

Considerations on Developing A System of Indicators Based on the Sendai Framework for Disaster Risk Reduction 2015-2030: A proposal for monitoring progress

*Draft to support the process for discussing on indicators,
follow up and review process*

for the Sendai Framework for DRR

Geneva, July, 2015

Contents

A. Background	3
B. The Sendai Framework for Disaster Risk Reduction: Global targets and National DRR Strategies	5
Global targets	5
National DRR Strategies	7
C. Monitoring progress in the HFA: Challenges and Issues	7
D. Concept and architecture of proposed monitoring framework	9
Input level: Public policies.....	13
Output level: Effectiveness of public policies	15
Outcome level	16
Integrated monitoring of the Sendai Framework for Disaster Risk Reduction, the Sustainable Development Goals and the Climate Change Convention	17
Appendix 1 – Suggested indicators	18
I. Input indicators.....	18
I-A. Risk Knowledge: Understanding Risk	20
I-B. Risk governance: Strengthening disaster risk governance to manage disaster risk	28
I-C. Investing in disaster risk reduction for resilience	35
1-C-a. Reducing existing risk	37
I-C-b. Preventing new risk generation	45
I-D. Preparedness and Build Back Better: Enhancing disaster preparedness for effective response, and to “Build Back Better” in recovery, rehabilitation and reconstruction.....	52
I-D-a. Preparedness	53
I-D-b. Build Back Better	61
II. Output Indicators.....	62
II-A. Underlying Drivers of Risk and Resilience	62
II-B. Disaster Risk	73
II-C. Resilience.....	76
III. Outcome indicators	80
III Disaster Loss	80
Appendix 2 - Terminology	83
Appendix 3 – Sustainable Development Goals (SDGs) and disaster risk reduction	88

A. Background

The document has been produced as a technical background paper to support process for developing indicators to monitor progress of the Sendai framework implementation.

In March 2015, at the Third World Conference on Disaster Risk Reduction (WCDRR), Sendai, Japan, United Nations Member States adopted the successor arrangements to the Hyogo Framework of Action (HFA), named as the Sendai Framework for Disaster Risk Reduction 2015-2030. The year 2015 will also see the adoption of the Sustainable Development Goals (SDGs) and a new agreement on climate change. Together these instruments should enable actions at all levels to manage disaster risks and climate change in a way that facilitates sustainable development.

The Third WCDRR recommended to the UN General Assembly to establish an open-ended intergovernmental working group (OEIWG), comprised of experts nominated by Member States, and supported by the United Nations Office for Disaster Risk Reduction (UNISDR), with involvement of relevant stakeholders, to develop a set of possible indicators to measure global progress in the implementation of the Sendai Framework for Disaster Risk Reduction. This work is to be carried out in conjunction with the work of the Inter-Agency Expert Group on sustainable development indicators (SDGs).

At its sixty-ninth session in June 2015 the UN General Assembly adopted a resolution, which specifies the working modalities of **the open-ended intergovernmental working group (OEIWG)** on global Sendai Framework indicators and terminology. The OEIWG is also expected to provide inputs to **Inter-Agency Expert Group on SDG indicators** to ensure coherence between the Sendai Framework and the SDGs. Countries will subsequently nominate national experts and start working. The first meeting of the OEIWG will be held in September 2015. The OEIWG is expected to finalize its work by end of 2016 with a final proposal of a set of global indicators to measure global progress in the implementation of the Sendai Framework.

The present guidance is built on the discussion of countries, UN System and relevant stakeholders before the WCDRR. Critical processes are as follows:

- In 2013, the Fourth Session of the Global Platform for Disaster Risk Reduction called for an immediate start of work to be led by UNISDR to develop targets and indicators to monitor the reduction of risk and the implementation of the post-2015 framework for disaster risk reduction.
- In November 2013, UNISDR produced a document containing initial ideas on a system of indicators for monitoring progress, based on a rigorous analysis of challenges reported by countries in implementing the HFA¹ and the review of other systems of indicators for measuring disaster risk reduction².

¹ UNISDR, 2014, Progress and Challenges in Disaster Risk Reduction: A contribution towards the development of policy indicators for a Post-2015 Framework on Disaster Risk Reduction

² UNU-EHS and The Nature Conservancy, 2012. World Risk Report 2012: Environmental degradation and disasters. Bündnis Entwicklung Hilft (Alliance Development Works). Bonn, Germany; Global Network of Civil Society Organizations for Disaster Reduction, 2011. Views From the Frontline 2011 Methodology. Document available online: http://www.globalnetwork-dr.org/images/documents/vfl2011_report/VFL2011%20detailed%20methodology.pdf; Joint Research Centre of the European Commission (JRC-EU), 2014. Index for Risk Management-InfoRM: Concept and Methodology. Publications Office

- An Expert Group on disaster risk reduction indicators that brings together many of those who have worked on other DRR related indicator system, as well as on other relevant economic, social and environment indicators met in February 2014 and provided critical inputs to the monitoring framework development.
- The developed guideline was then submitted to a technical workshop on monitoring at the first Preparatory Committee for the WCDRR held in Geneva in July 2014, in the context of the intergovernmental negotiations on the post-2015 framework for disaster risk reduction.
- The UNISDR implemented extensive consultations with expert groups and UN System, and briefings to countries through a series of regional platform for disaster risk reduction and the two technical workshops in Preparatory Committee.
- The results of the first Preparatory Committee, and later Informal Working Group on Targets and Indicators and a series of open-ended informal consultative meeting held in Geneva in latter 2014 to early 2015 informed further development of this guidance through to the second Preparatory Committee held in Geneva in November 2014 and the WCDRR itself.
- The refinement of the present guidance was informed by the development of disaster risk reduction related targets for the SDGs through the Open Working Group (OWG) mechanism. Synergies were sought between both sets of targets and indicators.
- The Public Policy Indicators have been pilot tested in several countries in 2014, beginning with Mozambique, Armenia and Japan to assess their relevance in different geographical and income regions. This exercise was concurrent with the piloting of DRR targets for the SDGs by UNDP and ODI. Relevance of policy indicators and measurability was mainly checked in countries. The preliminary findings of pilot studies were compiled in the background document for a working session “Measuring and Reporting Progress” in WCDRR³.
- In WCDRR, a working session “Measuring and Reporting Progress” was organized to provide further inputs from countries while technical expert meeting was organized in public forum as side event to discuss the modality of collaboration by technical experts.

for the European Union, Luxembourg; Inter-American Development Bank (IADB) and Universidad Nacional de Colombia, 2005. System of Indicators for Disaster Risk Management. Program for Latin America and the Caribbean. Main Technical Report. Universidad Nacional de Colombia, Manizales, Colombia. Also available online: <http://idea.unalmz.edu.co/ingles/principal.php>; DARA, 2013. Methodology of Risk Reduction Index: How the RRI work. Document available online: http://daraint.org/wp-content/uploads/2012/01/How_does_the_RRI_work.pdf; Mitchell, Tom., Jones, Lindsey., Lovell, Emma and Comba, Eva., 2013. Disaster Risk Management in Post-2015 Development Goals. Potential Targets and Indicators. Overseas Development Institute (ODI), London, UK.

³ <http://www.wcdrr.org/wcdrr-data/uploads/883/B.%20Main%20Brief%20Issue%20Paper.pdf>

B. The Sendai Framework for Disaster Risk Reduction: Global targets and National DRR Strategies

The Sendai Framework for Disaster Risk Reduction sets seven global targets and calls for adoption and implementation of national and local disaster risk reduction strategies and plans, across different timescales, with targets, indicators and time frames, aimed at preventing the creation of risk, the reduction of existing risk and the strengthening of economic, social, health and environmental resilience (paragraph 27 (b)) (Figure 1). The definition of targets at global, national and local level will stimulate political and financial commitment by countries to the Sendai Framework for Disaster Risk Reduction.

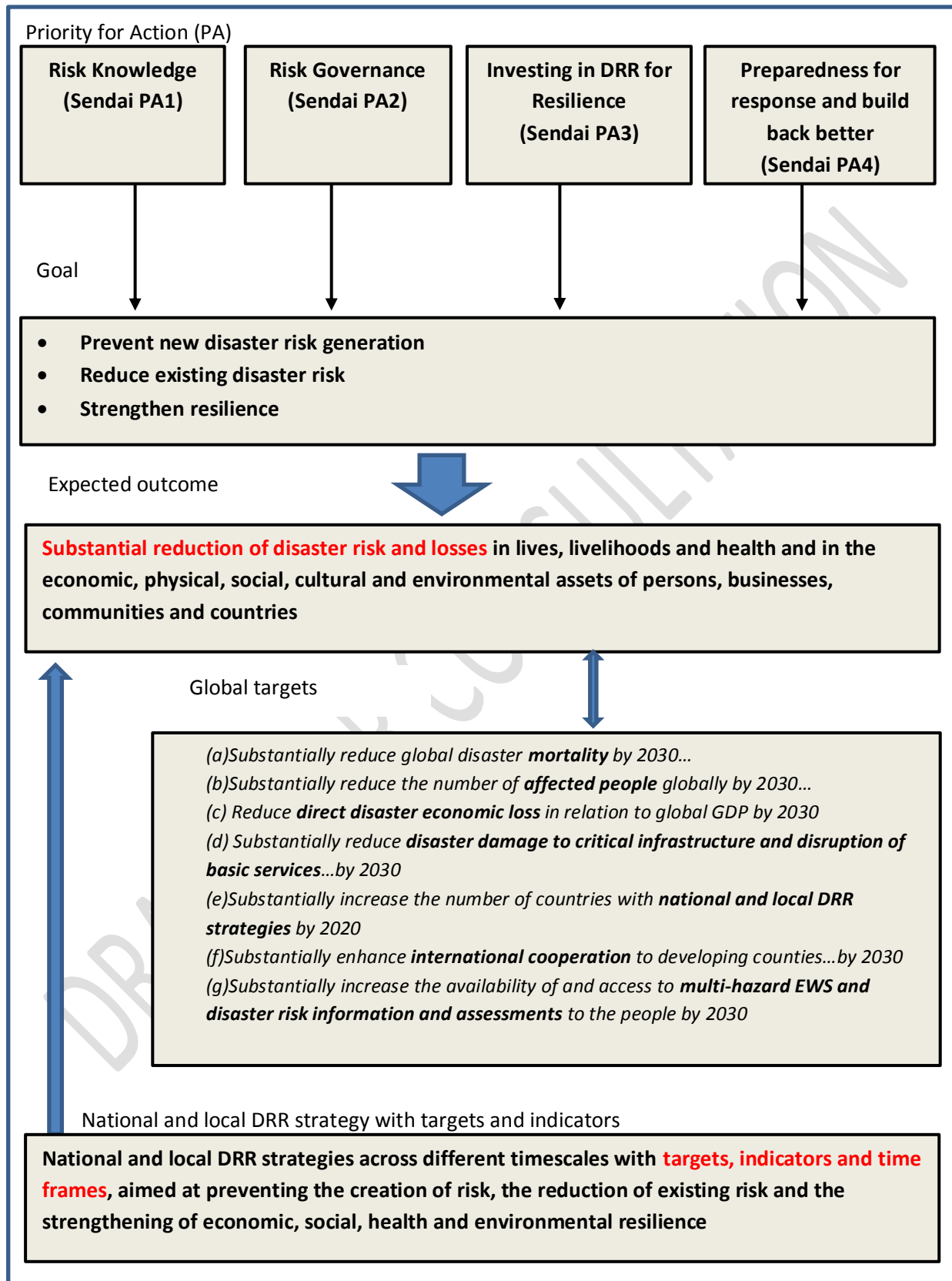
Global targets

To support the assessment of **global progress** in achieving the outcome and goal of the Sendai framework for Disaster Risk Reduction, seven global targets have been agreed. These targets will be measured at the global level and will be complemented by appropriate indicators. Targets (a) through (d) are directly addressing outcome of the Sendai Framework while Targets (e) through (g) are key means for achieving the outcomes.

The seven global targets are:

- (a) Substantially reduce global **disaster mortality** by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015.
- (b) Substantially reduce **the number of affected people** globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015.
- (c) Reduce **direct disaster economic loss** in relation to global gross domestic product (GDP) by 2030.
- (d) Substantially reduce **disaster damage to critical infrastructure and disruption of basic services**, among them health and educational facilities, including through developing their resiliency by 2030.
- (e) Substantially increase the number of countries with **national and local disaster risk reduction strategies** by 2030.
- (f) Substantially enhance **international cooperation** to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030.
- (g) Substantially increase the availability of and access to **multi-hazard early warning systems** and **disaster risk information and assessments** to the people by 2030.

Figure1 Goal, Expected Outcome, Priority for Action, Global Targets and National and local DRR strategies in the Sendai Framework for Disaster Risk Reduction 2015-2030



Disaster mortality is largely concentrated in intensive (infrequent, very severe) disasters, particularly in lower income countries. Damage to housing and infrastructure is also incurred in intensive disasters but the accumulated impact of extensive (frequent, less severe) disasters cannot be ignored. Such impacts are source of suffering especially for low-income households, small businesses and other marginalized groups at risk. Economic loss is spread across both intensive and extensive disasters but the absolute value is greater in higher-income capital intensive economies.

As such, the global targets could mobilize political commitment to reduce disaster risks in high-income countries that typically suffer large economic losses but low mortality as well as in low and middle income countries that suffer higher mortality but lower economic loss.

National DRR Strategies

The national government is called for the adoption and implementation of national DRR strategies and plans across different timescales with targets, indicators and time frames, establishment of baselines and benchmarks, review of the national policy framework, monitoring of the progress, learning of the lessons and solution finding, and follow up and reporting thereon.

National targets and indicators will contribute to the achievement of the outcome and goal of the Sendai framework. Global Targets help frame National DRR Strategies, without being prescriptive. States have the flexibility to evaluate and choose nationally appropriate policies and strategies to achieve the Global Targets.

Each country decides on number and nature of national targets and indicators, some of which may follow national standards and may not be internationally comparable. The specific ways in which national targets are formulated and indicators used for the new strategies, and methods adopted for their measurement, including disaggregation by key characteristics, will play a critical role for the buy-in of selected targets and indicators. These features will guide investments in data, the focus of policy discussions and progress reviews, and the analysis of interim and final targeted outcomes from DRR perspective.

At the same time, effective and participatory accountability mechanisms will be needed to underpin the full implementation of measures to facilitate DRR. Increase of peoples' access to information can empower citizens and help address underlying factors of accountability, transparency and participation, with strong impacts on DRR policy effectiveness.

C. Monitoring progress in the HFA: Challenges and Issues

Progress made by countries against the objective and goals of the HFA has been monitored against a set of 22 core indicators across the five HFA Priorities for Action. In 2007 governments were asked to submit a progress report on the first two years of HFA implementation. Subsequently, in 2009, 2011 and 2013, governments self-assessed their progress using an on-line HFA Monitor. In the HFA Monitor progress is benchmarked by countries on a scale of 1 to 5, complemented by means of verification and a qualitative description. In 2011, a mechanism for Peer Reviews was introduced

enabling governments to invite peers to review their national self-assessments, and which has been successfully rolled out in Europe.

Over time the number of countries providing self-assessments increased from 60 in 2007 to 133 in 2013. In doing so governments generated an enormous global repository of publically available information on the progress they are making and the challenges and issues they face to reduce their disaster risks. At the same time the application of the HFA Monitor has prompted countries to take a more systematic approach to disaster risk reduction, highlighting whether particular areas of policy are being addressed or not.

A thorough analysis of HFA progress reports submitted in 2011 and 2013 (UNISDR, 2014) highlighted a number of common challenges of the HFA implementation and limitations of the HFA Monitor as a tool for monitoring progress in DRR:

- The political and economic imperative for disaster risk reduction is often weak in the face of competing short and medium term needs and priorities, such as economic growth and poverty reduction. As a consequence much public and private investment fails to take disaster risk into account and may generate new risks. Governments dedicate insufficient financial resources to DRR.
- Disaster risk reduction requires local level action. Most disasters are small-scale and local. To be relevant and effective national policies, such as educational curriculum on disaster risk reduction, need to be adapted to local contexts. Many countries report the need to strengthen local capacities. While the devolution of responsibility for risk management is common to many countries it is unclear how national level policy is really supporting local level decision making.
- The HFA itself is largely structured around a paradigm of reducing and managing existing risks, configured through past development. The HFA Monitor has provided only limited information on whether development policies or practices are generating new disaster risks or whether countries have policy instruments to strengthen resilience, particularly of low-income households, small businesses and groups and sectors with high risks. As highlighted in the series of UN Global Assessment Reports on Disaster Risk Reduction (GARs)⁴, disaster risk is a function of hazard, exposure, and vulnerability. How governments manage and regulate both public and private (by businesses and households) investment influences the configuration of hazards, exposure and vulnerabilities over time, the risks that a country faces and social and economic resilience (the capacity to absorb and recover from losses).

⁴ UNISDR, 2009. Global Assessment Report on Disaster Risk Reduction: Risk and poverty in a changing climate. United Nations Office for Disaster Risk Reduction, Geneva, Switzerland; UNISDR, 2011. Global Assessment Report on Disaster Risk Reduction: Revealing Risk, Redefining Development. United Nations Office for Disaster Risk Reduction, Geneva, Switzerland; UNISDR, 2013. Global Assessment Report on Disaster Risk Reduction: From Shared Risk to Shared Value: The Business Case for Disaster Risk Reduction. United Nations Office for Disaster Risk Reduction, Geneva, Switzerland; UNISDR, 2015. Global Assessment Report on Disaster Risk Reduction: Making development sustainable: the future of disaster risk management. United Nations Office for Disaster Risk Reduction, Geneva, Switzerland.

- Coordination across stakeholders remains a challenge in spite of progress. While the HFA Monitor was designed to facilitate a multi-stakeholder and inter-disciplinary process of review, in practice reports have often been prepared by the HFA Focal Point (frequently the national disaster management office) without the involvement of other government sectors, local governments, civil society or the private sector. The HFA never provided explicit guidance on which sectors of government should address each of the 22 Core Indicators. As such the HFA Monitor may fail to account for policies and practices in other sectors that contribute to risk reduction or challenges faced in local implementation.
- The 22 HFA core indicators are input rather than output or outcome related. Countries reported insufficient level of “real” implementation against each indicator. For example, although risk sensitive building codes exist, they are not enforced due to lack of capacity, informal urban development and other factors. In other words, apparent progress in developing policies, laws and institutional frameworks does not necessarily translate into real change on the ground. As such, the HFA Monitor cannot measure whether the strategic objective of the HFA, namely *the substantial reduction of disaster losses*, is really being achieved or not.
- The HFA and its monitoring mechanism were not explicitly linked to the Millennium Development Goals (MDGs) or to the United Nations Framework Convention on Climate Change. As such, it has not been possible to identify whether progress in implementing the HFA has contributed to the MDGs or to climate change adaptation or vice versa.
- As self-assessment tool, the HFA Monitor generates results which are explicitly subjective. While this expresses a governments own vision of progress, this means that the results of the HFA Monitor cannot be used to benchmark or compare countries. Many of the HFA Core Indicators relate more to general concepts rather than to specific public policies and in reality require multiple public policies for their achievement. The lack of precision in the Core Indicators leads to widely varying interpretations, understanding and measurement of progress by governments.

D. Concept and architecture of proposed monitoring framework

The experience from the HFA Monitor suggests that a future monitoring system should take a more systemic or integrative approach that will promote the identification and consideration of underlying risk drivers (root cause) and the causal pathways and inter-linkages and facilitate action to address the drivers for change. The systemic collection, analysis and use of data are essential for developing forward-looking and evidence-based strategies for DRR as well as building better governance and accountability. It is also important to recognize and identify the multiple co-benefits, synergy and inter-relationship between DRR issues and other policy fields.

The Review of HFA Monitor and further discussion among countries, experts and other stakeholders clarified proposed Sendai Framework Monitor should:

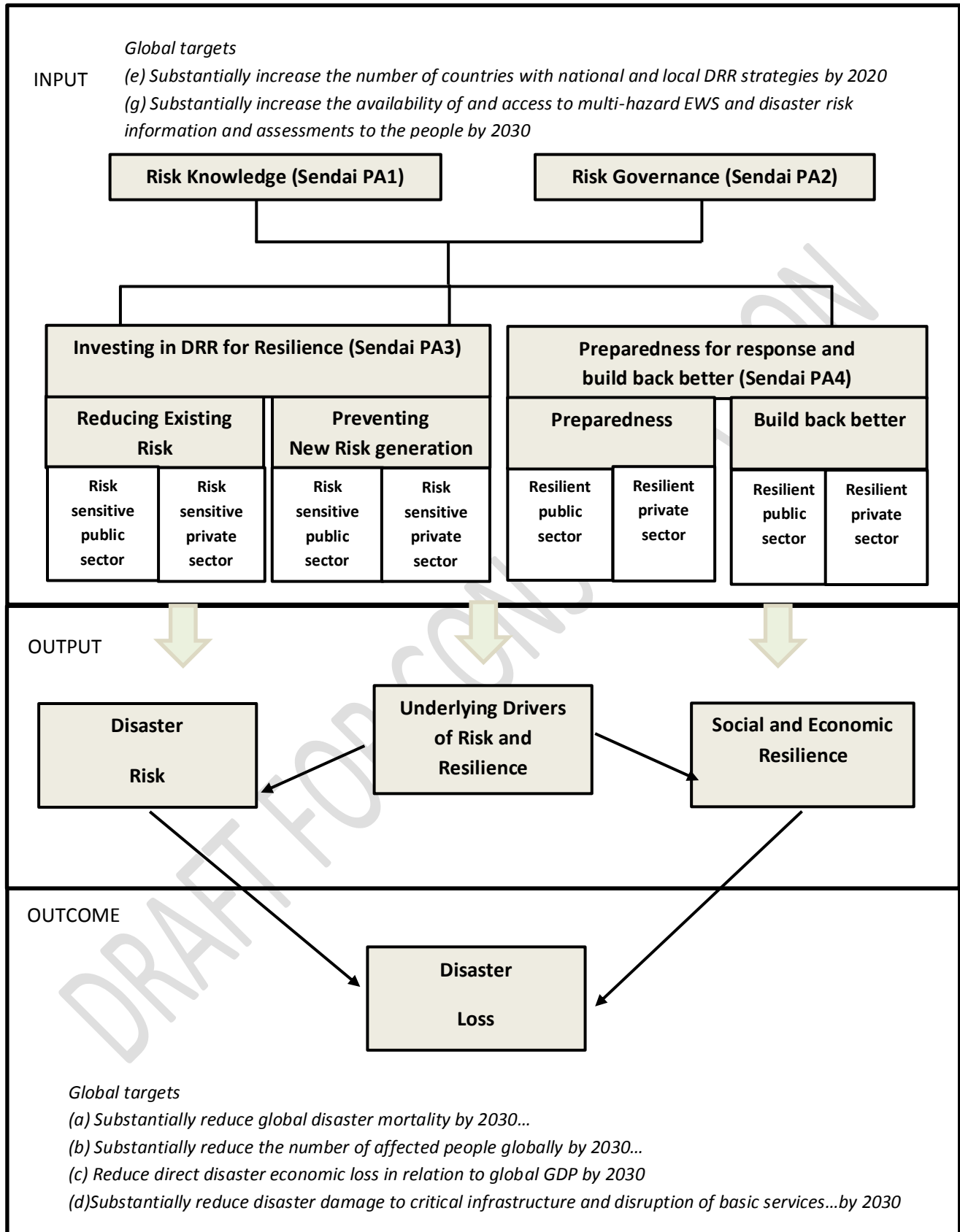
- Be useful “management tool” for pursuing focused and coherent action on DRR
- Inform decision makers on priority areas for the achievement of substantial reduction of disaster loss and risk in accordance with the Sendai Framework
- Strengthen the capacity of countries to create the national public policy frameworks for DRR
- Serve as a driver for implementation and mainstreaming of DRR in the whole of government and society and bringing on board all relevant ministries/agencies and stakeholders.
- Contribute to the full implementation of the other two major global agreements: SDG and Climate Change
- Enhance science-policy-society interface, including access to and building capacity to use the data that could support decision making
- Serve as “report card” to measure progress and strengthen national monitoring and evaluation capacities through increased and systematic availability of technical data and information in decision support system.
- Promote good governance and accountability

Figure 2 presents the architecture of the proposed monitoring framework in harmony with the Sendai Framework structure. In contrast to the HFA Monitor, it is proposed that progress is monitored not only at the level of Inputs but also at the level of Outputs and Outcomes⁵. This will enable governments to systematically assess, not only what policies and mechanisms they have in place to manage their disaster risks but whether these are effective in producing desired outputs in terms of preventing new risk generation, reducing existing risk and strengthening resilience, and outcomes in terms of reduced disaster loss and impacts.

