Meeting of the Inter-Programme Task Team on Cataloguing
Extreme Weather, Water and Climate Events
(IPTT-CWWCE)

18-19 February 2018

IMPROVING SERVICE DELIVERY - DISASTER AND CLIMATE RESILIENCE THROUGH IMPACT BASED DECISION SUPPORT SERVICES

DRAFT PROPOSAL FOR ASSIGNING UNIQUE IDENTIFIERS TO HIGH-IMPACT AND HAZARDOUS WEATHER, CLIMATE AND WATER EVENTS

Draft as of 06.03.2019

Leading Technical Commissions:
- Commission for Basic Systems (CBS)
- Commission for Climatology (CCI)

Contributing Commissions
- Commission for Hydrology (CHy)
- Commission for Agricultural Meteorology (CAgM)
- Joint WMO-IOC Commission for Oceanography and Marine Meteorology (JCOMM)

Responsible WMO Entities:
- Weather and Disaster Services Department (WDS),
- Climate and Water Department (CLW)

1. INTRODUCTION

Hydrometeorological hazards and extreme events are causal factors in a majority of disasters that occur worldwide. As associated risks continue to rise, spurred in part by climate variability and change and unsustainable development practices, so does the need for increased resilience. Consequently it is of growing importance to track losses and damages associated with these events globally as required by major policy frameworks such as the United Nations Sustainable Development Goals, the United Nations Framework Convention on Climate Change Paris Agreement and Warsaw
International Mechanism on Loss and Damage, and the Sendai Framework for Disaster Risk Reduction (Annex A.). These frameworks recognize the importance of averting, minimizing and addressing loss and damage associated with hydro-meteorological hazards and the adverse effects of climate change, including extreme weather and slow onset events.

There are significant challenges to achieve the goals of these frameworks, for example the lack of:

i. **Standards** - National and global statistics significantly suffer from the lack of internationally agreed upon terminology, definitions and accounting practices for aggregation (downstream, such as data duplication and wrong attribution) and analysis of loss data which can lead to under/overestimating the total losses.¹

ii. **Authoritative and quality assured hydrometeorological event information** - When impacts from a hydrometeorological hazard occur in a country, loss and damage information is recorded and aggregated based on a generally accepted or standardized national typology of events.² The recorder of the loss information seeks to attribute the loss to the phenomena which is supposed to be the direct cause. This is accomplished through various methods (e.g. news reports, disaster manager reports, universities, agencies responsible for monitoring and forecasting the phenomena). The process of recording loss and damage in most cases is completed by agencies other than the national agencies responsible for monitoring the related phenomena (hazard).

iii. **Context** - In many cases the context of the recorded loss is not accurately associated in the event/impact attribution analysis (e.g. flood damage could be linked to a number of underlying factors such as heavy rain, tropical storm, riverine flooding from upstream heavy rains).

iv. **Institutional coordination** - Data and information coordination with institutions responsible for recording relevant information beyond the responsibility of the NMHS.

However, there are opportunities to overcome these challenges including in particular:

i. **NMHSs have an established capacity to monitor and record weather, water and climate event information and their partnership with national agencies dealing with disaster and loss and damage.**

ii. **NMHSs are mandated by their governments to monitor and forecast hydrometeorological and climate hazards. This information when catalogued in a standardized way can be a significant resource for national and international entities that are the custodians of loss and damage information and analysis which can facilitate improved attribution of losses (disaster loss accounting) and provide the additional context required for further analysis (i.e. disaster forensics).**

iii. **The WMO is also the leading authority on naming and defining hydrometeorological and climate hazards. Through its collaborative network of 192 Member countries the WMO as a specialized agency of the United Nations is dedicated to international cooperation and coordination on the state and behaviour of the Earth’s atmosphere, its interaction with the land and oceans, the weather and climate it produces, and the resulting distribution of water resources. In this regards the WMO facilitates and promotes the creation of standards for**


² There are some international standards such as the Pearl classification which are generally accepted but not well applied by counties.
observation and monitoring in order to ensure adequate uniformity in the practices and procedures employed worldwide and, thereby, ascertain the homogeneity of data and statistics.

In this regard, the WMO decided in 2015 at its 17th World Meteorological Congress (Cg-17) to standardize weather, water, climate, space weather and other related environmental hazard information. In its decision, the WMO Congress emphasized the need for systematic characterization and cataloguing of weather, water and climate events in a form that allows data on losses and damage to be cross-referenced to the associated phenomena.

