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The Global Disaster-Related Statistics Framework (G-DRSF) January 2026

Prepared by the Inter-Agency Expert Group on Disaster-related Statistics

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Abbreviations and Acronyms

CES	Conference of European Statisticians
COFOG	Classification of the Functions of Government
DaLA	Damage and Loss Assessment
DRM	disaster risk management
DRR	disaster risk reduction
DRSF	Disaster-Related Statistics Framework
ECA	Economic Commission for Africa
ECE	Economic Commission for Europe
ECLAC	Economic Commission for Latin America and the Caribbean
ESCAP	Economic and Social Commission for Asia and the Pacific
ESCWA	Economic and Social Commission for Western Asia
FAO	Food and Agriculture Organization of the United Nations
FDES	Framework for the Development of Environment Statistics
G-DRSF	Global Disaster-Related Statistics Framework
GGA	Global Goal on Adaptation
GIS	geographic information systems
GRADE	Global RAPid Post-Disaster Damage Estimation
GSGF	Global Statistical Geospatial Framework
HIPs	Hazard Information Profiles
IAEG-DRS	Inter-Agency and Expert Group on Disaster-Related Statistics
IRDR	Integrated Research on Disaster Risk
ISIC	International Standard Industrial Classification of All Economic Activities
NDMO	national disaster management office
NGIAs	national geospatial information agencies
NGO	non-governmental organization
NSDS	National Strategies for the Development of Statistics
NSO	national statistical office
NSS	national statistical system
OIEWG	Open-ended Intergovernmental Expert Working Group on Indicators and Terminology Relating to Disaster Risk Reduction
PDNA	Post-Disaster Needs Assessment
SDGs	Sustainable Development Goals
SDI	spatial data infrastructure
SEEA	System of Environmental-Economic Accounting

Draft Global Disaster-Related Statistics Framework

SNA	System of National Accounts
UNDRR	United Nations Office for Disaster Risk Reduction
UN-GGIM	United Nations Committee of Experts on Global Geospatial Information Management
UN-IGIF	United Nations Integrated Geospatial Information Framework
UNSC	United Nations Statistical Commission
UNSD	United Nations Statistics Division
WMO	World Meteorological Organization
WMO-CHE	WMO Cataloguing of Hazardous Events

1. The need for the Global Disaster-Related Statistics Framework

1.1. Introduction

The rising frequency and severity of extreme events, coupled with rapid urbanization and population growth, are increasing exposure of societies, economies and the natural environment to hazardous events. From wildfires and floods to cascading infrastructure failures, disasters are becoming more complex, interconnected and costly, threatening individual and community well-being. Therefore, the focus must shift from reacting to disasters to proactively managing the risk of disasters.

Disaster risk management calls for timely, comprehensive and reliable statistics that capture not only the immediate impacts of hazardous events and disasters, but also provides insights into the underlying drivers, cascading effects and long-term implications for economic, social and environmental outcomes. Unfortunately, the relevant statistics remain fragmented. Inconsistent definitions, statistical methods, and reporting norms across institutions and countries make it difficult to quantify risks, compare outcomes, and learn from others' experiences.

Accurate and consistent data are fundamental to effective Disaster Risk Reduction (DRR). When these data are organized within a common statistical framework, it enables a deeper understanding of risk and supports evidence-based policymaking and planning. Indeed, integrated statistics, underpinned by standardized methodologies and frameworks, can foster a collective understanding that crosses institutional and national boundaries. Harmonized and accessible data, benefit from and can enhance coordination among national authorities, international actors, development partners and communities, thereby supporting more effective resource allocation, disaster response and policymaking.

The Global Disaster-Related Statistics Framework (G-DRSF) provides a statistical foundation that guides countries to compile and use disaster-related statistics more consistently. In doing so, it reinforces DRR efforts within countries, while also complementing global sustainable development and other relevant agendas and resilience initiatives. The G-DRSF is envisioned as a key tool for monitoring progress towards global commitments such as the Sendai Framework

29 for Disaster Risk Reduction¹ (Sendai Framework) and the 2030 Agenda for Sustainable
30 Development and associated Sustainable Development Goals (SDGs).² Grounded in national
31 contexts and policymaking needs, the G-DRSF aims to strengthen capacities at all levels to
32 anticipate, prepare for, and respond to an increasingly complex risk environment through
33 consistent and comparable statistics.

34 The G-DRSF builds upon many years of progressive initiatives and collaboration in disaster-
35 related statistics. At its fiftieth session in 2019, the United Nations Statistical Commission (UNSC),
36 in its decision 50/116,³ requested the United Nations Statistics Division (UNSD), the Economic and
37 Social Commission for Asia and the Pacific (ESCAP), the Economic Commission for Europe (ECE),
38 the Economic Commission for Latin America and the Caribbean (ECLAC) and the United Nations
39 Office for Disaster Risk Reduction (UNDRR) to work together, in consultation with members of the
40 existing regional expert groups and task forces, to consider options and modalities to advance a
41 common statistical framework on disaster-related statistics and to establish a network across the
42 expert communities to sustain cooperation, coordination and fundraising for enhancing statistics
43 related to hazardous events and disasters.

44 In response to this request, the aforementioned organizations, together with the Economic and
45 Social Commission for Western Asia (ESCWA) and the Economic Commission for Africa (ECA),
46 established an Inter-Agency and Expert Group on Disaster-Related Statistics (IAEG-DRS), with the
47 primary objective of developing a statistical framework on disaster-related statistics. Since its
48 inception in 2019, the IAEG-DRS and its core group members⁴ have convened experts in official
49 statistical and disaster risk management communities to advance the development of the G-DRSF.

50 To advance work towards a statistical framework, three issue papers on priority research topics
51 were published, covering (i) economic losses attributed to disasters, (ii) DRR expenditure satellite
52 accounting, and (iii) environmental and ecosystem-related disaster losses.⁵ The IAEG-DRS
53 conducted reviews of existing statistical guidance and frameworks, and organized consultations

¹ Adopted by the General Assembly, at its sixty-ninth session, on 23 June 2015. See Assembly resolution 69/283.

² Adopted by the General Assembly, at its seventieth session, on 25 September 2015. See Assembly resolution 70/1.

³ See Report on the fiftieth session of the Statistical Commission. *Official Records of the Economic and Social Council, Supplement No 4*. E/2019/24-E/CN.3/2019/34. Available at

https://unstats.un.org/UNSDWebsite/statcom/session_50/documents/Report-on-the-50th-session-of-the-statistical-commission-E.pdf.

⁴ The IAEG-DRS core group members comprise UNSD, ECA, ECE, ECLAC, ESCAP, ESCWA, and UNDRR.

⁵ See Resources section at https://www.undrr.org/implementing-sendai-framework/monitoring-sendai-framework#mg-tabs_section-statistics.

54 on key topics among subject matter experts. Subsequently, the IAEG-DRS submitted reports to
55 the fifty-second and fifty-fourth sessions of UNSC in 2021 and 2023,⁶ and organized two side
56 events at the fifty-second and fifty-third sessions of UNSC. Additionally, since 2021, the IAEG-DRS
57 core group members have organized five Global Expert Forums on Users and Producers of
58 Disaster-related Statistics.⁷

59 These efforts laid out the groundwork for the G-DRSF. By bringing together the statistical and
60 DRR communities, the work conducted by the IAEG-DRS created the necessary technical and
61 institutional foundations, platforms for engagement, coordination mechanisms, and resource
62 mobilization efforts for disaster-related statistics at a global scale, paving the way for the
63 development and implementation of the G-DRSF.

64 **1.2. The G-DRSF and internationally-agreed frameworks**

65 The G-DRSF seeks to support a range of internationally agreed frameworks on sustainable
66 development, climate action, DRR, institutional strengthening and the advancement of national
67 statistical systems. It plays a strategic role through its dual emphasis on DRR and statistical
68 development, adopting a common approach to connecting a number of relevant measurement
69 frameworks. In so doing, it acts as a critical enabling mechanism that strengthens the statistical
70 foundation underpinning the implementation, monitoring, and evaluation of relevant international
71 commitments.

72 At its heart, the G-DRSF's integrated approach recognizes that DRR cannot be effectively
73 pursued without simultaneously addressing broader development challenges, climate change
74 adaptation needs, and sustainable urban planning among other policy areas that all require robust,
75 comparable and timely statistical evidence to be effective and long-lasting. This section discusses
76 the role of the G-DRSF within selected key internationally-agreed frameworks, highlighting the

⁶ See United Nations Statistical Commission, *Disaster-related statistics: Report of the Secretary-General*, E/CN.3/2021/21 (New York, 2021), available at https://unstats.un.org/UNSDWebsite/statcom/session_52/documents/2021-21-Disaster-E.pdf; and United Nations Statistical Commission, *Disaster-related statistics: Report of the Secretary-General*, E/CN.3/2023/28 (New York, 2023), available at https://unstats.un.org/UNSDWebsite/statcom/session_54/documents/2023-28-DisasterRelatedStats-E.pdf.

⁷ For more information on each Global Expert Forum, please see Strengthening networks of expert communities section at https://www.undrr.org/implementing-sendai-framework/monitoring-sendai-framework#mg-tabs_section-statistics.

77 expected contributions of the G-DRSF to supporting these frameworks in achieving their intended
78 goals and outcomes.

79 1.2.1 The G-DRSF and the 2030 Agenda for Sustainable Development

80 As the overarching framework guiding development efforts globally, the 2030 Agenda for
81 Sustainable Development and its associated SDGs include significant emphasis on both DRR and
82 strengthening the statistical and information base for monitoring progress toward sustainable
83 development ambitions at the global, national and local levels. Hence, the G-DRSF can directly
84 inform the implementation of the 2030 Agenda, starting with the three SDGs which include specific
85 metrics associated with DRR. SDG 1 (No Poverty), 11 (Sustainable Cities) and 13 (Climate Action)
86 all call for a systematic approach to integrating disaster data into sustainable development.⁸ The
87 2030 Agenda also calls for disaggregated data, by sex, age, disability, income and other
88 characteristics, to monitor individual level hazard exposure, vulnerability, coping capacity and
89 impacts as embedded by the principle of “Leaving no one behind”. The G-DRSF helps to enhance
90 sustainable development policies by supporting risk-informed metrics, clear and common
91 concepts and definitions, robust statistics, and reliable, disaggregated data.

92 An important application of the G-DRSF in accelerating progress toward the SDGs is
93 improving country capacity in producing and understanding disaster-related statistics. In
94 particular, countries can streamline data collection efforts for both the SDGs and the Sendai
95 Framework, thus reducing reporting burdens and enhancing coherence. Efforts are ongoing to
96 facilitate reporting on the SDGs through SDG targets that are in alignment with the Sendai
97 Framework as illustrated in Figure 1.1. As these SDG targets and indicators are fully integrated
98 with and source data directly from the Sendai Framework Monitor⁹ and the DesInventar-Sendai¹⁰
99 national disaster tracking systems, these connections have contributed to the standardization of
100 methodologies and ensure that common data sets are available to advance the progress of
101 monitoring and evaluation under both frameworks. Through the Technical Guidance on Sendai
102 Framework Monitor,¹¹ sectoral assessment methodologies, such as the Food and Agriculture
103 Organization of the United Nations (FAO) guideline, *FAO’s Methodology for Damage and Loss*

⁸ See: www.undrr.org/sfm. Tab: “Integrated Monitoring with the SDGs”

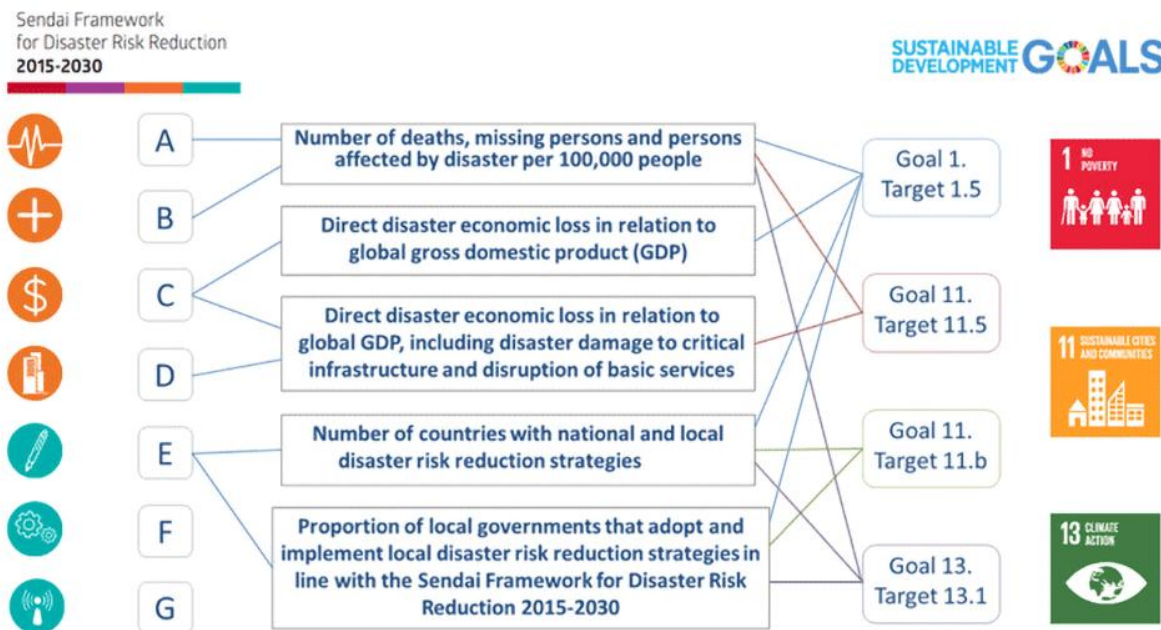
⁹ See UNDRR Sendai Framework Monitor at <https://www.undrr.org/sfm>.

¹⁰ See UNDRR DesInventar at <https://www.desinventar.net/DesInventar/index.jsp>.

¹¹ See UNDRR *Technical guidance for monitoring and reporting on progress in achieving the global targets of the Sendai Framework for Disaster Risk Reduction* <https://www.undrr.org/quick/11641>

104 *Assessment in Agriculture*,¹² were also fully integrated, providing technical considerations to
 105 countries on indicators monitoring progress of the Sendai Framework and the SDGs.

106 *Figure 1.1: Integrated SDG Monitoring with the Sendai Framework*



107
 108 *Source: UNDRR (n.d.)*

109 As Figure 1.1 presents, data produced to report on five Sendai Framework global targets (A
 110 to E) contribute to four SDG targets measured through 12 SDG indicators across Goals 1, 11, and
 111 13, which concern global disaster impacts, strengthening accountability, and providing empirical
 112 evidence to align DRR policy with relevant resources, funding and initiatives. This integrated
 113 approach has yielded several advantages in terms of mainstreaming data collection efforts,
 114 averting duplication and redundancy, reducing reporting burden, and enhancing coherence.
 115 These objectives are likewise central to the G-DRSF, across all domains where disaster-related
 116 statistics play a critical role.

117 1.2.2 The G-DRSF and disaster-related international frameworks

118 Triggered by the International Decade for Natural Disaster Reduction (1990-1999) and
 119 subsequently the Yokohama Strategy and the adoption of the Hyogo Framework for Action in

¹² See FAO's *Methodology for Damage and Loss Assessment in Agriculture* <https://doi.org/10.4060/ca6990en>

120 2005,¹³ UN Member States have been compiling data and metrics relating to several disaster-
121 related areas of work, such as risk identification and governance, risk knowledge and education,
122 and preparedness for effective response. The Hyogo Framework successfully improved
123 management of disaster data by promoting systematic data collection, encouraging open access,
124 and supporting the development of tools like disaster loss databases and risk knowledge
125 assessment. It established the foundation for improved disaster-related statistics, paved the way
126 for the adoption of the Sendai Framework and its quantitative progress on monitoring and helped
127 countries to build important institutional capacity for disaster-related statistics.

128 The adoption of the Sendai Framework in 2015 built upon this substantive work and advanced
129 efforts relating to disaster-related statistics. For instance, Priority Area 1 of Sendai Framework on
130 understanding disaster risk places importance on:

- 131 (a) risk assessments and their necessary periodicity;
- 132 (b) baseline determination;
- 133 (c) management of information;
- 134 (d) development of disaster risk services and transformation of data and scientific information
135 into usable information for decision-making;
- 136 (e) free availability and accessibility of data and information;
- 137 (f) systematically accounting for disaster losses, including their longer-term implications from
138 a social, educational, health and cultural perspectives;
- 139 (g) investments in research and the development of methodology and models for disaster risk
140 assessment.

141 A specific example concerns the Early Warnings for All initiative launched by UN Secretary-
142 General in March 2022, aligned with the Sendai Framework Target G, where the initiative's
143 Monitoring and Evaluation framework¹⁴ follows a twin-track approach of monitoring global
144 progress on early warning coverage and assessing the effectiveness of catalytic interventions.¹⁵
145 The life-saving impact of this initiative requires clear and coherent disaster-related statistics to

¹³ See Hyogo Framework for Action at <https://www.preventionweb.net/sendai-framework/Hyogo-Framework-for-Action>.

¹⁴ See United Nations, *Toolkit for Monitoring and Evaluation of Early Warnings for All*, version 1.0 (Geneva: World Meteorological Organization, August 2024) Available at https://wmo.int/sites/default/files/2024-09/EW4ALL%20ME%20Toolkit_Final%20Version%201_August2024.pdf.

¹⁵ Catalytic interventions can be understood in two sense: (1) targeted support in the form of projects and programmes that have been brokered or inspired by the EW4ALL Initiative and its partners / funders / supporters, and (2) country or government-initiated improvements in plans, budgets, and rendering of services related to the multi-hazard early warning systems value chains in response to the EW4ALL Initiative.

146 inform its work in terms of identifying and protecting the most vulnerable individuals and
147 communities, and reducing disaster mortality. The Sendai Framework underscores the
148 importance of gender-specific needs in disaster risk management, and empowers women and
149 people with disability to lead early warning, disaster response, recovery, rehabilitation and
150 reconstruction efforts using reliable and granular disaggregated data.

151 The G-DRSF provides a common approach to measuring disaster risk and impacts. It supports
152 the Sendai Framework global targets and indicators by offering standardized statistical
153 recommendations that strengthen national capacity to collect, compile, classify and disseminate
154 disaster-related statistics consistently overtime and across countries. The emphasis on disaster-
155 related statistics is most evident with the adoption of a Sendai Framework indicator specifically
156 dedicated to international cooperation on DRR-related statistical capacity (Target F, Indicator F-8).
157 The adoption of this indicator reiterated the importance of strengthening statistical systems to
158 serve the producers and users of disaster data and statistics. This recognition aligns with the
159 efforts to strengthen coherence of disaster data and deepen collaborations among the DRR and
160 national statistical communities. The G-DRSF also provides measurement guidance for the
161 consistent production of baseline exposure and vulnerability data, supporting the Early Warnings
162 for All initiative in delivering targeted multi-hazard early warnings to populations at risk.

163 1.2.3 The G-DRSF and international cooperation in statistics

164 Improving statistical capacity and coherence is central to the mandate of UNSC. As the highest
165 decision-making body of the global statistical system, UNSC sets international statistical standards
166 and promotes the development of consistent, reliable, and comparable statistics across countries.
167 The G-DRSF directly contributes to this mandate by establishing standardized methodologies,
168 definitions, and classifications that enable meaningful cross-country comparisons and global
169 aggregation of disaster-related statistics. This standardization addresses a longstanding challenge
170 in the DRR community, where varied approaches to data collection and reporting have hindered
171 the development of comprehensive global risk assessments and evidence-based policy
172 recommendations.¹⁶

¹⁶ See more information in the *Report of the Main Findings and Recommendations of the Midterm Review of the Implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030, A/77/640*. Available at: <https://docs.un.org/en/A/77/640>.

173 The G-DRSF also contributes to the modernizing of statistical systems through an emphasis
174 on utilizing innovative data sources and supporting the integration of national data ecosystems.¹⁷
175 This aligns with other global initiatives such as the Data for Now Initiative¹⁸ which aim to strengthen
176 statistical capacity for sustainable development and other internationally-agreed frameworks and
177 cooperation initiatives.

178 1.2.4 The G-DRSF and climate action

179 The UN Framework Convention for Climate Change and the Paris Agreement¹⁹ recognize that
180 data is essential for informing robust climate action. Reporting and transparency mechanisms
181 such as national communications, adaptation communications, and biennial transparency reports
182 rely on data to show the impacts of climate change and the positive outcome of actions taken,
183 among others. Applying comprehensive risk management approaches, as captured explicitly in
184 the Paris Agreement and implicitly in the UN Framework Convention for Climate Change, requires
185 a deeper understanding, action, and support that is grounded in data. By incorporating statistics
186 related to climate-related disaster events and impacts, the G-DRSF provides a structured basis for
187 compiling statistics on losses and damages. This requires a robust statistical framework to
188 understand the diverse, interrelated, cascading and compounding impacts of climate and disaster
189 risks. Noting the rapid evolution of the global disaster risk landscape, with climate change
190 intensifying the frequency and severity of extreme weather events, the G-DRSF becomes critical
191 in guiding global climate action efforts.

192 Another use case for the G-DRSF is the ongoing implementation of the Global Goal on
193 Adaptation (GGA), established under the Paris Agreement to enhance adaptive capacity,
194 strengthening resilience and reducing vulnerability to climate change. The Belem Adaptation
195 Indicators²⁰ of the GGA will require robust data systems, and therefore, the G-DRSF will have a
196 vital role in advancing the GGA by helping identify risks and vulnerabilities in the thematic areas
197 (such as health, livelihood, and poverty reduction), track progress through Means of

¹⁷ See Chapter 5 of the Handbook on Management and Organization of National Statistical Systems
https://unstats.un.org/capacity-development/handbook/chapters/Chapter5_Handbook_2025A_202505.pdf.

¹⁸ See <https://unstats.un.org/UNSDWebsite/capacity-development/data-for-now/>.

¹⁹ Adopted by the Conference of the Parties to the United Nations Framework Convention on Climate Change at its twenty-first session, held in Paris from 30 November to 13 December 2015. See <https://undocs.org/FCCC/CP/2015/10/Add.1>.

²⁰ See the Belem Adaptation Indicators of the GGA at <https://unfccc.int/documents/655022>.

198 Implementation indicators, guide data readiness assessment, and support the design and
199 development of effective, risk-informed adaptation measures.

200 The G-DRSF enables the global, regional, national and local climate communities to design
201 more targeted, accountable, and equitable adaptation measures, as well as respond to losses and
202 damages. By utilizing statistics produced in accordance with the G-DRSF, governments and
203 communities may better understand local climate impact and risks, prioritize high-risk areas, and
204 design context-specific strategies. Additionally, the alignment could ensure consistent tracking of
205 progress. This includes linking disaster loss databases (such as DesInventar-Sendai and DELTA
206 Resilience,²¹ the enhanced Disaster Tracking System, replacing it) with adaptation indicators
207 capturing reduced human and economic losses.

208 The G-DRSF also contributes to country-driven action relating to loss and damage. The
209 Santiago Network²², a technical assistance facilitation body established under the Warsaw
210 International Mechanism for Loss and Damage associated with Climate Change Impacts,²³ is
211 available for countries to access assistance to strengthen their data and statistical capabilities
212 relating to loss and damage, among other areas of support. Additionally, the Fund for responding
213 to Loss and Damage, established in 2022, will operate through a programmatic, bottom-up, and
214 country-driven approach. The G-DRSF serves as a tool for countries to produce statistically robust
215 evidence needed to design, implement, and monitor activities to be supported by such support
216 mechanisms available to countries.

217 **1.3. The G-DRSF at the national level**

218 At the national level, the G-DRSF can be instrumental in strengthening institutional
219 coordination between National Statistical Offices (NSOs), National Disaster Management Offices
220 (NDMOs), and other key data users and producers. A cross-sectoral and multi-level approach
221 ensures that disaster-related statistics are not developed in isolation but are integrated into the
222 broader national statistical development, enhancing both data quality and institutional capacity.
223 The G-DRSF supports the implementation of the Fundamental Principles of Official Statistics²⁴ by

²¹ See <https://www.undrr.org/building-risk-knowledge/disaster-losses-and-damages-tracking-system-delta-resilience>.

²² See <https://santiago-network.org/>.

²³ For further information, see <https://unfccc.int/topics/adaptation-and-resilience/workstreams/loss-and-damage/warsaw-international-mechanism>.

²⁴ See <https://unstats.un.org/unsd/dnss/gp/fundprinciples.aspx>.

224 promoting professional independence, methodological transparency, and equal access to
225 disaster-related information for all users.

226 With hazardous events and disasters increasing in both frequency and intensity, the associated
227 exposure, vulnerability, coping capacity, occurrences, and impacts must be monitored and studied
228 collectively in order to reduce risks and negative effects. By providing recommendations and
229 guidelines for the use of terminologies, classifications and methodologies for compiling disaster-
230 related statistics, the G-DRSF supports countries in the production of timely, comprehensive, and
231 high-quality statistics and thereby enhancing understanding of disaster risk. It responds to national
232 needs for comprehensive and reliable disaster-related statistics, supporting their effective use in
233 the systematic tracking and accounting for losses and damage. It is expected that the G-DRSF will
234 also foster institutional coordination and technological innovation to bridge the gaps in disaster-
235 related data collection and analysis.

236 Implementation of the G-DRSF may vary across countries, depending on legislative and
237 institutional mandates, and on national capacities to produce and use statistics for decision-
238 making and other purposes. For instance, countries with established statistical systems and strong
239 disaster risk management institutions may prioritize harmonizing existing data collection efforts
240 and addressing specific data gaps, while others may focus on producing selected components of
241 disaster-related statistics that align most closely with their immediate policy priorities. This work
242 can benefit from the G-DRSF in numerous ways to enhance national statistical capacity,
243 incorporate new technology in modern statistical production, deepen understanding and
244 coherence, meet disaster data needs, and facilitate policy dialogue for impactful results, in line
245 with National Strategies for the Development of Statistics (NSDS).

246 1.3.1 The G-DRSF and National Strategies for the Development of 247 Statistics

248 The G-DRSF captures the common emphasis of NSDS on DRR among other related areas of
249 work. NSDS emphasizes institutional coordination, technological innovation, and sustainable
250 financing to address gaps in data collection, production, dissemination, and analysis. By applying
251 the G-DRSF, NSDS will contribute to building disaster and climate resilience, track progress
252 towards global goals and objectives, and support informed policy responses to emerging
253 challenges.

254 Under NSDS guidelines (PARIS21, n.d.), countries are encouraged to prioritize integrating
255 DRR and climate data into their core national statistical production and utility. Key areas of
256 prioritization are strengthening data sources through innovative tools that access new data
257 sources, such as remote sensing, and fostering inter-institutional collaborations among NSOs,
258 NDMOs, and meteorological agencies to collectively ensure comprehensive data collection.

259 Investing in capacity building and standardized methodologies can also enhance the accuracy
260 and usability of disaster-related statistics for risk reduction and resilience planning, thereby making
261 important contributions to the implementation of National Disaster Risk Reduction Strategies.

262 1.3.2 The G-DRSF and National Disaster Risk Reduction Strategies

263 The Sendai Framework, through Target E, encourages countries to adopt national strategies
264 for understanding, addressing, and reducing disaster risks. These strategies should encompass
265 the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters
266 caused by natural or man-made hazards as well as related environmental, technological and
267 biological hazards and risks. A key premise underpinning these strategies is to guide the
268 management of multi-hazard disaster risks at all levels and across all sectors with a strong focus
269 on data, science, and inclusive, whole-of-society approaches. Achieving this objective requires
270 the presence of a robust information base informed by reliable disaster-related statistics and
271 metrics for the measurement of progress.

272 The G-DRSF supports the monitoring of progress under the Sendai Framework by providing
273 standardized methodologies, indicator reporting, and analysis of disaster-related statistics. The G-
274 DRSF enables countries to track progress toward the Sendai Framework targets through
275 harmonized statistical methods and consistent time series data. By integrating disaster-related
276 statistics into national statistical systems, promoting data disaggregation to capture hazard
277 exposure, vulnerability, coping capacity, and impact information, and aligning with global agendas
278 such as the SDGs and Paris Agreement, the G-DRSF enhances evidence-based policymaking and
279 ensures that DRR efforts are inclusive, data-driven and coherent.

280 Application of the G-DRSF at the national level can also ensure that high-quality, standardized
281 disaster-related statistics directly inform financing strategies, international cooperation, and public
282 investment priorities. By linking statistical quality to measurable returns on DRR investments,
283 countries can build evidence-based cases for sustained financing while creating positive feedback

284 loops that demonstrate how improved data systems lead to more cost-effective resource
285 allocation, reducing disaster losses and damage, and ultimately greater resilience across all levels.

286 1.3.3 The G-DRSF and other national development frameworks

287 Data-informed policymaking is indispensable for achieving the intended development
288 outcomes, whether they are cross-sectoral, sector-specific, or focused on a particular geographic
289 area. High quality, relevant and disaggregated disaster-related statistics enable policymakers to
290 assess vulnerabilities, identify risks, and design policy responses that lead to more resilient
291 outcomes. By working together with National Disaster Risk Reduction Strategies and national
292 statistical systems, as well as other relevant data systems directly linked to disaster monitoring
293 and risk reduction, the implementation of the G-DRSF can assist in identifying risks that undermine
294 development efforts, inform national resilience planning in the face of shocks, enhance
295 preparedness measures at the national and sub-national levels, and guide response and recovery
296 to “building back better” in the aftermath of disasters.

297 Sectoral strategies benefit substantially from implementation of the G-DRSF, particularly in key
298 areas such as agriculture, housing, and natural resource management, among others. A common
299 and coherent approach to disaster-related statistics underpins important decisions across these
300 sectors. By providing standardized methodologies, definitions, and reporting, the G-DRSF helps
301 prevent fragmented approaches in which different agencies, sectors, and regions use inconsistent
302 practices. These fragmented approaches undermine the nation-wide ability to understand risk
303 patterns, enact impactful policies, and deliver the intended results.

304 A key advantage of the G-DRSF is its support for policymakers and development partners in
305 identifying and addressing issues related to data availability, quality, and consistency in the context
306 of hazardous events and disasters, by providing guidance that will contribute to enhancing
307 disaster-related data accuracy and timeliness. In turn, recognizing the existing data challenges
308 encourages the development of a reliable information base to inform policymaking. The G-DRSF
309 is also instrumental in capacity development efforts, ensuring the accuracy and timeliness of
310 disaster-related data collection and analysis. This function is particularly crucial in an evolving
311 global landscape affected by uncertainty, climate shocks, and more intense disaster impacts while
312 aiming to leave no one behind.

