IRDR Science Plan/ICSU Regional Disaster Strategies Comparison

Executive Summary

The universal theme shared across all regional plans is to instill a 'culture of prevention' in order to reduce loss (natural, human, and economical) caused by hazards and disasters. To do so, each plan sets out to increase research and study focused on the collection, measurement, assessment, sharing and effective communication of hazards and disasters risk. Additionally, each plan recognizes the importance of linking science to policy making and creating a network (global and regional) of influencers who share the common purpose of reducing loss caused by hazards and disasters, and can pool/share resources to make the greatest impact.

Common Challenges:

- Uncharted regions/territories, and unknown risks (i.e. climate change)
- Out-of-date risk/impact assessments: older models don't take into account modern changes (population growth, multi-story self-engineered buildings, climate change, etc.)
- Insufficient data collection: non-universal, non-multi-hazard, not effectively shared
- Disparate/insufficient funding: competition for the same resources
- Science and policy making not effectively linked
- Understanding decision makers; how to communicate risks and reduce loss

Common Recommendations:

- Region (local) specific research focusing on the highest risk/highest loss hazards and disasters
- Create and maintain a multi-hazard database containing multi-disciplined (natural and social science) information
- Improve data collection, measurement, and decision making methods through the use of technology such as mapping and GPS and dynamic modeling systems
- Conduct studies on decision makers to determine how decisions are influenced, and what information/policies/methods are required to effectively influence decision making
- Develop effective communication strategies for raising public awareness about hazard and disaster risks in countries, regions, and communities, and effective early warning systems for limiting/mitigating loss.

IRDR/ICSU Regional Disaster Strategy Comparison

Objective	1. Characterization of hazards, vulnerability and risk	2. Understanding decision-making in complex and changing risk contexts	3. Reducing risk and curbing losses through knowledge-based actions
Sub-objective	1.1 Identifying hazards and vulnerabilities leading to risks	2.1 Identifying relevant decision-making systems and their interactions	3.1 Vulnerability assessments
	1.2 Forecasting hazards and assessing risks	2.2 Understanding decision-making in the context of environmental hazards	3.2 Effective approaches to risk reduction
	1.3 Dynamic modeling of risk	2.3 Improving the quality of decision-making practice	

ICSU Regional Science Plan

Africa and sub-Saharan Africa	**1.1.1 Places at risk**	**2.1 Relevant decision-making systems and their interactions**	**3.1 Vulnerability assessments**
	Nearly all countries in Africa are at risk of natural and human induced disasters, with drought and combinations of drought and hydro-meteorological hazards being the main causes of mortality and economic loss.	Currently there are gaps in the availability and quality of scientific data from which decisions can be made. There is a need to establish a consistent and complete method for creating and maintaining observation and data management systems that enable multi-disciplinary participation for scientists and researchers. Access to and funding for remote sensing technology, geospatial information systems, and observation platforms is also needed.	Socio-ecological systems - Research is needed on how to communicate warnings of impending disasters effectively, and how to disseminate knowledge to help communities to improve their resilience.
	Hydro-meteorological events account for most of the disasters in sub-Saharan Africa and they impact nearly every country. They include floods, tropical cyclones, storm wave surges, droughts, extremely high temperatures (global warming), wildfires, sand or dust storms, and landslides and avalanches.		Technology Systems - All countries depend on their power transmission and information technology infrastructure, and the level of dependence is expected to increase as African countries seek to bridge the 'digital divide'. Many natural hazards can damage these systems, resulting in widespread chaos and economic loss. The vulnerability of these systems must be assessed and steps taken to improve their resilience.