In this regard, Members considered the benefits of standardisation and cataloguing of weather, water, climate, space weather and other related environmental hazard information could bring to WMO Members and the regional and global loss and damage landscape such as:

- Filling a major gap in the standardisation of data collection and use of information on weather, water, climate and space weather related events and their recording and archival in inter-operable databases,
- Strengthening support for research of extreme events including assessment and attribution of the observed changes in their frequency and intensity and their attribution and enhance Member’s capabilities for preparedness and risk management and adaptation
- Support a consistent, robust and efficient implementation of key operational WMO activities such as MHEWS and Climate Watch System (CWS) and seamless interactions between regional and national data for data recording of events

The prospective users of the data and information that comes from this standardization and cataloguing capacity include i) WMO Members and, ii) loss and damage information stakeholders (including loss and damage data recording, aggregation, analysis and reporting at the national, regional and, global levels as well as private industry (e.g. insurance and infrastructure sectors).

A list of the activities and contributors that led to the development of this present proposal is included in Annex B and C respectively.

2. PROPOSAL FOR ASSIGNING UNIQUE IDENTIFIERS TO HAZARDOUS WEATHER, CLIMATE AND WATER EVENTS

The proposal centres on identifying hazardous hydrometeorological, climate and space weather events uniquely, while at the same time being able to group related events to the larger scale systems which provides additional context and the capability to conduct analysis from local to larger scale systems therefor reducing the risk of event double accounting.

More specifically, the scheme involves recording an event by first assigning a random Universally Unique Identifier (UUID) number as the event identifier and including specific key attributes of the event (e.g. temporal and spatial information, linkages to other events) into a data record. 3 The UUID is an ISO-standard random number generated by a relevant national, regional or global authority.

3 Universally Unique Identifier (UUID) is a 128-bit number used to identify information in computer systems. The term globally unique identifier (GUID) is also used. When generated according to the standard methods,
The key attributes of the event record (or data record) describe the event, including the event start and end times, spatial extent, event type and hazard specification as well as other attributes provide context such as description (e.g. local identifier, local or regional names of storms), and links to other events (e.g. heavy rain to tropical cyclone) which enables the ability to cluster related events into larger scale phenomena (please see Figure 1 and Table 1 for the event attributes). Additional information related and relevant to hydro-meteorological parameters (wind speeds, precipitation amounts, values of hydro-meteorological indexes, etc.) by associating these data with the related event UUID. Importantly, authorities responsible for assessing and cataloguing information on loss and damage would be able to use the same UUID to associate this type of non-hydro-meteorological information with the events as well.

**Linking of events**

The scheme also enables the linking of events (e.g. a cyclone, leading to heavy rain, strong winds, storm surge flooding and landslides) to better attribute to the causal event. Each event and sub-event can have its own UUID, yet incorporating the UUIDs of associated events in any given event record allows the entire chain of events to be linked to each other (cascading events), along with any associated data across borders.

**Event recording process**

At the time of event onset the UUID, record creation date, event start date, event type are to be recorded. The end date, spatial extent, description and UUIDs of related events are all entered at or prior to the time of record closure. A lead centre (regional/global) would assign the UUID for the causal event. Post analysis will be conducted for linking events into a hierarchical clustering. Quality control in partnership with loss and damage database stakeholders is necessary to verify and finalize event information (e.g. spatial area and/or relationships among events cross-referenced in each other’s event records).

**Event Types**

A draft typology which lists types of events associated with impacts has been compiled from authoritative WMO references and resource materials (See Table 2 - Event Types List). The purpose of this list is to provide the user with a non-technical, practical and authoritative list of events which will facilitate standardization of event terminology. This list is not intended to be a hierarchical list based on causalities but to be a flat list to facilitate observation and recording. Event types are meant to be used for global cataloguing and analysis while more detail can be entered in the hazard specification field according to national / regional requirements.

The typology contains an initial list of event types with which losses and damage are potentially associated. The event typology will be a standard living list that can be amended through the appropriate WMO governance mechanism by WMO Members, WMO Regions as well as collaborating institutions having mandate on other hazards.
Figure 1: Event record containing the Event Identifier (UUID) and key event attributes (attributes in red are mandatory entries)
Table 1 - Event Attributes, Field with * is mandatory for recording

