EXECUTIVE SUMMARY

Setting, measuring and monitoring targets for reducing disaster risk

Recommendations for post-2015 international policy frameworks

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Introduction

In many regions, disaster risk is continuing to increase (UNISDR, 2013c), mostly because greater numbers of vulnerable people and assets are located in exposed areas. It is vital to start reversing these trends. Over the next 18 months, there will be negotiation and hopefully agreement of three major international policy frameworks, each with a key interest in reducing disaster risk and minimising disaster losses. These are 1) the post-2015 framework on disaster risk reduction (DRR); 2) the Sustainable Development Goals (SDGs) – a way of prioritising development actions; and 3) an international agreement on climate change – to establish global action on tackling climate change beyond 2020. If well integrated, these frameworks should be able to provide a unique opportunity to deliver a coherent strategy and implementation plan to address the drivers of disaster risk.

A key way of linking these frameworks, particularly the SDGs and the post-2015 framework on DRR, lies in establishing common global goals, targets and indicators in relation to reducing disaster risks and losses. Such measures can provide a focus for action, a way of tracking progress and an opportunity to gauge the effectiveness of investments. A single set of targets and indicators spanning the SDGs and the post-2015 framework on DRR would clarify priorities, increase logic and coherence and minimise the amount of work required to develop monitoring and reporting capacity.

Hence, we consider the options available. The report investigates a set of possible components for this common target and indicator set, drawing on different evidence to establish potential numerical targets. It considers the data challenges of establishing such targets and how to improve the collection of data on disasters and disaster risk. It ends with ten recommendations on how post-2015 policy frameworks can support the development of a global monitoring system to track changing disaster risk and disaster losses. The international agreement on climate change has different, though linked targets to the SDGs and post-2015 framework on DRR – and this report does not consider these. However, reducing the impact of climate change will be key to ensure that, even with the successful achievement of predetermined DRR targets, disaster risk does not continue to increase in the future.

Observations on disaster losses since 1980

The report focuses on three dimensions of disaster losses: mortality, national economic losses and livelihood losses, assessed as 'disaster-induced impoverishment'. Based on existing international records of disaster losses collected by the Centre for Research on the Epidemiology of Disasters (CRED) and by analysing a number of household survey datasets, we can establish the following observations at global scale:

