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Economic and Social Commission for Asia and the Pacific

Bangkok, 7 January 2016

Draft Disaster-related Statistics Framework

Provisional Unedited Draft for Pilot Testing

This note is accompanied with a spreadsheet with detailed statistical tables:

DRSF_Draft_Tables.xlsx

Contents

Purpose & Background

Through Resolution E/ESCAP/RES/70/2 on "Disaster-related Statistics in Asia and the Pacific", the Commission established a regional expert group involving officially nominated experts from national statistics offices and national disaster management agencies from 14 Asia and Pacific countries along with experts on statistics or on disaster management information from many international organizations. The Expert Group has a mandate from the Commission to prioritize development of a Core Set of disaster-related statistics.

The resolution E/ESCAP/RES/70/2 and priorities established by the Expert Group at its first three meeting have been confirmed by the Sendai Framework on Disaster Risk Reduction 2015-2030.

In this document, a preliminary statistical framework and set of tables has been developed to support advancement of a guideline for disaster-related statistics in alignment with the mandate of the Expert Group and the requirements for monitoring progress towards achievement of the Sendai Framework.

This framework was developed with the intention to facilitate testing of the implementation of the definitions, classifications and conventions Framework based on existing databases in countries in Asia and the Pacific. A revision to this document will be prepared by the Secretariat based on results from the pilot testing towards development of a reference guideline for the Disaster-related Statistics Framework (DRSF).

Acknowledgements

This draft rev. 1 of the Disaster-Related Statistics Framework was prepared by the ESCAP Secretariat[1]. Key principles and conventions described in this document were developed based on recommendations from the three meetings of the Asia and Pacific Expert Group on Disaster-related Statistics, organized in 2014 and 2015 by the ESCAP Secretariat in response to E/ESCAP/RES/70/2.

This draft takes into account previous discussion of the EG and a survey to countries on their current practices as well as the outcome of an e-consultation of the EG and based on discussions during a capacity-building workshop in preparation for pilot tests of the framework convened in Bangkok, 15-17th December 2015.

[1] The first draft has been prepared by Jean-Louis Weber, consultant and Daniel Clarke, ESCAP Statistician. The revised version has benefited of comments from the Expert Group through the e-consultation and of significant inputs from Puji Pujiono, ESCAP Regional Adviser on Disaster Risk Reduction, and Dr. Dyah Rahmawati Hizbaron, consultant.

Chapter 1: Scope and Rationale for Framework

The Core Set of Statistics in this framework is built upon a clearly specified policy demand and existing mandate for government organization for monitoring, as described in the Sendai Framework. Monitoring the 7 targets in the Sendai Framework requires, as a basic minimum, good quality statistics on disaster occurrences and direct impacts.

The Sendai framework contains a statement of outcome, for the next 15 years, to achieve a substantial reduction of disaster risk and losses, to lives, livelihoods and health and to the economic, physical, social, cultural, environmental assets of persons, businesses, communities and countries. The proposed targets in the framework are:

1. Reduce global disaster **mortality**
2. Reduce the number of **affected people**
3. Reduce direct disaster **economic loss**
4. Reduce disaster **damage to critical infrastructure** and disruption of basic services, among them health and educational facilities
5. Increase the number of countries with national and local disaster **risk reduction strategies**
6. Enhance international cooperation
7. Increase the availability of and access to **multi-hazard early warning systems and disaster risk information**

The Sendai Framework targets have been followed by specification of a disaster-related target in the UN Sustainable Development Goals (SDGs). The SDGs provide the globally recognized framework for the major global public policy priorities, such as ending poverty and ensuring sustainable access to basic resources. Potentially, there are complex relationships between disasters and development goals, with influences in both directions.

SDG 11 calls for making cities and human settlements inclusive, safe, resilient and sustainable, with target 11.5:

"By 2030 significantly reduce the number of deaths and the number of affected people and decrease the economic losses relative to GDP caused by disasters, including water-related disasters, with the focus on protecting the poor and people in vulnerable situations"

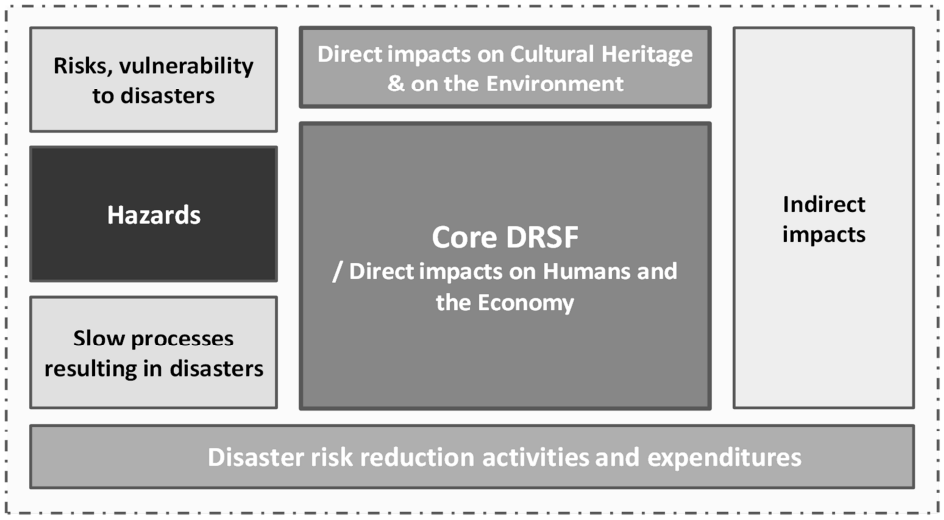
It is anticipated that implementation of this framework and improving consistency in use of classifications and definitions for disaster occurrences and direct impacts will be an important contribution to monitoring and achieving targets for disaster risk reduction and for sustainable development.

The terms of reference for this Framework are to meet requirements for monitoring the Sendai Framework targets, which is built on objectives of reducing impacts of disasters and improving disaster management. The approach in this framework is to align as much as possible, usual methodologies and classifications in the statistical domain as well as with current practices and existing databases.

The purpose of the framework is to support production of official statistics, that is data and statistics produced and reported by the responsible government agencies. There is a demand to prioritize a Core Set designed to focus on disaster occurrences and direct impacts. This Core Set is presented in the context of the DRSF.

The DRSF is a sketch of the broad picture built around the Core Set. The definitions, classifications and conventions for the Core Set contribute to defining the structure of the whole DRSF.

Figure 1: DRSF Core Set and Enlarged Framework



The concept for the Core of the DRSF is to apply the following sequence of actions to national databases: record an event, which initially is a hazard, record the occurrence of a disaster as defined by the existence of impacts (as show in figure 2), focus on identifying the direct impacts and measure them from the perspective of human and material impacts.

Building on this Core, the DRSF extends to include disaster management activities and expenditures and to cultural heritage and environmental impacts. Other blocks shown in the Figure are beyond the scope of the Core Set, except for the occurrences of hazards, which are the sources of disaster and also descriptive characteristics recorded in alignment, as much as possible, with the IRDR Peril Classification and Hazard Glossary (IRDR, 2015). Another extension is proposed for "Disaster management activities and expenditures" statistics which is essential knowledge for policy assessment, and therefore listed in the Sendai Framework Targets 5 and 7. It is proposed to consider including them at an early stage of the process.

Indirect impacts are those which relate to the consequences of the disaster on the further functioning of the social and economic systems. They are complex processes which require investigations and research and that are not, for that reason, included in the Core Set. The same considerations apply to risks and vulnerability to disasters, which combines natural hazards and socio-economic dimensions which are not part of the Core Set. Both indirect impacts and risks and vulnerability are of utmost importance and their study is prone at delivering other sets of statistics; they will be incorporated in DRSF in due time.

Chapter 2 describes definitions and other basic concepts of the Core Set, covering mostly statistics for Sendai Targets 1 to 4 as well as international comparison (target 6). Chapter 3 provides recommendations for recording statistics on disaster management activities and expenditures, in line with current practices of the System of National Accounts for functional analysis. Chapter 4 introduces three classifications developed for the DRSF, namely: classifications for disasters, direct impacts, and the disaster risk reduction activities (DRRA) and transfers. Chapter 5 reviews selected core measurement and compilation considerations, particularly measurement units, and the use of GIS and geospatial information. Chapter 6 contains the core and extended set tables and Chapter 7 concludes with a note on the topic of integration with other existing frameworks and initiatives of relevance.

Chapter 2: Definitions of Disasters & Impacts

2.1 Defining Disasters

A disaster is:
"*a serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the ability of the affected society to cope using only its own resources*". The United Nations International Strategy for Disaster Reduction (UNISDR)

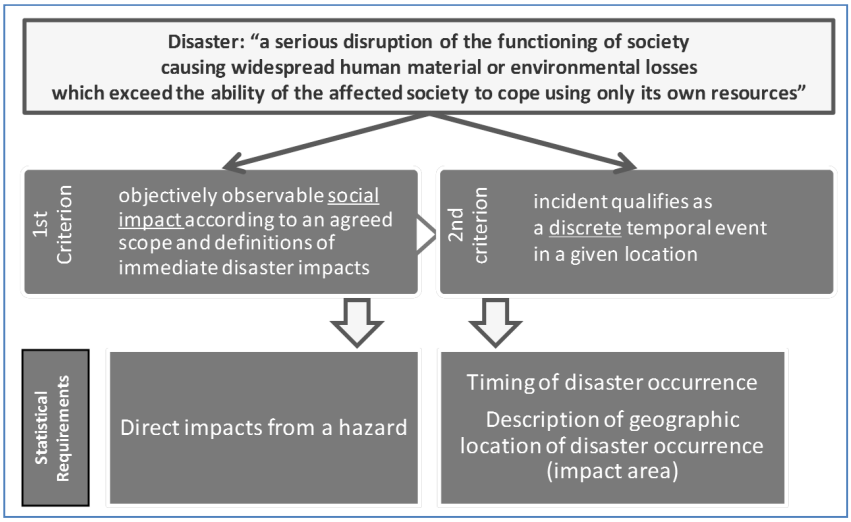
This framework applies the above general definition but elaborates more specific methods, including additional definitions of statistical and measurement units, conventions and classifications for compilers of statistics to produce statistics on occurrences and direct impacts consistently within DRSF.

To be considered a disaster occurrence, an observed event must simultaneously meet two criteria:

- The first criterion is existence of social impact. This is an objectively observable social impact according to an agreed scope and definition of disaster impacts.
- The second criterion is there is a discrete temporal scale (beginning and end to the disaster) and location (or impact area)

These proposed criteria imply a requirement for collecting three basic types of statistics as part of the Core Set in the DRSF, needed at least to produce counts of disaster occurrences following this definition. These requirements are discussed in more detail in the following sections and represented below:

Figure 2: Proposed criteria and data requirements for a statistical definition for disaster occurrence



The criterion of discrete temporal scale for a disaster leads to exclusion of elements linked to the disaster but not taking place within the occurrence period. Such linked elements occurring after disasters are classified as indirect impacts. An example of an indirect impact of a disaster is the consequence of the displacement of a population on the development or economic welfare for that region in the following months or years. Other events that take place prior to an occurrence period constitute development of risk but up until the beginning of a disaster are considered part of slow developing risk. These distinctions do not correspond to the analytical importance of the phenomena but are justified by the necessity of defining categories for recording statistics.

