



Social Sciences and Humanities  
Research Council of Canada

Conseil de recherches en  
sciences humaines du Canada

Canada

## **IRIACC Technical Report**

### **Coastal Cities at Risk (CCaR): Building Adaptive Capacity for Managing Climate Change in Coastal Megacities**

**IDRC project number - 106372 – 010, 011**

## **Final Technical Report**

**5 December 2017**

Location of Study: Vancouver, Canada; Bangkok, Thailand; Manila, Philippines; and Lagos, Nigeria

Gordon McBean, Western University, London, Canada

Richard Cooper, Southeast Asia START Regional Center, Chulalongkorn University, Bangkok, Thailand

Erin Joakim, Faculty of Environment, University of Waterloo, Waterloo, Canada

© 2017 Gordon McBean, Richard Cooper and Erin Joakim

Disseminated under Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>)

## Section A: Program Information

1. Identification		
IDRC File Number 106372-010, 011	Title: Coastal Cities at Risk: Building Adaptive Capacity for Managing Climate Change in Coastal Megacities	
<i>Report completed by<sup>1</sup>: (add rows)</i>		
Family Name: McBean	Given Name: Gordon	Initials: A.
Organization: Department of Geography, Western University		
Telephone number 519 661 2111 ext 86036	Primary E-mail gmcbear@uwo.ca	
Family Name: Cooper	Given Name: Richard	Initials
Organization: Southeast Asia START Regional Center, Chulalongkorn University		
Telephone number: +662 2218 9469	Primary E-mail: <a href="mailto:rcooper@start.or.th">rcooper@start.or.th</a>	
Family Name: Joakim	Given Name: Erin	Initials
Organization: Faculty of Environment, University of Waterloo		

---

<sup>1</sup> List only those people who were involved in writing the report. Those listed confirm that they have read the entire report before submitting it.

## Section B: Program Information

2. Identification		
IDRC File Number 106372-010, 011	Title: Coastal Cities at Risk: Building Adaptive Capacity for Managing Climate Change in Coastal Megacities	
<i>Report completed by all members of the CCaR team through electronic review and comment</i>		
Telephone number: +66(0)-2141-4470	Primary E-mail: <a href="mailto:anond@gistda.or.th">anond@gistda.or.th</a>	
Family Name - Cooper	Given Name - Richard	
Organization: Southeast Asia START Regional Center, Chulalongkorn University		
Primary telephone: +662 2218 9469	Primary E-mail: <a href="mailto:rcooper@start.or.th">rcooper@start.or.th</a>	
Family Name - Joakim	Given Name - Erin	Initials
Organization: Faculty of Environment, University of Waterloo		
Primary telephone: n/a	Primary E-mail: <a href="mailto:ejoakim@uwaterloo.ca">ejoakim@uwaterloo.ca</a>	
Date Submitted (13/11/2016):		

## Section C: Synthesis

2. One-page summary that describes the work conducted during the reporting period as it relates to the goals of the IRIACC competition (e.g., advancing research, influencing policies and practices, training and network development).
<p>The Coastal Cities at Risk (CCaR) program has met its objectives and made major advances towards meeting the longer-term societal objectives of enhancing knowledge of climate-related hazards and socio-economic and health vulnerability issues, developing an integrated City Resilience Simulator model designed for examining adaptation options, and in networking, building capacity and working with key stakeholders. In the following summary, illustrative examples of project advances are given for each of the project's three general domains.</p> <p><b>Advancing knowledge:</b> Climate-related hazards, vulnerability and risk were characterized in the four case study cities. A social vulnerability index was completed for Vancouver and other cities. Scientific results are documented in 40 published journal papers, with 15 more submitted, 32 books or chapters in books and many reports. There were 211 presentations to scientific audiences around the globe.</p> <p><b>Develop strategies and methodologies for climate change adaptation:</b> The CCaR project has contributed significantly to the development of strategies and methodologies for climate change adaptation (CCA). In cities, assistance in the development of disaster risk reduction (DRR) strategies based on knowledge generated from the project has been provided. In Vancouver region, information for adaptation planning in municipalities was provided; contributing to the flagship Adaptation Strategy formulated by the City of Vancouver and passed by Council. Working groups have been established in Vancouver and Bangkok Metropolitan Administration. In Metro Manila, systems thinking about climate</p>

change adaptation have been mainstreamed in national and local government processes through specific policy instruments in collaboration with the all-levels of government, the military, regional scientific groups like UNISDR-ASTAAG and private sector partners such as the Philippine Disaster Resilience Foundation and Partnerships for Climate and Disaster Resilience. The development of the City Resilience Systems Dynamic Model (CRS) over the course of the project is providing a new methodology for quantifying the relationships between climate impacts, socio-economic implications, and the development of adaptation strategies that will be applied to all case study cities, now and in future.

**Enhance practitioner and academic capacity and transfer knowledge:** All the project members in each of the cities connected with local authorities and governments, as well as relevant civil society organizations. 151 presentations were made to non-academic meetings. 40 students have received some form of funding support through CCaR: Vancouver (15); Bangkok (13); Manila (6); and Lagos (5) with 25 theses (12 PhD, 13 Masters) completed and 6 masters degrees underway. Additional capacity in climate change adaptation and disaster risk reduction has been built through researchers and research assistants developing new knowledge and relevant expertise. There have been many media presentations and the development of websites.

The multi-direction interactions and information exchanges within the transdisciplinary team, with other research groups and with many governments and civil society can have long-term benefits in all aspects of climate change adaptation and disaster-risk reduction. The benefits of positive linking of the global scientific community with their Canadian counterparts have been well demonstrated. A big opportunity is now linking the international CCaR team, MEOPAR NCE with the Future Earth (FE): Research for Global Sustainability Programme and START teams in a global continuing network on sustainable development and demonstrating the great value of IRIACC support.

## Section D: Objectives & Research Problem

### 3. General and specific project objectives.

The overall objective of Coastal Cities at Risk (CCaR) is to develop the knowledge base and enhance the capacity of coastal mega-cities to successfully adapt to and when necessary cope with risks posed by the effects of climate change, including sea level rise, in the context of urban growth and development. The research program integrates climate change adaptation and disaster risk reduction approaches towards building disaster resilient cities. CCaR objectives are organized into three overarching outcomes with associated sub-components:

*A. Advance knowledge of climate change adaptation and disaster risk reduction:*

- A1. characterize climate-related hazards, vulnerability and risk;
- A2. understand decision making processes in governance and society; and
- A3. define, qualify and quantify the relationships between climate impacts, adaptation strategies and socio-economic implications.

*B. Develop strategies and methodologies for climate change adaptation:*

- B1. integrate adaptation and disaster risk reduction strategies and knowledge-based actions;
- B2. construct interdisciplinary simulation models to develop, test and validate these knowledge-based actions;

*C. Enhance practitioner and academic capacity and transfer knowledge:*

C1. increase the numbers of highly-qualified people in Canada and abroad by mobilizing, exchanging, and translating knowledge;  
C2. transfer knowledge and capacity to a broader selection of communities and situations through workshops and parallel and follow-on projects with partners.

