"Why, when so much more is known about the science of natural events, including extremes, and when technological capacity is so much stronger [than in the past], are large-scale and even small- and medium-scale disasters apparently becoming more frequent and losses continuing to increase at a rapid rate?" - *IRDR, 2009; White, Kates & Burton, 2001*

START, the SysTem for Analysis, Research, and Training (www.start.org) is a capacity building partner of the Integrated Research on Disaster Risk (IRDR) program. START conducts a set of activities that enhance scientific and institutional capabilities in developing countries to conduct research related to IRDR themes, and to promote meaningful actions to manage disaster risk.

This report describes (i) specific activities conducted by START in relation to IRDR, specifically in collaboration with the IRDR International Centre of Excellence (ICoE) based at the Academy in Taipei, and (ii) START's other programs and projects activities that contribute to the IRDR program.

1. Activities conducted in collaboration with ICoE based in Taipei

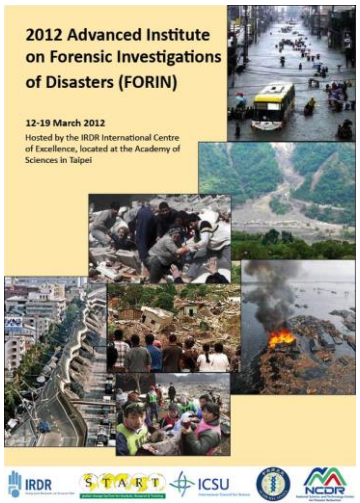
1.1 Advanced Institutes for Integrated Research on Disaster Risk (IRDR)

One focus of the START/IRDR partnership is a series of intensive training institutes that promote work along IRDR priority themes and projects. Each such Advanced Institute convenes around 20 young early-to-mid career researchers and practitioners from a specific region, country or thematic expertise and provides them with the enhanced understanding, skills and resources to design, organize and carry out IRDR related research in their own countries. The Advanced Institutes series for IRDR began in 2012. The first three years of IRDR Advanced Institutes are funded and co-organized by the IRDR International Centre of Excellence (ICoE) based at the Academy in Taipei.

1.1.1 2012 Advanced Institute on Forensic Investigations of Disasters (FORIN)

Knowledge of the causes of disasters and how to effectively manage disaster risks has grown considerably in recent years. The most recent 50 years have brought substantial expansion in understanding of the potential magnitude ad frequency of many natural events and the places in which they are more likely to occur. Judging by consistent increases in both disasters and disaster losses, however, this knowledge remains seriously inadequate.

The Forensic Investigations of Disasters (FORIN) project of IRDR advocates that neither previous nor current local, national and global disaster programs and activities are being guided or supported by a sufficiently strong, in-depth and profound knowledge base about environmental hazards and disasters and their underlying root causes. More penetrating investigations are needed – developed and carried out in an explicitly multi-disciplinary framework – that search for additional, wider and more fundamental explanations for the on-going rise in disaster losses. To download the FORIN Project report, click here.



The 2012 Advanced Institute on FORIN trained 24 international participants in FORIN perspectives and related approaches to

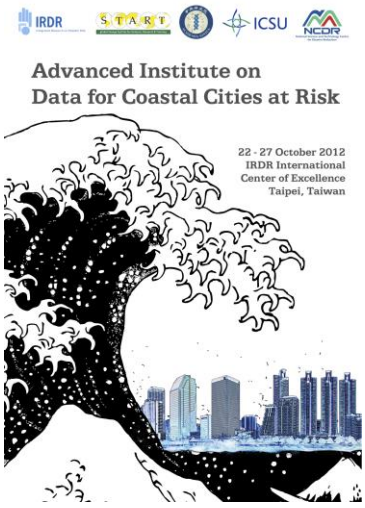
disaster research. The 8-day intensive training event included educational modules, hands-on interactive exercises and field visits. Click here to view the Institute program and here to browse the participant directory.

As a critical part of the Institute, all participants conceptualized an individual or collaborative project, presented in plenary at the conclusion of the event, that aims to apply one or more of the FORIN-related research methodologies. Project concepts range from promoting the contextualization of national disaster risk reduction and management efforts within an integrated human security framework in the Philippines to a critical cause analysis of the social impact of Typhoon Morakot in Taiwan to improving understanding of the impacts of flood disasters on gender relations in India and Pakistan. **Competitive follow-on research grants were awarded to four research teams to conduct FORIN-related projects in South and Southeast Asia.** These teams have completed their research, presented results at an international conference and are in process of submitting papers for publication in refereed journals.