Figure A: Global trends in disaster events and death tolls, 1980-2013

SOURCE: ADAPTED FROM WWW.EMDAT.BE

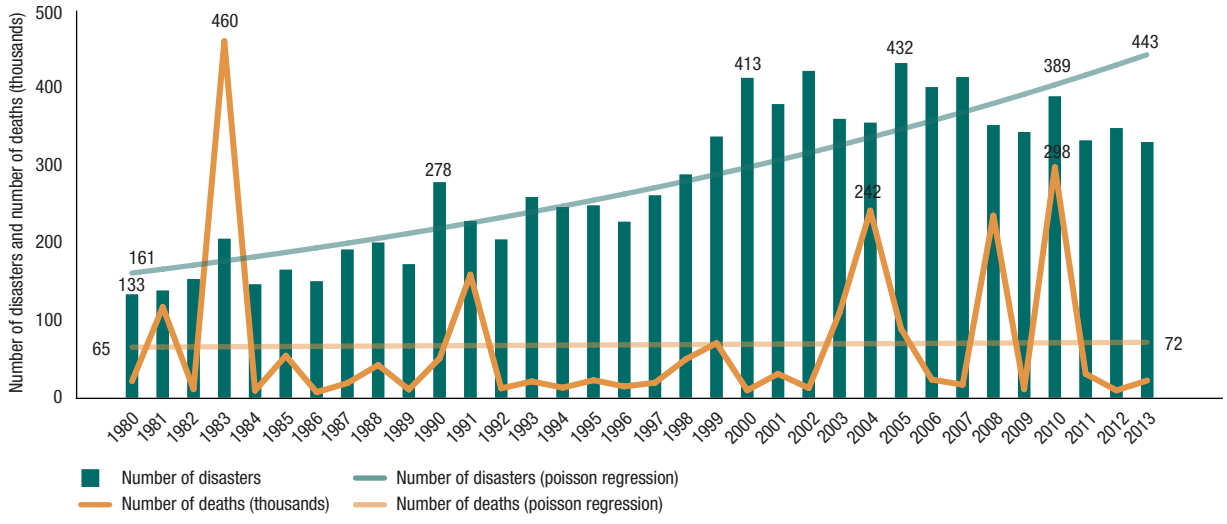
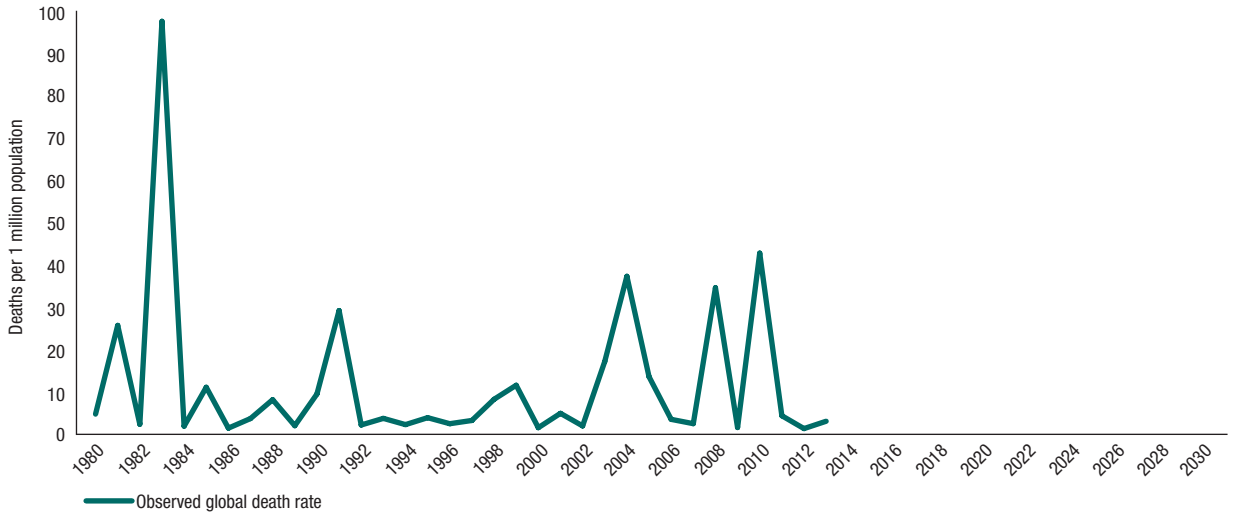


Figure B: Global disaster-related mortality rate (per million global population), 1980-2013)

SOURCE: ADAPTED FROM WWW.EMDAT.BE

NOTE: THE 'X' AXIS HAS BEEN EXTENDED TO 2030 TO HIGHLIGHT THE PERIOD COVERED BY 2015 AGREEMENTS AND TO ACCENTUATE THE LIKELIHOOD OF ANNUAL VARIATIONS CONTINUING.



Disaster deaths

Disaster deaths, the most commonly reported aspect of disaster events, are key motivators of national and international action on DRR. Taking 34 years of data on absolute disaster deaths (not adjusted for population growth or for the severity of particular hazard events) and applying a Poisson regression highlights that the number of disaster events that have occurred in the past few years has increased compared with two decades ago; the associated total number of annual global deaths from disasters has also increased slightly, because of three high mortality years (2004, 2008, 2010) (see Figure A).

Using these data, adjusting them for population growth and projecting 15 years into the future suggests a decrease in disaster-related deaths (per million population globally). The death rate in 1980 was 14.3 deaths per million people; the figure for 2030 would be 8.1 if the trend is extended (see Figure B, using a Poisson regression model). Inevitably given the volatility of the data there is a wide range of uncertainty in how any such statistical forecast can be projected. The high variability in disaster deaths in the observed years also makes it difficult to establish any clear 'trend', and one or two major disasters in the next 15 years, resulting in large numbers of deaths, would challenge any attempts to achieve a reduction in disaster deaths. The global data also hide very significant differences between countries at different levels of economic development. Using the same technique for projecting disaster deaths, the mortality rate in the Philippines for example, would increase by nearly 50% between 1980 and 2030 (22.9 per million in 2030), whereas in the US the decrease would be nearly 60% for the same period (0.8 per million in 2030). Comparing two short time periods using disaster loss data at country level, however, is not reliable statistically, as a major disaster event in the past three decades can greatly influence the variability of the data. This is particularly the case for countries where the total number of disaster events on record is very small.