4. a) original rationale for the research program and its scientific importance, b) the rationale for site selection and comparative research design, and c) societal/technical relevance.

Many low-lying coastal, river-delta mega-cities, already stressed by rapid population growth and economic, social, health and cultural difficulties, are now increasingly vulnerable due to climate change. The overall objective of the *Coastal Cities at Risk (CCaR): Building Adaptive Capacity for Managing Climate Change in Coastal Megacities* is to develop the knowledge base and enhance the capacity of mega-cities to successfully adapt to and when necessary cope with risks posed by the effects of climate change, including sea level rise, in the context of urban growth and development. The CCaR project will take interdisciplinary and trans-disciplinary approaches involving natural, engineering, socio-political-economic and health scientists and will build upon and partner with leading programs: START; Integrated Research on Disaster Risk; and other Canadian and international projects.

Four cities were selected for this project: Bangkok, Metro Manila, Lagos and Metro Vancouver. The cities were chosen to have a range of climate/weather and socio-cultural-economic characteristics, be representative of other cities, and provide enhanced research opportunities through ongoing efforts. In terms of population and other exposures, Bangkok is among the top ten delta cities whose population is presently at risk to sea level rise. Metro Manila is also exposed to flooding, wind damage and storm surge in a large vulnerable population. Based on projections of future growth and climate change, Lagos will have the most population exposed to coastal inundation in Africa. As the coastal city in Canada most at risk from sea-level rise combined with other climate change-related exposure threats, Metro Vancouver is the appropriate Canadian city for CCaR study.

The outputs of this five-year scientific program will be new integrated knowledge on climate change adaptation and disaster risk reduction strategies and their socio-economic-health implications, integrated, interdisciplinary simulation models to develop, test and validate knowledge-based adaptation actions, and increased numbers of highly-qualified people, both academic and practitioners, through knowledge mobilization and translation. Workshops and follow-on projects with partners will result in this knowledge and capacity being transferred to a broad selection of communities in Canada and Africa and Asia. The CCaR program outcomes will include enhanced adaptation and risk reduction capacity, better planned safer cities, and reduced socio-economic impacts as the climate changes.

#### **Section E: Program Results and Dissemination**

5. Notable examples and those who benefited from the work. Particular contributions made to building the capacity of vulnerable communities / sectors.

Researchers focused on identifying critical issues and concerns related to each of the case study sites. The focus of the final year of the project was to identify common challenges, issues and knowledge in order to integrate information pertinent for action for each study sites.

### **1) Advancing knowledge**

#### *A1. Characterize climate-related hazards, vulnerability and risk;*

The four cities are subject to a range of natural hazards: storms producing heavy precipitation (often with strong winds) and associated flooding which represent some of the greatest threats, especially in combination with sea level rise and land subsidence. Advancing knowledge about these hazards has progressed in all cities, as evidenced below.

One example is the study to examine the impacts of climate change on the July 2009 heatwave in Metro Vancouver. The methodologies using empirically derived functions and GCM model data, found that coarsely-resolved GCMs have difficulty in capturing the range of extremes in the region due to mesoscale circulation patterns like the land/sea breeze. Higher resolution data for periods specific to historical extremes including the 2009 heatwave were analysed with projected increases under global warming scenarios. In particular, modulation from the land/sea breeze has been identified as an important factor during heatwave episodes; it was also found that considerable spatial variation occurs in terms of the intensity of weather extremes across the region. A social vulnerability analysis of the Metro Vancouver area was completed.

Bangkok coastal flooding was modelled by integrating projected sea level rise, land subsidence and plate tectonic movement and hazard mapping of floods caused by river run-off delineated from historical radar data. Research identified urban risks (past-present-future) and for a city to have resilience, there is a need for forecasting of city changes with respect to physical and socio-economic aspects, as well as the characteristics of flooding. Risk assessment need to include: 1) structure of urban society; 2) urban economy, noting the increase in poverty ratio following past floods and regional relationships; and 3) public health systems and health of vulnerable groups. City system dynamics modelling used: 1) capital formation, 2) social resilience, and 3) flood protection stocks and a flood profile sub-model, the “Impact of Flood”, representing generic net impact of flooding, to account for benefits derived from implementing flood policies, including infrastructure.

Metro Manila presents a complex and rapidly changing physical environment which is very vulnerable to extreme weather events. In a future warmer climate, the vulnerability of the city to flooding may increase due to: torrential rainfall projected to be more frequent; increasing sea levels; and changes in land cover and urbanization. The study focused on these impacts as input to the design of adaptation strategies. Model simulations also showed that urban effects and interactions with the monsoon could increase rainfall by up to 20%. The effects of channel morphology on flood stages in the Marikina River were examined showing that current morphological conditions could worsen floods and flood stages can be reduced by increasing channel capacity either by widening or dredging. Increased understanding of exposure and vulnerability was also achieved through the design of a Flood Potential Index to identify flood-prone areas, which considers several factors, including topographic features, distance to water bodies, imperviousness, etc. The exposure of informal settlements, located along rivers, major roads, and waterways amplify their susceptibility to flooding.

In Lagos, characterization of hazards advanced knowledge in a number of key areas: sea level rise, land subsidence and analysis of rainfall. Flood frequency data shows localities can be characterized into low, medium and high flood areas. Flooding poses a major environmental risk in Lagos;

more than 50% of surveyed households indicated that they were affected by floods with flood occurrence found to be the result of several anthropogenic factors, including availability and condition of drainage networks, solid waste disposal and waste management practices, and unregulated patterns of urban development in wetlands and hazardous areas. Furthermore, the majority of flood-affected communities and households have limited capacity to cope with flood risk.

*A2. Understand decision making processes in governance and society;*

In Metro Vancouver, Canadian municipal, provincial and federal policies related to flood management and climate change adaptation with relevance for Metro Vancouver were examined (in 2012) and it was found that overall, there are very few specific adaptation policies and that the issue of coastal hazards exacerbated by climate change remained in the early stages of mainstreaming. The emphasis remains around knowledge generation and impact assessment. To build on the results of the policy scan, interviews of experts and practitioners at each of the jurisdictional levels have been completed and provide insights into how the government policies facilitate, or constrain, the mainstreaming of climate change information into policy and decision-making for planning and adapting to flood hazards. ACT, SFU has produced a report with support from the Canadian CCaR theme leaders that analyzes the role of policy in climate change adaptation with conclusions for each of the four themes, observations on policy actions that have been or are being taken in response to the climate impacts that are projected, and comments on future research and policy actions needed. A second, related paper is also being developed in partnership with the Bangkok team to examine land use planning policy decisions specifically related to excess water, and comparing the responses in the two megacities. A paper was also developed collaboratively by the whole Canadian team on the extreme heat event experienced in Metro Vancouver in 2009 that includes conclusions about emergency planning and decision-making in this context.

