Protocol (CAP)

Argentina and Colombia considered CAP is an advisable platform for the regional exchange of IBF information.

Uruguay requested the development of a website for the exchange of CAP information and related material.

3.4.2 WMO Guidelines on Multi-hazard Impact-based Forecast and Warning Services (WMO No. 1150)

- A thorough review of the publication including comments was provided by Argentina.

In addition participants indicated that the publication should:

- Include the integration of all phases of risk management (public awareness and education, preparedness and prevention, dissemination, reception and use of information, mitigation - coordination, response, post-disaster support and recovery-) as it currently only considers a short term conceptualization of the event (before, during, after) (Bolivia).

- Be aligned to the Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework) -endorsed by the UN General Assembly, Third UN World Conference on Disaster Risk Reduction (WCDRR)- which has already been adopted by many Member countries as a standard State policy and which includes guidelines on risk, hazard, vulnerability and exposure as well as criteria, definitions, outreach and roles on the field. The alignment of the WMO No. 1150 publication with the Sendai framework would avoid duplication of criteria and concepts and would enable a more integrated work with related institutions (Bolivia and Venezuela).
- Establish the use of standardized terminology (Colombia).
- Establish the use of a standardized colour code for IBF related information (Chile and Colombia)
- Provide recommendations on the development, updating and broadcasting of vulnerability and exposure information (Bolivia); more methods to study and define thresholds (Ecuador); a deeper level of analysis of the IBF by exploring different evaluation and analysis techniques (Colombia).
- Concepts should be stated with a probabilistic perspective (not deterministic), also, the Guide should provide more focus on the analysis of the impacts rather than on the forecasts (Colombia).
- Include more emphasis on the analysis of the cascading effects of hydrometeorological phenomena, particularly on its evaluation, forecasting and potential impacts including determination of thresholds (Peru).
- Include considerations on extreme hidrometeorological phenomena that cause beneficial impacts on society. (Peru).
- Include emphasis in the development of hydrological models (Suriname).
- Include examples of existent legal, organizational and structures and roles already in force in Member countries particularly for those cases in which the NMHSs are the producers of hydrometeorological information and the EMAs (or other Agencies) the producers of risk/impact forecasts. (Bolivia). Also, define or standardize the role and decision level of the different organizations involved in the decision-making process (Ecuador).
- Include communication strategies (Ecuador). Also, include social media as a dissemination and communication method (Colombia).
- Include the analysis of case studies (Colombia).
- IBF should be better adjusted to the reality of each Member country (Colombia).

3.5 Participants indicated the following proposals for Regional implementation

- Development of regional protocols on IBFWS for regional coordination (Argentina).
- Address transboundary issues (Argentina).
- Alert-AS platform could contribute to build a cooperation mechanism among the RAIII countries (Brazil).
- Standardization of IBF terminology throughout the RAIII (Chile).
- Sharing of best practices and on the latest advances achieved on IBF related issues among the RAIII Member countries (Chile).
- Creation of a Regional Early Warning Center in RAIII (Chile) or an Early Warning System Regional Network supported by WMO (Peru).

- Development of recommendations on how to access data across RAIH to create regional scale vulnerability models so as overlapping scenarios which might be missed or overlooked can be identified. (Guyana).
- Coordination protocols on Transboundary hydrometeorological events management should be promoted (e.g. behaviour of the Inter Tropical Convergence Zone –ITCZ-). The derived analysis of such cross border systems should be shared via an arranged web site. And, Development of numerical weather prediction models for South America or modification of the existing ones so as to include the local effects of circulation (Suriname).
- Development of a website for the exchange of information and related material on IBF (Uruguay).

3.5.1 Participants indicated the following needs/suggestions on Capacity development

- Promote and facilitate international and best practice workshops to allow access to the knowledge and experience gained on IBF by the more advanced countries in the field so as to breach the existent gap between Members (Argentina, Chile, Peru). Capacity development on IBF matters should be continuous (Peru).
- Focus on public awareness and education campaigns should be included during IBFWS workshops.
- Countries' submission of case studies for analysis during IBFWS Workshops (Colombia and Guyana) -Colombia proposed the analysis of two case studies occurred in 2017-. Case studies on severe meteorological events with **no** relevant impacts associated should be analysed during IBFWS workshops to determine new levels of alerts (Peru).
- Establish dedicated forums to further expand the knowledge on thresholds development techniques (Peru).
- Development of a dedicated website for the exchange of information and related material on IBF and CAP (Uruguay).