1.1.2 Sources of risk			
Climate and climate change, increasing social, economic, and environmental vulnerability to events such as recurrent drought, deforestation, and progressive land degradation and desertification.			
1.1.3 People most at risk			
Urban people, especially low-income groups. Urban areas are growing rapidly, millions of people are living in slums on hazardous sites such as flood planes and steep slopes.			
1.1.4 Risk level			
High. Risk level elevates in economically and politically unstable regions as fragile and degraded environments can fuel conflict and war.			
1.1.5 How risk will change with time			
It will increase			
1.2.1 Forecasting natural hazards	**2.2 Decision-making in the context of environmental hazards**	**3.2 Effective approaches to risk reduction**	

Forecasting hazards is challenging, because sub-Saharan Africa lacks data, information, knowledge, skills, human resources in the field, and funding for research.	Requires effective transfer of information to policy and decision makers and communities. Research is needed on how to translate research results into policies that minimize the human and economic cost of hazards. Focus is to link scientific research and capacity building in Africa to policy and decision makers and society.	Development of a regional and global partnership to minimize impacts, including multi-disciplinary involvement from scientists and researchers, the closing of existing knowledge gaps through the creation of a comprehensive database of historical information, including risk and lessons learned, integrated modeling of multiple disasters for better forecasting, an effective, multi-pronged communication and education strategy involving policy makers, influential institutions (i.e. UN and AU), and outreach programs for communities.
1.2.2 Factors contributing to future risk	The development of effective early warning systems that provide timely and effective information to institutions, such as the United Nations (UN) and the African Union (AU), as well as communities, schools, and tertiary institutions is critical.	The overarching goal is to build a culture of prevention by improving public awareness and facilitating accessibility to disaster information through joint initiatives with other national, regional, and international organizations, governments, and civil society.
Rapid population growth and an increasing dependency on power transmission and information technology infrastructure.		
1.2.3 Reducing uncertainties		

Propose development of a multidisciplinary hazards database, cross-cutting research activities with other ICSU ROA scoping groups, vulnerability assessments for specific high risk hazards/disasters in specific regions, communications strategy for effective transfer of information between scientists and policy makers, integrated modeling of multiple disasters, and outreach programs to educate and prepare communities.		
1.2.4 Communicating forecasts effectively		
Focus is on leveraging technology to create a unified source of information for scientists and researches to effectively forecast hazard and disaster risk. Additionally, there is a desire to develop an effective communications network between scientists and policy makers, influential organizations and communities.		
1.3 Dynamic modeling of risk	**2.3 Improving the quality of decision-making practice**	

	Requires an integrated, multi-hazard approach that addresses vulnerability and risk assessment. Integrated environmental and social-economic modeling as well as scenario building are needed to identify the scale and direction of the necessary mitigating and recovery strategies.	The development of systems that allow for the capture, modeling, and distribution of multi-disciplinary, multi-hazard information is critical to improving the quality of the decision making process. Additionally, the development of strong communication networks with policy makers, identified institutions, and the creation of effective early warning systems are necessary.	
Latin America and the Caribbean	**1.1.1 Places at risk**	**2.1 Relevant decision-making systems and their interactions**	**3.1 Vulnerability assessments**
	Regions where rapid population growth, urban development, and deforestation are occurring.	The decision making process is still largely uncharted, and tends to vary dramatically based on socioeconomic status. Scientific facts are not enough to influence decision makers. A multi-disciplinary scientific approach is required (natural and social), along with a region-specific and socioeconomic focused delivery. Science alone is not enough to influence policy makers, and policy makers do not necessarily influence decision makers at local and regional levels.	Disaster and region specific research is needed to determine how to communicate risks and warnings of impending disasters effectively. Communication strategy is likely to vary based on disaster/risk, region/location, socio-economic status of the community, and political climate.
	1.1.2 Sources of risk		Development and maintenance of technology is needed to capture, model, and measure multi-hazard risks. Effective solutions include multi-disciplinary data capture, including but not limited to natural, basic, applied and social science.
	Natural sources of risk such as seismic, volcanic, and hydro-meteorological, and human induced risks such as land degradation and deforestation, population growth in high risk areas, and climate change are abundant.		
	1.1.3 People most at risk		