In Bangkok, urban management in the spatial aspect is inefficient. Cross-jurisdictional urban management is not supported by a mandated entity, and various basic infrastructures are managed by agencies at different levels, leading to limitations of cross-jurisdictional management and creating gaps of multiple forms, such as basic infrastructure and urban planning. Coastal sensitivities which have been driven by non-climate risks such as urban development policy might lead to potentially harmful socioeconomic and environmental changes. The main findings of institutional gap analysis draws attention to four major adaptive pathways that need to be addressed: i) local governments have limited climate and non-climate risk perception in a variety of local contexts and conditions; ii) sources of budget and personnel for coping with climate risk have not contributed to local risk management; iii) policies and plans including spatial strategic management are not consistent with local circumstances and contexts; and iv) the overlapping of roles and authorities of local and national institutions. Institutional gap analysis can also help overcome limited conceptualization of climate change adaptation, which continues to be framed as an issue of a primarily technical rather than a social political and urban planning agenda, and also to support the mainstreaming of climate change adaptation into urban development policy and planning. Wastewater is one of the environmental challenges that is especially prevalent in urban areas and more efficient legal measures, organizational design as well as urban planning and tax measures will help organizations be able to function in full capacity and create tangible long-term results.

In Metro Manila, risk governance analysis was conducted through a policy review process of national, regional and local policies relevant to risk reduction, resilience and adaptation of local government units. The study shows that the Philippines is policy-rich, particularly in enabling policies for resilience, risk reduction, and adaptation. Risk as a concept that should guide risk governance is, however, poorly understood; thus local government decisions to address disaster and climate risk are often focused on reducing exposure to hazards rather than on addressing vulnerabilities

and enabling coping capacities. There are needs for good risk communications and connections across governance. While the Philippines policies allow local government units to have dedicated resources of risk reduction, resilience, and adaptation, local governments are not able to utilize funds efficiently and effectively because of challenges in developing programs, plans, and activities; the complexity in DRRM planning and budgeting processes; and lack of a common understanding between local governments and funds of the local disaster risk reduction and management fund.

The city of Lagos has in place a Lagos State Climate Change Policy (2012-2014). Capacity assessment of local governments and other relevant agencies reveal that they are constrained with regard to flood risk preparedness and prevention due to low capacity and limited knowledge. Structural measures therefore remain a primary approach to flood management. The inability of the waste management authority to effectively manage solid waste is also key factor in flooding of the city. The number of facilities and economic activities contravening urban regulations and therefore vulnerable to river/fluviial flooding was assessed and state capital expenditure for various sectors (2010-2015) was further examined.

*A3. Define, qualify and quantify the relationships between climate impacts, adaptation strategies and socio-economic implications.*

In **Metro Vancouver**, socio-economic themes were examined across social, economic and health thematic areas. A dynamic computable general equilibrium model (CGE) was designed and built to quantify the economic impacts of river and coastal flooding. Main findings are that the indirect costs of projected flooding, in the form of lost output are sizeable and likely exceed capital damage. Also, indirect costs are roughly proportional to capital damage. The model also shows that flood-caused impacts on industrial outputs extend quite strongly out from the flooded area, to the surrounding region and its industries. A wide range of aspects of the economic analysis of flooding costs, including the impacts of insurance arrangements, disaster relief, and public policy, were examined and showed that weak policies can raise the costs of flooding alarmingly. To capture social impacts, a GIS-based social vulnerability index (SoVI) was developed and tested with practitioners in 4 municipalities during Year 2 using a survey instrument. The results indicated concerns related to land-use that were adjusted and presented to municipalities in Metro Vancouver during Year 3. Survey's indicated practitioner concerns related to the statistical method of grouping metrics in the SoVI, which led to the development of a practitioner-based method of weighting metrics, allowing for comparisons between the statistical and practitioner-based weighting methods. A residential survey was conducted in selected neighbourhoods to investigate perceptions of risk and attitudes towards hazard mitigation which identified and established relationships between determinants of vulnerability to flood hazards. Examination of urbanization processes found significant land-use changes across Metro Vancouver, with complex linkages to health. A standardized methodology was created to establish a baseline burden of disease for each city, and development of a composite health index that can be used in the CRS model. This methodology was used to develop a baseline burden of disease map for Metro Vancouver using 2011 census data and highlighted higher risk regions in Metro Vancouver. In June 2015, ACT published a report on Paying for Municipal Urban Infrastructure Adaptation that identified funding tools and mechanisms available to local governments that could be used to upgrade or replace infrastructure at risk of flooding and sea level rise.

Risk management is difficult and complex, especially in big cities such as the **Bangkok Metropolitan Region**, leading to risks at multiple sectors and scales, including direct risks of disasters physically affecting the city or having impacts on the economic and social systems of the city. The physical risk profile of the city is continuously increasing, as is the social risk profile of the city due to increasing urban density, and the arrival of new residents who are unfamiliar with flood risk areas. The economic risk profile is important because the main economy of the city is the service sector which is sensitive to flooding, leading to higher likelihood of the urban economy being temporarily disrupted by floods. GCE economic risk assessment was accomplished to examine the relationship between the economy of Bangkok and/or the adjacent provinces and natural risks. A

Closed Economy GCE model was selected because of the completeness of available data. A Social Account Matrix (SAM) to complement the GCE was a challenge to the research team and required extensive cooperation with official agencies for important and necessary information and information translation to connect with the Vensim simulation model. Recovery capacity was analyzed to create the Social Vulnerability index. Institutional risk profile showed that there is no entity directly responsible thus limiting cross-jurisdictional management of risk areas. Challenges to urban risk management include not only the uncertainties of the period, frequency, and magnitude of future floods, but also urban changes that happen continuously and in shorter time frames than climate change. Long-term planning for making the city resilient to climate change shows the need for a process of adaptation in various aspects according to the time and study area. In other words, planning for future adaptation upon the basis of the present state of the city cannot make the city resilient to future floods. Future risk profiles must anticipate physical and socioeconomic changes of the city along with the characteristics of flooding in the long term, which in this case is 30 years.

Rapid urbanisation, population growth and the weak infrastructural and economic bases of the **Manila metropolis** have heightened its vulnerability to the effects of climate change like sea level rise, typhoons and flooding. Sample surveys of vulnerable communities in the three flood zones reported the following flood-related impacts: (1) shortages of transport, fuel, food and water supplies; (2) disruption of electricity, water distribution and communication services; (3) piled garbage and mud clogging the drainage system; (4) illness and death in some cases; (5) rise in the price of commodities; (6) damage to their homes; and (7) children unable to go to school while their parents were not able to report for work. The impacts of the flood varied according to the river/flood elevation index of their communities. Female-headed households also suffered more losses compared to male-headed households. The economic impacts of disasters in Metro Manila have been quite large, with 'direct impact' of Typhoon Ketsana being Php 68.2 billion and the 'indirect' impacts amounted to Php 137.8 billion, about 2-3% of total GDP. The Focused Group Discussions of the Economic Team show that the micro- and small-sized enterprises were the ones badly hit by the typhoon. Large-sized firms were able to recover quickly and went back into operation a week at most after the typhoon. It is interesting to note that these large retail establishments have also served as relocation sites for a city's population affected by the disasters; this has resulted in a small boost in the retail earnings of the stores located in these enterprises.