1.1.2 2012 Advanced Institute on Data for Coastal Cities at Risk

Much of the world's rapid population and economic growth is occurring in large coastal cities that are at high risk from a changing climate, including sea level rise, intense precipitation and heat stress. Densely populated mega-deltas and other low-lying coastal urban areas are among those described in the IPCC Fourth Assessment Report as "key societal hotspots of coastal vulnerability" with many millions of people potentially affected.

With the increase in population in coastal areas, there is an increased potential for loss of life and property. Physical risks and vulnerabilities in these regions are often accompanied by a deficit of adaptive capacity (i.e., the ability to cope with the risk and vulnerabilities posed by climate change) as the cities generally lack necessary resources – financial, human and institutional – as well as access to relevant scientific information. These constraints argue for an urgent demand to enhance the knowledge base and adaptive capacity of cities by the integration of science into planning and policy for potentially affected areas, based, in part, on improved data management. Further research is needed to advance the methods for collecting, analyzing and evaluating data for coastal cities and to have improved management and accessibility of scientific information and its incorporation into systemic analyses of methods to reduce risk and improve adaptive capacity. For this purpose, models of cities are being developed to reduce vulnerabilities and increase resilience.



Addressing this deficit requires integration of research and policy-making across all hazards, disciplines and geographic regions. The Integrated Research on Disaster Risk (IRDR) program, a decade-long program of international research and related activities, aims to bring together the natural, socio-economic, health and engineering sciences in coordinated efforts to address the challenges brought about by natural disasters, mitigate their impacts and improve related policy-making mechanisms.

The 2012 Advanced Institute on Data for Coastal Cities at Risk provided 29 international participants from Asia and Africa with the enhanced understanding, skills, and resources to use and collect data for coastal cities related studies in their own countries. The 6-day intensive training event included

educational modules, hands-on interactive exercises and field visits. Click here to view the Institute program and browse the participant directory. Many of the participants are involved in the Coastal Cities at Risk project funded through IDRC-Canada, and are conducting follow-on research that will be presented at a project workshop to be held in the first quarter of 2014.

1.1.3 2013 Risk Interpretation and Action: Decision Making under Conditions of Uncertainty

A key issue emerging from recent disasters is understanding the ways people interpret risks and how they respond based on these interpretations. Acceptable risk in the context of risk reduction and building safety always involves interactions between natural (physical) and human (social and behavioral) factors. To address this topic, an intensive two-week working seminar/advanced institute in November 2013 in New Zealand will explore how the Risk Interpretation and Action-Integrated Research on Disaster Risk conceptual framework for response to natural hazards can be integrated across disciplines and cultural contexts. The seminar will bring together 25 young scientists and practitioners from diverse disciplines of social and behavioral sciences, history and the humanities, as well as physical sciences, engineering, and land-use planning.

Participants will discuss and challenge each other on issues of determining acceptable levels of risks, an understanding and need of an integrated risk language, the importance of public perception of risk, and engineering performance. Fellows will produce a coauthored report of seminar discussions, which will be submitted to a peer-reviewed publication. Opportunities for further involvement in disaster risk and interpretation activities will include the IRDR general conference in June 2014 and competitive seed grants for collaborative, interdisciplinary research.

1.2 Young Scientists' Conference

In collaboration with the ICoE-IRDR based at the Academy in Taipei, 50 young scientists participated during October 2013 in a Young Scientists' Conference on Integrated Research on Disaster Risk, Future Earth, and Sustainability. The event offered an opportunity for young researchers present their work to one another and to leading scientists in the field. The conference was intended to stimulate competition, encourage excellence, reward outstanding performance, and foster the development of personal and institutional networks. This recently completed event has fostered new research collaborations that may lead to further publications during 2014 and beyond.

2. START Program Activities that contribute to IRDR

2.1 Disaster Risk Reduction and Climate Change Adaptation in South Asia

South Asia's rapid development, while providing opportunities for economic growth, has increased the region's vulnerability to natural disasters. START supports collaborative research in the areas of climate change adaptation and disaster risk reduction in South Asia through grants to interdisciplinary teams of researchers in Nepal, Pakistan, and India.