The monitoring framework for the Sendai Framework for Disaster Risk Reduction therefore should be able to indicate how **public policies** that **prevent future risk generation, reduce existing levels of risk** and **strengthen social and economic resilience** (the capacity to absorb loss and recover), aimed at both the **public and private sectors** contribute to address the **underlying drivers of risk and resilience** and thus to **reduce risk** and **strengthen resilience**. The success of these public policies will ultimately influence the level of **disaster loss** a country experiences and, mediated by social and economic resilience, **the medium and longer run impacts** on its economy and society.

⁵ The distinction between outcomes, outputs and inputs needs to be handled pragmatically, and the proposal is designed by the approaches that are best suited to mobilize action and ensure accountability. In some cases, input indicators can play a critical role in driving and tracking the changes needed for DRR. For example, EWS is a vital component of DRR. In many cases, outcomes might only materialize after a long period of time from DRR investment is implemented.

Figure 2 – Proposed architecture of indicator system



Note: This figure is simplified. In reality, more arrows will connect each item (inter-linkage).

The proposed monitoring framework is designed not only to assist governments to measure progress, in the context of a Sendai Framework for Disaster Risk Reduction, but as a tool to support the definition of national plans, priorities and targets. It is designed to be used by countries in all income and geographic regions, with different risk profiles and at different stages in addressing their disaster risks. It is also designed to maximize the use of existing indicators from publically accessible global databases and which are common to other reporting frameworks (for example on sustainable development and climate change).

The framework combines global targets and indicators at the outcome and input levels, which are part of the Sendai Framework for Disaster Risk Reduction, with nationally defined targets and selected indicators at the output and input level that would reflect how each country approaches the achievement of the global targets. Countries can select an appropriate set of output and input indicators with respect to their policy approaches to preventing new risk generation, decreasing existing risk and strengthening resilience.

In this sense, indicators are divided into two categories: (a) core, relatively small set of common indicators (global indicators) on which all countries would commit to report (including indicators to monitor global targets); and (b) optional indicators from which countries could select when devising their own national strategies for DRR, in keeping with their level of disaster risk, levels of development, national priorities, capacity and other national circumstances. Both constitute “dashboard” to meaningfully measure progress.

It is not proposed to produce a composite index from the different indicator families. Rather it is proposed to present the indicators as a *dashboard* enabling visualization of in which areas countries are achieving outputs and outcomes and in which not. This may also permit a cluster analysis, grouping countries with similar successes and challenges.

Countries need to pay special attention to the potential of data disaggregation called for in paragraph 19 (g). To the extent possible, the Sendai Framework Monitor should monitor specific vulnerabilities and different risk environments for specific groups at risk including women, children, aged, disabled and migrants, because they tend to live in areas prone to environmental shocks without sufficient coping capacity. Focusing on national figure may mask sub-national differences and lead to perverse outcomes by diverting policy attention and resources way from such groups whereby already marginalized groups tend to be “left until the last”. Expected outcome of Sendai Framework for Disaster Risk Reductions would only be considered achieved if the outcome is met for all relevant disaggregated groups⁶.

This monitoring framework is designed for use by national governments. However, the overall conceptual framework, especially sequential structure of input, output and outcome could be replicated at local and regional levels and other stakeholders. Many of the proposed indicators could also be used by them. Consistent monitoring mechanism from local to national, regional and global is desirable while keeping flexibilities.

⁶ Possible disaggregation to identify marginalized group includes age, sex, location, income quintiles and disability. Disaggregation by age is often categorized into the following age group: 0-2 years (infants), 2-5 years (pre-school), 5-14 years (school age), 15-49 years (childbearing age), 15-64 years (working age), and 65 years and older (elderly persons).

Participatory process and mechanism for monitoring and reporting should be designed in each country, to enhance understanding of disaster risk generation mechanism among all stakeholders and facilitate common view on the feedback to policy improvement.

The results of national level monitoring should be analyzed nationally, regionally and globally as critical inputs to future regional and global platforms in the context of the Sendai Framework for Disaster Risk Reduction. The regional and global analysis should provide feedback to countries and other stakeholders as well as to regional and international bodies and should inform reporting on progress to the UN General Assembly.

The country-to-country voluntary peer reviews, recommended by the Sendai Framework for Action and piloted in the HFA Monitor should be also integrated in the new monitoring framework as a means to strengthen implementation and accountability as well as mutual learning between countries.

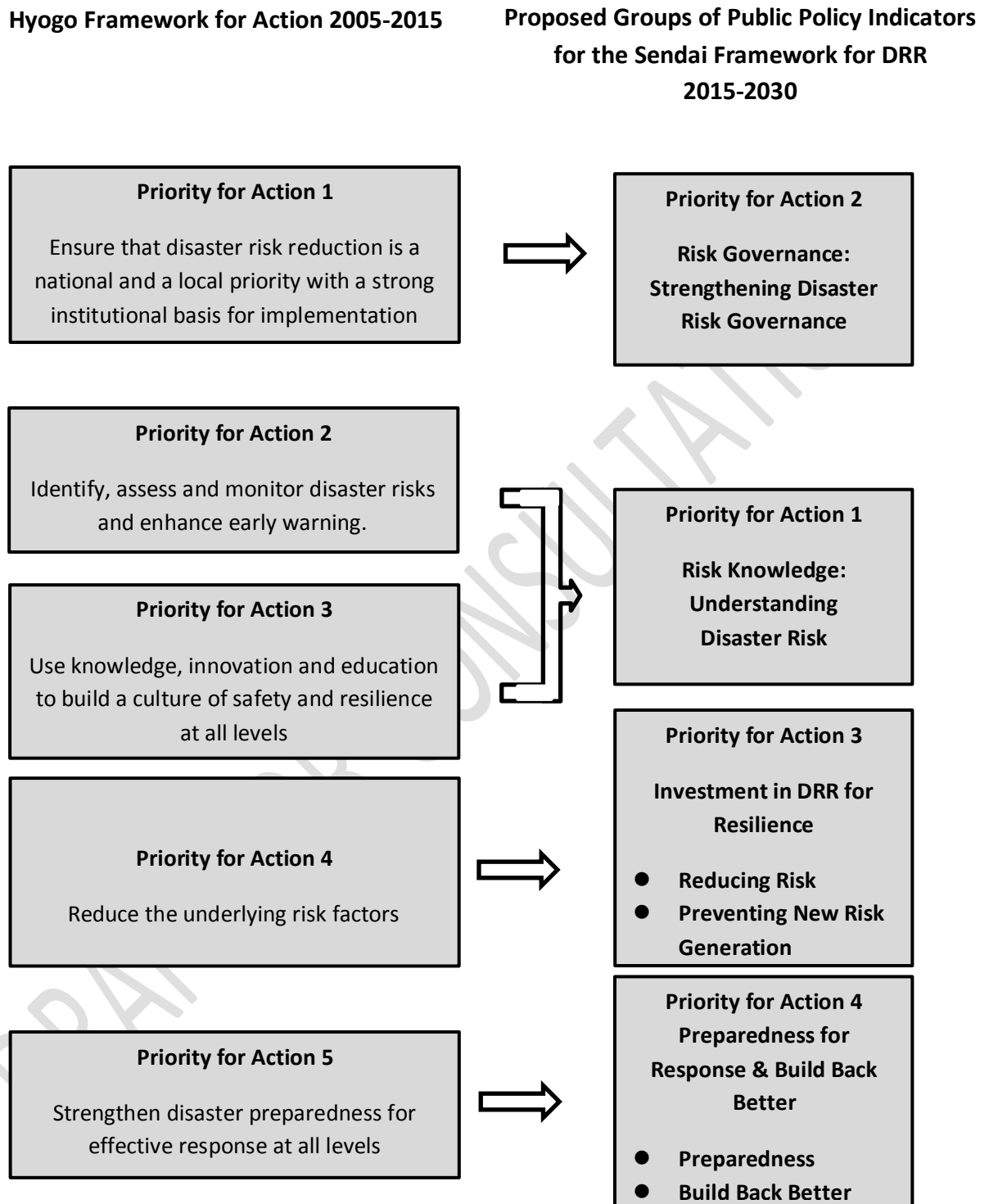
Below the structure of each level is briefly introduced. Details of suggested indicators are outlined in Appendix 1.

Input level: Public policies

At the **Input level**, a family of **Public Policy** indicators, comprised of four groups in accordance to the four priorities for action of Sendai Framework, would profile the kinds of policies that countries are using to manage their disaster risk. It will measure whether a country has public policies for preventing and reducing risk and for strengthening social and economic resilience and whether it has risk governance and risk knowledge arrangements in place to underpin these policy areas. It will focus on risk sensitive and resilient investment in both the public and private (businesses and households) sectors.

The proposed Public Policy indicators incorporate all the existing Core Indicators from the HFA, thereby ensuring no loss of continuity from the existing framework (see figure 3 and tables in Appendix A). In addition, new indicators on emerging areas and those that were newly introduced by the Sendai Framework are proposed.

Figure 3. Continuance from HFA: How are the groups of policy indicators restructured?



Note: For simplicity, the main policies in each priority for action are listed for this figure.

Indicators on **Risk Knowledge** and **Risk Governance** are considered as cross-cutting groups, given that they underpin other groups of public policy indicators organized around different disaster risk management strategies, namely: **Prevent Future Risk, Reduce Existing Risk** and **Strengthen Social and Economic Resilience**. These public policy indicators would be classified according to whether they support actions by the **public sector** (including local governments) or by the **private sector** (including businesses and households). In addition, the public policies would be grouped by **Sector** (e.g. health, education, transport, and environment). This will facilitate a more inclusive approach to monitoring progress and ownership of the indicators by each sector. It also represents a shift in paradigm towards disaster risk reduction seen as a responsibility of the state as a whole, rather than as a distinct sector under the responsibility of a specialized agency.

Progress in the family of Public Policy indicators would be measured, as in the HFA Monitor, through **periodic government self-assessment**. Given the focus on concrete public policies rather than on concepts and given the ownership of indicators by specific sectors, it is expected that self-assessment exercise could be more precise and less demanding than the current HFA Monitor.

As explained in the Section B, each country will select a set of appropriate Public Policy indicators according to its DRR National Strategies to implement the Sendai Framework for Disaster Risk Reduction. Therefore not all countries will report against all suggested indicators but rather against those indicators that are appropriate to their risk profile, economic trajectory and level of development. For example, fast growing economies in hazard exposed regions may need to concentrate efforts on preventing new risk generation, while countries with high risks but low levels of new capital investment may need to concentrate on reducing existing risks. In countries where certain level of risk should be retained as “residual risk” due to significantly high risk may concentrate on strengthening resilience. Process indicators are also proposed, where appropriate, to support countries in determination of national targets.

Subject to validation, a set of Global core Indicators against which all countries will report may be defined. These indicators will include global indicators to monitor global targets of Sendai Framework. Out of such global indicators, some will also monitor several targets of Sustainable Development Goals.

Output level: Effectiveness of public policies

At the Output level, three families of indicators are proposed, which would provide an objective measure regarding the effectiveness of the public policy indicators. The layer is expected to function as “bridge” connecting input and outcome indicators and enhance awareness and understanding of disaster risk generation mechanism for all stakeholders.

The first family would measure to what extent the **Underlying Drivers of Risk and Resilience** are effectively addressed or not. This family would contain six groups of indicators on Uneven Economic Development, Poverty and Inequality, Environmental Degradation, Badly Planned and Managed Urban Development, Climate Change and variability and Weak Governance. Disaster risk cannot be effectively and sustainably reduced unless these underlying drivers of risk and resilience are addressed.

The second indicator family would measure the current levels of **Disaster Risk** in the country with respect to key economic metrics, such as investment, debt and fiscal capacity. It would enable governments to assess their risk appetite and optimize their investments in disaster risk management in relation to their fiscal capacities.

The third indicator family would measure **Social and Economic Resilience**. This family would contain three groups of indicators measuring the Fiscal Resilience of the state, the Social Resilience of households and communities and Business Resilience. This indicator family would particularly provide information on whether a country can absorb and recover from disaster losses in a way that minimizes short and long run negative social and economic impacts.

All the suggested indicators at the Output Level would be sourced from existing published global datasets, compiled principally from sources such as the World Bank and the United Nations. This will partly constitute international cooperation for information sharing called for in paragraphs 47 (b) and (c) in the Sendai Framework. This would facilitate potential synergies with the (to be developed) data collection and monitoring systems for the SDGs and Climate Change Convention. The indicators and dataset suggested from international organizations and other stakeholders have most often consistent methodology and standard for global comparability and would provide useful benchmark in time and spatial horizon.

This collection of indicators does not mean the negligence of efforts by countries to develop national data. It is strongly recommended that countries start to collect and refine their own data and/or propose their own indicators.

Outcome level

At the Outcome level, a family of indicators on **Disaster Loss**, in terms of mortality, physical damage and direct economic loss is proposed, which would enable governments to monitor whether they are reducing disaster risk to sustainable and acceptable levels and whether social and economic development is being protected. Some indicators are global indicators to monitor global targets of Sendai Framework. Out of global indicators, some will also monitor several targets of Sustainable Development Goals.

Disaster loss is an indicator of realized risk. Whether loss is trending up or down, therefore gives governments a clear idea of the relevance and effectiveness of disaster risk management, in a broader context of development and climate change. The data for this indicator family would be sourced from national disaster loss databases. While not all governments currently record and account for their disaster losses in accordance to global standards for recording and reporting disaster losses⁷, creating this indicator family would provide an incentive to governments to improve their loss accounting mechanisms.

⁷ Until all countries have standardized disaster loss databases, as a temporary measure, it is proposed UNISDR will combine national and global data.

Integrated monitoring of the Sendai Framework for Disaster Risk Reduction, the Sustainable Development Goals and the Climate Change Convention

Guiding principle of the Sendai Framework for Disaster Risk Reduction clearly outlines that the development, strengthening and implementation of relevant policies, plans, practices and mechanisms need to aim at coherence, as appropriate, across sustainable development and growth, food security, health and safety, climate change and variability, environmental management and disaster risk reduction agendas. (Paragraph 19 (h))

The outcomes of the Sendai Framework will have a critical influence on the achievement of the SDGs and vice versa. Unless disaster risks are effectively managed, increasing disaster loss will undermine achievement across the SDGs. At the same time, whether or not the SDGs facilitate risk-sensitive investment by the public and private sectors will directly influence the underlying disaster risk drivers and hence future levels of risk and resilience. The public policies adopted to achieve both the Sendai Framework and the SDGs therefore need to be mutually supportive.

Given this mutually supportive relationship between both frameworks, it is critical that disaster risk reduction-related targets and indicators in the SDGs are also reflected in the Sendai Framework. Harmonized indicators, shared between both frameworks would allow measurement of how achievements in one framework contribute to the other (see Appendix 3).

The climate change agenda is also closely linked to the Sendai Framework, given that climate change is an underlying disaster risk driver that is increasingly and critically important. Currently the UNFCCC agenda is organized around climate change mitigation, climate change adaptation and loss and damage. Policies that countries adopt to mitigate climate change, focused on reducing greenhouse gas emissions, are part of policies aiming at preventing new risk generation. Policies on climate change adaptation and Warsaw Mechanism on loss and damage are central to policies that address existing disaster risks and strengthen resilience. The Sendai Framework and the Climate Change Convention are therefore linked at both the conceptual and policy levels. As in the case of the SDGs, shared indicators would functionally link both frameworks.

Aligning targets, indicators and reporting mechanism across all three agreements would encourage harmonized review to improve policy efficiency and effectiveness and reduce the reporting burden to countries. A synchronized and harmonized review process would be further facilitated by formal review of the Sendai Framework for Disaster Risk Reduction by the High Level Political Forum (HLPF) through the periodic meetings held under the auspices of the UN General Assembly and the ECOSOC.

Appendix 1 – Suggested indicators

This Appendix contains suggested indicators in each one of the families described in Section D of the document. The status of all indicators described below is that of suggestions that are subject to validation and testing over the coming months.

It is expected that countries will use a selection of these indicators, appropriate to their national DRR strategies to implement the Sendai Framework on Disaster Risk Reduction. The wide collection of suggested indicators provide the basis for a more definitive and smaller set of core indicators that will emerge following country consultations, expert meetings and country pilots.

In selecting a menu of indicators, the following criteria are considered⁸.

Action-oriented: The measurement of indicators should be achievable by the policy, and therefore should be sensitive to the improvements the policy wishes to achieve.

Relevant: Indicators should be directly relevant to the issue being monitored or assessed, and should be based on clearly understood linkages between the indicator and the phenomena under consideration.

Easy to understand: The definition and expression of the indicator should be intuitively and easily comprehensible to users.

Clear-cut: Indicators should effectively target the factor which they are measuring, and should avoid ambiguity and arbitrariness in the measurement.

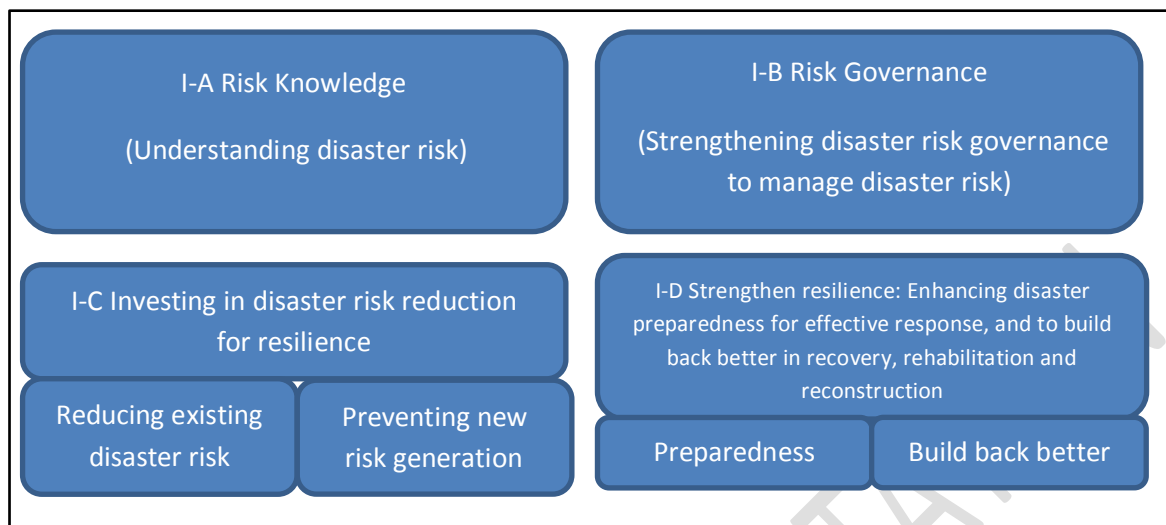
Cost: the Cost of collecting and processing the data needed for the selected indicators should be reasonable and affordable.

I. Input indicators

The family of Input indicators is made up of four groups of Public Policy indicators according to the four priorities for action in Sendai Framework (Figure A1-1). While these Public Policy indicators based on the Sendai Framework would replace the current HFA Monitor most of the proposed indicators are annotated with the corresponding Priority for Action under the HFA to facilitate cross-referencing.

⁸ Based on UNISDR (2008)

Figure A1-1: Structure of policy indicators



Whereas the HFA Monitor provides indicators for desired inputs and concepts (preparedness, culture of safety etc.), the proposed public policy indicators will focus on the specific policies required to achieve the outputs. Distortions as a result of subjectivity will be avoided to the degree possible. For example, the existence of a risk sensitive land use plan is objective and can be quantified as a binary (0 or 1) indicator (Table A1-1).

However, there are questions whether it is appropriate to measure countries' performance solely in pass/fail terms. To respond to this concern, and also facilitate national target discussion, **process indicators** are prepared to the extent possible.

Another issue is missing quality aspect. For example, the enforcement of building codes is often cited by countries as a challenge and it is difficult to quantify the level of enforcement. Therefore, it is important that the limitation of the policy indicators is recognized and that they are complemented with qualitative information, process indicators if possible, and analysis of the related output indicators.

