Guideline on Monitoring and Reporting the Impact of Sand and Dust Storms through the Sendai Framework Monitoring

ESCAP

APDIM

Asian and Pacific Centre for
the Development of Disaster
Information Management

Acknowledgement

Cover Photo
Photo received from: Struan Timms Photography - Photo taken on 5 March 2019 at approximately 18:10 PM - Location: Junee, NSW Australia

Photo description: Taken from Rocky Hill Reserve looking North-West, the storm was travelling in an easterly direction which is a usual weather pattern for this part of the country. Junee is a small country town of a few thousand people, known for its prime lamb and cereal crop production.

Disclaimer

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Acronyms

APDIM	Asian and Pacific Centre for the Development of Disaster Information Management
ADPC	Asian Disaster Preparedness Center
DRR	Disaster Risk Reduction
FAO	Food and Agriculture Organization of the United Nations
ICT	Information and Communication Technology
LCU	Local Currency Unit
NDMO	National Disaster Management Organizations
NSO	National Statistical Office
MHEWS	Multi-Hazard Early Warning System
SDGs	Sustainable Development Goals
SDS	Sand and Dust Storms
SFM	Sendai Framework Monitor
UNCCD	United Nations Convention to Combat Desertification
UNDESA	United Nations Department of Economic and Social Affairs
UNESCAP	United Nations Economic Commission for Asia and the Pacific
UNDRR	United Nations Office for Disaster Risk Reduction
UNEP	United Nations Environment Programme
WMO	World Meteorological Organization

Introduction

Background

In 2015, Members of the United Nations adopted the 2030 Agenda for Sustainable Development and the Sendai Framework for Disaster Risk Reduction 2015-2030 which promote risk-informed development. Through four priorities and seven targets, the Sendai Framework aims to reduce existing risks, prevent the creation of new risks and strengthen resilience. In 2016, recalling the Sendai Framework, the UN General Assembly resolution 70/195 recognized the **need to combat the negative impacts of sand and dust storms (SDS) which have inflicted substantial socioeconomic damage on people and economies** (UN, 2016a)**.** This includes collecting and analyzing data on loss and damage caused by the negative impacts of SDS in order to inform decision- and policymaking at regional, national and local levels.

The goal of the Asian and Pacific Centre for the Development of Disaster Information Management (APDIM) is to address the unmet needs of information management for disaster risk reduction and resilience. APDIM works to reduce the negative impacts of natural hazards, strengthen capacities for disaster information management and enhance regional cooperation and coordination on cross boarder disasters including sand and dust storms. In particular, APDIM aims to enhance Member States capacities to bridge existing gaps in terms of data availability, tools and access to data on sand and dust storms.

While the occurrence of sand and dust storms can be scientifically determined, **quantifying their impact on society, the environment and an economy is more difficult due to the lack of relevant data** and the absence of disaster-impact database that records and systematically quantifies SDS activity and impacts (UNESCAP & APDIM, 2018). And yet, existing case studies show that a single SDS event can cause economic loss amounting to hundreds of millions of USD. For instance, in northwest China, one SDS event destroyed and buried more than 4.412 houses and 373.000 hectares of cultivated land and killed 120.000 livestock. Highways, railways, electrical infrastructures and power generation plants were also destroyed (Pahlavanravi et al, 2012).

Led by governments, the Sendai Framework monitoring is an annual official process which provides an opportunity for Member States in Asia-Pacific to collect and gather historical data on SDS and build an evidence base which can inform policy and decision-making. Launched in 2018, by the United Nations Office for Disaster Risk Reduction (UNDRR), the Sendai Framework Monitor (SFM) is the online tool which supports this process, allowing countries to monitor and report their progress in implementing the Sendai Framework.

Purpose, scope and target audience

The purpose of the Guideline is to provide Member States from the Asia-Pacific region with a practical step-by-step guide to support their efforts to monitor and report the impacts of SDS through the Sendai Framework monitoring. Ultimately, the Guideline should contribute to:

1. **Enhancing capacities of Member States to collect, collate, understand, and use data** for the monitoring and reporting of the negative impacts of SDS through the Sendai Monitor;

2. **Building an evidence base on the negative impacts of SDS using the Sendai Framework monitoring process** for policy and decision-making.

This document adopts a hazard specific approach to the SFM reporting and should be **used as a complementary resource to the comprehensive UNDRR** Technical Guidance for monitoring and

reporting against global targets of the Sendai Framework[1]. Out of the seven global targets of the Sendai Framework, this Guideline **puts emphasis on targets and indicators which can be disaggregated by hazard type and custom indicators which can be tailored to monitor additional SDS impacts**. The Guideline also gives guidance on how SDS interacts with all the Sendai Framework indicators.

In terms of geography, the Guideline focuses on the Asia-Pacific region and on countries which are most at risk of being affected by the negative impacts of SDS. The Asia-Pacific region is the second largest in terms of dust emissions, contributing more than half a billion tons per year (UNESCAP&APDIM, 2018).

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Box 1: Definitions of Sand and Dust Storms

The World Meteorological Organization (WMO) defines dust storms **as the result of surface winds raising large quantities of dust into the air and reducing visibility at eye level (1.8 m) to less than 1000 m**. There is not a strict delineation in the definition of sand versus dust storms, as there is a continuum of particle sizes in any storm. (UNCCD, UNEP, WMO, 2016)

The United Nations Convention to Combat Desertification (UNCCD) proposed the following definition of SDS in the context of the Policy Framework for sand and dust storms: **SDS refer to mineral sand (particle size 63 microns to 2mm) and dust (particle size range < 1–63 microns) that originates from land surfaces.** SDS occur when strong, turbulent winds blow over dry, unconsolidated, finegrained surface materials where vegetation cover is sparse or absent. **The spatial extent of SDS events varies greatly.** Large-scale dust haze events affect areas measured in tens of thousands and sometimes hundreds of thousands of square kilometres. **The duration of SDS events varies from a few hours to several days**. (UNCCD, 2017)

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The target audience includes government officials working on sand and dust storms and on the monitoring of the Sendai Framework in Asia and the Pacific. Furthermore, the Guideline may provide useful inputs for implementing partners in the region including the United Nations System (UNS), the Red Cross Movement, INGOs, Civil Society Organizations (CSOs), academia, donors and other actors supporting data collection and monitoring and reporting of the impacts of SDS. While the Guideline focuses specifically on the Asia-Pacific region, it can be used by all countries affected by SDS who wish to report their impact through the Sendai Framework monitoring.

Process for developing the Guideline

This Guideline builds upon a desk-review of guidance and policy documents and consultations with UN entities working on SDS and the implementation of the Sendai Framework in Asia and the Pacific.

Outline of the Guideline

Chapter 1 gives an overview of the Sendai Framework monitoring process and its linkages with the SDGs. **Chapter 2 puts forth key elements for organizing the monitoring and reporting of SDS impacts.** The section addresses practical aspects for collecting and collating data on SDS impacts and suggests a four-step approach for reporting SDS impacts using the Sendai monitoring process. **Chapter 3 explains which data is needed to monitor and report SDS impacts by target and indicator of the Sendai Framework**. Finally, **Chapter 4 proposes five complementary custom targets and indicators** for monitoring and reporting additional SDS impacts, using the SFM 'custom target' feature.

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[1] An updated version of the Technical guidance will be available soon with more practical information including screenshots of the online monitoring system.

1 Overview of the Sendai Framework monitoring process

1. The Sendai Framework for Disaster Risk Reduction: 7 targets, 38 indicators

The Sendai Framework is a 15-year voluntary agreement which aims at preventing the creation of new risks and reducing existing disaster risk through the implementation of integrated and inclusive measures that prevent and reduce hazard exposure and vulnerability to disaster. To this end, the framework is articulated around seven (7) targets (Figure 1).

Figure 1: The seven targets of the Sendai Framework

Progress against these targets is measured by a set of 38 indicators which were recommended by the Open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction (OIEWG) and endorsed by the UN General Assembly.

2. Linkages between Sendai Framework indicators and the SDGs

The Sendai Framework monitoring process contributes to the reporting against indicators under SDG 1 (No poverty), SDG 11 (Sustainable cities) and SDG 13 (Climate action). Data collected in the SFM for DRR related indicators of the 2030 Agenda are compiled and reported by the UNDRR to the United Nations Department of Economic and Social Affairs (UNDRR, 2019). **By reporting data on SDS impacts through the Sendai Framework monitoring process, Member States will reflect efforts made towards the achievements of the SDGs and the 2030 Agenda regarding the reduction of SDS impacts**.

Table 1: Linkages between SDGs and Sendai Framework targets

SDGs	Target	Indicator	Sendai indicators
SDG 1, End poverty	1.5: By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.	1.5.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population	A-1; B-1
		1.5.2 Direct economic loss attributed to disasters in relation to global gross domestic product (GDP)	C-1
		1.5.3 Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework	E-1
		1.5.4 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies	E-2
SDG 11, Sustainable cities and communities	11.5: By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations	11.5.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population	A-1; B-1
		11.5.2 Direct economic loss in relation to global GDP, damage to critical infrastructure and number of disruptions to basic services, attributed to disasters	C-1; D-1; D-5
	11.b: By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels	11.b.1 Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework	E-1
		11.b.2 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategie	E-2
SDG 13, Climate action	13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	13.1.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population	A-1; B-1
		13.1.2 Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework	E-1
		13.1.3 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies	E-2

Source: UNDRR

3. The Sendai Framework Monitor (SFM)

In 2018, the UNDRR launched the [Sendai Framework Monitor,](#) an online tool which allows to report against the seven global targets of the Sendai Framework and to set additional custom indicators.

3.1 A government-led and multi-stakeholder process

The Sendai Framework monitoring is an annual official process which is led by governments and involves multiple stakeholders. **The tool encourages governments to add multiple users from various ministries, agencies, civil society organizations, academia and UN entities, amongst others**. If added to the system, these actors can input data or observe the process. The tool promotes accountability as data validated by the authorities are publicly available on the website.

There are four (4) roles in the system:

1. **Coordinator**: officially designated by the government (also called 'SFM Focal Point'), the Coordinator creates users in the system, configures the disaggregation, assigns targets and indicators to contributors, enters metadata, sets up custom targets.

2. **Contributors**: are in charge of providing and entering data for assigned targets or indicators.

3. **Validators:** validate the data for assigned targets and indicators for official publication.

4. **Observers**: are guests who can follow the process and provide comments to the data.