Urban dwellers, especially low income groups in high risk regions		
1.1.4 Risk level		
High-to-moderate depending on region.		
1.1.5 How risk will change with time		
Risk will continue to increase as population and development increase in high risk areas.		
1.2.1 Forecasting natural hazards	**2.2 Decision-making in the context of environmental hazards**	**3.2 Effective approaches to risk reduction**
The ability to forecast natural hazards lacks consistency and focus. The size and extent of the continent present significant challenges because of the large number of uncharted physical processes and occurrences. Additionally, even in charted high risk areas, the results of previous disasters are not well documented, and in some cases forgotten altogether.	Decision making requires multi-disciplinary data capture and information share between scientists and researchers, coupled with effective communication strategies with governments (local and national), organizations, regions, communities and individuals.	Development of national, regional and local partnerships to minimize impacts, including multi-disciplinary involvement from scientists and researchers, the closing of existing knowledge gaps through the creation of a comprehensive database of historical information, including risk and lessons learned, hazard mapping, integrated modeling of multiple disasters for better forecasting, an effective, multi-pronged communication and education strategy involving policy makers, influential institutions, and outreach programs for communities.
1.2.2 Factors contributing to future risk	Currently, information capture and knowledge share is inconsistent, and as a result, the decision-making process is less	The overarching goal is to build a culture of prevention by improving public awareness and facilitating accessibility to

	Lack of research on the full range of hazards and risks to the continent and the impacts of such risks on region-specific areas, inadequate documentation of past events, disparate and macro-focused research, and rapid population growth.	result, the decision making process is less structured and varies in its effectiveness.	awareness and facilitating accessibility to disaster information through joint initiatives with other national, regional, and local organizations, governments, communities and individuals.
	Continued population growth, especially in high risk regions and location such as hillsides will continue to elevate hazard risk. Developing methodology for natural and socio natural hazard mapping and integration into community planning processes is critical to risk reduction.		
	1.2.3 Reducing uncertainties		

	Firstly, there is a significant need to identify uncharted and un-mapped natural hazard processes and patterns. Secondly, there is a need to better understand the social and physical factors and processes that contribute to social construction of risk and the ways in which risk is distributed socially, territorially and temporally. Thirdly, there is a need to better understand the ways in which risk is, can be, and should be measured. Finally, there is a need to better understand decision making processes for the enacting and rejection of risk reduction and control, disaster preparedness, response and recovery actions.		
	1.2.4 Communicating forecasts effectively		
	Effective communication requires coordination between both natural and applied scientists, as well as governments and private companies, and local and regional communities.		
	1.3 Dynamic modeling of risk	**2.3 Improving the quality of decision-making practice**	

	Dynamic modeling of risk is both desirable and necessary. The most significant challenge is to effectively capture and manage the information required for modeling. This thematic area must project and promote the establishment of data recording infrastructure and conclude long-tern commitments from research institutions and other agencies for the maintenance and monitoring of the recording instruments. The obtaining and archiving of previously collected data is critical.	Propose the establishment of infrastructure for collecting and maintaining information pertaining to hazard and disaster risk as well as development of methodologies for understanding and communicating risk effectively. This includes focusing on linking roles of natural and technical sciences with policy makers, economists and other social science based actors and decision makers for implementation of more effective risk prevention communication strategies at national, regional, and local levels.	
Asia and the Pacific	**1.1.1 Places at risk**	**2.1 Relevant decision-making systems and their interactions**	**3.1 Vulnerability assessments**
	Densely populated regions and cities, hillside regions and communities located near water, especially island nations.	Hazard and risk assessment can be performed at the national, regional, and local levels, however decision making systems and their interactions must focus on needs at a regional and local level.	Multi-disciplinary and multi-hazard research is needed to capture and assess hazard and risk levels for many of the existing and not yet charted regions. Population growth in high risk areas coupled with insufficient building standards have significantly increased risk of loss across the region. This issue is prominent in both inland and island nations. Many areas within the Asia Pacific region do effectively capture and assess risk, as well as institute programs for minimizing loss (ex. earthquake drills), however, these programs are not being effectively disseminated and implemented in other similarly high risk regions.
	1.1.2 Sources of risk	Decision making requires the coordination and involvement of natural and social scientists, national, regional, and local policy makers and organizations/businesses, and regional and local communities.	
	Earthquakes, floods, and landslides caused by both natural and human induced events.		
	1.1.3 People most at risk		
	Urban dwellers, low income residents of densely populated high-risk regions, and island nations.		
	1.1.4 Risk level		