START, with support from the Climate and Development Knowledge Network (CDKN), awarded six interdisciplinary research projects for integrating disaster risk reduction and climate change adaptation into resilient development in South Asia. Under this broad research theme, scientists are investigating institutional arrangements and governance structures, policy innovations that promote convergence of disaster risk reduction and climate change adaptation into policy and practice, and the changing nature of development factors, all of which shape vulnerability to disasters.

2.2 Cities at Risk Program

Global environmental change, including climate change, is expected to exacerbate the risks and vulnerabilities inherent to the multistressor context of urban systems. Indeed, climate change will aggravate existing urban challenges and likely add layers of risk that will continue to threaten urban well-being and growth. Cities also offer opportunities, however—opportunities for innovative collaboration and policy responses to climate change. For these reasons, climate risk management and adaptation in urban areas, particularly in coastal cities at risk, is one of the fastest growing parts of START's portfolio in Asia and Africa.

Through its *Cities at Risk* program, START carries out a number of activities each year with the aim of enhancing adaptive capacities for managing and reducing risks and vulnerabilities brought on by the combined effects of climate change and rapid urban growth. In Asia, START convenes international conferences, organizes intensive training institutes, and supports city-specific research, communication, and outreach activities. These activities encourage coordinated action among scientists, policymakers, and the public and the integration of scientific information about vulnerabilities, impacts, and adaptation into planning and policy.

2.2.1 Improving Integration of Social Vulnerability into Urban Planning

New 2013 *Cities at Risk* activities in Ho Chi Minh City (HCMC), Vietnam, aim to integrate social vulnerability considerations into the city's decision-making and policy processes. Robust decision making (RDM) is an iterative decision analytic framework that offers a means to evaluate urban plans over a wide range of plausible futures, identify ways to make those plans more robust, characterize the vulnerabilities of such plans, and facilitate discussions with stakeholders. A three-day workshop organized by START and the RAND Corporation in June 2013 brought together practitioners, technical specialists, decision makers, and academics from the region to review and discuss an RDM analysis recently completed for the city. Participants generated a list of measures of social vulnerability, potential policy interventions, and relevant uncertainties to consider for HCMC. Discussions focused on how social vulnerability indices could be quantified as an input to the risk model and add richness to model outputs. This initial workshop will inform future analysis that considers tradeoffs and tipping points and helps identify creative new policies that meet the needs of a broader range of groups.

2.2.2 Planning Integrated Coastal Adaptation Strategies for North Jakarta Security

Efforts initiated in early 2012 in Jakarta, Indonesia, are supporting collaborative urban planning by researchers, provincial government, and communities at high risk for flooding. The project is uniquely promising for the city of nearly 10 million inhabitants, where much research has been conducted to highlight flood risks but where lack of integration between planning strategies has led to little action on the ground. Indeed, a science-policy dialogue organized in 2011 by the Indonesian Association of Planners (IAP), with START support, emphasized that the greatest challenge in managing climate change and related impacts in Jakarta is "the lack of collaboration among stakeholders to manage the strategic area."

The current START-supported project in Jakarta, *Planning Integrated Coastal Adaptation Strategies for North Jakarta* (PICAS), responds directly to this challenge by designing and facilitating a collaborative process for integrating previous recommendations on climate related risk and disasters in Jakarta; assessing the priorities, feedback, and additional ideas of at-risk populations; and leading collaborative development of a risk management and adaptation action

plan for selected study sites in the city.

IAP is the lead organizer for PICAS and has successfully garnered active engagement in the project by eight other Jakarta urban planning and development institutions. One key player is the Provincial Government of DKI Jakarta as a fully committed, collaborative partner in both project design and implementation. PICAS activities and emerging results are receiving significant media attention in Indonesia and the region. A conference marking culmination of the project is scheduled for November 2013.

2.2.3 Building Adaptive Capacity for Managing Climate Change in Coastal Megacities

The International START Secretariat and the Southeast Asia START Regional Research Center (SEA-START) support capacity building efforts for the *Coastal Cities at Risk* (CCaR) project funded through IDRC-Canada. CCaR promotes research and knowledge exchange among cities in Southeast Asia, West Africa, and Canada. The primary objective of the project is to develop the knowledge base and enhance the capacity of mega-cities to successfully adapt to and cope with risks posed by the effects of climate change, including sea level rise, in the context of urban growth and development.