Table A1-1: Major refinement from HFA Monitor (example)

HFA Monitor	Proposed Sendai Framework Indicator
<p>Priority 4 Core Indicator 4: Planning and management of human settlements incorporate disaster risk reduction elements, including enforcement of building codes: Select "Level of progress" from progress level 1 to 5.</p> <p>Key questions: Is there investment to reduce the risk of vulnerable urban settlements? Y/N</p>	<p>Land-use planning (including urban planning): Are disaster risk considerations factored into land-use planning laws, regulations and norms? (Y/N)</p> <p>If Yes, does the guideline take into consideration anticipated environmental and demographic changes? (Y/N)</p> <p>Process: the number of local governments that have land-use plans that conform to national land use regulation and consider disaster risk/ total</p>

<p>Means of verification:</p> <p>Investment in drainage infrastructure in flood prone areas: Y/M</p> <p>Slope stabilization in landslide prone areas: Y/N</p> <p>Training of masons on safe construction technology: Y/N</p> <p>Provision of safe land and housing for low income households and communities: Y/N</p> <p>Risk sensitive regulation in land zoning and private real estate development: Y/N</p> <p>Regulated provision of land titling: Y/N</p>	<p>number of local government at municipality level</p> <p>Building codes: Does the country have building codes that consider disaster risks? (Y/N)</p> <p>If yes, which disaster risk the building codes address? Select one or more from the following: (a) earthquake, (b) flood, (c) wind (due to cyclone etc.), (d) landslide, (e) tsunami, (f) heavy snow, (g) other (specify)</p> <p>Process: number of local governments that have building codes that conform to national hazard sensitive building code/ total number of local governments at municipality level</p>
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As highlighted in the main text, countries will develop National DRR Strategies towards the Sendai Framework for Disaster Risk Reduction and choose national targets and indicators appropriate to their risk profile and progress towards disaster risk reduction. The Public Policy Indicators suggested below provide (a) a menu that countries could select from in order to measure progress towards their agreed national targets in national DRR strategies, and (b) a basis for a set of common Core Indicators (including indicators that monitor global targets) to be designated against which all countries report.

At the same time, the sectors and regional/local level organizations that require sets of very specific indicators to monitor progress may define **Sub-Indicators** that nest within the proposed Public Policy Indicators, in harmony with the spirit of Sendai Framework for Disaster Risk Reduction. The present Appendix does not provide guidance at the sub-indicator level.

I-A. Risk Knowledge: Understanding Risk

Credible and useable risk information is essential to inform the design of DRR strategies at all levels, from the household and community level, through local governments, sectors and businesses and into national governments, and regional and global levels. Risk information critically underpins all disaster risk management applications. Risk information becomes risk knowledge only when users for specific applications appropriate it.

Risk knowledge is targeted at the Priority for Action 1 of the Sendai Framework for DRR. This builds on the Priority for Action 2 and 3 of the HFA. The experience of implementing the HFA highlights a number of challenges regarding risk knowledge:

- Governments, businesses and municipalities may not systematically record disaster loss and damage, particularly for small-scale events. They are unlikely to prioritize the necessary DRR investments unless they are aware of the magnitude of recurrent loss and damage.
- Impacts on economy (e.g. employment and production; investment and savings), society and environment are even more rarely measured except for specific large events.

- Loss data rarely differentiates disaster loss by gender, age, social group, economic sector, and other key indicators.
- While large numbers of risk assessments are produced at different scales, they are often inappropriate to the needs of users and are developed using non-standardized data and methodologies.
- Disaster risk reduction strategies, plans and programmes at the sector or local level may not be risk informed. Risk information is often neither utilized to strengthen public awareness and risk literacy amongst citizens or through the media, nor to improve public policy.
- Common global standards for measuring and accounting for disaster loss and for calculating risk have yet to be adopted.
- Information on disaster loss and risk are often not shared among related stakeholders. Such information may not be openly available to citizens, businesses, local governments, investors and other potential users and what is accessible may not be in a useful format.
- The potential for crowd data sourcing mechanism is not well captured.
- Integration of risk knowledge into curriculum in formal education and professional programme is still limited.
- Research into DRR, including reviews of disasters and of progress in reducing risks may be weak, uncoordinated and underused to inform public policy.
- Capacity building programme for DRR is often not systematic.

Focus	Suggested indicators (Underlined: suggested core indicators that all countries are expected to report) (Italic: Global indicators to monitor global target)	Sendai Priority for Action (PA)	Continuity from HFA Monitor
Disaster loss and impact	<u>A1: Loss Assessment:</u> Does the country have a nationally authorized loss and damage assessment guideline/methodology? (Y/N) If Yes, is it based on an international standard (such as DALA and PDNA)? (Y/N). If yes, specify the standard.	PA1 (d)	5.4 (MoV)
	<u>A2: Disaster Loss Database:</u> Does the country have a policy requiring local and the national government to systematically record disaster loss and damage due to both small-scale and large-scale disasters? (Y/N) If Yes, is there a national loss database? (Y/N) Is the national database disaggregated to the local level? (Y/N). Is the national database disaggregated by gender? (Y/N) <u>Is the database consistent with an international standard promoted by UNISDR/UNDP? (Y/N)? (TARGET (g))</u> <u>Is the database accessible to the public? (Y/N) (TARGET (g))</u>	PA1(d) PA1 (e) PA4 (n)	5.4 2.2 (MoV)
	<u>A3: Post-disaster impact assessments:</u> Does the country have nationally authorized guideline/methodology for measuring		

	<p><u>impacts from disasters? (Y/N)</u></p> <p>If Yes, which impacts does the guideline address? Please select one or more from following: (a) economic, (b) social, (c) environmental, (d) cultural heritage, (e) others (specify)</p> <p>If Yes, is a gender analysis included? (Y/N).</p> <p>If Yes, is the population displacement analysis included? (Y/N)</p> <p>A4: Loss accounting: Is disaster loss recorded in Statistical National Accounts? (Y/N).</p> <p>A5: Post-disaster review: Does the country have a policy or strategy to carry out post-disaster evaluations using an agreed methodology/ guideline to review disaster causality, occurrence and response/recovery based on evidence (Y/N)?</p> <p>If Yes, is government required to use the results of such reviews to inform risk-sensitive reconstruction or change in DRR policy (including “build back better”)? (Y/N)</p> <p>A6: International lessons learned: Are there any evidence that lessons learned from events abroad and changes in international agreements are reflected in domestic DRR policy?</p> <p>If Yes, which event or agreement? (Specify)</p>	<p>PA1(d)</p> <p>-</p> <p>PA4 (j)</p> <p>-</p>	<p>5.4 (MoV)</p> <p>-</p> <p>5.4</p>
<p>Risk Identification and socio economic analysis</p>	<p>A7: Hazard monitoring: Does the country have systems in place to monitor all hazards that the country is exposed to? (Y/N)</p> <p>If Yes, list the monitored hazards.</p> <p>A8: Risk assessments: Is the government legally or by national policy required to carry out risk assessments according to agreed guidelines in relevant sectors, including lifeline infrastructure and facilities (power, water and transport networks, hospitals etc.)? (Y/N)</p> <p>If Yes, it is based on probabilistic methodology? (Y/N)</p> <p>If Yes, list the targeted hazards.</p> <p>If Yes, list the sectors.</p> <p>If yes, are these assessments required to take into account potential sequential impacts? (Y/N)</p> <p>If Yes, are these assessments required to take into account climate change scenarios? (Y/N)</p> <p>If Yes, does the assessment take into consideration traditional, indigenous and local knowledge and practices? (Y/N)</p>	<p>PA1(b)</p> <p>PA1(b)</p> <p>PA1 (i)</p>	<p>2.2</p> <p>2.1</p>

	<p>If No, are there any missing information to carry out the risk assessment in appropriate scale? If Yes, please select one or more from the following: (a) hazard, (b) exposure, (c) vulnerability, (d) basic geography (DEM, administrative boundary), (e) historic loss data, (f) others (specify)</p> <p><u>A9: Multi Hazard risk profile: Does the country have a profile of all risks that country is exposed to? (Y/N) (TARGET (g))</u></p> <p><u>If Yes, the results are provided for stakeholders and people in an accessible, understandable and usable format? (Y/N) (TARGET (g))</u></p> <p><u>If Yes, it is based on probabilistic methodology? (Y/N)</u></p> <p>If Yes, year of the latest assessment</p> <p>If Yes, select one or more target hazards from the following: : (a) earthquake, (b) flood, (c) wind (due to cyclone etc.), (d) landslide, (e) tsunami, (f) heavy snow, (g) volcano, (h) drought, (i) forest fire, (j) epidemic, (k) others (specify)</p> <p>If Yes, is the profile accessible to the public? (Y/N)</p> <p>How is the risk profile used? Select one or more from the following: (a) national DRR strategy, (b) local DRR strategy, (c) spatial & land use planning, (d) building design criteria, (e) structural design of infrastructure, (f) national contingency plan, (g) local contingency plan, (h) DRR plan monitoring and enforcement, (i) economic planning, (j) environment policy, (k) others (specify)</p> <p><u>A10: Sector level risk assessments: Does the key development sector have implemented risk assessment? (Y/N)</u></p> <p>If Yes, which sector has the assessment? Select one or more from the following: (a) agriculture, (b) health, (c) energy, (d) water, (e) ecosystem management, (f) housing, (g) public finance, (h) others (specify)</p> <p><u>A11: Local level risk assessments: Does the country legally require local government to develop risk assessments? (Y/N)</u></p> <p>If Yes, is the assessment required to be probabilistic?</p> <p><u>Process: % of local government that have developed risk assessments for all hazards the city faces, at each sub-national level (e.g. state, municipality) (TARGET (g))</u></p> <p><u>% of local government having risk assessments for all hazards that city faces and presenting the assessments for all stakeholders and people in an accessible, understandable and</u></p>	<p>PA1(b)</p> <p>PA1 (n)</p> <p>PA1 (e)</p> <p>-</p> <p>-</p>	<p>2.1</p> <p>2.1</p> <p>2.1</p>
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	<p><u>usable format, at each sub-national level (TARGET (g))</u></p> <p>A12: Risk and Hazard maps: Are local governments legally required to develop and use risk and hazard maps to inform land-use zoning and development plans and evacuation planning? (Y/N)</p> <p>If Yes, is the methodology required to be probabilistic?</p> <p>If Yes, select one or more target hazards from the following: (a) earthquake, (b) flood, (c) wind (due to cyclone etc.), (d) landslide, (e) tsunami, (f) heavy snow, (g) volcano, (h) drought, (i) forest fire, (j) epidemic, (k) others (specify)</p> <p>If Yes, are the hazard maps updated regularly using better data and methodologies (Y/N)?</p> <p>Process: % of local governments that have developed risk and hazard maps at each sub-national level (e.g. state, municipality)</p> <p>% of local governments that have used risk and hazard maps to inform land-use and development at each sub-national level</p> <p>% of local governments that have used risk and hazard maps to inform evacuation site/route to the public at each sub-national level</p> <p>A13: Climate change: Does the country develop downscaled climate scenarios? Y/N</p> <p>If so are these integrated with hazard maps?</p> <p>A14: Social vulnerability assessment: Are local governments required to regularly monitor the location and conditions of vulnerable households and communities? (Y/N)</p> <p>If Yes, is gender analysis included in the assessment? (Y/N)</p> <p>Process: % of local governments that have a mechanism to monitor vulnerable households and communities at municipality level</p> <p>A15: Exposure database: Does the country maintain an inventory of exposed assets, including critical facilities, lifeline infrastructure, industrial zones and public buildings? (Y/N)</p> <p>If Yes, when was it last updated?</p> <p>A16: Building typology information: Are regular housing census undertaken? (Y/N)</p>	<p>PA1(b)</p> <p>PA1(c)</p> <p>PA1 (e)</p> <p>PA4 (m)</p> <p>-</p> <p>-</p> <p>-</p> <p>-</p> <p>-</p> <p>-</p>	<p>2.1</p> <p>-</p> <p>2.1 (MoV)</p> <p>-</p> <p>-</p>
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	<p>If Yes, do these include information on building structures? (Y/N)</p> <p>A17: Advising from Expert Committee on Risk Information for decision making: Has the country established a committee or network of experts who grasp the concepts of risk assessment, especially probabilistic approach to advise the national government in use of risk information in policy design? (Y/N)</p> <p>Does such a mechanism exist at sub-national level? (Y/N)</p> <p>A18: Disaster deficit scenario assessment: Does the country regularly review its financial capacity to absorb the Probable Maximum Loss from different hazards? (Y/N)</p> <p>A19: Cost-benefit analysis: Does a standardised approach or methodology exist for calculating the costs and benefits when determining public investments in risk reduction? (Y/N)</p> <p>A20: Baseline environmental data development through System of Environmental Economic Accounting (SEEA)⁹: Does country implement and report on SEEA accounts?</p>	-	-
		-	3.3 (MoV)
		-	3.3
		-	-
Data and information management	<p>A21: Open data platform: Does the country have policies and standards in place to develop and maintain a data platform enabling stakeholders and people to access and exchange risk-related information such as non-sensitive hazard exposure, vulnerability, risk, disasters and loss disaggregated information? (Y/N)</p> <p>If Yes, does the platform exist? (Y/N)</p> <p>If Yes, does the platform make use of GIS? (Y/N)</p> <p>Process: Number of access, Number of data download</p> <p>A22: Media involvement: Does the country have legislation or an official mechanism that requires national and local media accurately and responsibly represent/ analyze DRR information in public domain? (Y/N)</p> <p>A23: Crowd data sourcing mechanism: Does the country have a policy to utilize the information produced by the public (e.g. social media utilization)?</p>	PA1 (a) PA1(e) PA1 (f)	3.1
		-	2.3 (MoV)
		-	-
DRR research and development	<p>A24: Research agenda: Does the national science and technology agenda include research fields to strengthen technical and scientific capacity to capitalize on and consolidate existing knowledge and to develop and apply methodologies and models to assess disaster risks, vulnerabilities and exposure to all hazards</p>	PA1(j) PA1 (k)	3.3

⁹ SEEA provides information such as the use and availability of natural resources, the extent of emissions and the amount of economic activity undertaken for environment purposes. Such data will be a good baseline for loss and impact assessment. SEEA also makes it possible to create indicators linking poverty reduction and natural resource management.

	<p><u>that the country face? (Y/N)</u></p> <p>If Yes, is there a dedicated national budget line to support this research (Y/N)?</p> <p>Process: budget for DRM research</p> <p>Number of technical and scientific institute which implement DRR research</p> <p>If Yes, does the agenda include innovation and technology development in long-term, multi-hazard and solution-driven research in disaster risk management to address gaps, obstacles, interdependencies, and social, economic, education and environmental challenges and disaster risks? (Y/N)</p> <p>A25: Science-policy interface: <u>Is there a formal mechanism (e.g. DRR platform) to improve dialogue and cooperation among scientific and technological communities, other relevant stakeholders and policy makers in order to facilitate a science-policy interface for effective decision making in DRR? (Y/N)</u></p> <p>Process: Number of meeting organized with participation of science community and policy-makers through such mechanism, Number of participants in such meeting.</p>	PA1 (h)	3.3 (MoV)
<p>DRR education, awareness raising and capacity building</p>	<p>A26: Mandatory Education: <u>Are disaster risk knowledge (disaster mechanism, DRR measures and emergency preparedness) incorporated into the national educational curriculum at primary and secondary levels? (Y/N)</u></p> <p>If Yes, in which subject? (Specify the subject)</p> <p>If Yes, in which grade? (Specify the grade)</p> <p>A27: Professional Education: <u>Does the country have an educational policy that supports the establishment and/or maintenance of undergraduate or postgraduate programmes on DRR? (Y/N)</u></p> <p>Process: the number of undergraduate or post-graduate programmes on DRR</p> <p>A28: Awareness raising: <u>Does the country have a national strategy to strengthen public education and awareness in DRR and preparedness, including disaster risk information and knowledge, through campaigns, social media and community mobilization? (Y/N)</u></p> <p>If Yes, does the strategy consider the needs/accessibility of different groups? Select one or more from the following: (a) gender, (b) the aged (c) children, (d) disability, (e) geographically isolated (e.g. rural, island), (f) language barrier (e.g. migrant, tourist), (g) legal status (e.g. illegal migrant), (h) the poor, (i) other</p>	<p>PA1 (I)</p> <p>PA1 (I)</p> <p>PA1 (m)</p> <p>PA1(o)</p>	<p>3.2</p> <p>3.2</p> <p>3.4</p>

	<p>(specify)</p> <p>If Yes, are the results of risk assessments are integrated in the awareness raising strategy? (Y/N)</p> <p>Process: the number of participants in DRR campaign in International Disaster Reduction Day or similar national event</p> <p>Number of community-based organizations and non-governmental organization in DRR campaign in International Disaster Reduction Day or similar national event</p> <p>% of local governments that participate in City Resilient Campaign at municipality level.</p> <p>A29: Media policy: Does the national government provide training to media on DRR? (Y/N)</p> <p>A30: Capacity building for government official: <u>Are there dedicated plan or policy to strengthen the DRR capacity of public officials at both national and local levels? (Y/N)</u></p> <p>If Yes, which capacity is mainly trained? Select one or more from the following: (a) loss assessment and database, (b) risk assessment, (c) risk analysis for public investment project (including risk sensitive cost benefit analysis), (d) hazard monitoring, (e) information management including GIS, (f) early warning system, (g) risk-sensitive building and civil engineering, (h) disaster response, (i) DRR laws and institutions, (j) others (specify)</p> <p>If Yes, who are mainly trained? Select one or more from the following: (a) DRM agencies, (b) health services, (c) fire services, (d) police force, (e) armed force, (f) meteorological agency, (g) transportation/electricity/communication operators, (h) spatial planner, (i) civil engineer, (j) government official in general, (k) local government, (l) others (specify)</p> <p>If Yes, who are the targeted class? Select one or more from the following: (a) executive, (b) working level (legal, administrative), (c) working level (technical), (d) others (specify)</p> <p>Process: Number of training course</p> <p>Total number of days that government officials have taken capacity building exercise in one year.</p> <p>A31: Capacity building for civil and private sector: <u>Are there dedicated plan or policy to strengthen the DRR capacity of civil and private sector? (Y/N)</u></p> <p>If Yes, Who are the main targets? Select one or more from the</p>	<p>-</p> <p>PA1 (g)</p> <p>PA1(g)</p>	<p>-</p> <p>5.2</p> <p>3.4 (Mov)</p> <p>3.4</p>
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	<p>following: (a) the general public, (b) NGO and civil organizations, (c) community organization, (d) volunteers, (e) private sector, (f) others (specify)</p> <p>If Yes, which capacity is mainly trained? Select one or more from the following: (a) loss assessment and database, (b) risk assessment, (c) risk analysis for public investment project, (d)hazard monitoring, (e) information management including GIS, (f) early warning system, (g) risk-sensitive building and civil engineering, (h) disaster response, (i) DRR laws and institutions, (j) others (specify)</p>		
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I-B. Risk governance: Strengthening disaster risk governance to manage disaster risk

Risk governance refers to the set of institutional responsibilities, legislation, policies and regulations, administrative structures and procedures, planning, budgeting and reporting mechanisms that underpin disaster risk management. Risk governance is mainly targeted at the Priority for Action 2 of the Sendai Framework. This builds on the Priority for Action 1 of the HFA. The experience of the HFA implementation has highlighted many risk governance challenges:

- Disaster risk reduction legislation and policies may be skewed towards disaster preparedness and response and under emphasize the need to reduce existing risk especially via investment, to address underlying risk drivers and prevent risk generation or to strengthen resilience.
- The office responsible for disaster risk reduction in central government may lack the financial and human resources, technical capacity or political authority to ensure that disaster risk reduction is integrated into sector policies and plans. As a result, the sectoral plans are not well coordinated to improve synergy across sectors.
- Strong mechanisms for coordination across sectors, between central and local government and with other stakeholders, including civil society and the private sector, may not exist or remain weak.
- The policy and institutional frameworks for disaster risk reduction, climate change adaptation and other relevant sectors such as poverty reduction may not be integrated.
- The disaster risk issues are not well integrated into economic development planning at both national and local levels.
- A holistic vision of risk may not exist. Disaster risks may be managed in isolation from other related financial, technological, biological and political risks.
- Clear protocols for cooperation with neighboring countries that share trans-boundary risks may be absent or still at immature stage.
- While responsibilities for disaster risk reduction may have been decentralized to local government, this may not have been accompanied by the strengthening of the necessary capacities and resources.
- Mechanisms to ensure the implementation of policies and plans, compliance with laws and to assign accountability and responsibility may be absent.
- Partnerships between local governments and sectors with civil society and the private sector, in particular with low-income households and communities in planning and implementing disaster risk reduction are often more the exception rather than the norm.