3.2 Annual trends on disaster impacts on people and assets

The system provides annual trends on the implementation of the Sendai Framework:

- **Data on disasters is aggregated and reported annually since 2015 for all targets**. The system does not show a record of disaster events but shows annual trends on disaster impacts on people and assets as well as policy progress.

- **For targets A to D, the system can provide data since 2005.** Data for the period 2015-2030 are compared to a baseline data covering the period 2005-2015.

- **For each indicator, disaggregation is currently optional but encouraged.** It allows to gather additional data by hazard, geography, affected people (age, sex, income, disability) and types of assets impacted (infrastructures, crops etc.). **However, the system does not make linkages between the disaggregation options**. For instance, the system does not indicate how many women have been impacted by SDS but shows the overall number of affected women and men by all hazards.

3.3 SFM Analytics: Analyzing validated data

The [Sendai Framework Monitor analytics](#) **displays validated data** and allows to compare progress with other countries or regions. The analytics is a useful tool for governments and non-government actors to look at **disaggregated data on sand and dust storms** (Figure 2).

Figure 2: SFM analytics, country data

STEPS

1. On the homepage of the SFM, click on **'Analytics'**

2. Select the **'Reporting year'**, **'Global Target'**, **'Country or Region'** and the **'Indicator'** of your choice (e.g. 2018; Target B; Malaysia; B-2).

3. Scroll down, disaggregated data will show at the bottom of the page

4. Click on the table icon ⊞ to display data instead of a graph

2 Key elements for organizing SDS monitoring and reporting

There is a need to quantify the impacts of SDS on people, societies and economies. In the absence of disaster-impact database for SDS, the Sendai Framework monitoring process and its tool provide an opportunity for Member States to collect and gather historical data on SDS in order **to build an evidence base which can inform policy-making and reflect efforts made at national level to reduce the risk of SDS**. To this end, this chapter addresses practical aspects for collecting data on SDS impacts and suggests a four-step approach for reporting SDS impacts using the Sendai Framework monitoring.

1. Practical aspects for collecting and collating data on SDS

1.1 Data needs

Governments are encouraged to collect data on impacts of SDS on people, economies and societies. The seven global targets of the Sendai Framework provide an opportunity to collect data and monitor the impacts of SDS on people, economic loss, disruptions to basic services and to assess the impacts of policies on mitigation efforts. Additional custom targets presented in chapter 4 can complement this data. Table 2 presents the type of SDS impacts which can be monitored with the Sendai Framework monitoring both through the seven global targets and through additional custom targets proposed in chapter 4. The list presented in chapter 4 is not exhaustive as it tries to give a limited number of additional targets which can be used by all countries. Countries may add other custom targets, including to monitor impacts which are not covered by the Sendai Framework monitoring, such as the impacts of SDS on the environment (e.g., soil erosion, soil loss or the degradation of water quality).

For further information on data requirements for each target and indicator, please refer to chapter 3.

Table 2: Data needed for SDS monitoring

SDS impacts on…	Sendai Framework global targets	Proposed custom targets
People	Target A → Mortality and missing persons	
	Target B → People injured, ill, who lost their livelihoods, who lost their dwellings	Target 1 → People affected by sex and by age
Economic loss	Target C → Economic loss in the following sectors: agriculture, productive assets, housing, infrastructures, culture	
Disruptions to basic services	Target D → Disruptions to health and education services	Target 2 → Disruptions of schools Target 3 → Disruptions to the aviation sector Target 4 → Disruptions to the energy sector
Policy and mitigation efforts	Target E → DRR strategies	Target 5 → Mainstreaming SDS into DRR strategies
	Target F → International cooperation	

	Target G → EWS and risk assessments	

1.2 Consistent methodology

It is critical that countries **adopt the same criteria and methodology for assessing SDS loss and damage through the entire time span of data collection** (2005-2030). A consistent methodology allows consistency and comparability over time and between countries. To this end, the SFM gives a default methodology for each indicator and allows for a country-defined methodology. Therefore, countries can choose to use a national methodology to calculate indicators or UNDRR's proposed methodology. For Member States who do not have an established national methodology for collecting data on SDS impacts, the Guideline proposes some criteria and provides links to existing methodologies for assessing loss and damage.

For further information on methodologies for each target and indicator, please refer to chapter 3.

1.3 Data collection

Government representatives working on SDS should work closely with government and non-government actors who have data or could collect data on SDS impacts. Data can be collected by government agencies and organizations including Ministry of Health, Agriculture, Industry etc., National Disaster Management Offices (NDMO) and National Statistical Offices (NSO). In addition, some data can be collected by non-governmental organizations such as relief organizations (NGOs, Red Cross, UN etc.) and academia. If data cannot be collected in situ or is not accessible, some open source database can also provide complementary data. For instance, the United Nations and the World Bank gather socio-economic and demographic data by country and regions, and specialized organizations such as the Food and Agriculture Organization and the International Labor Organizations respectively gather data on agriculture and labor. Finally, access to satellite data through platforms such as the GEO network also provides an opportunity to fill in data gaps for SDS monitoring.

For further information on sources of data for each target and indicator, please refer to chapter 3.

1.4 Data centralization

Government representatives working on SDS can participate in the Sendai Framework monitoring process in different ways, by:

- **Collecting and centralizing data on SDS impacts from government and non-government actors** and feed this information to the institution in charge of the Sendai monitoring process (Ministry of Interior, Civil protection department or NDMO).

- **Mainstreaming SDS issues into other ministries and departments** so that they contribute data on SDS directly to the institution in charge of the Sendai monitoring process.

As the Sendai Framework monitoring process is official, data collected shall be validated in order to become official data.

2. Four steps to organize and systemize SDS monitoring and reporting

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RECOMMENDED STEPS

1. **Designation of an SDS contributor for the Sendai Framework monitoring** in the Ministry of Environment or Agriculture

2. **Designation by the SFM Coordinator of the SDS contributor** for specific targets and indicators of the Sendai Framework monitoring

3. **Agreement** between the Coordinator and the SDS contributor **on a standardized way to report SDS data**

4. **Agreement on a timeframe to report and meet the annual reporting milestones**

2.1 Designation of an SDS contributor

In the Ministry in charge of sand and dust storms matters (usually Ministry of Agriculture or Ministry of Environment), **a person responsible for SDS data collection and data gathering should be designated**. **Also called the 'SDS contributor'**, this person will be in charge of the monitoring and reporting of SDS data in the Sendai Framework monitoring process. This entails the following:

- gathering data to report against Sendai Framework indicators related to SDS,

- liaising with entities who have complementary data on SDS,

- liaising with the SFM Coordinator or the Focal point in charge of data gathering in the Ministry of Environment or Agriculture. If there is no SFM focal point in the Ministry of Environment or Agriculture, the SDS contributor can take the role of SFM focal point for other aspects of the monitoring and reporting.

Figure 2: Example of institutional arrangement for SDS reporting

2.2 Designation by the SFM Coordinator of the SDS contributor for the Sendai Framework monitoring

Institutional arrangements for the SFM reporting require the nomination of a Sendai Framework focal point, also called the **'Coordinator', who is in charge of coordinating the national reporting in the SFM.** This individual is often located in the Ministry of Interior, Civil protection or NDMO. As the national Focal Point for SFM, the Coordinator will **be responsible for creating the profile of the SDS**

contributor in the system, assigning targets and indicators to be reported on and adding SDS as a hazard in the settings.

Figure 3: Example of disaster-data information flow for the Sendai Framework monitoring

The SFM tool allows for different approaches to the reporting. Countries can decide to adopt one of the following method or to use a combination of approaches:

- **All in the system**: multiple stakeholders are granted access to the SFM system to input data on specific targets and indicators. When all departments have entered their share of information, the data is validated by the authorities.

- **Off-line coordination and validation**: for instance, countries can use an existing coordination mechanism for DRR (e.g., National DRR Platforms) or set up a small multi-sectoral team which will be in charge of centralizing and collating the data needed for the reporting. The data can be validated through a meeting, a consultation or any other process. The Coordinator then enters all validated data in the system.

Regardless of the approach selected (online, off-line or a combination of both), the SDS contributor should be designated by the Coordinator as the SDS contributor for the following targets and indicators:

Table 3: Targets and indicators to be assigned to the SDS contributor

Target	Indicators which can be disaggregated by hazard type	Indicators for which contributors can add comments
Target A	All indicators (A-2, A-3)	
Target B	All indicators (B-2, B-3, B-4, B-5)	
Target C	All indicators (C-2, C-3, C-4, C-5, C-6)	
Target D	D-6, D-7	D-8
Target E		E-1, E-2
Target F		F-5, F-7, F-8,

Target G	G-2, G-5	G-3, G-4, G-6

All the indicators listed in column 2 can be disaggregated by hazard type, therefore the SDS contributor can directly provide data for sand and dust storms. The SDS contributor may also have additional data relevant to targets and indicators for which disaggregation by hazard type is not available (listed in column 3). In the SFM tool, SDS contributors are encouraged to provide relevant additional information in the 'additional information' box under each indicator (see chapter 3).

2.3 Agreement on a standardized way to report SDS data to the SFM Coordinator

Whether it is online or off-line, the SDS contributor and the SFM Coordinator need to define and agree on a standardized way to send all relevant data to the SFM Coordinator. Preferably this method should be the same for all contributors. Below are several examples of methods which can be tailored to the country context and needs:

- **Reporting online in the SFM**: The Coordinator adds the institution of the SDS contributor (e.g., Ministry of Agriculture or Ministry of Environment) and **create a contributor profile**. The SDS contributor reports directly in the system on the assigned indicators listed in Table 3.

- **Collecting data through a standardized tool:** The Coordinator and the SDS contributor set up a tool with the indicators listed in Table 3 (e.g., using an excel spreadsheet), where the SDS contributor will enter data and/or comments. The Coordinator can **add the SDS contributor as an observer** in the SFM for accountability. As an observer, the SDS contributor can comment and ensure that the data reported is accurate.

2.4 Agreement on a timeframe to report and meet the annual reporting milestones

The SFM Coordinator and the SDS contributor should agree on a timeframe for the reporting in order to meet the annual milestones. Depending on the method of data collection agreed upon, **the timeframe should allow for sufficient time to contribute and validate the data before the milestones.** It is important to note that data can be added and modified at any time.

- **SDGs related targets** (Targets A, B, C, D, E) **should be reported by 31st March:** data collected in SFM for DRR related indicators of the 2030 Agenda are compiled and reported by the UNDRR to UNDESA each year in April. For instance, if a contributor is reporting on events which happened in 2019, data should be entered in the system before the end of March 2020.