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Format</th>
<th>Description</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Identifier*</td>
<td>Alphanumeric number</td>
<td>UUID (32 character random sequence)</td>
<td></td>
</tr>
<tr>
<td>Originator*</td>
<td>Text</td>
<td>Name of institution that is recording the event</td>
<td>Institution that is recording the event</td>
</tr>
<tr>
<td>Record Creation*</td>
<td>Date/Timestamp</td>
<td>Date- and time-stamp of event onset</td>
<td></td>
</tr>
<tr>
<td>Event start*</td>
<td>Date/Timestamp</td>
<td>Time of when the event started</td>
<td></td>
</tr>
<tr>
<td>Event end*</td>
<td>Date/Timestamp</td>
<td>Time of when the event ended</td>
<td></td>
</tr>
<tr>
<td>Event Type*</td>
<td>List</td>
<td>Controlled standard list – see Table 2 below</td>
<td>Globally agreed list for international data exchange</td>
</tr>
<tr>
<td>Area*</td>
<td>Recognized spatial datatype</td>
<td>Spatial area Recognized spatial format</td>
<td></td>
</tr>
<tr>
<td>Hazard specification</td>
<td>Text</td>
<td>Controlled list</td>
<td>Further specification of event type according to national and regional needs</td>
</tr>
<tr>
<td>Description</td>
<td>Text (Up to 500 characters)</td>
<td>Open description text. Description of event such as max temp, highest wind speed, severity, local event name and any other information that can assist attribution of loss and damages.</td>
<td>Highly recommended to enter.</td>
</tr>
<tr>
<td>Impacts</td>
<td>Text (Up to 500 characters)</td>
<td>References to initial reported impact</td>
<td>Recommended to enter.</td>
</tr>
<tr>
<td>Linkage</td>
<td>Alphanumeric number strings</td>
<td>UUID reference link to source or other events</td>
<td>UUID of other events considered as source or other events (e.g. Tropical cyclone)</td>
</tr>
<tr>
<td>Status</td>
<td></td>
<td>Indicate status of record</td>
<td>Ongoing / Completed/ Validated</td>
</tr>
<tr>
<td>Event Types List</td>
<td>Event Types List</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avalanche</td>
<td>Pollen pollution episode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cold wave</td>
<td>Polluted air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drought / Dry Spell</td>
<td>Rain / Wet Spell</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dust storm or sandstorm</td>
<td>Snow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extra-tropical cyclone</td>
<td>Snowstorm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flood</td>
<td>Space weather</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fog / Haze</td>
<td>Storm surge / Coastal flood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frost</td>
<td>Thunderstorms</td>
<td></td>
<td></td>
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<tr>
<td>Hail</td>
<td>Tornado</td>
<td></td>
<td></td>
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<tr>
<td>Heat wave</td>
<td>Tropical cyclone</td>
<td></td>
<td></td>
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<tr>
<td>High UV Radiation</td>
<td>Tsunami</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Icing</td>
<td>Volcanic Ash</td>
<td></td>
<td></td>
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<tr>
<td>Landslide / Mudslide</td>
<td>Wild land fire / forest fire</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lightning</td>
<td>Wind</td>
<td></td>
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ANNEX:

A. Links to the Global Policy Agenda

<table>
<thead>
<tr>
<th>United Nations Sustainable Development Goals</th>
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</thead>
<tbody>
<tr>
<td><img src="image" alt="Sustainable Cities and Communities" /></td>
<td>Significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations</td>
</tr>
<tr>
<td><img src="image" alt="Climate Action" /></td>
<td>Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sendai Framework for Disaster Risk Reduction</th>
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<tbody>
<tr>
<td></td>
<td>The Sendai Framework aims to guide the multi-hazard management of disaster risk in development at all levels as well as within and across all sectors. The Sendai Framework set several targets to be achieved by 2030, including a substantial reduction of: global disaster mortality, the number of affected people and direct disaster economic loss through, inter alia, the increase in the availability of and access to multi-hazard early warning systems and disaster risk information and assessments.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The Paris Agreement</th>
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<tbody>
<tr>
<td></td>
<td>Parties recognize the importance of averting, minimizing and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of loss and damage.</td>
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<table>
<thead>
<tr>
<th>The Warsaw International Mechanism on Loss and Damage</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>The Warsaw international mechanism on loss and damage associated with impacts of climate change, including extreme events and slow onset events facilitates and promotes, inter-alia, understanding of and expertise in approaches to address loss and damage associated with the adverse effects of climate change, and the collection, sharing, management and use of relevant data and information.</td>
</tr>
</tbody>
</table>
B. WMO RELATED ACTIVITIES

A number of activities have contributed to the development of this present draft of the WMO Cataloguing proposal, including:

- The WMO Executive Council at its 68th session (EC-68), following a recommendation of its EC Working Group on Disaster Risk Reduction (EC WG/DRR), decided to establish the WMO Inter-Programme Task Team on Cataloguing Extreme Weather, Water and Climate Events (IPTT-CWWCE) to coordinate the development of an organization-wide framework for the implementation of Resolution 9 of the 17th World Meteorological Congress (Cg-17). The IPTT-CWWCE is co-chaired by the Commission for Basic Systems (CBS) and the Commission for Climatology (CCI).