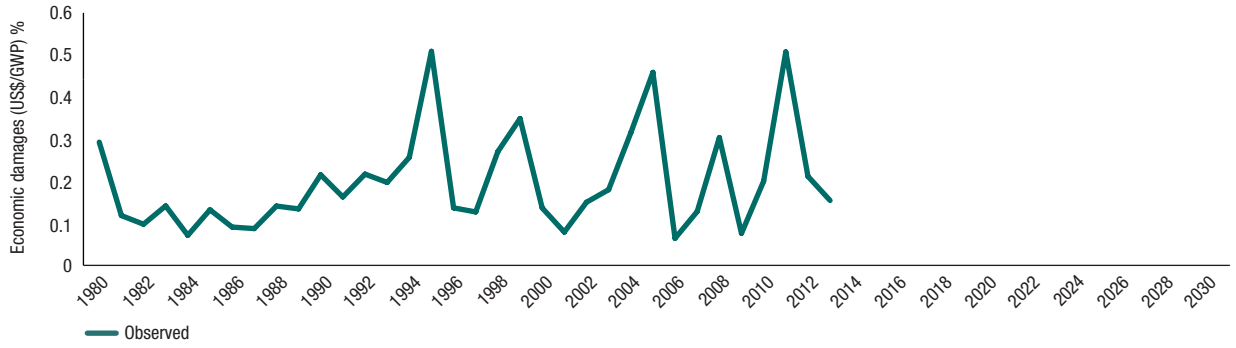
Economic losses

Economic losses from disasters are widely considered to be increasingly rapidly, because more assets are exposed to hazards. Data on global economic disaster losses since 1980, in US dollars based on 2013 US dollar values adjusted by unit of gross domestic product (GDP), show an increase to the present day. When projecting the trend forward to 2030, potential economic losses would be 161% higher in 2030 than they were in 1980 (see Figure C). We cannot draw strong conclusions from these economic loss data, however, as it is not easy to disentangle the impact of US dollar inflation, exchange rates and losses arising as a result of the disaster event itself. It should also be noted that only 36% of events recorded for the period 1980-2013 in the CRED database contain data on economic losses. Further, a small number of mega-disasters, dominating the level of global economic losses in any one year, greatly influence the historic record of economic losses. In the future, more reports on direct and indirect economic damages, using a standardised assessment method even for small events, would be desirable. Modelling could also help provide estimates of economic losses where data are missing. Further work is required to produce a reliable record of economic disaster losses, adjusted for inflation and for country GDP.

Figure C: Global economic losses related to gross world product (%), 1980-2013

SOURCE: DRAWING ON HTTP://DATA.WORLDBANK.ORG AND WWW.EMDAT.BE

NOTE: THE 'X' AXIS HAS BEEN EXTENDED TO 2030 TO HIGHLIGHT THE PERIOD COVERED BY 2015 AGREEMENTS AND TO ACCENTUATE THE LIKELIHOOD OF ANNUAL VARIATIONS CONTINUING.



Links between disasters and poverty

Disasters, climate change and development are inextricably linked: not only do disasters disproportionately affect the poorest and most marginalised people, but also they exacerbate vulnerabilities and social inequalities and harm economic growth. 'Natural' disasters can reverse years of development gains, and threaten efforts to eliminate poverty by 2030. Consequently, any strategy for eradicating extreme poverty must include efforts to prevent impoverishment (the descent below the poverty line of people currently living out of poverty). Rates of impoverishment are significant and, in some contexts and over certain periods of time, can exceed those related to escapes from poverty (see Figure D, showing an illustrative sample of districts within the countries listed, where comparable data are available, showing high impoverishment rates). Disasters are commonly cited as a major driver of impoverishment and are a significant obstacle to escaping poverty. Their impact on poverty and human development can vary according to both the characteristic of the hazard (e.g. whether it is rapid- or slow-onset and the recurrence time between events) and the degree of resilience at household and community level (itself a function of assets and endowments). The balance

Figure D: Households escaping from and falling into poverty - selected data to highlight impoverishment potential over particular periods of time

SOURCE: ADAPTED FROM SHEPHERD ET AL. (2014).