Provision of basic infrastructure facilities in **metropolitan Lagos** has not kept up with urban growth, including unplanned expansion. Many residents, especially in high-density, low-income areas, live in environmentally degraded conditions and lack basic infrastructure and services including water supply, electricity, roads, storm water drainage, solid waste disposal, sanitation and quality housing. CCaR research in Lagos in consultation with more than 30 major flood-affected communities across the city identified the primary physical, social, economic and environmental factors contributing to flood risk at the community level. The social, economic and health impacts of flooding at the individual, household and community levels were also examined. Official statistics for Lagos show a marked increase in reported malaria deaths in 2011's severe flood relative to earlier years. Household coping strategies, community adaptation strategies and community needs assessment in different localities were examined in order to provide the knowledge base for flood policy and planning for risk reduction. The nature and scale of impacts and capacity for individual and collective action to cope with flood impacts varies with socio-economic class, tenancy status of household and existence and strength of community development associations, since the majority of communities do not benefit from government assistance in the event of flooding and are of the opinion that government agencies do not provide adequate responses during flood emergencies. In the manufacturing sector, the disruption of transportation of raw materials from the port as a result of floods is a key issue. Delays in the distribution of finished goods from the factory, stoppage of production, loss of market share, loss of raw materials and finished goods and damage to spare parts in technical stores by floods are

also major challenges. Assessment of the contribution of solid waste to flooding indicated that blockage of drainage channels by municipal solid waste is the major cause of flooding. Of 211 streets sampled in the Lagos metropolis, a total of 120 areas had solid waste blocking wetland and drainage. This pattern was mapped as a decision support tool for waste managers.

## **2) Shaping policy and informing practice**

*B1. integrate adaptation and disaster risk reduction strategies and knowledge-based actions;*

In all the case study sites, efforts have been made to connect with relevant government and non-government organizations in order to facilitate CCA and DRR strategies and knowledge-based actions.

In **Metro Vancouver**, meetings were held with municipal practitioners regularly, about annually, to update practitioners on the progress and results of research. Research results were presented, and the opportunity provided to receive feedback. A presentation was made at the ICLEI Liveable Cities Forum 2014, which was attended by 230 people, 65% being local government representatives. In February 2015, a joint workshop on Social Vulnerability was held in Vancouver with teams from CCaR, ParCA, MEOPAR NCE and others to compare and further develop methods of mapping urban social vulnerability. In 2015, ACT, SFU coordinated a design charrette in partnership with West Coast Environmental Law, the City of Vancouver and the District of West Vancouver to consider urban planning responses to sea level rise. An interactive workshop was held in January 2016 with Metro Vancouver planners and managers giving them the opportunity to explore community vulnerability and resilience and how these ideas offer practical insights for climate change adaptation planning and implementation. On February 22, 2016, ACT co-hosted a workshop on Climate Hazards for Professionals attended by over 90 practitioners and local government experts that explored the changing nature of risk and responses being sought or developed by professionals in a variety of sectors.

Work was completed on managed retreat as a policy option in **Metro Manila**. The research demonstrated that managed retreat/resettlement is generally seen by Manila's 'resettlement actors' (i.e. those agencies responsible for city planning, community development and disaster risk reduction) as a feasible option for informal settlement communities which may experience significant future climate change-related hazards. Existing principles of good practice for resettlement have been developed over the last 40 years, and provide significant guidance for resettlement which does not overly destabilize or negatively impact informal settlement communities. However, additional research is required in order to merge climate change resettlement with livelihoods enhancement and poverty reduction.

The **Bangkok** team focused on translating knowledge into action. In working with communities of practice, the Bangkok team used CCaR knowledge to challenge Bangkok's flood drainage policy and secure canal settlements of about 6,000 households from forced eviction and helped convince the BMA and central government that the cost of community relocation would be more than the dike project itself. The team also provided an alternative solution to flood drainage. This solution was a win-win scenario where canal side communities can still settle along the canal, while the waterway remains open for public use. The construction of secure housing is now in progress. The team provided the government with different win-win scenarios, reconciling between the government's need (to widen the canal to drain water) and the canal settlement's need (to secure land tenure). It was pointed out that while flood policy should take a longer-term approach, building dikes only to drain water and to evict the community is a short-measure that will lead to larger losses, socially and economically. The team proposed a longer-term approach. For such development, it is suggested that a plan for canal bank community development should be designed collectively, with components from different sectors in order to

create a joint operational plan that simultaneously addresses flood prevention and solves the problems facing communities along the canals. With respect to OECD: Governance for urban green growth in the Bangkok Metropolitan Region, there was BMA cooperation with CCaR, and financial assistance was provided by bilateral providers of development cooperation. Capacity-building and urban resilience are frequently cross-cutting themes in many international cooperation projects.

In **Metro Manila**, the CCAR team engaged local government units and various stakeholders in transdisciplinary learning processes (i.e., workshops and consultations) that resulted to the use of the CCAR data in the formulation of the National Disaster Preparedness Plan of the Philippines, the guidance notes on Disaster Preparedness Manuals for local chief executives, communities and families. The team's contribution to the Toolkit on Mainstreaming DRR and CCA was also used by the Local Government Academy in the formulation of the guide for Local Climate Change Adaptation Plans for Local Government Units. A dialogue with then newly appointed coordinator of the NDRRMC and executive director of the Office of Civil Defense, on the importance for understanding risks in order to avert disasters, led to the institutionalization of the Pre- Disaster Risk Assessment process. These are now major policy documents in the Philippines.

CCaR activities in **Lagos** engaged four main stakeholder groups in consultation meetings and workshops with the primary objective of building/strengthening capacity for knowledge-based planning and action, integration of adaptation and disaster risk reduction strategies and communications. New knowledge on climate hazards, flood risk, flood risk perception, social and physical vulnerabilities, implications of Lagos population growth and patterns of urban development, provision of social services and patterns of location-allocation of social and social protection services were shared in presentations in workshops and development of fact sheets. A publication is also being developed for a wider audience and city stakeholders. Mapping of flood-affected areas, spatial pattern of flood depth, social vulnerability at the scale of LGAs, health facilities, police and fire services, as well as location-allocation models of key social services provided decision support tools useful for decision making to enhance adaptation. Flooding is perceived as an important hazard in flood-affected communities in Lagos, rated next to crime and robbery. The study has significant implications for a focused approach to channeling preparedness and post-disaster intervention in the city. For instance, by prioritising preventive and primary healthcare provision, property insurance and damage compensation, and family counselling and support, the actual risk priorities of the public would be addressed.