Focus	Suggested indicators (<u>Underlined</u> : suggested core indicators that all countries are expected to report) (<i>Italic</i> : Global indicators to monitor global target)	Sendai Priority for Action (PA)	Continuity from HFA Monitor
Policy and legislative framework	<p>B1: DRR legislation: Does the country have a specific <u>DRR law/legal framework to reduce existing risk, to prevent new risk generation and to strengthen economic and social resilience? (Y/N)</u></p> <p>If Yes, list the targeted hazards.</p> <p>If Yes, year of the latest amendment to the legislation.</p> <p>If Yes, is the sectoral law required to comply with national DRR law/legal framework? (Y/N)</p> <p>If Yes, whose role is defined in the law? Select one or more from the following: (a) disaster management or DRR agency, (b) Prime Minister or President, (c) Ministry of Finance, (d) Ministry of Planning, (e) sectoral agency, (f) local government, (g) private sector, (h) community, (i) NGO and civil sector, (j) gender organization, (k) scientific organization, (l) the general public, (m) others (specify)</p> <p>B2: DRR strategy and plan: <u>Does the country have national DRR strategies and plans with targets, indicators and time frames, aimed at preventing the creation of risk, the reduction of existing risk and the strengthening of economic, social, health and environmental resilience? (Y/N) (TARGET (e))</u></p> <p>If Yes, list the targeted hazards.</p> <p>If Yes, year of the latest amendment to the national DRR strategy and plan</p> <p>If Yes, is the plan based on consideration of risk assessment? (Y/N)</p> <p>If Yes, does the plan take into consideration traditional, indigenous and local knowledge and practices? (Y/N)</p> <p>If Yes, does the DRR strategy consider the special context/needs of different groups? Select one or more from the following: (a) gender, (b) the aged (c) children, (d) disability, (e) geographically isolated (e.g. rural, island), (f) language barrier (e.g. migrant, tourist), (g) legal status (e.g. illegal migrant), (h) people with life-threatening and chronic disease, (i) other (specify)</p>	<p>PA2 (a)</p> <p>PA2 (f)</p> <p>PA2(b)</p> <p>PA1(n)</p> <p>PA1 (i)</p> <p>PA3 (k)</p>	<p>1.1</p> <p>1.3</p> <p>1.1</p>

	<p>If Yes, is the plan needed agreement from all related government agencies before the adoption? (Y/N)</p> <p>If Yes, is the sectoral plan required to comply with national DRR strategy and plan?</p> <p>Process: the number of sectoral plan to comply with national DRR strategy and plan and the list of such plans</p> <p>B3: Participatory planning mechanisms: <u>Does the country have policies or strategies in place that explicitly promote the involvement of civil society and the private sector in DRR planning?</u></p> <p>If Yes, select one or more target group for involvement from the following: (a) civil society, (b)community, (c) indigenous peoples, (d) migrants, (e)gender organization, (f) private sector, (g) others</p> <p>If Yes, select one or more mechanism from the following: (a) public consultations, (b) limited consultations to selected stakeholders, (c) membership in planning council, (d)others (specify)</p> <p>B4: Disaster risk reduction and economic development planning: <u>Is disaster risk included and accounted for in development plans? (Y/N) (TARGET (e))</u></p> <p>B5: Disaster risk reduction and climate change adaptation: <u>Are the policy frameworks for managing disaster risks and climate change adaptation integrated? (Y/N).</u></p> <p>If Yes, are these frameworks explicitly linked to economic development policy? (Y/N).</p>	<p>PA2 (f)</p> <p>-</p> <p>-</p> <p>-</p>	<p>-</p> <p>1.1 (MoV)</p> <p>1.1 (Mov)</p> <p>4.1</p>
<p>Institutional arrangement</p>	<p>B6: Institutional framework: <u>Does the country have a dedicated institutional framework (office, agency, system) for implementing the Sendai Framework? (Y/N)</u></p> <p>If Yes, is its functional location under President/Prime Minister’s Office or similar place? (Y/N)</p> <p>If Yes, does it have formal authority over sectors and local governments on DRR? (Y/N)</p> <p>If Yes, does it have the necessary technical, human and financial capacities to fulfil its functions? (Y/N)</p> <p>Process: % of budget for the dedicated institution(a) per total budget, and (b) per population</p> <p>Process: % of the official in the institution(a) per total</p>	<p>PA2 (g)</p>	<p>1.1</p>

	<p>number of government official, and (b) per population</p> <p>Process % of female official/total official in the institution</p> <p>B7: Multi stakeholder coordination: Does the country have a formal mechanism (Committee, National Platform etc.) to coordinate DRR policies (especially activities to reduce existing risk, prevent new risk generation and strengthening resilience) across sectors? (Y/N).</p> <p>If Yes, who chairs the coordination mechanism?</p> <p>If Yes, list members (e.g. Ministry of xx, local governments, private sector, civil sector, academic organizations).</p> <p>If Yes, what are the responsibilities of the mechanism? (Select one or more from following: (a) identify sectoral and multi-sectoral disaster risk, (b) build awareness and knowledge of disaster risk through sharing and dissemination of non-sensitive disaster risk information and data, (c) contribute to and coordinate reports on local and national disaster risk, (d) coordinate public awareness campaigns on disaster risk, (e) facilitate and support local multi-sectoral cooperation (e.g. among local governments), (f) contribute to the determination of and reporting on national and local DRR strategies and all policies relevant for DRR, and (g) others (specify...))</p> <p>If Yes, is the responsibilities established through laws, regulations, standards or procedures? (Y/N)</p> <p>Process: the number of meeting held annually</p> <p>B8: Parliamentarians: Does the country have parliamentarians association/committee dedicated to discuss DRR? (Y/N)</p> <p>Process: the number of member parliamentarians/number of total parliamentarians</p> <p>B9: Voluntary sector: Does the country have a law, or formal mechanism to support voluntary sector (e.g. non-profit groups) for example by giving tax exemption status? (Y/N)</p> <p>Process: the number of NPO dedicated for DRR</p> <p>Process: the number of DRR volunteer</p>	<p>PA2(g)</p> <p>PA1 (i)</p> <p>-</p>	<p>1.4</p> <p>-</p> <p>-</p>
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Local ¹⁰ level Implementation	<p>B10: Local DRR strategy and plan: <u>Is the role and responsibility of local government in DRR planning and implementation legally defined?(Y/N)</u></p> <p><u>Does the national government require local governments to establish local DRR strategies and plans with targets, indicators and time frames, aimed at preventing the creation of risk, the reduction of existing risk and the strengthening of economic, social, health and environmental resilience? (Y/N)</u></p> <p><i>Process:</i> <i>% of local governments with such local DRR strategy and plan at each sub-national level (e.g. state, municipality) (TARGET (e))</i></p> <p>Does the national government have regulatory and financial means to facilitate whole-of-society approach at local DRR strategy planning and implementation? (Y/N)</p> <p>If Yes, select one or more target group from the following: (a) civil society, (b)community, (c) indigenous peoples, (d) migrants, (e)gender organization, (f) private sector, (g) others</p>	PA2(g) (h)	1.3
	<p>B11: DRM in local development plan: <u>Is DRR legally required to be integrated into local development planning? (Y/N)</u></p> <p>Process: % of local governments that have developed risk sensitive development plan</p>	PA2 (a)	-
	<p>B12: Multi stakeholder coordination: <u>Does the country have a laws, regulations, standards or procedures to require local governments to establish formal mechanism (Committee, National Platform etc.) to coordinate DRR (activities to reduce existing risk, prevent new risk generation and strengthen resilience) across sectors and stakeholders?, (Y/N).</u></p> <p>If Yes, who chairs the coordination mechanism?</p> <p>If Yes, list members (e.g. Department of xx, private sector, civil sector, academic organizations, de-concentrated national office).</p> <p>If Yes, what are the responsibilities of the mechanism? Select one or more from following: (a) identify sectoral and multi-sectoral disaster risk, (b) build awareness and knowledge of disaster risk through sharing and dissemination of non-sensitive disaster risk information and data, (c) contribute to and coordinate reports on local disaster risk, (d) coordinate public awareness campaigns on disaster risk, (e)facilitate and support local multi-sectoral cooperation (e.g. among local</p>	-	1.4

¹⁰ "Local" refers to a set of particular administrative unit under national government, including region, prefecture, state, municipality, city, village, etc. depending on the country administrative structure.

	<p>governments), (f) contribute to the determination of and reporting on local and national disaster risk management plans and all policies relevant for disaster risk management, and (g) others (specify...)</p> <p>If Yes, are the responsibilities established through laws, regulations, standards or procedures? (Y/N)</p> <p>Process: % of local governments established coordination mechanism at each sub-national level (e.g. state, municipality)</p>		
Accountability¹¹ and liability¹²	<p>B13: National reviews: Does the national government have mechanisms to follow-up, periodically assess and publicly report on progress on national and local DRR strategies? (Y/N)?</p> <p>If Yes, year of the latest review</p> <p>If Yes, does the parliament have dedicated committees to discuss the reports and to promote and monitor enforcement of disaster-risk-related laws and policies? (Y/N)</p>	PA2 (e)	-
	<p>B14: Local reviews: Does the national government require local governments to follow-up, periodically assess and publicly report on progress on their local DRR strategies to local parliament or national government? (Y/N)</p>	PA2 (e)	-
	<p>B15: Capacity Review: Does the national government carry out assessment of the technical, financial and administrative DRM capacity to deal with the identified risks at national and local level? (Y/N)</p> <p>If Yes, year of the latest review.</p> <p>If Yes, does the parliament have dedicated committees to discuss the review to enhance the capacity? (Y/N)</p>	PA2 (c)	-
	<p>B16: Enforcement: Can non-compliance with existing safety-enhancing provisions of sectoral laws and regulations (e.g. land use and urban planning, building codes, environmental and resource management and health safety) and accompanying malicious risk generation or transfer be legally defined and judged to be breach of a law in civil law (Y/N),</p>	PA2 (d)	-

¹¹ **Accountability:** It can be said that accountability is a higher-level activity than responsibility in that it does not merely designate who is responsible for an action but also requires that the person who undertakes the task is able to give an account, reason or explanation for the action (Cornock M., 2011, in Nursing children and young people, April 2011, vol.23, no3, pp.25-26).

¹² **Liability:** This is a legal concept and implies there is a disadvantage to the person who is liable. This disadvantage may be as simple as having to account for one's actions to a legal body or in a legal framework. Liability, therefore, may be seen as a form of legal or legislative accountability, having a legal obligation to answer to the law through the courts or to a regulatory body. With liability, in addition to the requirement to give an account, there is also the possibility of a sanction. (*ibid*)

	<p>criminal law (Y/N) and/or administrative law (Y/N)?</p> <p>Process: the number of non-compliance sanctioned/the number of inspection</p> <p>B17: Quality standards: Does the country have quality standards, such as certifications and awards for DRR, with the participation of the private sector, civil society, professional associations, scientific organizations or the United Nations? (Y/N)</p> <p>Process: the number of organizations that satisfies the quality standards</p>	PA2 (j)	-
Global and regional co-operation	<p>B18: Regional Cooperation: <u>Is the country a formal member of a regional partnership mechanism for DRR? (Y/N)</u></p> <p>If Yes, specify the regional mechanism/organization</p> <p>If Yes, select one or more activities engaged from the following: (a) hazard monitoring, (b) probabilistic risk assessment, (c) early warning systems, (d) information sharing, (e) risk pooling or insurance as contingency finance, (f) disaster response, (g) general DRR strategy, (h) others (specify)</p>	PA2 global (a)(b) PA4 global (a) (b) (c) (f) (g) (h)	2.4
	<p>B19: Trans-boundary Cooperation: <u>Does the county participate in formal cooperation arrangements and protocols with neighbouring countries to address trans-boundary risks? (Y/N)</u></p> <p>If Yes, select target hazards from the following: (a) flood, (b) earthquake, (c) tsunami, (d) forest fire, (e) volcano, (f) drought, (g) other coastal disasters (e.g. high tide), (h)epidemic, (i) others (specify)</p> <p>If Yes, select one or more activities engaged from the following: (a) hazard monitoring, (b) risk assessment, (c) early warning systems, (d) information sharing, (e) risk pooling or insurance as contingency finance, (f) disaster response, (g) evacuation, (h) general DRR strategy, (i) others (specify)</p>	PA2 global (d)	2.4
	<p>B20: Global and Regional Platform for DRR: <u>Does your country participate in the latest Global and regional platform for DRR? (Y/N)</u></p> <p>If yes, the year of participation</p> <p>Process: Number of delegates participated</p>	PA2 global (c)	-
	<p>B21: Peer review: <u>Does your government participate in peer</u></p>	PA2 global	-

	<u>review as host country or reviewers to other countries? (Y/N)</u> If yes, year of participation <u>B22: International arrangement: Does the country meet and sustain international regulation or mechanisms that are related with DRR, such as International Health Regulations (Y/N), xx (Y/N)?</u> If yes, specify such mechanism in participation.	(e) PA2 global (b)	-
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I-C. Investing in disaster risk reduction for resilience¹³

This group of indicators is divided into two components: Reducing existing disaster risk and preventing new disaster risk generation in accordance with the goal of the Sendai Framework. Most of the time, in practical sense, policies to reduce existing risk and prevent new risk generation is similar or the same. However it is important to make distinction. In public health, the conventional wisdom is “prevention is cheaper than cure”. Preventing new risk generation shall be more cost-efficient than reducing existing risk. For example, building risk-sensitive housing from the start is cheaper than retrofitting housing. Governments need to consider allocation of resources between these two goals in short term and in the long term, in order to reduce total cost of DRR investment. Prevention is an important bridge to sustainable development concept. We need to reduce existing disaster risk to the maximum degree without increasing disaster risk for future generation.

This group of indicators is mainly targeted at the Priority for Action 3 of the Sendai Framework. This builds on the Priority for Action 4 of the HFA. The HFA Monitor highlights that countries have been increasing their investments in reducing existing risk, for example retrofitting buildings and infrastructure in accordance with the latest risk-sensitive building/design codes and mitigating hazards, through flood control infrastructure.

However, despite this progress, the Priority Action 4 with focus on reducing underlying risk drivers is the weakest progress out of 5 HFA priority areas. As a consequence, new risks are generated and in many cases are accumulating faster than risks are reduced through risk reduction investments. As a result, the sustainable development of society will be hindered.

Under the Sendai Framework, therefore, countries will have to give far greater emphasis to promoting more anticipatory approaches to prevent the generation of new risks. This implies

¹³ The following two groups of policies (I-C and I-D) are organized along two sub-categories, each focus on public sector and private sector. Policies in “**Risk informed public sector**” refer to policies to protect national government’s assets and functions from new and existing risks and strengthen its resilience. Policies in “**Risk informed private sector**” refer to national government’s policies aiming to change the behaviors of private sector (business or household) via enforcement of regulation or provision of diverse incentives, so that private sector will act to prevent and reduce risk and be resilient to disaster. In that sense, we would like to emphasize that items in “Risk informed private sector” are not the action of private sector *per se* but public policies to force or encourage behavioral change of private sector toward risk sensitive development.

The following two groups are also organised by broad Sectors. This provides guidance on which government sector would *own* each indicator, would develop appropriate sub-indicators if required and would be responsible for the monitoring and implementation.

ensuring that all new public and private investment should be risk sensitive. Public investment in exposed and vulnerable infrastructure and services undermines investments in economic and social development. At the same time, a large proportion of investment is made by the private sector, including small and large businesses, investors and households. Therefore, policies that aim to prevent disaster risk generation and accumulation need to include mechanism to regulate and provide incentives for risk-sensitive private investment.

The experience of the HFA implementation has highlighted many challenges in terms of preventing new risk generation and reduction existing risks:

- There is a lack of or insufficient dedicated financial and human resources for disaster preparedness, risk reduction, risk prevention and strengthening resilience. The public budget for risk reduction is often inadequate, in particular to invest in protective infrastructures. Many countries even do not have a mechanism to track their budget for DRR.
- Disaster risks may not be considered in public investment planning. The public investment planning and evaluation process may not take disaster risk into account, meaning that countries may be increasing their stock of disaster prone assets and infrastructure and increasing risks to society as negative externality of such public investment.
- Policies that promote economic growth may not take disaster risk into account and thus encourage investment in hazard-exposed areas.
- Disaster risk may not be taken into account in either public or private finances. As a consequence risk-blind investment, including debt purchases, may lead to increases in disaster risk.
- Protection of critical infrastructure is gaining attention. Public private partnership (PPP) is often required in this area. At the same time aging infrastructures are adding risks to the existing infrastructures. Climate change is likely to require change of design code of infrastructure engineering.
- Investments in risk reduction by upgrading and/or relocating informal settlements are generally insufficient and land use planning and building regulations may not be risk sensitive.
- Mechanisms to protect and enhance vital regulatory ecosystem services may not be effectively applied. Investments in environmental restoration including soil and water management are generally insufficient, particularly in low-income countries.
- Environment assessments, including both environment impact assessment and strategic environment assessment, do not necessarily integrate disaster risk into the assessment framework.
- Specific policies to ensure that all existing and new health and educational facilities take disaster risk into account may not exist or be applied
- Cooperation of critical private sectors, for example, banking, construction, transport, retail is expected to be mobilized.
- Financial protection schemes, including contingency fund, insurance, catastrophe bonds to buffer the fiscal losses caused by intensive disasters as well as mechanisms to facilitate timely finance to affected households and businesses, through micro finance, property insurance, remittances many exist.
- When critical infrastructure is not insured and when redundancy is not built into networks, losses cascade into impacts in other sectors and recovery may be slow.
- Agriculture policy, including subsidies, may generate or exacerbate disaster risks and increase food insecurity. Investments in productive land or natural resources are often not regulated by consideration of disaster risk issues. Crop insurance and clear guidelines on compensation strengthen resilience in the agricultural sector and receive increasing attention.

- Post-disaster recovery and reconstruction often *rebuilds* risk as disaster risk is not considered in planning and rebuilding.

(Indicators common to both components)

Focus	Suggested indicators (Underlined: suggested core indicators that all countries are expected to report)	Sendai Priority for Action (PA)	Continuity from HFA Monitor
DRR in public finance	<p>C1: Budget: Does the country have a dedicated budget line for disaster risk reduction that can be accessed by sectors and local governments for all aspects of DRR including preventing new disaster risk generation (Y/N), reducing existing disaster risk (Y/N), increasing preparedness for response and recovery (Y/N), response and recovery (Y/N) and reconstruction (Y/N)?</p> <p>If No, does the country have a budget tracking mechanism for DRR budget, including preventing new disaster risk generation (Y/N), reducing existing disaster risk (Y/N), increasing preparedness for response and recovery (Y/N), response and recovery (Y/N) and reconstruction (Y/N)?</p> <p>Process: DRR budget/total budget, and percentage of allocation to each sub-category (Prevention of new risk generation, existing risk reduction, preparedness, response/recovery and reconstruction)</p>	PA3 (a)	1.2
	<p>C2: Local capacities: Does the national government have regular budget to transfer grant to local government for DRR activities?</p> <p>Process: transfer to local DRR budget/overall national budget</p> <p>Process: % of local governments that have established disaster risk management section with regular dedicated budgets at each sub-national level</p>	PA3 (a)	1.3

1-C-a. Reducing existing risk

Responsible Sector/Agency	Risk informed public sector (Underlined: suggested core indicators that all countries are expected to report) (Italic: Global indicators to	Sendai Priority for Action (Continuity from HFA Monitor)	Risk informed private sector (Underlined: suggested core indicators that all countries are expected to report)	Sendai Priority for Action (Continuity from HFA Monitor)

	monitor global target)			
Public Works or infrastructure sector (including transport, water and sanitation)	<p><u>C3: Critical infrastructure protection:</u> <i>Does the country adapt and implement a critical infrastructure protection plan or strategy to protect such infrastructures from disasters and other shocks? (Y/N)</i> <u>(TARGET (e))</u></p> <p>If Yes, which kinds of infrastructure are concerned in the plan? Select one or more from the following: (a) command function of government, (b) critical energy plant and storage (e.g. electricity, gas and oil), (c) drinking water plant/trunk route, (d) transportation hub and trunk route, (e) telecommunication, (f) critical health facility, (g) central bank and other critical financial facility, (h) critical army base, (i) others (specify)</p> <p>If Yes, does the plan consider the effect of climate change? (Y/N)</p> <p><u>C4: Infrastructure maintenance:</u> <i>Does the country have life cycle asset management policy or plans for infrastructures (including maintenance and replacement)? (Y/N)</i></p> <p>If Yes, which sector has asset management plan? Select one or more from the following: (a) electricity, (b) drinking water, (c) sewage water, (d) gas, (e) telecommunication, (f) railway, (f) road, (g) port/airport, (h) public health, (i) mandatory public education, (j) others (specify)</p>	<p>PA3 (c) (4.3)</p> <p>PA3 (c)</p>	<p><u>C10: Privately owned infrastructure protection:</u> <i>Are privately owned infrastructures covered in a country's critical infrastructure protection plan or strategy?(Y/N)</i></p>	PA3 (c)

	<p>If Yes, does the national government require local governments to prepare asset management plan? (Y/N)</p> <p>Process: % of local governments having asset management plan at each sub-national level (e.g. state, municipality)</p> <p>C5: Roads and transport: Does the country have a policy to <u>strengthen and protect transport infrastructure, including roads, rail, sea and air traffic, and built in redundancy for transportation hubs (sea and air ports) and trunk routes?</u> (Y/N)</p> <p>C6: Drainage infrastructure: Does the country have policy to <u>improve waste water and drainage management in urban areas, taking into account climate change?</u> (Y/N)</p> <p>Process: the area covered by drainage that has capacity to withstand flood of x years of return period (divided by all hazard exposed areas)</p> <p>C7: Water management: Does the country have a policy in <u>place to improve water management in areas prone to flood, drought or storm surge, taking into account climate change?</u> (Y/N)</p> <p>Process: the percentage of levees that has capacity to withstand event of x years of return period (divided by all hazard exposed coast/river line)</p> <p>C8: Government building: Does the country have a policy to</p>	<p>PA3 (c)</p> <p>PA3 (c)</p> <p>(4.4 MoV)</p> <p>PA3 (c)</p> <p>PA3 (c)</p>		
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	<p><u>strengthen national and city government buildings to withstand disasters? (Y/N)</u></p> <p>Process: the percentage of government buildings that has capacity to withstand event of x years of return period (divided by all government critical buildings)</p> <p>C9: Insurance for infrastructure: <u>Does the country have a regulatory framework and mechanism for infrastructure insurance against hazard? (Y/N)</u></p> <p>If Yes, sector covered</p>	PA3 (b)		
Telecom sector	<p>C11: IT infrastructure: <u>Does the national government have a comprehensive policy in place to protect its IT infrastructure and built in redundancy for data and computing hubs in case of emergencies? (Y/N)</u></p>	PA3 (c)	<p>C12: Privately owned IT infrastructure protection: <u>Are privately owned infrastructures covered in a country's IT infrastructure protection policy?(Y/N)</u></p>	PA3 (c)
Energy sector	<p>C13: Energy infrastructure: <u>Does the national government have a comprehensive policy in place to protect its energy infrastructure and built in redundancy in case of emergencies? (Y/N)</u></p>	PA3 (c)	<p>C14: Privately owned energy infrastructure protection: <u>Are privately owned energy infrastructures covered in a country's energy infrastructure protection policy?(Y/N)</u></p>	PA3 (c)
Housing and urban development sector	<p>C15: Settlement upgrading: <u>Does the country have a policy to upgrade informal settlements, including through the provision of basic and risk-reducing infrastructure? (Y/N)</u></p> <p>Process: % of population having access to basic infrastructure (sewage, portable water, electricity)</p>	PA3 (f) PA3 (h) PA3 (j) (4.4 MoV)	<p>C16: Facilitating relocation: <u>Does the country have a scheme (based on law or programme) to provide financial incentives (subsidy or tax exemption) for relocation from hazard prone area to safer area? (Y/N)</u></p> <p>Process: the number of housings/buildings relocated</p> <p>C17: Facilitating housings/buildings retrofitting: <u>Does the country have a scheme (based on law or programme) to</u></p>	PA3 (f) PA2 (k) PA3 (h) (4.3)

