Towards the Post-2015 Framework for Disaster Risk Reduction
Indicators of success: a new system of indicators
to measure progress in disaster risk management
21 November 2013

A. Background

The Third World Conference on Disaster Risk Reduction will be held in Sendai City, Japan in March 2015, at which countries will adopt the post-2015 framework for disaster risk reduction . The successor framework should address the challenges posed by increasing disaster risk over the next 20 to 30 years.

The fourth session of the Global Platform for Disaster Risk Reduction, which was held in May 2013 in Geneva with 3,500 participants from 172 countries, called for *an immediate start of work to be led by the UNISDR to develop targets and indicators to monitor the reduction of risk and the implementation of HFA2.*

To date, the achievement of the HFA has been monitored against a set of 22 core indicators across the five Priority Areas. Through an on-line HFA Monitor progress is benchmarked by countries on a scale of 1 to 5, complemented by means of verification and a qualitative description Although this has generated the most significant global repository of information available on the progress reported by governments in reducing disaster risk, the experience of three biennial review cycles in 2009, 2011 and 2013 has highlighted weaknesses, for example:

- The HFA itself is structured largely around corrective risk management and disaster management. Only HFA Priority Area 4 relates to anticipatory or prospective risk management. Therefore the HFA Monitor is only of limited value in assessing whether risk reduction is addressing the underlying risk drivers.
- Progress is not considered with respect to the disaster risk a country faces. For example If countries with very low disaster risk report significant progress in achieving the HFA, it is perhaps less significant than even minor progress reported by a very high risk country.
- Most of the HFA core indicators are input-related rather than output-related. Therefore, while the HFA Monitor may highlight how many countries have new disaster risk reduction legislation this does not necessarily indicate whether the legislation is effective in reducing risks. The HFA Monitor cannot measure whether the strategic objective of the HFA, a reduction in risks, is being achieved or not.
- Many of the core indicators relate to multiple policies, meaning that it is difficult to monitor public policy on disaster risk reduction. There is also duplication between indicators.