1 **2. Conceptual framework: Scope, concepts and definitions**

2 **2.1. Introduction**

3 Disaster-related statistics integrate data across three key measurement areas: (i) disaster risk,
4 (ii) impacts from hazardous events and disasters, and (iii) DRR activity²⁵ reflected through DRR
5 expenditures, which together span the full DRR management process. These three measurement
6 areas provide essential statistics critical for informed DRR-related policymaking such as disaster
7 risk prevention and mitigation, and disaster response and recovery. They are central to
8 accelerating progress toward internationally-agreed frameworks such as the Sendai Framework
9 and the 2030 Agenda for Sustainable Development.

10 The G-DRSF is built on the understanding that disaster risk is dynamic and multifaceted,
11 requiring systematic understanding and measurement of the aforementioned areas of disaster
12 risk, impacts, and DRR activity. By integrating these three areas within a statistical framework, it is
13 anticipated that countries can develop a more holistic understanding of their disaster risk and
14 progress towards achieving national DRR goals in line with the Sendai Framework and other
15 internationally-agreed frameworks.

16 This chapter outlines the conceptual framework of the G-DRSF. It establishes the key concepts
17 and definitions used in this framework (Sections 2.2 and 2.3), and describes the links to related
18 areas of measurement, including the relevant statistical frameworks (Section 2.4), relevant
19 disaster-related frameworks (Section 2.5) and approaches to hazard classification (Section 2.6).

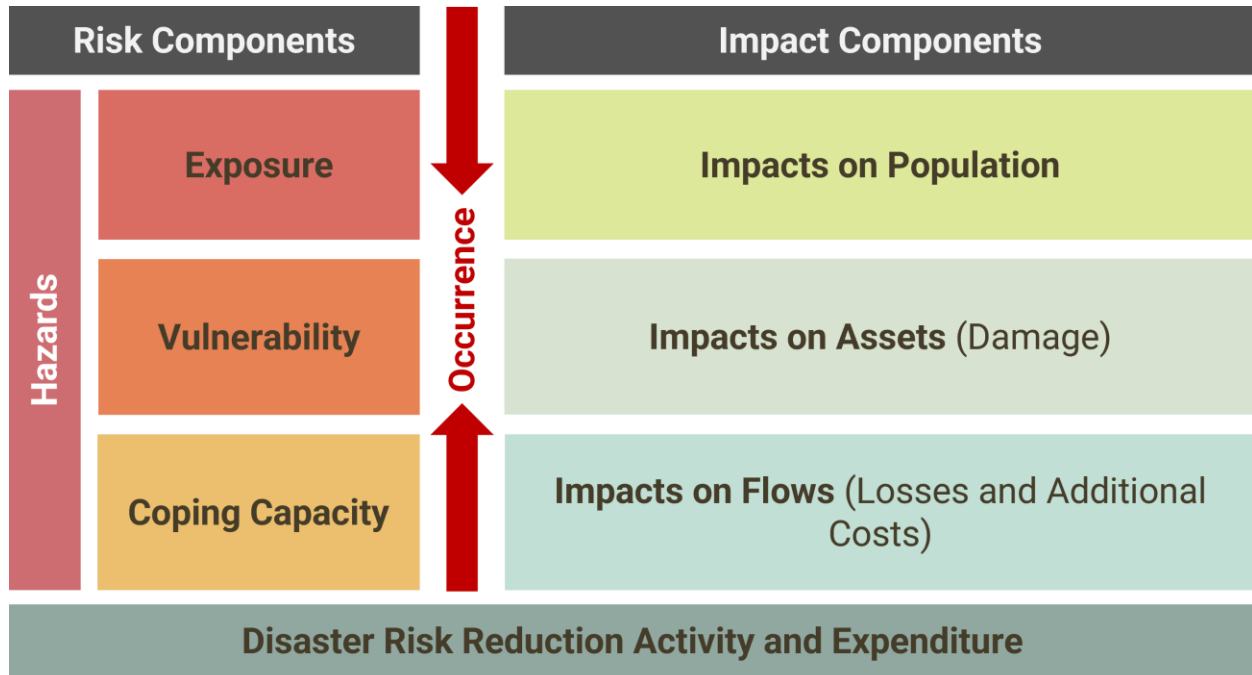
20 **2.2. The G-DRSF conceptual framework**

21 The G-DRSF's conceptual framework revolves around the three measurement areas,
22 illustrated in Figure 2.1, where the first area relates to understanding disaster risk; the second area
23 concerns hazardous events and disasters after their occurrences, and the third area relates to
24 DRR activities, reflected through DRR expenditures, that take place throughout disaster risk
25 management.

²⁵ See Chapter 6 for the definition and scope of DRR activity.

26

Figure 2.1: Graphical representation of the G-DRSF's conceptual framework



27

28 The first measurement area, disaster risk, encompasses the measurement of hazard exposure,
 29 vulnerability, and coping capacity. When measured in an ongoing manner, these components
 30 provide an understanding of the extent and level of risk critical to informing policymaking and
 31 action. Key applications for statistics relating to this area include risk knowledge to inform
 32 formulation and implementation of resiliency measures, pre-positioning response capabilities and
 33 other anticipatory actions and groundwork for post-disaster recovery. These statistics also serve
 34 as baseline for assessing impacts from hazardous events and disasters.

35 As different population groups experience varying levels of exposure to hazards, including
 36 individuals living within the same household, and have different levels of vulnerability and coping
 37 capacities based on intersectional socio-demographic characteristics,²⁶ disaster risk assessment
 38 may be conducted at the individual and household levels where possible.

39 The second measurement area, impacts from hazardous events and disasters, focuses on
 40 occurrences of hazardous events and disasters and their associated impacts. This area
 41 complements risk statistics to enable a comprehensive assessment of losses and damage, to
 42 assess disaster risk and to guide planning, recovery efforts and long-term DRR and climate

²⁶ The analysis of exposure, vulnerability, coping capacity should consider disaggregation by sex, age, disability, and other socioeconomic factors to capture intersectional inequalities and ensure inclusive policies.

43 adaptation efforts. Statistics in this area cover all hazardous events and disasters that occur within
44 a national boundary regardless of the scale and impact.

45 The impacts can be clustered into the following interrelated groups:

46 (a) *Impacts on population*: such as mortality, injuries, displacement, and other human impacts,
47 disaggregated as appropriate.

48 (b) *Impacts on assets*: such as destruction of housing and personal properties, public facilities,
49 critical infrastructure, utilities, industrial facilities and equipment, damage to crops,
50 livestock and farming facilities and equipment; and damage to ecosystems and
51 biodiversity.

52 (c) *Impacts on flows*: referring to disruption of activities that result in (i) losses in production
53 of goods and services (ii) losses of ecosystem services; and (iii) additional costs required
54 to maintain or resume the production of goods and services.

55 The third measurement area, DRR activities, concerns expenditures across all DRR efforts,
56 including by both public and private sectors. Key components include expenditures relating to
57 disaster risk prevention including investments in resilience building and adaptation, disaster risk
58 mitigation, preparedness and response including pre-positioning of emergency supplies and
59 anticipatory action, disaster recovery, as well as other efforts relating to outreach and education
60 on DRR.

61 It is recognised that hazardous events and disasters may result in a range of impacts on people
62 and communities, including impacts on long-term mental health, psychosocial well-being, and
63 social cohesion, among others.²⁷ Such impacts are sometimes discussed in the context of non-
64 economic or intangible losses. While these impacts are acknowledged, related concepts,
65 definitions, scope, and measurement approaches remain under development and have not yet
66 reached a level of maturity suitable for the development of internationally agreed statistical
67 methodologies or standards. Therefore, their measurement is currently not included within the
68 scope of the G-DRSF. The overall scope of impact statistics in the G-DRSF is described in Chapter
69 5.

²⁷ Consider for instance, the aspects discussed in a number of disaster and climate change-related literature (Global Facility for Disaster Reduction and Recovery (GFDRR), United Nations Development Programme (UNDP), European Union, and World Bank (2013c); Van Schie, and others (2024)

70 Although the three measurement areas in Figure 2.1 are interrelated, the implementation of
71 the G-DRSF at the national level can focus on the most relevant components of the framework.
72 Over time, measurement can develop progressively based on country circumstances to capture
73 and organize additional statistics across the three areas. Such ongoing development would be
74 expected in response to the deepening of risk knowledge, the increasing complexity and severity
75 of hazardous events and disaster impacts, and the expanding range of DRR-related activities.
76 Ongoing alignment with the framework will help to establish a measurement foundation that
77 ensures consistent compilation of statistics within countries and across sectors and will facilitate
78 international comparability.

79 **2.3. Key concepts and definitions**

80 The following definitions are aligned with the Report of the open-ended intergovernmental
81 expert working group on indicators and terminology relating to disaster risk reduction (OIEWG)
82 (United Nations General Assembly, 2016) (hereafter "the OIEWG report"), and the Sendai
83 Framework, and reflect current standards of practice. They are adopted to establish consistency
84 and uniformity for the purposes of compiling and using disaster-related statistics.

85 **2.3.1 Hazard**

86 *A hazard is a process, phenomenon or human activity that may cause loss of life, injury or*
87 *other health impacts, property damage, social and economic disruption or environmental*
88 *degradation.*

89 Hazards may be natural, anthropogenic or socio-natural in origin. Anthropogenic hazards, or
90 human-induced hazards, are induced entirely or predominantly by human activities and choices.
91 Several hazards are socio-natural, in that they are associated with a combination of natural and
92 anthropogenic factors, including environmental degradation and climate change.

93 Hazards may be single, sequential, or combined in their origin and effects. Each hazardous
94 event is characterized by its location, intensity or magnitude, area of extent, frequency, and
95 duration. In addition, each hazard has other specific dimensions, for example, biological hazards
96 are also defined by their infectiousness or toxicity, and other characteristics of the pathogen such
97 as dose-response, incubation period, case fatality rate and estimation of the pathogen for
98 transmission.

99 Multi-hazard is a term used to refer to the specific contexts where hazardous events may occur
100 simultaneously, cascading or cumulatively over time, and taking into account the potential
101 interrelated effects. Countries and communities can determine the selection of multiple hazards
102 that they are most at risk to, to set up their multi-hazard profiles.

103 2.3.2 Hazardous event

104 *A hazardous event is the manifestation of a hazard in a particular place during a particular*
105 *period of time.*

106 When a hazard is realized, it becomes a hazardous event. Severe hazardous events can lead
107 to a disaster as a result of the combination of hazard occurrence and other risk factors.

108 2.3.3 Disaster

109 *A disaster is a serious disruption of the functioning of a community or a society at any scale*
110 *due to hazardous events interacting with conditions of exposure, vulnerability and capacity,*
111 *leading to one or more of the following effects: human, material, economic and environmental*
112 *losses and impacts.*

113 The effects of a disaster can be immediate and localized, but they are often widespread and
114 last for a long period of time. The effects may test or exceed the capacity of a community or society
115 to cope using its own resources, and therefore may require assistance from external organizations,
116 which could include assistance from neighbouring jurisdictions, or from organizations at national
117 or international levels.

118 The Sendai Framework²⁸ recognizes the following types of disaster:²⁹

119 (a) *Small-scale disaster*: a type of disaster only affecting local communities and which require
120 assistance beyond the affected community.

121 (b) *Large-scale disaster*: a type of disaster affecting a society and which requires national or
122 international assistance.

²⁸ See para. 15 of A/RES/69/283. Available at <https://docs.un.org/a/res/69/283>.

²⁹ The definitions follow the OIEWG report.

123 (c) *Frequent disaster*: a type of disaster with a high probability of occurrence and the return
124 period of a given hazard and its impacts. The impact of frequent disasters could be
125 cumulative or become chronic for a community or a society.

126 (d) *Infrequent disaster*: a type of disaster with a low probability of occurrence and the return
127 period of a given hazard and its impacts.

128 (e) *Slow-onset disaster*: a type of disaster that emerges gradually over time. Slow-onset
129 disasters could be associated with drought, desertification, sea-level rise or epidemic
130 disease.

131 (f) *Sudden-onset disaster*: A type of disaster triggered by a hazardous event that emerges
132 quickly or unexpectedly. Sudden-onset disasters could be associated with earthquakes,
133 volcanic eruptions, flash floods, chemical explosions, critical infrastructure failure or
134 transport accidents.

135 2.3.4 Exposure

136 *Exposure describes the situation of people, infrastructure, housing, production capacities and*
137 *other tangible human assets located in hazard-prone areas.*

138 Measures of exposure can include the number of people or types of assets in a hazard-prone
139 area. These measures can be combined with the specific vulnerability and coping capacity of the
140 exposed elements to any particular hazard to estimate the quantitative risks associated with that
141 hazard in the area of interest. It is worth noting that disaster exposure is not gender-neutral:
142 Women and men often have different spatial and temporal exposure patterns due to their social
143 roles.

144 2.3.5 Vulnerability

145 *Vulnerability reflects the conditions determined by physical, social, economic and*
146 *environmental factors or processes which increase the susceptibility of an individual, a community,*
147 *assets or systems to the impacts of hazards.*

148 2.3.6 Coping capacity

149 *Coping capacity is the ability of people, organizations and systems, using available skills and*
150 *resources, to manage adverse conditions, risk or disasters.*

151 The capacity to cope requires continuing awareness, resources, and good management, both
152 in normal times as well as during disasters or adverse conditions. Coping capacities can contribute
153 to the reduction of disaster risks.

154 2.3.7 Disaster risk

155 *The potential loss of life, injury, or destroyed or damaged assets which could occur to a system,*
156 *society or a community in a specific period of time, determined probabilistically as a function of*
157 *hazard, exposure, vulnerability and capacity.*

158 2.3.8 Disaster impact

159 *Disaster impact is the total effect, including negative effects (e.g., economic losses) and*
160 *positive effects (e.g., economic gains), of a hazardous event or a disaster.*

161 Disaster impacts may include loss of life, injury, disease and other negative effects on human
162 physical and social well-being including displacement and loss of livelihoods, together with
163 damage to property, destruction of assets, loss of services, social and economic disruption and
164 environmental degradation. Impacts of disasters also differ widely between individuals, even
165 among those living within the same household. It is crucial to capture impacts at disaggregated
166 levels.

167 2.3.9 Disaster risk reduction

168 *Disaster risk reduction is aimed at preventing new and reducing existing disaster risk and*
169 *managing residual risk, all of which contributes to strengthening resilience and therefore to the*
170 *achievement of sustainable development.*

171 Disaster risk reduction is the policy objective of disaster risk management, and its goals and
172 objectives are defined in disaster risk reduction strategies and plans.

173 Disaster risk reduction strategies and policies comprise national and local DRR strategies and
174 policies which establish goals and objectives across different timescales and with concrete targets,
175 indicators and time frames. In line with the Sendai Framework, these strategies and policies should
176 be aimed at preventing the creation of disaster risk, reducing existing risk, and strengthening
177 economic, social, health, and environmental resilience. However, even when effective disaster risk
178 reduction measures are put into place, risk is never zero. Residual risk is the disaster risk that

179 remains in unmanaged form after DRR measures, and for which emergency response and
180 recovery capacities must be maintained.

181 2.3.10 Disaster risk management

182 *Disaster risk management (DRM) is the application of disaster risk reduction policies and*
183 *strategies to prevent new disaster risk, reduce existing disaster risk, and manage residual risk,*
184 *contributing to the strengthening of resilience and reduction of disaster losses.*

185 DRM can be distinguished between prospective disaster risk management, corrective disaster
186 risk management, and compensatory disaster risk management (also called residual risk
187 management). Specifically,

188 (a) *Prospective disaster risk management* prevents new or increased disaster risks from
189 developing. This includes activities such as improved land-use planning and disaster-
190 resistant infrastructure design.

191 (b) *Corrective disaster risk management* reduces existing disaster risks through activities such
192 as retrofitting critical infrastructure and relocating exposed populations or assets.

193 (c) *Compensatory disaster risk management* strengthens resilience against residual risks that
194 cannot be effectively reduced. This includes activities such as preparedness, response
195 and recovery activities, and the operation of financing instruments like contingency funds,
196 insurance, and social safety nets.

197 DRM can also be viewed from community-based or local and indigenous perspectives.
198 *Community-based disaster risk management* involves efforts to engage potentially affected
199 communities in local-level risk assessment, planning, implementation, and monitoring of disaster
200 risk reduction activities. *Local and indigenous disaster risk management* emphasizes integrating
201 traditional, indigenous, and local knowledge with scientific approaches as part of risk assessment
202 and local disaster risk management planning.

203 DRM plans set out the goals and objectives for reducing disaster risks, guiding the related
204 activities to accomplish these objectives. DRM should be aligned with Sendai Framework and
205 coordinated with relevant national development plans, resource allocations, and programme
206 activities. National-level DRM plans need to be specific to each level of administrative responsibility
207 and adapted to the different social and geographical circumstances that are present. The time
208 frame and responsibilities for implementation and the sources of funding should be specified in

209 the plan. Links to sustainable development and climate change adaptation plans should be made
210 where possible.

211 2.3.11 Activities related to Disaster Risk Management

212 Disaster risk management aims at understanding disasters risks and exposures, minimizing
213 vulnerabilities, and enhance the society’s coping capacity to prevent or reduce the adverse
214 impacts of disasters. DRM related activities are guided and grouped under the four priorities for
215 actions of the Sendai Framework:

- 216 (a) Priority 1: Understanding disaster risk.
- 217 (b) Priority 2: Strengthening disaster risk governance to manage disaster risk.
- 218 (c) Priority 3: Investing in disaster risk reduction for resilience.
- 219 (d) Priority 4: Enhancing disaster preparedness for effective response and to “Build Back
220 Better” in recovery, rehabilitation and reconstruction.

221 The paragraphs below highlight key terms and concepts for categorizing the relevant activities.
222 The activities can be both complementary and overlapping depending on their primary purposes.

- 223 (a) *Disaster risk assessment* is a qualitative or quantitative approach to determine the nature
224 and extent of disaster risk by analysing potential hazards and evaluating existing conditions
225 of exposure and vulnerability that may increase likelihood and severity of impacts on
226 people, assets, services, livelihoods and the environment on which they depend.
- 227 (b) *Disaster risk prevention* includes activities and measures to avoid existing and new disaster
228 risks. Prevention expresses the concept and intention to completely avoid potential
229 adverse impacts of hazardous events and disasters.
- 230 (c) *Disaster risk mitigation* aims at lessening or minimizing the adverse impacts of a hazardous
231 event. Disaster risk mitigation activities include engineering techniques, disaster-resistant
232 construction, and improved environmental and social policies and public awareness. It is
233 different from the climate change mitigation policies.
- 234 (d) *Disaster preparedness* refers to the knowledge and capacities developed by governments,
235 response and recovery organizations, communities and individuals to effectively anticipate,
236 respond to and recover from the impacts of likely, imminent or current disasters.

237 (e) *Disaster response* refers to the actions taken directly before, during or immediately after a
238 disaster in order to save lives, reduce health impacts, ensure public safety and meet the
239 basic subsistence needs of the people affected.

240 (f) *Disaster recovery* concerns restoring or improving livelihoods and health, as well as the
241 economic, physical, social, cultural and environmental assets, systems and activities, of a
242 disaster-affected community or society, aligning with the principles of sustainable
243 development and “build back better”, to avoid or reduce future disaster risk.

244 (g) *Disaster risk governance* concerns the operation of the system of institutions, mechanisms,
245 policy and legal frameworks and other arrangements that guide, coordinate and oversee
246 disaster risk reduction and related policies.

247 Disaster risk management encompasses a comprehensive range of activities. In the G-DRSF,
248 the measurement scope of DRR activities focuses on disaster risk prevention, mitigation,
249 preparedness, response and recovery. These activities as well as relevant activities of general
250 government, research & development and education, which should be aligned with the principles
251 of sustainable development and “build back better”, to reduce disaster risk, and the impacts of
252 hazardous events, are elaborated in Chapter 6 of this framework.

253 **2.4. Relevant statistical frameworks**

254 A number of internationally agreed statistical frameworks contain elements that address
255 disaster-related statistics. This section presents the key frameworks of relevance and provides a
256 brief overview of their focus and relationship with the G-DRSF.

257 **2.4.1 The 2025 System of National Accounts (2025 SNA)**

258 The System of National Accounts (SNA) is the global standard for compiling national economic
259 accounts. It provides concepts and classifications to measure key economic variables and
260 indicators such as GDP, production, income, consumption, and accumulation of assets. The SNA
261 organizes economic information into stocks (assets and liabilities) and flows (transactions and
262 other changes), which are essential for understanding the economic impacts of disasters.

263 The 2025 SNA was adopted by the UNSC at its fifty-sixth session in 2025 as the new
264 international statistical standard for national accounts.³⁰ It updates the 2008 SNA. The 2025 SNA
265 broadens the national accounts framework to better account for elements affecting well-being and
266 sustainability to inform various policy goals. As a conceptual framework, the 2025 SNA does not
267 provide detailed compilation guidance, prescribe priorities for implementing specific accounts or
268 tables, or set norms on the frequency or format of their presentation.

269 While the 2025 SNA does not specifically address disaster statistics, its enhanced focus on
270 well-being, sustainability, and consistent data frameworks supports the analysis of disasters’
271 economic impacts. Of specific note is the 2025 SNA’s “Other changes in volume of assets and
272 liabilities account”³¹ which records changes relating to catastrophic events, including disasters,
273 that affect the wealth of an economy. Several SNA concepts, and classifications provide the basis
274 for measuring disaster-related statistics, such as:

- 275 (a) Changes in assets,
- 276 (b) Disruption of production, services and income due to disasters,
- 277 (c) Expenditure for DRR.

278 The G-DRSF aligns overall with valuation guidance and principles, as well as industry and
279 institutional classification used in the SNA. More generally, the economic impacts of disasters will
280 be revealed in countries’ estimates of GDP and will affect prospects for both short-term and long-
281 term growth. For example, post-disaster spending may lead to direct increases in GDP and
282 reconstruction activity has the opportunity to contribute to longer term increases in productivity,
283 such as via improved infrastructure. Analytically, considering the macro-economic effects of
284 disasters can be facilitated through co-ordination between compilers of SNA and G-DRSF
285 statistics.

286 By promoting greater comparability of economic data across countries and over time, the 2025
287 SNA enables more accurate tracking of the economic consequences of disasters. Such insights
288 are vital for effective resource allocation during crisis response and recovery. In this way, the 2025

³⁰ See Report on the fifty-sixth session of the Statistical Commission. *Official Records of the Economic and Social Council, Supplement No. 4. E/2025/24-E/CN.3/2025/37*. Available at https://unstats.un.org/UNSDWebsite/statcom/session_56/documents/2025-37-Report-E.pdf.

³¹ See para. 13.50 of the 2025 SNA.

289 SNA provides a strong basis for evidence-based decision-making in disaster-related economic
290 planning.

291 2.4.2 System of Environmental-Economic Accounting (SEEA)

292 The System of Environmental-Economic Accounting (SEEA) is a statistical framework that
293 integrates economic and environmental data to provide a comprehensive view of the interactions
294 between the economy and the environment. SEEA uses accounting concepts, structures, rules
295 and principles consistent with the SNA and adapts or extends some of the SNA measurement
296 boundaries to provide a more comprehensive analytical focus on the environment and its linkages
297 with the economy. The data are organized and presented in terms of stocks and flows and are
298 recorded in both physical and monetary terms.

299 The SEEA consists of two parts: the SEEA Central Framework and the SEEA Ecosystem
300 Accounting. The SEEA Central Framework was adopted at the forty-third session of UNSC in
301 2012³² and was the first international statistical standard for environmental-economic accounting.
302 The SEEA Central Framework describes accounting for environmental assets, such as water
303 resources, mineral and energy resources, timber resources, etc.; their flows into the economy and
304 returns to the environment, including in the form of solid waste, air emissions and emissions to
305 water. The SEEA Central Framework includes accounts that measure stocks and flows in both
306 physical and monetary terms, and environmental activity accounts that record environmental
307 protection expenditures, environmental goods and services, and related transactions including
308 environmental taxes, subsidies and similar transfers.

309 The SEEA Ecosystem Accounting was adopted at the fifty-second session of UNSC in 2021.³³
310 It focuses on accounting for ecosystems and the services they provide through a spatially explicit
311 approach that complements the accounts described in the SEEA Central Framework. The SEEA
312 Ecosystem Accounting organizes biophysical information by tracking changes in ecosystem
313 extent, ecosystem condition and flows of ecosystem services (including changes due to disasters).
314 It also provides recommendations for the valuation in monetary terms of ecosystem services and

³² See Report on the forty-third session of the Statistical Commission. *Official Records of the Economic and Social Council, Supplement No 4*. E/2012/24-E/CN.3/2012/34. Available at https://unstats.un.org/UNSDWebsite/statcom/session_43/documents/statcom-2012-43rd-report-E.pdf.

³³ See Report on the fifty-second session of the Statistical Commission. *Official Records of the Economic and Social Council, Supplement No 4*. E/2021/24-E/CN.3/2021/30. Available at https://unstats.un.org/UNSDWebsite/statcom/session_52/documents/2021-30-FinalReport-E.pdf.

315 assets and facilitates linking this information to economic and human activity measures such as
316 economic growth and employment.

317 The SEEA framework as a whole can be instrumental in enhancing understanding of disaster-
318 environment-economy linkages through three primary applications, namely:

319 (a) *Asset accounts*: Tracking disaster impacts on stocks of environmental assets (including
320 land, water, timber and ecosystems) and recording changes during accounting periods in
321 both physical and monetary terms.

322 (b) *Accounting for the relationship between disasters and ecosystem services*: Assessing how
323 disasters affect flows of ecosystem services and identifying changes of parameters relating
324 to critical services, such as flood control and sediment retention.

325 (c) *Expenditure accounts*: SEEA rearranges national accounts relating to expenditures and
326 facilitates analysis to assess the size, impact, and benefits of these expenditures. A range
327 of the SEEA expenditures on environmental protections and resource management will be
328 relevant in analyzing intended DRR goals.

329 In the context of the G-DRSF, the SEEA offers concepts to:

330 (a) Record changes to environmental and ecosystem assets caused by hazardous events,
331 such as forest, wetlands, and coral reefs, and

332 (b) Assess changes in ecosystem services,

333 The G-DRSF aligns definitions of asset and ecosystem services with the SEEA Central
334 Framework and the SEEA Ecosystem Accounting.

335 2.4.3 Global Set of Climate Change Statistics and Indicators

336 Adopted at the fifty-third session of UNSC in March 2022,³⁴ the Global Set of Climate Change
337 Statistics and Indicators (the Global Set)³⁵ is a comprehensive statistical framework comprising
338 158 indicators and 190 statistics designed to support countries in developing climate change
339 statistics programmes. It provides flexible guidance that can be adapted to national

³⁴ See Report on the fifty-third session of the Statistical Commission. *Official Records of the Economic and Social Council, Supplement No 4. E/2022/24-E/CN.3/2024/41*. Available at https://unstats.un.org/UNSDWebsite/statcom/session_53/documents/2022-41-FinalReport-E.pdf.

³⁵ See the Global Set and metadata at <https://unstats.un.org/unsd/statcom/53rd-session/documents/BG-3m-Globalsetandmetadata-E.pdf>.

340 circumstances, priorities, and resources, serving both as a starting point for new programmes and
341 a reference for existing ones.

342 The Global Set employs a three-tier system distinguishing commonly applied indicators (Tier
343 1) from less applied ones (Tier 2) and those requiring substantial methodological development
344 (Tier 3). It includes 54 indicators/statistics related to the SDGs and covers all five policy areas
345 (drivers, impacts, vulnerability, mitigation, and adaptation) defined by the Intergovernmental Panel
346 on Climate Change.

347 The Global Set contains 16 indicators and 7 statistics that specifically address disasters,
348 including 14 related to the Sendai Framework. Key disaster-related components include those
349 addressing impacts (frequency of events, mortality, economic losses etc. as defined in the Sendai
350 Framework), 1 indicator and 1 statistic about Vulnerability (population living in hazard-prone
351 areas), and 5 indicators and 3 statistics about Adaptation addressing expenditures, insurance
352 costs, disaster strategies, disaster shelters, early warning, awareness and education.

353 The Global Set provides a harmonized reference of indicators for climate change and disaster-
354 related statistics. The G-DRSF provides a coherent structure for compiling statistics that populate
355 the Global Set, particularly to those concerning hazard occurrence, impacts, exposure,
356 vulnerability, and DRR expenditure.

357 2.4.4 Framework for the Development of Environment Statistics (FDES)

358 The Framework for the Development of Environmental Statistics (FDES) was endorsed by
359 UNSC at its forty-fourth session in 2013.³⁶ It is designed as the framework for strengthening
360 environmental statistics through a clear organizing structure that guides the collection and
361 compilation of environment-related data from various sources at the national level. The FDES
362 organizes environmental statistics into six components, and includes the Basic Set of Environment
363 Statistics and the Core Set of Environment Statistics.

364 The FDES offers a comprehensive conceptual structure for organizing environmental statistics,
365 including components on hazardous events and disasters. It covers data on hazard occurrence,

³⁶ See Report on the forty-fourth session of the Statistical Commission. *Official Records of the Economic and Social Council, Supplement No 4*. E/2013/24-E/CN.3/2013/33. Available at https://unstats.un.org/UNSDWebsite/statcom/session_44/documents/statcom-2013-44th-report-E.pdf.

366 exposure, vulnerability, impacts, environmental health, and governance supporting integration and
367 development of environmental statistics.

368 Component 4 of the FDES is “Extreme Events and Disasters”. It organizes statistics on the
369 occurrence of extreme events and disasters and the impacts on human well-being and the
370 infrastructure of the human subsystem. It has two subcomponents “4.1: Natural Extreme Events
371 and Disasters” and “4.2: Technological Disasters” each of which are further divided into topics
372 addressing their occurrence and impact. The statistics under occurrence refer to the type,
373 location, magnitude, date and duration of the events; and the statistics under impact include
374 number of people killed, injured and displaced. Also recorded are the effects of technological
375 disasters on the integrity of ecosystems, on economic losses and concerning assistance received.

376 The other five components of the FDES also contain some relevant disaster-related statistics,
377 for example:

- 378 (a) Component 1: Environmental conditions and quality includes statistics on air temperature
379 and precipitation; occurrence of El Niño/La Niña events;
- 380 (b) Component 2: Environmental resources and their use includes statistics defined to reflect
381 catastrophic losses of timber resources;
- 382 (c) Component 3: Residuals includes Topic 3.4.1: Release of chemical substances;
- 383 (d) Component 5: Human settlements and environmental health includes statistics on hazard
384 prone areas, exposure to ambient air pollution, etc.;
- 385 (e) Component 6: Environmental protection, management and engagement, includes Sub-
386 component 6.3: Extreme Event Preparedness and Disaster Management which is divided
387 into two topics: Topic 6.3.1: Preparedness for natural extreme events and disasters; Topic
388 6.3.2: Preparedness for technological disasters.