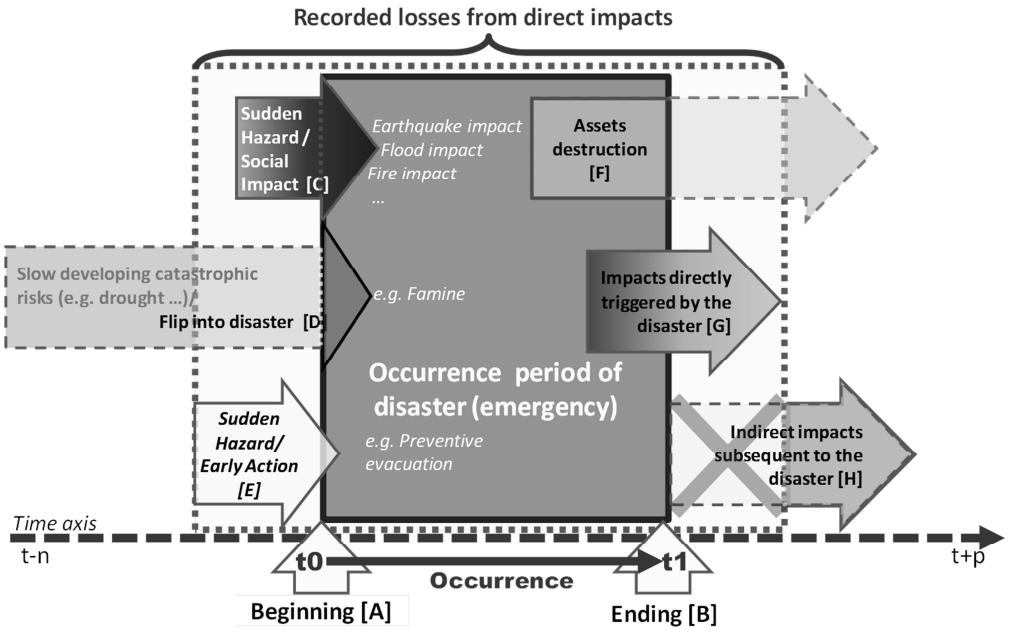
The concept of ability of a community to cope is the important rule for assessing the social impact criterion for recording disaster occurrences. The general rule is that a disaster occurrence is recorded by referring to declaration by the relevant authority. Usually, this moment is close in timing to the beginning of the disaster occurrence period and the hazard event. Therefore, it is logical to use this moment to record the beginning of the disaster occurrence period. This convention is in alignment with current practices by disaster management authorities.

The emergency declaration may be made by authorities at the national or local/regional level or both. In the draft tables designed for testing the DRSF, the concept of "very large disasters" and categorizing disasters according to emergency declarations at national or local level is introduced for summary statistics on disaster occurrences. Very large disasters have special characteristics of interest for analysis and are generally covered by specific extensive reporting and assessment. The DRSF can be used for such individual reporting. Statistically, very large disaster recording pose particular questions, for example related potentially multiple geographic regions in a countries or in several countries. Although it is not defined specifically in the DRSF, a category for very large disasters is included in disaster occurrences tables in accordance with the demand the information can be recorded according to national specifications for disaster impact scale. Further information about scale-related categories for disaster occurrences reporting is shown in Box 2.

Thus, following the criteria of an official declaration, occurrences are recorded in the database, with unique identifiers, with reference to a specific beginning time or date (beginning of occurrence period) and characterized by a hazard type or types.

As much as possible the use of hazards to describe a disaster is aligned with the IRDR (2015). However, following the recommendation of the Expert Group, multi-hazard disasters are recorded separately.

Box 1: Conventions on occurrence period and direct impacts



[A] Beginning of the generation of direct impacts: ***disaster occurrence.***
[B] Ending of the generation of direct impacts: ***end of the disaster occurrence (emergency) period.***
[C] Impacts generated by sudden hazards & [D] by Slow risks when their accumulation turns into a disaster (flip).
[E] Cost of early actions to mitigates losses during this particular occurrence period (e.g. by evacuating population).
[F] Assets losses during the occurrence period; economic assets reflect expected future benefits
[G] Losses due to direct impacts: loss of growing crops and non produced goods (e.g. picking up of forest berries, mushrooms, firewood…) & medical costs.
[H] Losses from indirect impacts (e.g. due to assets degradation). They are not recorded in Core DRSF.

2.2 Direct impacts

Direct impacts are impacts happening during the occurrence period. In practice, the beginning and end for the occurrence period are recorded according to the declaration of an emergency period, defined and documented by the government. In the case when only the beginning date (or time) is known, it is assumed that the reporting refers to immediate impacts during an emergency period and the losses are classified as direct impacts. These cases are generally smaller disasters with probably relatively smaller duration for emergency.

Direct impacts special cases

Thus, generally, the scope of recording direct impacts within the Core Set of the DRSF is limited to the shaded box in the centre of the diagram in Box 1, except for two special cases:

Some costs are triggered by a particular disaster, not by an additional event, but may continue after the emergency period, especially medical care. Also, there can be costs of evacuations or other pre-emptive measures in anticipation of a disaster prior to the beginning of the disaster occurrence. These are real and observable costs directly triggered by the disaster occurrence and, by convention, both of these particular cases are included as direct impacts.

2.3 Classification of Direct Impacts

Impacts are broad losses calculated not only in terms of mortality or economic valuation, but including other social costs, such as loss of cultural heritage and natural environment.

A classification of direct impacts was developed (see complete classification and explanatory notes in Chapter 4). At the most basic level, the framework distinguishes between human impacts (or directly affected population) and material impacts.

1 - Direct human impacts, affected population
1.1 Human, affected population
1.2 Losses of jobs

2 - Direct economic material impacts
2.1 Direct impacts on fixed assets (based on SNA asset definition)
2.2 Direct impacts on valuables (based on SNA asset definition)
2.3 Natural resources (based on SNA asset definition = non owned and managed biological assets)
2.4 Critical goods & services
2.5 Critical infrastructures (sub-set of [2.1.2], [2.1.4] & [2.1.6])

3 - Direct impact on cultural heritage
3.1 Direct impact on cultural heritage zones
3.1 Direct impact on cultural objects

4 - Direct environmental impact
4.1 Direct impact on global warming/ climate change
4.2 Direct impacts on ecosystems by land cover types (SEEA-EEA, ENCA-QSP...)
4.3 Losses of natural water resource (quantitative/qualitative)
4.4 Loss of critical ecosystems

Box 2: Categories for reporting disasters

In principle, there is no threshold requirement for recording statistics on disaster occurrences and direct impacts and all of the available data ought to be collected and stored in the national database according to the structure of the proposed tables. However, potentially there is an interest, particularly for international compilations, for applying some criteria to sample selected occurrences from the national databases. A commonly cited example is the database criteria from the Centre for Research on the Epidemiology of Disasters EM-DAT database, which is also applied for issuing a Global Identifier number (GLIDE) to the event as managed by the Asian Disaster Reduction Centre (ADRC):

- *Ten (10) or more people reported killed.*

- *Hundred (100) or more people reported affected.*
- *Declaration of a state of emergency.*
- *Call for international assistance.*

These criteria can be utilized together as a group or separately for summarizing statistics on disaster occurrences and impacts in analysis. The concept for these criteria is aligned with the DRSF definition for a disaster and may be relevant for analysis of a disaster's magnitude. However, care should be taken to consider the context for applying such threshold criteria for comparative analyses, such as the relative size of the population or amount of social-economic activity with an impact area, particularly when applying numeric criteria. Ninety or a hundred affected people could be devastating if the impact area is a very small community as compared to a similar scale of impact in a large city. Thus a multi-criteria analysis or perhaps relative (e.g. per capita) measures may be more interesting in some cases for assessing magnitude. There is no specific requirement within the DRSF Core Set to apply such criteria; thus, such calculations can be considered as additional analyses or extracted summaries from the official national databases.

Chapter 3: Disaster Risk Reduction Expenditures

The DRSF is a response to the requirements of the Sendai Framework for Disaster Risk Reduction for a streamlined set of statistics to support policies. The Framework stipulates disaster risk reduction as a broader scope of work that encompasses the policy objective, which aimed at a) preventing new and b) reducing existing disaster risk and c) managing residual risk, all of which contributes to strengthening resilience. It is important to understand the breadth of this new definition to appreciate the need for countries to allocate budgets, essential information for policy makers, to not only disaster management but, more importantly disaster risk prevention and disaster risk mitigation. While focusing the Core DRSF on disasters' direct impacts (see Chapter 2), the risk prevention and risk mitigation side should be addressed at an early stage as it is essential element for policy assessments. It is therefore proposed to supplement the core account focused on direct losses and costs related to particular disaster occurrences with a set of tables to record current and investment expenditure for disaster risk prevention and risk mitigation. While the Core Set statistics relate to direct impacts of an identified disaster, these additional tables will consider the probability of disasters and the efforts to reduce the risks.

3.1 A "satellite account" for recording disaster risk reduction expenditures

The targets of increasing prevention by dint of planning, organization and preparedness (5) and public information and early warning (7) can be addressed in the form of what is called a satellite account of the System of National Accounts. Satellite accounts are used to analyze public and private expenditure for functional domains such as education, health, social protection, research & development or environmental protection. Expenditures include current and investment costs. Current expenditures are the costs of producing the characteristic services or activities of the domain (e.g. disaster management) such as salaries and other operational costs supported by producing units as well as implicated budgetary or financial transfers (including with the Rest of the World). Investment expenditures include the formation of fixed capital of the SNA (buildings, machines, infrastructures...) and land acquisition.

The common methodology of satellite accounts allows calculating the National Expenditure in the domain, and to compare it to the National Expenditure of other domains and to the GDP. Detailed tables report on the relative contribution of sectors (e.g. central, regional, local government, enterprises, NGOs, households), which are also the beneficiaries. The analysis of how National Expenditure is financed will allow mapping the flows between sectors (e.g. between central and local governments) and between the national economy and the Rest of the World (e.g. transfers received and supplied). Physical data can be attached to satellite accounts as well. Satellite accounts are convenient tools for monitoring and assessing policies.

Box 3 Definition of National Expenditure for Disaster Risk Reduction and other aggregates.

The total outcome of characteristics activities performed various sectors involved is made of current expenditures and investments. This total is the production of the sectors. This production benefits to particular groups of beneficiaries, generally not in proportion to their contribution to their financing of these activities. The activity of domain's producers is financed either from national budgets (public or private) or by funding from the Rest of the World. Therefore, the National Expenditure for Disaster Risk Reduction will be calculated as Total Expenditure of the Producers minus transfers received/plus transfers supplied from/to the Rest of the World.