- The Commission for Climatology developed guidelines for monitoring extreme weather and climate events which consists of definition of a set of critical high impact events including heat waves, cold waves, drought and extreme precipitation. The guidelines provided recommended practices for characterising these events and associated data management aspects.

- WMO convened a Meeting of the Disaster Risk Reduction User-Interface Working Group on Hazard and Risk Analysis (DRR UI-WG HRA) from 15 to 17 December 2015 to provide guidance and recommendations on WMO activities and processes related to Cg-17 Resolution 9. Participants included experts from WMO Members (i.e. NMHSs, WMO technical commissions), and Organizations such as the United Nations, other (inter-)governmental and non-governmental international, regional, and national agencies; academia and the private sector with extensive experience in risk assessment and collection of damage and loss data. The meeting provided a sound basis and way forward to the development of an approach. http://www.wmo.int/pages/prog/wcp/wcdmp/meeting/documents/DRREAG-HRAFinalReport.pdf ;

- WMO conducted the first meeting of the IPTT-CWWCE (19-21 September 2016) reviewed the explicit and implicit aspects of Resolution 9 and developed a way forward in development of a proposal which could be tested for viability in Europe (RA-VI);

- WMO conducted an international workshop on cataloguing and managing information on extreme events, 20-22 November 2017. The workshop was convened by IPTT-CWWCE and co-chaired by the presidents of CBS and CCI. Attendees included experts from various disciplines relevant to the topic developed an innovative approach for cataloguing of events which leverages international standards and that is versatile and flexible enough to account for complex relationships among various event types. The meeting developed a draft WMO cataloguing proposal WHICH consists of two components:

  1) A draft innovative approach for cataloguing of events which leverages international standards and that is versatile and flexible enough to account for complex relationships among various event types (Annex II). The approach also leverages the WMO network of NMHSs, regional and global centres to catalogue hydrometeorological and climate events (having a potential to be associated with impacts in terms of loss and damage) that does not create new processes but leverages existing monitoring and recording capabilities thereof.

  2) A draft typology which lists types of events associated with impacts has been compiled from authoritative WMO references and resource materials (Annex III). The typology contains an initial list of event types with which losses and damage are potentially associated and is intended to be a standard living list.
that can be amended by countries and regions through the appropriate WMO governance mechanism. In this regard, the cataloguing initiative requires a common approach with at least two other initiatives including the Impact-Based Forecast and Warning Services (IBFWS) and Common Alerting Protocol (CAP) that are being led by the Commission for Basic Systems Open Programme Area Group on Public Weather Service Delivery (CBS/OPAG-PWSD) to the definition of event types to be employed across these initiatives to ensure alignment of terminology.

- WMO convened a second meeting of the IPTT-CWWCE which took place just after the International Workshop ended. In this meeting it was requested that the proposal be tested by WMO Members to refine the proposal and provide feedback as its operationality.
- RA-VI (Europe) conducted a kick-off meeting (in Offenbach, Germany from 2-3 July 2018) for the regional pilot test of the universal unique identifier on high-impact events to design the test phase including its period, guidance on operational procedure, coordination and collaboration aspects. Experts nominated from participating countries refined the cataloguing proposal, developed key principles for the test phase, and agreed that RCC Europe will facilitate the overall technical coordination of the test phase; and,
- IPTT-CWWCE meeting at the WMO headquarters in Geneva Switzerland on 22-23 February 2019 finalized the proposal and prepared a draft Congress 18 cataloguing resolution for submission to Congress 18.

C. Contributors to this present proposal include:

- WMO Members (through their representatives and experts)
- Technical Commissions
  - CBS, CCI, CHy, CAgM and JCOMM (through their membership in the IPTT-CWWCE)
- Regional Associations
  - RA 6 (DWD RCC and the Members participating in the test phase), RA V (Members participating in the test phase including Indonesia, Australia, Philippines)
- WMO Expert teams
  - CCI Task Team on Definitions of Extreme Weather and Climate Events (TT-DEWCE)
  - DRR WG on Hazard Risk Assessment (DRR WG HRA)
  - DRR WG on Multi-Hazard Early Warning Systems (DRR WG-MHEWS)
- WMO Secretariat
  - Weather and Disaster Risk Reduction Service Department (WDS)
  - Climate and Water Department (CLW)
- EUMETNET through its Meteoalarm Expert Group Task Team on CAP 2.0
  - Many experts from diverse fields related to loss and damage accounting (e.g. UNISDR, CRED, MunichRE, etc.)