NOTE: CALCULATIONS USE NATIONAL POVERTY LINES.

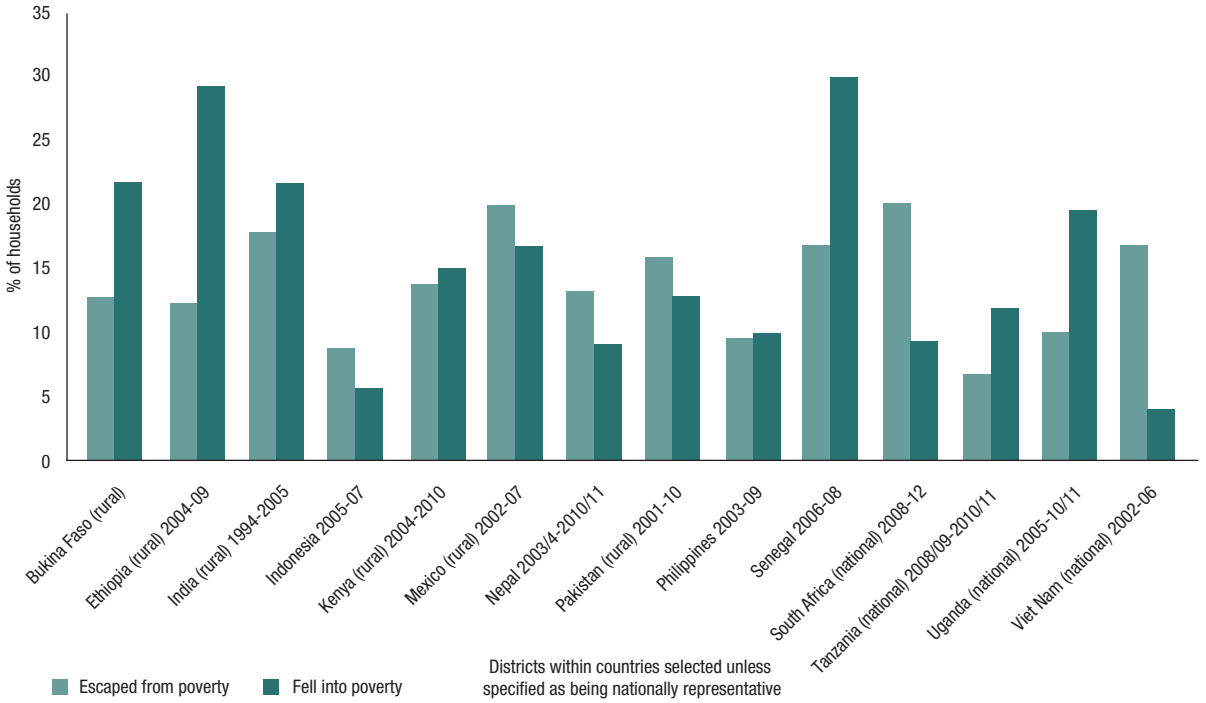


TABLE A: RATES OF IMPOVERISHMENT ACROSS DIFFERENT TIME PERIODS, MATCHED WITH DISASTERS IN THESE PERIODS

Country	Years/ period of time	Annual rate of impoverishment (%)	Information on main disasters (www.emdat.be)
Ethiopia (rural)	1990-1994	4	
	1999-2004	3.6	Drought September 1999 affecting 4.9 million people. Drought 2003 affecting 12.6 million people.
	2004-2009	6	Drought start of 2009 affecting 6.2 million people.
Kenya (rural)	2004-2007	4.7	Drought July 2004 affecting 2.3 million people. Drought December 2005 affecting 3.5 million people.
	2007-2010	4.7	Drought July 2008 affecting 3.8 million people.
South Africa	2008-2010	5	
	2010-2012	4.5	Floods 2011 affecting 200,000 people. Floods October 2012 affecting 125,000 people.