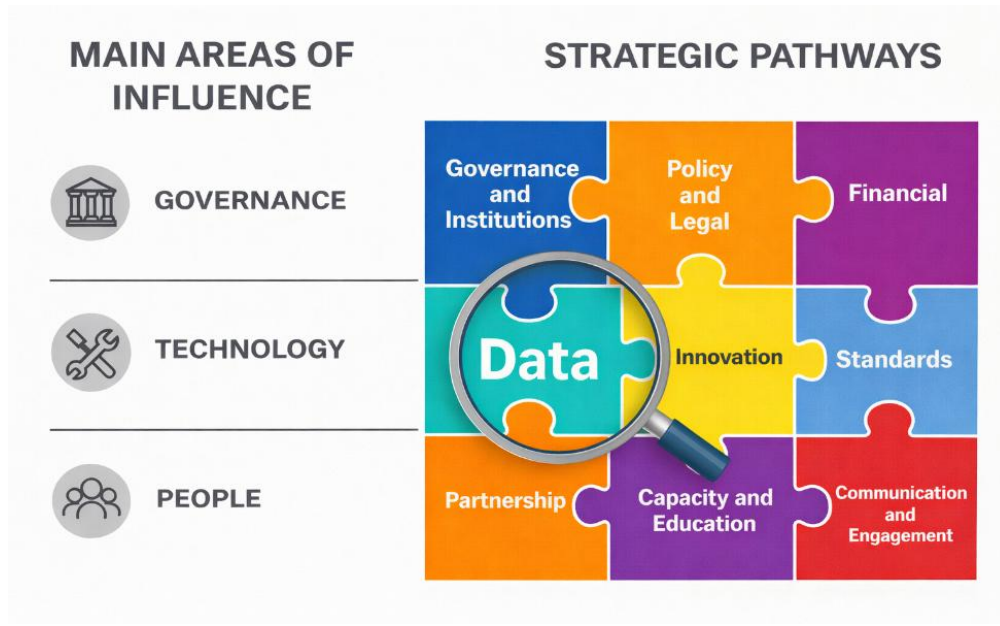
389 The statistics organized under Component 4 and as well as the relevant statistics from the
390 other components provide a solid basis for NSOs and NDMOs to set up the necessary data
391 collection processes to support the implementation of the G-DRSF.

392 A number of environmental statistics listed in the Basic Set of Environment Statistics³⁷ also
393 support the production and compilation of disaster-related statistics across all FDES components
394 described in the G-DRSF.

395 2.4.5 United Nations Integrated Geospatial Information Framework 396 (UN-IGIF)

397 United Nations and the World Bank developed the Integrated Geospatial Information
398 Framework (UN-IGIF),³⁸ which was subsequently adopted by the United Nations Committee of
399 Experts on Global Geospatial Information Management (UN-GGIM) in 2018 and 2020³⁹ and
400 recognised by the Economic and Social Council as a means of achieving the SDGs.

401 *Figure 2.2: The United Nations Integrated Geospatial Information Framework - focused on data*



402

³⁷ See <https://unstats.un.org/unsd/envstats/fdes/basicset.cshhtml>

³⁸ See further information on the UN-IGIF, including documents on overarching strategy, implementation guide and country-level action plan at <https://ggim.un.org/UN-IGIF/>.

³⁹ The UN-IGIF Overarching Strategic Framework (Part 1) was adopted at the eighth session of UN-GGIM in 2018, and the UN-IGIF Implementation Guide (Part 2) was adopted at the tenth session of UN-GGIM in 2020. See Report on the eighth session of United Nations Committee of Experts on Global Geospatial Information Management. *Official Records of the Economic and Social Council, Supplement No. 26, E/2018/46-E/C.20/2018/19*. Available at <https://ggim.un.org/meetings/GGIM-committee/8th-Session/documents/GGIM8-report-e.pdf>, and Report on the tenth session of United Nations Committee of Experts on Global Geospatial Information Management. *Official Records of the Economic and Social Council, Supplement No. 26, E/2021/46-E/C.20/2020/35*. Available at https://ggim.un.org/meetings/GGIM-committee/10th-Session/documents/GGIM10_report_e.pdf.

403 The UN-IGIF offers a comprehensive and adaptable blueprint for enhancing geospatial
404 capabilities (across many domains, including effective land administration, statistical data
405 management, climate, environment, and resilience), which is crucial for addressing national
406 sustainable development priorities. Through engaging with the UN-IGIF, NSOs will better
407 understand the national geospatial ecosystem. In turn, this will allow them to take advantage of
408 data, inputs, governance, and technologies and add value and quality to statistical information,
409 especially for the production of disaster related statistics.

410 The UN-IGIF is anchored by, and implemented through, nine strategic pathways across three
411 domains of influence:

412 (a) *Governance*: Assisting countries to develop robust geospatial policies and cooperation
413 agreements, governance structures, financing, legal frameworks, and approaches to
414 enable effective geospatial information management.

415 (b) *Technology*: Promoting the use of common standards, interoperable systems, and
416 innovative technologies to facilitate seamless data exchange across sectors and
417 organizations, enhancing the efficiency and accuracy of data integration, analysis, and
418 dissemination.

419 (c) *People*: Providing resources and guidance for enhancing capacities, effective
420 communication and collaboration with local communities, government agencies, and other
421 stakeholders in managing geospatial data.

422 The UN-IGIF promotes the advancement and delivery of national geospatial information
423 management, essential for understanding hazards, forecasting, early-warning, and assessment of
424 exposure and vulnerability. This in turn, underpins data needs of disaster-related statistics, SDGs
425 and the Sendai Framework, supporting the geospatial aspects of modelling disaster impacts to
426 the monitoring of resilience and recovery efforts and production of localized economic loss data.

427 The UN-IGIF provides an overarching strategy and implementation guide for integrating
428 geospatial information into national statistical systems The UN-IGIF facilitates the integration of
429 geospatial information when implementing the G-DRSF.⁴⁰

⁴⁰ For a complete resource on the UN-IGIF, please visit <https://ggim.un.org/UN-IGIF/>.

430 2.4.6 Strategic Framework on Geospatial Information and Services for 431 Disasters

432 The Strategic Framework on Geospatial Information and Services for Disasters, developed by
433 UN-GGIM in 2017,⁴¹ promotes the role of geospatial information for all phases of disaster risk
434 management. The framework emphasizes the importance of timely, reliable, and accessible
435 geospatial data to support decision-making before, during, and after disasters. The framework
436 outlines five guiding principles: data availability, accessibility, interoperability, quality, and
437 sustainability. Applying these principles is essential for building resilient societies and enhancing
438 disaster preparedness and response.

439 In the context of disaster-related statistics, the framework aims to support disaster
440 management agencies with the production and availability of data relating to disaster impacts,
441 such as the number of people affected, infrastructure damaged, or economic losses incurred in
442 specific geographic areas and deliver more accurate and actionable insights.

443 Moreover, this framework encourages collaboration among national mapping agencies,
444 statistical offices, emergency services, and international organizations to ensure that geospatial
445 services are embedded in disaster management workflows. This collaboration is intended to
446 enhance the ability to produce timely data, conduct risk assessments, and support recovery
447 planning. Embedding this Strategic Framework into the production and compilation of disaster-
448 related statistics as guided by the G-DRSF enhances quality and accessibility of statistics, as well
449 as collaboration among stakeholders involved in disaster risk reduction and management.

450 2.4.7 Global Statistical Geospatial Framework (GSGF)

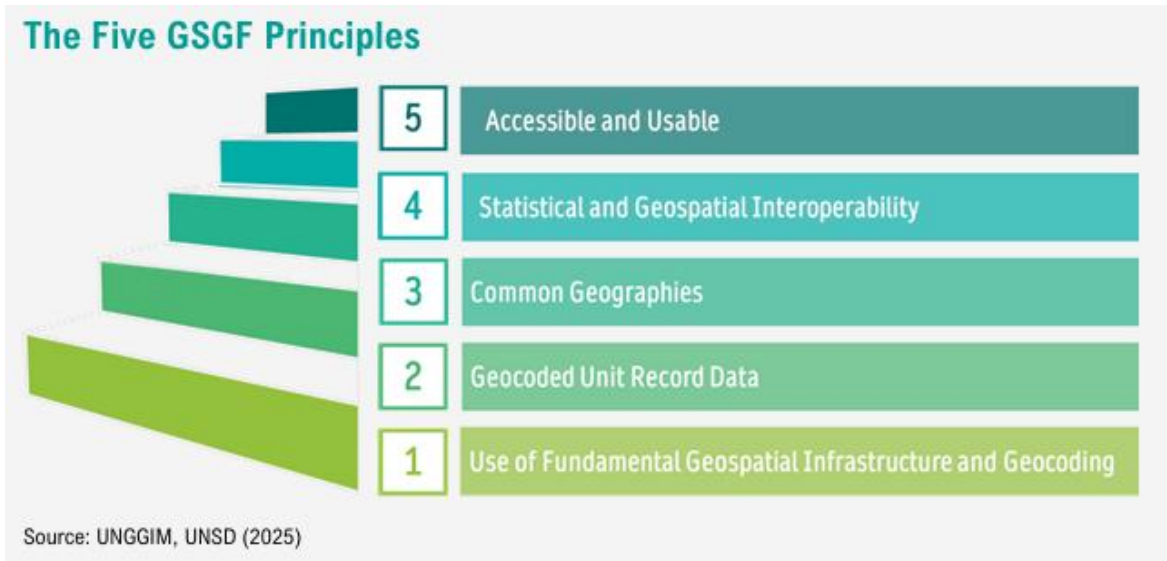
451 The United Nations Global Statistical Geospatial Framework (GSGF)⁴² provides a structured
452 approach to linking statistical and geospatial data, enabling NSOs to effectively engage with
453 National Geospatial Information Agencies (NGIAs) allowing governments worldwide to produce
454 more accurate, consistent, locally relevant, and actionable national statistics. The GSGF

⁴¹ See the Strategic Framework on Geospatial Information and Services for Disasters at https://ggim.un.org/documents/UN-GGIM_Strategic_Framework_Disasters_final.pdf.

⁴² See the GSGF (second edition) at https://ggim.un.org/meetings/GGIM-committee/15th-Session/documents/GSGF_v2_GGIM.pdf.

455 complements the UN-IGIF, as the two frameworks jointly provide both policy and technical
456 guidance on integrating geospatial and disaster data.

457 *Figure 2.3: The five principles of the Global Statistical Geospatial Framework*



458
459 The GSGF seeks to enhance interoperability across agencies and countries, facilitating the
460 sharing and comparison of disaster-related data. As disasters often transcend administrative
461 boundaries, a harmonized framework ensures that data collected by different entities can be
462 combined and analyzed cohesively. This is particularly valuable for international organizations and
463 governments working together on DRR, climate resilience, and humanitarian aid.

464 The GSGF is built upon five guiding principles (Figure 2.3) that are crucial for producing high-
465 quality, location-enabled statistics, especially in disaster-related contexts: (1) Use of fundamental
466 geospatial infrastructure and geocoding, which ensures that statistical data can be accurately
467 linked to geographic locations; (2) Geospatially enabled statistical data, which allows for spatial
468 analysis and visualization of disaster impacts; (3) Common geographies establishing standardized
469 geographic boundaries for dissemination of statistics; (4) Statistical and geospatial interoperability,
470 enabling collaboration across sectors and borders; and (5) Accessible and usable statistics
471 ensuring location-enabled data is readily available for informed decision-making.

472 These five principles collectively support the development of robust disaster-related statistics
473 by ensuring that data is not only accurate and timely but also spatially relevant and
474 interoperable. By embedding geospatial dimensions into statistical systems, the GSGF can help

475 to support longitudinal studies of disaster impacts at granular levels. Implementing the GSGF
476 alongside the G-DRSF ensures that statistics are geocoded and interoperable across
477 administrative and sectoral boundaries, facilitating integration of hazard, exposure, vulnerability,
478 coping capacity, and impact data as well as their dissemination for decision-making.

479 **2.5. Relevant disaster-related frameworks**

480 The G-DRSF builds upon previous work developed by a number of international organizations
481 and informed by regional and global experts as well as policymakers working on both DRR and
482 statistics. This section discusses key disaster impact assessment frameworks, including the Post-
483 Disaster Needs Assessment (PDNA), Damage and Loss Assessment (DaLA), the Global RApid
484 Post-Disaster Damage Estimation (GRADE), the ECLAC Handbook for Disaster Assessment and
485 the disaster assessment methodology exercise guide, as well as the ESCAP Disaster-related
486 Statistics Framework (ESCAP DRSF) which served as a major inspiration for the G-DRSF, and the
487 Economic Commission for Europe (ECE) recommendations on hazardous events.

488 **2.5.1 Post-Disaster Needs Assessment (PDNA)**

489 The European Union, World Bank, FAO, International Labour Organization, United Nations
490 Development Programme (UNDP), United Nations Environment Programme (UNEP), United
491 Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Human
492 Settlements Programme (UN-Habitat), United Nations Children's Fund (UNICEF), United Nations
493 Entity for Gender Equality and the Empowerment of Women (UN Women) and World Health
494 Organization (WHO) jointly developed the Post-Disaster Needs Assessment (PDNA),⁴³ as a
495 national government-led structural process to evaluate disasters' human, social, economic, and
496 environmental impacts. PDNA generates standardized, comparable data on the scale and
497 distribution of impacts. It combines baseline data with damage assessments, sectoral losses
498 analyses, and community consultations to produce a comprehensive picture of losses, damage
499 and needs across disaster impacted areas, provide support to governments in post-disaster
500 recovery assessments and planning through coordinated approaches.

501 A PDNA consists of four main elements:

⁴³ See PDNA publications Volume A at <https://www.gfdrr.org/en/publication/post-disaster-needs-assessments-guidelines-volume-2013> and Volume B at <https://www.gfdrr.org/en/pdna-volume-b>.

- 502 (a) Pre disaster context and baseline information.
- 503 (b) The assessment of disaster effects, which include:
- 504 (1) Damage to infrastructure and physical assets
- 505 (2) Disruption of access to goods and services
- 506 (3) Governance and decision-making processes
- 507 (4) Increased risks and vulnerabilities.
- 508 (c) The assessment of disaster impacts, including human development impacts and economic
- 509 impacts.
- 510 (d) The recovery strategy, determining sector recovery needs.

511 The key sectors evaluated in a PDNA are generally grouped into 1) social sectors, including

512 housing and settlements, education, health, culture, and nutrition; 2) productive sectors, covering

513 agriculture, industry, commerce, trade, and tourism; 3) infrastructure sectors including water,

514 sanitation and hygiene (WASH), energy and electricity, transport, and telecommunications; and 4)

515 cross-cutting sectors.

516 2.5.2 Damage and Loss Assessment (DaLA)

517 Building upon the ECLAC Handbook for Estimating the Socio-economic and Environmental

518 Effects of Disasters,⁴⁴ the Damage and Loss Assessments (DaLA)⁴⁵ aim to operationalize the

519 concepts and data collection for DRR practitioners. The DaLA methodology aims at systematically

520 estimating damage to physical assets, losses in economic flows, and the financial needs for

521 recovery and reconstruction, using national accounts and sectoral data to ensure consistency and

522 comparability. It is conceptually aligned with this Framework by using objective, quantitative

523 information on the value of destroyed assets and temporary production losses to estimate

524 government interventions for the short term and post-disaster financing needs.

⁴⁴ The ECLAC Handbook for Estimating the Socio-economic and Environmental Effects of Disasters, published in 2003, is a predecessor of the 2014 ECLAC Handbook for Disaster Assessment elaborated in Section 2.5.4.

⁴⁵ See DaLA publications Volume 1 at <https://www.preventionweb.net/publication/damage-loss-and-needs-assessment-guidance-notes-volume-1-design-and-execution-damage>; Volume 2 at <https://www.preventionweb.net/publication/damage-loss-and-needs-assessment-guidance-notes-volume-2-conducting-damage-and-loss>; and Volume 3 at <https://www.preventionweb.net/publication/damage-loss-and-needs-assessment-guidance-notes-volume-3-estimation-post-disaster-needs>.

525 DaLA method promotes standardized damage and losses⁴⁶ definitions and sectoral
526 classification of impacts. It ensures that the affected government and other international and
527 domestic agencies jointly develop properly estimated and prioritized financial requirements that
528 identify all possible financial sources and modalities. While the G-DRSF focuses on structuring
529 and harmonizing disaster data for official statistics, DaLA operationalizes these data to assess
530 economic impacts and inform recovery planning, integrating disaster-related statistics with policy
531 analysis.

532 In operation, DaLA can support PDNA in generating baseline data for assessing disaster
533 impact, and evaluating damage, losses, and other additional costs of disasters. They also estimate
534 recovery and reconstruction resources required to restore services, rebuild infrastructure, and
535 improve resilience post disaster.

536 For both the PDNA and DaLA methodologies, the effects of disasters are estimated based on
537 the impacts on assets and flows. For impact on assets (damage), the methodologies evaluate the
538 total or partial destruction of infrastructure and physical assets in the affected area, in measure of
539 physical units, for all sectors. For impact on flows (losses), they examine the decline in output of
540 the productive sectors (agricultural, industry, commerce, and tourism, etc.) that is associated with
541 the partial and total destruction of infrastructure and physical assets. This approach forms the
542 basis of impact statistics discussed in Chapter 5.

543 2.5.3 Global RAPid Post-Disaster Damage Estimation (GRADE)

544 There are needs for rapid post-disaster damage assessments, as PDNA and DaLA typically
545 take a few months to complete after an event. To provide fast and cost-effective assessment, World
546 Bank introduced the Global RAPid Post-Disaster Damage Estimation (GRADE)⁴⁷ assessment
547 approach. GRADE is a remote, desk-based methodology designed to quickly answer critical early
548 questions after the onset of the event, including the scale of damage, the overall economic impact
549 on key sectors such as housing, infrastructure, and agriculture, and priorities for response and

⁴⁶ The term “damage and losses” refers to the negative impacts resulting from hazardous events and disasters, in line with the terminology used in DaLA. For the purpose of this Framework, this term is considered equivalent in scope to “losses and damages” in the context of the Sendai Framework and Intergovernmental Panel on Climate Change (IPCC) assessment reports.

⁴⁷ See the Global RAPid post-disaster Damage Estimation (GRADE) approach at <https://www.gfdr.org/en/publication/global-rapid-post-disaster-damage-estimation-grade-approach>; and A Review of the GRADE Assessments at <https://www.gfdr.org/en/publication/review-global-rapid-post-disaster-damage-estimation-grade-assessments>

550 recovery. It incorporates harmonized methodologies of PDNA and DaLA, and is structured to
551 provide reliable information when data were still scarce immediately after an event.

552 By combining risk modelling, structural engineering analysis, satellite and remote sensing
553 data, drone imagery, social media, and disaster reports, GRADE complements PDNA and DaLA
554 approaches by providing rapid, model-based estimates of damage using hazard, exposure, and
555 vulnerability data in the immediate post-disaster period. It is both cost-effective and fast, with
556 results available on average within three weeks of a disaster.

557 In operational terms, GRADE informs early decision-making and prioritization, PDNA
558 represents the broader, government-led, multi-partner assessment which incorporates DaLA's
559 economic analysis alongside social, productive, infrastructure and cross-cutting sectors, and
560 DaLA serves as the foundational analytical methodology to quantify direct damage, indirect losses,
561 and recovery and reconstruction needs in monetary values. Together these disaster assessment
562 tools provide the methodological backbone and baseline for the production of official data on
563 disaster risk and impacts, as well as providing forward looking guiding information on DRR
564 expenditures.

565 2.5.4 ECLAC Handbook for Disaster Assessment and Disaster 566 Assessment Methodology Exercise Guide

567 The ECLAC Handbook for Disaster Assessment (2014)⁴⁸ is an essential reference for
568 harmonizing the assessment of the impacts of disasters. The Handbook offers a conceptual
569 foundation and structured methodology to measure the immediate and long-term effects of
570 disasters, including damage to assets (physical destruction), losses in economic flows
571 (interruption of production, income, and services), and additional costs (recovery and
572 reconstruction expenses). The Handbook methodologies ensure that the data collected is
573 consistent, comparable, and comprehensive across sectors and countries, promoting a
574 standardized approach. This consistency is relevant not only for informing immediate emergency
575 response and recovery but also for integrating disaster impacts into broader socioeconomic
576 planning and sustainable development strategies.

⁴⁸ See <https://www.cepal.org/en/publications/36823-handbook-disaster-assessment>.

577 Supplementing the Handbook, the Disaster Assessment Methodology Exercise Guide⁴⁹ serves
578 as a bridge between theoretical concepts and practical application. It addresses the
579 implementation capacity gap by providing practical exercises, real-world scenarios, and detailed
580 instructions tailored for NSOs and statistical systems. This guide helps build the capacities of
581 NSOs to produce, analyze, and disseminate disaster-related statistics, offering practical exercises
582 to train professionals in applying DaLA methodology. For strengthening the methodological
583 competencies of national statistical systems, the handbook and the exercise guide ensure that
584 disaster data is relevant, accessible, and timely. Ultimately, this empowers policymakers to adopt
585 evidence-based risk reduction measures and supports the mainstreaming of disaster risk
586 information into national development agendas.

587 2.5.5 ESCAP Disaster-Related Statistics Framework (ESCAP DRSF)

588 The ESCAP DRSF⁵⁰ was published in 2018. It incorporates a broad range of socio-economic
589 and environmental statistics and provides concepts and tabulations that guide users in integrating
590 data from several sources from across different government agencies. The framework supports
591 the production of risk and impact statistics that are relevant to all phases of disaster risk
592 management, from risk assessment, disaster preparedness, response, and recovery, to prevention
593 and mitigation. A key feature is the set of core summary tables that present the basic range of
594 disaster-related statistics. Also included are good practices from case studies and countries and
595 guidance on applying official statistics to produce key components of disaster related statistics
596 using Geographic Information Systems (GIS) and other technologies.

597 Recognizing the ESCAP framework's potential for global application, UNSC at its fiftieth
598 session⁵¹ acknowledged that the technical guidelines serve as a strong foundation for a universally
599 applicable tool aligned with the Sendai Framework for Disaster Risk Reduction 2015–2030. The
600 G-DRSF builds on these methodological foundations, expanding the ESCAP DRSF's scope to
601 provide a universally applicable framework for disaster-related statistics production. By integrating

⁴⁹ See <https://www.cepal.org/en/publications/44157-disaster-assessment-methodology-exercise-guide>.

⁵⁰ See https://www.unescap.org/sites/default/d8files/event-documents/%21DRSF%20Manual_20220620_0.pdf.

⁵¹ See Report on the fiftieth session of the Statistical Commission. *Official Records of the Economic and Social Council, Supplement No 4. E/2019/24-E/CN.3/2019/34*. Available at https://unstats.un.org/UNSDWebsite/statcom/session_50/documents/Report-on-the-50th-session-of-the-statistical-commission-E.pdf.

602 the ESCAP DRSF's technical approaches and good practices, the G-DRSF establishes coherent
603 global concepts, definitions, and tabulations for all countries and regions.

604 2.5.6 ECE Recommendations on Hazardous Events

605 ECE under the mandate of the Conference of European Statisticians (CES) developed the *CES*
606 *Recommendations on the Role of Official Statistics in Measuring Hazardous Events and*
607 *Disasters*.⁵² Designed to complement the ESCAP DRSF, this guidance clarifies the responsibilities
608 of NSOs and national statistical systems in collecting and disseminating disaster-related data, and
609 outlines practical steps for integrating such data into national statistical systems. It also promotes
610 effective collaboration with disaster risk management agencies through enhanced coordination,
611 harmonized terminology, and joint development of geo-referenced and disaggregated statistics.
612 The *Recommendations* provide guidance on how statistical systems can contribute across the
613 disaster risk management cycle—from risk assessment and preparedness to impact
614 measurement and recovery monitoring—and serve as a basis for Chapter 3 of the G-DRSF.

615 To implement the CES Recommendations in practice, ECE also developed a set of 53 core
616 disaster-risk-related indicators,⁵³ endorsed by the CES. The core indicators cover key components
617 of disaster risk and are designed to be able to be disaggregated, to be internationally comparable,
618 and to complement the 2021 CES Set of Core Climate Change-Related Indicators and Statistics
619 based on the SEEA.⁵⁴ ECE is currently drafting an implementation guide to support countries in
620 applying the CES disaster-risk-related statistics and developing the core indicators.

621 2.6. Hazard classification systems

622 Standardized and consistent hazard classifications are fundamental to compiling effective
623 disaster-related statistics. Such classifications support uniformity and consistency in definitions,
624 terminology and data collection standards. Given the inter-connected nature of risks, the
625 systematic use of hazard classifications is inescapable to underpin multi-hazard approaches in
626 DRR.

⁵² See <https://unece.org/statistics/publications/recommendations-role-official-statistics-measuring-hazardous-events-and-disasters>.

⁵³ See https://unece.org/sites/default/files/2023-05/CES_2023_4_E_0.pdf.

⁵⁴ See https://unece.org/sites/default/files/2021-08/CES_Set_Core_CCR_Indicators-Report.pdf.

627 Three major hazard classification systems are dominant in DRR discourse, namely the Hazard
628 Information Profiles (HIPs) co-developed by UNDRR and the International Science Council; the
629 World Meteorological Organization (WMO) Cataloguing of Hazardous Events (WMO-CHE), and
630 the Integrated Research on Disaster Risk (IRDR) Peril Classification system. These classification
631 systems have strong connections but important differences in their scope (natural vs. multi-
632 hazard), complexity (simple hierarchical vs. detailed profiles), and primary application (risk
633 assessment vs. operational cataloguing).

634 2.6.1 Hazard Information Profiles (HIPs)

635 The HIPs represent the most comprehensive international hazard classification system,
636 emerging first in 2021,⁵⁵ and updated in 2025.⁵⁶ The HIPs are anchored around the United Nations
637 General Assembly's definition of hazards as “*processes, phenomena, and human activities that*
638 *may cause various forms of loss and disruption*”. HIPs are organized into 8 hazard types, 39
639 clusters and 281 hazards, where each hazard meets three criteria: community impact potential,
640 measurable spatial and temporal components, and availability of proactive and reactive measures.
641 Figure 2.4 illustrates the structure of the HIPs 2025 Edition.

⁵⁵ See <https://www.undrr.org/publication/documents-and-publications/hazard-definition-and-classification-review-technical-0>.

⁵⁶ See <https://www.undrr.org/publication/documents-and-publications/hazard-information-profiles-hips-2025-version>.

642

Figure 2.4: Updated Hazard Information Profiles (HIPs) 2025



643

644 The HIPs 2025 Edition update places special emphasis on multi-hazard contexts, enhancing
 645 the understanding of multi-hazard profiles while incorporating machine learning advances to
 646 improve usability. With contributions from 330 authors and reviewers across 150+ organizations,
 647 HIPs serve as the foundation for describing DRR strategies, structuring loss databases and
 648 building statistical frameworks aligned with the Sendai Framework, Paris Agreement, and SDGs.
 649 It also underpins the enhanced Disaster Tracking System, DELTA Resilience,⁵⁷ implemented by
 650 UNDRR and partners to support the collection of disaster-related statistics at the national level.
 651 Furthermore, countries may adjust and adapt the HIPs classification to reflect on their national and
 652 local specificities of hazardous events, or create their national hazard classification systems.

653 There is no internationally agreed statistical classification of hazards but for the purposes of
 654 the G-DRSF, HIPs are recommended to be used as the reference list of hazards and hazard
 655 classification for the production of disaster-related statistics.

656 2.6.2 WMO Cataloguing of Hazardous Events (WMO-CHE)

⁵⁷ See <https://www.undrr.org/building-risk-knowledge/disaster-losses-and-damages-tracking-system-delta-resilience>.

657 The WMO-CHE methodology⁵⁸ has a particular focus on meteorological, hydrological, climate,
658 and environmental hazards. It introduces standardized parameters including Hazard
659 Specifications, Universal Unique Identifiers, event descriptions, and linkages for cascading or
660 compound events. It has a particular strength in its operational focus, where it enables systematic
661 cataloguing that separates the event data, including recording of hazard occurrence, from the
662 impact data, hence ensure data quality control and completeness of hazard metadata.

663 This classification system is designed to align with the HIPs and supports the integration of
664 hazard data with losses and damage records. This integration facilitates attribution between
665 hazardous events and their impacts, while allowing for context-specific customization through a
666 free-text narrative in the description of hazardous events.

⁵⁸ See Annex to Resolution 12 (Cg-18) of WMO Congress Report 2019 at https://library.wmo.int/viewer/56690/download?file=1236_en.pdf&type=pdf&navigator=1.

667 2.6.3 The Integrated Research on Disaster Risk (IRDR) Peril
668 Classification

669 As a prequel to the HIPs, the Integrated Research on Disaster Risk (IRDR) Peril Classification
670 and Hazard Glossary (2014)⁵⁹ provides a standardized framework for categorizing hazards into six
671 major families: geophysical, hydrological, meteorological, climatological, biological, and
672 extraterrestrial. This classification system employs a hierarchical structure. It organizes hazards
673 from the major families to specific perils (e.g., earthquakes leading to tsunamis and landslides).
674 The classification's strength lies in its simplicity and universal applicability, making it accessible to
675 diverse stakeholders from scientists to policymakers while maintaining consistency across
676 different geographical and cultural contexts.

677 However, the IRDR's system focuses only on selected types of hazards as it excludes
678 technological and societal hazards which are increasingly important in complex disaster
679 scenarios.

⁵⁹ See https://irdrinternational.org/knowledge_pool/publications/13.

3. Implementation ecosystem for disaster-related statistics

This chapter introduces the information needs for disaster-related statistics and describes the institutional implementation ecosystem that produces and organizes the relevant data. It highlights how NSOs, NDMOs and other relevant stakeholders can collaborate effectively to generate high-quality statistics that adhere to international standards while meeting both national policy needs and global reporting requirements. The chapter also discusses the strengths of official statistics, which have key characteristics associated with high-quality data and how existing data sources can complement each other to generate high-quality disaster-related statistics useful for policymakers and partners advancing disaster risk reduction efforts.

3.1. Information needs in the national and international context

The national and international information needs for disaster-related statistics must consider various requirements and be tailored to both national contexts and global reporting mandates.

3.1.1 National context

At the national level, data needs are primarily driven by national disaster risk management policies and strategies. These data commonly include information about the core disaster risk management activities, namely risk assessment, prevention, mitigation, preparedness, response and recovery. Measurement of each of the activities requires different sets of data inputs, including those related to gender perspectives, as nationally appropriate, to inform data-driven policies and decisions. Data that are spatially explicit and disaggregated are of utmost importance. Key information and statistics used for each component are listed below.

- (a) *Disaster risk assessment:* Data about the prevailing hazards and their risks are crucial and hence the monitoring of hazards, exposure, vulnerability, and coping capacity is essential for effective early warning systems and comprehensive risk assessment. Hazard assessment and mapping, and regular monitoring in hazard-prone areas at the scale of individual communities and identifying vulnerable population groups may provide local-level risk knowledge to identify disproportionate risk. It is important to utilize individual level information to assess intra-household inequalities, and to generate data disaggregated by sex, age, disability and other factors. Historical disaster data help identify hotspots of

29 vulnerability and exposure based on past impacts, while data on prospective risk⁶⁰ -
30 informed by projections of climate change, demographic change, economic development,
31 and urbanization - provide information on possible future scenarios. Together, these two
32 sets of data inform and help prioritize DRR activities and investments.