		<p><u>provide financial incentives (subsidy or tax exemption) for building retrofitting? (Y/N)</u></p> <p>If yes, which hazard the retrofitting address? Select one or more from the following: (a) earthquake, (b) flood, (c) wind (due to cyclone etc.), (d) landslide, (e) tsunami, (f) other (specify)</p> <p>Process: The number of housings/buildings retrofitted to conform to the latest building codes</p> <p>the number of non-compliance sanctioned/the number of inspection</p> <p>C18: Property rights: <u>Does the country have transparent and secure registration system of land rights? (Y/N)</u></p> <p>Process: the number of persons with documented or recognized evidence of rights to land and properties/population</p> <p>C19: Work place resilience: <u>Does the national government have a scheme (based on law or programme) to provide financial incentives (subsidy or tax exemption) for office/factory retrofitting? (Y/N)</u></p> <p>Process: The number of offices/factories retrofitted to conform to the latest safety standard</p> <p>the number of non-compliance sanctioned/the number of inspection</p> <p>C20: Informal housing: <u>Does the country have a policy in place to promote safe building in informal settlements (for example, including mason training, the application of</u></p>	<p>-</p> <p>PA3(e)</p> <p>PA3 (f)</p> <p>PA3 (h)</p>
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			<u>improved technologies and materials)? (Y/N)</u>	PA3 (j)
Economy and finance sector	<p>C21: Financial infrastructure: <u>Does the national government have a comprehensive policy in place to protect its financial infrastructure (e.g. central bank, stock exchange) from disasters? (Y/N)</u></p> <p>C22: Contingency fund: <u>Does the country have a contingency fund (money pooled over years)? (Y/N)</u></p> <p>If Yes, can the fund also be used for reducing and preventing risk? (Y/N)</p> <p>Process: Pooled amount</p> <p>C23: Annual budget allocation for contingency: <u>Does the country have a policy to set aside certain % of the budget for emergency? (Y/N)</u></p> <p>Process: % of annual budget which is set aside</p> <p>C24: Risk transfer: <u>Does the country transfer part of its fiscal disaster risk through mechanisms such as intergovernmental risk pools, insurance, reinsurance or catastrophe bonds? (Y/N)</u></p> <p>If Yes, which hazards are targeted? Select one or more from the following: (a) cyclone, (b) earthquake, (c) flood, (d) other (specify)</p> <p>C25: Contingency Credit: <u>Does the country have contract for contingency credit to prepare for disaster? (Y/N)</u></p> <p>C26: Economic diversification: Does the country have trade</p>	<p>PA3 (c)</p> <p>PA3 (b) (5.3)</p> <p>PA3 (b) (5.3)</p> <p>PA3 (b) (5.3)</p> <p>PA3 (b) (5.3)</p> <p>PA3 (b) (5.3)</p> <p>PA3 (b)</p> <p>-</p>	<p>C27: Catastrophe insurance: <u>Does the country have a regulatory framework and mechanism for property insurance against hazard? (Y/N)</u></p> <p>If Yes, does the country provide subsidy to make it affordable to low income households? (Y/N)</p> <p>If Yes, which hazards are targeted? Select one or more from the following: (a) earthquake, (b) flood, (c)cyclone, (d) fire, (e)other (specify)</p> <p>Process: penetration rate</p> <p>C28: Catastrophe insurance: <u>Does the country have a regulatory framework and mechanism for business interruption insurance against hazard? (Y/N)</u></p> <p>If Yes, does the country provide subsidy to make it affordable to SMEs? (Y/N)</p> <p>If Yes, which hazards are targeted? Select one or more from the following: (a) earthquake, (b) flood, (c)cyclone, (d) fire, (e)other (specify)</p> <p>C28: Micro-finance: Does the country have law or regulation that allows micro-finance schemes to provide credit in case of disaster? (Y/N)</p>	<p>PA3 (b) (5.3, 4.2)</p> <p>PA3 (m) (4.2)</p> <p>-</p>

	and investment policies and agreements in place that facilitate economic diversification? (Y/N)			
Environment sector including forestry	<p>C29: Sustainable forest management planning: Does country have sustainable forest management plan that reduce existing risk, prevent new risk generation and strengthen resilience? (Y/N)</p> <p>C30: Sustainable costal area management planning: Does country have sustainable coastal area management plan that reduce existing risk, prevent new risk generation and strengthen resilience? (Y/N)</p> <p>C31: Environmental restoration: <u>Does the country have a policy to restore or enhance damaged or degraded ecosystems in order to reduce risks and increase ecosystem services? (Y/N)</u></p> <p>If Yes, which is the target ecosystems protected? Select one or more from the following: (a) mountain, (b) forest, (c) river, (d) coastal areas, (e) drylands, (f) wetlands, (g) aquifers, (h) mangroves, (i) marine environment, (j) other (specify).</p> <p>Process: the restored area supported by such policy/ total environmentally sensitive areas</p>	<p>-</p> <p>(4.1 MoV)</p> <p>-</p> <p>(4.1 MoV)</p> <p>PA3 (g)</p> <p>PA3 (n)</p> <p>(4.1)</p>	<p>C32: Environmental restoration: <u>Does the country have financial or legal incentives to encourage the private sector to invest in the restoration of ecosystem services? (Y/N)</u></p> <p>If Yes, which is the target ecosystems protected? Select one or more from the following: (a) mountain, (b) forest, (c) river, (d) coastal areas, (e) drylands, (f) wetlands, (g) aquifers, (h) mangroves, (i) marine environment, (j) other (specify).</p> <p>Process: the restored area supported by such policy/ total environmentally sensitive areas</p> <p>Process: the amount private sector invested in ecosystem conservation service</p>	<p>PA3 (g)</p> <p>PA3 (n)</p> <p>(4.1)</p>
Agriculture and rural development sector	<p>C33: Food security: <u>Does the country have a food security policy (e.g. maintaining food stockpiles or having contingency arrangements to purchase food or controlling food exports in the case of food</u></p>	<p>PA3 (j)</p>	<p>C35: Productive asset protection: <u>Does the national government have a scheme (based on law or programme) to provide financial incentive (subsidy or tax exemption) to strengthen protection of livestock, working animals and tools or facilitate</u></p>	<p>PA3 (p)</p>

	<p><u>crisis)? (Y/N)</u></p> <p>C34: Agricultural infrastructure: Does the country have a policy to invest in water and soil conservation and other measures aimed at reducing agricultural disaster risk? (Y/N)</p> <p>Process: the crop area supported by agricultural water infrastructure that has capacity to withstand drought (and/or flood) of x years of return period (divided by all vulnerable crop areas)</p>	-	<p><u>adoption of disaster resilient seeds? (Y/N)</u></p> <p>Process: amount of subsidy (or forgone tax) for such programme</p> <p>C36: Crop insurance: Does the country have a regulatory framework and mechanism to provide crop insurance? (Y/N)</p> <p>If Yes, does the country provide subsidy to make it affordable to low income households or small scale farmers? (Y/N)</p> <p>Process: penetration rate.</p>	<p>PA3 (b) (4.2 MoV)</p>
Social welfare sector			<p>C37: Social protection scheme: <u>Does the country have legislation and policies on social protection that explicitly considers a social protection floors? (Y/N)</u></p> <p>Process: % of eligible population covered by national social protection programs in (a) medical care, (b) sickness benefits, (c) protection for disability, (d) old age and survivorship, (e) maternity, (f) children, (g) unemployment and employment injury, and/or (h) general protection against poverty</p>	<p>PA3 (j) (4.2)</p>
Education	<p>C38: School assessment and retrofitting: <u>Does the country have a policy to assess disaster risks of public schools and retrofit them? (Y/N)</u></p> <p>Process: % of public schools assessed</p> <p>Process: % of public schools retrofitted to conform to the latest safety standard</p>	<p>PA3 (c) (4.3(MoV))</p>	<p>C39: School assessment and retrofitting: <u>Does the country have a policy to facilitate the disaster risk assessment and retrofitting of private schools via regulation or financial incentive? (Y/N)</u></p> <p>Process: % of private schools assessed</p> <p>Process: % of private schools retrofitted to conform to the latest safety standard</p>	<p>PA3 (c) (4.3(MoV))</p>
Health	<p>C40: Health facility assessment and retrofitting: <u>Does the country have a policy to assess disaster risk of public health facilities and retrofit them?</u></p>	<p>PA3 (i) PA3 (c) (2.1 (MoV))</p>	<p>C41: Health facility assessment and retrofitting: <u>Does the country have a policy to facilitate the disaster risk assessment and retrofitting of private health facilities via regulation or financial</u></p>	<p>PA3 (i) PA3 (c) (2.1 (MoV))</p>

	(Y/N) Process: % of public health facilities assessed Process: % of public health facilities retrofitted to conform to the latest safety standard	4.3 (MoV)	<u>incentive?</u> (Y/N) Process: % of private health facilities assessed Process: % of private health facilities retrofitted to conform to the latest safety standard	4.3 (MoV)
Culture	C42: Cultural heritage protection: Does the national government have a policy to protect sites of historical, cultural heritage and religious interest from disaster? (Y/N) Process: % of protected sites owned by public sector	PA3 (d)	C43: Cultural heritage protection: Does the national government have a scheme (based on law or programme) to provide to private owners financial incentive (subsidy or tax exemption) to protect sites of historical, cultural heritage and religious interest from disaster (Y/N). Process: amount of subsidy (or forgone tax) for such programme Number of protected sites	PA3 (d)
Tourism			C44: Tourism preparedness: Does the country have formal protocol to mobilize cooperation from tourism association to reduce disaster risk and prepare for emergency? Process: the number of tourism related companies joining formal protocols (e.g. MOU)	PA3(q)

I-C-b. Preventing new risk generation

Responsible Sector/Agency	Risk informed public sector (Underlined: suggested core indicators that all countries are expected to report)	Continuity from HFA	Risk informed private sector (Underlined: suggested core indicators that all countries are expected to report)	Continuity from HFA
Investment Planning	C45: Public Investment planning: Is disaster risk concern included in public investment plan? (Y/N) C46: Public Investment criteria: Does the national government institutionalise by policy or law the evaluation of benefit of	PA3 (c) (1.1, 4.3, 4.6)		

	<p><u>disaster risk reduction/prevention as criteria of decision making of all or large scale public investment projects?</u> (Y/N)</p> <p>Process: % of public investment projects that have been evaluated/total number of project evaluated</p>			
<p>Economy and finance sector (including trade and investment)</p>	<p>C47: National Bond issuance: Does the country have disaster risk information disclosure policy when issuing national bond? (Y/N)?</p>	<p>PA3 (m)</p>	<p>C48: Disclosure and reporting: Are there statutory requirements that oblige large companies, the financial sector and critical utility companies to declare and report on their exposure to disaster risk, investment in DRR and the likely impacts on revenue and growth? (Y/N)</p> <p>C49: Disclosure of Natural Resource Rights Holdings¹⁴: Does the government maintain and publish an up to date register of all natural resource rights holders and the full text of terms and conditions associated with their natural resource rights and the beneficial owners of those rights? (Y/N)</p> <p>C50: Investment promotion: Is disaster risk management integrated into investment promotion policies, including the location setting of Special Economic Zones (SEZs)? (Y/N)</p> <p>Process: % of SEZ that implemented risk assessment</p>	<p>PA3 (c) PA3 (m)</p> <p>-</p> <p>PA3 (m) PA3 (c)</p> <p>PA3 (m)</p>

¹⁴ Extractive industries are one of the most risk-prone or even risk generating industry. Disclosure of rights and rights holder is an essential precondition to ensure that all parties benefit from large scale resource investments. It allows citizens to monitor rights in areas such as environmental compliance and the fulfillment of social comments.

			<p>C51: FDI policy: Does the country have a scheme (based on law or programme) to provide financial incentives (subsidy or tax exemption) for risk sensitive foreign direct investment? (Y/N)</p> <p>Process: subsidized FDI/total FDI</p> <p>C52: Public procurement: Does the country have a policy to provide preferential advantage to authorized risk sensitive companies in public procurement process?</p>	<p>PA3 (c)</p> <p>PA3 (m)</p> <p>PA3 (c)</p>
<p>Public Works or infrastructure sector (including transport, water and sanitation, communication)</p>	<p>C53: Risk sensitive infrastructure: Are laws and policies in place to ensure that disaster risk is integrated into the engineering design code and site selection criteria of all public works and infrastructure? (Y/N)</p> <p>If Yes, does the national government take climate change scenario into consideration for the infrastructure design code? (Y/N)?</p>	<p>PA3 (c)</p> <p>(1.2 (MoV))</p>	<p>C54: Public-private partnerships: Are utility providers and other private companies delivering public services legally obliged to report to government on and manage disaster risks?(Y/N)</p> <p>C55: PFI Contract: Does the country have a policy to take disaster risk issues into consideration in PFI contracting process? (Y/N)</p>	<p>PA3 (c)</p> <p>PA3 (m)</p>
<p>Housing and urban development sector</p>	<p>C56: Public sector housing: Does the country have legislation or policy in place that requires disaster risk to be taken into account in the design and siting of public housing? (Y/N)</p> <p>Process: % of new public housings that have factored disaster risk into their design or siting</p>	<p>PA3 (j)</p> <p>PA3(c)</p>	<p>C57: Land-use planning (including urban planning): Are disaster risk considerations factored into land-use planning laws, regulations and norms? (Y/N)</p> <p>If Yes, does the guideline take into consideration anticipated climatic, environmental and demographic changes? (Y/N)</p> <p>If Yes, which hazard the land</p>	<p>PA3 (f)</p> <p>4.4 (Mov)</p>

		<p>use planning laws address? Select one or more from the following: (a) earthquake, (b) flood, (c) wind (due to cyclone etc.), (d) landslide, (e) tsunami, (f) heavy snow, (g) other (specify)</p> <p>Process: % of local governments that have land-use plans that conform to national land use regulation and consider disaster risk at municipality level</p> <p>C58: Building codes: Does the country have building codes that consider disaster risks? (Y/N)</p> <p>If Yes, does the guideline take into consideration anticipated climatic, environmental and demographic changes? (Y/N)</p> <p>If Yes, which hazard the building codes address? Select one or more from the following: (a) earthquake, (b) flood, (c) wind (due to cyclone etc.), (d) landslide, (e) tsunami, (f) heavy snow, (g) other (specify)</p> <p>Process: % of local governments that have building codes that conform to national hazard sensitive building code at municipality level</p> <p>C59: Building permits: Does the country have a policy in place to take disaster risk into account in the granting of building permits (with respect to siting and building safety)? (Y/N)</p>	<p>PA3 (h) (4.4)</p> <p>PA3 (h)</p>
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			<p>Process: % of local governments that have building permit criteria that conform to such national policy at municipality level</p> <p>C60: Inclusive urban development: Are laws or policies in place that facilitate access to safe land (for example publically provided serviced sites) and risk reducing infrastructure for low-income households? (Y/N)</p> <p>C61: Architect License: Does the country have licensing system for engineers or architects to ensure their qualification for designing/constructing safer buildings? (Y/N)</p> <p>Process: number of licensed architect</p> <p>C62: Work place resilience: <u>Does the national government have a policy of structural safety standard applied to offices and factories? (Y/N)</u></p> <p>Process: % of office and factory that satisfy standard</p>	<p>PA4 (j)</p> <p>4.4 (MoV)</p> <p>PA4 (h)</p> <p>PA3 (e)</p>
Education sector	<p>C63: Safe school construction: <u>Does the country have legislation or policy in place that requires disaster risk to be taken into account in the design and siting of public schools? (Y/N)</u></p> <p>Process: % of new public schools that have factored disaster risk into their design or siting</p>	<p>PA3 (c)</p> <p>PA3 (i)</p>	<p>C64: Safe school construction: <u>Is disaster risk evaluated before the granting of approval for new private schools? (Y/N)</u></p> <p>Process: % of new private schools that have factored disaster risk into their design or siting</p>	<p>PA3 (c)</p> <p>PA3 (i)</p>
Health sector	<p>C65: Safe health facility construction: <u>Does the country have legislation or policy in place</u></p>	<p>PA3 (c)</p> <p>PA3 (i)</p>	<p>C66: Safe health facility construction: <u>Is disaster risk evaluated before the</u></p>	<p>PA3 (c)</p> <p>PA3 (i)</p>

	<p><u>that requires disaster risk to be taken into account in the design and siting of public health facilities? (Y/N)</u></p> <p>Process: % of new public health facilities that have factored disaster risk into their design or siting</p>		<p><u>granting of approval for new private health facilities? (Y/N)</u></p> <p>Process: % of new private health care facilities that have factored disaster risk into their design or siting</p>	
<p>Environment sector including forestry</p>	<p><u>C67: Ecosystem protection area:</u> Does the national government use protected areas legislation to ensure the conservation and enhancement of regulatory ecosystem services? (Y/N)</p> <p>If Yes, which is the target ecosystems protected? Select one or more from the following: (a) mountain, (b) forest, (c) river, (d) coastal areas, (e) drylands, (f) wetlands, (g) aquifers, (h) mangroves, (i) marine environment, (j) other (specify).</p> <p>Process: the protected area supported by such policy/ total environmentally sensitive areas</p> <p><u>C68: Ecosystem planning:</u> Does the national government prepare ecosystem management plan that take disaster risk into consideration? (Y/N)</p> <p>If Yes, which is the target ecosystems planned? Select one or more from the following: (a) mountain, (b) forest, (c) river, (d) coastal areas, (e) drylands, (f) wetlands, (g) aquifers, (h) mangroves, (i) marine environment, (j) other (specify).</p> <p><u>C69: Environment Impact Assessment (EIA):</u> Is disaster risk issue integrated into environment impact</p>	<p>PA3 (g)</p> <p>PA3 (n)</p> <p>(4.1 (MoV))</p> <p>PA3(g)</p> <p>PA3 (n)</p> <p>PA3 (c)</p> <p>(4.1 (MoV))</p> <p>4.6)</p>	<p><u>C71: Ecosystem management:</u> Does the national government have financial or legal incentives to encourage the private sector to invest in the conservation and enhancement of ecosystem services? (Y/N)</p> <p>If Yes, which is the target ecosystem protected? Select one or more from the following: (a) mountain, (b) forest, (c) river, (d) coastal areas, (e) drylands, (f) wetlands, (g) aquifers, (h) mangroves, (i) marine environment, (j) other (specify).</p> <p>Process: the protected area supported by such policy/ total environmentally sensitive areas</p> <p>Process: the amount private sector invested in ecosystem conservation services</p>	<p>PA3 (g)</p> <p>PA3 (n)</p> <p>(4.1)</p>

	<p><u>assessment? (Y/N)</u></p> <p>Process: the number of EIA implemented annually</p> <p>C70: Strategic Environment Assessment (SEA): Is disaster risk issue integrated into Strategic Environment Assessment and hence into environmental policy (Y/N)</p> <p>Process: the number of SEA implemented annually</p>	PA3 (c)		
Agriculture and rural development sector			<p>C72: Rural and agricultural development planning: <u>Are disaster risk considerations factored into rural and agricultural development planning laws, regulations and norms? (Y/N)</u></p> <p>If Yes, does the guideline take into consideration anticipated climatic, environmental and demographic changes? (Y/N)</p> <p>Process: % of rural municipalities that have rural development plans that conform to national regulation and consider disaster risk</p> <p>C73: Commercial agriculture and land development: Are laws or policies in place that regulate the acquisition and use of productive land by national and international investors from a perspective of disaster risk (Y/N)?</p>	PA3 (f)
Energy sector (climate change mitigation)	<p>C74: Greenhouse gas emissions: Do targets exist to reduce greenhouse gas emissions through increasing energy</p>	-	<p>C75: Energy efficient private investment: Do financial and other incentives, regulations (such as energy</p>	-

	efficiency or the adoption of renewable energy sources? (Y/N) Process: the greenhouse gas emission per citizen		efficiency standards) exist to encourage energy efficient private investments? (Y/N)	
Social welfare and employment sector			C76: Cash transfers for vulnerable households: Does the country have schemes in place that allow for cash transfers to households at risk to or affected by disasters?(Y/N) C77: Employment guarantee schemes: Does the country have employment guarantee schemes in place that cover households at risk to or affected by disasters?(Y/N)	PA3 (j) (4.2 (MoV)) PA3 (j) (4.2 (MoV))

I-D. Preparedness and Build Back Better: Enhancing disaster preparedness for effective response, and to “Build Back Better” in recovery, rehabilitation and reconstruction

This group of indicators monitors progress in priority for action 4 of the Sendai Framework and is strongly related with resilience. Resilience refers to the capacity of individuals, communities and economies to absorb the impacts of disasters and recover from shocks. A society that is able to absorb significant losses while retaining its essential identity, structure and functions as well as its capacity for learning and adaptation is resilient even in the face of large disasters. In resilient sectors, communities and societies disaster losses do not necessarily translate or cascade into short and longer run social, economic and other impacts.

A range of public policy instruments exist that strengthen the resilience of the state as well as of households and businesses. Strengthening resilience of the state includes economic measures such as contingency financing. The resilience of households and businesses is strengthened through continuity planning, compensation, and a range of critical services and resources that without state support and appropriate regulation will be limited in a post-disaster context.

Resilience and reconstruction was under-emphasized in the HFA. In HFA progress reports countries have highlighted the following issues:

- While early warning capacities have improved, some countries are still challenged to ensure that adequate early warning capabilities exist in highly vulnerable communities, particularly in remote areas with few development assets.

- Countries such as SIDS with small economies concentrated in a single sector or only weakly integrated into regional and global trade are generally less resilient and experience more difficulty in recovery than those with larger and more diversified economies.
- Resilience may be strengthened when the country has policies and mechanisms in place to rapidly provide land, temporary housing or materials to disaster-affected households, backed up by clear guidelines on compensation and by policies that guarantee the supply of building materials and services.
- Pre-defined compensation level and criteria will be useful to prevent moral hazard and facilitate self-protection efforts of private businesses and households.
- Social safety nets, including the adaption of cash transfers, employment guarantee schemes and other mechanisms to risk-prone and disaster affected households can effectively prevent risks but they are also source of resilience. Continued and expanded provisions of such social safety nets strengthen social resilience, together with mechanism to ensure the continued provision of health and education services.
- Many small and medium enterprises in hazard-exposed countries still do not have business continuity plans in place. Business continuity plans may enable businesses to quickly recover thus protecting employment and income for households.