The satellite account for disaster risk reduction follows the same principle as the Core DRSF in that it is structured around the concept of direct impacts (see Chapter 2). However, whereas disaster response policies are to some extent driven by actual events or occurrence, risk prevention and risk mitigation policies consider the probability of disasters. Disaster risk reduction has to be considered as a continuous process marked by the irregular and often unpredictable appearance of disasters. The level of disaster risk reduction will critically determine the magnitude of the direct impacts of a natural hazard. It records facts anterior, coincident or posterior to the occurrence of the disaster only as they relate to characteristic activities in the domain (e.g. public awareness raising, delivery of emergency services or planning and enforcement of prevention measures). These characteristic activities can also take place during the occurrence of the disaster period, their recording providing a bridge between the Core DRSF (in the strict sense) and the DM satellite account.

3.2 Disaster Risk Reduction Characteristic Activities (DRRCA)

The scope of a satellite account is usually defined in relation to the characteristic activities of the domain. A draft classification of Disaster Risk Reduction Characteristic Activities (DRRCA) is proposed below. It is supplemented with another draft classification aimed at highlighting Characteristic Transfers taking place in the domain, in particular insurance and international flows.

Box 3 B Disaster Management and Disaster Risk Reduction

The aim for DRR expenditure statistics in the the DRSF is to maintain consistency with Sendai Framework. ng Disaster Risk Reduction (DRR) is used as overarching concept instead of Disaster Management (DM).

DM is a narrower scope of the work pertaining to managing the consequences of risks that are known to be leading towards, or already, materializing into a disaster event.

***Disaster management** is the organization, planning and application of measures preparing for, responding to and, initial recovery from disasters.*

Disaster management may not completely avert or eliminate the threats, it focuses on creating and implementing preparedness and others plans to decrease the impact of disasters and build back better. Failure to create/apply a plan could lead to damage to life, assets and lost revenue.

Disaster risk reduction *(DRR) is the policy objective aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contributes to strengthening resilience. DRR encompasses all aspects of work including the management of residual risk, i.e. managing risks that cannot be prevented nor reduced, and are known to give raise to, or already, materialize into a disaster event..*

The provisional classification of DRRCA is established starting from the Sendai Framework and considering the recently updated ISDR terminology document. For ISDR, disaster risk reduction is: "*The policy objective aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contributes to strengthening resilience*." This is the scope of DRRCA. Within this scope, Disaster risk reduction characteristic activities include:

1. Disaster Risk Prevention
2. Disaster Risk Reduction
3. Disaster Management
4. Disaster Recovery
5. General Government, Research & Development, Education Expenditure

Disaster risk reduction characteristic transfers include

1. Internal transfers between public government services
2. Risk transfers, insurance premiums and indemnities
3. Disaster related international transfers
4. Other transfers

3.3. Annotated classification of Disaster Risk Reduction Characteristic Activities and Transfers

According to ISDR, disaster risk reduction is: "*The policy objective aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contributes to strengthening resilience*." The terms, definitions and annotations of the DRRCA displayed below are extracted, as much as relevant, from a paper prepared and reissued with technical corrections by UNISDR in October 2015, titled "Working Background Text on Terminology for Disaster Risk Reduction" .

Characteristic Activities

1. **Disaster risk prevention**
   Activities and measures to avoid existing and new disaster risks.
   a. **Risk prevention in advance of hazardous event**
      The concept and intention to completely avoid potential adverse impacts of hazards, vulnerability conditions and exposure through action. Examples include construction of dams or embankments that eliminate flood risks, land-use regulations that do not permit any settlement in high risk zones, and seismic engineering designs that ensure the survival and function of a critical building in any likely earthquake.
   b. **Risk prevention in or after hazardous event**
      Measures taken to prevent secondary hazards or their consequences such as measures to prevent contamination of water supplies or measures to eliminate natural dams resulting of earthquake induced landslides and/or rock falls.

2. **Disaster risk mitigation**

Activities and measures to reduce or lessen existing disaster risk or to limit the adverse impacts of a hazardous event

a. **Structural measures, constructions**
   Structural measures: Any physical construction to reduce or avoid possible impacts of hazards, or application of engineering techniques to achieve hazard resistance and resilience in structures or systems. Common structural measures for disaster risk reduction include constructed dams, flood levies, ocean wave barriers, earthquake-resistant construction, and evacuation shelters.
b. **Non-structural measures**
   Any measure not involving physical construction that uses knowledge, practice or agreement to reduce risks and impacts through their integration in sustainable development plans and programmes, in particular through policies and laws typically to reduce vulnerability and exposure, public awareness raising, training and education.
c. **Land-use planning**
   Land- use planning can help to mitigate disasters and reduce risks by discouraging settlements and construction of key installations in hazard-prone areas, including consideration of service routes for transport, power, water, sewage and other critical facilities.
d. **Early warning systems management**
   An interrelated set of hazard warning, risk assessment, communication and preparedness activities that enable individuals, communities, businesses and others to take timely action to reduce their risks.

3. Disaster management

The organization and management of resources and responsibilities for creating and implementing preparedness and addressing all aspects of emergencies and others plans to respond to, and to decrease the impact of, disasters and to build back better.

a. **Preparedness**
   The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current disasters.
b. **Emergency management**
   The organization and management of resources and responsibilities, which predominantly focused on immediate and short-term needs, for addressing all aspects of emergencies and effectively respond to a hazardous event or a disaster. The set of specialized agencies that have specific responsibilities and objectives in serving and protecting people and property in emergency situations including agencies such as civil protection authorities, police, fire, ambulance, paramedic and emergency medicine services, Red Cross and Red Crescent societies, and specialized emergency units of electricity, transportation, communications and other related services organizations.
c. **Other disaster responses**
   Include provision of emergency services and public assistance by private and community sectors, as well as community and volunteer participation.
d. **Emergency supply of commodities**

4. Disaster Recovery

a. **Relocation**
   Of people who, for different reasons or circumstances because of risk or disaster, have moved permanently from their places of residence to new sites.
b. **Rehabilitation**
   The rapid and basic restoration of services and facilities for the functioning of a community or a society affected by a disaster.
c. **Reconstruction**

The medium and longer-term repair and sustainable restoration of critical infrastructures, services, housing, facilities and livelihoods required for full functioning of a community or a society affected by a disaster.

5. **General Government, Research & Development, Education Expenditure**
   a. **General Government Expenditure for Disaster Risk Reduction**
   b. **Research & Development, Risk assessment, and Information**
   Risk assessments (and associated risk mapping) include: a review of the technical characteristics of hazards such as their location, intensity, frequency and probability; the analysis of exposure and vulnerability including the physical social, health, economic and environmental dimensions; and the evaluation of the effectiveness of prevailing and alternative coping capacities in respect to likely risk scenarios. This series of activities is sometimes known as a risk analysis process.
   ISO 31000 defines risk assessment as a process made up of three processes: risk identification, risk analysis, and risk evaluation.
   Risk information includes all studies, information and mapping required to understand the risk drivers and underlying risk factors.
   c. **Education to Disaster Risk Reduction**
   Includes natural and engineering science, training of risks professional, risks specialized medicine professionals

6. **Acquisition less disposals of land and other non produced non-financial assets**

Addition to Gross formation of fixed capital for the calculation of investment expenditures

   a **Acquisition less disposals of land**
   b **Acquisition less disposals of non produced non-financial assets**

7. **Transfers (paid or/and received)**
   a. **Internal transfers between public government services (current or in capital)**
   Includes in particular budgetary transfers from Central government to local government
   b. **Risk transfers, insurance premiums and indemnities**

   Insurance is a well-known form of risk transfer, where coverage of a risk is obtained from an insurer in exchange for ongoing premiums paid to the insurer. Risk transfer can occur informally within family and community networks where there are reciprocal expectations of mutual aid by means of gifts or credit, as well as formally where governments, insurers, multilateral banks and other large risk-bearing entities establish mechanisms to help cope with losses in major events. Such mechanisms include insurance and re-insurance contracts, catastrophe bonds, contingent credit facilities and reserve funds, where the costs are covered by premiums, investor contributions, interest rates and past savings, respectively.

   c. **Disaster related international transfers (current or in capital)**
   d. **Public transfers to private (subsidies, transfers in capital...)**
   e. **Private transfers (taxes, voluntary transfers...)**

3.4 DRRE Aggregates

The satellite accounts allow computing aggregates of DRRE.

They are typically:

- Total DRR Production Expenditure (current plus investment) which is a measurement of what has been done and by which sector.
- DRRE Net Transfers (paid minus received) within the country and with the Rest of the World.
- DRR National Expenditure which is the sum of Total Production Expenditure plus DRRE Net Transfers. It measures which domestic sectors paying for DRRE and how much. DRR NE can be compared to the National Expenditure in other domains such as education, health, R&D... and to the GDP.
- Benefits of the DRR National Expenditure (by beneficiaries), composed of benefits from Total Production Expenditure, which is an estimation of the services consumption and Total Transfers received. The beneficiaries are households when DRR NE and Transfers received can be assigned to them, the government on behalf of the community and the enterprises. In the latter case, benefits for enterprises include altogether the outcome of expenditure for self account and transfers.

3.4 Physical data, maps associated with the satellite account

In addition to compilation of the expenditure and investment statistics on characteristic activities, another useful element for the DRSF satellite account is a compilation of geo-referenced information on known disasters, and also risk management, such as the areas covered or not covered by early warning systems, with risks of various hazards and/or exposed population. Such data are common for Disaster management agencies as well as in a lot of current research on hazards and risks which are conducted using a GIS platform. Significant data are already available for many of the high-risk prone areas in Asia and the Pacific on hazards or risks of hazards and can be made available to populate the DRSF. This information can be overlaid with the data on risk management and also with Core Set statistics on occurrences and impacts in order to carry out assessments of risk reduction policies.

Chapter 4: Classifications

In this chapter we present three classifications to assist to operationalize the DRSF into structured tables with clear scope and clear definitions. The classifications are for hazards, direct impacts, and the disaster risk reduction activities and transfers.

4.1 Hazards classification

The classification of disasters by hazards types is a direct application of the hazards classification from IRDR (2015) with the addition of classes for cascading multi-hazard disasters. Cascading multi-hazard disasters are single events which are linked in time and space - such as, for example, an earthquake that also causes a tsunami or landslide. These multi-hazard disasters are called cascading hazards because one hazard directly leads to another. Separate hazards that happen in the same location or area but that are not otherwise related as a cascading event are separate single-hazard disasters, with their own discrete spatial and temporal characteristics rather than as multi-hazard disasters. In the case of multi-hazard disasters, it may be useful to maintain an attribution in the database to each of the component hazards and/or to a special multi-hazard class (e.g. earthquake-tsunami). The attribution of disasters to multiple hazards is accommodated in the DRSF with corrections for double-counting in summary statistics (e.g. total disaster occurrences counts multi-hazard disasters once). Following this practice, there is no immediate need for a comprehensive classification of multi-hazard disasters as reporting agencies can make the reference to the component hazard types in the metadata.

The detailed ISDR Hazards classification is presented in Annexes 1 (Family and Main events) and 2 (Perils).