33 (b) *Disaster risk prevention*: With adequate risk information, national stakeholders can utilize
34 multi-domain data to establish effective disaster risk prevention plans and actions. Relevant
35 disaster risk information includes hazard exposure and vulnerability profiles, demographic
36 baseline, assets repository, damage and losses records, and institutional capacity metrics,
37 among others.

38 (c) *Disaster risk mitigation*: Key information for disaster risk mitigation includes multi-hazard
39 risk profiles, population data, lists of critical infrastructures and economic assets in risk-
40 prone areas. It also includes vulnerability statistics, preferably disaggregated by socio-
41 economic, sex, income, and age groups. Investment in infrastructure and development
42 projects must consider the evolving disaster risks to avoid exacerbating vulnerabilities.

43 (d) *Disaster preparedness*: Timely data is needed to enable governments at various levels,
44 communities and businesses to prepare effectively for hazardous events and disasters.
45 Multi-hazard early warning systems and associated swift dissemination mechanisms are
46 crucial for communities and businesses to anticipate and prepare. Preparedness actions
47 should also be informed by sex-disaggregated data on how women and men gain access
48 to and utilize early warning systems. It is crucial to identify population groups with specific
49 needs, such as pregnant women, women-headed households, children, older persons,
50 people with disabilities and displaced populations, who may face barriers to evacuation, or
51 require specific types of care and social services during pre-emptive evacuation or in
52 displacement settings. Logistic information and contingency plans, such as those on
53 evacuation routes, shelters, healthcare facilities, and energy infrastructure, for example,
54 are equally important. Simulation exercises and drills are also invaluable for preparedness
55 information, plans, and response protocols.

56 (e) *Disaster response*: During and after disasters, real-time and geospatial data on the
57 disaster's occurrences, impacts on the populations, critical infrastructure, economic
58 activities, and the disruption of services is critical. Efficient coordination and timely
59 information are essential to maximize the efficiency of response operations.

60 The definition of perspective risk follows the OIEWG report.

60 (f) *Disaster recovery*: Post-disaster recovery demands comprehensive accounting of damage
61 and losses, alongside data to support planning for restoration and reconstruction efforts.
62 Information on the impact to economic activities, critical infrastructure, and vulnerable
63 communities guides short- and long-term recovery policies and plans.

64 3.1.2 International context

65 Standardized reporting has multiple benefits at the international level, it allows for measuring
66 progress among countries with a degree of comparability, and informs criteria to prioritize
67 international cooperation and funding flows to address DRR needs in the most pressing contexts.
68 Adopting a consistent international standard also reduces the reporting burden by facilitating the
69 use of the same data for multiple international reporting obligations.

70 Internationally, the information needs are aligned across different frameworks, such as the
71 Sendai Framework, the Paris Agreement, and the 2030 Agenda for Sustainable Development.
72 These frameworks require the collection of harmonized data following international standards for
73 global reporting purposes. For example:

74 (a) *Sendai Framework*: Tracking global progress in DRR, the Sendai Framework Monitor
75 collects statistics on progress towards its targets and goals, including national annual
76 totals, as well as disaggregation, on disaster mortality and morbidity, economic losses,
77 critical infrastructure damage, and the implementation of DRR strategies at national and
78 local levels.

79 (b) *SDGs*: 12 SDG indicators align and use data from the Sendai Framework.

80 (c) *Paris Agreement*: Climate risk and resilience data for climate action reporting, including
81 the GGA indicators requiring similar inputs to disaster risk management.

82 (d) *Others*: These include, for instance, internationally-agreed frameworks associated with
83 Small Island Development States (SIDS) such as the Antigua and Barbuda Action Agenda
84 for small island developing States, the outcomes of the UN Convention to Combat
85 Desertification, and various UN resolutions addressing agriculture, water, humanitarian
86 action, and related areas.⁶¹

⁶¹ See: <https://mandates.un.org/?page=1&keyword=disaster> for a more comprehensive listing of relevant international mandates requiring DRS.

87 Information must be collected and shared according to common international reporting
88 requirements, ensuring comparability and transparency across nations. This process is critical for
89 tracking regional and global progress in DRR, climate adaptation, and sustainable development as
90 well as facilitating international cooperation.

91 Overall, national disaster risk management requires detailed, locally relevant data that can also
92 feed into broader international reporting systems. The role of NSOs in coordinating this
93 information, ensuring quality, and disseminating it for decision-making is pivotal in both the
94 national and international contexts.

95 **3.2. National data ecosystem for DRR activities and organizations**

96 The multitude and diversity of components involved in disaster risk governance, ranging from
97 monitoring through response and recovery, along with the range of hazards, interlinkages, and
98 types of vulnerability factors affecting various populations at risk, reflect a context in which data
99 collection and production are shaped by numerous organizations, each contributing data as part
100 of their operational activities.

101 A national DRR data ecosystem integrates users, producers, policies, infrastructure, standards,
102 and applications of data for DRR activities. It includes official offices, ministries and organizations
103 responsible for data, including producers and users of disaster-related statistics from the public
104 sector, civil society, the private sector and academia, and extends beyond those with direct and
105 clear roles within a National Statistical System (NSS). Depending on their primary role, these
106 organizations may follow specific protocols that do not always align with established statistical
107 standards for data management. This represents a key challenge to an NSS noting that the role
108 of official statistics, without adopting the G-DRSF, can be limited and may not satisfy their
109 respective needs for disaster-related statistics.

110 Institutionalized systems and arrangements for the systematic and continuous collection of
111 data on hazardous events and disasters help national DRR data ecosystem to function effectively.
112 Such systems ensure that data are captured consistently over time, regardless of the size,
113 frequency, or characteristics of events, including small-scale and recurrent hazards that are often
114 underreported, and help move data collection beyond ad hoc or project-based efforts.

115 The national DRR data ecosystem is often complex and cross-sectoral. The key data producing
116 and utilization agencies may include, besides NSOs and NDMOs, national line ministries and
117 agencies, geospatial, environmental, hydro-meteorological and geophysical agencies, public
118 health entities, cadaster/land management, administrative offices, and other organizations as data
119 producers across multiple domains. Guidelines on setting up and managing NSSs and capacity
120 have been produced by the United Nations, including the Handbook on Management and
121 Organization of National Statistical Systems,⁶² that may help countries to establish an effective,
122 inclusive, and responsive national DRR data ecosystem. One of the illustrative examples of such
123 a system is described in Box 3.1.

124 The level of detail, spatial resolution, and disaggregation of disaster risk and impact data will
125 depend on national needs, priorities, and capacities. However, institutionalized systems provide a
126 foundation for progressively improving data coverage, quality, and disaggregation over time.

127 ***Box 3.1: An illustrative example of NSS setup for disaster-related statistics***

As an example, Table 3.1 provides an illustrative summary of a possible NSS theoretical setup. As this example shows, across the various data domains—such as risk reduction, hazards, vulnerability, impacts, emergency response, recovery, and reconstruction—a wide range of organizations may be responsible for producing disaster-related data. Organizations may generate disaster data independently or collaboratively, and in certain cases mandates may overlap. Given the complex, interdisciplinary, and cross-cutting nature of disaster-related statistics, no single organization can effectively manage the entire domain alone. A well-established legal framework and clearly defined institutional mandates – complemented by formal arrangements such as Memoranda of Understanding and data-sharing protocols – are essential to ensure that organizations understand their responsibilities and can access necessary datasets across domains to effectively manage disaster risk, reduce impacts, speed up responses and recovery, and enable the full potentials of the NSS.

Table 3.1 also underscores the distribution of responsibilities among key stakeholders, across government offices, local authorities, private actors, and research institutions. This demonstrates both the opportunities and challenges of building an integrated disaster data ecosystem as well as gaps in existing practice. Effective coordination and robust data-sharing arrangements among the entire disaster data value chain is essential to ensure that all the data are interoperable and readily usable.

⁶² See https://unstats.un.org/capacity-development/handbook/Handbook_All_2025A_202505.pdf.

Table 3.1: An illustrative example of a DRR data ecosystem producing disaster-related statistics

Data produced		Organizations
Hazard data	Geospatial (atmospheric, marine and land surface processes) data	<ul style="list-style-type: none"> • NGIA
	Hydrography and hydrographic data	<ul style="list-style-type: none"> • National Hydrographic Office
	Geology and geological processes data	<ul style="list-style-type: none"> • National Geological Survey
	Meteorological data Oceanographic and atmospheric	<ul style="list-style-type: none"> • National Meteorological Office • National Oceanic and Atmospheric Agencies
	Groundwater hydrology and hydrologic processes data	<ul style="list-style-type: none"> • Groundwater Authority
	Land cover and land use data	<ul style="list-style-type: none"> • Forestry Administration; Land Survey/ National mapping; Cadaster
	Industrial location, activity and processes data Civil aviation authorities	<ul style="list-style-type: none"> • Industrial development Administration • Energy Administration
	(Human and animal) disease surveillance, e, Other data	<ul style="list-style-type: none"> • Academia & Research Institutes
Disaster risk reduction data	Mitigation data Coping capacity data Emergency planning data Emergency preparedness data Early warning data	<ul style="list-style-type: none"> • NDMO • Maritime Search and Rescue • Fire response system • Food Safety Agency • Animal Health Agency • Health Security Agency • Environmental Protection Administration • Infrastructure Administration • Energy Administration • Road & Aviation Transportation Administration • Nuclear Energy Agency • Transmission System Operators for Oil • Cybersecurity Agency
Hazard exposure data	Location of residents' data	<ul style="list-style-type: none"> • Civil statistics / Population Register / NSO
	Data on location and attributes of most vulnerable groups	<ul style="list-style-type: none"> • Social Non-governmental Organizations (NGOs) / Ministry of Women
	Data on land use and urban plans	<ul style="list-style-type: none"> • Urban Development Administration
	Critical infrastructure data	<ul style="list-style-type: none"> • Infrastructure Administration • Energy Administration • Municipalities

Table 3.1: An illustrative example of a DRR data ecosystem producing disaster-related statistics (cont.)

Data produced		Organizations
Vulnerability data	Socio-economic data	<ul style="list-style-type: none"> • NSO, Census
	Data on location and attributes of most vulnerable groups	<ul style="list-style-type: none"> • Social NGOs / Ministry of Women • Municipalities
	Housing stock data	<ul style="list-style-type: none"> • Housing administration • Municipalities
	Industrial facilities	<ul style="list-style-type: none"> • Municipalities
	Data on land use and urban plans	<ul style="list-style-type: none"> • Urban development administration • Municipalities
	Geospatial (land use) data	<ul style="list-style-type: none"> • NGIA
Hazardous event impact data	Mortality data	<ul style="list-style-type: none"> • Public Health Administration • Department of Labor • NSO • NDMO • Maritime Search and Rescue
	Morbidity data	<ul style="list-style-type: none"> • Public Health Administration • Department of Labor • NSO
	Mental health data	<ul style="list-style-type: none"> • Public Health Administration
	Damage and losses data	<ul style="list-style-type: none"> • NDMO • Maritime Search and Rescue • Wildfire response system • Army Corps and police • Public Health Administration • Environmental Protection Administration • Cybersecurity Agency • Reinsurance industry • Infrastructure ministries • Utilities and/or regulators • Sectorial ministries (agriculture, education, tourism, energy, industry, telecommunications, etc.)
	Insured assets data	<ul style="list-style-type: none"> • Insurance industry
	Insured farming data	<ul style="list-style-type: none"> • Insurance industry
	Geospatial (land use changes) data	<ul style="list-style-type: none"> • NGIA

Table 3.1: An illustrative example of a DRR data ecosystem producing disaster-related statistics (cont.)

Data produced		Organizations
Emergency response, recovery and reconstruction data	Response actions (resources mobilized) data	<ul style="list-style-type: none"> • NDMO • All entities with DRR / DRM mandates
	Security sector and public order data	<ul style="list-style-type: none"> • Criminal activity data • Law enforcement Administration
	Recovered and reconstructed health and education data	<ul style="list-style-type: none"> • Infrastructure Administration • Education Administration • Public Health Administration
	Recovered and reconstructed energy and telecommunications data	<ul style="list-style-type: none"> • Transmission System Operators for Electricity • Telecommunication system operators • Transmission System Operators for Oil • Transmission System Operators for Gas
	Local services recovered (water, wastewater, solid waste, education) data	<ul style="list-style-type: none"> • Municipalities

128 **3.3. Roles of institutions in the NSS for disaster-related statistics**

129 At the heart of the national DRR data ecosystem are the NSOs and NDMOs. The wider NSS
 130 is often coordinated by NSOs. As a result, NSOs must play a vital role in supporting DRR through
 131 the production, coordination, and dissemination of high-quality data in co-ordination with NDMOs.

132 **3.3.1 The roles and strengths of NSOs**

133 NSOs offer a distinct set of statistical competencies that position them as key contributors to
 134 the development of disaster-related statistics:

135 (a) *Expertise and mandate:* As the highest governing body for statistics in a country, NSOs
 136 often possess the most comprehensive level of statistical expertise and have the legal and
 137 institutional mandates to advance and coordinate national statistical production.

138 (b) *Established standards and methodologies:* NSOs apply internationally agreed statistical
 139 classifications, frameworks, and methodologies for quality assurance which ensure data
 140 comparability across regions and over time. This harmonization is particularly valuable for
 141 reporting progress under global frameworks like the Sendai Framework, the SDGs, and
 142 the Paris Agreement. It is also of benefit in facilitating the exchange of expertise and

143 experience across countries to support implementation of disaster statistics work
144 programs.

145 (c) *Quality assurance and data integrity:* Through adherence to the UN Fundamental
146 Principles of Official Statistics,⁶³ NSOs ensure the credibility of their outputs. Their rigorous
147 statistical processes—encompassing data validation, methodological transparency, and
148 documentation—provide the level of accuracy and reliability required for disaster-related
149 analysis and reporting.

150 (d) *Capacity for data integration and coordination:* NSOs have experience in coordinating
151 among diverse data producers across government ministries and agencies. This includes
152 integrating data from censuses, surveys, administrative records, and geospatial sources—
153 critical for developing comprehensive disaster risk profiles and post-disaster assessments.

154 (e) *Geospatial integration:* Increasingly, NSOs are incorporating geospatial data into official
155 statistics, enhancing their utility for disaster preparedness, early warning systems, and
156 impact assessments. Geo-referenced statistics allow precise mapping of hazards,
157 vulnerabilities and exposure to hazards.

158 (f) *Time series and trend analysis:* NSOs maintain long-term, consistent datasets that are
159 essential for trend analysis, forecasting, and understanding changes in risk over time.

160 (g) *Commitment to data confidentiality:* NSOs uphold strict standards for protecting the
161 privacy of individuals and businesses. While this may present challenges in emergency
162 situations requiring highly granular data, it is essential that protocols are set forth to
163 maintaining public trust and ensuring that sensitive information and statistics are used in
164 accordance with the Fundamental Principles of Official Statistics.

165 (h) *Trusted platforms for dissemination:* NSOs provide transparent, well-documented
166 platforms for disseminating official statistics.

167 (i) *Professional independence:* NSOs are mandated to operate free from political or
168 commercial influence, ensuring objectivity and impartiality in the data they produce and
169 disseminate.

170 3.3.2 The roles and strengths of NDMOs

171 NDMOs, as the principal mandate-holders for both DRR and DRM, establish the national DRR
172 strategies and policies, DRR actions, first responses and recovery plans at the national level. As

⁶³ See <https://unstats.un.org/unsd/dnss/gp/fundprinciples.aspx>.

173 the core agency that coordinates disaster responses and risk reduction, NDMOs are key to the
174 collection, analysis, management and use of relevant disaster data and practical information
175 through the following capacities:

176 (a) *Primary data production*: NDMOs are often the first agencies arriving at the scene after the
177 onset of disasters, dispatching responders, and are the first and primary producers on key
178 data points, including mortality and morbidity, immediate damage and initial assessment
179 reporting.

180 (b) *Understanding of the data*: NDMOs have historical data on disaster risk and impacts, and
181 holds the capacity to provide assessments of risks, vulnerability, damage and losses, and
182 evidence-based policy guidance.

183 (c) *Early warning and preparedness*: NDMOs can use disaster-related statistics and data to
184 set up comprehensive multi-hazard early warning systems.

185 (d) *Coordination and collaboration*: NDMOs establish the national policy frameworks and
186 strategy for DRM, which includes guidance on data collection, management, and reporting.
187 NDMOs coordinate with other ministries and key stakeholders to implement the national
188 strategy.

189 (e) *Standardization and integration*: NDMOs create and issue national DRR technical
190 guidelines, and align national data with international standards such as HIPs and the
191 Sendai Framework.

192 (f) *Capacity development and technical support*: NDMOs help improve DRR data literacy,
193 collection, understanding, and use by working with, and training, officials in the
194 municipality and regions.

195 3.3.3 Institutional collaboration

196 The collaboration between NSOs, NDMOs and other data producing stakeholders can
197 facilitate official statistics to be produced at the geographic granularity and timeliness required for
198 emergency response. The disaster data legal frameworks, cross-institutional data sharing and
199 multi-stakeholder coordination are crucial mechanisms of the data ecosystem, especially for crisis
200 response.

201 To unlock the full potential of the NSS for disaster-related statistics production and utilization,
202 clear institutional mandates and legal frameworks are needed to define roles and responsibilities.

203 Effective partnerships between NSOs, NDMOs and other key data producing stakeholders
204 ensure that there are clear data-sharing protocols, joint working groups, and shared platforms for
205 risk information. It also enables existing statistical resources to be better aligned with the real-time
206 and practical policy and programmatic needs of DRR, while also enabling the integration of high-
207 quality statistical standards into supporting DRR efforts across its five components. By working
208 together, both systems can build a more coherent, responsive, and evidence-based approach to
209 managing and reducing disaster risks.

210 Strengthening coordination between NSOs and NDMOs to align data needs can leverage
211 complementary strengths. NDMOs and other agencies, including sub-regional level statistical
212 offices, disaster management offices, and other public sector organizations, can provide real-time,
213 operational data, while national entities ensure data quality, comparability, and coherence with
214 existing official statistics. It also enables the use of baseline and operational data, promotes
215 situational awareness, and highlights sector-specific risk knowledge that can showcase the
216 strengths of the NSS.

217 It is also important to note that not all countries share the same DRR governance model. For
218 consolidated systems, a mandate-driven, centralized model led by strong NSO and NDMO
219 coordination can be effective. In other situations, for example a fragmented system where data
220 and authority are dispersed across sectoral ministries and levels of government, a federated setup
221 is essential in utilizing a multi-stakeholder technical committee with legal backing to set standards
222 and compel data sharing. For emerging systems, governance should focus on coordination
223 protocols, supported by international partners, to build interoperability without overburdening
224 capacities. In all governance models, the core objective remains the same: establishing clear legal
225 mandates to break the data and responsibility silos to ensure timely and effective emergency
226 response and resilience development. Through a close, efficient collaboration and a fully
227 integrated data value chain, NSSs can contribute significantly and add unique value to the five
228 components of DRR work:

- 229 (a) *Monitoring*: The NSS can contribute to the regular monitoring of hazardous events,
230 vulnerabilities and exposures.
- 231 (b) *Risk assessment*: The NSS can provide baseline data on population, infrastructure, health,
232 economic activity, and the environment, and help identify areas of high exposure and
233 vulnerability. The NSS can also support the development of composite risk indices.

- 234 (c) *Preparedness and mitigation*: The NSS can inform planning to reduce vulnerability and
235 improve resilience by providing data on housing, income, access to services, and early
236 warning systems,
- 237 (d) *Response*: The NSS can support emergency operations by rapidly integrating existing data
238 with real-time information, enabling effective targeting of assistance by first responders.
- 239 (e) *Recovery*: The NSS can contribute to post-disaster needs assessments, monitor the socio-
240 economic recovery process, and provide updated statistics for rebuilding and planning
241 efforts.

242 **3.4. Recommendations to strengthen the existing DRR data** 243 **ecosystem**

244 To meet the growing demand for timely, reliable, and actionable disaster-related statistics,
245 NSSs must be adapted to improve timeliness, granularity, and relevance. Countries can enhance
246 the coordination, capacity, efficiency in resource allocation, and infrastructure of their national
247 data ecosystems for disaster-related statistics. Recommendations on the disaster data ecosystem
248 are provided by relevant disaster-related frameworks already existing, including the *CES*
249 *Recommendations on the Role of Official Statistics in Measuring Hazardous Events and Disasters*
250 (see Chapter 2, Section 2.5.4). In practice, specific roles and institutional arrangements will vary
251 from country to country, and the recommendations should be tailored considering the needs and
252 best practices of the national scenarios. This includes:

- 253 (a) *Clarify institutional roles and mandates within the NSS*: Clearly define the responsibilities
254 of NSOs and other members of the NSS that produce and support disaster-related data.
255 Ensure all public institutions overseeing the needs of population groups are included in the
256 disaster data coordination mechanism. Formal mandates, supported by statistical
257 legislation and national strategies, are essential for sustained engagement.
- 258 (b) *Improve the fitness of official statistics for DRR purposes*: Adapt existing statistical products
259 to better serve DRM and improve institutional coordination. This includes increasing the
260 timeliness, spatial granularity, disaggregation, and thematic relevance of datasets,
261 particularly in emergency situations.
- 262 (c) *Invest in geospatial integration and new data sources*: Promote the integration of geospatial
263 data with statistical information, using frameworks such as the GSGF (see Chapter 2,

- 264 Section 2.4.7). Explore innovative data sources such as earth observation, mobile data,
265 citizen science, and administrative records.
- 266 (d) *Ensure confidentiality and data accessibility in emergencies*: Develop protocols that allow
267 rapid access to critical, disaggregated data while protecting confidentiality. This is vital for
268 enabling evidence-based response and recovery without compromising data privacy.
269 Critical emergency protocols will allow expedited, secure data sharing under strict
270 anonymization standards, ensuring the system is both robust and operationally responsive
271 during crises.
- 272 (e) *Foster innovation*: Integration and analysis of existing with new data sources to triangulate
273 information (e.g., satellite imagery, mobile data on movement of people), increased use of
274 geospatial tools, and flexibility in data access during emergencies. With appropriate
275 resources and mandates, NSS can modernize to meet both national priorities and
276 international reporting demands.
- 277 (f) *Strengthen capacity and knowledge sharing*: Build technical and institutional capacity for
278 disaster-related statistics within NSOs and across the NSS through training, international
279 collaboration, and knowledge exchange. Encourage joint initiatives with international
280 partners and participation in communities of practice.
- 281 (g) *Private sector, Non-governmental Organizations (NGOs) and local communities* can help
282 bridge critical gaps in official data, enhance the granularity of disaster data, be it socio-
283 economical, financial, or technical, and ensure the national DRR data ecosystem are
284 technically informed and socially inclusive.

1 **4. Exposure, vulnerability and coping capacity statistics**

2 **4.1. Introduction**

3 Much of the activity undertaken to reduce impacts from hazardous events and disasters, and
4 to strengthen the resilience of communities is carried out on an ongoing basis. In other words,
5 DRR activities are implemented by governments and other actors continuously, and not uniquely
6 in response to one specific event. DRR activities are undertaken based on risk assessments, which
7 use risk statistics to study relationships between hazards and impacts on communities. The
8 relationships are studied based on the economic, social and environmental context of
9 communities before the onset of a hazardous event or disaster. The context is described according
10 to three key risk components: exposure,⁶⁴ vulnerability, and coping capacity. The purpose of this
11 chapter is to specify how these three key risk components can be measured using population,
12 social, economic and environmental statistics.

13 Exposure, vulnerability, and coping capacity statistics serve two key use purposes. First, they
14 underpin risk assessments that inform DRR monitoring and other DRR-related activities, enabling
15 policy makers to prioritize resources for the most exposed and vulnerable regions and population
16 groups; to direct response and recovery efforts; and to allocate DRR budgets effectively. Second,
17 particularly for exposure and vulnerability statistics, they provide essential baseline information for
18 impact assessments, such as PDNAs, thus supporting more accurate and timely impact
19 assessments.

20 Section 4.2 introduces three integrating concepts of risk assessments, hazard mapping and
21 disaster risk indices. These concepts support an understanding of how the measurement of
22 exposure, vulnerability and coping capacity can be combined. The following three sections
23 describe the measurement of the three key risk statistics: section 4.3 describes exposure statistics;
24 section 4.4 describes vulnerability statistics; and section 4.5 describes coping capacity statistics.
25 Section 4.6 discusses how the three components can be combined for analytical purposes and
26 notes some general recommendations on measurement.

⁶⁴ As described in Section 4.3, exposure is hazard specific. Hence, it is sometimes referred to as hazard exposure. For the purposes of the G-DRSF, the term “exposure” is used throughout the framework.

27 **4.2. Integrating concepts for exposure, vulnerability and coping** 28 **capacity statistics**

29 **4.2.1 Risk assessments**

30 Disaster risk assessments include hazard assessment, analysis of exposure and vulnerability,
31 and evaluation of the effectiveness of prevailing and alternative coping capacities with respect to
32 likely risk scenarios. Disaster risk assessments can be both qualitative and quantitative, and they
33 integrate statistics across the components of exposure, vulnerability and coping capacity. This
34 integration involves compiling data on social, environmental and economic conditions in relation
35 to specific hazards prior to the occurrence of a hazardous event or disaster. Risk assessments
36 assist in predicting the extent of expected impacts from hazardous events and disasters given the
37 context of communities. This can help policy makers to intervene by reducing exposure and
38 vulnerability and by increasing coping capacity and hence bring risks to the population and to
39 economies within manageable levels.

40 Risk assessments can be used for short-term and urgent purposes (e.g. for specific events)
41 as well as for long-term compilation of time series statistics that can help improve understanding
42 of risk over time. For example, risk assessments may inform decisions on evacuation from a
43 sudden-onset event. Longer-term data can provide information to guide DRR investments like
44 hazard-proof building standards or installing disaster prevention systems.

45 Risk assessment is an iterative and continuous process as input data are updated continuously.
46 Each risk assessment can also result in new knowledge that can refine the measurement and use
47 of risk statistics. A continuous effort to update and assess risk statistics informs efforts to build
48 resilience across hazard types, and thus provides support beyond the response to a specific
49 hazardous event or a disaster.

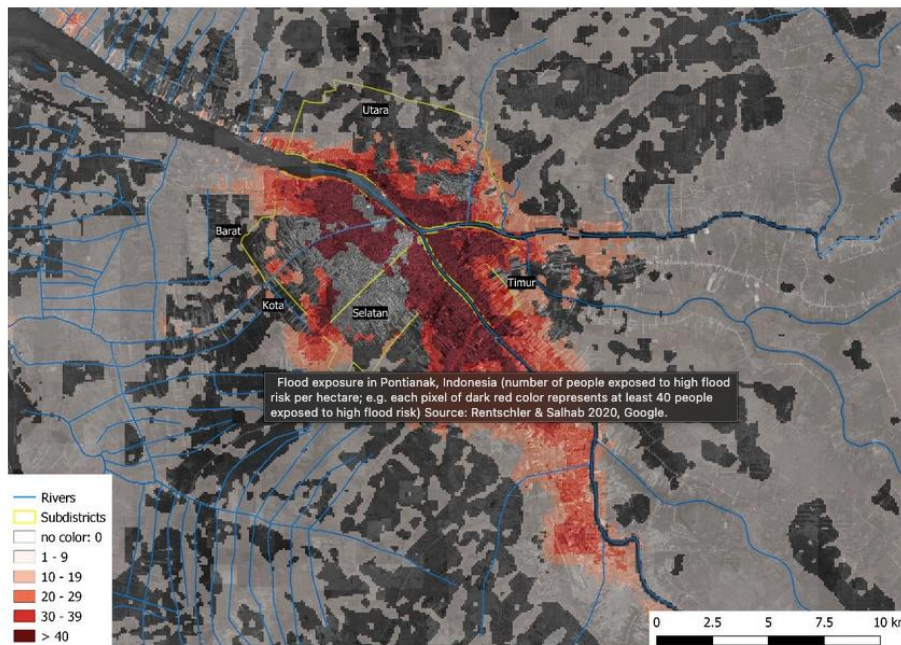
50 **4.2.2 Hazard mapping**

51 A foundational input for producing risk statistics is maps of potential hazards, including
52 probabilities of an occurrence, its likely timing or frequency, and its intensity. However, not all
53 hazards are equally amenable to probabilistic mapping of the likely affected areas, and each
54 hazard has its own unique nature and degree of predictability. The science of hazard mapping is
55 well documented in hazard-related literature, and it is an exercise requiring data and expertise

56 specific to each hazard. The HIPs publication (see Chapter 2, Section 2.6.1) includes a wealth of
57 useful resources for hazard mapping methods and technologies. As well, NDMOs typically
58 produce official hazard maps for their countries.

59 A simple example of using hazard mapping is shown in Figure 4.1 for population exposure to
60 flood hazard in Pontianak, Indonesia (World Bank, 2021). This computation is based on
61 overlaying⁶⁵ population data on a hazard map for flooding. Many NDMOs already have adopted
62 spatial data infrastructure (SDI) for compiling such information.⁶⁶ For example, the National
63 Agency for Disaster Management of Indonesia has developed InaRISK, an online platform and
64 mobile application⁶⁷ that provides users with mapped risk information by region for the entire
65 country.

66 *Figure 4.1: Flood exposure in Pontianak, Indonesia*



Flood exposure in Pontianak, Indonesia (number of people exposed to high flood risk per hectare; e.g. each pixel of dark red color represents at least 40 people exposed to high flood risk)

Source: Rentschler & Salhab 2020, Google.

67

⁶⁵ This same overlaying technique can also be used for producing statistics on impacted population, assets and flows (see Chapter 5) on a systematic basis, by hazard type using an actual affected area.

⁶⁶ Countries may refer to the GSGF for principles on integrating geospatial and statistical information, and to the Strategic Framework on Geospatial Information and Services for Disasters for guidance specific to hazard mapping.

⁶⁷ See <https://inarisk.bnpb.go.id/>.

68 4.2.3 Risk indices

69 The OIEWG report defines **disaster risk** as: “the potential loss of life, injury, or destroyed or
70 damaged assets which could occur to a system, society or a community in a specific period of
71 time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity.”

72 Risks can be estimated but are often not known. Consequently, risk measurement is a
73 continuous effort to integrate new information to align with new hazard probabilities in combination
74 with evolving baseline statistics on population, assets and flows and on DRR activities. This
75 combination of new information is then used to update the exposure, vulnerability and coping
76 capacity for a potential future hazard at a given point in time. This process includes building on
77 the information from historic hazardous events and disasters as well as associated impact data to
78 calibrate risk models. An efficient system for geospatial data integration of these data sources is
79 important to accommodate the need to update risk modelling for specific geographic areas.