I-D-a. Preparedness

Responsible Sector/Agency	Risk informed public sector (Underlined: suggested core indicators that all countries are expected to report)	Continuity from HFA	Risk informed private sector (Underlined: suggested core indicators that all countries are expected to report) (Italic: Global indicators to monitor global target)	Continuity from HFA
Disaster risk management organization	<p>D1: Contingency plans: <u>Does the country, based on law or strategic document, prepare national contingency plan? (Y/N)</u></p> <p>If Yes: the latest year of amendment</p> <p>If Yes, list the targeted hazards</p> <p>If Yes, is the plan based on consideration of risk assessment? (Y/N)</p> <p>If Yes, does the plan consider climate change scenarios and their impact on disaster risk? (Y/N)</p> <p>If Yes, which elements does the</p>	<p>PA4 (a)</p> <p>PA4 (e)</p> <p>PA4 (h)</p> <p>PA3 (k)</p> <p>PA3 (j)</p> <p>(5.1, 5.2)</p>	<p>D13: Early warning: <u>Does the country have complete and effective early warning system against hazards that the country faces? (Y/N)</u> (TARGET (g))</p> <p>If Yes, select one or more target hazards from the following: : (a) earthquake, (b) flood, (c) wind (due to cyclone etc.), (d) landslide, (e) tsunami, (f) heavy snow, (g)volcano, (h)drought, (i) forest fire, (j) epidemic, (k) others (specify)</p> <p><u>If Yes, does the EWS consider the sequential effects or inter-linkage between various hazards? (Y/N) (Target (g))</u></p>	<p>PA4 (b)</p> <p>(2.3)</p>

	<p>plan include? Select one or more from the following: (a) coordination of each sectors/agencies on response, (b) funding, (c) command system, (d) information flow, (e) relief assistance and compensation, (f) evacuation, (g) loss assessment, (h)others (specify) (Y/N)</p> <p>If Yes, whose role is defined in the plan? Select one or more from the following: (a) DRM agency, (b) Prime Minister or President, (c) Ministry of Finance, (d) Ministry of Planning, (e) sectoral agency, (f) local government, (g) private sector, (h) community, (i) NGO and civil sector, (j) gender organization, (k) scientific organization, (l) the general public, (m) others (specify)</p> <p>If Yes, does the contingency plan consider the special needs of different groups? Select one or more from the following: (a) gender, (b) the aged (c) children, (d) disability, (e) geographically isolated (e.g. rural, island), (f) language barrier (e.g. migrant, tourist), (g) legal status (e.g. illegal migrant), (h) people with life-threatening and chronic disease, (i) the poor, (j) other (specify)</p> <p><u>D2: Contingency plans at local level: Does the country require local governments to formulate and implement contingency plans? (Y/N)</u></p> <p>Process: % of local government that have contingency plans at each</p>	<p>PA4 (a)</p>	<p>If Yes, does the EWS consider the needs of different groups? Select one or more from the following: (a) gender, (b) the aged (c) children, (d) disability, (e) geographically isolated (e.g. rural, island), (f) language barrier (e.g. migrant, tourist), (g) legal status (e.g. illegal migrant), (h) other (specify)</p> <p>If Yes, Does the early warning disseminated through which channels? Select one or more from the following: (a) radio, (b) TV, (c) internet-website, (d)internet-email, (e) mobile phone-SMS, (f) social media, (g) public billboard, (h) siren, (i) phone, (j) other (specify)</p> <p>If Yes, do communication protocols and agreements exist with radio, television, telecommunication providers and others, to provide early warning information to households and businesses? (Y/N)</p> <p>Process: percentage of population that has access to early warning information</p> <p>The number of formal protocols (e.g. MOU) with media providers</p> <p><u>D14: Training and drills: Do regular emergency drills and training sessions take place engaging and targeting citizens? (Y/N)</u></p> <p>Process: number of participants annually/total population</p>	<p>PA4 (h)</p> <p>3.4</p>
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	<p>sub-national level</p> <p>D3: Contingency plans at sector: <u>Does the country require sectoral ministries to formulate and implement contingency plans? (Y/N)</u></p> <p>Process: the number of sectoral ministries that have contingency plans.</p> <p>D4: Training and drills: <u>Do regular emergency drills and training sessions take place to enhance response capacity of government officials ?(Y/N)</u></p> <p>If Yes, does the country utilize the lessons from the drills to review contingency plan?</p> <p>If Yes, does the training target only civil defence related agencies (or target all sectors)? (Y/N)</p> <p>If Yes, does the training also target voluntary workers? (Y/N)</p> <p>Process: the number of days of government official participated in training annually</p> <p>D5: Local level trainings and drills: <u>Does the national government require local governments to exercise area-based trainings and drills for response? (Y/N)</u></p> <p>If Yes, the requirement includes evacuation training? (Y/N)</p> <p>Process: % of local governments regularly exercise trainings and drills at municipality level</p> <p>Process: % of local government regularly exercise evacuation trainings and drills at municipality level</p>	<p>PA4 (a)</p> <p>PA4 (f)</p> <p>PA4 (h)</p> <p>(4.5 (Mov), 5.2)</p> <p>PA4 (h)</p> <p>PA4 (m)</p>		
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	<p>D6: Emergency operations centre (information management): Does the country have an emergency operation centre which coordinates information and activities during disaster? (Y/N)</p> <p>D7: Shelter and stockpile: Does the country require local governments to prepare shelters, identify displacement sites for disaster-affected persons and stockpile relief items (Y/N)?</p> <p>If Yes, are these accessible to all, inclusive of gender, age and disability?</p> <p>If Yes, are these shelters required to consider disaster risk in terms of location and structural strengths?</p> <p>D8: Community centres: Does the national government promote establishment/designation of community centres which contribute to the promotion of public awareness and stock piling of emergency materials? (Y/N)</p> <p>Process: Number of established/designated community centre</p> <p>D9: Government Business Continuity planning: Does the government have a business continuity plan in place that allows for the continuity of critical public service provision following disaster? (Y/N)</p> <p>If Yes, which services are considered? Select one or</p>	<p>PA4 (b) (5.2, 5.4)</p> <p>PA4 (h) PA4 (j) (5.4)</p> <p>PA4 (d)</p> <p>PA4 (e) PA4 (c)</p>		
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	<p>more from the following: (a) electricity, (b) drinking water, (c) sewage water, (d) gas, (e) telecommunication, (f) public transportation (e.g. railway and bus), (g) port/airport, (h) public health, (i) mandatory public education, (j) central bank, (k) provision of social welfare for those in need, (l) others (specify)</p> <p>D10: Horizontal cooperation: Does the country have a legal or formal mechanism in place that allows for local governments to draw on the capacities and resources of other local governments during emergencies? (Y/N)</p> <p>Process: the number of local governments that have formalized such cooperation mechanism</p> <p>D11: A state of emergency: Is legal regulation available to declare a state of emergency for a disaster in order to limit the constitutional rights of individuals? (Y/N)</p> <p>D12: Civil-military cooperation: Is the legal basis in place for the use of an army in disasters and for the planning and utilization of military resources? (Y/N)</p>	-		
<p>Economy and finance sector (including trade and investment)</p>	<p>D15: Regional trade: Does the country have agreements in place within its territories and with its neighboring countries that allows for the free flow of goods and services during and post-disaster recovery and reconstruction? (Y/N)</p>	-	<p>D16: Business continuity planning: Does the country have a scheme (based on law or programme) to provide incentives (financial, technical) to private companies to have business risk management and continuity planning? (Y/N)</p> <p>Process: % of companies</p>	<p>PA3 (e) PA3 (o) (4.3)</p>

			<p>with BCP</p> <p>D17: Bank preparedness: Does the country have formal protocol to mobilize cooperation from major and local banks to prepare for emergency?</p> <p>Process: the number of formal protocols (e.g. MOU)</p> <p>D18: Retail preparedness: Does the country have formal protocol to mobilize cooperation from major retail companies to prepare for emergency supply?</p> <p>Process: the number of formal protocols (e.g. MOU)</p> <p>D19: Supply chain: Are supply chain risks identified during the implementation of prevention and preparedness measures? (Y/N)</p> <p>D20: Compensation: Does the country have clear guidance in place (through law or regulation) to determine its obligations and criteria to compensate households or businesses for disaster loss and impact? (Y/N)</p> <p>D21: Remittances: Does the country have a policy that reduces the cost of remittances from emigrant workers into the country pre- and post-disaster? (Y/N)</p>	-
Public Works or infrastructure sector			D22: Construction sector preparedness: Does the country have formal protocol	-

(including transport, water and sanitation, communication)			<p>to mobilize cooperation from major construction/civil engineering companies to prepare for emergency?</p> <p>Process: the number of formal protocols (e.g. MOU)</p> <p>D23: Logistics preparedness: Does the country have formal protocol to mobilize cooperation from major transport companies to prepare for emergency?</p> <p>Process: the number of formal protocols (e.g. MOU)</p>	-
Housing and urban development			D24: Temporary housing: Does the country have a strategy in place to provide temporary housing or materials to disaster affected households? (Y/N)	PA3 (j)
Agriculture and rural development	D25: Agricultural extension and subsidies: Does the country's agricultural policy or strategy consider the possible impact of disaster on agriculture sector and additional demands on extension services and subsidies during post-disaster recovery and reconstruction? (Y/N)	-	D26: Compensation: Does the country have a mechanism in place to provide compensation for lost yields and productive land damage due to disaster? (Y/N)	- (4.2 (MoV))
Education sector	<p>D27: Continued schooling: Does the country's education plan include a business continuity plan in case of disasters? (Y/N)</p> <p>Process: number of school closure days x number of closed schools</p> <p>D28: School preparedness: Does the country require public schools to prepare</p>	<p>PA4 (c)</p> <p>PA3 (j)</p> <p>PA4 (c)</p>	<p>D29: Continued schooling: Does the country have a mechanism in place that allows low-income households to continue sending their children to school after a disaster (e.g., school vouchers, cash transfers etc.)?(Y/N)</p> <p>Process: number of children who is absent from school x days after</p>	<p>PA4 (c)</p> <p>PA3 (j)</p>

	<p><u>contingency plans based on law or strategic document?</u> (Y/N)</p> <p>Process: % of public schools having contingency plans</p>	<p>(4.3 (MOV))</p> <p>5.1 (MOV))</p>	<p>disaster</p> <p>D30: School preparedness: <u>Does the country require private schools to prepare contingency plans based on law or strategic document?</u> (Y/N)</p> <p>Process: % of private schools having contingency plans</p>	<p>PA4 (c)</p> <p>(4.3 (MOV))</p> <p>5.1 (MOV))</p>
Health sector	<p>D31: Continued health service provision: <u>Does the country have a disaster response and recovery plans that consider business continuity in case of disasters?</u> (Y/N)</p> <p>If Yes, do such plans include recovery schemes to provide psychological support and mental health services for all people in need? (Y/N)</p> <p><u>Does the country require public health facilities to develop contingency and business continuity planning based on law or strategic document?</u> (Y/N)</p> <p>Process: % of public health facilities having contingency plans and BCP</p> <p>D32: Health worker training: <u>Does the national government have policy to support health worker training for emergencies?</u> (Y/N)</p> <p>Process: Number of health workers trained annually/total number of health workers</p>	<p>PA3 (i)</p> <p>PA4 (c)</p> <p>PA4 (o)</p> <p>(5.1 MoV)</p> <p>PA3 (i)</p> <p>PA4 (o)</p>	<p>D33: Health facility preparedness: <u>Does the country require private health facilities to prepare contingency and business continuity plans based on law or strategic document?</u> (Y/N)</p> <p>Process: % of private health facilities having contingency plans and BCP</p> <p>D34: Continued health service provision: <u>Does the country have a mechanism in place that allows low-income households to continue accessing affordable health care after a disaster (e.g. free health care in emergency situations, health vouchers)?</u> (Y/N)</p>	<p>PA3 (i)</p> <p>PA4 (c)</p> <p>PA4 (o)</p> <p>(5.1 MoV)</p> <p>PA3 (j)</p>
Foreign Affairs	<p>D35: International cooperation: <u>Does the country have formal procedure to receive and coordinate bilateral and multilateral donor aid, through grants and loans,</u></p>	<p>PA4 (p)</p>		

	in case of disaster? (Y/N)			
	Does the country have formal procedure to render assistance to emergencies abroad? (Y/N)			

I-D-b. Build Back Better

Responsible Sector/Agency	Risk informed public sector (Underlined: suggested core indicators that all countries are expected to report)	Continuity from HFA	Risk informed private sector (Underlined: suggested core indicators that all countries are expected to report)	Continuity from HFA
Disaster risk management organization (Post disaster recovery and reconstruction)	<p><u>D36: Recovery and reconstruction policy:</u> Does the country have legislation or policy in place to ensure risk sensitive post-disaster recovery and reconstruction (Y/N)</p> <p>If Yes, which elements are included in such policy? Select one or more from the following: (a) land use planning, (b) building code improvement, (c) infrastructure structural standard improvement, (d) relocation of public facilities and infrastructure, (e) loss assessment, (f) others (specify)</p> <p>If Yes, whose role is defined in the legislation/policy? Select one or more from the following: (a) DRM agency, (b) Prime Minister or President, (c) Ministry of Finance, (d) Ministry of Planning, (e) sectoral agency, (f) local government, (g) private sector, (h) community, (i) NGO and civil sector, (j) gender</p>	<p>PA4 (k)</p> <p>PA4 (l)</p> <p>PA4 (e)</p> <p>PA4 (i)</p> <p>PA4 (j)</p> <p>PA3 (h)</p> <p>PA3 (k)</p> <p>PA3 (j)</p> <p>(4.5)</p>	<p><u>D38: Incentives for risk sensitive recovery and reconstruction:</u> Does the country have financial or legal incentives in place to encourage risk sensitive recovery and reconstruction of businesses and households (e.g. relocation, retrofitting)? (Y/N)</p>	PA4 (k)

	<p>organization, (k) scientific organization, (l) the general public, (m) others (specify)</p> <p>If Yes, does the policy consider the special needs of different groups? Select one or more from the following: (a) gender, (b) the aged (c) children, (d) disability, (e) geographically isolated (e.g. rural, island), (f) language barrier (e.g. migrant, tourist), (g) legal status (e.g. illegal migrant), (h) people with life-threatening and chronic disease, (i) the poor, (j) other (specify)</p> <p>D37: Displacement policy: Does the country have policies to address the long-term needs of populations (e.g. access to services, livelihood opportunities, land and property in destination and in case of return, integration in destination community) displaced by disasters? (Y/N)</p> <p>If Yes, do they take into account possible risk concerns for the communities of destination? (Y/N)</p>	<p>PA3 (I)</p>		
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II. Output Indicators

II-A. Underlying Drivers of Risk and Resilience

This family of indicators will measure how a country is managing its underlying drivers of risk and resilience. The family consists of six groups: increasing hazard exposure; badly planned and managed urban and regional development; poverty and inequality; environmental degradation; climate change; and weak governance (Figure A1-2).

The 2009 Global Assessment Report on Disaster Risk Reduction (GAR09) identified and provided evidence to illustrate four underlying risk drivers: badly planned and managed urban and regional

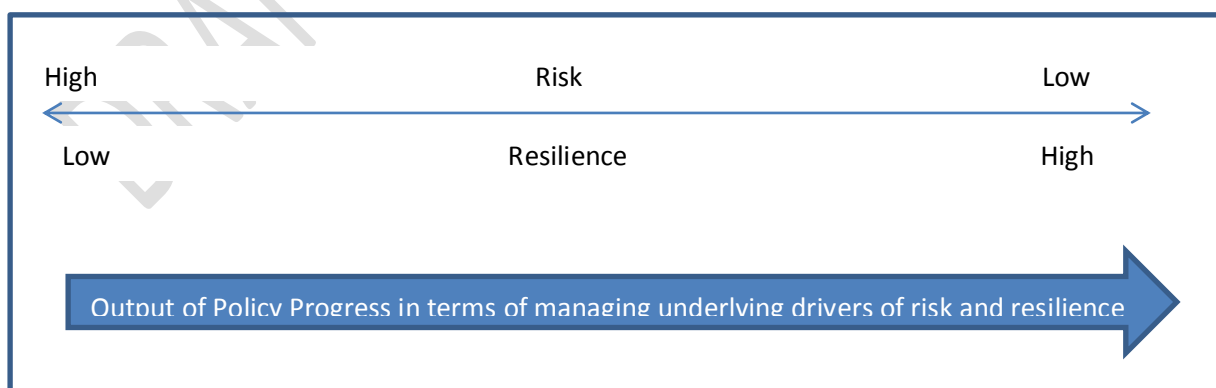
development; environmental degradation; poverty and inequality and weak governance. GAR11 then provided evidence of how both public and private investment, in the context of economic development and globalization, is driving hazard exposure. The 2012 IPCC SREX report provided strong evidence to highlight how climate change is now a global driver of risk, through modifying hazard levels and vulnerability.

Figure A1-2 : Underlying drivers of risk and resilience



Underlying drivers of risk and resilience refer to these social and economic characteristics of development processes, operating at different spatial and temporal scales, which influence levels of hazard, exposure and vulnerability as well as the capacity to absorb and recover from disaster losses (Figure A1-3).

Figure A1-3: Concept of “underlying drivers of risk and resilience”



Even when current loss and risk levels are relatively low, the way a country manages its underlying drivers of risk and resilience, will have a critical influence on how loss and risk evolve in the future.

For example, if regulatory ecosystem services are being lost due to land-use changes, hazard associated with flood or drought may increase and the disaster loss might increase. Similarly, in contexts where most urban development is taking place informally considerations of hazard resistance are unlikely to be factored into land use and building, leading to new generation of vulnerable neighborhoods.

Many of the underlying drivers contribute directly or indirectly to resilience. Educated households and communities and those with incomes that provide access to risk-reducing assets, living in well-planned and managed cities, with healthy ecosystems, access to social services and protected by good quality infrastructure will be far more resilient to loss than households in extreme poverty, living in informal settlements without infrastructure and surrounded by degraded ecosystems.

The concept of underlying drivers should not be understood to mean that urbanization, economic development or environmental change generate risk *per se*. The concept refers, rather, to *how* development is planned and managed. Those countries that do not address their underlying drivers as they develop are likely to experience increasing disaster risk and decreasing resilience.

All proposed indicators are selected from existing DRR-focused indicator system and academic research as relevant indicators, and are available from publically available global data sources or from national official government statistics. Some indicators in this family will also provide explicit links to the targets and indicators proposed under the SDGs and climate change agendas. This set of indicators are the best available proxy of output produced from policies and can be used as “dashboard” to examine weak policy areas for each country and suggest priority action addressing the weakness of the country.

Six composite indexes (one for each category) can be created from the set of indicators. The composite indexes will enhance communication by simplification while there is a risk to overlook the each element constituting the composite index.

A-1 Increasing hazard exposure

Economic development influences risk in different ways. As GDP per capita rises, vulnerability factors such as poverty and disaster mortality tend to decrease in many countries. However, in rapidly growing economies, the hazard exposure of economic assets is likely to outpace decreasing vulnerability thus increasing the risk of economic loss. Opportunity cost of reconstruction activities is high in such economy because reconstruction projects might crowd out private demand.

Suggested Indicators	Rationale	Data sources
A1: Annual change in GDP	Rapidly increasing GDP will indicate decreasing vulnerability and mortality for a given level of hazard exposure but increasing hazard exposure of economic assets. Opportunity cost of reconstruction activities is high in such economy.	World Bank Development Indicators
A2: Gross fixed	High rates of Gross Fixed Capital Formation are likely to be	World Bank

capital formation/GDP	associated with better quality of infrastructures but also with rapidly increasing hazard exposure of economic assets. Opportunity cost of reconstruction activities is high in such economy.	Development Indicators
A3: Population growth (Annual %)	High population growth may translate into rapidly increasing hazard exposure of people. Opportunity cost of reconstruction expenditure is high in such society due to increased competing social needs.	World Bank Development Indicators

A-2 Badly planned and managed urban and regional development

The world's population has surpassed the 7 billion with the half living in cities. Population is projected to exceed 9 billion by 2050, with an estimated 67% living in cities¹⁵. 80% of the world's GDP comes from cities as do 80% of greenhouse gas emissions. In rapidly growing economies, urban growth is largely *pulled* by economic development. Many weak economies also experience rapid urban growth without an economic base due to internal migrants *pushed out* from rural area. However, cities are some of the most vulnerable areas to natural hazards. Over half of coastal areas are urbanized and 21 of the world's 33 megacities lie in coastal flood zones¹⁶.

The *way* that urban development takes place plays a major role in configuring disaster risk and resilience capacity, not just in cities but in broader city regions, where urbanization transforms land-use, economic activities and the use of ecosystems. Thus, the *way* that regional economies and their urban centres develop in terms of demography, employment opportunities and infrastructure has a profound influence on risk and resilience^{17,18}. Low-income households and small businesses tend to occupy areas of low land value that are often hazard prone areas and constitute especially vulnerable groups.

In summary, unplanned urban growth increases vulnerability to natural hazards and can exacerbate urban poverty. Opportunity is that 60% of the area expected to be urban by 2030 remains to be built¹⁹, indicating that the shape of future cities can be proactively guided into more risk sensitive

¹⁵ TST Issue Brief 11 Population Dynamics.

¹⁶ TST Brief Issue 20 Sustainable Cities and Human settlement

¹⁷ The transformation of city regions often generates new risks (flooding from the expansion of impermeable areas, the loss of regulatory ecosystem services such as wetlands and subsidence due to excessive groundwater extraction; landslides, as slopes are destabilized through infrastructure development, informal settlement, deforestation and other factors; drought as aquifers are exhausted etc.),

¹⁸ Vulnerabilities are related to the form of urban development which peripheral dispersion, proliferating transport lines and piecemeal speculative development are primarily responsible for the fragmentation, degradation and destruction of natural habitat. In addition to the impact on communities and non-human species, they also undermine the ecosystem services that support much hard urban infrastructure. This type of development also exacerbates urban vulnerability to climate change impacts, including weather and geological hazards. The risks in cities differ due to density, weak local governance structures and the location of urban slums, thus requiring different solutions for improved sanitation, disaster preparedness and increased food and nutrition security. Despite a rapidly changing climate, many urban areas are designed on the basis of past weather related information and without regard for disaster impact. (Cited by TST Issue Brief 20 Sustainable Cities and Human Settlements)

¹⁹ TST Brief Issue 20 Sustainable Cities and Human settlement

development. Once cities have planned and infrastructure developed, it will be far more costly to develop retrofit solutions.