4.2 Direct impacts classification

Technically the direct impacts classification is built as a list of objects (e.g. individuals, buildings) which may be impacted in different ways (e.g. damaged or destroyed). The types of impacts are detailed in the classification of human affected, following the common practices such as the approach taken in the Disaster Information Management System (DesInventar) initiative of UNISDR and UNDP. In the case of material impacts, priority is given for simplicity to the types of objects impacted rather than to the classification of the impacts themselves. However, the distinction between damaged and destroyed is proposed in the case of dwellings (again following the practice of DesInventar). This distinction can be specified within the tables for all assets categories if relevant. A comparison of disaster impact categories and definitions in DESInventar (DES), in the EM-DAT database of the Centre for Research on the Epidemiology of Disasters (CRED), in the UN Framework for the Development of Environmental Statistics (FDES) is presented in Annex 3. It will be supplemented with references to the UN ECLAC Damage and Loss Assessment (DALA) methodology (forthcoming) .

Material impacts include direct economic impacts, direct impacts on cultural heritage, and direct environmental impacts. Within direct economic impacts, there are categories for fixed assets, valuables and natural resources designed for coherence with the definition and categorization of assets in the System of National Accounts (SNA). For direct economic impacts there is also a sub-set of classes for critical infrastructure, in order to respect the requirement for statistics on impacts particularly identified for their importance according to current practices. The scope of critical infrastructure cuts across multiple categories in the classification scheme. A category for direct impacts to critical goods and services is also needed so that the framework and tables will capture important information on direct losses that are technically not accounted for as fixed assets, such as destruction of crops that were under cultivation and losses to medical services not otherwise captured by losses to fixed assets. The direct impacts to cultural heritage and to the environment are included as categories separate from the direct economic impacts because the importance and value of these losses extend beyond the scope of economic value as defined by the SNA.

DRSF Direct Impacts Classification (detailed DIC v.1)

1 - Direct human impacts, affected population

1.1 Human, affected population

1.1.1 Deaths
1.1.2 Missing
1.1.3 Injured, ill
1.1.4 Evacuated
1.1.5 Relocated
1.1.6 Otherwise affected

1.2 Losses of jobs

1.2.1 Losses of jobs/ agriculture
1.2.2 Losses of jobs/ industry and services

2 - Direct economic material impacts

2.1 Direct impacts on fixed assets (based on SNA asset definition)

2.1.1 Dwellings
2.1.2.1 Dwellings destroyed
2.1.2.2 Dwellings damaged
2.1.2 Key buildings & structures
2.1.3 Other buildings and structures
2.1.4 Key machinery & equipment
2.1.5 Other machinery & equipment
2.1.6 Agriculture land, livestock, fish stocks, and managed forests

2.2 Direct impacts on valuables (based on SNA asset definition)

2.2.1 Art objects, music instruments
2.2.2 Other valuables

2.3 Direct impacts on natural resources (based on SNA asset definition = non owned and managed biological assets)

2.3.1 Land, incl. soil
2.3.2 Primary forests
2.3.3 Fish stocks
2.3.4 Freshwater
2.3.5 Other natural resources

2.4 Losses of critical goods & services

2.4.1 Inventories (SNA asset definition)
2.4.1.1 Inventories/ intermediate and final food products
2.4.1.2 Inventories/ other products
2.4.2 Expected output of growing and non-produced crops
2.4.3 Critical services (SNA commodities)
2.4.4 Medical cost of people injured or ill during the disaster occurrence period

2.5 Direct impacts on critical infrastructures (sub-set of [2.1.2], [2.1.4] & [2.1.6])

2.5.1 Hospitals, health facilities
2.5.2 Education facilities
2.5.3 Other critical public administration buildings
2.5.4 Public monuments
2.5.5 Roads
2.5.6 Bridges
2.5.7 Transport equipments
2.5.8 Electricity generation facilities
2.5.9 Electricity grids
2.5.10 ICT Equipments
2.5.11 Dams
2.5.12 Water supply infrastructure
2.5.13 Water sewage & treatment systems

2.5.14 Agriculture land, livestock, fish stocks, and managed forests
2.5.15 Other critical infrastructures

3 - Direct impact on cultural heritage

3.1 Direct impact on cultural heritage zones
3.1.1 UNESCO Heritage sites
3.1.2 National heritage designations
3.1.3 Other heritage designations
3.2 Direct impact on cultural heritage objects
3.2.1 Buildings and monuments
3.2.2 Other cultural objects

4 - Direct environmental impact

4.1 Direct impact on global warming/ climate change
4.1.1 Emissions of GHGs
4.1.2 Loss of carbon sequestration capacity
4.1.3 Other direct impact on global warming
4.2 Direct impacts on ecosystems by land cover types (SEEA-EEA, ENCA-QSP...)
4.2.1 Urban and associated developed areas
4.2.2 Homogeneous herbaceous cropland
4.2.3 Agriculture plantations, permanent crops
4.2.4 Agriculture associations and mosaics
4.2.5 Pastures and natural grassland
4.2.6 Forest tree cover
4.2.7 Shrubland, bushland, heathland
4.2.8 Sparsely vegetated areas
4.2.9 Natural vegetation associations and mosaics
4.2.10 Barren land
4.2.11 Permanent snow and glaciers
4.2.12 Open wetlands
4.2.13 Inland water bodies
4.2.14 Coastal water bodies and inter-tidal areas
4.3 Losses of natural water resource (quantitative/qualitative)
4.3.1 Losses due to pollution of natural surface water
4.3.2 Losses due to pollution of groundwater
4.3.3 Losses due to destruction of natural surface water reserves
4.3.4 Losses due to destruction of groundwater reserves
4.4 Loss of critical ecosystems
4.4.1 Biosphere reserves (UNESCO Man And Biosphere Programme)
4.4.2 Other designated ecosystems/habitats
4.4.3 Ecosystems hosting threatened species (IUCN Red List)
4.4.4 Other critical ecosystems

4.3 DRRCA and transfers

The classification of DRRCA and transfer is described in greater detail in Chapter 3, above. The presentation below is the general structure that could be used by the compilers of statistics related to investment and expenditure for disaster prevention and risk management.

Current and Investment expenditures

1 Disaster Risk Prevention

1.1 Risk prevention in advance of hazardous event
1.2 Risk prevention in or after hazardous event
2 Disaster Risk Mitigation
2.1 Structural measures
2.2 Non-structural measures
2.3 Land-use planning
2.4 Early warning systems management
3 Disaster Management
3.1 Preparedness
3.2 Emergency management
3.3 Other disaster responses
3.4 Emergency supply of commodities
4 Disaster Recovery
4.1 Relocation
4.2 Rehabilitation
4.3 Reconstruction
5 General Government, Research & Development, Education Expenditure
5.1 General government expenditure for Disaster Risk Reduction
5.2 Research & Development, risk assessment, and information
5.3 Education to Disaster Risk Reduction

Investment expenditures (in addition to Gross formation of fixed capital)
6 Acquisition less disposals of land and other non produced non-financial assets
6.1 Acquisition less disposals of land
6.2 Acquisition less disposals of non produced non-financial assets

Transfers
7. 1 Disaster risk reduction characteristic transfers paid
7.1.1 Internal transfers between public government services (current or in capital)
7.1.2 Risk transfers, insurance premiums and indemnities
7.1.3 Disaster related international transfers (current or in capital)
7.1.4 Public transfers to private (subsidies, transfers in capital...)
7.1.5 Private transfers (taxes, voluntary...)
7.1.6 Other transfers
7. 2 Disaster risk reduction characteristic transfers received
7.2.1 Internal transfers between public government services (current or in capital)
7.2.2 Risk transfers, insurance premiums and indemnities
7.2.3 Disaster related international transfers (current or in capital)
7.2.4 Public transfers to private (subsidies, transfers in capital...)
7.2.5 Private transfers (taxes, voluntary...)
7.2.6 Other transfers

Chapter 5: Measurement & Compilation

Adopting this framework has implications for how disaster-related statistical databases are structured and managed by national disaster management agencies. The first principle of a disaster related statistics database is to assign to each incident reported to the agency with a unique identifier (e.g. numeric code), which can then be linked via a relational database structure to the available information on location, temporal scale, and observed immediate or direct impacts of the incident. Chapter 6, below, contains the core tables for organizing the statistics following the DRSF. This chapter summarizes some of the crucial principles or choices, such as units of measurement that are necessary to populate the tables.

5.1 Measurement Units

There are several potential approaches for defining the measurement units for direct impacts. One approach is to compile statistics in monetary terms, e.g. the monetary cost of restoration of a damaged building or the medical costs. However, prior to monetary valuation, there is an observation of impact in physical units, such as numbers of individuals, numbers of hospitals or a spatial area (e.g. hectares). Statistics on disaster impacts in physical terms can be very important information and should be collected and stored for future analysis. There are difficult questions related to how to aggregate impacts in physical terms that are not yet resolved. At this stage, counts of people affected give very acceptable measurements but totals (e.g. of deaths and other affected people) can be difficult to interpret. The problem is worse with material assets of very different nature and size. In some cases, one solution can be to weight the physical units according to their main property in terms of service given. For example, dwellings can be weighted by the number of inhabitants, hospitals by the number of beds, and so on. A provisional list of suggested units and weights was prepared as guidance for the testing of the DRSF in countries. Pilot tests will assess feasibility for measurement units of direct impacts according to currently available data on historical disasters.

It is important to maintain a database of direct impacts in physical terms regardless of whether statistics are also available for calculating the monetary value of the losses as well. One reason is that monetary valuation depends on the economic context where and when the impacts take place and not only the magnitude of the impacts in a broader sense. For example, prices for reconstructing a damaged dwelling in Japan could be significantly different as compared to prices in Bangladesh. As discussed below, there are potentially multiple approaches, or multiple prices, that can be applied to monetary valuation of assets and so maintaining statistics in physical terms will allow greater flexibility for future analyses of a disaster as compared to statistics in monetary terms only, in which case it is difficult or impossible to work backwards to interpret the scale of impacts in physical terms or following an alternative valuation method.

In the case of human impacts, there is an interest to disaggregate statistics on affected populations according to certain groups (e.g. gender or age groups). But, generally in basic compilation tables the measurement unit for human impacts is always the counts of individuals. Numbers of households is another possibility, but this choice is less practical for these particular statistics and would affect the efficiency for calculating the totals - e.g. total number of deaths or injured.

Below is a working table with some initial suggestions for measurements for each item in the direct impacts classification. These suggested measurement units will be further discussed and evaluated through pilot testing of the DRSF in order to develop final recommendations on this issue. The table also indicates (third column) where monetary valuation is applicable, not applicable, or not relevant.