*B2. Construct interdisciplinary simulation models to develop, test and validate these knowledge-based actions;*

Work on the “City Resilience Model” has expanded to include an original systems framework for quantifying resilience, a space-time dynamic resilience measure, a Generic System Dynamics Simulation Model and Generic Spatial System Dynamics Simulation Framework Guide for other participating cities, and examples of implementation. Linking the spatial and temporal simulation capabilities of the model has provided a new and innovative methodology for capturing dynamic characteristics of resilience.

In **Metro Vancouver**, the temporal simulation component of the CRS has been completed and tested. Integration of spatial (GIS) and temporal simulation (system dynamics) features of CRS have been completed and tested. Work on collecting and processing the required input data for Vancouver is in the final stage. Lack of access to hydrologic and hydraulic modeling available for flooding scenarios for the Lower Fraser River was a major problem during Year 4. Considerable time and human resources were devoted to fill this gap. CRS work continues with economic, health and social impacts being integrated into the computation of resilience – work is in progress on finalizing the development and implementation

of the quantitative resilience modeling tool that will provide a comparison of various adaptation scenarios. Three climate change adaptation scenarios are being evaluated.

The **Bangkok** CCAR System Dynamic model consists of a climate sub-model and three stocks: total production capacity; social vulnerability; and flood vulnerability. Linked together via an entity called “Impact of Flood”, representing a generic net impact of flooding, takes into account the benefits derived from implementing flood policies, such as relating to infrastructure and land use policies. The time horizon for the model is 60 years. The conversions between different units are made through indices, which are based on expert judgement. The proposed index values were checked with relevant stakeholders. The initial values of the three stocks for the base year, including relevant increase and decrease rates are set for each zone based on the data gathered from official sources and field surveys. The primary focus of the model is the impact of flooding on social aspects. The social vulnerability index is used to combine several indicators that are believed to influence social robustness, such as infrastructure, social demography, and health. A number of policies that influence these indicators are also included.

In **Manila**, the System Dynamics modelling platform produced new methods for quantifying resilience, and the SD team tested the approach across three different sectors: (1) socio-economic, (2) organizational, and (3) health. Whereas “assets” were used as key stocks for both the socio-economic and organizational models, the “number of susceptible population” was used as a key stock for the health model. Overall, systems thinking approach encourages a “bigger picture” perspective of how different components and sectors relate to each other, given the feedback mechanisms at work in society, yielding invaluable insights for trends and behaviors in time. The SD team did focus on training stakeholders about the Vensim interface, and importantly emphasized the importance of “systems thinking” and the use of basic causal loop diagramming. Two trainings/ workshops provided by the Manila Observatory were Health workshop entitled “Systems Dynamics Modelling of Flood Related Leptospirosis” allowing participants to create their own causal loop diagrams on the impacts and effects of leptospirosis on their respective stakeholders and CA-SURGE interns were also introduced to systems thinking and were applied in their trainings.

### **3) Training and networking**

*C1. Increase the numbers of highly-qualified people in Canada and abroad by mobilizing, exchanging, and translating knowledge;*

Over the five years of the project, many students have completed their degrees. In Canada: 5 PhD students (G. Oulahen, I. Ajibade, Geography; A. Gertz, J. Wibe Economics; A. Owrangi, Engineering) and 5 Master’s student (N. Agam, Engineering; A. Bethune, Political Science, A. Graham, Planning; A. Tadjell and J. Shao in Geography and Environmental Management) with 3 still underway (S. Wang, K. Whitebread, A. Rutledge). The Metro Manila team supported 5 graduate degrees: 2 Master’s students have completed their degrees (F. Castillo, MS Environmental Science, and J. See, MA Sociology) and three students (E. Gozo, MS Atmospheric Science, J. Perez, MS Environmental Science; J. Dalupang, PhD Sociology) will complete their degrees by the end of 2016. The Manila team continued to work with Dr. S. Simonovic and A. Peck on translating sectoral system dynamics outputs spatially and Dr. K. Gotangco, J. See and E. Gozo travelled to the University of Western Ontario to advance discussions on this effort and to discuss a joint publication. In Lagos, four students completed their Master’s degree: M. Edem (Geography), V. Philipps (Geography), A. Adeyefa (Geography) and M. Ezeji (Disaster Risk Management) and 1 PhD: S. Ojolowo (Urban and Regional Planning). Dr M. Ahmed (Department of Community Medicine) working for an M.Sc. in Global Health will submit his thesis in 2016. The class of M.Sc (GIS) -18 students used the Lagos satellite imagery as practical tools and are providing results on exposure of population and urban infrastructure to flooding in the

Lagos metropolis. In Bangkok, six PhD and two MSc students were supported, including: Mr.Y. Pothong (Urban Planning), MSc and Miss T. Pholcharoen. Student members of participated in conferences, scientific fora, workshops, and other training opportunities, locally and internationally.

*C2. Transfer knowledge and capacity to a broader selection of communities and situations through workshops and parallel and follow-on projects with partners.*

Many workshops and meetings have been held to transfer knowledge and build capacity with a variety of organizations (both government and non-government) within each of the case study cities. A conference and annual team workshop was held in Metro Manila during February 2013 to facilitate coordination and networking among the cities, develop integration among the sub-teams of each city team and executive council meetings. A two-day dedicated meeting of the steering committee was held in London, Ontario during September 2012 and a conference and annual meeting was held in Metro Vancouver during March 2014. In Year 4, the annual meeting was held in Bangkok and included knowledge sharing with the Shanghai Climate Centre and the UNU-IIGH. The meeting also facilitated planning for Year five and efforts to develop collaboration across the four city teams (e.g. comparative papers).

Project material has been incorporated into the following courses at universities across the city teams. In Canada: GEOG 677 Climate Change, Natural Hazards, and Disaster Risk Reduction (Graduate course (20 students), University of Waterloo); EnvrSust 9011 Foundations of Sustainability (graduate course (45 students), Western University); ENVS 195 Introduction to Environmental Studies (first-year undergraduate course (250 students), University of Waterloo); GEOG 2300: Atmospheric Thermodynamics, Clouds and Precipitation (undergraduate course, University of Manitoba); GEOG 4780/7780: Storms and Mesoscale Meteorology (4<sup>th</sup> year/graduate course, University of Manitoba); GEOG 4390/7010 Global Climate Change (4<sup>th</sup> year/graduate course, University of Manitoba); GEOG 306: Human Dimensions of Natural Hazards (3<sup>rd</sup> year undergraduate course (2015 & 2016) about 100 students, at the University of Waterloo). In Lagos, a public lecture was held at the Seventeenth Faculty Lecture, Faculty of the Social Sciences, University of Ibadan on the 25th May, 2011 entitled, "Climate Change, Weather Extremes and Society". Project materials have been incorporated into courses at the University of Ibadan: GEO 411 Applied Climatology (4th year undergraduate course- 67 students); DRM 706 Impact of Disasters (Graduate course-12 students); CEE 716: Climate Change Economics and Policy (Postgraduate course-9 students); Pan African University of the African Union Commission (Masters program in Environmental Management with student population from different countries in Africa); PEM 702 Contemporary Environmental Challenges in Africa (Postgraduate course-36 students); URP 781 Environmental Planning and Management (Graduate course- 12 students); URP 804 Advanced Analytical Technique in Urban and Regional Planning Research (Graduate course- 10 students).