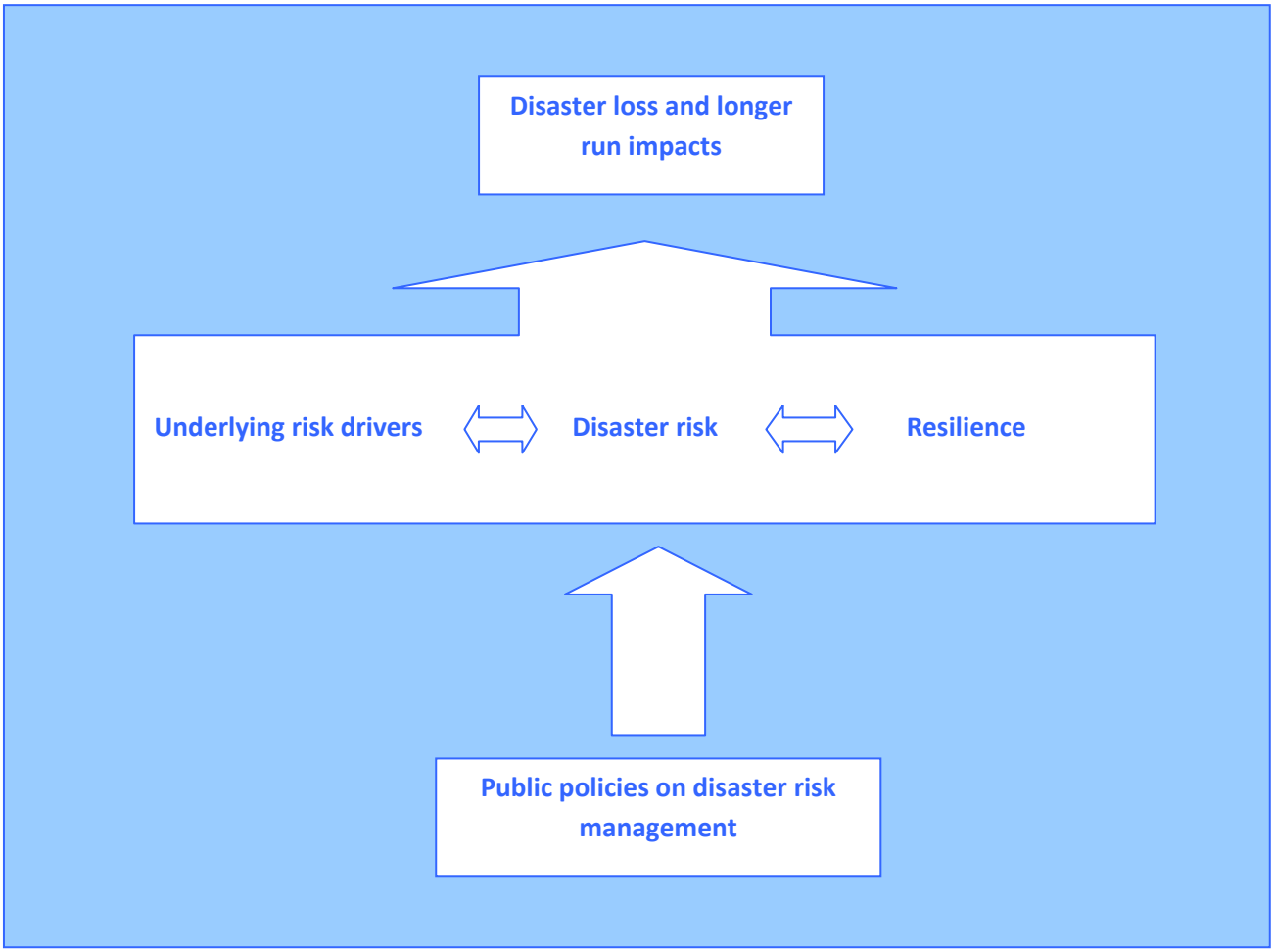
- Self-assessment by governments is *per se* subjective, meaning that the quantitative benchmarking undertaken by countries does not provide a valid means of inter-country comparison.

Recognising these weaknesses, UNISDR is developing a proposed new system of indicators for disaster risk management, which will contribute to discussions on HFA2 and to the Third World Conference on Disaster Risk Reduction, thereby raising public and stakeholder awareness.

B. Structure of the Indicator System

As highlighted in the series of UN Global Assessment Reports on Disaster Risk Reduction (GAR09, GAR11, GAR13), disaster risk is a function of hazard, exposure, and vulnerability. While governments cannot influence their geology and climate, it is the combination of public and private investment and how this investment is managed and regulated that determines the degree of hazard, exposure and vulnerability that a country faces. Underlying risk drivers, such as badly planned and managed urban and regional development; the decline of regulatory ecosystem services; poverty and inequality; weak governance; and climate change, influence the construction of risk and ultimately levels of disaster loss and damage. **Public policy to manage disaster risk** therefore needs to address the **underlying risk drivers to avoid risk construction** (anticipatory or prospective risk management), **reduce existing levels of risk** (corrective risk management) and **strengthen resilience** (the capacity to absorb loss and bounce back) when disasters occur. Its success will determine the level of **disaster loss and damage** a country faces and the longer run impacts on its economy and welfare.

The proposed new indicator system would therefore be comprised of families of indicators to provide insight into progress in each of these domains.



Disaster loss and damage Indicators

The level of disaster loss is the ultimate indicator of success of public policy in disaster risk management. Fundamentally if losses are increasing, disaster risk management is not being effective and vice versa. The first family of indicators will therefore include a set of disaster loss and damage metrics, expressed in both absolute and relative (to population, GDP etc) terms. They will include both human loss (mortality, people injured or affected); physical damage (houses and local infrastructure damaged and destroyed) and economic loss (replacement costs of damaged and destroyed assets). A methodology to model economic loss (adapted from the well known ECLAC methodology) was piloted successfully in GAR13 and will be used in calculating monetary value of physical damage. This family of indicators will also include, if possible, indicators on longer run impacts of loss on the economy, on social welfare and the environment.