SOURCE: DRAWING ON ETHIOPIA: ETHIOPIAN RURAL HOUSEHOLD SURVEY; KENYA: TEGEMEO AGRICULTURAL SURVEY; SOUTH AFRICA: NATIONAL INCOME DYNAMICS STUDY AND WWW.EMDAT.BE

of evidence suggests droughts and extreme rainfall volatility are the hazards most correlated with an increase in poverty.

Without the benefit of more detailed research, only anecdotal comparisons are possible of rates of impoverishment in a given time period in a country with major disaster events falling in the same period. The table above presents an assessment of trends in impoverishment over time using household panel surveys undertaken across different periods. It also gives information on major national covariant shocks. The aim is not to attribute particular rates of impoverishment to these events, but rather to illustrate the context within which countries have been successful, or more usually unsuccessful, at reducing their impoverishment rates. This is a small sample of a longer table included in the main report. The aim is to give an idea of the possible rate of reduction of impoverishment.

Specifying targets

As described above, a global dataset of disaster losses covering 34 years is not a strong basis on which to establish global disaster mortality targets for 2030, but it is probably the best we have. Loss data would need to be available for a much longer period to enable establishment of a more accurate baseline and projection – although this would also introduce a problem in that demographics and building stock would likely have changed significantly over the time period. Accordingly, until it is possible to produce a reliable global assessment of the risk of losses across a range of hazards at country level, the establishment of targets around disaster losses is as much an art as it is a science. By looking at global and national data and considering the scale of mortality risk reduction some countries have achieved, as well as the relative blend of hazards (those that offer a chance of evacuation or not), **we propose a global target of halving disaster deaths by 2030 (normalised by population exposed).** The reductions achievable around earthquake fatalities (which accounted for 38% of global mortality from disasters between 1980 and 2013) are likely to be much lower than those for hazards that offer early warning potential – storm surges, tropical cyclones, river floods and tsunamis, for example. Evacuations are much more effective than incremental changes in building stock at saving lives. Relatively radical changes in building types need to be made, such as from unreinforced masonry to wood or steel, depending on the specific hazard involved, in order to make a significant difference. Additionally, cost and time taken to replace building stock are key considerations.

Based on an assessment of country-level evidence and relative trends related to mortality risk and economic loss risk, and given that even standard building codes are designed to save lives rather than limit damages, a proposed target of **reducing economic losses from all disasters by 20% (per unit of GDP) by 2030** could be set. We consider this highly ambitious, given the background trend in many countries of increasing exposure of economic assets. For floods, progress towards this target could be achieved through improved zoning of new construction as well as through the development of flood defences. For earthquakes, progress could be made by replacing the most dangerous buildings with new earthquake-resistant construction and building in areas of low risk. Our analyses for Japan show reductions achieved in casualties have been much larger than those achieved around economic losses.

It is equally difficult to ascertain a globally representative figure for rates of impoverishment, given the relative paucity of household surveys investigating the role of natural hazards and disasters in any depth. However, based on the few data points available, it is clear that preventing all impoverishment resulting from disasters will not be possible, as the immediate impacts (hours, days and weeks) following a disaster are very difficult to mitigate entirely, even in the wealthiest societies. However, it appears reasonable (based on case study evidence) to expect to be able to reverse post-disaster impoverishment after a period of months or at maximum a year. Accordingly, a target within the context of poverty eradication could be as follows: **A shock, such as a disaster, does not increase poverty levels, as measured 12 months after the event.** It is important to note that a target focused on disasters alone may not be appropriate, as processes of impoverishment are complex and commonly involve interconnected factors that are hard to distinguish. This is a challenging target, since the impact of a disaster on poverty depends on the type of hazard, the context, the scale and the nature of the recovery process. More process-oriented and input targets could focus on 'reducing the exposure of poor people to extreme hazards by x%' or be as follows: '100% of post-disaster recovery plans address the impact of disaster on poverty'.