Throughout the project, several opportunities were presented to network with scientists and researchers outside of the CCaR project internal members. The CCaR team has made 211 conference presentations to conferences or academic groups and another 151 presentations to non-academic groups – CcaR was usually presented as an example of research. Mortsch presented on "The Coastal Cities at Risk (CCaR) Project: Research advancing climate change adaptation planning and implementation in Metro Vancouver, Canada" at the conference Our Common Future under Climate Change". McBean spoke at and chaired the opening science plenary panel in Paris July 2015, preliminary to CoP21.

In Bangkok, there was interdisciplinary learning by social studies students, for example, the urban planning program learnt more technical knowledge from developing the VENSIM model, while technical teams learnt more social science knowledge as well. The community of practice developed by the Bangkok team grew to include local governments and others.

The research output from the CCAR study of Metro Manila was presented and shared to inform the work of ICLEI Southeast Asia's Asian Cities Climate Change Resilience Network (ACCCRN) partners in the Philippines; Urban Environment Accord Summit, with participants in the side event on 'UN Outcomes: Challenges and Opportunities for Local Government Units' during the Second Asia-Pacific Forum on Urban Resilience and Adaptation; civil society partners of FASTEPONER in the Philippines planning for climate change work; Aksyon Klima Pilipinas who are trying to build their capacity on ecosystems-based adaptation; Malaysian Institute of Planners; Partnership for Climate and Disaster Resilience; Asia Climate Change Consortium; IPCC Expert Meeting on Communications; Association of Religious Men in the Philippines who want to incorporate DRR and CCA in their current mission; during the side event on Scaling up resilience in governance (SURGE) on Small Island Resilience during the APEC Senior Official's Meeting in 2015; pilot households of the Armed Forces of the Philippines who were trying to enhance their resilience capacities; and the National Federation of DRRM officers in the Philippines who were exploring transboundary partnerships for risk reduction and resilience-building. The Manila team's organizational sector supported the Philippine delegation's negotiations at UNFCCC CoP 21. Ms. J. Bercilla was subsequently invited by the IPCC to discuss risk communication for non-scientists and communities.

The focus, approach and methods of CCAR were presented at the USAID SURGE 2016 International Conference on Urban Development: Accelerating Resilience and Inclusive Growth. These were also presented in Kobe, Japan at the International Recovery Forum and ILO Open Dialogue Session in January 2016.

Radio Austria (Vienna) interviewed Professor E. Porio on the basic elements of urban resilience, especially for cities in the Global South, prior to delivering her closing plenary speech (before 5,000 people) on "Risk and Resilience in a Rapidly Unfolding World: Implications for Sociological Practices" (largely based on CCaR findings) in the 2016 International Sociological Association Vienna Forum (July 14).

Professors Clarete and Porio in reviewing the research agenda of the Philippine Institute of Development Studies (PIDS), National Economic Development Authority (NEDA) think-tank, successfully integrated the theme of resilience into the PIDS Research Agenda (2016-2020). For the PIDS Annual Policy Conference on Risks, Shocks and Resilience of the Philippine Economy (Sept. 22, 2016), Professors Clarete, Tuaño, and Porio were invited to present their CCaR research findings. As vice-chair of the National Research Council of the Philippines (NRCP), Professor Porio has succeeded in getting the NRCP input revisions into the DRRM law that is being deliberated in the Philippine Congress. Prof. Porio is part of the 2016 strategic review team for the food security policy framework of the Philippine government where she highlighted CCaR insights towards climate-resilient food systems before the Second Policy Reference Group meeting on "Food Security, Health and Nutrition", headed by the Vice-President of the Philippines.

Dr Adelekan gave presentations using project material at local and international meetings including 'Disaster Risk Management: How Prepared is Nigeria? Ijebu-Ode, Nigeria (May 2014), 2nd Global Forum on Urban resilience and Adaptation. Bonn, Germany (20 May 2014) and the 6th International Conference on Flood Management, Sao Paulo, Brazil (September 2014). In Year 4 opportunities for the project to engage with international partners were presented. Specifically, Climate Interactive, USA (Dr T. Franck) contacted Dr Adelekan to share knowledge on flood

hazards in Nigeria including Lagos which is expected to be helpful in the work of the Climate Interactive and Internal Displacement Monitoring Centre, Geneva (IDMC) -“Building analytics to understand repeated displacement from flooding in Nigeria”. This engagement is ongoing. Also, a team of Scandinavian journalists working on the project called Building Urban Resilience, partly funded by European Journalism Centre, are initiating networking with the project. The aim is to investigate different strategies to build urban sustainability in the context of flooding and sea-level rise in Lagos which will be published in Al Jazeera English, Mail & Guardian and several Scandinavian media outlets. Building Urban Resilience will be told as a multimedia story with pictures, video and infographics. In Year 5, Dr Adelekan had opportunity to share CCaR Lagos project experiences with the UK DFID funded project ‘Adaptation of urban infrastructure to enhance climate resilience in Nigeria’, a part of the Urbanization Research Nigeria project. CCaR research results were shared with 39 Lagos media practitioners at a CCaR media workshop in July 2015. The workshop contributed to participants’ better understanding of climate change, climate risk, vulnerabilities and adaptation issues in relation to Lagos. The workshop also built capacity of participants for knowledge-based communication and agenda setting.

## Section F: Implementation and Management

6. How were non-academic partners (e.g., research users, community organizations, businesses) involved in the implementation of your Team’s research program? For example, how did partner organizations contribute (in cash and/or in-kind and/or intellectual leadership) to research activities, support implementation, or provide feedback on research results?

There has been feedback to the overall project through the participation of team leaders in scientific meetings of START, the Shanghai Climate Centre (Chinese Meteorological Agency), an IDRC workshop for all regional staff (Ottawa) and other opportunities. A presentation on CCaR was made at the Regional Action on Climate Change forum (chaired by G. McBean with E. Porio and A. Loyzaga as speakers) and the associated Science and Technology in Society Forum in Kyoto, Japan in October 2013; these meetings were attended by government, academic and private sector leaders from around the world (about 1000 people) and they provided valuable feedback.