To date, measuring loss trends globally has been possible through international databases such as EM DAT. However, given that this database only registers larger events occurring over longer return periods it does not have the granularity necessary to measure loss and damage trends and patterns at the national level.

UNISDR has been encouraging countries to establish detailed national databases of loss and damage and by November 2013, 71 countries had done so. By recording the loss and damage associated with small, recurrent extensive disasters as well as large, infrequent intensive disasters, the databases allow for a more complete estimation of loss levels and can be used to measure the evolution of loss over time. Ultimately this will allow an evaluation of the efficacy of public policy in managing disaster risk, and reducing loss and damage.
The growing number of countries that systematically record disaster loss and damage data at the sub-national level now makes the development of this indicator family possible. And the adoption of this family of indicators would encourage those countries that currently do not record this data to start doing so.

Risk and Resilience Indicators

The second family of indicators would refer to the countries risk profile, including both intensive and extensive 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. It is important to understand the difference between observed historical losses and risks. Given that some intensive disasters only occur infrequently (for example every 500 or 1000 years), thirty or forty years of historical data does not, in itself, express the level of risk a country may face.

This indicator family would also explore the resilience of a country's economy to probable losses. This will be done by identifying indicators that compare risk to the size of a country's economy, its capital stock, investment and savings levels, trade flows, insurance penetration, the fiscal health of government, the degree of social protection and other metrics. This family will also measure fiscal resilience by comparing the risk that governments are responsible for with fiscal capacity and the availability of risk financing, including but not restricted to insurance.

Since 2011, UNISDR has been working with a number of leading scientific and technical organisations to build a probabilistic multi-hazard global risk assessment for earthquake, tropical cyclone, storm-surge, flood, tsunami and volcanic ash. This assessment uses the best available global hazard models, an innovative exposure proxy and appropriate vulnerability functions. Importantly, by using a consistent methodology and mathematics, the assessment provides globally comparable metrics, in other words enabling risk and resilience to be compared and benchmarked across countries.

Underlying Risk Drivers Indicators
Even when current loss and risk levels are relatively low, the way a country manages its underlying risk drivers, will have a critical influence on how loss and risk levels evolve in the future. For example, environmental degradation badly planned and managed urban development and growing poverty and inequality are all potential drivers of new disaster risk. This third family of indicators will measure how a country is managing its underlying risk drivers, using internationally available and comparable data sets. It will also link disaster risk

management to the sustainable development and climate change agendas. Indicators will be developed in six categories: economic and fiscal structure; poverty and social vulnerability; environmental degradation and climate change; urbanization; coping capacity; and overall governance (table 1).

Following a survey of existing indicators and a literature review, 52 indicators have been selected as candidates to develop this indicator family in the six categories highlighted above. All proposed indicators are available from global open data sources or from national government statistics.

The methodology for the formal selection of indicators will be to: firstly analyze the relationship between each indicator and loss and risk data; secondly, create six composite indexes (one for each category) and analyze the relationship between the composite index and the loss and risk data. Particular attention will be paid to the correlation between the individual indicators in each composite index to avoid problems of autocorrelation.