- **All targets should be reported by end of September:** For instance, if a contributor is reporting on events for the year 2019, data should be entered in the system before the end of September 2020.

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Global targets: Measuring the impacts of SDS and progress to reduce SDS risks

All the information contained in this chapter is complementary to the UNDRR Technical Guidance for monitoring and reporting on progress in achieving the global targets of the Sendai Framework (2017)[2] which is the reference document for the Sendai Framework monitoring process. The document provides detailed information with regard to definitions, required data, ideal data and computing methodology.

In addition, UNDRR and the Asian Disaster Preparedness Center (ADPC) have developed an online E-learning training course which aims to train government officials and relevant stakeholders involved in reporting national progress using the SFM. The course is comprised of videos, online tutorials, discussion boards, and short assessments for each target.

RESOURCES

UNDRR (2017) Technical Guidance on SFM

UNDRR and ADPC E-learning training course on SFM

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1. Preliminary steps to reporting on SDS impacts

Box 2: Color and shape coding applied for the steps to be undertaken in the SFM

The following color and shape coding is used throughout the Guideline:

Yellow pointer shows where to click

Red rectangle shows where to enter the data

Orange rectangle points out menus and relevant sections

1.1 Disaggregating by hazard type: adding sand and dust storms to the list of hazards

In the setup, the **Coordinator must add manually 'Sand and dust storms' to the list of hazards** so that it appears in the disaggregation list of the global targets. Once the hazard disaggregation is set up, **sand and dust storms will appear under all indicators which are disaggregated by hazard type**.

The SDS contributor always reports in the SFM under the 'hazard' disaggregation option. For instance, under indicator B-2, the SDS contributor should enter the number of people who were injured

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[2] An updated version of the Technical guidance will be available soon with more practical information including screenshots of the online monitoring system.

or ill because of SDS under the 'hazard' section (Figure 4). Once the number has been entered next to the SDS box, the SDS contributor needs to ensure that the SDS data is included in the total number. **As disaggregation is optional, totals from the disaggregation option are not automatically calculated**. For instance, in the below example, the total number of injured and ill people '59' was entered manually.

Figure 4: Adding data on sand and dust storms in SFM

STEPS

1. Click on the **'+'** button to **expand the 'Hazards'** section.

2. **Report data in the box next to 'Sand and dust storms'**

3. Ensure that the number of SDS related injuries and illnesses is reflected in the total number of injured and ill people above.

1.2 Adding SDS contributors and assigning targets

The Coordinator should **add the institution responsible for collecting SDS data** (Ministry of Environment or Ministry of Agriculture) and create a contributor profile for the users whom will be entering the data for SDS. The Coordinator should then add the Ministry in charge of SDS as a contributor for targets and indicators presented in Table 3 (chapter 2).

> **RESOURCES**
>
> Quick step by step guide for setting up the online Sendai Framework Monitoring System

1.3 Selecting the reporting year

Once the SDS contributor profile has been set up by the SFM Coordinator, the contributor will receive an email to activate the account and start the reporting. Once in the system, the contributor should follow the below steps:

Figure 5: Starting the reporting

STEPS

1. Click on 'Global Targets'

2. Click on '**Global reporting'**

3. Select the **'Reporting year'** (top right corner)

4. **On the left side menu, click on the target** you want to report on

1.4 Ensuring that the metadata has been added by the SFM Coordinator

Metadata is data needed each reporting year in order to calculate indicators. It includes information on the currency, exchange rate, nominal GDP, number of households, percentage of road networks paved, total population and information related to population by age and sex. This data should be entered every year by the Coordinator in order to ensure that indicators are calculated.

1.5 Using the comment box for additional information

Contributors should **make use of the 'additional information' box.** This box is available under each indicator to add any additional information, comment or explanation. For instance, for indicator D-8 (number of disruptions to basic services), the system does not allow the disaggregation by hazard type, this means that the SDS contributor would not be able to enter data for SDS. By using the 'additional information' box, the SDS contributor will be able to indicate how many interruptions to basic services were attributed to SDS.

Figure 6: Additional information box

STEPS

1. Click on the 'additional information' box

2. A dialogue box will open → Enter your comment → Click on 'Save'

2. Target A: Mortality

2.1 Indicators

Target A: Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared with 2005-2015.

A-1 (compound)	Number of deaths and missing persons attributed to disasters, per 100,000 population.
A-2	Number of deaths attributed to disasters, per 100,000 population.
A-3	Number of missing persons attributed to disasters, per 100,000 population.

A-1 is a compound indicator of indicators A-2 and A-3. Data do not need to be entered for A-1, as the indicator will be automatically calculated based on data entered for A-2 and A-3.

2.2 Definitions and terminologies

Death (A-2): The number of people who died during the disaster, or directly after, as a direct result of the hazardous event.

Missing persons (A-3): The number of people whose whereabouts is unknown since the hazardous event. It includes people who are presumed dead, for whom there is no physical evidence such as a body, and for which an official/legal report has been filed with competent authorities.

2.3 Linkages with SDS

Trauma (A-2)

SDS can cause mortality and injuries related to reduced visibility and strong winds. Low visibility can cause road traffic accidents and strong winds can trigger indirect accidents such as roof or electric poles collapsing on people.

Health impacts (A-2)

Fine particulates carried by SDS can affect the health of people by causing or aggravating pulmonary and cardio-vascular disorders and illnesses. Inhalation of fine dust particles exposes individuals to fine mineral particulates as well as pollutants, spores, bacteria, fungi, and potential allergens carried along with mineral dusts. These can cause cardio-vascular disorders (e.g., stroke) and respiratory disorders such as asthma, tracheitis, pneumonia, aspergillosis, allergic rhinitis and nonindustrial silicosis, known as 'desert lung' syndrome. In addition, dust can cause or aggravate diseases such as bronchitis or lung cancer (WMO, UNEP, UNCCD, 2016). Populations particularly vulnerable to airborne and respiratory diseases in all countries are children and the elderly, people with pre-existing heart and lung diseases (e.g. asthma, chronic obstructive pulmonary disease, ischemic heart disease, and allergies) and outdoor workers in high exposure situations (WMO, UNEP, UNCCD, 2016).

2.4 Source of data

Indicators	Source of data
A-2, Mortality	NDMO, Ministry of Health, Police services, Civil protection, Relief organizations (NGOs, Red Cross, UN etc.), National statistical offices, Local authorities.
A-3, Missing persons	Police services, Local authorities, Relief organizations

2.5 Methodology

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DATA NEEDED

- **Minimum**:
  - A-2: Number of deaths attributed to SDS
  - A-3: Number of missing people attributed to SDS

- **Ideal** (for custom indicators):

  - A-2, A-3: Disaggregation by sex and age

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For countries that are yet to establish a framework for SDS data collection, a minimum methodology for assessing mortality due to SDS could include the excess mortality across a population during and following an SDS event due to trauma, respiratory and cardiovascular disorders and diseases (e.g., pneumonia, bronchitis, lung cancer and strokes). A cut-off period should be pre-defined in order to have a consistent methodology.

Hazard	Cause of death	Timespan or cut-off period
Sand and dust storms	Pulmonary disease, heart disease, trauma	To be defined in number of days after the event

Note: the methodology captures short-term impacts (following an event) but not the long-term effects of SDS.

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RESOURCES

WHO Technical Guidance notes on Sendai Framework reporting for Ministries of Health provides information related to the reporting of health information through the Sendai Framework Monitor

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3. Target B: Affected people

3.1 Indicators

Target B: Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared with 2005-2015.

B-1 (compound)	Number of directly affected people attributed to disasters, per 100,000 population
B-2	Number of injured or ill people attributed to disasters, per 100,000 population.
B-3	Number of people whose damaged dwellings were attributed to disasters.
B-4	Number of people whose destroyed dwellings were attributed to disasters.
B-5	Number of people whose livelihoods were disrupted or destroyed, attributed to disasters.

B-1 is a compound indicator of indicators B-2, B-3, B-4 and B-5. Data do not need to be entered for B-1 as the indicator will be automatically calculated based on data entered for B-2, B-3, B-4 and B-5.

3.2 Definitions and terminologies

Affected people (B-1): people who are affected, either directly or indirectly, by a hazardous event. Directly affected are those who have suffered injury, illness or other health effects; who were evacuated, displaced, relocated or have suffered direct damage to their livelihoods, economic, physical, social, cultural and environmental assets. Indirectly affected are people who have suffered consequences, other than or in addition to direct effects, over time, due to disruption or changes in economy, critical infrastructure, basic services, commerce or work, or social, health and psychological consequences.

Injured or ill (B-2): People suffering from a new or exacerbated physical or psychological harm, trauma or an illness as a result of a disaster.

Houses damaged (B-3): Houses (housing units) with minor damage, not structural or architectural, and which may continue to be habitable, although they may require repair and/or cleaning.

Houses destroyed (B-4): Houses (housing units) levelled, buried, collapsed, washed away or damaged to the extent that they are no longer habitable, or must be rebuilt.

Livelihoods (B-5): The capacities, productive assets (both living and material) and activities required for securing a means of living, on a sustainable basis, with dignity.

3.3 Linkages with SDS

Illnesses and injuries (B-2)

SDS can cause injuries and illnesses (see above section 2.3, linkages with SDS).

Dwellings (B-3 & B-4)

Sand and dust particles shifted by SDS can cause substantial damages to residential areas by destroying or damaging houses. Houses are considered destroyed when they are buried or damaged by SDS to the extent that people cannot live there. SDS can also cause substantial damages to dwellings by accumulation of sand particles behind walls and inside the house. Sand can also cause

erosion of buildings (particularly those built in mud and adobe) which become weaker over time as walls become thin and eventually collapse (Pahlavanravi et al, 2012).

Livelihoods (B-5)

SDS affect people by disrupting and/or destroying their livelihoods by impacting agricultural crops, livestock and facilities (commercial, services or industrial) amongst others. For instance, during and after SDS events, shopkeepers may have to close their shops because of the entrance of dust in the shop, or because they need to clean up, or because they have no or low clients (Pahlavanravi et al, 2012).