3.5.2 Participants contributed with the following comments on Public-Private partnerships

- Argentina:
 - The rapid advance, resources availability and capacities of the Private sector pose a great challenge to NMHSs willing to evolve in PP partnerships.
 - NMHS need to establish collaboration agreements with relevant stakeholders including the media to guard the authoritative voice and attribution to NMHSs as service providers.
 - Necessity to develop International standards on IBFWS which will in turn build more egalitarian capacities for NMHSs when dealing with the Private sector.
- Bolivia:
 - Attention has to be driven to the Private sector's related Legislation currently in force in the Member countries.

3.4.6 The following comments were provided on the “ IBF related Shift of Paradigm”

- Forecasters will in future combine the meteorological and risk management perspectives. The future weather forecasting office is envisaged as a shared space with professionals of related disciplines (Argentina).
- A shift of paradigm is also required for the Academia and research sectors (Argentina).
- The regular citizen should be the main focus of attention to allow him/her to interpret the new IBFWS products. Strong public awareness and education campaigns should be enforced (Argentina).
- Forecasters would need to acquire or increase their knowledge on IBF related disciplines. Greater involvement of the Forecaster in the decision making process will be expected (Ecuador).
- Emphasis on the integration of Forecasters with other disciplines (Peru and Suriname).

3.4.7 The “Fragility of the Credibility” problem

- NMHSs need to increase their credibility, particularly in countries where the lack of credibility is caused by cultural or communication issues. Responsibility of the communication media in relying NMHSs' authoritative information with source attribution. A joint work in developing IBF matrixes between NMHSs and EMAs would enhance the quality of the product and thus the credibility and efficacy of the IBFWS. (Argentina)
- DMA of Chile overcame a deep credibility problem by implementing a strong and continuous strategy during the last years.

3.4.8 Data sources

- Social Media: Argentina highlighted the need of a unified platform that aggregates/integrates all available real time social media information on weather. Such platform would constitute a valuable additional tool for the Forecasters' routine evaluations, particularly during severe hydrometeorological events, and also for post-event verification.
- Other Comments:
 - To encourage the enforcement of protocols with unconventional data sources such as Transport, Insurance and Electric companies, National Bureau of Statistics, etc.
 - Review the data policy of each Member country.

3.4.9 The following IBF general aspects have been identified for improvement

- Argentina
 - Development of International standards on IBFWS.
 - Encourage multidisciplinary meetings among the organizations / stakeholders involved in the IBFWS process.

- IBFWS should be recommended as a State policy to facilitate its implementation at National level. Such approach would contribute to a more effective multidisciplinary exchange among the producers and managers of the information and would establish better communication links with the media, the general public and users.
- Chile
 - Climatological statistic records regularly used in the past not applicable nowadays due to Climate change.
- Colombia:
 - Inverse relation between staffing availability / severity of hydrometeorological event constitutes a problem for NMHSs.
- Ecuador
 - IBF information and its derived recommendations to the public and users are generic, subjective or not adjusted to reality.
 - Weak inter institutional interaction and communication undermines the generation of joint collaborative IBF projects.
- Bolivia
 - need to put emphasis on the analysis of the cascading hazards and its related risks and impacts.
 - Need to work on the digitization of NMHSs products.
 - Develop IBF Matrixes for nowcasting and seasonal impact forecast
 - Develop IBF Matrixes in accordance to the specific needs of areas of application (e.g. Agrometeorology, Health, etc.)
 - Need to close the existent gap between the Risk and the communities' preparedness.
 - IBF requires an interdisciplinary layer integration.
 - An impact (library) cataloguing on IBF is required. (Note: This requirement relates to Recommendation 1 (EC-70)).
 - Need to increase model resolution.
- Other comments:
 - It is required that IBF related Institutions upgrade their products and services to better serve the needs of the NMHSs when performing IBF processes (e.g. geological agencies).

3.5 Outcomes

3.5.1 As recommend by the Implementation-Coordination Team on Public Weather Service Delivery (CBS-OPAG ICT-PWSD) meeting (2017, Beijing, China) the Workshop produced the following important outcomes and recommendations:

(break up group session moderated by WMO representative and C/SDD Ms. Miriam Andrioli)

3.6 Recommendations

A sequel of the Workshop is recommended for follow up purposes; however, it should be enhanced by including:

- The analysis of case studies provided by the RAIII countries;
- A section addressing the Social Economic Benefits/Losses aspects of the IBFWS;
- A section on the “Fundamental WMO Competency Requirements for Public Weather Forecasters...” WMO Technical Regulations (WMO-No.49) Vol I, Part V. as adopted by EC-70;
- A section addressing Public-Private Partnerships in relation to IBFWS;
- A section addressing Hydrological related issues;
- Specific issues should be addressed such as Heat-waves, urban IBFWS, etc.; and,
- on IBFWS for the Andes range (Volcanic Ash, lahars, avalanches, landslides, etc.) as a matter of interest for the seven (7) countries sharing the Andes and for other mountain areas in the Region;
- A session on the experience gained by the WMO-ICAO Volcanic Ash Advisory Center (VAAC) Buenos Aires on VA dispersion/transport modelling and products and its joint work with the SMN of Argentina during eruptive events of massive social and economic impact in the Region (e.g. El Chaiten volcano 2008, Puyeu-Cordon Caulle volcanic complex, 2011) as case studies;
- Approach to cataloguing high-impact events (Recommendation 1 (EC-70)).

It is recommended to publicize next events through the respective WMO Regional Office and Regional Association, as it was successfully done during this WMO RA III Workshop.

3.7 Conclusions

- All 12 (twelve) WMO RA III Member countries participated in the Workshop and unanimous consensus was expressed on the high relevance this Workshop had for the Region.
- RA III perceives IBFWS as a value chain that includes Drivers, Inputs, Processes, Outputs and Outcomes and Benefits to society. This was evident by the immediate linkage participants made among Observations, Data management and exchange, Data processing, Modelling, Forecasting and generation of IBF and Warnings and the Delivery of IBFWS in response to the general public and user's/areas of application's needs during discussions.
- Regarding the above, integration with MH-EWS and DPFS perspectives would be highly valuable.
- RA III possesses robust bases, readiness and willingness to fully implement IBFWS with a Regional perspective. Some countries count on solid experience in the field and others are setting the bases for a future implementation process.
- An evolutionary sequence of capacity development ventures would be beneficial to help the implementation process. Best practices, Mentoring and Twinning should be encouraged within the Region as well as in relation to Members from other WMO RAs that possess high IBFWS expertise.

- An in-country Pilot project on IBFWS should be facilitated (in a selected Member country) through a joint effort between WMO and a potential donor agency.
- The outcomes of the Workshop will constitute indispensable contributive material to the international Symposium planned to collect Members experiences with IBFWS (Q4 2019, venue TBD) as approved by WMO EC-70.
- The Workshop represented a good opportunity to promote and encourage the adoption of CAP. It might allow further discussions on CAP as an advisable platform for regional exchange of IBF information and on a possible implementation of a regional Global Multi-hazard Alert System (GMAS) platform in South America.
- A full Report of the Workshop including Member countries' status report, outcomes of the debate session, and contributions from Mr. Eliot Christian; Mr. James Taylor and Ms. Helen Foster (BoM) for the future updating of Publication WMO No. 1150, will be submitted to the CBS-OPAG/PWSD Chair and to the respective Chairs of the Task Teams on Multi-hazard Prediction and Communication (TT-IMPACT) and on Services and Products Innovation and Improvement (TT-SPII), for their analysis and further action, if thus considered.
- Finally, and as a continuity of the Capacity building process on IBFWS in RAIII, the RTC-SMN-Argentina promoted the **V-Lab "Weather and Climate Ready Nations Impact-based Forecast and Warning process: A view toward V-Lab collaboration"** (Oct. 17th, 2018) among the Workshop's participants and lecturers.

4. CLOSURE OF THE WORKSHOP

4.1 With closing remarks by the Servicio Meteorologico Nacional of Argentina's authorities, and WMO representative WDS/SDD Chief, the WMO RA III Capacity Building Workshop on Impact-based Forecast and Warning Services (IBFWS) and on the Common Alerting Protocol (CAP), closed at 16.45 hours on Friday, September 14, 2018.

5. PHOTO GALLERY [here](#)

Regional Association III Capacity Building Workshop on Impact-Based Forecast and Warning Services and the Common Alerting Protocol (CAP), Buenos, Aires, 10-14 September 2018