Throughout the project, six meetings were held with municipality practitioners in **Metro Vancouver** area (including Vancouver, District of North Vancouver, West Vancouver, Delta, Surrey, Burnaby, Squamish and Richmond), to present research goals and progress as well as receive feedback on relevance and accuracy of data. Practitioners from West Coast Environmental Law, floodplain and engineering consultants from Delcan, Urban Systems, and Ebbwater, and local NGOs including the GLOBE Foundation, BC Real Estate Foundation, BC Real Estate Association, Canadian Institute of Planners, and the Urban Development Institute, amongst others, also participated in the meetings and provided feedback on the research work. Smaller discussions, meetings and telephone conversations have been held with meetings with the Crescent Beach Property Owners’ Association, and representatives from identified vulnerable populations (e.g. those with disabilities). The research team provided support for Vancouver’s Climate Change Adaptation Strategy, which was passed by council in July 2012. There has been enormous interest in Metro Vancouver in our approach to mapping social, physical, health and economic hazards and this is advancing local approaches to design planning and policy. The physical hazards team working on the Vancouver case study presented findings at the 2013 Canadian Meteorological and Oceanographic Society congress, which provided valuable feedback, including from meteorologists of Vancouver weather office and BC Hydro. Insight was provided into the physical process which shapes the spatial variability and distribution of extremes across the Vancouver region. This

has led to new research directions, such as understanding the physical basis for worst case scenarios in regions not currently subjected to the most intense extremes. The established contacts at other agencies will facilitate further development of our research. The physical science team has been in contact with BC Hydro in connection with electricity use. One would anticipate greater use during heat waves and the team sought to quantify this information. It turns out that no one had ever asked BC Hydro about electricity use during heat waves. All their attention has been on demand during cold winter periods. BC Hydro generated information for us and our understanding is that they will carry out their own, in depth studies of this issue now that it has been brought to their attention. Electricity usage is not as dramatic as during cold winter periods, but it is dramatic. With more air conditioning (and perhaps more heat waves), usage during heat waves will only increase. A resilience workshop (held in conjunction with ICLEI Canada) with local stakeholders was held in January 2016, exploring conceptualizations of community vulnerability and resilience and how these can be used to frame adaptation thinking. A final mini-conference was held in September - 2016 to report on the results of the research to local decision-makers and stakeholders in Vancouver.

With the aim of influencing policy, the **Bangkok** team is engaged at national and local levels of government. The BKK team leader is a member of the Subcommittee of Political, Legislative and Social Situation Analysis of the Thailand National Assembly, where one of the issues discussed is disaster and the development of Bangkok and its periphery. A working group with the Bangkok Metropolitan Administration (BMA) was established (comprising four departments - environment; social welfare; strategic planning; and city planning and the BKK governor) to collaborate with CCaR research activities. The team meets with the BMA to provide an update of research progress and to receive feedback. The Bangkok team is also working with ONEP (a focal point for climate change adaptation) to develop the National Adaptation Plan in the field of human settlement. This is a work in process and the team is able to share its research framework, information, results and policy recommendation to the committee.

Through capacity building projects, the team aims to transfer knowledge related to climate change to the younger generation. In this regard, the Asia Youth Forum and BKK+20 engaged high school students to brainstorm and understand possible future risk. The information gained from these workshops is disseminated via the project's online channels. Spatial data has been provided by GISTDA. For example, this enabled the generation of a flood extent/hazard map, caused by river run-off, for the Bangkok Metropolitan Region.

At the local level, the Bangkok team is working with Community Organization Development Institute of Thailand (CODI) and together with eight other universities. The Bangkok team uses scenario-based planning to help CODI and informal communities to plan for secure settlement along the canal network. These communities are currently faced with risk of eviction due to the national flood policy to dredge the canal and expropriate land for flood walls. CODI, Bangkok Metropolitan Administration, Bangkok team and other universities will be part of the steering committee.

The CCAR **Metro Manila** team held a series of workshops and dialogues with local government partners and others to present updates from the research and get inputs that will enrich the analysis of the study. Civil society organizations and other stakeholders engaged with the research team in two post Haiyan workshops to share their insights on risk communication and risk governance in the Philippines and explore innovative pathways for enhancing resilience in pre, during and post-disaster contexts. Local government units provided key insights on the dimensions of risk governance where vulnerabilities are enhanced or are contributing to further vulnerabilities. A national consultation and validation workshop was held July 2016 to present sector results, consult and validate findings in terms of relevance, usefulness, and replicability. Feedback and future research directions were obtained from representatives from the National Economic and Development Authority, Department of Interior and Local

Government, National Disaster Risk Reduction and Management Council and local governments (Metro Manila, coastal cities). The NDRRMC provided access to disaster data and extended participation of CCAR in the formulation of the Pre-Disaster Risk Assessment tool for local governments. The Department of Interior and Local Government provided information on policies and decision-making, and accepted systems-thinking inputs to the design and implementation of the National Disaster Preparedness Plan. The Pan-Asia Risk reduction Fellowship Program provided support for a research project by Dr. G. Narisma and Ms. J. Bercilla. Exposure to the DRR framework and methods of the National Science and Technology Center for Disaster Reduction and consultation with national, regional and local CCAR partners contributed to Dr. Narisma's "*Design and Framework for a Decision Support System for Highly Urbanized MegaCities: Case Study of Metro Manila*". This systems-based decision support model for local government was released by START in April 2016 as the first PARR Knowledge Brief.

The private sector, through the Carlos P. Romulo Foundation, Zuellig Family Foundation, SHELL Exploration, the Philippine Disaster Resilience Foundation, and SM Prime, provided funding for conferences, meetings and workshops that included systems-based approaches to disaster resilience. This was complemented by support from the NDRRMC for government-industry-academe dialogue on new modes of collaboration between the science and technology community and the public and private sector. Due to this exposure, the Manila Observatory is recognized as the Work Theme Leader for Education and Training for UNISDR ARISE Philippines. Among the deliverables for the Work Theme are the systems-focused academic degree and diploma programs on disaster risk and resilience that will be launched in 2017 at the AdMU/MO.

Community-based DRRM councils in Metro Manila have partnered with the social sector team in organizing community meetings/dialogues and providing logistical arrangements. These meetings and dialogues have led the community leaders to re-examine their DRR strategies/techniques. The 2012-2014 presentations of early CCaR findings by Ms. A. Loyzaga and Dr. E. Porio before the AdMU School of Social Sciences' Research Cluster on Environment, Society and Sustainable Development led to the identification of climate change adaptation as a key priority research issue for research. Businesses in Ketsana-affected and flood prone cities provided loss/damage information for the analysis of the Manila team's economic sector. The Department of Health and local health units provided morbidity and mortality data on Leptospirosis and dengue fever.

Non-academic partners contributed in-kind and were pivotal in the achievement of project goals through collaboration and sharing of knowledge and data. The Lagos State Ministry of Environment was an important stakeholder throughout the research process. The ministry facilitated networking with other city ministries/agencies and participated actively in meetings and workshops organized. Lagos State Ministry of Urban Planning and Physical Development shared recently produced master plans of selected sections of the city while the Ministry of Economic Planning and Budget provided economic and social data for the city. Local government officials in 17 local government areas provided good insight into the state of play with respect to flood risk management, existing capacity, knowledge and resource needs to effectively manage flood risks, and challenges in each local government area. Lagos State Ministry of Health and the Primary Health Care Development Board were pivotal in granting ethical approval for the field research/study for the health component of the project and Medical Officers of Health (MOH) in the local government areas provided the health team access to medical records in the health facilities of the study areas.