3.4 Source of data

Indicators	Source of data
B-2	Hospitals, Ministry of Health, Relief organizations (NGOs, Red Cross, UN etc.), Traffic police, Civil protection, Local authorities
B-3; B-4	Local authorities, Housing corporation, Civil protection, Ministry of Social Welfare / Family
B-5	NSO, Ministry of Agriculture, Ministry of Industry

3.5 Methodology

DATA NEEDED

- **Minimum required**:
  - B-2: Number of injured and ill people attributed to SDS
  - B-3: Number of damaged dwellings attributed to SDS
  - B-4: Number of destroyed dwellings attributed to SDS
  - B-5: Number of people who had their livelihoods disrupted attributed to SDS

- **Ideal**:
  - B-2: Disaggregation by geography, age, sex, income, disability
  - B-3: Number of people who had their dwellings damaged by SDS
  - B-4: Number of people who had their dwellings destroyed by SDS

Indicator B-2: Injuries and illnesses

For countries that are yet to establish a framework for SDS data collection, a minimum methodology for assessing injuries and illnesses due to SDS could include the excess illnesses due to pulmonary and cardio-vascular diseases (e.g., pneumonia, bronchitis, lung cancer and strokes), trauma and eye infections. A cut-off period should be pre-defined in order to have a consistent methodology.

Hazard	Cause of illness and injuries	Timespan or cut-off period
Sand and dust storms	Pulmonary disease, heart disease, trauma, eye infections	To be defined in number of days or weeks after the event

Indicators B-3 and B-4: Damaged and destroyed dwellings

Indicator B-3 and B-4 measure the number of people who had their dwellings damaged or destroyed. The number of people can be directly measured in situ or estimated using a nationally defined methodology. If the country does not have a defined methodology, the number of people who had their

dwellings damaged or destroyed can be estimated using the UNDRR proposed methodology[3] based on the number of damaged or destroyed dwellings and population data.

The Average number of Occupants per Household in the country (AOH) is calculated as follows:

*B3 = Number of dwellings damaged * AOH*
*B4 = Number of dwellings destroyed * AOH*

with   *AOH = Population / Number of households*

Indicator B-5: Livelihoods

If a national methodology or measurement is not available to calculate B-5, the UNDRR proposes the following methodology to calculate the number of people who had their livelihoods disrupted:

*B-5 = hectares of crops damaged/destroyed * average workers per hectare*

> *+ livestock lost * average workers per livestock*

> *+ sum of productive assets and infrastructure damaged/destroyed * average workers per facility*

This methodology is based on data reported as part of target C:

- The number of hectares of crops damaged/destroyed is reported under sub-indicator C-2C
- The number of livestock lost is reported under sub-indicator C-2L
- The number of productive assets and infrastructure damaged/destroyed are reported as part of C-2LA, C-3 and C-5.

The UNDRR proposed methodology combines these numbers with several ratios such as the average number of workers per hectares, the average number of workers per livestock and the average number of employees per commerce and per industrial facility. These ratios have been pre-defined for several type of crops, livestock, assets and infrastructures in the 'set up' of the system (only accessible by the coordinator). For indicator B-5, the 'automatic calculation' option is currently not available. Therefore, Member States who do not have yet a methodology to assess SDS impacts on livelihoods can use the above methodology as well as the pre-defined ratios in the 'set-up' to calculate the number of people who had their livelihoods disrupted due to SDS.

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[3] See the Technical Guidance for additional information

3.6 Reporting in the system

Figure 7: Example for indicator B-3, manual entry

STEPS

1. Click on the **'+'** to expand the **'hazard'** disaggregation

2. If **Option 1 'Enter B-3 manually'** has been selected → In the box next to 'sand and dust storms', enter the **number of people whose dwellings were damaged** by SDS
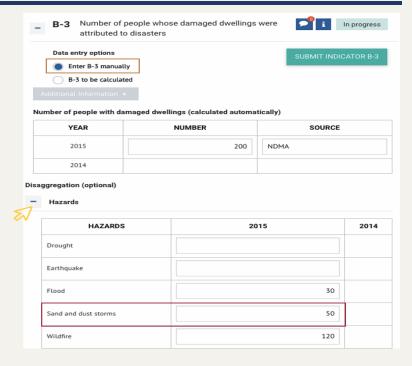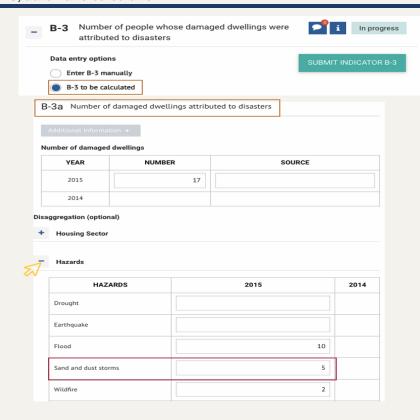

Figure 8: Example for indicator B-3, automatic calculation

STEPS

1. Click on the **'+'** to expand the **'hazard'** disaggregation

2. If **Option 2 'B-3 to be calculated'** has been selected → Go to **indicator B-3a,** and in the box next to 'sand and dust storms', enter the **number of dwellings damaged** by SDS

4. Target C: Economic loss

4.1 Indicators

Target C: Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.

C-1 (compound)	Direct economic loss attributed to disasters in relation to global gross domestic product.
C-2	Direct agricultural loss attributed to disasters *Agriculture is understood to include the crops, livestock, fisheries, apiculture, aquaculture and forest sectors as well as associated facilities and infrastructure.*
C-3	Direct economic loss to all other damaged or destroyed productive assets attributed to disasters *Productive assets would be disaggregated by economic sector, including services, according to standard international classifications.*
C-4	Direct economic loss in the housing sector attributed to disasters.
C-5	Direct economic loss resulting from damaged or destroyed critical infrastructure attributed to disasters. *Critical infrastructures include education facilities, health facilities and other critical infrastructures depending on Member States' context.*
C-6	Direct economic loss to cultural heritage damaged or destroyed attributed to disasters.

C-1 is a compound indicator of indicators C-2, C-3, C-4, C-5, C-6. Data do not need to be entered for C-1 as it will be automatically calculated based on data entered for C-2, C-3, C-4, C-5, C-6.

4.2 Definitions and terminologies

Target C only measures direct economic loss attributed to disasters, and not indirect economic losse

Direct economic loss (C-1): the monetary value of total or partial destruction of physical assets existing in the affected area. Direct economic loss is nearly equivalent to physical damage. Direct economic losses usually happen during the event or within the first few hours after the event and are often assessed soon after the event to estimate recovery cost and claim insurance payments. These are tangible and relatively easy to measure. Examples of physical assets that are the basis for calculating direct economic loss include homes, schools, hospitals, commercial and governmental buildings, transport, energy, telecommunications infrastructures and other infrastructure; business assets and industrial plants; production such as crops, livestock and production infrastructure. They may also encompass environmental assets and cultural heritage.

Indirect economic loss: a decline in economic value added as a consequence of direct economic loss and/or human and environmental impacts. It includes micro-economic impacts (e.g. revenue declines owing to business interruption, impacts on natural assets, loss of revenue or income due to missing assets, interruptions to transportation networks, supply chains or temporary unemployment) and macroeconomic impacts (e.g. price increases, increases in government debt, negative impact on stock market prices, and decline in GDP). Indirect losses can occur inside or outside of the hazard area and often with a time lag. As a result, they may be intangible or difficult to measure.

<u>**Critical infrastructures (C-5):**</u> the OIEWG identified health facilities and education facilities as critical infrastructures for all countries. Countries can add additional critical infrastructures according to their context under the category 'other critical infrastructures'. Examples of other critical infrastructures include transport, energy, water, telecommunications or protective infrastructures.

- **Educational facilities**: play schools, kindergartens, primary, secondary or middle schools, technical-vocational schools, colleges, universities, training centers etc.

- **Healthcare facilities**: health centers, clinics, local, regional and tertiary hospitals, outpatient centers, health laboratories and in general facilities used by primary health providers

- **Power/energy system**: generation facilities, transmission and distribution system and dispatch centers and other works

- **Transport system**: road networks, railways (including stations), airports and ports

- **Water supply**: drinking water supply system (water outlets, water treatment plants, aqueducts and canals which carry drinking water, storage tanks.)

- **Information and Communication Technology (ICT) system**: plants and telephone networks (telecommunication network), radio and television stations, post offices and public information offices, internet services, radio telephones and mobile phones

<u>**Cultural heritage assets (C-6):**</u> are divided into two groups. Non-movable assets consist of buildings, monuments and fixed infrastructure such as the Angkor Wat. Movable assets consist of art and historical artefacts, such as paintings.

4.3 <u>Linkages with SDS</u>

It is estimated that **SDS events cost up to USD 5.6 billion annually in the Asia-Pacific region** (UNESCAP & APDIM, 2018). In general, SDS do not cause major damage to infrastructure or structures but they can lead to disruptions to economic system (Middleton et al. 2018). SDS have negative impacts on many sectors including agriculture, education, productive assets, health, housing, infrastructures, transportation, energy and environment (see Table 4). SDS events can destroy or damage crops, livestock, fisheries, productive assets, infrastructures (educational, health, energy, ICT, transports) and interrupt services during and after the event.

Costs of clearing sand and dust from infrastructures (e.g., roads, airports, dams, irrigation canals, flood control structures, ditches, power facilities) represent an important amount of direct economic loss due to SDS. In 2012, a study in the Sistan region of Iran showed that household clearing costs accounted for more than 85 percent of the total estimated costs of dust storms (Pahlavanravi et al, 2012).