Figure 5: Possible units of measurements to be used for direct damages (working table)

Direct Impacts Classification and measurement units

I - Direct human impacts		Suggested measurement units				
		$ costs	Physical units			
I.1	**Direct human impacts, affected population**					
I.1.1	Deaths	No	individuals			
I.1.2	Missing	No	individuals			
I.1.3	Injured, ill	Yes	individuals			
I.1.4	Evacuated	Yes	individuals			
I.1.5	Relocated	Yes	individuals			
I.1.6	Otherwise affected	Yes/No	individuals			
I.2	**Direct losses of jobs**					
I.2.1	Direct losses of jobs/ agriculture	Yes	Individuals			
I.2.2	Direct losses of jobs/ industry and services	Yes	Individuals			
II - Direct economic material impacts						
II.1 Direct impacts on fixed assets (SNA asset definition)						
II.1.1	Dwellings	Yes	No. of dwellings	Weighted No. of dwellings *	No. of households	
II.1.2.A	*Dwellings destroyed*	Yes	No. of dwellings	Weighted No. of dwellings *	No. of households	
II.1.2.B	*Dwellings damaged*	Yes	No. of dwellings	Weighted No. of dwellings *	No. of households	
II.1.2	Key buildings & structures	Yes	No. of buildings OR Lenght of structures	Weighted No. of buildings OR Lenght of structures *	No. of jobs	
II.1.3	Other buildings and structures	Yes	No. of buildings OR Lenght of structures	Weighted No. of buildings OR Lenght of structures *	No. of jobs	
II.1.4	Key machinery & equipment	Yes	Tonnes of machinery & equipments	Weighted tonnes of machinery & equipments * capacity	No. of jobs	
II.1.5	Other machinery & equipment	Yes	Tonnes of machinery & equipments	Weighted tonnes of machinery & equipments * capacity	No. of jobs	
II.1.6	Agriculture land, livestock, fish stocks, and managed forests	Yes	Hectares	No. of livestock units, tonnes of timber, tonnes of fish, shell fish	No. of jobs	
II.2 Direct impacts on valuables (SNA asset definition)						
II.2.1	Art objects, music instruments	Yes	No of art objects, music instruments	Number of registered art objects, music instruments		
II.2.2	Other valuables	Yes				
II.3 Direct impacts on natural resources (SNA asset definition = non owned and managed biological assets)						
II.3.1	Land, incl. soil	No	Hectares	Weighted hectares		
II.3.2	Primary forests	No	Hectares	Weighted hectares		
II.3.3	Fish stocks	No	tonnes			
II.3.4	Freshwater	No	m3			
II.3.5	Other natural resources	No	?			
II.4 Direct impacts on critical goods & services						
II.4.1	Inventories (SNA asset definition)	Yes	tonnes of goods			
II.4.1.A	*Inventories/ intermediate and final food products*	*Yes*	tonnes of goods			
II.4.1.B	*Inventories/ other products*	*Yes*	tonnes of goods			
II.4.2	Expected output of growing and non-produced crops	Yes	Estimation of expected tonnes lossed			
II.4.3	Critical services (SNA commodities)		Service units	weighted service units	No. of jobs	
II.4.4	Medical cost of people injured or ill during the disaster occurence period	Yes	individuals			

Direct Impacts Classification and measurement units [continued]

II.5 Direct impacts on critical infrastructures [II.1.2], [II.1.4] & [II.1.6]						
II.5.1	Hospitals, health facilities	Yes	Number of units	Beneficiaries weighted number of units	Staff weighted number of units	Area weighted number of units
II.5.2	Education facilities	Yes	Number of units	Beneficiaries weighted number of units	Staff weighted number of units	Area weighted number of units
II.5.3	Other critical public administration buildings	Yes	Number of units	Beneficiaries weighted number of units	Staff weighted number of units	
II.5.4	Public monuments	Yes	Number of units	Visitors weighted number of units		
II.5.5	Roads	Yes	km	km by size, type...		
II.5.6	Bridges	Yes	Number of units			
II.5.7	Transport equipments	Yes	Number of units			
II.5.8	Electricity generation facilities	Yes	Number of units	Capacity		
II.5.9	Electricity grids	Yes	population connected	population affected		
II.5.10	ICT Equipments	Yes	?			
II.5.11	Dams	Yes	Number of units			
II.5.12	Water supply infrastructure	Yes	population connected	population affected		
II.5.13	Water sewage & treatment systems	Yes	population connected	population affected		
II.5.14	Agriculture land, livestock, fish stocks, and managed forests	Yes/No				
II.5.15	Other critical infrastructures	Yes				
III - Direct impact on cultural heritage						
III.1 Direct impact on cultural heritage zones						
III.1.1	UNESCO cultural heritage sites		Hectares	Weighted hectares		
III.1.2	National cultural heritage designations		Hectares	Weighted hectares		
III.1.3	Other heritage designations		Hectares	Weighted hectares		
III.2 Direct impact on cultural heritage objects						
II.2.1	Buildings and monuments		Number			
II.2.2	Other cultural objects		Number			
IV - Direct environmental impact						
IV.1 Direct impact on global warming/ climate change						
IV.1.1	Emissions of GHGs		CO2-equivalents			
IV.1.2	Loss of carbon sequestration capacity		CO2-equivalents			
IV.1.3	Other direct impact on global warming		CO2-equivalents			
IV.2 Direct impacts on ecosystems by land cover types (SEEA-EEA, ENCA-QSP...)						
IV.2.1	01 Urban and associated developed areas	No	Hectares	Weighted hectares		
IV.2.2	02 Homogeneous herbaceous cropland	No	Hectares	Weighted hectares		
IV.2.3	03 Agriculture plantations, permanent crops	No	Hectares	Weighted hectares		
IV.2.4	04 Agriculture associations and mosaics	No	Hectares	Weighted hectares		
IV.2.5	05 Pastures and natural grassland	No	Hectares	Weighted hectares		
IV.2.6	06 Forest tree cover	No	Hectares	Weighted hectares		
IV.2.7	07 Shrubland, bushland, heathland	No	Hectares	Weighted hectares		
IV.2.8	08 Sparsely vegetated areas	No	Hectares	Weighted hectares		
IV.2.9	09 Natural vegetation associations and mosaics	No	Hectares	Weighted hectares		
IV.2.10	10 Barren land	No	Hectares	Weighted hectares		
IV.2.11	11 Permanent snow and glaciers	No	Hectares	Weighted hectares		
IV.2.12	12 Open wetlands	No	Hectares	Weighted hectares		
IV.2.13	13 Inland water bodies	No	Hectares	Weighted hectares		
IV.2.14	14 Coastal water bodies and inter-tidal areas	No	Hectares	Weighted hectares		
IV.3 Losses of natural water resource (quantitative/qualitative)						
IV.3.1	Losses due to pollution of natural surface water	Yes	m3			
IV.3.2	Losses due to pollution of groundwater	Yes	m3			
IV.3.3	Losses due to destruction of natural surface water reserves	Yes	m3			
IV.3.4	Losses due to destruction of groundwater reserves	Yes	m3			
IV.4 Loss of critical ecosystems						
IV.4.1	Man And Biosphere and other biological reserves (UNESCO, UNEP)	Yes/No	Hectares			
IV.4.2	Other designated ecosystems/habitats	Yes/No	Hectares			
IV.4.3	Ecosystems hosting threatened species (IUCN Red List)	Yes/No	Hectares			
IV.4.4	Other critical ecosystems	Yes/No	Hectares			

5.2 Valuation, reparations cost

When it comes to producing statistics on direct impacts in monetary terms, again there are multiple options. The recommendation for the DRSF is to follow an approach which is generally most practical and best aligned with current practice for the broad range of disaster types, which is to use the best available data on replacement costs.

Even with the convention to apply replacement costs in valuation of impacts, it is important to note that there may be two relevant prices. In the case of the destruction of public buildings and other infrastructures, the full reconstruction price will be recorded (likely at the price of a new asset) as this amount has to be budgeted by the Government. In the case of compensations to households or enterprises, it is likely that the price will cover the loss, not always the actual replacement; in addition, this compensation may happen in the form of a lump sum. All in all, attention will have to be paid to these differences in replacement costs and case by case the method used need be carefully documented.

Monetary valuation of the losses of assets and production should be conducted, when endeavored, in accordance with the valuation principles established in the SNA, which is utilized for a broad range of purposes, including calculating aggregate indicators for production (GDP), consumption and saving. In the case of products, the general rule in the case of no observable price is to use the closest analogy. This rule can be followed for losses of services and goods (e.g. crops).

The valuation of physical assets is complicated and complete compilation of national asset accounting is not commonly done in Asia and the Pacific. It is therefore recommended not to focus on an approach in terms of loss of economic value of physical assets. However, it may happen that in some countries the NSO is doing such calculation. It would in principle include, under the item "Other changes of volume to assets" of the Balance Sheet of the SNA a measurement for "catastrophic losses". In that case, such data can be used if they can be downscaled to the impacted area; as well data on losses (at the replacement cost) and total non financial asset values can be usefully compared.

The term economic loss is referenced in the Sendai Framework and Sustainable Development Goal 11. UNISDR (August, 2015) has suggested to reserve the use of the term economic loss for the monetary valuation of impacts to assets and we have adopted this use of the term for this framework as well.

In theory, it might be possible estimate for direct economic losses associated with deaths, but is not recommended for DRSF as the issue is controversial and no agreed methodology exists. The basic suggested principle is to apply the observed recovery and remediation costs. It includes medical costs and various other costs linked to emergency situation such as evacuation or relocation of a population. As explained in chapter 2, costs which are directly triggered by the disaster are recorded as being the result direct impacts; it consists mainly in medical costs of persons injured during the disaster period and of growing crops and non-produced goods (picked up berries, mushroom, firewood and the like). In symmetric way, when an evacuation is undertaken in view of mitigating the impacts of an announced hazard, the costs are considered as part of those of the disaster. This is not the case of the general disaster management measures which costs all along the year relate to the probability of disasters; their costs are actual expenditures (current expenditures and investments) which are recorded in the satellite account (see Chapter 3).

Also, there are no calculations of monetary asset values for the cultural heritage and for environment assets considered beyond their property of being economic resources. In that case, valuation should follow the SNA rules based on economic benefits. Cultural and ecological values are not included in SNA estimations and should be recorded in the DRSF as a function of material losses. Instead, restoration costs should be estimated and recorded for cultural heritage and the ecosystem.

5.3 Need for geographic information and GIS

Risks and disaster prone areas (or "hot spots") are not evenly distributed across countries or the region. Disaster risk-related statistics are not usually produced from nationwide data collection but from data collected from studies of hotspots or affected regions. The use of geo referenced data and GIS is common in most Disaster Management Agencies. As well, given the nature of the analytical demand for disaster-related statistics, geographic information systems are important tools for compiling the statistical Core Set. Moreover, geo-referenced statistics and geospatial data, such as satellite images can be crucial resources for disaster-related statistics.