Suggested indicators	Rationale	Data sources
A4: Urban population growth (Annual %)	Very rapid urban development is likely to challenge the capacity of city governments to plan and regulate land-use, building and vital regulatory ecosystem services such as flood-plains and wetlands, increasing risk and weakening resiliency. At the same time, the increase in impermeable areas increases peak storm run-off, increasing vulnerability to flood. Over extraction of ground-water can lead to subsidence (again increasing flood risk) and exhaust aquifers (increasing water stress in dry periods).	World Bank Development Indicators
A5: Population living in slums (%)²⁰	Cities with large proportions of their population living and working in informal settlements are likely to have high disaster risk, due to location in hazard-prone areas with low land values, flimsy or poorly built housing and an absence of or deficient provision of risk reducing infrastructure. Informal urbanization may generate additional hazards such as fire (in areas with closely packed wooden construction) or landslide (when steep, unstable slopes are settled). Poor infrastructure reduces resilience of such areas.	UN Statistics
A6: Property rights	Property rights influence disaster risk, given that when rights are not protected, property owners are less likely to make investments in DRR or may be unable to use their property as collateral for credit.	World Economic Forum
A7: Quality of infrastructure	Poor quality infrastructure is likely to be more vulnerable to hazards. Damaged and destroyed infrastructure is responsible for business and livelihood interruption and is therefore weakens resilience.	World Economic Forum
A8: Paved roads	Unpaved roads are more vulnerable to hazards such as floods and landslides and weaken resilience.	World Bank
A9: Percentage of urban solid waste regularly collected and well managed	Solid waste collection is highly related with flood in urban setting.	UN Habitat and/or WHO?

²⁰ There are now roughly one billion slum dwellers, including one third of the population of the developing world. In the developing world, 33% of the urban populations are slum dwellers and in sub-Saharan Africa, that portion even reaches 62%. The number of slum dwellers in the developing world has risen as urban municipalities have failed to keep up with the rapid pace of generation of new slum areas. (TST Brief Issue 20 Sustainable Cities and Human settlement, TST Brief Issue 11 Population Dynamics, TST Issue Brief 29 Conflict Prevention, Post-Conflict Peacebuilding and the Promotion of Durable Peace, Rule of Law and Governance)

A10: Urban green and public space/ total city areas²¹	Green spaces and public space (street and squares) in urban areas can reduce the risk of heat islands developing, improve the micro-climate of cities during dry and hot spells and increase run-off capacity reducing the risk of urban flooding. Urban green space is also utilized for temporarily shelter and command areas when disaster happens.	To be developed (UNEP & UN-HABITAT?)
A11: Electricity access²²	Lack of electricity access generally reflects poor infrastructure and represents vulnerability. It also reduces resilience when emergency occurs.	UN Sustainable Energy for ALL (SE4ALL)
A12: City biodiversity index (Singapore Index)	Green space and biodiversity are crucial for healthy urban environment. This indicator measures the protection of endemic species as well as the environmental health of the city.	

A-3 Poverty and Inequality

Poverty and inequality have a multi-directional relationship to disaster risk. It is estimated that there will still be about a billion people in extreme poverty in 2015. In addition, large numbers of people remain perilously close to falling into poverty, should they experience shocks they are unable to cope with. For the poor, a shock of even a relatively short duration can have long term adverse consequence²³. Low-income households, in both rural and urban contexts are likely to be more vulnerable and exposed to hazards, due to difficulties in accessing assets such as land, infrastructure, housing and services. This manifests not only as intensive and extensive risk but also as very high levels of everyday risk (related to accidents, illness, violence etc.). The unemployed, female, the disabled and displaced people may be particularly at risk.

At the same time, low-income households have more difficulty buffering losses, meaning that disaster losses translate into a series of impacts, including greater and sustained poverty, declining health, worsening nutrition.

Suggested Indicators	Rationale	Data Sources
A13: GDP per capita	Low GDP per capita is consistent with high vulnerability and mortality risk for any given level of hazard exposure. Low GDP per capita prevents investment in preventing and reducing risk and saving to be resilient to disaster.	World Bank Development Indicators

²¹ UN Habitat reports that the generally accepted minimum standard for public space in urban areas is 45% (30% for streets and sidewalks and 15% for green space) (Cited in Sustainable Development Solution Network (2015)).

²² Globally, nearly one out of every five people has no access to electricity. Energy access rates are much lower for LDCs. (TST Brief Issue 14 Energy)

²³ Cited from TST Issue Brief 2: Poverty Eradication.

A14: Proportion of population below \$1.25 (PPP) per day	Households in extreme poverty have greater difficulty to access the assets required to reduce disaster risk and are therefore likely to be less resilient to disaster losses.	World Bank Development Indicators
A15: Unemployment as % of total labor force	As with poverty, the level of unemployment will have a direct influence on the capacity of households to invest in reducing and preventing disaster risk and increase saving to buffer disaster losses and recover. On the other hand, many jobs could be lost due to disasters and environmental degradation with serious implications for the most vulnerable groups of the population.	World Bank Development Indicators
A16: Gender inequality index	Disadvantaged women, in terms of reproductive health, empowerment and the labour market, are likely to have less capacity to invest in reducing and preventing disaster risk and increase saving to be resilient to disaster loss ²⁴ . On the other hand, unpaid work such as child care and cooking is intensified in contexts of natural disasters and environmental degradation.	UNDP
A17: Global Hunger Index²⁵	Households and communities with high levels of malnutrition are likely to have a very low capacity to invest in reducing and preventing disaster risk and increase saving to buffer disaster losses, such as failed harvests.	IFPRI
A18: Displaced people (% of population)	Displaced people are normally a particularly at-risk group and are more likely to live in vulnerable conditions in hazard prone areas, with less access to basic services than low-income households in general.	IOM, UNHCR, and OCHA
A19: Net international migration rate²⁶	Migrated people often do not know the history of disaster in the country and not fully integrated into social protection structure. They tend to be vulnerable and less resilient.	HDI?
A20: Life expectancy at	Life expectancy at birth represents health standard of the country and is a proxy for levels of vulnerability and everyday	World Bank Development

²⁴ Stark gender differences are evident in vulnerability to climate change and natural hazards. The higher female mortality in 141 countries over 22 years from natural disasters and their aftermaths is due to the socially-constructed vulnerability of women. The fewer discriminatory gender norms and roles and the higher women's social and economic status, the smaller the gender differentiated impacts on life expectancy in natural disasters. Similarly, countries that focus on education for girls and women had fewer losses due to extreme weather events than those countries that do not with equivalent income and weather conditions. Rural women's dependence on and unequal access to natural resources and productive assets, compounded by limited mobility and decision making power, mean that they are disproportionately affected by climate change. (TST Issue Brief 28 Gender Equality and Women's Employment)

²⁵ In spite of progress, one in eight people in the world today (868 million) remains undernourished. The progress is subject to setbacks caused by shocks including disaster. One key lesson from a country-disaggregated review of trends in food security and nutrition is the importance of insecurity, conflict, climate variability and vulnerability to shocks and crisis. Causes of protracted crisis situations are diverse, but common conditions include frequent or continued exposure to shocks that undermine livelihoods, food and market systems. (TST Brief Issue 3 Food Security and Nutrition)

²⁶ More than 214 million people today live outside their countries of origin. Many migrants move to areas where they are more vulnerable to natural hazards than in their home countries. (TST Issue Brief 11 Population Dynamics)

birth	risk.	Indicators
A21: Vaccination coverage	Vaccination coverage represents public health standard of the country and is a proxy for levels of vulnerability. Vaccination will reduce public health risks associated with emergencies and increase resilience.	WHO
A22: Total health expenditure per capita (including public and private)/GDP per capita	Health expenditure is a source of increased poverty for vulnerable households and hinders DRR investment. On the other hand, health is often a consequence of disaster or degraded environment ²⁷ .	WHO Indicator and Measurement Registry

A-4 Environmental degradation

Regulatory ecosystem services, including wetlands, forests, mangroves, aquifers and others play a vital role in mediating hazard levels, particularly in the case of floods, droughts, storm surges, landslides and other weather and climate related events. In addition ecosystems often provide valuable provisioning and other services. Mangroves, for example, protect against coastal erosion and storm surge but also play a key role in the health of marine ecosystems and fisheries, which will strengthen resilience. However, according to the current estimate, over 60% of the ecosystems and their services upon which human being rely are degraded, overexploited or already lost²⁸. It is estimated 20% of global mangrove have been lost, 19% of coral reefs have disappeared and 29% of sea grass habitat has vanished²⁹ Better managed natural resources can strengthen the resilience of the poor, by both reducing the likelihood of natural hazards and offering resources to cope with them. On the other hand, most of the highly food insecure populations reside in degraded environments that are highly exposed to shocks (e.g. droughts, floods and cyclones). People who are focused on daily survival usually do not give priority to environmental quality like forest, soil and water conservation activities. (Disaster-poverty-environment nexus)³⁰.

Countries that are losing regulatory ecosystem services are likely to face increased hazard levels (in terms of frequency, intensity, duration and unpredictability), which in turn is translated into increased risk and weakened resilience.

Suggested Indicators	Rationale	Data sources

²⁷ Every year 100 million people are either pushed into poverty by health care costs or unable to afford essential health services. It is also estimated that one quarter of the global burden of disease can be attributed to environmental risks, including climate change. (TST Issue Brief 10 Health and Sustainable Development)

²⁸ TST Issue Brief 22 Sustainable Consumption and Production

²⁹ TST Issue Brief 24 Oceans and Seas

³⁰ TST Issue Brief 2 Poverty Eradication and 8 Social Protection.

A23: Ecological footprint	A high ecological footprint indicates a disproportionately high pressure on ecosystem services, either in the country or overseas.	Footprint network
A24: Ecosystem vitality	Healthy ecosystems providing regulatory ecosystem services moderate many weather and climate related hazards.	Yale University (Environmental Performance Index)
A25: Environmental health	Polluted air and water and other environmental health hazards increase everyday risks and decrease resilience to both extensive and intensive disasters.	Yale University (Environmental Performance Index)
A26: Protection of regulatory ecosystem services	When a high proportion of areas that provide vital regulatory ecosystem services are covered by protected areas legislation there is a higher likelihood that the services will be sustainable.	To be developed by UNEP-GRID
A27: Water stress	Demand for water is projected to increase by 55% by 2050. Two thirds of the world's population could be living in water stressed countries by 2025 if current consumption patterns continue ³¹ . An unsustainable withdrawal of renewable water resources can increase land degradation and drought risk.	FAO
A28: Deforestation rate (changes in forest area as % of total forest area)^{32,33}	Forests provide vital regulatory ecosystem services including regulating infiltration rates of rain, stabilizing slopes and protecting against land degradation.	World Bank Development Indicators
A29: Forest area under sustainable forest management³⁴	A high proportion of a countries forest area under sustainable management would indicate the protection of the ecosystem services provided.	To be developed by UNEP-GRID and FAO

³¹ TST Issue Brief 6 Water and Sanitation.

³² Globally, forests cover 31% of global land area and they contain 80% of the world's terrestrial biodiversity. More than 1.6 billion people worldwide depend on forests for food, medicines and fuel as well as their jobs and livelihoods. Healthy and resilient forests play a critical role for addressing mitigation of and adaptation to climate change, combatting desertification and land degradation, and DRR while supplying the ecosystem services that society depends on. However, worldwide, around 13 million hectares of forest were converted to other uses or lost through natural causes each year in the period 2000-2010, including some of the most biologically diverse habitats on earth. While the most immediate cause of deforestation is the expansion of large-scale commercialized agriculture and rapid urbanization at the global level, climate change could impact the growth and the productivity of forests, both directly, due to changes in atmospheric carbon dioxide and climate, and indirectly, by altering the frequency and severity of forest disturbances like fires and droughts. (TST Issue Brief 25 Forests)

³³ Aichi Biodiversity Target 5 aims to halve deforestation and the loss of other natural habitats by 2020.

³⁴ Aichi Biodiversity target 7

A30: Territorial areas protected and restored³⁵	Protected areas increase ecosystem services and thus reduce vulnerability and increase resilience.	World Database on Protected Areas (UNEP)
A31: Coastal and marine areas protected	Coastal regions are particularly affected by sea-level rise, coastal flooding and erosion, and extreme events (e.g. tsunamis and storm surges) due to undermined natural protective barriers, low levels of development combined with rapid population growth in low lying coastal areas and inadequate capacity to adapt. Sea level is expected to continue to rise due to a combination of thermal expansion of seawater, melting of glaciers and other snow/ice and continued increases in ground water extraction. These challenges require enhanced protection.	Aichi Target 11 ³⁶
A32: Land use change	Biodiversity is threatened by land use change and land degradation. When biodiversity is lost, ecosystem services are compromised. Land use change from ecologically sensitive area (e.g. wetland and coastal area) to urban land use influences the vulnerability. A range of ecosystems act as buffers against natural hazards, enhance natural resilience and reduce the vulnerability of people, improve the sustainability and economic efficiency of built infrastructures. Healthy ecosystems are vital for human wellbeing and resilience particularly of those living in poverty ³⁷ .	GEO/CEOS (to be developed)
A33: Land Cover Status Change	Land degradation exacerbates climate change and natural hazard impacts.	UNCCD
A34: Red List Index	Biodiversity and ecosystem are mutually supportive.	ICUN

A-5 Climate change

Climate change can alter the frequency, intensity, periodicity and predictability of weather and climate related hazards. While at present other drivers, such as environmental degradation and badly planned and managed urban development, may have greater influence on disaster risk, there is a high likelihood that accelerating and dangerous climate change will become an increasingly significant driver of disaster risk in coming decades. In addition, climate change transfers risks between countries and generations, meaning that it is primarily a global rather than national risk driver. Sustainable cities, energy systems, transport systems and infrastructure will contribute to climate change mitigation and disaster risk reduction.

³⁵ Aichi Biodiversity Target 11 aims to protect 17% of land through protected areas by 2020 and Target 15 aims to restore at least 15% of degraded lands by 2020.

³⁶ Aichi Biodiversity Target 11 aims that 10% of coastal and marine areas are conserved by 2020.

³⁷ TST Issue Brief 26 Biodiversity, 22 Sustainable Consumption and Production

Suggested Indicators	Rationale	Data Source
A35: GHG emissions (per capita and per unit of GDP)	Anthropogenic climate change influences weather and climate related hazards.	World Bank
A36: Electricity production from renewable energy (% of total)	Countries with a significant or growing proportion of electricity production from renewable sources are likely to be more committed to mitigating global climate change and its effects as well as to environmental sustainability. Renewable energy is also decentralized solution and contributes to increasing resilience and security by energy diversification.	World Bank Development Indicators

A-6 Governance

Governance refers to processes of governing, including assigning responsibility to each stakeholder and crafting the coordination mechanism, setting policies and standards, defining strategies and plans, taking decisions and allocating resources, verifying and hold accountable for results. Governance is different to government. It involves not only central government but also local authorities, the private sector, civil society and others.

The strength and effectiveness of governance in a country has a decisive influence over its capacity to address all the other underlying drivers of risk and resilience. In their HFA Progress Reports countries frequently describe governance failures as factors that challenge the implementation of disaster risk reduction.

Suggested Indicators	Rationale	Data sources
A37: Rule of law	DRR related plans, including land-use plans, building codes and environmental regulations are unlikely to be implemented in countries where there is only weak compliance with laws and regulations.	World Bank Governance Indicators
A38: Government effectiveness	Ineffective government, also undermines implementation, for example when policies and strategies for DRR are not evidence based, clearly formulated, integrated into broader policy and backed by political commitment.	World Bank Governance Indicators
A39: Regulation quality	The capacity to regulate the private sector, including households, will influence the effectiveness of DRR instruments such as building codes and land-use plans.	World Bank Governance Indicators
A40: Voice and	The extent to which citizens are able to hold others,	World Bank

accountability	including government, to account for their actions is critical not only to ensure that DRR plans are implemented but also to strengthen accountability in the case of actions that transfer risks from one sector to another.	Governance Indicators
A41: Control of corruption	The level of corruption has a direct and statistically significant impact on government efficiency and the rule of law, two key governance components mentioned above.	World Bank Governance Indicators
A42: Conflict	Conflicts exacerbate and create new vulnerabilities for natural disasters ³⁸ .	Global Peace Index?
A43: Literacy rate (%)	Literacy rate influences the possibility for citizens to engage actively in the governance of disaster risk. Illiteracy is also related with poverty and may limit the capacity to receive early warnings and awareness of risks and DRR strategies. More than 40% of adults in LDCs lack literacy skills ³⁹ .	World Bank Development Indicators
A44: Tertiary education enrolment (%)	The higher the educational attainment, the higher the level of risk literacy in a country increasing the likelihood of good governance of risk.	World Bank Development Indicators
A45: Internet per 100 people	Internet access influences the possibility for citizens, local government and civil society to engage actively in the governance of DRR.	World Bank Development Indicators

II-B. Disaster Risk

Disaster risk refers to the probability of future losses in a given place and over a given period of time, calibrated on the analysis of existing conditions of exposure, vulnerability and hazard. Disaster risk can be extensive in character (referring to the risk of frequent, low severity losses, distributed extensively in space) and intensive (referring to the risk of infrequent but severe losses, distributed intensively in particular spaces).

Intensive risk is a threat to national economies and both large and small businesses, and can affect strategic infrastructure. It is responsible for a large proportion of mortality and loss of capital-intensive assets. Extensive risk might not pose a huge threat to overall countries but represents the major threat to low-income households and local communities by causing a high proportion of damage to housing, local infrastructure and livelihoods. If accumulated, the impact of extensive disasters can be significantly negative to national economics and society.

³⁸ TST Issue Brief 29 Conflict Prevention, Post-Conflict Peacebuilding and the Promotion of Durable Peace, Rule of Law and Governance.

³⁹ TST Issue Brief 17: Needs of Countries in Special Situations- African Countries, Least Developed Countries, Landlocked Developing Countries and Small Island Developing States as well as the Specific Challenges facing middle Income Countries.

Extensive risk can be estimated from historical loss patterns given the high frequency and recurrence of hazard events. However, we must emphasize that monitoring of historic loss does not provide any hint to intensive risk and the concept of loss and risk should not be confused. Intensive risk can only be estimated using probabilistic modelling techniques, given that many hazard events occur with long return periods and cannot be estimated from historical records. Indicators are proposed for both extensive and intensive risk. This family would be built on metrics such as Annual Average Loss (AAL) and Probable Maximum Loss (PML) in order to highlight the likely future losses that a country could experience in the future.

A proposed data source is the new UN Global Risk Assessment, a probabilistic multi-hazard assessment to be launched in 2014. This assessment uses global hazard models, an innovative exposure proxy, appropriate vulnerability functions and a consistent methodology and mathematics, to provide globally comparable metrics. In other words it enables disaster risk to be compared and benchmarked across countries.

B-1 Intensive risk

Suggested Indicators	Rationale	Data Source
B1: Annual Average Loss (AAL) as % of Gross Fixed Capital Formation	AAL represents the probable annualized loss from all hazard events with different frequency of occurrence. Countries that risk losing a significant proportion of their annual capital investment in disasters have a high risk to their economies.	UN Global Risk Assessment and World Bank Development Indicators
B2: Fiscal AAL per inhabitant	The higher the fiscal AAL (the annual average loss of public assets and government's responsibility for compensation to certain group of people) per inhabitant, the higher the sovereign disaster risk, for which each citizen is responsible	UN Global Risk Assessment and UN Population Statistics
B3: Risk adjusted public debt/GDP (Indicator to be constructed from Fiscal AAL and public debt)	Fiscal AAL represents a contingent liability for governments, and is invisible when accounting for public debt. For countries with already high or unsustainable levels of public debt, disaster risk represents another critical debt layer.	UN Global Risk Assessment, IMF and World Bank Development Indicators
B4: PML (250 year) as proportion of national wealth	When the risk from a major disaster in a particular country represents a significant proportion of national wealth, it may have an impact on economic assets of the country.	UN Global Risk Assessment and World Bank
B5: PML (250 year) as proportion of global GFCF	When the risk from a major disaster in a particular country represents a significant proportion of global capital investment, it may have an impact on regional and even the global economy.	UN Global Risk Assessment and World Bank Development Indicators

B6: AAL and PML (250 year) mortality	Countries with low GDP per capita and weak governance are likely to continue to experience significant disaster mortality.	To be developed
B7: InForm Index	This is a set of indicators and the composite index to help priority setting of humanitarian existence. It measures the country' hazard, exposure, vulnerability and coping capacity for both disaster and conflict.	EC-JRC

B-2 Extensive risk

Indicators to monitor extensive risk can supplement disaster loss monitoring (explained in the Section III). These are straightforward indicators to monitor policy progress by excluding the impact of intensive disasters (outliers). The extensive loss is more related with development process and by managing underlying drivers of risk and resilience, the countries can drastically reduce the loss.

Target A: Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015	
B8	Number of deaths and missing due to extensive disasters (hazard events) per 100,000
Target B: Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015	
- Current proposals are based on data from national disaster loss database. Categories of “affected people” need to be elaborated and contributions from the other agencies are strongly expected for this target.	
B9	Number of affected people due to extensive disasters per 100,000. This indicator will be computed based on indicators B-2 to B-4.
B10	Number of injured or ill people due to extensive disasters (hazard events) per 100,000
B11	Number of evacuated people due to extensive disasters (hazard events) per 100,000
B12	Number of relocated people due to extensive disasters (hazard events) per 100,000
B13	Number of people living in houses damaged due to extensive disasters (hazard events) per 100,000
B14	Number of people living in houses destroyed due to extensive disasters (hazard events) per 100,000
B15	Number of people who received relief or compensation after extensive disasters (hazard events) per 100,000
Target C: Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030	
- Economic valuation methodology should be discussed and agreed at the later stage.	
B16	Direct economic loss due to extensive disasters (hazard events) in relation to global gross

	domestic product. This indicator will be computed based on indicators C-2, C-5, C-6 and C-7.
B17	Agricultural loss due to extensive disasters (hazard events)
B18	Direct economic loss due to industrial facilities damaged and destroyed by extensive disasters (hazard events)
B19	Direct economic loss due to commercial facilities damaged and destroyed by extensive disasters (hazard events)
B20	Direct economic loss due to housing units damaged by extensive disasters (hazard events)
B21	Direct economic loss due to housing units destroyed by extensive disasters (hazard events)
B22	<i>(also proposed as D-1)</i> Direct economic loss due to extensive disaster damage to critical infrastructure This indicator will be computed based on indicators D-2, D-3 and D-4.
<p>Target D: Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030</p> <ul style="list-style-type: none"> - Current proposals are based on data from national disaster loss database. The element of “disruption of basic services” need to be elaborated and contributions from the other agencies are strongly expected for this target. 	
B23	<i>(also proposed as C-7)</i> Damage to critical infrastructure due to extensive disasters This indicator will be computed based on indicators D-2, D-3 and D-4.
B24	Number of health facilities damaged and destroyed by extensive disasters (hazard events)
B25	Number of educational facilities damaged and destroyed by extensive disasters (hazard events)
B26	Number of lengths of road damaged and destroyed by extensive disasters (hazard events)
B27	Number of times basic services have been disrupted due to extensive disasters (hazard events)

II-C. Resilience⁴⁰

Resilience refers to the capacity to absorb disaster losses and recover, whether at the level of an individual, household, community, business, sector, government or an economy and society as a whole.