Table 4: SDS direct economic impacts, damage and destructions

Sector	Indicator	Damage and destruction
Agriculture	C-2C	- Crops can be damaged, destroyed, buried. - Accumulation of dust particles on the plant foliage reduces the production of crops by delaying plant development. - Sand and dust can cause sunlight blockage, soil loss, soil erosion, soil pollution through the deposition of pollutants
	C-2Fo	Forest can be damaged or destroyed by strong winds.
	C-2L	Livestock can die, be lost or injured; any stress from the physical environment can reduce livestock productivity and growth

	C-2LA	▪ Productive assets such as machinery, fencing, watering points, irrigation channels etc., can be destroyed, buried or damaged.
	C-2LB	▪ Agricultural stock can be buried and sandblasted causing damages and total or partial destructions.
Productive assets (commercial, services, industrial)	C-3	▪ Accumulation of dust can affect services, industry and businesses notably due to clearing, decline in labor productivity and office and business closure.
Housing	C-4	▪ Houses can be destroyed, damaged or buried (see target B)
Education	C-5	▪ Accumulation of sand and dust can bury or damage education facilities
Health	C-5	▪ Accumulation of sand and dust can bury or damage health facilities
Transports	C-5	▪ Airports can be damaged, and sand can cause erosion of aircraft engine. ▪ Roads and railways can be damaged
Energy	C-5	▪ Power plants, electricity lines, electric poles, solar farms can be damaged or destroyed ▪ Sand can cause the erosion of solar panels and wind turbines and create loss of productivity by accumulation of sand and dust on panels after an event
Infrastructures	C-5	▪ Sand and dust can damage or destroy ICT infrastructures
Cultural heritage	C-6	▪ SDS can damage or destroy movable and non-movable cultural heritage

Source: Compiled based on UNESCAP & APDIM, 2018; Pahlavanravi et al, 2012; Tozer & Leys, 2013; UNEP, WMO, UNCCD, 2016; Middleton et al. 2018

4.4 Source of data

Indicators	Source of data
C-2, C-3	Ministry of Agriculture, NSO, Relief organizations (NGOs, Red Cross, UN etc.), FAO
C-4	Local authorities, Housing corporation, Civil protection
C-5	NSO, Ministry of Health, Ministry of Education, Ministry of Industry, Ministry of Energy, Ministry of Transports/Road, Ministry of Environment, Chamber of Commerce
C-6	Ministry of Culture

4.5 Methodology

Overall methodology for target C (except C-6)

The OIEWG gave countries freedom to choose between the methodology proposed by the UNDRR or a selected nationally defined methodology by which direct economic loss attributed to disasters is determined. Therefore, there are two options to report under indicators C-2, C-3, C-4 and C-5.

- ▪ **Option 1 is to enter monetary value and the corresponding surface/number of destroyed and damaged assets manually.** This requires having data for SDS events on physical damages as well as the economic valuation of direct loss. For this option, the SDS contributor should enter the monetary value of SDS damage and loss in Local Currency Unit (LCU) and the system will convert it to US dollars based on the exchange rate inputted into the metadata.

- ▪ **Option 2 is to enter the surface / number of destroyed and damaged assets manually and monetary value to be calculated automatically.**

SDS contributors should use option 1 to report as option 2 cannot be used to assess economic loss by hazard type. The system currently does not allow to add under the 'hazard' section data by type of production, asset and infrastructure which have been damaged/destroyed. Although the system includes an option to disaggregate data by type of production, assets and infrastructures, this data is disconnected from the 'hazard' section and as such cannot be used to calculate economic loss by type of hazard. Without information on the type of production (e.g., crop of maize or crop of vegetable), assets (e.g., machinery or fences) or infrastructures (e.g., large hospital, small restaurant), the system will not be able to calculate economic loss attributed to SDS.

For each indicator, the **SDS contributor should add manually the total number of assets or surface damaged/destroyed by SDS along with its monetary value**. For instance, if three chickens and ten cows have been lost due to SDS, under indicator C-2L, the SDS contributor will enter '13' in the column 'livestock lost' regardless of the type of livestock. In addition, the SDS contributor will add manually the total monetary value associated with this loss.

SDS contributors should collect disaggregated data on SDS impacts by type of production, productive assets and infrastructures in order to calculate direct economic loss resulting from SDS events. Furthermore, SDS contributors are encouraged to share this information with the Coordinator and/or to use the 'additional information' box to give further detail on data reported under the 'hazard' section.

DATA NEEDED

- **Minimum required**:
  - C-2C: Number of hectares of crops damaged/destroyed by SDS and monetary value
  - C-2Fo: Number of hectares of forest damaged/destroyed by SDS and monetary value
  - C-2L: Number of livestock affected/killed by SDS and monetary value
  - C-2LA: Number of agricultural assets damaged/destroyed by SDS and monetary value
  - C-2LB: Number of hectares of agricultural stock damaged/destroyed by SDS and monetary value
  - C-3: Number of productive assets damaged/destroyed by SDS and monetary value
  - C-4: Monetary value of economic loss in the housing sector due to SDS
  - C-5: Number of educational facilities damaged/ destroyed by SDS and monetary value
  - C-5: Number of health facilities damaged/destroyed by SDS and monetary value
  - C-5: Number of other critical infrastructures damaged/destroyed by SDS and monetary value
  - C-6: Number of cultural heritage (movable and non-movable) damaged/destroyed and the respective costs of rehabilitation/ reconstruction.

- **Ideal**:
  - Disaggregation by type of crops, livestock, productive assets, facilities and infrastructures
  - Disaggregation by size of productive assets, facilities and infrastructures

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Indicator C-2: Agricultural loss

For indicator C-2, the loss of:

- Surfaces (C-2C, C-2Fo) and stocks (C-2LB) is reported in **hectares** damaged and destroyed,
- Livestock (C-2L) is reported **in number of animals** affected or killed,
- Agricultural assets (C-2LA) is reported in **number of assets** damaged or destroyed.

For countries that are starting to collect data on damage and loss attributed to SDS in the agriculture sector and are yet to establish a framework, they can use the methodology for damage and loss assessment in agriculture developed by the FAO. Table 5 describes the key components of the methodology. For further details on the methodology and data requirements see the 'Resources box' below.

Table 5: FAO methodology for damage and loss assessment in agriculture

Production			
Damage		**Loss**	
Items	**Measurement**	**Economic flow**	**Measurement**
Stored inputs (seeds, fertilizer, feed, etc.) **Stored production** (Crops, livestock produce, fish, etc.) **Perennial trees**	Pre-disaster value of destroyed stored production and inputs	Value of lost production (excluding stored outputs)	**Difference between expected and actual value of production** (crops, livestock, etc.) **For perennial crops and forestry**: Pre-disaster value of fully destroyed crops and trees **For crops, livestock and aquaculture**: Temporary costs incurred towards the maintaining of post-disaster agricultural and farming activities
Assets			
Items	**Measurement**	**Economic flow**	**Measurement**
Machinery, equipment, and tools used in crop and livestock farming, forestry.	Total destruction: replacement cost of fully destroyed assets at pre-disaster price Partial destruction: repair/ rehabilitation cost of partially destroyed assets at pre-disaster price		

Source: FAO (2018), 2017, the impact of disasters and crises on agriculture and food security

Indicator C-3: Productive assets

Productive assets include different kinds of assets in all economic sectors, including commercial, industrial and services according to an international classification (UNDRR, 2017). Examples of assets include commercial and governmental buildings, transport equipment, business assets and industrial plants, and production infrastructures (e.g., factories, hotels, amongst others).

Loss and damage to agricultural productive assets (machinery, equipment and tools used in crop and livestock farming, forestry, fisheries, aquaculture) should not be reported under C-3 as they are reported under indicator C-2, sub-indicator C2-LA.

For countries that are starting to collect data on loss and damage attributed to SDS regarding productive assets and are yet to establish a framework, they can use the methodology to assess economic losses of disasters developed by United Nations Economic Commission for Latin America and the Caribbean (ECLAC). For further details on the methodology see the 'Resources box' below.

Indicator C-4: Housing sector

For indicator C-4, the number of destroyed and damaged dwellings have already been reported as part of indicator B-3 and B-4 and will automatically appear under indicator C-4. Countries should only add the monetary value of the destroyed and damaged dwellings.

For countries that are starting to collect data on loss and damage attributed to SDS regarding productive assets and are yet to establish a framework, they can use the methodology to assess economic losses of disasters developed by United Nations Economic Commission for Latin America and the Caribbean (ECLAC). For further details on the methodology see the 'Resources box' below.

Indicator C-6: Cultural heritage

For indicator C-6, economic costs of **damaged and destroyed cultural heritage should be evaluated by experts, on a per case basis**. As such, the monetary value of damaged or destroyed cultural heritage need to be entered manually by countries and cannot be calculated by the system.

The system proposes two types of indicators:

- Indicators to monitor t**he number of cultural heritage damaged or destroyed** (C-6a, C-6b, C-6c)

- Indicators to **monitor costs** associated with the loss (C-6d, C-6e, C-6f)

Indicators monitoring the number of cultural heritage damaged or destroyed	Corresponding indicators monitoring the costs associated with damages and destructions
C-6a - Number of damaged or destroyed non-movable assets	**C-6d -** Cost of rehabilitation or reconstruction for all damaged or destroyed cultural buildings inputted into C-6a
C-6b - Number of damaged movable assets	**C-6e -** Cost of rehabilitation/ to repair damaged artwork and other mobile cultural objects reported in C-6b
C-6c - Number of destroyed movable assets	**C-6f -** Acquisition or replacement cost for movable cultural assets destroyed and reported in C-6c

For C-6f, the term **acquisition cost** may be misleading because the value of artwork or historical artefacts increases with time. It is best to consider this indicator as how much the damaged or destroyed asset will cost to replace, for this purpose the insurance value may be the best measure.

4.6 Reporting in the system

Note: Totals (damage + loss) have to be entered manually by contributors as they are not calculated automatically by the system.

Figure 9: Example for indicator C-2C, option 1

STEPS

Option 1 'Enter monetary value & hectares manually' has been selected:

1. Click on the **'+'** to expand the **'hazard'** disaggregation

2. In the box next to 'sand and dust storms', enter:

   - the number of hectares of crops **damaged** by SDS
   - the number of hectares of crops **destroyed** by SDS
   - the **total number** of crops damaged and destroyed by SDS
   - the **total monetary value** of crops damaged and destroyed by SDS in LCU

5. Target D: Damage and disruptions to critical infrastructures

5.1 Indicators

Target D: Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030

D-1 (compound)	Damage to critical infrastructure attributed to disasters **(reported as part of C-5)**
D-2	Number of destroyed or damaged health facilities attributed to disasters.
D-3	Number of destroyed or damaged educational facilities attributed to disasters.
D-4	Number of other destroyed or damaged critical infrastructure units and facilities attributed to disasters.
D-5 (compound)	Number of disruptions to basic services attributed to disasters.
D-6	Number of disruptions to educational services attributed to disasters.
D-7	Number of disruptions to health services attributed to disasters.
D-8	Number of disruptions to other basic services attributed to disasters.

D-1 is a compound indicator of indicators D-2, D-3 and D-4, and is reported as part of C-5. The indicators will be automatically calculated based on data entered for C-5. D-5 is a compound indicator of indicators D-6, D-7 and D-8. Data do not need to be entered for D-5, which will be automatically calculated based on D-6, D-7 and D-8.

5.2 Linkages with SDS

SDS have negative impacts on infrastructures, including educational, health, energy, ICT, transports, and as such, can interrupt services during and after the event.