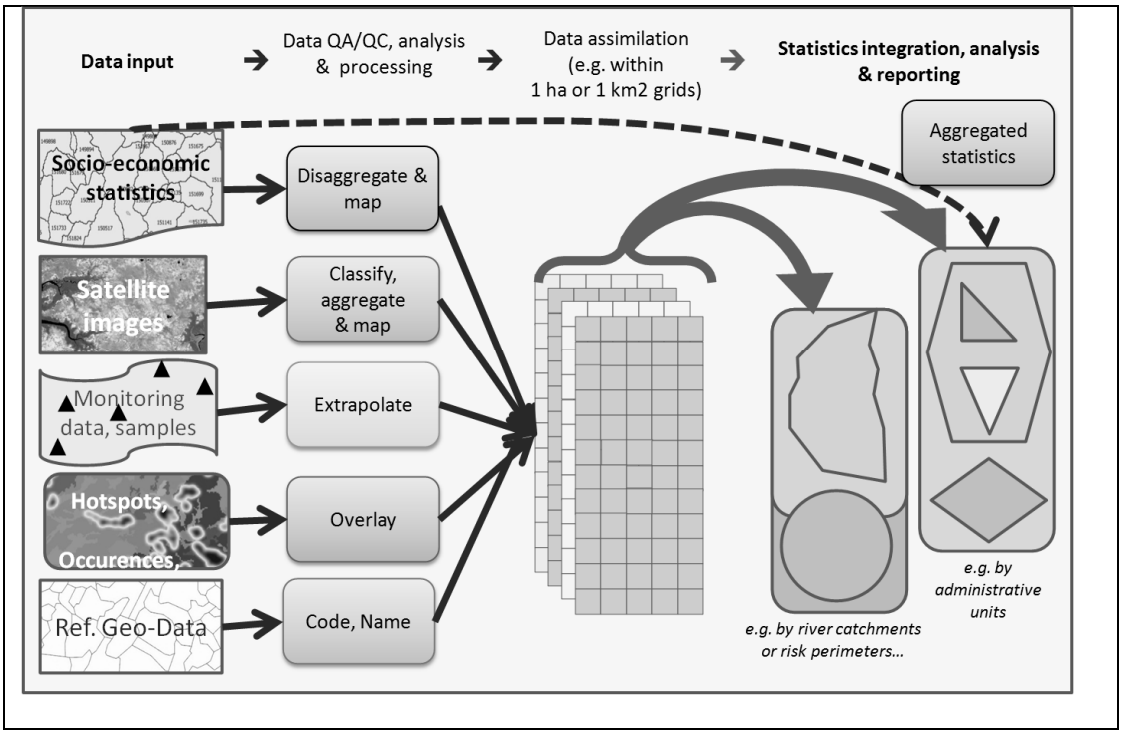
The geographic area for a disaster is defined by locations of direct impacts (according to the most appropriate level of detail available). One of the advantages of compiling data in a geographic information system is that multiple sources of input data become available for identifying locations of disasters, or hazards, or relevant prevention and risk management act4ities and to support integration of these statistics for analysis.

Most of the DRSF tables are structured by geographic regions, particularly by municipalities and regions/states for which data are expected to be available. Through integration with GIS, national agencies will be able to produce a variety of other analytical interesting geographic units for the statistics, such as statistics by river catchments, coastal zones, or by other areas known to be exposed to hazards.

Box 4: Compiling, Reporting, and Analysis with GIS

The following diagram shows an example of simple procedures for integration of statistics using a geographic information system GIS allows for integration of multiple sources of data inputs, including the geo-reference baseline socio-economic statistics, satellite images, monitoring or sampled data, the existing geographic data for a country and then the historical data on disaster occurrence and the risk areas (or hot spots).

These inputs have different requirements for preparing for assimilation in the GIS database, as show in the diagram below. One basic method for assimilation is to apply a grid with the most appropriate level of resolution (e.g. 1 hectare or square kilometer) depending on data inputs and needs for producing the statistical outputs. Through the grid assimilation, it is then possible to produce outputs of statistics and maps according to multiple possible analytical needs, such as: summaries by administrative units or by other relevant geographic zones, such as by river basins or according to the known at risk areas. In few cases, downscaling of statistics is difficult to process or irrelevant. It can be the case of medical costs for people from various places when healed in a central hospital, or to financial costs (This point is noted in the box “Aggregated statistics” on the right side of the figure).



5.5 Double counting, time

There are multiple special sources of potential double-counting for compiling statistics on disaster occurrences and impacts. These potential issues are detailed in the draft tables with columns or rows for making the adjustments for the totals (where relevant). Generally, the identification and adjustment to aggregate figures without double-counting is quite simple. However, the compiler must take care because sometimes there are more than one type of double-counting possibility per table.

There are adjustments for potential double-recording of disasters across geographic regions (e.g. disaster affecting multiple municipalities), across hazard types (cascading multi-hazard disaster) and sometimes there are multiple counts across variable, for example the same person could be affected in multiple ways by a disaster (e.g. injured *and* displaced).

Ideally, a specific time period (beginning and end of disaster) and geo-referencing for the spatial area where there are direct impacts of the disasters, at least for the large disasters.

Challenges related to gaps in the national database or possible double-counting when aggregating data upwards to the national database can be largely avoided through the use of GIS tools as a core part of the structure of basic tables in the FDRS.

Chapter 6: Indicators

The DRSF is a multi-purpose framework for producing statistics providing for a broad range of possible indicators as inputs to the different stages of disaster risk reduction policy development. While the purpose of the DRSF is to assist with development of official statistics that could underpin a range of national and international indicator monitoring requirements, a part of this process is to identify key indicators with the strongest policy relevance.

Many ratios or other combinations of impacts data with background statistics can be derived from compilations following from the DRSF to assess progress towards reducing direct impacts from disasters.
A distinction has to be made between statistical indicators which are implicit to DRSF, which can be extracted from it and policy indicators. In order to facilitate the computation of basic statistical indicators, DRSF includes tables with selected background statistics which can be combined with DRS variables. The presentation of this statistical indicators will allow analysts and policy makers to build upon that basis develop additional indicators, as required and more importantly to select high level policy indicators.. Ultimately, the DRSF should allow the production and regular update of the headline indicators directly relevant to monitoring the seven targets of the Sendai Framework for Disaster Risk Reduction, 2015 and the Sustainable Development Goals Indicator 11.5 which will be defined according to SFDRR.

a) <u>Statistical indicators:</u>

Some simple examples of statistical indicators are ratio of DRSF variables with :

- Mortality share of total national population
- Total affected people share of total national population
- Extent of affected area (hectares)
- Mortality share of affected population• Number of damaged or destroyed dwellings share of total number of dwelling in affected area
- Number of households affected by damaged or destroyed dwellings
- Monetary value of direct impacts to economic assets
- Direct impacts to ecosystems (share by land cover type or/and share of protected natural habitats
- Damages to critical infrastructures (units weighted by number of affected beneficiaries)

Two simple indicators derived from DRRE satellite accounts relevant to a macro assessment of disaster risk reduction effort are:

- National disaster risk reduction expenditure (local currency)
- National disaster risk reduction expenditure share of GDP.

b) <u>DRSF and required Sendai Indicators</u>

The first four Sendai Framework targets all refer to reducing direct impacts from disasters on lives, livelihoods, health and the economic, physical, social, cultural, environmental assets of persons, businesses, communities and countries. The portions of the DRSF related to measuring disaster occurrences and direct impacts are well aligned to these targets. The 5th-7th targets in the Sendai Framework address the need for risk reduction interventions, including through international cooperation.

Box 6 : Possible input of DRSF to Sendai Indicators (and SDG's)

Sendai Targets	DRSF input to indicators (ref. to Tables coding)

1. Reduce global disaster **mortality**	C1a Summary table of affected population by hazards types, national level/ 1 - Direct human impacts, affected population/ 1.1.1 Deaths or missing
2. Reduce the number of **affected people**	C1a Summary table of affected population by hazards types, national level/ 1 - Direct human impacts, affected population/ 1.1 Human, affected population (without double counts)
3. Reduce direct disaster **economic loss**	E1a Summary table of direct material impacts by hazards types at country level/ 2.1+2.2+2.3+2.4
4. Reduce disaster **damage to critical infrastructure** and disruption of basic services, among them health and educational facilities	E1a Summary table of direct material impacts by hazards types at country level/ 2.5 Critical infrastructures
5. Increase the number of countries with national and local disaster **risk reduction strategies**	DRRE-B Transfers expenditure account & Calculation of the DRR National Expenditure/ DRR National Expenditure = Total Production Expenditure plus Net Transfers
6. Enhance international cooperation	DRRE-B Transfers expenditure account & Calculation of the DRR National Expenditure/ 6.1.3 Disaster related international transfers (current or in capital) (paid) and 6.2.3 Disaster related international transfers (current or in capital) (received)
7. Increase the availability of and access to **multi-hazard early warning systems and disaster risk information**	DRRE_A Production expenditure account (current plus investment) by characteristic activities/ 2.4 Early warning systems management PLUS 5.3 Education to Disaster Risk Reduction

c) Towards a headline indicator of disaster risk?

The National Agency for Disaster Management of Indonesia (BNPB) has developed a composite index as a numeric assessment of the level of **disaster risk** across the countries. The BNPB's method along with similar indicator calculations used in countries could be evaluated for applicability in other countries towards a unified regional collection of indicators and methodologies for risk reduction and derived from the DRSF. This work on further development of indicators and other uses of the disaster-related statistics can be taken up by the regional Expert Group at a later stage and building on the outcomes of the pilot tests.

Chapter 7: Descriptions of tables

The following tables have been finalized on the basis of the DRSF discussion by the volunteer pilot-testing countries. . The proposed selection of tables for compilation of statistics and assessment through the pilot testing is available in the annex file DRSF_Draft_TablesV5.xlsx. It contains the following:

A	**Summary tables of events by hazards types**
A1a	Summary table of events by hazards types and size
A1b	Summary table of events by hazards types and size, by regions/states
A1c	Summary table of events by hazards types and size, by municipalities
B	**Selected background statistics by hazard types and administrative units**
B1a	Selected background statistics by hazard types, country level
B1b	Selected background statistics by hazard types, by regions or states
B1c	Selected background statistics by hazard types, by municipalities
B1d	Selected background statistics by hazard types, by river sub-catchments (or sub-basins)
C	**Summary tables of affected population**
C1a	Summary table of affected population by hazards types
C1b	Summary table of affected population by hazards types and Regions/Sates
C1c	Summary table of affected population by hazards types and municipalities
C1d	Summary table of affected population by hazards types and Sub-catchments
C2a	Summary table of affected population by social groups, all groups, country level
C2b1	Summary table of affected population by social groups, age groups, region/state level
C2b2	Summary table of affected population by social groups, gender groups, by regions/states
C2b3	Summary table of affected population by social groups, Urban/Rural population , by regions/states
C2b4	Summary table of affected population by social groups, specific vulnerability groups , by regions/states
C2c1	Summary table of affected population by social groups, age groups, by municipalities
C2c2	Summary table of affected population by social groups, age groups, by municipalities
c2c3	Summary table of affected population by social groups, Urban/Rural population , by municipalities
C2c4	Summary table of affected population by social groups, specific vulnerability groups , by municipalities
D1a	Summary table of direct material impacts by hazards types
D	**Summary tables of direct material impacts**
D1a	Summary table of direct material impacts by hazards types
D1b	Summary table of direct material impacts by hazards types, by regions/states
D1c	Summary table of direct material impacts by hazards types by Municipalities
E	**Summary tables of direct material impacts in monetary terms**
E1a	Summary table of direct material impacts by hazards types
E1b	Summary table of direct material impacts by hazards types, by regions/states
E1c	Summary table of direct material impacts by hazards types by Municipalities
F	**Summary tables of direct cultural impacts**
F1a	Summary table of direct cultural heritage impacts by hazards types
F1b	Summary table of direct cultural heritage impacts by hazards types, by regions/states
F1c	Summary table of direct cultural heritage impacts by hazards types by Municipalities

G	**Summary tables of direct environmental impacts**
G1a	Summary table of direct environmental impacts by hazards types
G1b	Summary table of direct environmental impacts by hazards types, by regions/states
G1c	Summary table of direct environmental impacts by hazards types by Municipalities
DRRE	**Disaster risk reduction satellite accounting**
DRRE_Activities	Production expenditure account (current plus investment) by characteristic activities
DRRE_Transfers	Transfers expenditure account

Chapter 8: Integration with other frameworks

The DRSF is designed to serve multiple analytical purposes and for integration with policy monitoring and indicator frameworks that have been established or are under development internationally.