Factors to consider in developing global and national disaster risk reduction targets and tracking progress

In establishing a target and indicator framework across the SDGs and the post-2015 framework on DRR, we need to address some fundamental questions:

Is a global aggregate target directly applicable at country level? If a proposed global target is to 'halve disaster deaths by 2030', is it appropriate to adopt this as a national target also? Based on the data assessed in the report, we believe it is vital to establish a global target to guide progress but, given the wide variety of national risk contexts, it does not make sense to apply this single common target directly to every country. Support should be given instead to a process of national differentiation, shaped by agreed parameters for establishing national commitments, and registering these within an international reporting framework. This increases the likelihood of country ownership. This process of setting national targets would need to be independently reviewed, and guidance given based on the country profile (hazard risk, possible mitigation methods, economic band, exposure at risk).

Should progress reports on implementing the SDGs and the post-2015 framework on DRR be synchronous? The target timeframe and reporting protocol for the SDGs and the post-2015 framework on DRR need to align fully to avoid unnecessary duplication or burdening on reporting capacity at the national level.

Do global disaster loss data offer the best way of tracking progress? Any global, regional or national trends in disaster losses must be treated with caution, as accurate data on disaster losses are not available for many countries. In addition, severe hazard events and major disasters can be so rare in any one region that they are not taken into account within the time sample. A global disaster monitoring system rooted at the national level, as described below, will need to tackle these challenges. A common target and indicator framework should have targets linked to disaster risk as a way of estimating expected losses. This is necessary to establish a clear picture of progress on DRR at national and global level.

How can progress in reducing expected losses be measured globally and nationally? National disaster data are often very 'noisy', meaning they may be dominated by whether an extreme event has, or more often has not, occurred within that observation period. Accordingly, it is not possible to establish a true statistical average for mortality or economic losses from only a few decades of national loss data. An example of this is for Haiti, where earthquakes killed fewer than 10 people between 1900 and 2009 before over 220,000 people were killed in a single afternoon in 2010. Therefore, both in establishing baselines and in measuring progress on DRR, it is necessary to use other methods of measuring disaster risk.

One way is to use a catastrophe loss model containing a synthetic catalogue of tens of thousands of years of potential events, as widely used by the insurance industry. However, such models are complex, do not cover every country and can be expensive to build. A simpler and more practical method, available globally, involves employing 'proxies' for expected disaster casualties and economic loss. For earthquake, the proxy method takes the level of ground-shaking hazard established at one or more consistent annual probability as shown on a hazard map (such as the 0.2% or 500-year average return period), and collects data on the numbers of buildings in each hazard zone, classified into categories according to their susceptibility to collapse. Based on identifying the population expected to be within these collapsed buildings, it becomes possible to sum across all zones, multiplying by the probability of the hazard, to find the expected number of casualties per year. For hazards with the potential for early warning and evacuations, such as floods, the method also uses consistent hazard maps to identify the population at risk. Based on expected warning times, and the rigour of the evacuation planning, the proportion of this population expected to be saved is calculated. The use of hazard maps and proxies provides a simpler way of tracking risk-based loss information. Agreement on the hazards measured and standardisation of data are critical for the application of this monitoring framework.

Ten propositions for a global monitoring framework on disaster risk reduction

The following propositions, based on assessments in this report, focus on agreeing common targets and indicators for DRR and establishing national and global monitoring systems to track progress:

1. **A target set on DRR should combine the targets with a methodology that assesses levels of disaster risk.** Only then can we adequately track progress on reducing disaster risk. Given the short timeframe between now and 2030, assessing trends in observed disaster losses might give a false impression of success if countries or regions are lucky in avoiding severe disaster events in the period.

2. **Such targets should be included in both the SDGs and the post-2015 framework on DRR, using identical language.** A single set of goals, targets and indicators spanning the SDGs and the post-2015 framework on DRR would clarify priorities, increase logic and coherence and minimise the amount of work required to develop monitoring and reporting capacity. Such indicators could monitor inputs and outputs, such as the presence of plans or legislation, or the number of people effective early warning systems cover or of school and health facilities built to hazard-resistant building codes, linked to the hazard risk in the area.