80 Using these risk statistics, an index for estimating risk in a given location can be derived. For
81 example, a risk index⁶⁸ has been used in risk assessment studies such as the European Union’s
82 Joint Research Center INFORM Risk assessments and reports (Marin-Ferrer, M and others, 2017).
83 A standard risk index is a function of exposure, vulnerability and coping capacity:

$$84 \quad Risk\ index_i = f(exposure_i, vulnerability_i, coping\ capacity_i)$$

85 where i is a hazard (or a category of hazard).

86 By design, a risk index simplifies complex realities, and it is important to recognize that
87 relationships among risk components are not always linear. Nonetheless, integrating multiple
88 components can provide a comprehensive assessment of risk for a defined geographic area and
89 time period. The introduction of the risk index is intended to provide context and motivation for
90 the content and coverage of the present chapter. Section 4.6 provides additional discussion on
91 combining the three risk components.

⁶⁸ A risk index combines multiple measures, indicators, or risk statistics into a single score. Its composite metrics quantify and compare different risk aspects across geographic areas.

92 **4.3. Exposure statistics**

93 **4.3.1 Introduction**

94 **Exposure statistics** describe the presence of population, assets and flows within a
95 probabilistically determined hazard area. In contrast to impact statistics (see Chapter 5) which
96 measure observed consequences of hazardous events and disasters, exposure statistics describe
97 and quantify the elements at risk from a specific hazard, providing a statistical representation of
98 potential impacts prior to the occurrence of a hazardous event or disaster occurs. When analysed
99 together with statistics on vulnerability and coping capacity, a comprehensive understanding of
100 the potential impacts can be gained.

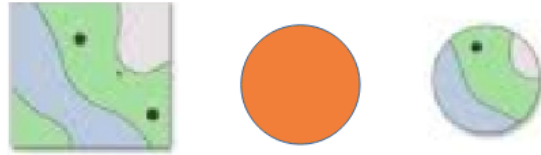
101 Exposure statistics can have urgent and potentially life-saving operational applications during
102 the response and recovery phase, for example for developing or implementing early warning and
103 evacuation protocols. There are also longer-term statistical uses for the data, such as for
104 monitoring risk across space and time and prioritizing preventative measures such as early
105 warning systems. Exposure statistics also provide a foundation for the compilation of impact
106 statistics, noting that ideally the classifications applied in measuring impact statistics should be
107 the same as those used to measure exposure statistics, especially as experience develops in
108 predicting probabilities for each hazard and their likely impacts.

109 **4.3.2 Scope**

110 Exposure statistics provide quantitative measurement of elements within the mapped area of
111 a hazard, or a hazard area. As shown in the figure below, the hazard area is overlaid on a base
112 map to provide the scope for the identification and measurement of the elements. In practice,
113 hazard areas are polygons of any shape or size, including, potentially, a group of non-contiguous
114 polygons. Consequently, statistical units seldom align exactly with hazard-area polygons, so
115 compiling exposure statistics may require geospatial methods to re-express data produced for
116 standard administrative or statistical units. Exposure is measured by summarizing data in the
117 hazard area.

118

Figure 4.2: Stylized visual representation of exposure measurement



Base map → Hazard area → Exposure area

119

120 Principally, these statistics are calculated for each hazard, for example presenting information
121 on the number of people exposed to floods or fires. Exposure statistics can be presented in the
122 form of maps that are converted into standardized statistical tables, such as in the example shown
123 in Table 4.1 below. The scope and measurement units for exposure statistics should align with
124 those applied in measuring impacts of hazardous events and disasters described in Chapter 5.

125 Elements included in exposure statistics are:

126 (a) *Population* including all persons – both resident and non-resident – who are expected to
127 be in a hazard area at a given point in time.

128 (b) *Assets* including (i) fixed assets (such as dwellings, buildings, transport infrastructure,
129 religious buildings), (ii) inventories (such as stocks of final and semi-finished goods, raw
130 materials), (iii) valuables (such as precious metals and stones), (iv) consumer durables
131 (such as vehicles and furniture owned by households), and (v) environmental and
132 ecosystem assets.⁶⁹

133 (c) *Flows* including production of goods and services (including basic services⁷⁰), income and
134 employment generated by the presence of economic activities⁷¹ and flows of ecosystem
135 services.⁷²

136 In principle, exposure statistics can be produced for any elements (i.e., population, assets and
137 flows) and any geospatial areas that can be mapped and overlaid with mapped hazard
138 probabilities. Accordingly, exposure measurement incorporates geospatial data on the location of

⁶⁹ For details, see paras. 2.17 and 5.10-5.15 of SEEA Central Framework; and paras 2.11 and 3.5 of SEEA Ecosystem Accounting.

⁷⁰ Basic services are defined as services that are needed for all of society to function effectively or appropriately. For details, see metadata for SDG indicator 11.5.3.

⁷¹ As appropriate, data on economic activities should be classified following the International Standard Industrial Classification for economic activities (ISIC Rev. 5).

⁷² For measurement of ecosystem services in physical and monetary terms, see Section C and D of SEEA Ecosystem Accounting.

139 these elements within identified hazard areas. Exposure statistics can also be produced at various
140 temporal resolutions (e.g., annual, quarterly, monthly) to capture variations such as seasonal
141 population dynamics or changes in production, depending on policy priorities and data availability.

142 As explained in Chapter 2, the measurement scope of the G-DRSF excludes those elements
143 within a hazard area that may not be readily captured through established statistical methods. For
144 instance, elements relating to cultural and social relationships and values—although they may
145 influence how communities are exposed to hazards—are not yet incorporated within the G-DRSF.
146 This exclusion reflects the lack of agreed statistical guidance for measuring these elements and
147 does not imply any judgement about their importance or relevance.

148 A detailed breakdown of the elements of exposure statistics should support risk assessment
149 processes. Hence, a breakdown can include any elements of interest such as agricultural areas
150 by crop type or ecologically important areas (e.g. protected areas), keeping in mind the alignment
151 with impact statistics in Chapter 5.

152 4.3.3 Summary table

153 Table 4.1 presents a basic statistical table for exposure statistics for the three main elements:
154 population, assets, and flows.

155 Table 4.1: Exposure statistics (in physical or monetary units)

Hazard type	Exposure elements										
	Population	Assets					Flows				
		Asset i	Asset ii	Asset iii	Asset iiiii	...	Flow i	Flow ii	Flow iii	Flow iiiii	...
Hydrological and meteorological											
High exposure											
Medium exposure											
Low exposure											
Total											
Extraterrestrial											
High exposure											
Medium exposure											
Low exposure											
Total											
Geological											
High exposure											
Medium exposure											
Low exposure											
Total											
Environmental											
High exposure											
Medium exposure											
Low exposure											
Total											
Chemical											
High exposure											
Medium exposure											
Low exposure											
Total											
Biological											
High exposure											
Medium exposure											
Low exposure											
Total											
Technological											
High exposure											
Medium exposure											
Low exposure											
Total											
Societal											
High exposure											
Medium exposure											
Low exposure											
Total											

156

157 The rows represent the eight hazard types classified following the Hazard Information Profiles
158 (HIPs). The HIPs classification is discussed in Chapter 2.

159 Hazard rankings (high, medium, low), typically produced through hazard mapping exercises
160 (see Section 4.2.2), generally represent a combination of the probability (frequency) of an event
161 and its potential intensity (severity) at specific locations. For example, while flood hazards may
162 have higher intensity (e.g., deeper water) closer to the source, the likelihood of flooding is
163 dependent on slope, elevation, and other terrain variables. Consequently, the same flood event
164 may impact areas further away, but potentially with lower intensity or different probability. Hazard
165 probabilities⁷³ and intensities are calculated individually for each hazard using authoritative
166 scientific information (e.g., geological information for earthquakes, and slope and natural drainage
167 mapping for flood hazards) and historical data on the occurrence and impacts of hazardous events
168 at the relevant locations. The assignment of hazard rankings is optional and subject to data
169 availability.

170 The focus of measurement for exposure statistics is the total elements exposed within a hazard
171 area for a given hazard, i.e., total population, total assets, total flows. However, to support the
172 assessment of vulnerability, the disaggregation of totals will be beneficial (see Section 4.4). For
173 example, the total population exposed may be disaggregated according to nationally relevant sub-
174 population groups and demographic characteristics. For assets and flows, specification by type
175 will be relevant. For example, for assets it will be appropriate to provide separate information on
176 the number of dwellings, the length of roads, and the area of agricultural land. Further, depending
177 on the context, detailed asset information may be recorded within each asset type using
178 appropriate units of measurement. For example, data on transportation infrastructure may be
179 further disaggregated into roads, railways, ports, and airports. Once the range of asset types has
180 been determined, more detailed information on these asset types can be provided, such as age
181 and condition, to support vulnerability assessments.

182 Flow elements in exposure statistics refer to the flows associated with economic activity such
183 as production, income and employment, and other flows such as ecosystem services, within a
184 hazard area. The recording of exposure of flows is vital for risk assessments since hazardous
185 events and disasters could result in disruptions to businesses or other economic units and their
186 ability to continue their productive activity during a certain period. Flow elements also include

⁷³ While geospatial mapping of hazard probabilities is an input for calculating exposure statistics, some hazards can also vary in probability over time, for example certain hazards can be highly seasonal. For these hazards, temporal factors can be included in the hazard maps. For example, hazard probabilities could shift seasonally, from high to low for different times of the year.

187 measures of agricultural activity, which often has the highest exposure of all economic activities,
188 especially for biological, and hydrological and meteorological hazard types. The exposed
189 agricultural activity may be measured in terms of area of crops by crop type. Hazardous events
190 and disasters could also affect flows of ecosystem services that provide a range of benefits to
191 local communities and economic activities.

192 4.3.4 Measurement units

193 Population exposure is measured in terms of the total number of individuals—residents and
194 non-residents—estimated to be in a hazard area during the reporting period.

195 For compiling statistics on the exposure of assets, such as housing, infrastructure, and
196 ecosystems, simple counts, sums, or areas of the different elements in a hazard area are the
197 starting point—recognizing that different assets will be measured in physical terms using different
198 measurement units depending on the type of asset. For example, the exposure of roads and
199 bridges should be measured in terms of their length (e.g., in kilometre). The classes and
200 measurement units used for the exposure of assets should be aligned with those used for the
201 compilation of impact statistics.

202 To complement these initial measurements of the exposure of assets to hazards, the relative
203 importance of exposure can be integrated by recording data on the intensity of the use of assets.
204 For example, the average monthly intensity of road traffic (expressed in terms of number of
205 vehicles per month) can be measured for the portion of road exposed to the hazard. The same
206 principle applies to providers of basic services in general, such as energy, health and
207 telecommunications. Assessment of exposure, as part of a broader risk assessment, benefits from
208 incorporating data on the intensity of asset use.

209 In addition to data on the number of elements for each asset type, data on assets (such as
210 dwellings, infrastructure, land and ecosystems) can be presented in terms of the monetary value
211 of assets within the hazard areas recognizing that the level of exposure may vary across different
212 hazards.

213 Where market valuation is available such as the market value of exposed dwellings, transport
214 networks, or production facilities, these estimates should be compiled in national currency units,
215 enabling integration with macroeconomic aggregates as part of disaster impact modelling.

216 The valuation of ecosystem assets encompasses both market and non-market values. The
217 SEEA Ecosystem Accounting provides an overview of relevant considerations for ecosystem
218 valuation, with emphasis on provisioning, regulating and maintenance, and cultural services
219 provided by ecosystems, applying a net present value technique. It also describes a range of
220 potential non-market valuation methods that facilitate the measurement of exchange values, i.e.,
221 values that are conceptually consistent with market values, and therefore comparable with those
222 of other assets.

223 At the same time, and as recognized in the Intergovernmental Science-Policy Platform on
224 Biodiversity and Ecosystem Services “Nature’s Contributions to People” framework, other values
225 for ecosystems beyond the scope of the SEEA Ecosystem Accounting may be present. While
226 valuation techniques such as contingent valuation or multi-criteria assessment may be used to
227 estimate these values, these aspects of the value of ecosystems are outside the scope of the G-
228 DRSF due to the lack of agreed statistical guidance.

229 The measurement of flows, including production, income, employment and ecosystem
230 services, can be quantified in monetary terms, physical units, or population-based measures,
231 depending on the nature of the flow.

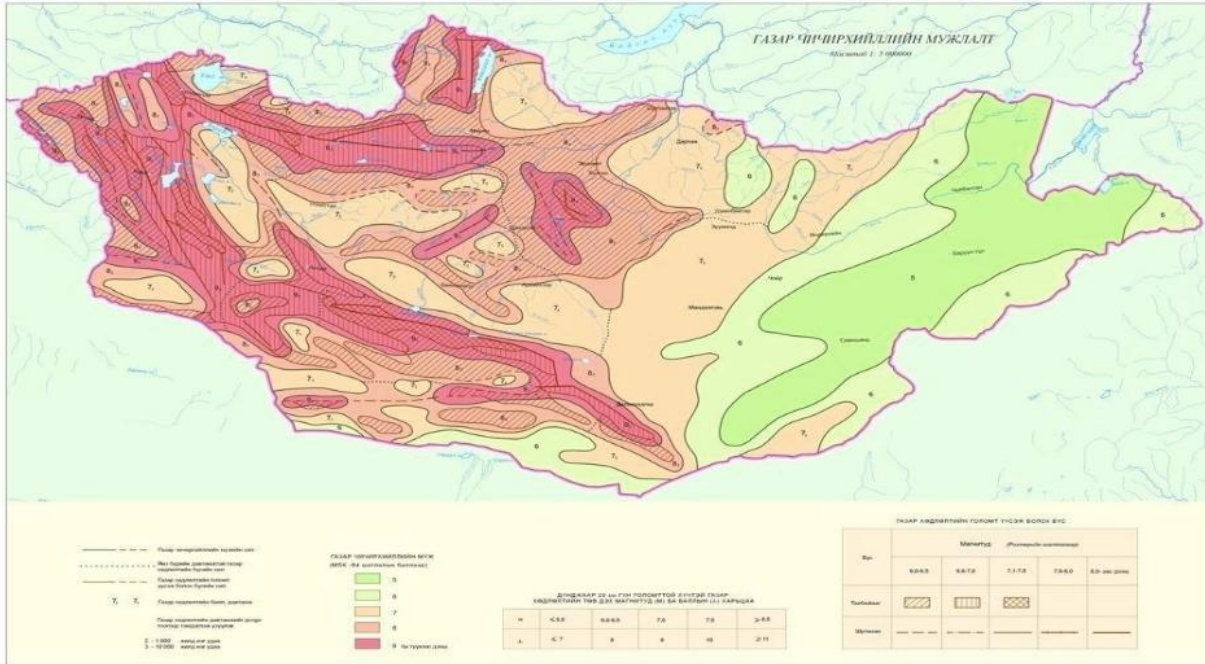
232 For measuring assets and flows, approaches and treatments can draw on established
233 statistical standards to ensure coherence with NSSs. Relevant standards include the SNA for
234 integrating monetary data on assets and flows, the International Labour Organization
235 recommendations for employment and labour force statistics, and the SEEA for the measurement
236 of environmental stocks and flows. As appropriate, data on economic activities should be classified
237 following the International Standard Industrial Classification of All Economic Activities⁷⁴ (ISIC), Rev.
238 5.

239 The derivation of exposure statistics relies on official hazard maps, and the qualities of hazard
240 maps will vary. Often, they will include areas with a gradient of probabilities or risk levels (see
241 example below). The availability of a reliable hazard map for different hazards is a foundation for
242 developing exposure statistics.

⁷⁴ As nationally relevant, other standard industrial classifications including the Statistical Classification of Economic Activities in the European Community (NACE) and the North American Industry Classification System (NAICS) may be used.

243

Figure 4.3: Earthquake hazard map example



244

245 Example sourced from the Mongolian National Statistics Office and originally in the study titled:
246 Probabilistic Seismic Hazard Assessments for Bayankhongor Aimag of Mongolia (Ankhtsetseg, D. and
247 others, 2019)

248 4.3.5 Measurement issues and recommendations

249 As described above, exposure is calculated by overlaying data on population, assets, and flows
250 on probabilistic hazard maps; and hence exposure measurement is always hazard specific. Most
251 countries have developed maps for hazards that are most relevant to them – i.e. those most likely
252 to result in significant impacts. Further, these maps often incorporate hazard intensity levels (e.g.,
253 flood depth, ground shaking) associated with specific return periods or probabilities. As a result,
254 the geospatial infrastructure for producing exposure statistics is therefore important for developing
255 disaster-related statistics.

256 Geocoding is the coding of data, statistics and indicators according to geographic location,
257 either to a point location (coordinates) or an area (a standard reference shape or polygon).
258 Adopting and implementing common intra-governmental protocols and standards for place
259 names, geographic identifiers and geocoding practices underpins the spatial integration required
260 for producing exposure statistics and ensuring that all units can be consistently overlaid with
261 hazard maps. Depending on national data availability, this spatial integration may draw on

262 geocoded census and survey data, administrative geospatial layers and, where appropriate, Earth
263 observation sources such as satellite imagery. A common SDI allows for integration across layers
264 to produce multi-purpose statistics. A common SDI also facilitates use of GIS to seamlessly
265 integrate across the various types of geospatial information inputs (UN-GGIM, 2015).

266 Overall, standards for geographic integration and utilization of available administrative and
267 statistical data sources are at the forefront of creating national baseline exposure statistics.
268 Compiling these statistics can also ultimately create a positive feedback loop by motivating
269 broader efforts to establish national SDI.

270 NSSs are encouraged to prioritize the development of exposure statistics for the hazards that
271 are most common in the country, and for which there is already substantial national and sub-
272 national experience in risk measurement and assessment, and the development of probabilistic
273 hazard maps within the official geospatial data infrastructure.

274 **4.4. Vulnerability statistics**

275 **4.4.1 Introduction**

276 The OIEWG report (United Nations General Assembly, 2016) defines **vulnerability** as “*the*
277 *conditions determined by physical, social, economic and environmental factors or processes*
278 *which increase the susceptibility of an individual, a community, assets or systems to the impacts*
279 *of hazards.*”

280 Vulnerability statistics present data on characteristics that are likely to exacerbate or increase
281 susceptibility to impacts within a hazard area. They complement exposure statistics since not all
282 exposed elements will be affected equally. Vulnerability statistics are thus crucial for prioritizing
283 DRR activities in the hazard areas by informing a more efficient targeting of interventions and
284 allocation of DRR resources, and for integrating DRR activities into broader sustainability and
285 poverty-reduction programmes. By creating a link between DRR activities and broader sustainable
286 development policy, vulnerability statistics are useful in mainstreaming DRR in national-level social
287 and economic policies.

288 **4.4.2 Scope**

289 Vulnerability statistics incorporate statistics on characteristics of population, assets and flows
290 that increase their susceptibility to impacts of hazardous events and disasters.

291 Vulnerability statistics for population are related to data on characteristics such as age, sex,
292 disability, educational attainment, employment, poverty, access to and control over productive
293 resources, and other relevant socio-economic and/or environmental characteristics that can
294 influence a population's susceptibility to impacts.

295 Vulnerability statistics for assets are related to characteristics that can be directly associated
296 with a potential for higher impacts from hazardous events and disasters. Relevant characteristics
297 include, for instance, the quality and safety of housing and other infrastructure, and the condition
298 (e.g., health) of land and water bodies.

299 Vulnerability statistics for flows cover, for example, the characteristics of the production of
300 goods and services that depend on a single or limited number of supply chains or distribution
301 networks, thereby increasing the susceptibility to impacts. One illustrative case is a country whose
302 food processing industry relies heavily on a single port for importing raw materials. This industry
303 may face significant production disruptions if that port is damaged by a typhoon. While in scope
304 conceptually, in practice, identifying relevant characteristics for vulnerability statistics for flows is
305 challenging, partly due to the interconnected and complex nature of modern societies and
306 economic sectors. This topic will be examined further in the G-DRSF research agenda.

307 Although these three vulnerability characteristics are measured separately, certain
308 communities may simultaneously experience multiple characteristics of vulnerability. One
309 example is slums, where residents often face overlapping disadvantages such as limited access
310 to good quality water sources and sanitation facilities, inadequate living space, poor housing
311 durability, and insecure tenure (UN-Habitat, 2016).

312 It is important to note that the active interventions of individuals, communities or institutions to
313 build resilience are not recorded as part of vulnerability statistics. These interventions are
314 considered in the measurement of coping capacity (Section 4.5). Thus, poorly constructed
315 housing, like slums, is an example of a characteristic of vulnerability because it increases
316 susceptibility to impacts. However, interventions, such as increased flood barriers aimed at

317 building resilience of housing to hazards are measured under the community or population's
318 coping capacity.

319 Population density and geographic location are basic variables used for measuring exposure,
320 but they can also be characteristics relevant for measuring vulnerability. For example, densely
321 populated areas may be more vulnerable to certain hazardous events. Also, many rural
322 communities face higher vulnerabilities due to the generally poorer access to transportation,
323 health facilities, and other types of critical infrastructure or support services. The share of people
324 living in poverty also tends to be larger in rural areas. Nonetheless, each risk component should
325 be separately measured and the relevance of different exposure and vulnerability characteristics
326 should be separately considered.

327 Generally, poverty correlates with or influences other vulnerability characteristics, and
328 therefore poverty measures are a strong overall predictor of a population's vulnerability to impacts
329 from hazardous events and disasters. Studies have shown, for example, that poverty and disasters
330 can interact together in vicious cycles, reinforcing a poverty trap (Hallegatte, S. and others, 2017).
331 Consequently, data on demographic and socio-economic characteristics of population, such as
332 age, sex, disability and poverty status, provide fundamental baseline information for vulnerability
333 assessments.

334 Sometimes, one hazard or a risk driver can also increase vulnerability to other hazards. For
335 example, a community living on degraded land might be more susceptible to floods or other
336 hydrological and meteorological hazards. Another example is air pollution which contributes to
337 social and economic vulnerability, leading to significantly greater impacts on human lives and
338 health, as well as on the economic costs of recovery.

339 From a statistical perspective, vulnerability statistics are an extension of exposure statistics by
340 adding data on characteristics of population, assets and flows. Vulnerability statistics may include
341 characteristics that are specific to a given country or region (for example vulnerability factors may
342 differ in rural and urban areas, and in small islands compared to land-locked countries). It is
343 therefore important for NSOs, NDMOs and key policy stakeholders to coordinate in identifying the
344 relevant vulnerability characteristics that most effectively explain higher susceptibility to impacts
345 from hazardous events and disasters.

346 **4.4.3 Summary table**

347 Table 4.2 aims to support the prioritization of a set of nationally relevant vulnerability statistics
348 for population, assets and flows. The summary table is open-ended; that is, vulnerability
349 characteristics in the columns should be selected based on policy interest and data availability.
350 Selection should take into account the observed factors affecting vulnerability from past risk
351 assessments and reflect local, context-specific, social, economic and environmental conditions.
352 As discussed in section 4.4.2, intersections of characteristics (e.g., urban poor, indigenous women,
353 etc.) often exacerbate vulnerabilities and hence these intersectionalities may be identified
354 separately in the columns. Vulnerability characteristics may evolve over time, and hence they
355 should be collected and reviewed on a regular basis.

356 Vulnerability statistics are recorded by hazard type (i.e., the rows) and following the high,
357 medium, low hazard rankings in Table 4.1. This facilitates linkages between exposure and
358 vulnerability statistics.

359 Table 4.2: Vulnerability statistics (in physical units)

Hazard type	Population			Assets									Flows								
	Characteristic i	Characteristic ii	Characteristic...	Asset i			Asset ii			Asset...			Flow i			Flow ii			Flow...		
				Characteristic i	Characteristic ii	Characteristic...	Characteristic i	Characteristic ii	Characteristic...	Characteristic i	Characteristic ii	Characteristic...	Characteristic i	Characteristic ii	Characteristic...	Characteristic i	Characteristic ii	Characteristic...	Characteristic i	Characteristic ii	Characteristic...
Hydrological and meteorological																					
High exposure																					
Medium exposure																					
Low exposure																					
Total																					
Extraterrestrial																					
High exposure																					
Medium exposure																					
Low exposure																					
Total																					
Geological																					
High exposure																					
Medium exposure																					
Low exposure																					
Total																					
Environmental																					
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Low exposure																					
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Chemical																					
High exposure																					
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Low exposure																					
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Biological																					
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Technological																					
High exposure																					
Medium exposure																					
Low exposure																					
Total																					
Societal																					
High exposure																					
Medium exposure																					
Low exposure																					
Total																					

360

361 **4.4.4 Measurement issues and recommendations**

362 Increasingly, traditional and regularly collected data sources from the national statistical
363 system such as household and business registers and surveys, and population and housing
364 censuses collect data on individuals, households, and businesses that have detailed geographic
365 referencing. The geographic referenced data may be confidential at the level of individual records,
366 but summary statistics can be disseminated for defined areas, including hazard areas.

367 This data trend has seen a rapid expansion in the possibilities of increased flexibility and detail
368 for the geographic disaggregation of risk statistics using open and affordable geospatial tools. For
369 example, utilizing tablets for surveys and census interviews and preparing datasets in GIS-
370 accessible formats have become common practices for censuses and surveys across the globe.

371 As noted above, due to its broad impacts on people and their communities, poverty commonly
372 correlates with other characteristics of vulnerability. Poverty mapping, using geolocation and
373 geospatial integration techniques with poverty metrics, is an important input for assessing
374 vulnerability simply by overlaying the information on hazard maps. UNDRR (2009) analyzed the
375 data sources and statistical methodologies relevant for poverty mapping.

376 High resolution poverty mapping is a field of statistics that has advanced significantly over the
377 past decades. The World Bank's Geospatial Poverty Portal⁷⁵ and related work from WorldPop⁷⁶
378 and Asian Development Bank (2021) provide applicable data inputs and methodologies for
379 integrating poverty data with hazards and their probabilities. WorldPop utilizes household survey
380 data collected through the Demographic and Health Surveys or the Living Standards
381 Measurement Study programs. Data from geolocated household surveys, which collect
382 information on, among other topics, household incomes, assets and dwelling conditions, can be
383 integrated with geospatial variables and with hazard maps to describe vulnerability in these
384 locations and communities. Vulnerability statistics can then be derived as summaries, for instance
385 by administrative area, of these high-resolution geographic assessments that identify overlapping
386 areas of poverty and related vulnerabilities within the hazard areas.

387 Poverty mapping and the downscaling of average poverty statistics for high-resolution overlays
388 with hazard area information are subject to varying degrees of uncertainty, which should be cited

⁷⁵ See <https://pipmaps.worldbank.org/en/data/datatopics/poverty-portal/home>.

⁷⁶ See https://www.worldpop.org/focus_areas/mapping_poverty/.

389 (e.g., as a margin of error) along with the publication of vulnerability statistics. Nonetheless, for the
390 purposes of compiling vulnerability statistics, modern sources of mapped poverty information,
391 such as the examples cited above, provide a useful starting point.

392 In principle, there is no limit to the number of potentially relevant characteristics for reviewing
393 and assessing vulnerability to a hazard. Ultimately, the precise coverage of vulnerability statistics
394 will be determined by each country taking into consideration national circumstances and the
395 unique profile of relevant hazards.

396 **4.5. Coping capacity statistics**

397 **4.5.1 Introduction**

398 **Coping capacity** is “the ability of people, organizations and systems, using available skills and
399 resources, to manage adverse conditions, risk or disasters. The capacity to cope requires
400 continuing awareness, resources and good management, both in normal times as well as during
401 disasters or adverse conditions” (United Nations General Assembly, 2016). Coping capacity
402 statistics measure the types of resources available and interventions undertaken that are aimed
403 at increasing the ability of individuals, households, businesses, government agencies and
404 institutions, as well as other economic units to respond to external shocks without sustaining major
405 long-term impacts and to progress towards improved resilience (e.g. “building back better”).

406 Coping capacity is not the opposite of vulnerability as even the most vulnerable individuals
407 and communities could have coping capacities that independently influence the extent of impacts
408 from a hazardous event or a disaster. Coping capacity can change over time and therefore it is
409 important to track and update relevant statistics on a regular basis in hazard areas.⁷⁷

410 Analyzing the differences over time and for different population groups and hence
411 understanding the relative importance of coping capacity factors is a crucial part of risk
412 assessment and in strategizing a country or region’s DRR interventions. Further, understanding
413 coping capacity helps in planning and improving disaster response strategies, ensuring that
414 resources are efficiently allocated and utilized to mitigate disaster impacts.

⁷⁷ See examples from Statistics New Zealand at <https://www.stats.govt.nz/news/one-in-five-say-their-household-is-prepared-for-a-natural-disaster/>.

415 **4.5.2 Scope**

416 Coping capacity statistics focus on the active interventions commonly used for boosting
417 resilience, as shown in Table 4.3.

418 In many cases, coping capacity is likely to be correlated with the level of economic
419 development. However, while there may be a link to macro-economic indicators such as GDP, it is
420 important to produce targeted statistics on coping capacity resources and interventions to support
421 the assessment of their effectiveness in reducing risks over time.

422 Coping capacity statistics also include measurement of interventions that improve
423 environmental conditions and flows of associated ecosystem services, where the purpose of the
424 intervention is to reduce the potential impacts from future hazards. Specific examples include
425 reforestation in coastal areas or near flood hazard areas where there is a primary purpose to create
426 a buffer against impacts from floods to the population, assets and flows.

427 People may not have equal access to the resources and interventions that enhance coping
428 capacity, such as knowledge and information about hazards, or equal access to and awareness of
429 early warning and emergency response systems. Organizations that provide training and
430 dissemination of knowledge and experience can have significant positive effects on reducing the
431 impacts of a disaster (Wisner and others, 2003).

432 For example, a study of disaster preparedness in Padang, Indonesia, examined the percentage
433 of households who had attended training and/or simulation activities in hazard areas (Figure 4.4).
434 These types of statistics should be disaggregated, where feasible, by characteristics such as sex,
435 age, income groups, disability and for urban and rural areas.

436

Figure 4.4: A study of disaster preparedness in Padang city of Indonesia

Example statistics on percentages of households attending training or simulations in hazard areas

Type of Training and/or Simulation Attended	Yes (%)	No (%)
(1)	(2)	(3)
Earthquake	96,1	3,9
Earthquake and Tsunami	80,5	19,5
Flood	14,3	85,7
Volcanic Eruption	2,6	97,4
Drought	2,6	97,4
Tidal Wave	2,6	97,4
Landslide	1,3	98,7
Tornado	1,3	98,7
Land and Forest Fires	1,3	98,7

437

438

439

Source: National Agency for Disaster Management of Indonesia, Statistics Indonesia and United Nations Population Fund (2013)

440

4.5.3 Summary table

441

442

Table 4.3 presents coping capacity statistics at sub-national levels and at the national level to support analysis of the distribution of coping capacity with a country.