High **1.1.5 How risk will change with time** Risk will continue to increase as population, land degradation and deforestation, and climate change continue to grow.		
1.2.1 Forecasting natural hazards	**2.2 Decision-making in the context of environmental hazards**	**3.2 Effective approaches to risk reduction**
Depending on the region, information and technology necessary for forecasting and measuring the impacts of natural disasters varies. Areas such as China and Japan are extremely advanced, however this information is not effectively communicated to other high risk regions such as India and rural and isolated areas (islands), regions of a lower socio-economic status.	Decision making requires effective multi-hazard information capture, risk mapping, modeling, and assessment, accurate forecasting, efficient early warning systems, and effective communication with national, local, and regional policy makers, businesses/organizations, and communities.	An emphasis on capacity building and continuity, and the establish of a culture of prevention are of high priority. The establishment of programs for assessing, capturing, measuring and modeling multi-hazard risk are an integral component to the capacity building strategy. Additionally, development of effective communication systems for disseminating early warning information to at risk localities is essential. Coordination and cooperation between scientists, governments, organizations, and regional and local communities is essential for the establishment of risk mitigation policies such as retrofitting self-engineered
1.2.2 Factors contributing to future risk		

Continued population growth coupled with lack of knowledge/research, lack of technology for capturing and measuring risk, ineffective methods for communicating and incorporating risk into community planning and disaster prevention/preparedness, and inconsistent and ineffective methods for communicating hazard risk and early warning information to high risk areas.	structures and the enforcement of more resilient building codes, the development of reliable landslide hazard and vulnerability zonation technology and sophisticated flood prediction systems, and the relocation of high risk low lying flood prone communities.
1.2.3 Reducing uncertainties	
Earthquakes pose the most significant risk for loss in the Asia Pacific region. Adequate earthquake recording and GPS monitoring of crustal deformation is crucial for risk mitigation, as well as the effective capture of risk information and modeling for present day loss scenarios and mitigation, retrofitting of self-designed non-engineered homes, effective information share with countries who have developed effective earthquake preparedness programs and drills, and development of facilities for making use of early warning and forecasting systems for tsunamis and other natural hazards.	

Floods are a major natural hazard in the Asia Pacific region and consist of five main types: coastal, flash, river, urban and cloud burst. Rapid economic development, especially in low lying areas, is creating a rising toll from flood disasters. Recent developments in hydrological and meteorological sciences provide the opportunity for further improvements in flood forecasting, flood risk management, improvement in flood warning systems and Integrated Water Resources Management (IWRM).

Landslides are directly linked to earthquakes and flooding, and although they are a significant risk in some regions, they can be mitigated by cost-effective engineering works. Stabilization of slope through geometric, hydrogeological and mechanical methods can significantly reduce the risk of major loss due to landslides. Landslide risk can be significantly reduced through the development of reliable landslide hazard and vulnerability zoning for land use planning, early warning technology suitable for natural and social conditions in the Asia Pacific region, and the implementation of landslide reduction technology for areas such as cultural heritage sites and other locations of high-societal value.		
1.2.4 Communicating forecasts effectively		
Most countries in the Asia Pacific region have effective forecasting and early warning systems in place, however countries need to develop facilities to make use of these advisories, facilities that provide an effective means for communicating advisories at local and regional levels.		

	1.3 Dynamic modeling of risk	**2.3 Improving the quality of decision-making practice**	
	Dynamic modeling exists for earthquakes in many high risk regions, however more information, mapping, and modeling is required for assessing impacts of flooding, landslides and climate change, particularly for highly populated rural regions and island nations.	Due to varying levels in impact for different hazards and different regions, it's critical to focus on building self-sustaining capacity at various levels for different hazards. These variations require different institutional frameworks and governance schemes, as well as different manpower skills, planning, information gathering, access and dissemination, and resource mobilization and allocation strategies.	
		This approach requires the enablement, enhancement, and sustainment of existing capacity, the expansion, dissemination, and transfer of capacity/resilience amongst communities and nations, the building of self-sustaining capacity for disaster-resilient communities and nations, the enhancement and incorporation of indigenous knowledge and capacities into natural hazard management, and the engaging of communities to identify their own capacities to reduce vulnerability to disasters and build resilience.	