Table 6: Disruptions to services attributed to SDS

Sector	Indicator	Disruptions
Education	D-6	▪ Disruption of educational services during the event: school may be closed; staff and students may be unable to come to school. ▪ After an event, accumulation of sand and dust may require clearing, schools will stay closed.
Health	D-7	▪ Disruption of health services during the event, staff may be unable to come to the health center. ▪ After an event, accumulation of sand and dust may require clearing, services may be reduced because of damages.
Transports	D-8	▪ Flights can be canceled, delayed or diverted because of low visibility. ▪ Airports, railways, roads and seaports can be closed during the SDS event. ▪ After an event, airports, railways, roads and seaports can experience disruptions because of cleaning.
Energy	D-8	▪ After an event, reduced efficiency of solar panels because of particulates sitting on panels. ▪ Disruption to power supply during and after SDS events due to damages and destructions to energy infrastructures.

Source: Compiled based on UNESCAP & APDIM, 2018; Pahlavanravi et al, 2012; Tozer & Leys, 2013; UNEP, WMO and UNCCD, 2016; Middleton et al. 2018

5.3 Source of data

Indicators	Source of data
D-6	Ministry of Education
D-7	Ministry of Health
D-8	Ministry of Energy, Ministry of Transport

5.4 Methodology

DATA NEEDED

- **Minimum required**:
  - D-6: Number of disruptions to educational services due to SDS
  - D-7: Number of disruptions to health services due to SDS

- **Ideal**:
  - D-8: Number of disruptions to other critical services due to SDS

Indicator D-5: Disruptions to basic services

For D-6, D-7 and D-8, the number of disruptions of services includes:

- interruptions which are either single or multiple, short or long (i.e. there is no distinction between a five-hour and a four-day interruption of electricity)

- damage to the facilities or networks that provide the service,

- noticeable reduction in the quality of the service,

- reduction in the population covered by the service.

If during an SDS, or as a consequence of an SDS, any of the above-mentioned situation occur, it will be counted as **one disruption of service**.

For instance, as a consequence of an SDS event, electricity was fluctuating in voltage, it was interrupted several times in different parts of a city, leaving several neighborhoods without power. This means that electricity was disrupted for this one SDS event. As electricity was disrupted, one hospital had to reduce its service, and water supply and communications were also interrupted. For this SDS event, the SDS contributor would report:

- One (1) disruption to health facilities under D-7,

- Three (3) disruptions of other services with one (1) disruption to electricity, one (1) disruption to communications and one (1) disruption to water services, under D-8.

Indicator D-8: Disruptions to other critical services

For indicator D-8, the list of critical services is set by the system and includes electricity / power; water supply; ICT system; sewage service; solid waste service; transportation services; relief and emergency services; and public administration services. D-8 cannot be disaggregated by hazard type but the SDS contributor is encouraged to provide data and information regarding disruptions to other basic services in the 'additional information' box (see Chapter 3, Section 1.5, Using the comment box for additional information).

6. Target E: National and local DRR strategies

Target E: Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020

6.1 Indicators

E-1	Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030.
E-2	Percentage of local governments that adopt and implement local disaster risk reduction strategies in line with national strategies.

6.2 Definitions

Disaster risk reduction strategies define goals and objectives across different timescales and with concrete targets, indicators and time frames. In line with the Sendai Framework, these should be aimed at preventing the creation of disaster risk, the reduction of existing risk and the strengthening of economic, social, health and environmental resilience. DRR strategies are planning tools that provide the vision and long-term perspective, identify goals and actions decided by a high-level authority at national or local level or a multi-stakeholder mechanism with the appropriate authority, building on the country context (governance structure, political and economic priorities) on an understanding of disaster risk (prevailing hazards, risk vulnerability, exposure, perception of risk and existing coping capacities of society) and an evaluation of current DRR systems and capacities at country level (UNDRR, 2019).

6.3 Linkages with SDS

The UNCCD Policy Advocacy Framework for SDS (ICCD/COP(13)/19) underscores precautionary approach in enhancing preparedness and resilience of countries and communities. Consistent with disaster risk reduction principles, the Policy Advocacy Framework presents a three pillars approach in addressing SDS risks, including: (i) early warning systems; (ii) preparedness and resilience; (iii) anthropogenic source mitigation, and cross-cutting action areas (UNCCD, 2017).

Furthermore, the UNCCD Parties adopted their first substantial decision (decision 31/COP.13) where the UNCCD recommended to mainstream SDS into disaster risk reduction and to integrate SDS into multi-hazard management plans for disaster risk at all levels and across all sectors. This decision also puts emphasis on the critical need for coordination among institutions and sectors at national level.

Integrating SDS into DRR strategies and plans can contribute to mainstreaming SDS into sectoral policies with a view to preventing and mitigating their negative impacts. In particular, SDS risks need to be included in national and local risk-assessments in order to inform strategies and plans in the health, agriculture, land management, ICT, transportation and energy sectors.

> **RESOURCES**
>
> Chapter 6: Technical Measures for Mitigating SDS in Global Assessment of Sand and Dust Storms. (UNEP, WMO, UNCCD, 2016)

6.4 Source of data

Indicators	Source of data
E-1	NDMO
E-2	NDMO, Local authorities

6.5 Methodology

Reporting against indicator E-1 relies on a self-assessment that considers a set of 10 key elements which capture and reflect the key principles and the four priorities of the Sendai Framework. In practice, Member States assess their DRR strategy by rating each of the 10 key elements on a scale from 0 to 1.0 (with 0 being no achievement or existence, and 1.0 being a comprehensive achievement).

List of the 10 key elements

1. Have different timescales, with targets, indicators and time frames
2. Have aims at preventing creation of new risk
3. Have aims at reducing existing risk
4. Have aims at strengthening economic, social, health and environmental resilience
5. Address the recommendations of Priority 1: Understand Disaster Risk
6. Address the recommendations of Priority 2: Strengthening disaster risk governance
7. Address the recommendations of Priority 3: Investing in DRR for resilience
8. Address the recommendations of Priority 4: Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction
9. Promote policy coherence relevant to DRR
10. Have mechanism to follow-up, periodically assess and publicly report on progress

This rating is designed to assess the alignment of DRR strategies and plans to the Sendai Framework. As such, it addresses general principles and elements which should guide prevention, mitigation and response efforts to a range of hazards. Therefore, the scoring is not tailored to assess specific measures aiming at reducing the risk of SDS. Nonetheless**, the SDS contributor can use the 'additional information box' in order to point whether SDS are addressed in the national DRR strategy, notably for key elements 2, 3, 4, 5, 6, 7 and 8.** For instance, in countries where SDS have significant impacts and the risk is not included into the DRR strategy's risk-assessment, the SDS contributor should indicate that the scoring of element 5 should be low.

7. Target F: International cooperation

Target F: Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030.

7.1 Indicators

F-1	Total official international support (official development assistance + other official flows), for national disaster risk reduction actions.
F-2	Total official international support (ODA + other official flows) for national disaster risk reduction actions provided by multilateral agencies.
F-3	Total official international support (ODA + other official flows) for national disaster risk reduction actions provided bilaterally.
F-4	Total official international support (ODA + other official flows) for the transfer and exchange of disaster risk reduction-related technology.
F-5	Number of international, regional and bilateral programmes and initiatives for the transfer and exchange of science, technology and innovation in disaster risk reduction for developing countries.
F-6	Total official international support (ODA + other official flows) for disaster risk reduction capacity-building.
F-7	Number of international, regional and bilateral programmes and initiatives for disaster risk reduction-related capacity-building in developing countries.
F-8	Number of developing countries supported by international, regional and bilateral initiatives to strengthen their disaster risk reduction-related statistical capacity.

7.2 Definitions

Official development assistance (ODA): flows of official financing (essentially grants or concessional loans) to countries and territories on the DAC List of ODA Recipients (developing countries) and to multilateral agencies which are: i) provided by official agencies, including state and local governments, or by their executive agencies; ii) administered with the promotion of the economic development and welfare of developing countries as the main objective; and iii) are concessional in character with a grant element of at least 25 per cent (using a fixed 10 per cent rate of discount). In addition to financial flows, technical co-operation is included in aid. Grants, loans and credits for military purposes are excluded. Transfer payments to private individuals (e.g. pensions, reparations or insurance payouts) are in general not counted.

Other official flows (OOF): are defined as transactions by the official sector which do not meet the conditions for eligibility as ODA, either because they are not primarily aimed at development, or because they are not sufficiently concessional.

7.3 Linkages with SDS

Combating the negative impacts of SDS requires financial support, capacity building and transfer of technology. The mobilization of financial and logistical resources is necessary at all levels of administration for the reduction of SDS risk. Using indicators under target F can contribute to collating data on financial and logistical flows aiming to reduce and combat SDS in developing countries.

In particular, indicators F-4 and F-5 aim to measure flows and trends in activity, in support of the transfer and exchange of science, technology and innovation for DRR for developing countries. In addition, indicators F-6, F-7 and F-8 aim to measure flows and trends in activity, in support of DRR-related capacity, including statistical capacity, for developing countries. **As such, support received for combatting SDS from multilateral entities, such as APDIM, WMO, UNCDD, FAO and other, can be reported under these indicators.**

7.4 Source of data

Indicators	Source of data
F-1, F-2, F-3, F-4 and F-6	Ministry of Finance, OECD–DAC
F-5, F-7 and F-8	NDMO, NSO

7.5 Methodology

DATA NEEDED

- **Ideal**:
    - F-5: Number of programmes and initiatives for the transfer and exchange of science, technology and innovation for SDS
    - F-7: Number of programmes and initiatives for DRR-related capacity building for SDS
    - F-8: Number of programmes and initiatives for enhancing statistical capacity for SDS

Target F measures international cooperation in support of DRR efforts **in monetary value** (indicators F-1, F-2, F-3, F-4, F-6) and in **number of programmes and initiatives** (indicators F-5, F-7, F-8).

For these indicators, disaggregation is available by donor, sector, type of finance and type of support (e.g. DRR considerations integrated into development policies, planning and legislation; early warning systems with outreach to communities etc.) but not by hazard. Therefore, the SDS contributor will not be able to report directly against these indicators but they **can provide information related to SDS in the 'additional information' box**.

Indicators F5, F-7, F8

In particular, the SDS contributor is encouraged to report **the number of programmes and initiatives** for the transfer and exchange of science, technology and innovation (F-5), and DRR-related capacity building (F-7), as well as the number of developing countries supported in strengthening their disaster risk reduction-related statistical capacity (F-8).