Table 1: Underlying Risk Drivers

Category	Indicator
Economic and fiscal structure	• GDP per capita (or GNI per capita), USD • GDP annual growth rate, % • Trade and Investment(balance of payments, % of GDP, trade concentration index, FDI, net inflows, % of GDP) • Industrial structure (value-added and employment of top three sectors, % of GDP, % of total employment) • Age dependency ratio, % of working-age population • Per capita net savings • Fiscal (central government debt, % of GDP, primary balance, % of GDP) • International bond rating • Per capita ODA received, USD
Poverty and Social Vulnerability	• Poverty (poverty gap at national poverty line, Gini index, unemployment rate, % of total labor force) • Human Development Index • Gender Inequality Index • Health (health expenditure, % of GDP, private insurance, % of private of private expenditure on health, life expectancy at birth) • Education (public expenditure on education, % of GDP, school enrollment, %, literacy rate, %)

	• Net food import ratio, %
Environmental degradation and Climate Change	• Ecological footprint • Water stress • Deforestation rate • Environmental health • Ecosystem vitality (including CO2 emissions)
Urbanization	• Population (population density, people/km2, population growth annual rate, %, urban population growth annual rate, %, population living in slums, % of urban population) • Capital (gross fixed capital formation, % of GDP, capital stock, million USD/1000km2) • Settlement (housing ownership rate, property right)
Coping Capacity	• Hospital beds per 1,000 people • Communication (Internet per 1,000 people, mobile phone per 1,000 people, percentage of households with TV) • Energy (quality of electricity supply, energy source diversification) • Road density • Quality of overall infrastructure • Public investment, % of GDP
Overall Governance	• Rule of law • Government effectiveness • Regulation quality • Voice and accountability • Control of corruption

Disaster risk management policy indicators

This family of indicators will measure to what extent public policy is addressing the underlying risk drivers, existing levels of disaster risk and resilience.

To develop this system of indicators, a thorough analysis of all HFA progress reports submitted in 2011 and 2013 was carried out. Challenges and progresses for each core indicator were analysed and a number of common challenges identified, including:

- Countries reported insufficient level of "real" implementation against each indicator. For example, although risk sensitive building codes exist, the enforcement is not assured due to lack of government capacity, lack of awareness among the public, and other factors. Risk information is often not translated into policy partly because policy makers are able to use such information effectively. Public awareness campaigns do not necessarily translate into changes in behavior, for example in terms of responding

to early warning systems. In other words, apparent progress does not necessarily translate into real change.

- Disaster risk reduction requires local level action. Most disasters, especially small scale events, are local. National policies often need to be adapted to local contexts (for example, national curriculum on DRR). Building codes and land use planning are not enforced due to lack of local level capacity. Many countries report the need to establish local level platforms for DRR and local level risk and vulnerability assessments. However, the current HFA Monitor cannot measure how national level policy is really supporting local level decision making.

- The political and economic imperative for disaster risk reduction is often weak in the face of competing needs and priorities, such as poverty reduction, economic growth, social welfare, education etc. Land use planners also face difficulty in balancing DRR needs and economic needs. As a result there are often insufficient financial resources for disaster risk reduction. Countries report the need for objective tools, such as cost-benefit analysis to make the case for disaster risk reduction but most report the absence of such tools as a challenge.

- Climate change is reported as an emerging issue to be integrated into disaster risk reduction policy. Risk assessment, research, building codes, and land use planning need to factor the changing climate into account. However, many countries report challenges to weave climate change adaptation into their disaster risk reduction policy frameworks, although some have created common platforms to do so.

- Coordination across stakeholders remains a challenge in spite of progress. Both horizontal coordination between sectors and vertical coordination between national and local level remain a challenge. This is compounded by the prevailing treatment of disasters as exogenous events rather than endogenous to societal development, which nurtures the tendency of government institutions to absolve themselves of anticipatory disaster risk management responsibilities and adopt a default delegation to responsive mechanisms of disaster, as opposed to risk, management.

In summary, as illustrated in Table 2 below, while there has been a paradigm shift from an "old" paradigm" of response and recovery to a disaster risk reduction paradigm, as manifested in the HFA, there are still major challenges to move towards a new risk management paradigm, focusing on risk avoidance as well as reduction.