As such the level of resilience has a critical influence on whether physical loss (destroyed houses, damaged infrastructure etc.), mortality, morbidity and direct economic loss, translate into short or

⁴⁰ This family of indicators is different from the one of underlying drivers of risk and resilience because the indicator does not monitor elements that have direct relevance to risk level. For example, trade concentration suggests risk distribution in a country and only monitors the aspect of capacity to recover quickly after the disaster as country.

long run impacts in health, education, nutrition, employment, productivity, poverty and inequality. It is these impacts, rather than loss *per se*, that define disaster. The magnitude, impact, duration and scale of disaster are heavily mediated by the level of resilience.

Indicators are suggested for three aspects of resilience: social resilience of vulnerable households and communities, business resilience and the economic resilience of nations.

C-1 Household and community resilience

Suggested Indicators	Rationale	Data Source
C1: Age dependency ratio	A high age dependency ratio means a high proportion of children and aged people compared to working age population. This lowers resilience, particularly in the case of death or injury of a working-age adult.	World Bank Development Indicators
C2: Gini Index	Resilience is likely to be lower in countries with a high degree of income inequality	World Bank Development Indicators
C3: Per capita net savings	Low per capita savings implies a lower capacity to buffer losses and recover, therefore low resilience to disaster loss	World Bank Development Indicators
C4: Primary healthcare per 100,000 inhabitants	The existence of primary healthcare is fundamental to disaster resilience. Improvements in primary healthcare over recent decades have played an important role in the reduction of disaster mortality and in the avoidance of the downstream impacts that result from the death of household members	WHO
C5: Transfer cost of personal remittances⁴¹ (% of GDP)	Remittance will be additional financial sources for recovery (currently remittance reaches 3 time the size of ODA. High remittance also suggests high vulnerability of everyday life of the country.	World Bank Development Indicators G20?
C6: Social trust	Social trust is a measure of social capital, which in turn can be <i>drawn upon</i> in disaster to strengthen resilience	Gallup World Poll
C7: Mutual support	As above, a strong tradition of mutual support will strengthen disaster resilience	Gallup World Poll

C-2 Business resilience

⁴¹ Migrant remittances reached USD 401 billion in 2012, three times the size of ODA. Remittances represent one of the largest sources of foreign currency earnings in a number of recipient countries. 5x5 objective endorsed by the G8 and G20 aims to reduce remittances costs by 5 percentage points (from 10 to 5%) in 5 years. (TST Issue Brief 15 Means of Implementation)

Suggested Indicators	Rationale	Data Source
C8: Private sector debt as % of GDP	High levels of private sector debt will limit the capacity of businesses to obtain loans for disaster recovery	World Bank Development Indicators
C9: Financial market development	The efficiency of the financial market will influence the availability of credit to finance disaster recovery	World Economic Forum
C10: Non-life insurance penetration rate	The more assets are covered by disaster insurance, the more exists the capacity to buffer losses and the speed of recovery	To be provided by reinsurance industry (Swiss Re?)
C11: Foreign direct investment (net inflows as % of GFCF)	Economies where a high proportion of capital investment is from overseas may be more resilient given that parent companies of damaged facilities can quickly invest to repair and rehabilitate damaged facilities	World Bank Development Indicators
C12: Quality of electricity supply	A significant proportion of business interruption is associated with power outages. A reliable electricity network is therefore a key resilience factor for business	World Economic Forum
C13: Energy source diversification	The more diversified the energy sources, the less likelihood of power interruption if a given source is affected by disaster	World Bank Development Indicators

C-3 Macroeconomic resilience

Suggested Indicators	Rationale	Data Source
(1) Macro economy		
C14: Socio-economic resilience indicator	This is a composite index to measure the risk to welfare by estimating impact of disaster on output, consumption and income distribution. Methodology is developed by the World Bank.	World Bank
C15: Balance of payments (current account net, % of GDP)	The economies of countries with a positive balance of payments to GDP ratio are likely to be more resilient to reductions in domestic demand following disasters, but could be less resilient to disasters in key export markets.	UNCTAD statistics
C16: Trade concentration index	The more diversified an economy the more resilient to disasters affecting any one sector.	UNCTAD statistics

C17: Critical goods dependency concentration	The more diversified sources of critical goods (such as steel), the more resilient an economy will be to disasters affecting any given supplier.	To be developed
C18: Concentration of population and value added in the primary city	Countries with a highly centralized spatial structure may be challenged to recover if a large disaster affects the primary city.	World Bank – to be developed further
C19: Dependence on critical infrastructure	As above, if trade is concentrated in a single primary port this decreases economic resilience.	To be developed
C20: Net food import ratio	Countries with a high food import ratio would be more resilient to the effects of disasters in the agricultural sector in the country, but more at risk to the impact of food price spikes on the international market.	FAO
C21: Tourism as % of GDP	Economies which are significantly concentrated in the tourism sector may have lower resilience when the sector is affected.	UNWTO
(2) Public finance		
C22: PML (250 years) with respect to a governments capacity to access financial resources for recovery	Countries with a high PML and a low capacity to mobilize financial resources (through insurance, credits, taxation, debt etc.) will have a low resilience to intensive disasters.	IADB Disaster Deficit Index and IIASA CATSIM (geographical coverage to be further developed)
C23: Central government debt, total (%of GDP)	High existing debt stock limits the capacity of a government to increase indebtedness to finance disaster recovery.	World Bank Development Indicators
C24: Government net borrowing/lending (% of GDP)	Net lending (+)/ borrowing (–) is calculated as revenue minus total expenditure. This balance may be viewed as an indicator of the financial capacity of general government to impact on the rest of the economy. Countries with a cash surplus will have more flexibility to respond quickly to recovery and reconstruction needs.	IMF
C25: Sovereign rating	Low rating limits access to external credit in crisis situations, hampering rapid recovery.	Standard and Poor’s
C26: ODA received per person⁴²	Countries heavily dependent on ODA will be more dependent on ODA decisions to finance recovery and reconstruction.	World Bank Development Indicators

⁴² In the LDC, ODA represents about half of all external financing available to close their saving gap. (TST Issue Brief 15 Means of Implementation: Global Partnership for Achieving Sustainable Development)

III. Outcome indicators

This family of indicators will include a set of disaster loss metrics. Different kinds of indicator are proposed that would allow the achievement of the four global targets of the Sendai Framework. These refer to mortality, affected people, direct economic loss and damage to critical infrastructures.

Disaster losses are a manifestation of disaster risk and can result in short-term to long-term disaster *impacts*, depending on an individual, household, community or society’s ability to absorb the loss and recover.

Mortality is one of the most robust indicators of disaster loss, in both national as well as global disaster loss databases. Direct economic loss (replacement costs of damaged and destroyed assets) can be derived from physical damage and modelled using proxy values derived from the widely accepted ECLAC-DALA and the following PDNA methodology (ECLAC, 2015, WB-EC-UN, 2013). Damage to housing and agriculture are proposed as indicators of losses that fundamentally affect low-income populations. Damage to local infrastructure, particularly roads and health and education facilities, may provide insight into how disaster loss translates into wider impacts on economy, health and education.

UNISDR facilitates the establishment of standardized national disaster loss databases and currently over 85 such databases exist. By recording the loss associated with small, recurrent extensive disasters as well as large, infrequent intensive disasters, these databases allow for a more complete estimation of loss levels and can be used to measure the evolution of loss over time. The growing number of countries that systematically record disaster loss and damage data now makes the development of these outcome indicators possible and will encourage those countries that currently do not record this data to start doing so.

III Disaster Loss⁴³

Global indicators (Proposals will be discussed in the Open-ended Intergovernmental Working Group)

Target A: Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015		
A-1	Number of deaths and missing due to disasters (hazard events) per 100,000	SDG proposal
Target B: Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015		
<ul style="list-style-type: none"> - Current proposals are based on data from national disaster loss database. Categories of “affected people” need to be elaborated and contributions from the other agencies are strongly expected for this target. 		

⁴³ Disaster loss data, even taking 10 year moving average, cannot be exempt from impact of extreme event. To complement loss data, loss due to expensive disasters (which are proposed as part of output indicators) should be monitored together (See the section II-B).

B-1	Number of affected people per 100,000. - This indicator will be computed based on indicators B-2 to B-4.	SDG proposal
B-2	Number of injured or ill people due to disasters (hazard events) per 100,000	SDG proposal
B-3	Number of evacuated people due to disasters (hazard events) per 100,000	SDG proposal
B-4	Number of relocated people due to disasters (hazard events) per 100,000	SDG proposal
B-5	Number of people living in houses damaged due to disasters (hazard events) per 100,000	-
B-6	Number of people living in houses destroyed due to disasters (hazard events) per 100,000	-
B-7	Number of people who received relief or compensation after disasters (hazard events) per 100,000	-
<p>Target C: Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030</p> <p>- Economic valuation methodology should be discussed and agreed at the later stage.</p>		
C-1	Direct economic loss due to disasters (hazard events) in relation to global gross domestic product. - This indicator will be computed based on indicators C-2, C-5, C-6 and C-7.	SDG proposal
C-2	Agricultural loss due to disasters (hazard events)	SDG proposal
C-3	Direct economic loss due to industrial facilities damaged and destroyed by disasters (hazard events)	-
C-4	Direct economic loss due to commercial facilities damaged and destroyed by disasters (hazard events)	-
C-5	Direct economic loss due to housing units damaged by disasters (hazard events)	SDG proposal
C-6	Direct economic loss due to housing units destroyed by disasters (hazard events)	SDG proposal
C-7	<i>(also proposed as D-1)</i> Direct economic loss due to disaster damage to critical infrastructure - This indicator will be computed based on indicators D-2, D-3 and D-4.	SDG proposal
<p>Target D: Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030</p> <p>- Current proposals are based on data from national disaster loss database. The element of “disruption of basic services” need to be elaborated and contributions from the other agencies are strongly expected for this target.</p>		

D-1	<i>(also proposed as C-7)</i> Number of Disaster damage to critical infrastructure - This indicator will be computed based on indicators D-2, D-3 and D-4.	SDG proposal
D-2	Number of health facilities damaged and destroyed by disasters (hazard events)	SDG proposal
D-3	Number of educational facilities damaged and destroyed by disasters (hazard events)	SDG proposal
D-4	Number of lengths of road damaged and destroyed by disasters (hazard events)	SDG proposal
D-5	Number of times basic services have been disrupted due to disasters (hazard events)	-

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Appendix 2 - Terminology

While terminology update has been and continues to be discussed in STAG, we compiled minimum terminology necessary for developing monitoring mechanism to enhance fruitful discussion.

1. *Technical term regarding monitoring*⁴⁴

Benchmark: A standard by which something can be measured or judged, a point of reference for measurement

Goal: Something worked toward or striven for; the purpose toward which an endeavor is directed; an objective; desired results that a programme or project seeks to achieve

Indicator: An explicit measure used to determine progress; a signal that reveals progress towards objectives; a means of measuring what actually happens against what has been planned in terms of quality, quantity and timeliness.

Input: Resources to achieve goal (e.g. policy, financial resources)

Monitoring: A continuous function, tracking the actual performance or situation against what was planned or expected according to pre-determined standards.

Outcome: The changes or benefits that result from input via output.

Output: What is produced through input

Target: The specific and intended result to be achieved within an explicit timeframe and against which actual results are compared and assessed.

2. *Term regarding DRR (based on July Terminology meeting)*

Affected people: People who experience the effects of an event* or a disaster*

Basic Services: Services that are needed for all of society to function effectively

Biological hazard: Process or phenomenon of organic origin or conveyed by biological vectors, including exposure* to pathogenic micro-organisms, toxins and bioactive substances.

Build back better: The guiding principle to utilize the reconstruction process to improve living and environmental conditions including through integrating disaster risk reduction* into development measures, making nations and communities more resilient to disasters*.

Climate Change:

a) The Inter-governmental Panel on Climate Change (IPCC, 2014) defines climate change as: “a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings

⁴⁴ Mainly based on the UNISDR (2008), *Indicators of Progress: Guidance on Measuring the Reduction of Disaster Risks and the Implementation of the Hyogo Framework for Action*. United Nations secretariat of the International Strategy for Disaster Reduction (UNISDR), Geneva, Switzerland”

such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use.

b) The United Nations Framework Convention on Climate Change (UNFCCC, 1992) defines climate change as “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods”.

Critical infrastructure: The physical structures, facilities, networks and other assets that support services that are socially, economically or operationally essential to the functioning of a society or community, both in routine circumstances and in the extreme circumstances of an emergency.

Direct economic loss: The monetary value of total or partial destruction of physical assets existing in the affected area.

Disaster: A serious disruption of the functioning of a community or a society involving the losses and impacts on lives, livelihoods, health and economic, physical, social, cultural and environmental assets which exceeds the ability of the affected community or society to cope using its own resources.

Disaster damage: Total or partial destruction of physical assets existing in the affected area.

Disaster impact: Represents the overall effects of a disaster*, including negative and possibly positive ones.

Disaster risk: Disaster risk is considered to be a function of hazard*, exposure*, vulnerability* and capacity* and is normally expressed as a probability of loss of life, injury or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time.

Disaster risk governance: A set of collective decisions taken to guide, coordinate and oversee disaster risk reduction* and related areas of policy.

Disaster risk management: Disaster risk management is the application of disaster risk reduction* policies, processes and actions to prevent new risk*, reduce existing disaster risk* and manage residual risk* contributing to the strengthening of resilience*.

Disaster risk reduction: The concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

Early warning system: The set of hazard* assessment and communication processes needed to generate, disseminate and use timely, accurate and actionable hazard warning information to enable individuals, communities and organizations, threatened by a hazard*, to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss.

Economic loss: Total economic impact that consists of direct economic loss* and indirect economic loss*.

Environmental hazard: Process by which the environmental consequences of a proposed project or programme are evaluated, undertaken as an integral part of planning and decision making processes with a view to limiting or reducing the adverse impacts of the project or programme.

Evacuated: People who, for different reasons or circumstances because of risk* or disaster*, move as a temporary measure before, during or after the event to safer places.

Event: The occurrence of a natural or human-induced phenomenon in a particular place during a particular period of time due to the existence of a hazard*.

Exposure: People, property, systems, or other elements present in hazard* zones that are thereby subject to potential losses.

Extensive risk: The widespread risk associated with the exposure* and vulnerability* of dispersed populations to repeated or persistent hazard* conditions of low or moderate intensity, often of a highly localized nature, which can lead to debilitating cumulative disaster impacts*.

Geological hazard: Geological process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Hazard: A potentially damaging physical event*, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation*.

Indirect economic loss: Declines in output or revenue as a consequence of direct economic loss* or disaster impacts*.

Injured or ill: People suffering from a new or exacerbated physical or psychological harm, trauma or an illness as a result of an event* or a disaster*.

Intensive risk: The risk* associated with the exposure* and vulnerability* of large concentrations of people and economic activities to intense hazards*, which can lead to potentially catastrophic disaster impacts* involving high mortality and asset loss.

Killed: People who lost their lives as a consequence of an event* or a disaster*.

Man-made hazard: Hazards induced entirely or predominantly by humans, including technological* and socio-natural* hazards.

Natural hazards: Natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Peer review: Systematic and independent examination of performance or studies in a particular area through a collaborative approach involving experts from different disciplines and sectors, allowing mutual learning, identification of effective practices and recommendations for improvements.

Preparedness: The knowledge and capacities* developed by governments, professional response* and recovery* organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazards*, events* or conditions.

Prevention: Activities and measures to avoid existing and new disaster risks*.

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

Recovery: Decisions and actions aimed at restoring or improving livelihoods, health, as well as economic, physical, social, cultural and environmental assets, systems and activities, of a disaster-affected community or society, aligning with the principles of sustainable development, including “build back better” to avoid or reduce future disaster risk*.

Rehabilitation: The rapid and basic restoration of services and facilities for the functioning of a community or a society affected by a disaster*.

Relocated: People who, for different reasons or circumstances because of risk* or disaster*, have moved permanently from their places of residence to new sites.

Resilience: The ability of a system, community or society exposed to hazards* to resist, absorb, accommodate to and recover from the effects of a hazard* in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.

Response: Actions taken in anticipation of during or immediately after a disaster* in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected*.

Risk: The combination of the probability of an event* and its consequences which result from interaction(s) between natural or human induced hazard*(s), vulnerability*, exposure* and capacity*.

Risk assessment: A methodology to determine the nature and extent of risk by analyzing potential hazards* and evaluating existing conditions of vulnerability* that together could potentially harm exposed* people, property, services, livelihoods and the environment on which they depend.

Risk information: Comprehensive information on all dimensions of risk including hazards*, exposure*, vulnerability* and capacity* related to persons, communities, organizations and countries and their assets developed through the risk management* process and communicated to policy and decision-makers, practitioners, communities at risk and other stakeholders.

Risk transfer: The process of formally or informally shifting the financial consequences of particular risks from one party to another whereby a household, community, enterprise or state authority will obtain resources from the other party after a disaster occurs, in exchange for ongoing or compensatory social or financial benefits provided to that other party.

Socio-natural hazard: The phenomenon of increased occurrence of certain geological and hydrometeorological hazards*, such as landslides, flooding, land subsidence and drought, that arise

from the interaction of natural hazards* with overexploited or degraded land and environmental resources.

Sustainable development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

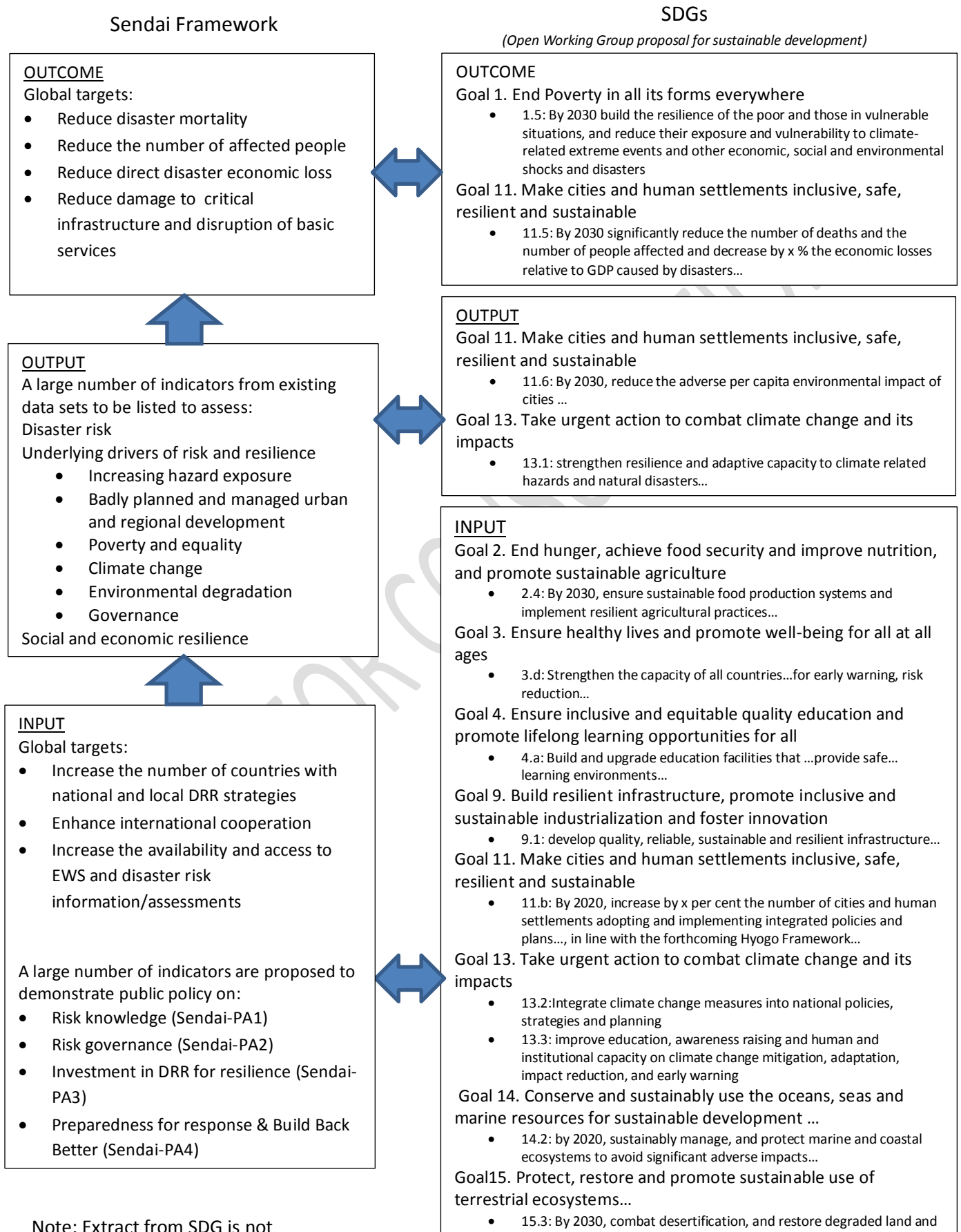
Technological hazard: A hazard originating from technological or industrial conditions, including accidents, dangerous procedures, infrastructure failures or specific human activities.

Underlying disaster risk drivers: Processes or conditions, including development-related, that influence the level of risk*.

Vulnerability: The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards*.

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Appendix 3 – Sustainable Development Goals (SDGs) and disaster risk reduction



Note: Extract from SDG is not comprehensive due to space and need for simplification of the figure.