RESOURCES

OECD, QWIDS database

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8. Target G: Multi-hazard early warning systems and disaster risk information

Target G: Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030

8.1 Indicators

G-1 (compound)	Number of countries that have multi-hazard early warning systems.
G-2	Number of countries that have multi-hazard monitoring and forecasting systems.
G-3	Number of people per 100,000 that are covered by early warning information through local governments or through national dissemination mechanisms.
G-4	Percentage of local governments having a plan to act on early warnings.
G-5	Number of countries that have accessible, understandable, usable and relevant disaster risk information and assessment available to the people at the national and local levels.
G-6	Percentage of population exposed to or at risk from disasters protected through pre-emptive evacuation following early warning.

G-1 is a compound indicator of indicators G-2, G-3, G-4 and G-5. Data do not need to be entered for G-1 which will be automatically calculated based on data entered for G-2, G-3, G-4, and G-5.

8.2 Definitions

Multi-hazard early warning systems (MHEWS): address several hazards and/ or impacts of similar or different type in contexts where hazardous events may occur alone, simultaneously, cascadingly or cumulatively over time, and taking into account the potential interrelated effects. A multi-hazard early warning system with the ability to warn of one or more hazards increases the efficiency and consistency of warnings through coordinated and compatible mechanisms and capacities, involving multiple disciplines for updated and accurate hazards identification and monitoring for multiple hazards.

8.3 Linkages with SDS

SDS require continuous monitoring and early warning to allow people downwind to take preventive measures to minimize their impact on human health, the environment and a country's economy (UNESCAP & APDIM 2018). Early warning systems can reduce SDS impacts on people as well as loss and damage to agriculture, infrastructures and services. By issuing timely information to the population, early warning can give people time to take cover and wear masks to minimize the adverse impacts on their health as well as avoid taking their cars to prevent accidents on the roads. Moreover, early warnings give people time to seal doors and take their livestock and equipment indoors to protect their assets (Stefanski & Sivakumar, 2009). Finally, early warnings can also reduce services disruptions costs by giving time to airlines and railway compagnies to revise their schedule. Target G, and in particular indicators G-2 and G-5, provides a methodology to assess the quality and efficiency of SDS early warning systems and risk assessments.

<div style="border:1px solid #000;">

RESOURCES

WMO SDS-WAS Regional Centre for Asia

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8.4 Source of data

Indicators	Source of data
G-1	NDMO, Meteorological offices, Local governments
G-6	NDMO, Meteorological offices

8.5 Methodology

DATA NEEDED

- **Minimum**:
    - G-2: Information on the quality of SDS early warning systems (Monitoring, Forecasting, Warning messages, Processes in place)
    - G-5: Information on the quality of SDS risk information and assessments (Accessibility rate, Science, Consultation, Responsibilities)

- **Ideal**:
    - G-3: Number of people covered by SDS early warning
    - G-4: Number of local governments which have a plan to act on SDS early warning
    - G-6: Number of people protected of SDS through pre-emptive evacuation

Indicator G-2: Multi-hazard monitoring and forecasting systems

Reporting against indicator G-2 relies on a self-assessment of the quality of MHEWS. For this indicator, the contributors have to **assess the weight of each hazard**. There are several methodologies to assess the weight including according to potential impacts on human or natural hazard risk, historical records, expert criteria, or national objectives and targets. **Assessing the weight of hazard requires consultations between contributors to agree on the list of major hazards in the country.**

Member states can decide to use percentages (0-100), numbers (0-10), decimals (0-1) for assessing the weight but the total weight should be respectively equal to 100, 10 or 1. For instance, if a country historical records shows that floods and SDS are the two main hazards in the country and floods tend to cause more loss and damage, weight could be 70% / 7 or 0.7 for floods and respectively 30%/ 3 or 0.3 for SDS.

Once the weight of each major hazard has been agreed upon, **there are two options to report against G-2**:
- For the **minimum option**, the SDS contributor will indicate whether the country has a multi-hazard monitoring or forecasting system for SDS by **selecting 'Yes' or 'No'**.

- For the **recommended option**, SDS contributors can rate the quality of the multi-hazard monitoring or forecasting system, based on **4 sub-indicators** to be rated from 0 to 1.0 (with 0 being no achievement or existence, and 1.0 being a comprehensive achievement):

  - **Monitor**: is SDS data collected and available for risk assessments?

  - **Forecast**: is SDS forecast established through monitoring and analysis?

  - **Messages:** does your country disseminate warning messages which includes SDS risk information, in a timely, accurate and actionable manner?

  - **Process**: does your country have established processes and roles and responsibilities for SDS to respond to the warnings received?

Indicator G-3 & G-4: Population covered by EWS and local plans to act on early warnings

Indicators G-3 and G-4, which respectively address the number of people covered by EWS and the percentage of local governments having a plan to act on early warnings, **do not include disaggregation by type of hazard**. Nonetheless, the SDS contributor is encouraged to use the 'additional information' box to provide information on the number of people covered by SDS early warning systems (G-3) and the number of local governments which have a plan to act on SDS early warning (G-4). Plans to act on early warnings may include preparedness plans, evacuation plans, response plans or any other plans describing early warning response and evacuation.

Indicator G-5: Risk assessments

Reporting against indicator G-5 relies on a self-assessment of **SDS risk information and assessments.** As for indicator G-2, the contributors have to **assess the weight of each major hazard**. After assessing the weight, the SDS contributor has to rate the quality of SDS risk information and assessments based on **4 sub-indicators**:

- **Accessibility rate (%):** rate of accessibility and availability of SDS risk information. If SDS risk information is publicly available on the web or/and any other means (e.g. community boards, signs, and fliers) to all the (exposed) population, it can report 100%. If the main communication tool is internet, a national internet penetration rate could be used as a proxy.

- **Scientific (0 to 1.0)**: is the SDS risk assessment based on the most scientific approach possible (ideally probabilistic risk assessment)?

- **Consulted (0 to 1.0):** is the SDS risk assessment the product of a national consultation, shared, coordinated, and used by national institutions?

- **Responsibility (0 to 1.0)**: does the SDS risk assessment establish clear responsibilities for decision making, planning, and storing data and information?

The accessibility rate is reported in percentage whereas the three other sub-indicators should be rated from 0 to 1.0 (with 0 being no achievement or existence, and 1.0 being a comprehensive achievement).

Indicator G-6: Population protected by pre-emptive evacuation

Indicator G-6 does not include disaggregation by type of hazard. However, the SDS contributor is encouraged to use the **'additional information'** box to provide information on the number of people protected through pre-emptive evacuation and the estimated population exposed to SDS.

8.6 Reporting in the system

Figure 10: Example for indicator G-2, minimum methodology

STEPS

If **the minimum option** 'Indicate whether your country has a multi-hazard early warning system' has been selected → On the same line as 'sand and dust storms':

1. Click on **'Yes' or 'No'** to indicate if your country has an early warning system for SDS.

2. **Enter manually the weight of SDS**. For instance, floods have had more impacts historically than SDS and droughts, but droughts and SDS are still major hazard in the country. Floods is rated 6 and drought and SDS are rated 2. The scoring of the weight is rated out of 10.
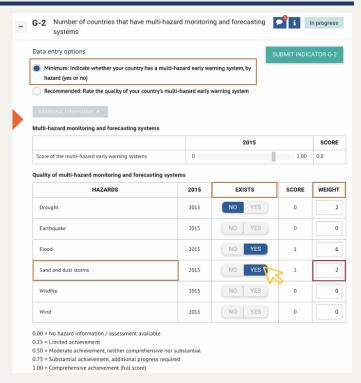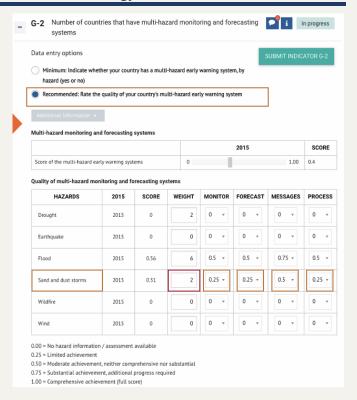

Figure 11: Example for indicator G-2, recommended methodology

STEPS

If **the recommended option** 'rate the quality of your country's multi-hazard early warning system' has been selected → On the same line as 'sand and dust storms':

1. **Enter manually the weight of SDS.**

2. Select **from the scroll-down menu a score** (0; 0.25; 0.5; 0.75; 1.0) to assess the 4 sub-indicators.

4

Custom targets and indicators for monitoring SDS impacts

The custom target feature **provides countries with the opportunity to set up additional targets and indicators to monitor SDS impacts which cannot be captured as part of the global process**. This includes for instance impacts of SDS on the aviation or the energy sector. Furthermore, **custom targets can be used to monitor and report against regional targets and indicators** to better capture the transboundary effects and impacts of SDS[4].

1. Setting up and reporting on custom targets and indicators

Coordinators of the SFM will have the prerogative of setting up any number of nationally defined custom targets and indicators. Among the settings to be determined are the frequency of reporting (every one or two years); the start of the reporting year; if the country wants to go retroactively to baseline years (2005-2015); and adding the use of multiple languages to facilitate the participation of actors in their own language.

Note: This section aims to show SDS contributors which information is needed in order for the coordinator to add custom targets and indicators. The purpose is to support SDS contributors to design targets and indicators which can be added in the system. This section is <u>not</u> a step-by-step guide on how to set up the custom targets (see Resources box).

RESOURCES

Quick step by step guide to the online Sendai Framework Monitoring System, Custom targets and indicators'

1.1 <u>Adding a target</u>

For the Coordinator to add a target on SDS, the following information are required:
- Title of the target
- Scale of the target: national and local reporting or only local reporting
- Description of the target.

In addition, the coordinator can link this custom target to a global target and add a help text.

Example of custom target for sand and dust storms:

Title of Target	Reduce the number of vulnerable people affected by sand and dust storms
National and / or local	For national and local
Description	Reduce the impact of sand and dust storms on women, children and elderly people.
Related Global Target	Target B: People affected

1.2 <u>Adding an indicator</u>

After adding a target, the coordinator can add as many indicators as needed in order to monitor progress against the defined target. **Each indicator is composed of a "main" question** (the indicator

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[4] Regional modules shall be made available soon in the Sendai Framework Monitor.

itself), and a set of **"additional questions".** These can be seen as sub-indicators of the main question and in general should provide more detailed information to the response of the main question. In some cases, the main question could be a compound indicator based on the values of the additional questions.