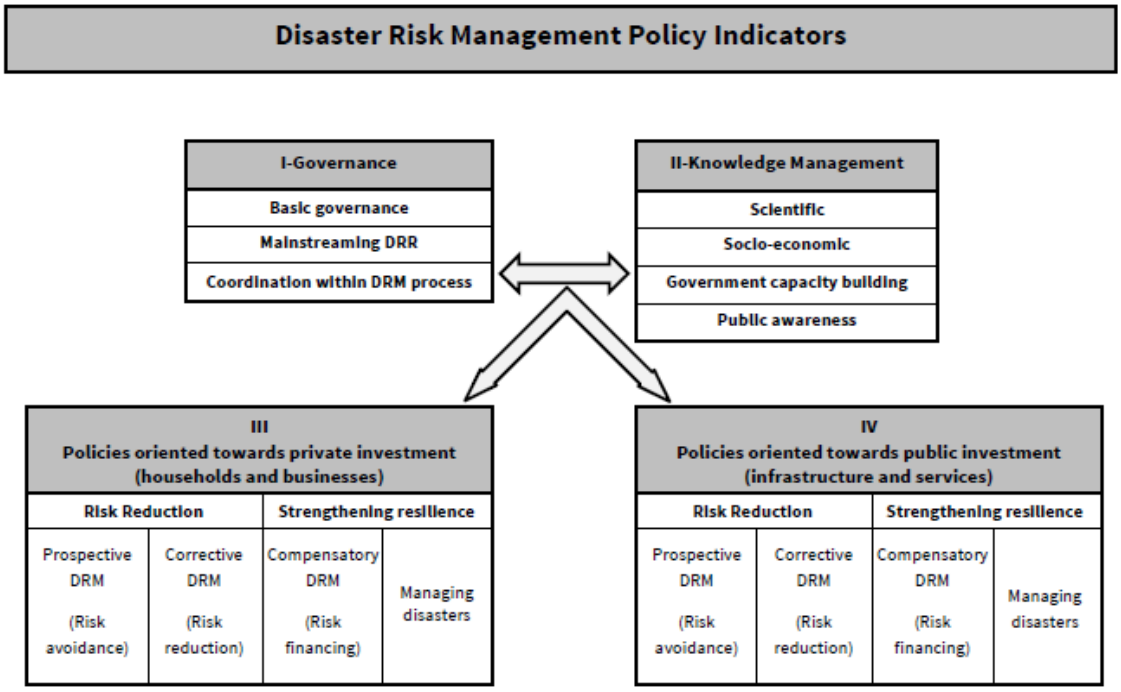
Table 2: Paradigm shift of Disaster Risk Management Policy

	Old Paradigm	**HFA**	**Toward HFA2(Key message of GAR 13)**
Problem Recognition	Effective response and recovery	Disaster risk reduction	Risk management is embedded in

			development process (More focus on underlying factors)
Main policy tools(examples)	Preparedness policy (e.g. contingency plan)	DRR investment such as levee construction and housing retrofitting	Land use planning, risk proof investment
Required knowledge		Risk assessment	Risk assessment and socio-economic assessment
Actors	DRM agency	DRM agency with different levels of government, various stakeholders (public, private, NGOs)	More involvement of various stakeholders, especially private sector and local level actors

The proposed family of public policy indicators aim to overcome the limitation of the current HFA Monitor. It will measure how public policy is achieving prospective or anticipatory risk management (addressing the underlying risk drivers), corrective risk management (addressing existing disaster risk) and strengthening resilience. It will focus on both public and private investment and take into account both governance and knowledge management. Whereas the HFA Monitor provides indicators for desired inputs and concepts (preparedness, early warning etc.), the proposed public policy indicators will focus on the policies required to achieve the inputs. A total of 66 indicators in total are proposed.