3. **It is important to establish clear, numerical targets at a global scale to act as eye-catching awareness-raising components of the SDGs and the post-2015 framework on DRR, and also to help direct actions. Space should be created for the differentiation and self-determination of targets at national level, however.** Differences between countries in terms of their potential to reduce risks, as a result of previous actions and exposure to certain types of hazards, means one-size-fits-all targets – like halving disaster deaths – are not appropriate for all. Instead, countries should be encouraged to establish their own levels, in light of the global target, and to select from a basket of indicators, and then to register these as part of the reporting process. This is likely to promote greater ownership and relevance. However, this would necessitate independent review and guidance based on the country profile (hazard risk, possible mitigation methods, economic band, exposure at risk).

4. **A disasters data revolution is needed, involving the systematic collection of data on disaster risk and losses across countries, to enable the establishment of national and global trends.** This revolution can happen only if DRR targets and indicators are included in the SDGs and are treated as part of a much wider movement to improve the quality and availability of data on sustainable development. This is why it is so vital to include DRR in the SDGs. Without such data, no country can truly know if it is becoming more or less resilient to the impacts of hazards. Disaster risk data can be used to monitor progress over time, whereas disaster loss data improve our understanding of the risk and how best to provide mitigation measures, as well as feeding hazard maps and models.

5. **A monitoring methodology for tracking national progress on DRR must focus on the use of detailed disaster risk information,** including high-resolution data on national building inventories, population data (including by socioeconomic group), mapped hazard data and DRR plans. This makes it possible to measure levels of disaster risk using the real experience of disaster losses to validate findings. Although there has been some progress, there will be a need for investment in setting up a technical support programme to address the challenge outlined here.

6. **Upgrades to poverty data should involve modules on shocks.** Where countries start more comprehensive and regular monitoring of poverty dynamics, potentially by extending household surveys, these or other data collection methods should incorporate modules or questions on the impact of disaster events on income poverty and other dimensions of human development, such as health or school attendance.

7. **To increase simplicity, logic and integration, the SDGs and the post-2015 framework on DRR should include DRR targets with the same start and end points (e.g. targets set from 2015 to 2030), with synchronous reporting periods.** Any mismatch of timeframes or irregularity of reporting periods will increase the workload for countries, stretching their capacity to monitor progress across a range of targets.

8. **Tracking progress on disaster losses and risks requires the normalisation of data for key variables, like population or GDP, to allow for comparisons between time periods. It also requires the establishment of a baseline against which progress can be assessed.** As records of losses from only a few decades typically under-sample the impact of the most extreme disasters, the baseline should be based principally on the assessed level of risk (of losses) in that country, based on the use of proxies indicative of casualties and economic losses. The methodology to define the baseline must be consistent with how progress is measured.

9. **The institutional architecture for delivering a global monitoring system needs to involve multiple groups at different scales, each serving a distinct function.** While the responsibility for monitoring progress on DRR lies with national governments,

a facilitating body at international level, such as the UN Office for Disaster Risk Reduction (UNISDR), is needed to collect data and help strengthen national and local monitoring capacity. Such a body would need to involve national statistical offices and other relevant governmental bodies in order to be able to collect the required data, including census data. This could be supported by regional technical agencies, with data also drawn from the scientific community to establish risk profiles, from technology companies (satellite data to approximate building coverage, for example) and from other groups on disaster losses. The institutional architecture should span the post-2015 framework on DRR and the SDGs so as not to create duplication.

10. **While governments will continue to self-report progress, it is vital that independent groups at all levels can contribute to the overall framework for monitoring progress on DRR. This will help with transparency and accuracy.** The original framework for monitoring progress on the post-2015 framework on DRR – the Hyogo Framework for Action (HFA) monitor – has suffered from being a self-reporting platform, with global and regional institutions unable to check claims or accurately compare reports between countries. An independent international technical group has an important role to play in helping guide standards (e.g. in definitions[1] or methods for risk assessment), assess data quality and transparency and support other potential processes of accountability, including country-to-country peer review.

1. The Integrated Research on Disaster Risk (IRDR) programme is currently leading a working group on definitions.

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