Once the title of the indicator and the main question have been defined, the Coordinator needs to **select <u>one</u> type of answer** from a pre-defined list which includes the following options:

- Yes/No
- Multiple choice (multiple answer)
- Multiple choice (single answer)
- Short text
- Free text
- Number

- Amount
- Percentage
- Rating (5 levels)
- Attach document
- Add link

For each question, the coordinator will be able to select only <u>one type of answer</u>. Adding "additional questions" will allow to add different types of answers for one indicator.

Finally, the **'help text' box provides the opportunity to give additional information** on the indicators such as the methodology to calculate the indicator or definitions.

Example of custom indicators for sand and dust storms:

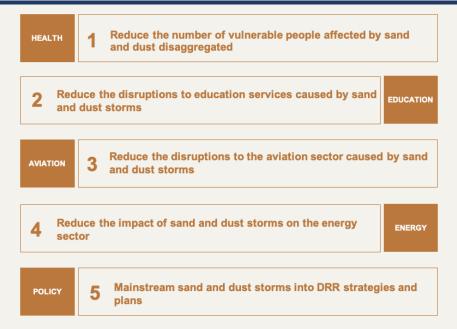|	
Title of indicator	Percentage of children who were affected by SDS
Main question	Among people who were affected by SDS, how many people are children?
Answer type	Percentage
Help text	Children are individuals between 0 and 14 years old.

1.3 Attributing targets and indicators to contributors

Same as for global targets, custom targets require data covering different sectors, including humanitarian, education, health, agriculture, infrastructures, amongst others. The online system allows for the configuration of the institutions that will be responsible for the gathering of the data. **The Coordinator will be responsible for assigning the defined custom targets for monitoring SDS impacts to the institution in charge of SDS matter**.

2. Five additional targets and indicators to monitor SDS impacts

The chapter on global targets has shown that global indicators, which were designed to monitor DRR efforts led by countries, do not cover all aspects of SDS impacts. Therefore, this section presents **a set of targets and indicators by sector which complements the Sendai Framework global targets**. Acknowledging the differences between countries who are reporting on SDS impacts in Asia and the Pacific, countries can choose to use all of them or select the ones which are most relevant to their context. The following additional targets have been identified as particularly relevant to monitor progress in reducing SDS impacts and increasing mitigation efforts. However, a more comprehensive list of targets and indicators is available as annex to this Guideline.

Figure 12: Five custom targets for sand and dust storms

HEALTH	1	Reduce the number of vulnerable people affected by sand and dust disaggregated
	2	Reduce the disruptions to education services caused by sand and dust storms	EDUCATION
AVIATION	3	Reduce the disruptions to the aviation sector caused by sand and dust storms
	4	Reduce the impact of sand and dust storms on the energy sector	ENERGY
POLICY	5	Mainstream sand and dust storms into DRR strategies and plans

2.1 Vulnerable people

For the global reporting, the number of affected people by SDS has been reported under target B. This includes people with injuries/illnesses, people whom had their dwellings damaged and destroyed and people whom had their livelihoods disrupted or destroyed. Additional information which could be useful to better assess SDS impacts include **impacts of SDS on vulnerable people: women, children, elderly people.**

TARGET 1 - Reduce the number of vulnerable people affected by SDS	
INDICATOR 1.1 – Percentage of women affected by SDS	
Main question	Among people who were affected by SDS, how many are women?
Answer type	Percentage
Help text	Number of women affected by SDS / Total number of people affected by SDS (target B) * 100
INDICATOR 1.2 – Percentage of children (<15) affected by SDS	
Main question	Among people who were affected by SDS, how many are children?
Answer type	Percentage
Help text	Number of children affected by SDS / Total number of people affected by SDS (target B) * 100
INDICATOR 1.3 – Percentage of elderly (65+) people affected by SDS	
Main question	Among people who were affected by SDS, how many are seniors (65+)?
Answer type	Percentage
Help text	Number of elderly people affected by SDS / Total number of people affected by SDS (target B) * 100

2.2 Education

For the global reporting, data on disruptions of education services have been reported under target D. However, the definition of disruption is too wide, including:

- interruptions which are either single or multiple, short or long (e.g. there is no distinction between a five-hour and a four-day interruption of electricity)
- damage to the facilities or networks that provide the service,
- noticeable reduction in the quality of the service,
- reduction in the population covered by the service.

For SDS, a possible indicator which can contribute to better assessing impacts on education services is the number of days lost at school due to SDS.

TARGET 2 - Reduce the disruptions to education services caused by SDS	
INDICATOR 2.1 – Number of days lost at school due to SDS	
Main question	How many days of school were lost because of SDS in one year?
Answer type	Number

2.3 Aviation

Global targets do not include the number of disruptions to transportation services due to SDS. Therefore, countries could add one target to monitor the impacts of SDS on the aviation sector which is particularly impacted by SDS.

TARGET 3 - Reduce the number of disruptions caused by SDS to the aviation sector	
INDICATOR 3.1 – Number of flights canceled because of SDS	
Main question	How many flights were canceled because of SDS in one year?
Answer type	Number
INDICATOR 3.2 – Number of flights delayed because of SDS	
Main question	How many flights were delayed because of SDS in one year?
Answer type	Number
INDICATOR 3.3 – Number of flights diverted because of SDS	
Main question	How many flights were diverted because of SDS in one year?
Answer type	Number

2.4 Energy

Global targets do not include the number of disruptions to energy services due to SDS. As such, countries can to add one target to monitor the impacts of SDS on the energy sector.

TARGET 4 - Reduce the impact of SDS on the energy sector	
INDICATOR 4.1 – Energy lost due to SDS expressed in Megawatts	
Main question	How many Megawatts of energy were lost because of SDS in one year?
Answer type	Amount

Help text	This number includes loss due to damage or destructions to power plants, electric poles, solar panels etc.

2.5 Mainstreaming SDS into DRR

Target E monitors progress in the alignment of DRR strategies and plans to the Sendai Framework. As such, it addresses general principles and elements which should guide prevention, mitigation and response efforts to a range of hazards. This scoring it not tailored to assess specific strategies and measures aiming at reducing the risk of SDS. Based on target E indicators and the 10 key elements, the following indicators can be used to assess the integration of SDS into DRR strategies and plans.

TARGET 5 - Mainstream SDS into DRR strategies and plans	
INDICATOR 5.1 – Integration of SDS into risk-assessments	
Main question	Does the strategy / plan include SDS into the risk-assessment part?
Answer type	Yes/No
INDICATOR 5.2 – Objectives and measures aiming at mitigating SDS sources and the negative impacts of SDS	
Main question	Are there objectives and measures aiming at mitigating SDS sources and the negative impacts of SDS?
Answer type	Yes/No
Help text	Examples of objective and measures to mitigate SDS impacts include: - Reduce wind erosion through rangelands and crop lands control (e.g. agroforestry, crop rotation, inter-cropping, ridging, fencing...) - Control windblown sand and moving sand dunes through eco-system management (e.g. surface stabilization, fencing, vegetation, tree belts...) - Mitigate the impacts of SDS on infrastructures (e.g. tree belts, fencing…) - Prevent or mitigate the impacts of SDS on the health (e.g. filtering in buildings, wearing of dust masks during dust storms...) Examples of objective and measures to mitigate SDS sources include: - Reduce natural resources degradation such as land degradation, deforestation, over-grazing

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Annex: Examples of additional targets and indicators for monitoring SDS impacts

Disclaimer

This annex is a draft (v.1 – 01.09.2020) and the information contained herein is subject to change as this document will be reviewed by Member States and partner entities.

List of additional targets and indicators for monitoring SDS impacts

The below Table presents a list of targets and indicators are considered 'Ideal targets and indicators' as they require a more detailed set of data and further methodology. If countries already collect the below data, they are encouraged to use indicators outlined in the below table

TARGET			MAIN INDICATOR				ADDITIONAL QUESTIONS	
Title	Global target	Sector	Title	Main question	Answer type	Help text	Question	Answer type
Reduce mortality of vulnerable people due to sand and dust storms	Target A	Health	Percentage of women who died because of SDS	Among people who died because of SDS, how many are women?	%	Number of women who died because of SDS / Total number of people who died because of SDS (indicator A-2)*100		
			Percentage of children (<15) who died because of SDS	Among people who died because of SDS, how many are children?	%	Number of children who died because of SDS / Total number of people who died because of SDS (indicator A-2)*100		
			Percentage of elderly (65+) who died because of SDS	Among people who died because of SDS, how many are elderly people?	%	Number of elderly people who died because of SDS / Total number of people who died because of SDS (indicator A-2)*100		
Reduce the number of people who fell ill because of SDS	Target B	Health	Percentage of people who were ill because of SDS	Among people who were affected by SDS, how many were ill?	%	Illness of SDS include pulmonary, cardio-vascular, infectious diseases, eye infections.	How many people were ill because of pulmonary diseases?	%
							How many people were ill because of cardio-vascular diseases?	%
							How many people were ill because of infectious diseases?	%
			Percentage of people who were injured because of SDS	Among people who were affected by SDS, how many had a trauma?	%	Includes people who were injured from an indirect injury (e.g. roof or electric pole collapsing), traffic accidents or other causes	How many people were injured because of an indirect injury?	%
							How many people were injured because of traffic accidents?	%

							How many people were injured because of other cause?	%
Reduce the number of disruptions to transportation services	Target D	Transport	Number of disruptions to roads caused by SDS	How many roads were disrupted because of SDS?	#	Roads disruptions include roads which were closed, roads which had a lower speed limit, and which were disrupted because of accidents.	How many roads were closed due to SDS?	#
							How many roads had lower speed limits because of SDS?	#
							How many vehicles were involved in road accidents caused by SDS?	#
			Number of disruptions to railways caused by SDS	How many trains were canceled or delayed due to SDS?	#			
			Number of disruptions to ports caused by SDS	How many days ports had to close due to SDS?	#			
Reduce the number of disruptions to ICT services	Target D	ICT	Number of satellite communications interrupted due to SDS	How many satellite communications were disrupted because of SDS?	#			
			Number of disruptions to wireless communications	How many wireless communications were disrupted because of SDS?	#			
			Number of hardware damaged due to SDS	How many hardware were damaged due to SDS?	#			
Reduce the number of disruptions to energy services	Target D	Energy	Solar energy loss due to SDS	How many Megawatts of solar energy were lost because of SDS?	#	These includes losses in productivity due to dust particulates sitting on solar panels as well as losses due to solar panel erosion	How many Megawatts were lost due to dust particulates sitting on solar panels after SDS events?	#
							How many Megawatts were lost due to solar panels erosion?	#

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