443

444

The variables listed in the rows are examples of coping capacity indicators. They include, but are not limited to, the following:

445

446

447

448

449

450

451

452

453

- (a) *Institutional preparedness* (multi-hazard early warning systems, monitoring and forecasting systems, emergency evacuation facilities, and trained emergency personnel). These statistics reflect the DRR systems, infrastructure including those for transport, and resources that enable a society to respond effectively to hazardous events and disasters.
- (b) *Household/individual-level preparedness* such as emergency planning, backup food and water storage, access to banking/insurance, coverage by social protection programs, and backup systems for water, electricity, and communication, disaggregated by household and/or individual-level characteristics where possible. They capture the society capacity to reduce impacts at the local and community level.

454 (c) *DRR activity* reflected through DRR expenditures and transfers recorded in subnational
455 and national DRR expenditure accounts. DRR activity statistics contribute to risk
456 measurement using geolocation of these activities.

457 The selection of coping capacity indicators should be informed by the policy context, analytical
458 objectives, and data availability, ensuring that the statistics meaningfully reflect the coping
459 capacities most relevant to the country's needs.

460 As shown in Table 4.3, the compilation of coping capacity statistics overlaps with the
461 compilation of DRR expenditure accounts (Chapter 6), which record expenditures undertaken to
462 purchase the goods, services and assets used for DRR activities. DRR activities (see classification
463 in Chapter 6, Section 6.3) are often designed to boost coping capacity. Thus, in addition to the
464 benefits of compiling DRR expenditure accounts described in Chapter 6, recording expenditures
465 for DRR activities is useful for tracking changes in coping capacity over time.

466 **Table 4.3: Coping capacity summary table (in physical or monetary units)**

Coping capacity type	Geographic unit 1	Geographic unit 2	Geographic unit ...	National total
Institutional preparedness				
Multi-hazard early warning systems				
<i>Population covered</i>				
<i>Share of population in exposure areas covered</i>				
<i>Expenditure (also in DRRE account)</i>				
Monitoring and forecasting systems				
<i>Population covered</i>				
<i>Share of population in exposure areas covered</i>				
<i>Expenditure (also in DRRE account)</i>				
Emergency evacuation facilities				
<i>Population covered</i>				
<i>Share of population in exposure areas covered</i>				
<i>Expenditure (also in DRRE account)</i>				
Trained emergency personnel (number)				
Household/individual-level preparedness				
<i>Share of households with emergency plan</i>				
<i>Number of households with backup storage of food, water and electricity</i>				
<i>Population with access to banking and insurance services (or share of population...)</i>				
<i>Population covered with social protection programs, especially including unemployment benefits and disaster relief funds</i>				
<i>Population with mobile phone with internet connection, backup systems for communication</i>				
Disaster risk reduction activity (sub-national DRRE)				
<i>Disaster risk prevention</i>				
<i>Disaster risk mitigation</i>				
<i>Disaster preparedness and response</i>				
<i>Disaster recovery</i>				
<i>General government, research & development, education activities</i>				

467

468 **4.5.4 Measurement units**

469 Coping capacity statistics are compiled according to discrete geographic areas, e.g. hazard
470 areas and administrative areas. Ideally, geo-referencing processes should be used to align coping
471 capacity statistics with exposure and vulnerability statistics in order to build comprehensive risk-
472 related statistical information for the same geographic areas over time.

473 Measurement units for coping capacity statistics are variable-specific generally concerning
474 population numbers, numbers of households and expenditures in national currency units. For
475 subnational geographic units, population-related coping capacity statistics may be expressed as
476 the share of population covered.

477 **4.5.5 Measurement issues and recommendations**

478 Coping capacity statistics should be developed in tandem with the development of DRR
479 expenditure accounts to support analyses of interventions that can ultimately reduce the impacts
480 of hazardous events and disasters and strengthen sustainable development for disaster-prone
481 communities. Methodological details, including definitions and standard measurement concepts
482 for measuring and producing DRR expenditure accounts are presented in Chapter 6.

483 The objective of providing detail on the implementation of DRR strategies and using
484 subnational statistical information is to develop an accurate and comprehensive assessment of
485 coping capacity. This information, in combination with information on exposure and vulnerability,
486 enables policy makers to make the case for financing interventions that can enhance
487 preparedness and build disaster resilience.

488 Coping capacity is the outcome of active interventions by individuals, by institutions, by
489 communities, and by government. Many strategies for coping with hazardous events and disasters
490 are informal and not necessarily managed by government agencies and institutions. For example,
491 one of the coping mechanisms in the case of drought or other climate-related or hydrological and
492 meteorological hazards is migration, either permanently or temporarily, in search of livelihoods
493 outside the worst affected areas. Population movements that correspond with a hazardous event
494 can sometimes be captured via statistics from population censuses or administrative records,

495 complemented by non-traditional data sources and techniques such as population mobility
496 mapping.⁷⁸

497 Coping capacity can also sometimes be captured by surveys of preparedness of households
498 or businesses in hazard areas or affected areas. After major earthquakes struck the Canterbury
499 province of New Zealand, survey results revealed significant increases in disaster preparedness
500 of households (e.g. rationing emergency food and water storage). The New Zealand General
501 Social Survey asked New Zealanders about a range of factors of basic preparedness for disasters
502 and found significant differences in results across regions and over time for the factors studied
503 (Statistics New Zealand, 2022).

504 Data on both formal and informal forms of coping capacity can be collected and statistically
505 summarized in a table format such as the example in Table 4.3. It is important to note that the
506 regular and consistent production of coping capacity statistics will support the analyses of
507 changes in coping capacity over time and across geographic locations, providing essential
508 information for developing a comprehensive understanding of risk. Such information supports the
509 design and implementation of activities that reduce the impacts of hazardous events and disasters,
510 while strengthening coping capacity and resilience at national and local levels.

511 **4.6. Combining the risk components**

512 The three risk components of exposure, vulnerability and coping capacity are closely
513 interlinked. Therefore, integrated analysis of these statistics for the at-risk population, assets and
514 flows is particularly useful. An elevated level of exposure, combined with high vulnerability and
515 low coping capacity usually indicates a high level of risk. In contrast, low levels of exposure and
516 vulnerability with enhanced coping capacity indicate lower risk. When exposure statistics and
517 vulnerability statistics are collected on their respective elements (i.e., for population, assets and
518 flows) for the same hazards, it provides valuable insights to the determination of the appropriate
519 coping capacity resources and interventions that may be established to minimize the potential
520 impacts and support rapid recovery.

521 In addition to the connections between risk components, in theory, risk can be assessed at
522 multiple scales – e.g. for individuals or households, communities, regions, countries, and

⁷⁸ See <https://www.iom.int/sites/g/files/tmzbd1486/files/documents/IOM-Migration-Health-Population-Mobility-Mapping-Infosheet.pdf>.

523 internationally. This chapter describes the measurement foundation for consistent and
524 comparable statistics that can be applied at multiple scales, simultaneously, depending on user
525 requirements. In practice, risk information is often summarized according to the country's
526 administrative areas for policy development purposes.

527 4.6.1 General recommendations

528 Examining statistics on exposure, vulnerability, and coping capacity facilitates an
529 understanding of how different factors contribute to overall risk and supports the identification of
530 areas that need intervention to enhance resilience. The design and monitoring of activities aimed
531 at reducing disaster risks should be informed by the best available data about the three risk
532 components described in this chapter. Ideally, risk statistics will become an integrated part of the
533 broader sustainable development planning of a country at national and subnational levels.
534 Examples of integration include incorporating disaster risk assessments into land use planning
535 and embedding resilience-building to disasters within broader strategies for reducing multi-
536 dimensional poverty.⁷⁹

537 Each hazard requires a specially tailored compilation of exposure, vulnerability, and coping
538 capacity statistics that reflect individual hazard characteristics. Thus, these statistics are compiled
539 specifically for each hazard following the HIPs.

540 A standard SDI enables the efficient integration of geospatial data, such as satellite imagery,
541 which are often crucially important for producing or validating statistics both before and after a
542 hazardous event or a disaster. To support coherent analysis, consistent geospatial units, reference
543 layers and geocoding practices should be used across exposure, vulnerability and coping capacity
544 statistics.

545 Generally, the computing capacity of statistical agencies has increased in recent decades,
546 enabling the processing of high-resolution geospatial data. However, the more pertinent
547 challenges for national institutions often relate to securing the technical capacity, knowledge, and
548 experience required to process and analyze geospatial data using current technologies. Where
549 feasible, the statistical compilations for each of the risk components should be compiled for

⁷⁹ See examples at <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/512241480487839624/unbreakable-building-the-resilience-of-the-poor-in-the-face-of-natural-disasters>.

550 standardized geographical area units, i.e. following a common SDI and common collection of
551 relevant analytical GIS layers (e.g. administrative regions, hazards areas, and ecosystems).

552 There are beneficial synergies in developing a common or integrated SDI within broader GIS-
553 based official statistics domains, such as the compilation of SEEA ecosystem accounts which
554 present data for geographic areas approximating a country's ecosystems. A robust national SDI
555 can also be used to support integrated sustainable development monitoring and policymaking.

556 The temporal dimension of these statistics is also important, as risk is dynamic over time. It is
557 recommended to compile exposure, vulnerability and coping capacity statistics on a regular basis
558 (e.g. annually) so that a time series may be constructed to analyze risk over time even though
559 some hazards, by their nature, happen with a degree of unpredictability.

560 Some hazards also have significant variabilities across seasons. This information should be
561 incorporated in the mapped hazard probability inputs. Further, statistics for the three risk
562 components may also be compiled on a seasonal basis to capture the temporal dynamics of risk
563 throughout the year. Consequently, both the temporal and geospatial resolution of risk statistics
564 can be adapted to specific hazard types and aligned with information demands and data
565 availability

1 **5. Occurrence and impact statistics**

2 **5.1. Introduction**

3 This chapter concerns statistics on the occurrences and impacts of hazardous events and
4 disasters. These statistics are critical for understanding historical trends, supporting the
5 identification of areas at risk, as well as informing and monitoring DRR strategies, including early
6 warning and early action, preparedness, risk-informed planning, and recovery efforts. Reliable
7 statistics on these events also underpin effective policymaking, financing for DRR activities, and
8 the monitoring of global frameworks such as the Sendai Framework and the SDGs. This chapter
9 provides a framework for collecting, compiling and reporting occurrence and impact statistics that
10 meet the needs⁸⁰ of a wide range of users, including disaster risk management practitioners,
11 policymakers, statisticians and researchers.

12 Section 5.2 discusses occurrence statistics for hazardous events and disasters covering their
13 scope, measurement considerations and a description of a summary table for presenting relevant
14 data. Section 5.3 discusses impact statistics and approaches to estimating and recording
15 casualties, damage and losses related to population, assets and flows as described in Chapter 4.
16 Consistent with Chapter 4 of this framework, the HIPs are recommended to be used as the
17 reference list for hazards and as the hazard classification for occurrence and impact statistics.

18 The content of this chapter draws on content from other international statistical frameworks
19 and related statistical standards, including the SNA, the SEEA and the FDES.

20 **5.2. Occurrence statistics**

21 **5.2.1 Introduction**

22 Occurrence statistics are essential for gaining insights into the frequency, spatial patterns and
23 trends of past hazardous events and disasters. Systematic collection and compilation of such
24 statistics provide a robust evidence base to inform disaster risk assessment and management. By
25 drawing on these historical records and analysed together with statistics on exposure and

⁸⁰ Note the chapter does not provide guidance on how, who, where and when to collect, compile and report occurrence and impact statistics. Such implementation guidance is beyond the scope of the present framework.

26 vulnerability, occurrence statistics enable governments and other users to better prevent, manage,
27 and reduce disaster risks, while anticipating and mitigating impacts.

28 Occurrence statistics provide the foundation for the statistics presented in Chapter 5 of this
29 framework. The concepts and definitions described support international consistency and
30 comparability in the production and reporting of statistics on the occurrence of hazardous events
31 and disasters across countries. This consistency is also relevant when a single event has impacts
32 on multiple countries, or when an event triggers cascading events elsewhere. Equally significantly,
33 occurrence statistics define the scope for the compilation of impact statistics (section 5.3), which
34 are compiled exclusively, from a statistical perspective, for hazardous events with observed
35 impacts and disasters. This alignment ensures consistency between occurrence and impact
36 statistics and supports integrated analysis.

37 5.2.2 Scope

38 Occurrence statistics concern data about the number of hazardous events and disasters that
39 have occurred within the national boundary during a reporting period (e.g., annually). These
40 statistics apply the definitions and classifications of hazardous events and disasters that are
41 described in Chapter 2.

42 Following the HIPs, all hazardous events— whether impacts are observed — fall within the
43 scope of occurrence statistics and should be included in the occurrence statistics table (see
44 Section 5.2.3).

45 A disaster represents a subset of hazardous events with observed impacts, specifically those
46 that result in a serious disruption to the functioning of a community or society. The OIEWG report
47 (United Nations General Assembly, 2016) defines a disaster as *“a serious disruption of the
48 functioning of a community or a society at any scale due to hazardous events interacting with
49 conditions of exposure, vulnerability and capacity, leading to one or more of the following: human,
50 material, economic and environmental losses and impacts. This includes small-scale and large-
51 scale, frequent and infrequent, sudden and slow-onset events caused by natural or man-made
52 hazards, as well as related environmental, technological and biological hazards.”*

53 In practice, what constitutes a serious disruption will differ by context, depending on the type
54 of event and national circumstances and local capacities. For statistical purposes, national
55 agencies or designated coordination mechanisms may consider factors such as the scale of

56 impacts on population, the economy or the environment, the geographic or time span of the event,
57 or any relevant official declarations, etc. When a hazardous event meets the nationally determined
58 factors, it is recommended that it be included as a disaster in Table 5.1, with the factors
59 documented in the metadata.

60 5.2.3 Summary table for occurrence statistics

61 A basic statistical table for occurrence statistics is shown in Table 5.1. The table provides a
62 high-level summary of the number of events disaggregated by geographic location and hazard
63 type. These data are then further disaggregated into (i) hazardous events and (ii) disasters (i.e., a
64 subset of hazardous events). The table is structured such that statistics can be compiled by
65 aggregating geographic units (e.g., administrative units) for each type of event. Alternatively, a
66 separate table for each type of event might be compiled at national level with a breakdown by
67 geographic unit as appropriate. The structure of the table recognizes that single events may occur
68 in multiple geographic areas and hence there is a potential for double counting. This issue is
69 discussed further below.

70 Table 5.1: Occurrence statistics (unit: number of occurrences)

Hazard type	Geographic units						Total events across geographic units		Adjustment for multiple counting of		National total	
	Geographic unit 1		Geographic unit 2		Geographic unit...		Hazardous events	Disasters	Hazardous events	Disasters	Hazardous events	Disasters
	Hazardous events	Disasters	Hazardous events	Disasters	Hazardous events	Disasters						
Hydrological and Meteorological												
Extraterrestrial												
Geological												
Environmental												
Chemical												
Biological												
Technological												
Societal												
Total												

71

72 Hazardous events are classified following the HIPs (for details, see Chapter 2). Depending on
73 policy interest and analytical focus, additional levels of detail may be introduced. For example,
74 within the ‘geological’ hazard type, a sub-row such as ‘of which: earthquakes’ can be included if
75 earthquakes are particularly significant to the country. Events may also be categorized by scale—
76 e.g. small, medium, and large—acknowledging that the cumulative impacts of small-scale events
77 may be greater than a single major event. In such cases, the criteria used to define each scale
78 should be documented in the metadata.

79 Geographic disaggregation captures the spatial nature of hazardous events and disasters,
80 recognizing that certain areas within a country or territory may experience some events more
81 frequently than others. Meaningful geographic disaggregation of occurrence statistics enables
82 more targeted and effective DRR efforts. Countries may choose to disaggregate occurrence
83 statistics by state, region, province, island, atoll, or other relevant geographic units, depending on
84 their specific geographic characteristics, administrative divisions and policy relevance. Similarly,
85 a sub-column such as ‘of which: transboundary’ may be added if the events extend across national
86 boundaries.

87 Where an event spans multiple geographic units, the ‘Adjustment for multiple counting of
88 events’ column should be used to apply statistical corrections to account for potential double
89 counting when aggregating to record the total number of occurrences. For example, if a single
90 disaster affects three regions within a country, it should be recorded as one event in each of the
91 three regions. At the national level, however, the correct total number of events is one, not three.
92 To correct for multiple counting at the national level, an adjustment of –2 should be entered in the
93 relevant row under the ‘Adjustment for multiple counting of events’ column.

94 In countries where a system of unique identifier codes⁸¹ (e.g., hazardous and/or disaster event
95 IDs) is used to track all hazardous events and disasters, the issue of multiple counting is avoided
96 by compiling national totals based on these unique identifiers. In such cases, the ‘Adjustment for
97 multiple counting of events’ column may be omitted.

⁸¹ A unique identifier is a code specifically assigned to individual events to allow easy and unambiguous identification, tracking, and information sharing about that event across different databases and organizations.

98 5.2.4 Measurement issues and recommendations

99 Occurrence statistics present the number of hazardous events and disasters that take place
100 within a country during a defined reporting period (e.g., annually⁸²). The general principle is that
101 events are recorded in the reporting period in which they occur. However, events can be of varying
102 durations and be connected in various ways. The following measurement conventions are
103 recommended.

104 5.2.4.1 Recording of sudden-onset and slow-onset events

105 Sudden-onset events (e.g. earthquakes) are typically of short duration and have clearly defined
106 temporal boundaries. Attribution of the occurrences to a reporting period (e.g., calendar year) is
107 generally straightforward. For events that span two reporting periods—for example, beginning in
108 late December and continuing into early January—it is recommended that the event’s start date
109 be used as the reference point for determining the reporting period.

110 Slow-onset events (e.g., desertification) generally follow the same temporal attribution
111 principle, with the initiation date determining the reporting period. However, in cases where a slow-
112 onset event extends over long durations—e.g., spanning multiple calendar years—it is
113 recommended that the occurrence of the event (as well as its associated impacts) be recorded on
114 an annual basis for the entire period of persistence, with the multi-year nature of the event
115 documented in the metadata. For instance, if an event persists from 2021 through 2023, it should
116 be included in the occurrence statistics for 2021, 2022, and 2023.

117 5.2.4.2 Treatment of cascading events

118 Cascading events present challenges for recording due to the interconnected nature of the
119 events. A cascading event occurs when a primary event triggers the occurrence of one or more
120 events. In some cases, the primary event may not result in any impact, while the triggered events
121 do. Examples of cascading events include a tsunami triggered by an earthquake; a mudslide or
122 flood caused by heavy rainfall; or a disease outbreak following a cyclone.

123 From the perspective of occurrence statistics, it is recommended that each event, i.e. both
124 primary and triggered events that occur in a cascading sequence, be recorded separately,

⁸² There might be some complications where reporting of events is based on a particular government fiscal year. This may require some adjustments if multi-country comparisons are required for specific purposes.

125 following the appropriate hazard classification and applying the temporal attribution
126 recommendations for sudden- and slow-onset events. In Table 5.1, primary and triggered events
127 in a cascading sequence will be separately recorded and aggregated by their hazard type and
128 location of the occurrences. The cascading relationships between primary and triggered events
129 should be documented in the metadata. The total numbers of occurrences can be summarized
130 from the primary and triggered events.

131 Cascading events can also be transboundary, where the effects of a primary event extend
132 beyond national borders. For example, heavy rainfall in Country A may lead to flooding in
133 neighbouring Country B. In line with the scope of recording occurrence statistics within the
134 national boundary, the rainfall event should be recorded in the occurrence statistics of Country A,
135 while the flood should be recorded in Country B. Where possible, the cascading relationship
136 between the events should be documented in the metadata.

137 In certain cases, it may be difficult to attribute specific impacts to individual events within a
138 cascading sequence. Recommendations for recording and attributing impacts from cascading
139 events are provided in Section 5.3.4.

140 **5.3. Impact statistics**

141 **5.3.1 Introduction**

142 Impact statistics provide essential information for understanding and managing the
143 consequences of hazardous events and disasters. Central to the G-DRSF is the consistent and
144 systematic recording of these impacts.

145 Reliable impact statistics support detailed analysis of the extent and nature of the effects
146 caused by hazardous events and disasters across population groups, various sectors and
147 industries within the economy, and the environment, including ecosystems. This information is
148 critical for effective disaster risk management planning, resource allocation, and budgeting. In
149 combination with occurrence statistics, impact statistics also serve as a useful tool to inform
150 impact-based warning and early action, enable risk assessment and modelling to anticipate future
151 impacts from hazards of concern, as well as for assessing the effectiveness of DRR strategies and
152 activities, thereby informing future policy and investment decisions.

153 **5.3.2 Scope**

154 Impact statistics present the observable consequences of hazardous events and disasters
155 during a reporting period (e.g., annually), for defined spatial areas (e.g., region) and durations (i.e.,
156 start and end time).⁸³

157 The spatial and temporal boundaries used for compiling impact statistics may vary depending
158 on the type of hazardous event. For example, the impact area of a tropical cyclone may include all
159 regions affected by its winds and rainfall, and the duration may span from the first observable
160 effects to when the cyclone dissipates or exits the country. In contrast, the spatial and temporal
161 boundaries for a drought might be defined based on official declarations by meteorological
162 authorities. It is recommended that information regarding geographical coverage and the start and
163 end of hazardous events and disasters be documented in metadata.

164 Impact statistics should be attributed to specific events and are categorized into three
165 components: impacts on population, impacts on assets, and impacts on flows.

166 Impacts on population encompass (i) the number of deaths, missing persons, and individuals
167 who are ill or injured; (ii) population movements, whether forced or voluntary, such as the number
168 of people evacuated, displaced, or relocated; and (iii) disruptions to employment, education, basic
169 services⁸⁴ and livelihoods—for instance, job losses, school or workday losses, the number of
170 people whose homes or property damaged or destroyed, and the number of people whose access
171 to basic services such as water, electricity and healthcare (e.g., medical services, sexual and
172 reproductive health services, etc.) is disrupted or the quality of services received is reduced.
173 Statistics about the impacts on population are compiled in terms of number of people.

174 It is recognized that hazardous events and disasters may lead to long-term human
175 consequences— often influenced by broader socio-economic and environmental factors—such
176 as increased poverty and marginalization, wider inequalities, reduced life expectancy, lower
177 average years of schooling, reduced opportunities for education, decent work or social mobility,
178 and chronic health or mental conditions. For the purposes of the G-DRSF, however, these long-
179 term consequences are excluded from the scope of impact statistics.

⁸³ Impact statistics in this framework concern negative effects defined by the OIEWG report. Analyses of positive effects of hazardous events and disasters may be undertaken separately.

⁸⁴ Basic services are defined as services that are needed for all of society to function effectively or appropriately. For details, see metadata for SDG indicator 11.5.3 at <https://unstats.un.org/sdgs/metadata/?Text=&Goal=11&Target=11.5>.

180 Impacts on assets and flows may be understood in various ways, such as direct and indirect
181 or primary, secondary and tertiary. While these impact categories are referred to in disaster-
182 related fields and literature, differences in their scope and interpretation limit their suitability for
183 consistent measurement.

184 For the purposes of the G-DRSF, it is recommended to categorize impacts into damage, losses,
185 and additional costs.⁸⁵ This provides a sufficient foundation for the consistent measurement of
186 impacts on assets and flows and is consistent with the approach to assessing impacts in the
187 PDNAs.

188 Impacts on assets correspond to the category of damage and include impacts of hazardous
189 events and disasters on:

- 190 (a) *Fixed assets* such as dwellings, buildings, transport infrastructure, water/irrigation
191 systems, machinery, equipment, religious buildings, public monuments, other
192 structures;
- 193 (b) *Inventories* such as stocks of final and semi-finished goods, raw materials, spare parts;
- 194 (c) *Valuables* such as precious metals and stones, paintings, sculptures or other art
195 objects;
- 196 (d) *Non-produced assets* such as environmental and ecosystem assets;⁸⁶
- 197 (e) *Consumer durables* such as vehicles, furniture, and electrical goods acquired by
198 households,⁸⁷

199 Impacts on flows cover the categories of losses and additional costs and include:

- 200 (a) *Losses in production of goods and services (including basic services)* due to
201 hazardous events and disasters;
- 202 (b) *Losses of ecosystem services*⁸⁸ due to hazardous events and disasters;

⁸⁵ For details on the definitions of damage, losses and additional costs, see chapter 2 of the 2014 ECLAC's Handbook for Disaster Assessment.

⁸⁶ For details, see paras. 2.17 and 5.10-5.15 of SEEA Central Framework and paras 2.11 and 3.5 of SEEA Ecosystem Accounting.

⁸⁷ For details on the definitions, see paras. 1.75, 7.131, 7.270-7.271, 10.58 and 11.10 of the 2025 SNA. While consumer durables are not economic assets following the integrated framework of the 2025 SNA, they are grouped within assets here given their relatively long lifespans and relevance for understanding the impacts of hazardous events and disasters on households.

⁸⁸ For measurement of ecosystem services in physical and monetary terms, see Section C and D of SEEA Ecosystem Accounting.

203 (c) *Additional costs*, which are outlays required to maintain or resume the production of
204 goods and services as a result of hazardous events and disasters. Additional costs may
205 take the form of additional spending (e.g., the cost of managing and transferring victims
206 to care facilities outside the affected areas; additional transport costs to deliver
207 produced goods) or a reallocation of spending (e.g., the government reduces the
208 spending on technological development and directs the funds towards emergency
209 assistance). Also included in additional costs are other expenses, by households, paid
210 as a result of the events such as cleanup or mud removal costs after flooding, or costs
211 of purchasing air purifiers in case of air pollution.

212 Damage often results in associated losses. For example, the destruction of a hotel constitutes
213 damage while the resulting interruption to its operations generates losses since income is no
214 longer earned from the operation of the hotel. However, losses—particularly those arising from
215 disruptions in the production of goods and services—may also occur in the absence of any
216 damage to fixed assets. An example is the COVID-19 pandemic, during which educational facilities
217 remained physically intact, yet the sector experienced substantial losses due to the prolonged
218 suspension of in-person instruction and related service delivery. Another case is production losses
219 from droughts, for example. Accordingly, both losses resulting from damage to assets and losses
220 incurred without physical damage fall within the scope of impact statistics, provided they are
221 attributable to hazardous events or disasters.

222 The measurement of losses from a statistical perspective is focused on recording the change
223 in the level of production or ecosystem services by comparing the flows before and after the event.
224 Separately, analysis of losses may be undertaken to estimate the future quantity or value of
225 production or ecosystem services that may be affected as a result of the impacts of the event.
226 These forward-looking estimates of losses may be compiled according to the 2014 Handbook for
227 Disaster Assessment (ECLAC, 2014). In that Handbook, losses are estimated from the time a
228 disaster occurs until full recovery and reconstruction are completed.

229 Losses in production should be measured in terms of changes in output that are associated
230 with hazardous events and disasters. Conceptually, the value of output implicitly includes the
231 remuneration of employees, including wages and salaries. Consequently, estimates of losses in
232 production already incorporate losses of remuneration, and separate estimates of losses of
233 remuneration should not be calculated and added to production losses. Nonetheless, where

234 relevant and subject to data availability, separate estimates of the losses of remuneration of
235 employees may be estimated, together with estimates of the losses of operating surplus for
236 affected businesses.

237 It is important to note that remuneration of employees is one component of household income.
238 Other relevant components include government social transfers, interest payments and insurance
239 premiums and claims which are also likely to be affected by hazardous events and disasters.
240 Hence, the measurement of losses of remuneration of employees alone will not capture the full
241 range of impacts on household income. The compilation of separate estimates of changes in these
242 other components of household income as a result of hazardous events and disasters may be
243 undertaken in line with standard national accounts treatments where relevant and when data are
244 available.

245 In accordance with the scope of impact statistics outlined above, the G-DRSF measures losses
246 and additional costs within the defined spatial and temporal boundaries of the event while
247 acknowledging their possible longer-term impacts and time lags. The 2014 Handbook for Disaster
248 Assessment provides useful examples on how damage, losses and additional costs can be
249 measured. Similarly, FAO (2020) develops a methodology specifically for the assessment of
250 damage and losses in agriculture.

251 Subject to analytical interest and available data, damage and losses can be measured in both
252 physical and monetary terms. Additional costs are measured only in monetary terms.

253 Damage, losses and additional costs define the measurement scope of impacts on assets and
254 flows. In practice, compilation of these impact statistics depends on the relevance of each
255 component to a specific event and to assets and flows present within the affected areas. Further,
256 it must be recognized that compiling basic measures of impacts such as the number of deaths
257 may be challenging in some instances, let alone measures of impacts on assets and flows. On the
258 other hand, for specific events, more in-depth study and integration of data on impacts may be
259 warranted. Overall, the aim of the G-DRSF is to provide a clear and practical measurement
260 boundary and structure that can be applied in different contexts and extended in further research
261 as required.

262 5.3.3 Summary table for impact statistics

263 Basic summary tables for impacts on population, and for impacts on assets and flows are
264 presented in Table 5.2 and 5.3, respectively. Depending on the policy interest and analytical focus,
265 impacts caused by hazardous events and disasters may be combined or recorded separately.
266 Thus, rows and columns can be added to tables 5.2 and 5.3 or the structure can be refined to
267 align with policy requirements and the relevance of particular impacts to the events.

268 Tables 5.2 and 5.3 are structured to present statistics at the national level. Similar tables may
269 be prepared at subnational levels, disaggregated by geographic units. In some cases, these
270 summary tables may be compiled exclusively for a specific event.

271 Table 5.2 presents a basic summary table for impacts on population. It contains statistics on
272 casualties, population movements, and disruptions to employment, education, basic services and
273 livelihoods (see more details in Section 5.3.2), disaggregated by hazard type. Where possible,
274 individual impact categories (i.e., the rows) should be disaggregated by sex, age group, disability
275 status, vulnerability group, income level, or other relevant subpopulation groups, as appropriate
276 to national contexts.

277 There are two related but conceptually distinct aggregated counts of impacts on population
278 across impact categories and hazard types. First, the ‘Total impacts (number of impacts on
279 people)’ column refers to the total number of impacts on the population, i.e., including multiple
280 impacts experienced by the same individual across multiple events during a reporting period.
281 Second, the ‘Total impacted individuals (number of people after adjusting for multiple events)’
282 column represents the number of unique individuals who have experienced impacts from one or
283 more events during a reporting period. This adjustment requires additional information on how
284 many events each individual experienced for a specific impact type.

285 Separately, for each event, to estimate the ‘total impacts (number of impacts on people)’ in the
286 row, a simple sum across all impact categories is used. However, this will count the same
287 individuals more than once if they experienced multiple types of impacts over a reporting period.
288 To calculate the ‘total impacted individuals (number of people after adjusting for multiple types of
289 impacts)’ additional information is needed to determine how many impacts each person
290 experienced in relation to a specific event or hazard type.