Work on the "City Resilience Model" has included an original systems framework for quantifying resilience and a Generic System Dynamics Simulation Model guide. Knowledge on hazard characterization, health and economic systems, and developing and validating a System for Bangkok and an exchange between Canada and Bangkok led to Bangkok's City System Simulator. Parallel work on adapting the city simulator framework in Manila and Lagos is ongoing.

2.2.4 Cities at Risk Workshop–Africa

START is expanding its cities-related program to Africa. A March 2013 *Cities at Risk Workshop–Africa* brought together scientists, municipal representatives, and other practitioners to identify priority knowledge and capacity needs for urban risk management and resilience in Africa. Priority messages from the workshop emphasized the following:

- More work needs to be done in bridging gaps in knowledge on climate change impacts and the vulnerability of African cities.
- There is a strong need for scaling up targeted training for urban planners on how to incorporate climate change in their works.
- There is a dire need for "climate translators"—climate information must be presented in terms that are accessible to urban planners as well as the broader public.
- Good governance contributes to resilience in urban areas by enabling effective and integrated action on climate change by all stakeholders.
- Vulnerability of infrastructure and communities in many cities in Africa cannot be meaningfully tackled without addressing urban poverty.
- There is a need to engage African cities in a sustained dialogue on low carbon growth through various initiatives, including the Durban Adaptation Charter.

The four-day workshop included expert presentations, several facilitated discussions, and participatory activities that challenged participants to view urban development from multiple, interwoven perspectives and a one-day "Climate Change Green Tour" that enabled participants to experience examples of mitigation and adaptation activities in and around Durban. Workshop

recommendations will inform a new three-to-five-year program of *Cities at Risk* research, education, and training for Africa.

2.3 Pan-Asia Risk Reduction Fellowship Program

START is committed to expanding the *African Climate Change Fellowship Program* model of adaptation research fellowships to Asia and beyond. In September 2013, START organized a planning meeting for the proposed *Pan-Asia Risk Reduction (PARR) Fellowship Program.* The program aims to build research and scientific communication skills, and to develop interdisciplinary curricula and bolder teaching capacities for understanding complex interlinkages inherent to GEC across the Asia-Pacific region. The two-day PARR Planning Meeting brought together a small group of regional experts for serious discussion of PARR program design, objectives, and expected outcomes as well as evaluation criteria and funding possibilities. During the second day of the meeting, feedback on evolving ideas was sought from a larger group of representatives from US agencies and DC-based research, nonprofit, and funding organizations. The second day closed with a debriefing by the original group of participants, including synthesis of ideas and planning for follow-on roles and responsibilities. The pilot round of the PARR Fellowship Program is expected to kick off in 2014.

2.4 Forecast-Based Humanitarian Decisions: Designing Tools and Processes to Link Knowledge with Action

The *Graduate Student Research Opportunity in Climate Risk Management* fosters a network of young researchers interested in action-oriented, collaborative research on climate, development, and humanitarian work. The program aims to enhance knowledge about how climate threats and risks should be taken into account to improve humanitarian decisions within Africa. Grants were awarded to 14 graduate students at a workshop in Nairobi in May 2012. This intensely participatory workshop focused on games that simulate the complexity of decision making of people and organizations confronting serious challenges on climate, disasters, and ecosystems. Through presentations, small group tasks, plenary discussions, and gameplay, students discussed how new tools can support existing initiatives for climate-compatible development.

Grant support allowed graduate students to research climate risk management in Africa. One case study explored the value of participatory approaches for enhancing community disaster preparedness in rural and urban areas. The study, *Innovative Approaches to Engaging Communities in Participatory Dialogues that Enhance Community Disaster Preparedness*, was published by the American Red Cross and coauthored by one of the student grantees from Zimbabwe. It discusses more efficient ways to engage communities in the Caprivi region of northeastern Namibia in a focused dialogue that leads to action on disaster preparedness and risk reduction. In addition to research funding, three grantees joined UNFCCC COP18 in Doha, Qatar, to support Development & Climate Days 2012 and to participate in side events.

As a result of this project and similar initiatives, demand for interactive game design is growing rapidly, as is demand for more facilitation of games-based approaches. In May 2013, partners held a "train the trainers" workshop on climate-related educational games that have a strong emphasis on humanitarian and development work and climate risk management within Africa. Participants became familiar with game facilitation principles and gained first hand knowledge in order to facilitate these games with professionals and/or with communities in the field.