Compatibility between DRSF and these other frameworks is crucial because the Core Set of the DRSF will be needed for government agencies to respond to the demands on statistics and indicators for national or international monitoring of the related frameworks.

Important examples, include the UN Sustainable Development Goals, which proposes indicators on disasters aligned on the Sendai Framework, the Framework for the Development of Environmental Statistics, the work of the IPCC on "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation" (2012), the United Nations Convention to Combat Desertification (UNCCD), the Convention on Biological Diversity, other related initiatives by the United Nations Regional Commissions, and the work led by UNISDR and the Open-ended Intergovernmental Expert Working Group on Indicators and Terminology Relating to Disaster Risk Reduction.

Further work to coordinate and build coherencies with these other initiatives will continue during the testing of this preliminary draft of the DRSF.

Glossary

<see draft prepared in attached file: drsfglossary_1.xlsx>

List of References

<under development>

Annexes

ANNEX 1: IRDR Family and Main Event Classification

Family	Main Event	Definition
GEOPHYSICAL	EARTHQUAKE	Sudden movement of a block of the Earth's crust along a geological fault and associated ground shaking.
	MASS MOVEMENT	Any type of downslope movement of earth materials.
	VOLCANIC ACTIVITY	A type of volcanic event near an opening/vent in the Earth's surface including volcanic eruptions of lava, ash, hot vapor, gas, and pyroclastic material.
HYDROGEOLOGICAL	FLOOD	A general term for the overflow of water from a stream channel onto normally dry land in the floodplain (riverine flooding), higher-than-normal levels along the coast and in lakes or reservoirs (coastal flooding) as well as ponding of water at or near the point where the rain fell (flash floods).
	LANDSLIDE	A general term for the rapid downslope movement of rock or soil controlled by gravity and the presence of water ranging from rock falls, avalanches, to debris flows.
	WAVE ACTION	Wind-generated surface waves that can occur on the surface of any open body of water such as oceans, rivers, and lakes, etc. The size of the wave depends on the strength of the wind and the traveled distance (fetch).
METEREOLOGICAL	CONVECTIVE STORM	A type of meteorological hazard generated by the heating of air and the availability of moist and unstable air masses. Convective storms range from localized thunderstorms (with heavy rain and/or hail, lightning, high winds, tornadoes) to meso-scale, multi-day events.
	EXTRATROPICAL STORM	A type of low-pressure cyclonic system in the middle and high latitudes (also called- mid-latitude cyclone) that primarily gets its energy from the horizontal temperature contrasts (fronts) that exist in the atmosphere. When associated with cold fronts, extratropical cyclones may be particularly damaging (e.g., European winter/windstorm).
	EXTREME TEMPERATURES	A general term for temperature variations above (extreme heat) or below (extreme cold) normal conditions.
	FOG	Water droplets that are suspended in the air near the Earth's surface. Fog is simply a cloud that is in contact with the ground.

	TROPICAL CYCLONE	A tropical cyclone originates over tropical or subtropical waters. It is characterized by a warm-core, non-frontal synoptic-scale cyclone with a low pressure center, spiral rain bands and strong winds. Depending on their location, tropical cyclones are referred to as hurricanes (Atlantic, Northeast Pacific), typhoons (Northwest Pacific), or cyclones (South Pacific and Indian Ocean).
CLIMATOLOGICAL	DROUGHT	An extended period of unusually low precipitation that produces a shortage of water for people, animals, and plants. Drought is different from most other hazards in that it develops slowly, sometimes even over years, and its onset is generally difficult to detect. Drought is not solely a physical phenomenon because its impacts can be exacerbated by human activities and water supply demands. Drought is therefore often defined both conceptually and operationally. Operational definitions of drought, meaning the degree of precipitation reduction that constitutes a drought, vary by locality, climate and environmental sector.
	GLACIAL LAKE OUTBURST	A flood that occurs when water dammed by a glacier or moraine is suddenly released. Glacial lakes can be at the front of the glacial (marginal lake) or below the ice sheet (sub-glacial lake).
	WILDFIRE	Any uncontrolled and non-prescribed combustion or burning of plants in a natural setting such as a forest, grassland, brush land, or tundra which consumes the natural fuels and spreads based on environmental conditions (e.g., wind, topography). Wildfires can be triggered by lightning or human actions.
BIOLOGICAL	ANIMAL INCIDENT	Human encounters with dangerous or exotic animals in both urban and rural environments.
	DISEASE	Either an unusual, often sudden, increase in the number of incidents of an infectious disease that already existed in the region (e.g., flu, E.coli) or the appearance of an infectious disease previously absent from the region (e.g., plague, polio).
	INSECT INFESTATION	The pervasive influx, swarming and/or hatching of insects affecting humans, animals, crops, and perishable goods. Examples are locusts and African Bees.
EXTRATERRESTRIAL	IMPACT	A type of extraterrestrial hazard caused by the collision of the Earth with a meteorite.
	SPACE WEATHER	A general term for extraterrestrial weather conditions driven by solar eruptions such as geomagnetic storms, radio disturbances, and solar energetic particles.

ANNEX 2: IRDR Peril Classification

GEOPHYSICAL	**Ash Fall**: Fine (less than 4 mm in diameter) unconsolidated volcanic debris blown into the atmosphere during an eruption; can remain airborne for long periods of time and travel considerable distance from the source.
	Fire following Earthquake: Urban fires triggered by earthquakes. Particularly susceptible areas include densely spaced, wooden buildings that dominate local architecture, and where the earthquake has damaged or ruptured water and gas pipelines. Small local fires have the potential to merge into conflagrations destroying many city blocks.
	Ground Movement: Surface displacement of earthen materials due to ground shaking triggered by earthquakes or volcanic eruptions, or expansion or shrinkage of soils due to changes in water content also called shrink-swell clays .
	Landslide following Earthquake: Independent of the presence of water, mass movement may also be triggered by earthquakes.
	Lahar: Hot or cold mixture of earthen material flowing on the slope of a volcano either during or between volcanic eruptions.
	Lava Flow: The ejected magma that moves as a liquid mass downslope from a volcano during an eruption.
	Liquefaction: The transformation of (partially) water-saturated soil from a solid state to a liquid state caused by an earthquake. Liquefaction reduces the strength and stiffness of soil causing buildings to topple over.
	Pyroclastic Flow: Extremely hot gases, ash, and other materials of more than 1,000 degrees Celsius that rapidly flow down the flank of a volcano (more than 700 km/h) during an eruption.
	Tsunami: A series of waves (with long wavelengths when traveling across the deep ocean) that are generated by a displacement of massive amounts of water through underwater earthquakes, volcanic eruptions or landslides. Tsunami waves travel at very high speed across the ocean but as they begin to reach shallow water they slow down and the wave grows steeper.
HYDROGEOLOGICAL	**Avalanche:** A large mass of loosened earth material, snow, or ice that slides, flows or falls rapidly down a mountainside under the force of gravity. Snow Avalanche: Rapid downslope movement of a mix of snow and ice. Debris Avalanche: The sudden and very rapid downslope movement of unsorted mass of rock and soil. There are two general types of debris avalanches - a cold debris avalanche usually results from an unstable slope suddenly collapsing whereas a hot debris avalanche results from volcanic activity leading to slope instability and collapse.
	Coastal Flood: Higher-than-normal water levels along the coast caused by tidal changes or storms that result in flooding which can last from days to weeks.
	Coastal Erosion: The temporary or permanent loss of sediments or landmass in coastal margins due to the action of waves, winds, tides, or anthropogenic activities.

	Debris Flow, Mud Flow, Rock Fall: Types of landslides that occur when heavy rain or rapid snow/ice melt and send large amounts of vegetation, mud, or rock downslope by gravitational forces.
	Flash Flood: Heavy or excessive rainfall in a short period of time that produce immediate runoff, creating flooding conditions within minutes or a few hours during or after the rainfall.
	Ice Jam Flood: The accumulation of floating ice restricting or blocking a river's flow and drainage. Ice jams tend to develop near river bends and obstructions (e.g., bridges).
	Rogue Wave: An unusual single crest of an ocean wave far out at sea that is much higher and/or steeper than other waves in the prevailing swell system.
	Riverine Flood: A type of flooding resulting from the overflow of water from a stream or river channel onto normally dry land in the floodplain adjacent to the channel.
	Seiche: A standing wave of water in a large semi- or fully-enclosed body of water (lakes or bays) created by strong winds and/or a large barometric pressure gradient,
	Sinkhole: Collapse of the land surface due to the dissolving of the subsurface rocks such as limestone or carbonate rock by water.
METEREOLOGICAL	**Cold Wave**: A period of abnormally cold weather. Typically a cold wave lasts two or more days and maybe aggravated by high winds. The exact temperature criteria for what constitutes a cold wave vary by location.
	Derecho: Widespread and usually fast-moving windostrms associated with convection/convective storm. Derechos include downburst and straight-line winds. The damage from derechos is often confused with the damage from tornadoes
	Frost, Freeze: Frost is the consequence of radiative cooling resulting in the formation of thin ice crystals on the ground or other surfaces in the form of needles, feathers, scales, or fans. Frost occurs when the temperature of surfaces is below freezing and water vapor from humid air forms solid deposits on the cold surface. Freeze occurs when the air temperature is at (32°F/0°C) or below over a widespread area for a climatologically significant period of time. Use of the term is usually restricted to advective situations or to occasions when wind or other conditions prevent frost. Frost and freeze are particularly damaging during the crop growing season.
	Hail: Solid precipitation in the form of irregular pellets or balls of ice more than 5 mm in diameter.
	Heat Wave: A period of abnormally hot and/or unusually humid weather. Typically a heat wave lasts two or more days. The exact temperature criteria for what constitutes a heat wave vary by location.