	Name of Participant	Country	Email Address	Representing
1	Ms Marisol Lucia Portugal Alvarez	Bolivia	marisol@senamhi.gob.bo	NMHS
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4	Mr Tiago Molina Schnorr	Brazil	tiago.schnorr@integracao.gov.br	Disaster
5	Mr Nasser Yousef Santana Ali	Brazil	nasser.yousef.unb@gmail.com	CAP
6	Mr Victor Ferreira Leite	Brazil	victor.leite@inmet.gov.br	CAP
7	Mr Arnaldo O. Zuniga Abarca	Chile	azuniga@dgac.gob.cl	NMHS
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10	Mr Leonardo Cardenas Chivita	Colombia	lcardenas@ideam.gov.co	CAP
11	Mr Christian Felipe Euscategui Collazos	Colombia	cuescategui@ideam.gov.co	NMHS
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18	Mr Juvenal Medina Rengifo	Peru	jmedina@indec.gov.pe; juvenal.medina1@gmail.com	NMHS
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21	Mr Francisco Pereyra Barreiro	Uruguay	f.pereyra@inmet.gub.uy	NMHS
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23	Ms Cindia S. Lopez Crespo	Venezuela	aidnic@gmail.com	CAP
23	Mr Eric Michielli	USA	eric.michielli@accuweather.com	WRN
23	Mr Matthew Alto	USA	matthew.alto@accuweather.com	WRN
Host Country				
1	Mr Miguel Angel Béron	Argentina	mberon@smn.gov.ar	CAP
2	Mr Marcos Adolfo Saucedo	Argentina		NMHS
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Korea Meteorological Administration				
1	Mr Seungkyun Park	Republic of Korea	pskk@korea.kr	NMHS/CAP
2	Ms Young-Youn Park	Republic of Korea	yypark@korea.kr	NMHS/CAP

Appendix 2

Monday, September 10 (IT participants only)

CAP, PART I

8.30 – 9.15	Registration & Café	
09.00-09.10	Opening remarks on behalf of WMO Weather and DRR Service Dpt. & NMS-AR Director	Miriam Andrioli and Celeste Saulo
09.10-10.10	CAP-101: Introducing Common Alerting Protocol 101.1 Opportunity and Challenge 101.2 Alerting Authorities 101.3 Benefits of CAP 101.4 Features of a CAP Message 101.5 CAP-enabled Alerting Systems 101.6 CAP Alert Hubs	Eliot Christian
10.10-10.30	CAFÉ / TEA BREAK	
10.30-10.40	CAP-102: Registering an Alerting Authority 102.1 Characterizing an Alerting Authority 102.2 Identifying Alerting Authorities and Alert Messages 102.3 Maintaining the Register of Alerting Authorities 102.4 Tracking Changes to Entries in the Register	Eliot Christian
11.00-11.30	CAP-105: Implementing a Source of CAP Alerts 105.1 Putting CAP Alert Files on a Public Internet Host 105.2 Validating CAP by Scheme Version and Profile 105.3 Authorization/ Authentication of Users and Editors 105.4 Example of CAP Alert Sources 105.5 Dissemination Options Beyond Web Browser	Eliot Christian
11.30-12.00	CAP-106: Publishing a CAP Alert News Feed 106.1 Introducing Real Simple Syndication (RSS) 106.2 CAP Alerts as News Items in an RSS News Feed 106.4 Finding and Subscribing to CAP Alert News Feeds 106.5 Examples of CAP Alert Feeds	Eliot Christian
12.00-13.30	LUNCH BREAK	
13.30-14.20	CAP-204: Implementing Freeware for Creating and Publishing CAP Alerts (hands-on) 204.1 Overview of Tool for Creating CAP Alerts 204.2 Components Required for Deploying Tool 204.3 Authorized Editors, Sample Alerts, RSS File, Stylesheet, Installing CAP Editor 204.4 Local Configuration of CAP Editor	Eliot Christian
14.20-14.40	CAFÉ / TEA BREAK	
14.40-16.00	Practical Issues for Each Implementation Hosting Arrangements Test and Operational Systems Obtaining SSL Certificates Other Issues	Participants, guided by Eliot Christian
17.00	END OF DAY	

Tuesday, September 11

IBF TRAINING (IBF and Emergency agencies only)

8.30 – 9.00	Registration & Café	
9.00 – 9.10	Opening and welcoming to IBF and Emergency Agency participants	Miriam Andrioli and Celeste Saulo
9.10 - 9.20	The Public Weather Services Program of WMO	
9.20 – 9.30	WMO Guidelines on Multi-hazard Impact-based Forecast and Warning Services (WMO No.1150)	Miriam Andrioli

Session 1: Countries presentation about IBF status.

9.30 – 10.30	1.1 Impact Based forecast status in RAIII	Countries presentation
10.30 – 11.00	CAFÉ BREAK	
11.00 – 12.00	1.1 Impact Based forecast status in RAIII	Countries presentation
12.30 – 14.00	LUNCH	

CAP – Part II (IT+ IBF + Emergency Agencies)

14.00-14.10	Opening remarks on behalf of WMO Weather and DRR Service Dpt.	Miriam Andrioli
14.10-15.10	CAP-101: Introducing Common Alerting Protocol (cont.)	Eliot Christian
15.10-15.30	Group Photo + CAFÉ	
15.30-17.00	Steps for Implementing CAP Locally	Participants, guided by Eliot Christian
17.00	END OF DAY	
18.00	WELCOME COCKTAIL	

Wednesday, September 12

Session 2: Impact Survey: types and format of sources, basis integration, data validation.