291 In both cases, if the required information is unavailable, only the unadjusted totals can be
292 recorded, with the understanding that individuals may be counted multiple times across both rows
293 and columns.

294 Table 5.2: Impacts on population (unit: number of people)

Impact type	Hazard type								Total impacts (number of impacts on people)	Adjustment for multiple events individuals experienced (-)	Total impacted individuals (number of people after adjusting for multiple events)
	Hydrological and Meteorological	Extraterrestrial	Geological	Environmental	Chemical	Biological	Technological	Societal			
1. Casualties											
1.1 Deaths											
1.2 Missing											
1.3 Injured											
1.4 ...											
2. Population movements											
2.1 Evacuated											
2.2 Displaced											
2.3 Relocated											
2.4 ...											
3. Disruptions to employment, education, basic services and livelihoods											
3.1 Job losses											
3.2 Schoolday losses											
3.3 Workday losses											
3.4 ...											
Total impacts (number of impacts on people)											
Adjustment for multiple types of impacts individuals experienced (-)											
Total impacted individuals (number of people after adjusting for multiple impacts)											

295

296

Dark grey cells are null by definition

297 In all cases where the same individuals are impacted by more than one event or by more than
298 one type of impact, the details should be documented in the metadata.

299 Table 5.3 presents a basic summary table for impacts on assets and flows (see more details in
300 Section 5.3.2), disaggregated by hazard type. As noted above, damage and losses can be
301 measured in both physical and monetary terms, while additional costs are only measured in
302 monetary units (i.e., currency). Using the structure of Table 5.3, two separate tables should be
303 compiled—one in physical units and the other in monetary terms.

304 The physical units used for damage and losses measurement will vary depending on the type
305 of impact category. For example, dwellings, machinery, and equipment may be measured by the
306 number of units, with sub-rows such as ‘of which: totally destroyed’ included where applicable;
307 offices, conference and exhibition facilities may be measured by square metres; roads and
308 railways by kilometres; land areas by square kilometres or hectares. It is important to note that
309 these physical measures are often the basis for the compilation of damage and losses in monetary
310 terms (for details, see Section 5.3.4).

311 For each hazard type, damage, losses and additional costs should be recorded by industry
312 and household. The industry column should be further classified in accordance with the ISIC, Rev.
313 5 such as agriculture, forestry and fishing; mining and quarrying; manufacturing; etc. There may
314 be policy and analytical interest to distinguish damage, losses and additional costs by public or
315 private ownership. In such cases, an ‘of which’ category can be introduced as sub-rows in each
316 category.

317 As shown in Table 5.3, all asset types except consumer durables may be subject to damage
318 incurred by industry. For households, the recording of damage, losses and additional costs
319 involves additional considerations which are described in section 5.3.4.2.

320 Table 5.3: Impacts on assets and flows (unit: physical or monetary terms)

Impact type	Hazard type																Total		
	Hydrological and meteorological		Extraterrestrial		Geological		Environmental		Chemical		Biological		Technological		Societal				
	I	HH	I	HH	I	HH	I	HH	I	HH	I	HH	I	HH	I	HH	I	HH	
Damage																			
Fixed assets																			
Inventories																			
Valuables																			
Non-produced assets																			
Consumer durables																			
Losses																			
Production of goods lost																			
Provision of services lost																			
Other losses																			
Additional costs																			
Additional costs for the production of goods																			
Additional costs for the provision of services																			
Other additional costs																			
Total (monetary units only)																			

321

322

Where:

323

I = Industries classified by ISIC

324

HH = Households

325

Dark grey cells are null by definition

326 More detail may be provided under the categories for damage, losses, and additional costs
327 shown in Table 5.3, as relevant to policy and analytical purposes, the specific impacts of events,
328 and in line with the overall scope of impacts on assets and flows described in Section 5.3.2. For
329 instance, given the policy interest, detail on critical infrastructure⁸⁹ and cultural heritage objects
330 may be added as subcategories under fixed assets.

331 5.3.4 Measurement issues and recommendations

332 5.3.4.1 Recording of impacts from sudden-onset, slow-onset and cascading 333 events

334 Impact statistics should be attributable to the events that caused them. Therefore, the time of
335 recording for impact statistics should align with the principles applied to the compilation of
336 occurrence statistics. For sudden-onset events, the event's start date should serve as the
337 reference point for assigning the reporting period in which associated impacts are recorded. For
338 slow-onset events extending across multiple calendar years, it is recommended that impact
339 statistics are compiled on an annual basis for the full duration of the event.

340 For cascading events, where impacts can be clearly attributed to individual events within a
341 cascading sequence, it is recommended that the impacts be recorded separately as multiple
342 discrete events, in accordance with the hazard classification and the time of recording
343 recommendations for sudden- and slow-onset events. For example, if a major flood triggers a
344 disease outbreak, the impacts of the flood, classified under hydrological and meteorological
345 hazards, should be recorded separately from the impacts of the disease outbreak which is
346 classified under biological hazards, given the distinct nature and consequences of each event.

347 In some cases, however, it may be challenging to assign specific impacts to individual events
348 particularly when the events occur concurrently in the same location and timeframe—such as,
349 deaths and injuries resulting from an earthquake that triggers structural collapses. In such
350 instances, it is recommended that pragmatic choices be made to attribute relevant impact
351 categories to the most related event while also ensuring consistency between impact and
352 occurrence statistics. In the aforementioned example, deaths and injuries may be recorded under

⁸⁹ Examples of critical infrastructure include hospitals, health facilities, education facilities, other critical public administration buildings, public monuments, religious buildings, roads, bridges, railways, airports, piers, transport equipment, electricity generating facilities, electricity grids, ICT equipment, dams, water supply infrastructure, water sewerage and treatment systems.

353 structural collapses as the most likely cause of the impacts. It is critical that pragmatic choices are
354 documented in the metadata to support consistent application of measurement approaches over
355 time.

356 5.3.4.2 Treatment of households

357 Households may be impacted by hazardous events and disasters in two distinct ways (i) as
358 final consumers, and (ii) as producers of goods and services (e.g., home-based businesses such
359 as small shops, repair services, or agricultural activities). From an economic perspective and in
360 this context, a household is defined as a single person or a group of persons who share the same
361 living accommodation, who pool some, or all, of their income and wealth and who consume certain
362 types of goods and services collectively, mainly housing and food (2025 SNA, para. 32.10).

363 When households are impacted as final consumers, the resulting damage and additional costs
364 that are not related to the production of goods and services should be recorded in the household
365 column of Table 5.3. Because these households are not engaged in productive activities, losses
366 and additional costs related to production are, by definition, not applicable. By convention, damage
367 associated with housing is recorded in the household column, irrespective of whether dwellings
368 are owner-occupied. These entries may relate to fixed assets (e.g., dwellings' structures and
369 materials) and for non-produced assets (i.e. the land associated with housing).

370 When households also function as producers, damage, losses and additional costs incurred in
371 the production of goods and services (including production of goods and services for own use,
372 but excluding dwelling services for own use), should be attributed to the relevant economic activity
373 and recorded under the industry column. Where analytically useful, the impacts on household-
374 based production can be disaggregated by ISIC classification and presented as a subset (e.g., "of
375 which, households") within the corresponding industry category (e.g., agriculture). In recording
376 damage, it is recognised that practical challenges may arise in distinguishing household assets
377 used for production from those used for consumption. For example, a single building may serve
378 both as a retail outlet and as a dwelling, or a vehicle may be used for both business-related and
379 private transport. Where such a distinction cannot be made, all associated damage should be
380 recorded under the household column in Table 5.3.

381 Table 5.3 records damage to assets, as well as losses and additional costs at the level of
382 institutional units and economic activities. While these impacts may manifest differently among

383 individual members within a household, recording such intra-household variation is outside the
384 scope of Table 5.3, which focuses on households as a single institutional unit. Where applicable,
385 this information may be incorporated as part of PDNAs, other impact assessments or relevant
386 statistical surveys.

387 5.3.4.3 Valuation of damage and losses

388 Compilation of estimates of damage and losses in monetary terms (i.e., Table 5.3 in monetary
389 units) will utilize a range of information including: (i) statistics on damage and losses in physical
390 terms (i.e., Table 5.3 in physical units), (ii) appropriate prices to convert physical metrics into
391 monetary values; and (iii) estimates of the monetary value of production, income and assets.

392 The selection of a valuation method depends on the objective of the analysis, the availability
393 of data, and the intended use of the resulting statistics. For the purposes of the G-DRSF, valuation
394 pertains to measuring the impacts on assets and flows resulting from a hazardous event or
395 disaster, as opposed to estimating the reconstruction expenditures that may follow. Accordingly, it
396 is recommended that the as-built replacement cost valued at purchasers' prices prevailing prior
397 to the event be used for the valuation of damage.⁹⁰ That is, damage should be valued based on
398 the cost of restoring or replacing the damaged unit to the condition it was in immediately before
399 the event, using market prices that would have applied before the event occurred. Where possible,
400 valuation should exclude⁹¹ any "build back better" costs, which refer to additional expenditures
401 incurred beyond restoring the damaged asset to its pre-event condition. Such expenditures may
402 include investments in disaster risk mitigation measures, enhancements to improve the asset's
403 resilience to future hazardous events or disasters, or upgrades that raise the asset to a higher
404 quality or technological standard than the original state.

405 The valuation approach described above aligns with the exchange value concepts of the SNA.
406 Conceptually, exchange values can be measured at both aggregate (national) and finer
407 geographic scales on a consistent basis. However, in practice, the use of different data sources
408 for the compilation of expenditures for national level accounts (e.g., investment surveys) and for

⁹⁰ For details regarding valuation of environmental and ecosystem assets, see paras. 2.17 and 5.94-5.109 of SEEA Central Framework, and chapters 8 and 10 of SEEA Ecosystem Accounting.

⁹¹ Excluding "build back better" costs can be difficult particularly when using actual replacement expenses, as these may include improvements beyond the original condition. To avoid this, an estimated replacement cost approach may be used. This method considers the cost to restore or replace the damaged units with ones that have the similar characteristics as before the event.

409 valuation for specific events (e.g., insurance data), may lead to inconsistencies in estimates across
410 scales. Consequently, it is important to undertake the valuation of damage and losses considering
411 also all relevant physical measures.

412 For the valuation of losses, it is recommended that producers' prices prevailing prior to the
413 event be used to estimate the monetary value of lost production of goods and services. Producers'
414 prices reflect the average prices producers receive for their goods and services as they leave the
415 production units. They exclude deductible taxes such as value added taxes (VAT) and subsidies
416 on products. In cases where producers' prices are not available, purchasers' prices from before
417 the event may be used as an alternative. Purchasers' prices are the final prices paid by consumers
418 on goods and services including any taxes, transport margins and other charges excluding
419 deductible taxes.

420 For environmental assets, including all natural resources and land, the valuation of damage
421 should be undertaken in accordance with the approaches set out in the SEEA Central Framework.
422 Accordingly, the valuation is limited to market values consistent with the measurement boundary
423 of the SNA. Damage to these assets, such as timber resources and agricultural land, will be valued
424 in terms of the reductions of future income from the harvesting of resources or use of land
425 resulting from the hazardous event or disaster.

426 For ecosystem assets, the valuation of damage should be undertaken in accordance with the
427 SEEA Ecosystem Accounting. The valuation is broader than that for environmental assets and
428 should encompass the full suite of relevant ecosystem services, including provisioning services
429 which are recorded in the SNA as well as regulating and maintenance services, and cultural
430 services whose values are not recorded in the SNA. Hence, the valuation of damage will be equal
431 to the reductions of future flows of all relevant ecosystem services resulting from the hazardous
432 event or disaster.

433 In general, it is not appropriate to aggregate the values of environmental assets and ecosystem
434 assets, as this would risk double counting. In particular, the value of provisioning services is
435 captured both in the valuation of natural resources and land and in the valuation of ecosystem
436 assets. For example, in a forestry context, damage of timber resources and forest land resulting
437 from wildfires is recorded as damage to environmental assets. The same impacts are also reflected
438 in the valuation of damage to the forest ecosystem asset through reductions in future flows of
439 provisioning services; aggregating these values would therefore result in double counting.

440 Estimates of damage and losses are inherently dependent on the quality of the broader data
441 collection and estimation processes undertaken for a given hazardous event or disaster, which
442 may vary in completeness and coverage, particularly in relation to the availability of baseline data.
443 A key role of the G-DRSF is to strengthen these processes by organizing more comprehensive
444 data on exposure and vulnerability of assets and flows (see Chapter 4) and by structuring
445 information to enable more consistent, comparable, and detailed assessments of damage and
446 losses, as described in this chapter.

6. Disaster risk reduction expenditure accounting

6.1. Introduction

DRR activities are designed to prevent new risk, reduce existing risk, and manage residual risk. Outcomes of these activities, such as expanded coverage of early warning systems and increases in basic knowledge and preparedness of households, affect the overall disaster risk⁹² profile of a given community or region within a country.

A UNDRR study (2021)⁹³ on financing prevention and de-risking investment estimated that less than 1% of national public budgets are used for DRR activities. The study underscored that investments in risk prevention have not been commensurate with the challenge, although “investing in DRR is a precondition for developing sustainably in a rapidly changing climate”. This is despite finding that in low- and middle-income countries every \$1 invested in more resilient infrastructure can result in \$4 of benefits.

DRR expenditure statistics facilitate analysis of the costs and benefits of DRR activities over time. Regular production of DRR expenditure statistics can be used to support the assessment of the effectiveness of previous DRR interventions in reducing exposure and vulnerability, and boosting coping capacity. They can also inform the design and targeting of new strategies for long-term DRR planning within the broader framework of sustainable development.

Many countries have conducted *ad hoc* studies of disaster risk expenditures, known as disaster risk management expenditure reviews. However, *ad hoc* studies do not generate consistent time series data, particularly across different disasters and hazardous events. Moreover, several studies (including UNDRR, 2021) have called for improving the evidence base for analyzing DRR expenditures and effectiveness of the current financing for DRR activities. Overall, monitoring expenditures in risk reduction is important for understanding the risk context, and can be used for identifying new opportunities that could reduce or prevent risks.

The intent of DRR expenditure statistics is to produce regular (e.g., annual) accounts on the expenditures and transfers as elaborated in specifically designed “functional” accounts, which are

⁹² See Chapter 4 for detail on statistics concerning risk components.

27 re-organizations of more detailed data collected by government and other entities that underlie
28 their regular compilation of national accounts and government finance statistics. Once the data
29 are organized appropriately, the amount of DRR expenditure can be meaningfully compared with
30 other economic activities and with total GDP. Furthermore, an analysis of transfer sources can be
31 undertaken to inform strategies for DRR financing and international cooperation.

32 Section 6.2 discusses the measurement scope of DRR expenditures and transfers, and
33 Section 6.3 describes the classification of DRR activities. Section 6.4 presents DRR expenditure
34 accounts comprising an expenditure account and a transfer account. The final section, Section
35 6.5, outlines key measurement issues and recommendations for the compilation of DRR
36 expenditure accounts.

37 **6.2. Scope**

38 DRR expenditure accounts, comprising an expenditure account and a transfer account, record
39 all types of expenditures and transfers in the economy undertaken with DRR as their primary
40 purpose within a reporting period (e.g., annually). The accounts are developed based on the
41 interim classification of DRR activities (see Section 6.3).

42 Recording information about the transactions related to DRR expenditure requires an
43 understanding of the different economic units engaged in DRR-related transactions. Each
44 transaction may involve up to four distinct economic units.

- 45 (a) *Producing unit*: The unit that supplies the goods or services associated with a DRR activity.
46 For example, a manufacturing company that produces early warning systems.
- 47 (b) *Purchasing unit*: The unit that procures the DRR goods or services and engages directly
48 with the producer. For instance, NDMO purchasing early warning systems.
- 49 (c) *Funding unit*: The unit that finances the expenditure, either through (i) transfers such as
50 grants in kind or cash, or subsidies, (ii) loans or other debt instruments, or (iii) the
51 purchasing unit's own resources. For example, a non-resident agency may fund early
52 warning systems via a grant. When the purchasing unit uses its own resources, it is also
53 considered a funding unit.
- 54 (d) *Beneficiary unit*: The end-users or beneficiaries of the DRR activities, such as local
55 households or businesses benefiting from the installed early warning systems.

56 From statistical and accounting perspectives, DRR expenditure accounting describes the flow
57 of resources with an emphasis on the purchasing and funding units, and applying a basic supply
58 and use framework as used in the national accounts. For the purposes of the G-DRSF, the account
59 associated with the funding units focuses on transfers as an important source of DRR financing.

60 Additional accounts may be developed, for example, to record data on the activity of producing
61 units involved in supplying goods and services for DRR activities, or to record the financial
62 transactions of the funding units associated with debt financing of DRR expenditures. The
63 development of guidelines for these additional accounts is part of the G-DRSF research agenda.

64 The DRR expenditure accounts described in this chapter concern expenditures of activities
65 whose primary purpose is DRR. In many contexts, many activities are undertaken to support DRR
66 objectives but do not have DRR as their primary purpose. For example, education and other social
67 programs may be implemented that make a contribution to reducing disaster risks but have other
68 primary purposes. As another example, infrastructure projects may both support economic
69 development and serve DRR purposes. To provide a more complete coverage of DRR expenditure,
70 recording expenditures whose secondary purpose is DRR may be of significant relevance.

71 However, clear statistical guidance on the appropriate approach to recording secondary
72 purpose expenditures has not yet been established and, in the context of DRR expenditures, the
73 development of guidelines for recording these expenditures is part of the G-DRSF research
74 agenda.

75 It is expected that this area of G-DRSF research agenda can benefit significantly from the work
76 being carried out on this topic in the context of the update of the SEEA Central Framework. This
77 update process explicitly considers how to introduce secondary purpose expenditures into the
78 environmental activity expenditure accounts of the SEEA Central Framework. There are a range
79 of challenges to tackle, including identification of secondary purposes and determining whether
80 the expenditure on secondary purposes should be recorded in terms of the full (total) expenditure
81 or the extra (additional) expenditure attributable to the target purpose (e.g., DRR). In concept,
82 recording only the extra expenditure appears warranted in most cases but in practice this may be
83 difficult to estimate.

84 The issue of recording secondary purpose expenditure is also being considered in the update
85 of the Classification of the Functions of Government (COFOG) and the Government Finance

86 Statistics Manual since there is a general interest in determining comparable and integrated
87 approaches to recording these expenditures within government related statistics.

88 In parallel with these statistical developments, a related measurement practice being applied
89 for the analysis of government expenditures is budget tagging. Budget tagging involves working
90 through the line items of a government's budget and associating each expenditure line with
91 specific purposes. The most well-known examples of budget tagging concern identifying
92 expenditures for gender response and inclusion and for climate mitigation and adaptation.
93 Extending budget tagging to exclusively identify DRR expenditure is possible. Although some
94 practices exist, at this stage, there is no systematic or comparable approach to DRR budget
95 tagging, and analysis is generally conducted on a country-by-country basis.

96 It is relevant to note that the set of DRR activities, as listed in Table 6.1, remains unchanged,
97 irrespective of whether the expenditure being recorded concerns a primary or secondary
98 purpose. Consequently, an extension to record secondary purpose expenditures would not
99 change the structure of the DRR expenditure accounts as described in Section 6.4. However, it
100 would be recommended to compile the accounts separately for primary and secondary purpose
101 expenditure.

102 To further support advancing the understanding of this topic, compilers are encouraged to
103 investigate the potential to estimate and record secondary purpose expenditures, including
104 estimation of extra expenditures attributable to DRR or approaches to estimating proportions of
105 multi-objective programs that serve DRR purpose.

106 **6.3. The classification of disaster risk reduction activities**

107 International statistical classifications are developed and adopted to establish standardized
108 and consistent frameworks for classifying statistical data. Their primary purpose is to facilitate the
109 production of statistics that are consistent over time and internationally comparable, including
110 supporting the development of national classifications for the same variables and characteristics,
111 which can then be aggregated into harmonized higher-level reporting categories.

112 Statistical classifications group and organise information meaningfully and systematically, in
113 exhaustive, mutually exclusive and structured set of hierarchical classes that are defined
114 according to a set of criteria for similarity. A statistical classification provides a simplification of

115 reality and is an instrument for collecting, organising and analysing data. Statistical classifications
116 are reviewed and updated to reflect changes in social, economic and environmental contexts,
117 changes in analytical requirements, or accumulated experience with their implementation, noting
118 that a core function remains to facilitate comparability of statistics over time and across countries.

119 There is no internationally agreed classification of DRR activities. To support the compilation
120 of DRR expenditure accounting, an interim classification of DRR activities, as shown in Table 6.1,
121 has been developed. It is designed to ensure coherence with the other components of the G-
122 DRSF and aligned with the current theory and practice in DRR. The categories of DRR activities
123 are guided by the priority areas for action identified in the Sendai Framework and the
124 terminologies adopted in the OIEWG report, and are structured to maintain consistency with
125 concepts in the SNA and related classifications. Further improvement in the classification of DRR
126 activities is part of the G-DRSF research agenda.

127 The definitions in the interim classification have been developed for the G-DRSF, drawing on
128 established DRR practices. It builds on the ESCAP DRSF, where the initial classification of DRR
129 activities was first developed, tested, and validated through pilot implementations.⁹⁴ The
130 categories and definitions are recommended for DRR expenditure accounting, noting that, as a
131 hierarchical classification, more detailed sub-classes for DRR activities can be developed and
132 implemented without sacrificing comparability at the higher category levels.

133 The interim classification of DRR activities includes disaster risk prevention, disaster risk
134 mitigation, disaster preparedness and response, and disaster recovery, which correspond to
135 Categories 1-4 in Table 6.1 and are related to direct risk management interventions. Category 5,
136 covering general government, research and development, and education activities, focuses on the
137 enabling, systematization, and knowledge functions for disaster risk prevention. Such functions
138 include research, statistics, planning, education, and risk information systems, support all disaster
139 risk management activities. Their separation ensures visibility of systemic, cross-cutting and
140 foundational investments that are often hidden in general government expenditure.

⁹⁴ See further details from the Philippine Statistics Authority's. Technical Notes on Disaster Risk Reduction Expenditures (DRRE) <https://psa.gov.ph/system/files/technical-notes/2023%20DRRE%20Technical%20Notes.pdf>.

141 Table 6.1: The interim classification of disaster risk reduction activities

Category or class	Description
1. Disaster risk prevention	Activities and measures to avoid existing and new disaster risks. The objective of risk prevention activities is to avoid potential adverse impacts of hazardous events.
1.1. Risk prevention before disasters	Risk prevention before disasters refer to activities that intend to avoid or minimize potential adverse impacts. While certain disaster risks cannot be eliminated, prevention activities aim at reducing vulnerability and exposure to hazards. Examples include construction of dams or embankments that eliminate flood risks, creating seismic engineering designs that ensure the survival and function of a critical building in any likely earthquake area, and immunization against vaccine-preventable diseases.
1.2. Risk prevention in or after disasters	Risk prevention in or after disasters relates to prevent secondary hazards, cascading failures, or their consequences. These activities interrupt hazardous event impact chains before secondary damage occurs, addressing hazards triggered or exacerbated by the primary hazardous event. Preventing water supply contamination, removing earthquake-induced debris and rockfalls to prevent subsequent landslides, or stabilizing structures to prevent collapse are examples of such activities.
2. Disaster risk mitigation	Disaster risk mitigation includes activities and measures to lessening or minimizing of the adverse impacts of a hazardous event. Mitigation differs from prevention in that it addresses residual risks that cannot be fully avoided, focusing on reducing the severity of impacts rather than eliminating risk.
2.1. Structural measures	Structural measures include any physical construction activity to reduce or avoid possible impacts of hazards, or application of engineering techniques to achieve hazard resistance and resilience in structures or systems. Common structural measures for DRR include constructed dams, flood levies, ocean wave barriers, earthquake-resistant construction, and evacuation shelters. Structural measures will include “building back better” activities undertaken after a disaster.

Category or class	Description
2.2. Non-structural measures	Non-structural measures are any measures not involving physical construction activities that use knowledge, practices, legislation, policies, plans, strategies, etc. to reduce risks and impacts. Non-structural measures can be applied through their integration in sustainable development plans and programmes, through policies and laws, in public awareness raising and, in training and education. They are typically used to reduce vulnerability and exposure. Non-structural measures may include risk transfers paid/received to reduce risk (e.g., insurance purchases). Non-structural measures could also include vaccination drives, for example aimed at building resilience against biological hazards and the cascading effects of other hazards. Ecosystem-based approaches—conservation, restoration, and sustainable management of natural ecosystems for DRR—represent a distinct mitigation methodology and may be classified within non-structural measures, as structural measures when involving engineering, or as an independent category depending on national statistical frameworks.
2.3. Land-use planning	Land-use planning activities can help to mitigate disasters and reduce risks by discouraging (or eliminating) settlements and the construction of key installations in hazard-prone areas, including consideration of service routes for transport, electricity, water, sewage and other critical facilities.
2.4. Early warning systems management	Early warning systems management incorporates inter-related sets of hazard warnings, risk assessments, communication and preparedness activities that enable individuals, communities, businesses and others to take timely action to reduce their risks. Early warning systems include both equipment as well as ongoing regular systems maintenance and updating the knowledge and awareness among the systems' stakeholders.
3. Disaster preparedness and response	Disaster preparedness and response are the organization and management of resources and responsibilities for creating and implementing preparedness and addressing all aspects of emergencies and others plans to respond to, and to reduce the impact of disasters.

Category or class	Description
3.1. Preparedness	Preparedness refers to activities that enhance and share knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current disasters.
3.2. Emergency management	Emergency management activities include the development and maintenance of national-level plans that are specific to each level of administrative responsibility and adapted to different social and geographical circumstances.
3.3. Emergency supply of commodities	Emergency supply of commodities includes activities that supply resources and manage responsibilities for providing emergency support of commodities during a disaster.
3.4. Other disaster response activities	Other disaster response activities include provision of emergency services and public assistance by private and community sectors, including volunteer participation contributions. Other disaster response activities could include activities addressing a source of physical vulnerability, such as restoring a degraded water source (assuming the disaster risk response was a primary purpose).
4. Disaster recovery	Disaster recovery activities involve restoring or improving livelihoods and health of a disaster-affected community or society including their economic, physical, social, cultural and environmental assets, systems and activities. These activities should be implemented for a disaster-affected community or society, aligning with the principles of sustainable development and “building back better”, so as to avoid or reduce future disaster risk.
4.1. Relocation	Relocation activities involve the movement of people because of risk or disaster, permanently from their places of residence to new sites.
4.2. Rehabilitation	Rehabilitation activities involve the rapid and basic restoration of services and facilities to support for the return to basic functioning of a community or a society affected by a disaster.

Category or class	Description
4.3. Reconstruction	Reconstruction activities involve the medium and longer-term repair and sustainable restoration of critical infrastructures, services, housing, facilities and livelihoods required for fully functioning of communities and livelihoods of residents in the areas affected by a disaster.
5. General government, research and development, education activities	This category comprises activities that support DRR through general government activities, research and development, risk assessment, and information activities, and related education and training activities.
5.1. General government activities for disaster risk reduction	General government activities for DRR refer to government activities with an explicit DRR purpose, other than research and development or education.
5.2. Research and development, risk assessment, and information activities	Governments conduct a broad range of research and development activities aimed at improving the understanding and building resilience against disaster risks. Risk assessments (and associated risk mapping) are a key example. They involve reviews of the technical characteristics of hazards such as their location, intensity, frequency and probability; the analysis of exposure and vulnerability including the physical, social, health, economic and environmental dimensions; and the evaluation of the effectiveness of prevailing and alternative coping capacities in respect to likely risk scenarios. ISO 31000 defines risk assessment as comprising three processes: risk identification, risk analysis, and risk evaluation. Research and development activities includes all efforts to undertake studies, collate information and undertake mapping required to understand the risk drivers and underlying risk factors.
5.3. Education activities for disaster risk reduction	Education activities for DRR such as completing degrees in natural and engineering science, training of risk professionals and risk specialist medical professionals.

142 The interim classification distinguishes DRR activities by primary purpose for accounting purposes. Many activities contribute to
143 multiple dimensions of DRR in practice; where overlap exists, expenditures are classified according to their dominant objective.
144 Guidance on how to apply the interim classification is elaborated in section 6.4.

145 **6.4. DRR expenditure accounts**

146 The concepts and definitions used for DRR expenditure accounting are derived by integrating
147 DRR measurement practices across countries and related conceptual literature, with the
148 accounting standards and definitions of the SNA.

149 The Sendai Framework describes DRR as those involving a scope of work *“aimed at*
150 *preventing new and reducing existing disaster risk and managing residual risk, all of which*
151 *contribute to strengthening resilience and therefore to the achievement of sustainable*
152 *development.”* DRR expenditure accounts are compiled for the transactions that have a primary
153 purpose aligned with this definition of DRR and supporting various crucial roles of DRR in reducing
154 future risks.

155 The SNA has been implemented globally for the compilation of national accounts for over 70
156 years, since UNSC first provided standards for national accounting in 1947.⁹⁵ The process of
157 separately identifying expenditures of a specific type or purpose has also been a common practice
158 in NSOs, and for a variety of domains.⁹⁶ Compiling accounts for specific themes or sub-sets of the
159 economy, referred to as thematic accounting,⁹⁷ has been in practice among some leading NSOs
160 since the 1980s (Teillet, 1988).

161 Thematic accounting is described in Chapter 38 of the 2025 SNA as involving the organization
162 of data on transactions for consumption of goods and services by economic units (government,
163 non-profits serving households, corporations, and households). The transactions covered include
164 all monetized transactions including, in-kind contributions that are valued in terms of currency.
165 Thematic accounts are often compiled with a focus on a specific range of activities within the ISIC,
166 creating a thematic subset of economic activities. DRR expenditure accounts apply this thematic
167 accounting approach, as they are based on accounting for a subset of economic activities which
168 have DRR as a primary purpose. These activities, in principle, may be undertaken by economic
169 units in any of the SNA’s institutional sectors: corporations (financial and non-financial), non-profit
170 institutions serving households, households, and government.

⁹⁵ See <https://unstats.un.org/unsd/nationalaccount/docs/1947NAreport.pdf>.

⁹⁶ See https://unstats.un.org/unsd/nationalaccount/aeg/2019/M13_5_2_Review_Satellite_Accounting.pdf.

⁹⁷ The term thematic accounting is applied in the 2025 SNA. Other terms that have previously been used to describe the same general approach including satellite accounting.

171 DRR expenditure and transfer accounts are constructed using an approach analogous to that
172 employed by NSOs in compiling Environmental Protection Expenditure Accounts⁹⁸ and other
173 environment-related transaction accounts, as outlined in Chapter 4 of the SEEA Central
174 Framework. For the purposes of the Environmental Protection Expenditure Accounts compilation,
175 the Classification of Environmental Purposes⁹⁹ is applied to delineate the scope of environmental
176 protection expenditures.