Figure 2 Framework of disaster risk management policy indicators



The new indicators can be easily related to the existing HFA indicators.. Distortions as a result of subjectivity will be avoided to the degree possible. For example, the existence of a disaster risk management plan or risk sensitive building codes is objective and can be quantified as a binary (0 or 1) indicator. However, 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 also important that the limitation of the policy indicators is recognized and that they are complemented with qualitative information.

C. Cluster analysis

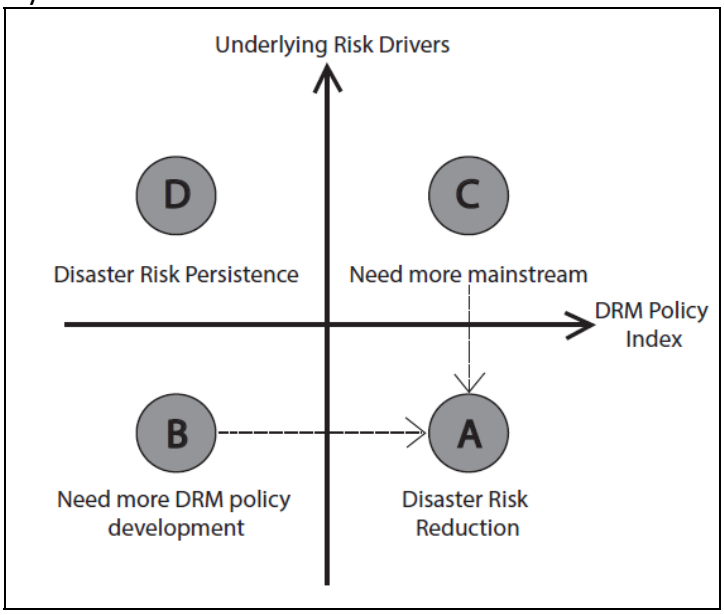
A cluster analysis of the results from all four indicator families will enable the grouping of countries to facilitate analysis and comparison. For example, on the basis of an analysis of the underlying risk drivers and policy indicators countries can be grouped into four categories (Figure 4).

A. Countries in category A score high in respect of their DRM policy index and low in terms of underlying risk drivers. These are countries where disaster risk should be trending down.

B. Countries in category B score low in DRM policy index and low in terms of underlying risk drivers. These are countries where risk may be low but efforts are required to manage existing risks.
C. Countries in category C have score high on DRM policy index and high in terms of underlying risk drivers. These are countries where public policy may not be effective in avoiding risk construction.
D. Lastly, countries in category D score low on the DRM policy index and high in terms of underlying risk drivers. These are countries where public policy needs to be developed to address rising disaster risk levels.

This kind of analysis, which is presented here only as an illustration, may enable countries to visualize whether more effort needs to be put into the design and implementation of specialized disaster risk management policies or into sustainable development, in the context of available financial and human resources. This analysis can be deepened through comparing these efforts with risk, resilience and loss trends.

Figure 3: Cluster Analysis



D. Piloting the proposed indicator system

A report on policy challenges from the existing HFA review process has been produced and will be published in the first quarter of 2014.

A pilot application of the indicator system will be carried out in the first and second quarter of 2014 using data from 49 countries (in all income categories and regions), taking into account the existence of a disaster loss database and the submission of HFA progress reports.

This analysis will be combined with the statistical analysis of the indicators on the underlying risk drivers, leading to a cluster analysis of the results. In the third and fourth quarter of 2014, the results will input into GAR15 and into the processes leading up to the WCDR.

An expert group will be convened to advise the development of the indicator system, the final selection of indicators and to peer review the results of the pilot application.

Time frame

	2013Q4	2014Q1	2014Q2	2014Q3	2014Q4	2015Q1
Policy	**Framework**	**Publication of policy report** **Data collection for pilot Analysis**		**Results input into GAR 15**		
Underlying Risk Driver	**Analysis**					
Cluster analysis			**Analysis**			
Event		**Expert Meeting1**	**Expert Meeting2**			**WCDRR**