8.00 – 8.30	2.1 Types of official information: what information does the NMHS need to build impact-based forecast? Australian experience.	James Taylor (AUS)
8.30 – 9.00	2.2 Types of official information, relevant to IBF and Emergency Agencies.	Civil Defense-(CL)
9.00 – 10.00	2.3 Understanding the role of unconventional sources of information when collecting impact data	James Taylor (AUS)
10.00 – 11.00	2.4 Official and unofficial data integration. Weighing, validation/datum verification.	James Taylor (AUS)
11.00 – 11.15	CAFÉ BREAK	
11.15 – 12.00	2.5. Debate on IBF application in South America. Future challenges.	Adriana Cuartas (BR)
12.00	LUNCH	

Session 3: Building data matrix for IBF step by step

13.30 – 15.30	3.1 Building datum board. Creating data matrix. Differentiate by phenomena/region	James Taylor (AUS)
15.30 – 15.45	CAFÉ BREAK	

Session 4: Developing thresholds according to impact.

15.45– 17.00	4.1 Establishing thresholds by impact and variability	James Taylor (AUS)
17.00 - 18.00	4.2 Discussion on feasibility of application in South	Adriana Cuartas

	America	(BR)
18.00	END OF THE DAY	

Thursday, September 13.

Session 5: IBF & Temporary scales

8.30 – 9.30	5.1 IBF and private services of meteorological information	Matthew Alto (AccuWeather)
9.30 – 10.15	5.2 IBF in the short, medium and long term	Adriana Cuartas (BR)
10.15 – 11.00	5.3 Open debate on scopes and challenges	SMN-AR
11.00 – 11.15	CAFÉ BREAK	
11.15 – 13.00	5.4 Matrix building practical workshop	SMN – AR and James Taylor (AUS)
13.00 – 14.30	LUNCH	

Session 6: Integration of forecast with vulnerability exposure and impact.

14.30 – 15.15	6.1 Impact and Risk modelling overview	Joanne Robbins (UK)
15.15 – 16.15	6.2 Impact modelling	Joanne Robbins, (UK)
16.15 – 16.30	CAFÉ BREAK	
16.30- 17.30	6.3 Practical application of impact models	Joanne Robbins, (UK)
17.30	END OF THE DAY	

Friday, September 14

Session 7: Post event verification and evaluation.

8.30 – 9.30	7.1 A paradigm shift: incorporating risk concepts into Forecast Department. Communicating IBF to society	Anne Charlat-Abeille (FR)
9.30 – 10.30	7.2 Real time in social media verification method. Argentinian experience	Pedro Lohigorry (AR)
10.30 – 10.45	CAFÉ BREAK	
10.45 – 12.00	7.3 IBF verification	Anne Charlat-Abeille (FR)
12.00 – 12.30	Successfull experiences	Adriana Cuartas (BR)
12.30 – 13.00	IBF Korea	Dr. Young – Youn Park
13.00 – 14.30	LUNCH	

Session 8: Communicating impact forecast:

14.30 – 15.45	Guided debate between experts and participants	SMN-AR
	IBF Closure	

Report of CAP Workshop

Prepared 12 September 2018 by Eliot Christian

This "Report of CAP Workshop" concerns my trip to Buenos Aires as an unpaid consultant to WMO, which had agreed to reimburse part of my travel expenses. The purpose of my trip was to participate in and speak at the workshop titled: "Regional Association III Capacity Building Workshop on Impact-Based Forecast and Warning services and the Common Alerting Protocol (CAP)".

The workshop was held 10-14 September 2018 at the National Weather Service of Argentina in Buenos Aires. My role in the Workshop as funded by WMO was limited to Monday, 10 September, and Tuesday, 11 September. (USAID/OFDA funded the other days of my participation in the full Workshop.)

On Monday, I conducted a one-day CAP Jump Start with about 20 participants from about a dozen countries, mostly in South America. The participants engaged actively in the training, and all who attempted to install the CAP Editor freeware were successful. In the last 90 minutes of the day, each country voiced their enthusiasm for implementing CAP in their country. Most have already done so, several are in process, and the others now intend to push for it.

On Tuesday, I repeated my one-hour "Introduction to CAP" session because about 25 participants on Tuesday had not attended the Monday sessions. Then, I facilitated a broad discussion about CAP implementations across all of the countries having a participant in the Workshop. Again we heard from each country a great deal of enthusiasm for implementing CAP in their country.