177 In a similar way, the interim classification of DRR activities, as described in Section 6.3, can be
178 used to identify and group relevant data on DRR expenditures noting that the scope of the DRR
179 expenditure accounts at this stage is limited by the application of the primary purpose criterion.
180 Thus, only activities with DRR as their primary purpose are included in the DRR expenditure
181 accounts.

182 The application of the primary purpose criterion is a pragmatic decision aimed at calculating
183 unbiased, accurate and consistent values for the target concept, i.e., in this case: expenditures
184 and transfers for DRR activities. It has been acknowledged, for example in the SEEA Central
185 Framework, that accounting for environmental protection transactions using a primary purpose
186 criterion does not inherently guarantee that they will always have a net positive influence on the
187 environment in practice.¹⁰⁰ Similarly, in the case of DRR, it cannot be guaranteed that the
188 expenditures will reduce risks. However, assessments of the account for DRR expenditures can
189 be made ex post, for example by assessing the impact of the expenditures on overall risk
190 measurement and on the impacts from hazardous events and disasters over time.

191 It is important to recognize that the nature of DRR activities is often highly interconnected. A
192 DRR activity may benefit multiple categories in the classification. For instance, the construction of
193 a major flood levee as a structural measure for disaster risk mitigation (class 2.1) may also prevent
194 potential adverse impacts of new hazardous events and disasters (class 1.1). Similarly, risk
195 assessments (class 5.2) are fundamental to and support the efficacy of activities across all classes
196 from 2.3 to 4.3. For statistical and accounting purposes, a DRR activity and its associated
197 expenditures should be categorized into a single class according to the primary purpose of the
198 activity.

⁹⁸ See sect 4.3.2 (Environmental protection expenditure accounts (EPEA)) of SEEA Central Framework.

⁹⁹ See https://showvoc.op.europa.eu/#/datasets/ESTAT_Classification_of_Environmental_Purposes_%28CEP%29/data.

¹⁰⁰ See para 4.143 and sect 4.3.3 (Environmental goods and services sector (EGSS)) of SEEA Central Framework.

199 In cases where activities have more than one explicit purpose, compilers must either decide
200 to allocate the associated expenditures to one of those purposes or consider allocation of shares
201 of the expenditures by relevant purpose. Availability of information for making this determination
202 will usually involve a judgement on how to allocate expenditures within highly aggregated data.
203 For example, if a reconstruction project includes elements of building back better in the form of
204 improved hazard-resilient construction methods, ideally those expenditures should be accounted
205 separately under class 2.1: structural measures, as part of the risk mitigation component of the
206 DRR activities classification.

207 To complement data on primary purpose, work is underway within the statistical community
208 to establish agreed approaches to recording expenditures and other transactions where the target
209 activity (e.g. DRR or environmental protection) is a secondary purpose. This work will be followed
210 as part of the G-DRSF research agenda,

211 It is also important to note that DRR activities are not fully congruent with the category of social
212 protection as described in the COFOG¹⁰¹ and applied in the Government Finance Statistics
213 Manual.¹⁰² Instead, DRR activities cut across many government functions. The interim
214 classification of DRR activities presented in Table 6.1 provides the compilation scope of activities
215 for DRR expenditure accounting.

216 The DRR expenditure accounts have two main areas of focus. The first concerns the
217 expenditures made by purchasing units (e.g., NDMOs), classified by DRR activity. The second
218 concerns transfers made by funding units to finance these expenditures. These transactions are
219 recorded in two separate accounts: the DRR expenditure account and the DRR transfer account.
220 Transactions in both accounts are structured by the SNA's institutional sectors to ensure wider
221 consistency and comparability with macroeconomic statistics frameworks.¹⁰³

222 The transactions recorded as DRR expenditures are implicitly embedded within countries'
223 national accounts, although not separately identified as such, while DRR related transfers are in
224 principle recorded in the income and capital accounts of the SNA and the balance of payments.
225 Accountants should review detailed line-by-line expenditures from the underlying data sources to
226 extract the relevant figures for compiling the DRR expenditure account. In many cases, estimation

¹⁰¹ See <https://unstats.un.org/unsd/classifications/cofog/revision>.

¹⁰² See <https://www.imf.org/external/Pubs/FT/GFS/Manual/2014/gfsfinal.pdf>.

¹⁰³ See the 2025 SNA, para 3.17

227 may be required, particularly when estimating the DRR-related share of broader budget items or
228 expenditure reports. Likewise, balance of payments statistics can provide a basis for identifying
229 DRR-related international current and capital transfers. Domestic DRR-related transfers can be
230 sourced from various administrative records or specialized surveys.

231 The next two subsections describe the accounts for DRR expenditures and transfers. The
232 accounts provide an overall structure for recording all types of DRR expenditure by all types of
233 economic units. However, there is no expectation that all cells within the accounts will be populated
234 with data. In practice, focus should be placed on those parts of the accounts that are considered
235 to be most significant, for example expenditure by specific economic units (e.g. governments) or
236 transfers related to specific DRR activities (e.g. disaster recovery).

237 6.4.1 Expenditure account

238 Table 6.2 presents a basic accounting structure for recording DRR expenditures. In this
239 account, the focus is on separately identifying, and then detailing, by type, the DRR expenditures
240 for various activities. These are the activities with a DRR primary purpose and thus, if the
241 expenditure is effective, there should be an increase in coping capacity. Compilers should record
242 relevant flows as exhaustively as possible, from available data.

243 The columns represent resident economic units¹⁰⁴—namely, non-financial corporations,
244 financial corporations, general government, households, non-profit institutions serving
245 households—and non-resident economic units, i.e., the rest of the world.

246 The DRR expenditures, presented in the rows, are broadly grouped into two categories:
247 namely, recurrent¹⁰⁵ (intermediate consumption and final consumption) and investment (gross
248 fixed capital formation) expenditure,¹⁰⁶ classified by DRR activity. Expenditure statistics are
249 typically compiled and presented annually at the national scale.

¹⁰⁴ These economic units also include entities such as private sectors, civil society organizations, and community-based organizations as part of the SNA institutional sectors, although they are not the terms generally used in national accounts.

¹⁰⁵ The term “recurrent” is derived from the IMF Government Finance Statistics Manual 2014. This fits the 2025 SNA terminologies on intermediate consumption and final consumption expenditure by government.

¹⁰⁶ For details regarding final consumption, intermediate consumption and gross fixed capital formation, see the 2025 SNA paras 1.73-1.75.

250 Table 6.2: Expenditure account (units: Local currency, US\$PPP)

		Institutional sectors										TOTAL Resident sectors (units with >1 year of activity)	Rest of the World (RoW)
		Non-financial corporations	Financial corporations	General government (incl. non-profit institutions controlled by governments and social security)				Households			Non-profit institutions serving households (NPISHs)		
				Central government	State government	Local government	Subtotal General government	Households owners of unincorporated enterprises	Employees and recipients of property and transfer incomes	Subtotal Households			
A	Recurrent expenditure (intermediate + final consumption)												
1	Disaster risk prevention												
1.1	<i>Risk prevention before disasters</i>												
1.2	<i>Risk prevention in or after disasters</i>												
2	Disaster risk mitigation												
2.1	<i>Structural measures</i>												
2.2	<i>Non-structural measures</i>												
2.3	<i>Land-use planning</i>												
2.4	<i>Early warning systems management</i>												
3	Disaster preparedness and response												
3.1	<i>Preparedness</i>												
3.2	<i>Emergency management</i>												
3.3	<i>Emergency supply of commodities</i>												
3.4	<i>Other disaster response activities</i>												
4	Disaster recovery												
4.1	<i>Relocation</i>												
4.2	<i>Rehabilitation</i>												
4.3	<i>Reconstruction</i>												
5	General government, research & development, education activities												
5.1	<i>General government activities for disaster risk reduction</i>												
5.2	<i>Research and development, risk assessment, and information activities</i>												
5.3	<i>Education activities for disaster risk reduction</i>												
	Subtotal for recurrent expenditure												
B	Investment expenditure (gross fixed capital formation)												
1	Disaster risk prevention												
1.1	<i>Risk prevention before disasters</i>												
1.2	<i>Risk prevention in or after disasters</i>												
2	Disaster risk mitigation												
2.1	<i>Structural measures</i>												
2.2	<i>Non-structural measures</i>												
2.3	<i>Land-use planning</i>												
2.4	<i>Early warning systems management</i>												
3	Disaster preparedness and response												
3.1	<i>Preparedness</i>												
3.2	<i>Emergency management</i>												
3.3	<i>Emergency supply of commodities</i>												
3.4	<i>Other disaster response activities</i>												
4	Disaster recovery												
4.1	<i>Relocation</i>												
4.2	<i>Rehabilitation</i>												
4.3	<i>Reconstruction</i>												
5	General government, research & development, education activities												
5.1	<i>General government activities for disaster risk reduction</i>												
5.2	<i>Research and development, risk assessment, and information activities</i>												
5.3	<i>Education activities for disaster risk reduction</i>												
	Subtotal for investment expenditure												
C	Supplementary information												
	<i>Acquisition of land for DRR purposes</i>												
	...												
	Total DRR expenditure (recurrent expenditure + investment expenditure)												

252 DRR investments, such as the construction of protective infrastructure or the acquisition and
253 utility of durable assets, may span more than one reporting period. Examples include the
254 installation of early warning systems or the construction of flood protection dykes. It is
255 recommended that such investment expenditures be recorded in accordance with standard
256 principles and guidelines of the SNA.¹⁰⁷

257 The “supplementary information” rows support recording of DRR expenditures that fall outside
258 the categories of recurrent and investment expenditure. For example, if a government acquires
259 coastal land for the construction of seawalls, the costs associated with the acquisition of the
260 coastal land should be recorded under “the acquisition of land for DRR purposes” undertaken, for
261 instance, by the central government.

262 For government expenditures, it is important to note that costs incurred at the different stages
263 of DRR activities (e.g., pre-disaster, disaster response, and post-disaster recovery) are often
264 distributed across multiple government agencies. As described above, the COFOG does not
265 capture the full range of DRR-related expenditures in one single government function and instead
266 they are present across different functions of government, either directly or indirectly. In practice,
267 compilers need to examine detailed government finance statistics to identify the relevant
268 expenditures.

269 6.4.2 Transfer account

270 A basic account for recording DRR transfers is presented in Table 6.3. The table is structured
271 symmetrically by institutional sectors, including the rest of the world, and records all transfers from
272 funding units to corresponding recipient units. Depending on specific contexts and purposes of
273 the transfers, the recipient units may be producing units, purchasing units, or beneficiary units.

274 Transfers can be both current and capital¹⁰⁸ in nature and can be made in cash or in kind.
275 Accounting for these transfers is a crucial complement to the expenditure account, as it enables
276 the identification of both the sources and the beneficiaries of DRR financing.

¹⁰⁷ See Chapter 11 on capital account of the 2025 SNA.

¹⁰⁸ For the distinction between current transfers and capital transfers, see Chapter 9 of the 2025 SNA

277 Table 6.3: Transfer account (units: Local currency, US\$PPP)

		Transfers received by											Rest of the World (RoW)				
		Institutional sectors															
		Non-financial corporations	Financial corporations	General government (incl. non-profit institutions controlled by governments and social security)				Households			Non-profit institutions serving households (NPISHs)	TOTAL Resident sectors (units with >1 year of activity)					
Central government	State government			Local government	Subtotal General government	Households owners of unincorporated enterprises	Employees and recipients of property and transfer incomes	Subtotal Households									
Transfers made by	Institutional sectors	Non-financial corporations															
		Financial corporations															
		General government (incl. non-profit institutions controlled by governments and social security)	Central government														
			State government														
			Local government														
			Subtotal General government														
		Households	Households owners of unincorporated enterprises														
			Employees and recipients of property and transfer incomes.														
			Subtotal Households														
		Non-profit institutions serving households (NPISHs)															
		TOTAL Resident sectors (units with >1 year of activity)															
Rest of the World (RoW)																	

278

279 Of particular interest are transfers made by general government and from international
280 sources. Data on DRR transfers from general government—for example, transfers from the central
281 government to local governments for flood response and relief—may be sourced from relevant
282 administrative records, though detailed analysis is often required to determine their DRR
283 purposes. Compilers are encouraged to enter data to show all transfers, including those within the
284 same institutional sector, for example from one central government agency to another or from one
285 local government to another. This will support a more complete reconciliation between data on
286 transfers and data on expenditures.

287 Transfers from the rest of the world, such as Overseas Development Assistance,¹⁰⁹ can be
288 identified through balance of payments statistics. Reconciliation of these transfers for DRR
289 purposes should be undertaken in collaboration with relevant agencies such as the central bank
290 and the ministry of finance. Further guidance on the recording of Overseas Development
291 Assistance is available in Organization for Economic Cooperation and Development
292 documentation.

293 For specific analytical purposes, specialized surveys of key resident development partners,
294 charitable organizations, and major corporations can provide supplementary data on DRR
295 transfers. In addition, data on transfers might be further classified by type of DRR activity where
296 additional details on the primary purpose of the transfer can be identified.

297 **6.5. Measurement issues and recommendations**

298 DRR activities aim to strengthen society's resilience and response to hazardous events and
299 disasters. Accordingly, DRR expenditure accounts should be compiled on a regular basis, for
300 example, as annual accounts. Over time, these accounts should become an integrated domain of
301 official statistics, functioning as an extension of the existing national accounts. Such an approach
302 also enables the production of time series statistics for long-term analysis.

303 The regular production of DRR expenditure accounts provides essential baseline information
304 to support a wide range of analyses. These accounts are compiled *ex post* on an annual basis,
305 meaning they are records of expenditures and transfers that have already occurred rather than

¹⁰⁹ See <https://www.oecd.org/en/topics/policy-issues/official-development-assistance-oda.html>.

306 forward-looking estimates. As with other official statistics, revisions may be required as new
307 information becomes available after initial publication.

308 At the same time, there may be demand for more timely analysis of DRR activities in specific
309 periods, particularly in the aftermath of large-scale disasters, when emergency situations often
310 trigger increases in DRR expenditures and international transfers. In these contexts, the structure
311 of the DRR expenditure and transfer accounts described above provides a consistent framework
312 for recording such data, and the use of a common structure ensures that these event-specific
313 records can be systematically linked to national level aggregates for analytical purposes.

314 The DRR expenditure and transfer accounts are measured in national currency units generally
315 using data from the relevant sources underpinning the compilation of national accounts. A key
316 measurement challenge is identifying transactions and expenditures that have DRR as their
317 primary purpose. DRR activities undertaken by government often involve multiple institutions and
318 are frequently embedded within activities serving other objectives. To support the consistent
319 identification and measurement of DRR expenditures and transfers, budget tagging of DRR
320 expenditures and transfers, where possible, may be a useful compilation technique.

321 As noted, countries may adapt or define additional, more detailed DRR activity classes to
322 reflect their specific national context. However, it is recommended that, at a minimum, compilation
323 be undertaken at the aggregate levels of the classification of DRR activities such that comparability
324 can be maintained.

References

- Ankhtsetseg, D. and others (2019). *Probabilistic Seismic Hazard Assessment for Bayankhongor Aimag of Mongolia*. Ulaanbaatar: Institute of Astronomy and Geophysics, Mongolian Academy of Science. Available at https://www.researchgate.net/publication/333200837_Probabilistic_seismic_hazard_assessment_f_or_Bayankhongor_aimag_of_Mongolia.
- Asian Development Bank (ADB) (2021). *Mapping the Spatial Distribution of Poverty Using Satellite Imagery in Thailand*. Manila, ADB. Available at <https://www.adb.org/publications/mapping-poverty-satellite-imagery-thailand>.
- Food and Agriculture Organization of the United Nations (FAO) (2020). *FAO's Methodology for Damage and Loss Assessment in Agriculture*. FAO Statistics Working Paper Series, ESS/19-17. Rome, FAO. Available at <https://openknowledge.fao.org/server/api/core/bitstreams/3fa5c9c6-c4fd-4009-b190-1e51e0b407e8/content>.
- Global Facility for Disaster Reduction and Recovery (GFDRR), United Nations Development Programme (UNDP), European Union, and World Bank (2013a). *Post-Disaster Needs Assessment Guidelines, Volume A*. Washington, DC: World Bank. Available at <https://www.gfdr.org/en/pdna-volume-a>.
- Global Facility for Disaster Reduction and Recovery (GFDRR), United Nations Development Programme (UNDP), European Union, and World Bank (2013b). *Post-Disaster Needs Assessment Guidelines, Volume B*. Washington, DC: World Bank. Available at <https://www.gfdr.org/en/pdna-volume-b>.
- Global Facility for Disaster Reduction and Recovery (GFDRR), United Nations Development Programme (UNDP), European Union, and World Bank (2013c). *Post-Disaster Needs Assessments Guidelines: Volume B – Culture*. Washington, D.C. Available at <https://www.gfdr.org/sites/default/files/2017-09/PDNA%20GUIDELINES%20VOLUME%20B%20-%20Culture.pdf>.
- Hallegatte, S. and others (2017). *Unbreakable: Building the Resilience of the Poor in the Face of Natural Disasters*. Washington, D.C.: World Bank. Available at <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/512241480487839624/unbreakable-building-the-resilience-of-the-poor-in-the-face-of-natural-disasters>.
- Integrated Research on Disaster Risk (2014). *Peril Classification and Hazard Glossary (IRDR DATA Publication No. 1)*. Beijing: Integrated Research on Disaster Risk. Available at [IRDR - Addressing the challenges of natural & human-induced environmental hazards](https://www.irdr.org/publications/IRDR-Addressing-the-challenges-of-natural-&-human-induced-environmental-hazards).
- International Monetary Fund (2014). *Government Finance Statistics Manual 2014*. Washington, D.C. Available at <https://www.imf.org/external/Pubs/FT/GFS/Manual/2014/gfsfinal.pdf>.
- International Organization for Migration (n.d.). *Migration Health Population Mobility Mapping: Infosheet*. Geneva: IOM. Available at <https://www.iom.int/sites/g/files/tmzbdl486/files/documents/IOM-Migration-Health-Population-Mobility-Mapping-Infosheet.pdf>.
- Marin-Ferrer, M. and others (2017). *Index for Risk Management: INFORM Concept and Methodology Report — Version 2017*. EUR 28655 EN. Luxembourg: Publications Office of the European Union. Available at <https://drmkc.jrc.ec.europa.eu/inform-index/Portals/0/InfoRM/INFORM%20Concept%20and%20Methodology%20Version%202017%20PdF%20FINAL.pdf>.
- National Agency for Disaster Management of Indonesia (n.d.). *InaRISK: Indonesian Disaster Risk Assessment Portal*. Jakarta: BNPB. Available at <https://inarisk.bnpb.go.id/>.

- National Agency for Disaster Management of Indonesia, Statistics Indonesia, and United Nations Population Fund (UNFPA) (2013). *Pilot Survey of Knowledge, Attitudes and Practice (KAP) – Disaster Preparedness in Padang City*. Jakarta: BNPB, BPS and UNFPA. Available at [https://indonesia.unfpa.org/sites/default/files/pub-pdf/\(For web\) KAP Survey 20131.pdf](https://indonesia.unfpa.org/sites/default/files/pub-pdf/(For%20web)%20KAP%20Survey%2020131.pdf).
- Organisation for Economic Co-operation and Development (OECD) (n.d.). "Official Development Assistance (ODA)." Paris: OECD. Available at <https://www.oecd.org/en/topics/policy-issues/official-development-assistance-oda.html>.
- PARIS21 (n.d.). Crisis Management. In: NSDS Guidelines – Special Topics. Paris: PARIS21, n.d. Available at <https://nsdsguidelines.paris21.org/en/specialtopics/crisis-management>.
- Philippine Statistics Authority (2023). *Technical Notes on Disaster Risk Reduction Expenditures (DRRE)*. Manila. Available at <https://psa.gov.ph/system/files/technical-notes/2023%20DRRE%20Technical%20Notes.pdf>.
- Teillet, P. (1988). "A Concept of Satellite Accounts in the Revised SNA." *Review of Income and Wealth*, 34(4): 411–428. Available at <https://www.roiw.org/1988/411.pdf>.
- Statistics New Zealand (2022). "One in Five Say Their Household Is Prepared for a Natural Disaster." News article. Wellington, Stats NZ. Available at <https://www.stats.govt.nz/news/one-in-five-say-their-household-is-prepared-for-a-natural-disaster/>.
- United Nations (UN) (1947). Report of the Sub-Committee on National Income Statistics: *Measurement of National Income and the Construction of Social Accounts*. Geneva, United Nations. Available at <https://unstats.un.org/unsd/nationalaccount/docs/1947NAreport.pdf>.
- United Nations Advisory Expert Group on National Accounts (AEG) (2019). *Review of Satellite Accounting*. SNA/M1.19/5.2. 13th Meeting, Washington, D.C., 1–3 October 2019. Available at https://unstats.un.org/unsd/nationalaccount/aeg/2019/M13_5_2_Review_Satellite_Accounting.pdf.
- United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) (2015). *A Guide to the Role of Standards in Geospatial Information Management*. New York: United Nations. Available at <https://ggim.un.org/documents/Standards%20Guide%20for%20UNGGIM%20-%20Final.pdf>.
- United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) (2017). *Strategic Framework on Geospatial Information and Services for Disasters*. New York: United Nations. Available at https://ggim.un.org/documents/UN-GGIM_Strategic_Framework_Disasters_final.pdf.
- United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) (2025). *The Global Statistical Geospatial Framework (GSGF) – 2nd Edition*. New York: United Nations. Available at https://ggim.un.org/meetings/GGIM-committee/15th-Session/documents/GSGF_v2_GGIM.pdf.
- United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) (n.d.). "United Nations Integrated Geospatial Information Framework (UN-IGIF)." New York: United Nations Statistics Division. Available at <https://ggim.un.org/UN-IGIF/>.
- United Nations Economic Commission for Europe (ECE) (2019). *Recommendations on the Role of Official Statistics in Measuring Hazardous Events and Disasters*. ECE/CES/STAT/2019/3. Geneva: ECE. Available at <https://unece.org/sites/default/files/2021-03/ECECESSTAT20193.pdf>.
- United Nations Economic Commission for Europe (ECE) (2021). *Set of Core Climate Change-Related Indicators and Statistics Using the System of Environmental-Economic Accounting*. Prepared by the Task Force on a Set of Core Climate Change-Related Indicators and Statistics. ECE/STAT/NONE/2021/1. Geneva: ECE. Available at https://unece.org/sites/default/files/2021-08/CES_Set_Core_CCR_Indicators-Report.pdf.

- United Nations Economic Commission for Europe (ECE) (2023). *Measuring Hazardous Events and Disasters: Set of Core Disaster-Risk-Related Indicators*. Prepared by the Task Force on Measuring Hazardous Events and Disasters. ECE/CES/2023/4. Geneva, 13 April. Available at https://unece.org/sites/default/files/2023-05/CES%202023%204%20E_0.pdf.
- United Nations Economic Commission for Latin America and the Caribbean (ECLAC) (2014). *Handbook for Disaster Assessment*. LC/L.3691. Santiago: ECLAC. Available at <https://www.cepal.org/en/publications/36823-handbook-disaster-assessment>.
- United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) (2018). *Disaster-related Statistics Framework (DRSF)*. Expert Group on Disaster-related Statistics in Asia and the Pacific. Bangkok: ESCAP. Available at https://www.unescap.org/sites/default/d8files/event-documents/%21DRSF%20Manual_20220620_0.pdf.
- United Nations General Assembly (UNGA) (2014). *Fundamental Principles of Official Statistics*. Resolution 68/261, A/RES/68/261. New York, 29 January. Available at <https://unstats.un.org/unsd/dnss/gp/FP-New-E.pdf>
- United Nations General Assembly (UNGA) (2016). *Report of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction*. A/71/644. New York, 1 December. Available at https://www.preventionweb.net/files/50683_oiewgreportenglish.pdf.
- United Nations Human Settlements Programme (UN-Habitat) (2016). *Slum Almanac 2015/2016: Tracking Improvement in the Lives of Slum Dwellers*. Nairobi: United Nations Human Settlements Programme (UN-Habitat). Available at <https://unhabitat.org/slum-almanac-2015-2016-0>.
- United Nations Office for Disaster Risk Reduction (UNDRR) (2009). *Global Assessment Report on Disaster Risk Reduction: Risk and Poverty in a Changing Climate – Invest Today for a Safer Tomorrow*. Geneva: United Nations. Available at <https://www.preventionweb.net/english/hyogo/gar/2011/en/home/gar09.html>.
- United Nations Office for Disaster Risk Reduction (UNDRR) (2017). *Technical Guidance for Monitoring and Reporting on Progress in Achieving the Global Targets of the Sendai Framework for Disaster Risk Reduction: Collection of Technical Notes on Data and Methodology*. Geneva: UNDRR. Available at <https://www.undrr.org/publication/technical-guidance-monitoring-and-reporting-progress-achieving-global-targets-sendai>.
- United Nations Office for Disaster Risk Reduction (UNDRR) (2021). *Policy Brief: Financing Prevention and De-risking Investment*. Geneva: UNDRR. Available at <https://globalplatform.undrr.org/sites/default/files/2022-03/UNDRR%20Policy%20Brief%20Financing%20prevention%20and%20de-risking%20investment.pdf>.
- United Nations Office for Disaster Risk Reduction (UNDRR) (n.d.). “Integrated Monitoring of the Global Targets of the Sendai Framework and the Sustainable Development Goals.” PreventionWeb. Available at <https://www.preventionweb.net/sendai-framework/Integrated%20monitoring%20of%20the%20global%20targets%20of%20the%20Sendai%20Framework%20and%20the%20Sustainable%20Development%20Goals>.
- United Nations Office for Disaster Risk Reduction (UNDRR) and International Science Council (ISC) (2021). *Hazard Definition and Classification Review: Technical Report*. Geneva and Paris: UNDRR and ISC. Available at <https://www.undrr.org/publication/documents-and-publications/hazard-definition-and-classification-review-technical-0>.
- United Nations Office for Disaster Risk Reduction (UNDRR) and International Science Council (ISC) (2025). *Hazard Information Profiles: 2025 Update*. Geneva and Paris: UNDRR and ISC. Available at <https://www.undrr.org/publication/documents-and-publications/hazard-information-profiles-hips-2025-version>.

- United Nations Statistics Division (UNSD) (2017). *Framework for the Development of Environment Statistics (FDES 2013)*. Studies in Methods, Series M, No. 92. Sales No. 14.XVII.9. Available at <https://unstats.un.org/unsd/environment/FDES/FDES-2015-supporting-tools/FDES.pdf>.
- United Nations Statistics Division (UNSD) (2022). *Background document to the report of the Secretary-General on climate change statistics*. E/CN.3/2022/17. Global Set and metadata. Available at <https://unstats.un.org/unsd/statcom/53rd-session/documents/BG-3m-Globalsetandmetadata-E.pdf>.
- United Nations Statistics Division (UNSD) (2025). *Handbook on Management and Organization of National Statistical Systems* (4th edition). New York: United Nations. Available from <https://unstats.un.org/capacity-development/handbook/Handbook All 2025A 202505.pdf>.
- United Nations Statistics Division (UNSD) (2025). *International Standard Industrial Classification of all Economic Activities (ISIC) Revision 5*. Department of Economic and Social Affairs, Statistics Division, Statistical papers, Series M, No 4, Rev. 5. United Nations. New York. Available at <http://unstats.un.org/unsd/class/default.asp>.
- United Nations Statistics Division (UNSD) (2025). "Sustainable Development Goal Indicators: Metadata Repository for Goal 11, Target 11.5." New York: United Nations. Available at <https://unstats.un.org/sdgs/metadata/?Goal=11&Target=11.5>.
- United Nations Statistics Division (UNSD) (n.d). "Classification of the Functions of Government (COFOG): Revision." New York: United Nations. Available at <https://unstats.un.org/unsd/classifications/cofog/revision>.
- United Nations, European Commission, Food and Agriculture Organization of the United Nations, International Monetary Fund, Organisation for Economic Co-operation and Development and World Bank (2014). *System of Environmental-Economic Accounting 2012 – Central Framework*. Series F, No. 109. Sales No. E.12.XVII.12. Available at https://seea.un.org/sites/seea.un.org/files/seea_cf_final_en.pdf.
- United Nations, European Commission, Food and Agriculture Organization of the United Nations, International Monetary Fund, Organisation for Economic Co-operation and Development and World Bank (2024). *System of Environmental-Economic Accounting – Ecosystem Accounting*. Series N, No.124. Available at https://seea.un.org/sites/seea.un.org/files/documents/EA/seea_ea_f124_web_12dec24.pdf.
- United Nations, European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development, and World Bank (2025). *System of National Accounts 2025 (pre-edit version)*. ST/ESA/STAT/SER.F/2/Rev.6. New York: United Nations. Available at https://unstats.un.org/unsd/nationalaccount/docs/2025_SNA_Pre-edit.pdf.
- Van Schie, and others (2024). *Valuing a values-based approach for assessing loss and damage*, Climate and Development, 16-8, 722-729, Available at <https://www.tandfonline.com/doi/full/10.1080/17565529.2023.2289533>.
- Wisner, B. and others (2003). *At Risk: Natural Hazards, People's Vulnerability and Disasters*, 2nd ed. London, Routledge. Available at <https://www.preventionweb.net/publication/risk-natural-hazards-peoples-vulnerability-and-disasters>.
- World Bank (2021). "Floods, neighborhood mapping, poverty and flood risk in Indonesian cities." Blog post. Washington, DC: World Bank. Available at <https://blogs.worldbank.org/en/eastasiapacific/floods-neighborhood-mapping-poverty-and-flood-risk-indonesian-cities>.
- World Bank (2023). *Geospatial Poverty Portal*. Washington, D.C.: World Bank Group. Available at: <https://pipmaps.worldbank.org/en/data/datatopics/poverty-portal/home>.
- World Bank and Global Facility for Disaster Reduction and Recovery (GFDRR) (2018). *The Global Rapid Post-Disaster Damage Estimation (GRADE) Approach*. Washington, DC: World Bank. Available

at <https://www.gfdr.org/en/publication/global-rapid-post-disaster-damage-estimation-grade-approach>.

World Bank and Global Facility for Disaster Reduction and Recovery (GFDRR) (2024). *A Review of the Global Rapid Post-Disaster Damage Estimation (GRADE) Assessments*. Washington, DC: World Bank. Available at <https://www.gfdr.org/en/publication/review-global-rapid-post-disaster-damage-estimation-grade-assessments>.

WorldPop (n.d.). *Mapping Poverty: Geospatial Approaches to Measuring Poverty and Inequality*. Southampton, University of Southampton. Available at https://www.worldpop.org/focus_areas/mapping_poverty/.