	Lightning: A high-voltage, visible electrical discharge produced by a thunderstorm and followed by the sound of thunder.
	Rain: Water vapor condenses in the atmosphere to form water droplets that fall to the Earth.
	Sandstorm, Dust Storm: Strong winds carry particles of sand aloft, but generally confined to less than 50 feet (15 m), especially common in arid and semi-arid environments. A dust storm is also characterized by strong winds but carries smaller particles of dust rather than sand over an extensive area.
	Snow, Ice: Precipitation in the form of ice crystals/snowflakes or ice pellets (sleet) formed directly from freezing water vapor in the air. Ice accumulates when rain hits the cold surface and freezes.
	Storm Surge: An abnormal rise in sea level generated by a tropical cyclone or other intense storms.
	Tornado: A violently rotating column of air that reaches the ground.
	Wind: Differences in air pressure resulting in the horizontal motion of air. The greater the difference in pressure, the stronger the wind. Wind moves from high pressure toward low pressure.
	Winter Storm, Blizzard:A low pressure system in winter months with significant accumulations of snow, freezing rain, slet, or ice. A blizzard is a severe snow storm with winds exceeding 35 mph (56 km/h) for three or more hours producing reduced visibility (less than .25 mile (400 m).
CLIMATOLOGICAL	**Forest Fire**: A type of wildfire in a wooded area.
	Land fire: Wildfires in scrub landscapes dominated by short shrubs and grasses. Such land fires are call bush fires (Australia), or brush fires (Europe and North America),
	Subsidence, Desiccation: Subsidence refers to the sinking of the ground due to, groundwater removal, mining, dissolution of limestone (e.g., karst, sinkholes), extraction of natural gas, and earthquakes. Sinking may also occur from a complete or nearly complete drying of fine-grained sediment such as clay, which is called desiccation.
BIOLOGICAL	**Bacterial Disease**: An unusual increase in the number of incidents caused by the exposure to bacteria either through skin contact, ingestion or inhalation. Examples include salmonellae, MSRA (Staphylococcus aureaus), and vibrio cholerae , among others
	Fungal Epidemic: Exposure to fungi either through skin contact, ingestion or inhalation of spores resulting in an unusual increase in the number of incidents. Examples are fungal pneumonia, fungal meningitis, etc.
	Parasitic Epidemic: Exposure to a parasite – an organism living on or in a host – causes an unusual increase in the number of incidents. Exposure to parasites occurs mostly through contaminated water, food or contact with insects, animals (zoonotic), pets, etc. Examples are malaria, chagas

	disease, giardiasis and trichinellosis.
	Prion Epidemic: A type of biological hazard caused by prion proteins. Prion diseases or transmissible spongiform encephalopathies (TSEs) are a family of rare progressive neurodegenerative disorders that affect both humans and animals characterized by long incubation periods and neural loss. Examples are Bovine Spongiform Encephalophaty (BSE), Creutzfeld-Jakob-Disease (CJD), Kuru, etc.
	Viral Epidemic: A type of biological hazard where an unusual increase in the number of incidents is caused by the exposure to a virus either through skin contact, ingestion or inhalation. Examples are dengue fever, Hepatitis A, HIV/AIDS, avian influenza, and Ebola.
EXTRATERRESTRIAL	**Airburst**: An explosion of a comet or meteoroid 12 to 50 km above the earth's surface.
	Energetic Particles: Emissions from solar radiation storms consisting of pieces of matter (e.g., protons and other charged particles) moving at very high speed. The magnetosphere and atmosphere block (solar) energetic particles (SEP) from reaching humans on Earth but they are a danger to life in outer space and pose a radiation hazard to aircraft travelling at high altitudes.
	Geomagnetic Storm: A type of extraterrestrial hazard caused by solar wind shockwaves that temporarily disturb the Earth's magnetosphere. Geomagnetic storms can disrupt power grids, spacecraft operations, and satellite communications.
	Radio Disturbance: Triggered by x-ray emissions from the Sun hitting the Earth's atmosphere and causing disturbances in the ionosphere such as jamming of high and/or low frequency radio signals. This affects satellite radio communication and Global Position Systems (GPS).
	Shockwave: A type of extraterrestrial hazard caused by the explosion (airburst) or impact of meteorites that generate energy shockwaves capable of shattering glass, collapsing walls, etc. A shockwave carries energy from a disturbance through a medium (solid, liquid, gas) similar to a wave though it travels at much higher speed.

ANNEX 3: Comparison of disaster impact categories and definitions

in DESInventar (DES), in the EM-DAT database of the Centre for Research on the Epidemiology of Disasters (CRED), in the UN Framework for the Development of Environmental Statistics (FDES) and in the UN ECLAC Damage and Loss Assessment (DALA) methodology (forthcoming)

Impact Category	Impact name	Source	Definition
Human impacts	Deaths	DES	The number of persons whose deaths were directly caused. When final official data is available, this figure should be included with corresponding observations, for example, when there are differences between officially accepted figures and those of other sources.
	Deaths	DES	The number of persons whose deaths were directly caused. When final official data is available, this figure should be included with corresponding observations, for example, when there are differences between officially accepted figures and those of other sources.
	Deaths	CRED	Number of people who lost their life because the event happened
	Deaths	DES	People confirmed as dead and people missing and presumed dead
	Missing	DES	The number of persons whose whereabouts since the disaster is unknown. It includes people who are presumed dead, although there is no physical evidence. The data on number of deaths and number of missing are
	Missing	CRED	The number of people whose whereabouts since the disaster is unknown, and who are presumed dead (official figure when available)
	Injured, sick	DES	The number of persons whose health or physical integrity is affected as a direct result of the disaster. This figure does not include victims who die. Those who suffer injuries and or illness, if the event is related to a plague or epidemic, should be included here.
	Injured	CRED	People suffering from physical injuries, trauma or an illness requiring medical treatment as a direct result of a disaster
	Injured	FDES	People suffering from physical injuries, trauma or an illness requiring medical treatment as a direct result of a disaster.
	Evacuated	DES	The number of persons temporarily evacuated from their homes, work places, schools, hospitals, etc. If the information refers to families, calculate the number of people according to available indicators.
	Homeless	CRED	Number of people whose house is destroyed or heavily damaged and therefore need shelter after an event.
	Homeless	FDES	People needing immediate assistance for shelter
	Relocated	DES	The number of persons who have been moved permanently from their homes to new sites. If the

			information refers to families, calculate the number of people according to available indicators.
	Affected	DES	The number of persons who suffer indirect or secondary effects related to a disaster. This refers to the number of people, distinct from victims, who suffer the impact of secondary effects of disasters for such reasons as deficiencies in public services, commerce, work, or because of isolation. If the information refers to families, calculate the number of people according to available indicators.
	Affected	CRED	People requiring immediate assistance during a period of emergency, i.e. requiring basic survival needs such as food, water, shelter, sanitation and immediate medical assistance.
	Affected	FDES	People requiring immediate assistance during a period of emergency; it can also include displaced or evacuated people
	Total affected	FDES	Sum of injured, homeless, and affected (including "people requiring immediate assistance" but excluding number of people killed)
	Victims	DES	The number of persons whose goods and/or individual or collective services have suffered serious damage, directly associated with the event. For example, partial or total destruction of their homes and goods; loss of crops and/or crops stored in warehouses, etc. If the information refers to families, calculate the number of people according to available indicators.
Impacts to assets	Loss value	DES	Sum of losses directly caused by the disaster in local currency.
	Loss Value US$	DES	The equivalent in dollars (US$) of the value of losses in local currency, according to the exchange rate on the date of the disaster. This figure is useful for comparative evaluations between databases.
	Estimated damage	CRED	The amount of damage to property, crops, and livestock. In EM-DAT estimated damage are given in US$ ('000). For each disaster, the registered figure corresponds to the damage value at the moment of the event, i.e. the figures are shown true to the year of the event
	Houses damaged	DES	The number of homes with minor damage, not structural or architectural, which may continue being lived in, although they may require some repair or cleaning.
	Houses destroyed	DES	The number of homes leveled, buried, collapsed or damaged to the extent that they are no longer habitable.
	Crops and woods (Hectares)	DES	The amount of cultivated or pastoral land or woods destroyed or affected. If the information exists in another measurement, it should be converted to hectares
	Livestock	DES	The number of animals lost (bovine, pig, ovine, poultry) regardless of the type of event (flood, drought, epidemic, etc).
	Educational centres	DES	The amount of play schools, kindergartens, schools, colleges, universities, training centres etc, destroyed or directly or indirectly affected by the disaster. Include those that have been used as temporary shelters.
	Hospitals	DES	The number of health centres, clinics, local and regional hospitals destroyed and directly or indirectly

			affected by the disaster.
	Roads Affected (Mts)	DES	The length of transport networks destroyed and/or rendered unusable, in metres.
	Other losses	DES	A description of other losses not included in the fields of the basic record. For example: religious buildings and monuments, architectural or cultural heritage buildings, theatres and public installations, public administration buildings relating to banks, commerce and tourism; vehicles or buses lost, bridges.
Impacts to Assets by Sector	Transport sector	DES	Qualitative field in the database. It has two options: Affected or Not Affected. It relates to the effects of the disaster on the transport sector: road networks (train or rail), transport stations, airports, river and sea bridges, sea walls, etc, that have been affected or destroyed.
	Communications	DES	Qualitative field in the database. It has two options: Affected or Not Affected. It relates to damages to the communication sector: plants and telephone networks, radio and television stations, post offices and public information offices, internet services, radio telephones and mobile phones.
	Aid Organisations Installations	DES	Qualitative field in the database. It has two options: Affected or Not Affected. It relates to damages to the emergency response sector, specifically to the aid organisms' installations: Fire fighters and other aid organisms and to entities of public order.
	Agriculture and fishing	DES	Qualitative field in the database. It has two options: Affected or Not Affected. It relates to damaged to the Agriculture and Fishing sector: crops, granaries, pastoral zones.
	Water supply	DES	Qualitative field in the database. It has two options: Affected or Not Affected. It relates to damages to the aqueduct sector: water outlets, water treatment plants, aqueducts and canals which carry drinking water, storage tanks.
	Sewerage	DES	Qualitative field in the database. It has two options: Affected or Not Affected. It relates to damages to the sewage sector: sewage systems and treatment plants.
	Educational centres	DES	Qualitative field in the database. It has two options: Affected or Not Affected. It relates to damages to the Education sector: everything relating to this sector – pre-schools, kindergartens, schools, colleges, universities, training centres, libraries, cultural centres, etc
	Power/Energy	DES	Qualitative field in the database. It has two options: Affected or Not Affected. It relates to damages to the Energy sector: dams, substations, transmission lines, generators, energy processing plants and combustible stores, pipelines, gas lines, nuclear plants.
	Industry	DES	Qualitative field in the database. It has two options: Affected or Not Affected. It relates to damages to the Industrial sector: all types and sizes of industry, including agricultural and fishing plants.
	Health Sector	DES	Qualitative field in the database. It has two options: Affected or Not Affected. It relates to damages to the Health sector: everything related to the health sector, including communication networks, emergency networks (ambulances), casualty centres, etc

ANNEX 4 Composition of the Disaster-Related Statistics Expert Group

The Expert Group is composed of officially nominated experts from national disaster management agencies and from national statistics offices and is Co-Chaired by Ms. Hae Ryun Kim of Republic of Korea and Mr. Yuichi Ono of Japan. A team of ESCAP staff is Secretariat to the Expert Group, led by Puji Pujiono, with Sung Eun Kim and Teerapong Phraphotjanaporn and under the overall guidance of Shamika Sirimanne, Director of the Division. Information and Communications Technology and Disaster Risk Reduction (IDD) and Rikke Hansen, Chief of Economic and Environment Statistics Section.

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