Representatives of Community Development Associations (CDAs) provided the platform for the generation of new knowledge by granting key informant interviews and being available for the conduct of focus group discussions. The Nigerian Red Cross Society (NRCS), which plays a key role in emergency response during flood and other disasters, was instrumental in identification of major flood-affected communities in the different LGAs. This largely provided the basis for selection of communities in which the purposely-designed questionnaire to assess social and health

vulnerability was administered. The NRCS team at the district levels also assisted in mobilising community members for focus group discussions. Aerial view solutions supplied the project with 2012 Geo Eye-1 satellite imageries for Lagos metropolis at 50% discount rate. Access to the imagery has enabled physical vulnerability analysis and digitization of boundary files, water features and buffers of permissible setbacks for the coast, lagoon, rivers/streams and drainage canals in the city. The invitation of the Nigeria Insurers Association (NIA) to CCaR-Lagos to make a presentation at the 2014 Fire Officers Committee Annual Retreat helped the project to reach out to a larger audience.

The CCaR-organized meeting with officials of local governments and local community development committees of key flood-affected localities and the Nigerian Red Cross Society (30-31 August 2016) will provide feedback on research findings and provide a platform for identifying actions, prioritizing and designing strategies for building urban resilience to flood risk in Lagos. The output of this meeting will be shared with key city stakeholders in September 2016.

7. Thinking about the opportunity to collaborate with team members across boundaries (e.g., disciplinary, organizational, and country), critically assess whether the design of your collaboration and the competition has added value to your efforts to advance knowledge, shape policy and inform practice.

There were multiple opportunities to collaborate with team members across boundaries, both within as well as across the case study cities. Within the Metro Vancouver team, a climate and hazards scenarios working group was developed to discuss and decide on issues related to developing appropriate hazards scenarios for Metro Vancouver, as well as climate scenarios across the cities. The working group offered the opportunity to collaborate across sub-teams on the Vancouver case study (engineering, modelling, health, economics, and social) in developing approaches to defining key hazards (e.g. historical riverine flooding, future projections of coastal and sea level risk flooding). A heat waves group was also established to explore the impacts of heat waves from an interdisciplinary perspective.

To facilitate the development of the resilience simulator, all project cities established modeling teams. These teams were in regular contact although there were challenges associated with uneven programming ability and conceptual acceptance of the developed modeling frameworks. Training sessions at the project meetings and other sessions in Years 2 and 3 helped to address these challenges. The resilience model has also provided a linkage between all the sub-teams of each city, as well as between cities, as all sub-teams are required to develop inputs to the resilience model in order to understand the social and economic impacts of future floods and sea level rise. The social team from Bangkok shared methodologies with Manila to enable comparative studies, and support concerning system dynamics with the Vancouver team to advance development of the Vensim-based Bangkok city simulator model.

Collaboration across cities was hindered by geographical and time zone barriers, although several comparative working groups were established. A comparison of managed retreat strategies across the four case studies was completed – this allowed for further understanding of the overarching barriers to implementing retreat as an adaptation strategy.

Modeling resilience attracted researchers from Europe. Dr. Neuwirth, visited Western University in 2014 leading to two publications in the

international journals. Work on the resilience modelling in Manila and Vancouver is being compared and one joint paper is in preparation. Manila team visited Western University in 2015 to work on the joint paper. This added value through (a) exchange of experience and joint improvement of the theoretical concept of resilience developed for implementation in our project; (b) work with Austria was very significant in adding a spatial dimension to the concept; and (c) joint publications (3 papers with Austrian collaborator and 1 with Manila team).

The CCAR project initiated the momentum towards building trans-disciplinary collaboration in the fields of disaster risk reduction and climate change adaptation. Specifically, it developed a platform for advancing systems thinking beyond Metro Manila into other coastal provinces, cities and municipalities in the Philippines. Because the project's approach addresses knowledge creation of disaster resilience along different sectors/disciplines and along the different decision-making levels, scientific knowledge and skills can apply to the range of DRR challenges found in different communities. This outreach has resulted in direct consultation regarding systems-based thinking on DRR with 18 political and administrative units in the Visayas and Mindanao regions. The trans-disciplinary collaboration has likewise enriched the science-policy-practice framework developed and resulted in an evidence-based advocacy that convinced local and national agencies to adopt important changes in the disaster preparedness policies as a foundation to partnerships such as those with international partners in PARR and ICLEI and the support project of the Zuellig Family Foundation (ZFF) on public health change-models in 12 Haiyan-affected municipalities. Initially involving only the Department of Health and UNICEF, ZFF invited members of the CCAR team to provide a systems-based, multi-hazard risk assessment as part of the foundation for health care-delivery reform in municipalities impacted by Haiyan.

CCAR has also provided critical avenues for engagement and collaboration between the public and private sector which should be further studied. As a result of this cross-sectoral approach, the Observatory serves as a member of the UNISDR Asia Science and Technology Academia Advisory Group focused on DRR and the private sector. Canadian team members have been part of UNISDR and related science planning groups.

In working collaboratively with CCA-DRRM, managers of local governments and policy-makers, the CCaR Manila team has led to collaboration with researchers from, for example, UK-College London, School of Natural Resources and Environment of the University of Michigan and School of Geography and Urban Planning, University of Amsterdam and the International Institute of Environment and Development.

For Lagos, the design of the international CCaR program has enabled the collaboration of local researchers in the fields of social science (geography and economics), urban planning and medicine (community medicine/public health) to generate new knowledge for climate change adaptation in the context of flood risks in Lagos. Researchers were provided with an opportunity to employ a transdisciplinary approach to the study, and the involvement of local stakeholders through multi-stakeholder consultations and social/shared learning, means that as much as possible holistic and robust knowledge is elicited to inform practice and shape policy. The platforms provided by the CCaR program for city teams to share knowledge and experiences has facilitated the cross-fertilization of ideas and exchange of methods and approaches for doing research which has added value to our local efforts.

## **Section F: Other**

8. Looking forward, please briefly outline active or planned activities involving team members or partner organizations that build on the results of your work.

**Vancouver**

High resolution output from the WRF model will be used to examine historical extreme weather events driven by projected changes in key hydrometeorological variables. Data will be used to examine changes in intensity and duration of key parameters associated with selected events (in accordance with proposed thresholds), and to examine the evolution of synoptic and mesoscale driving mechanisms. ACT, SFU will continue to build on the awareness generated by the Coastal Cities at Risk network's activities and results, and the current momentum in implementation on responses to coastal climate impacts in the Metro Vancouver area, through our work with West Coast Environmental Law (WCEL), which encompasses a variety of initiatives, including: development of a resilience indicators scorecard for climate change and sea level rise-influenced freshwater/ocean interactions that affect ecosystems as well as urban infrastructure such as waste and drinking water systems, due for completion in 2016, that will be made available to planners and emergency managers in local municipalities and regional governments; continued development and maintenance of relationships between neighbouring coastal municipalities in the Metro Vancouver region, most of whom interacted with the CCaR team during the network's five-year presence, in order to drive collaborative coastal planning based on regional thinking through communication, data sharing and pilot project planning amongst coastal local government (this process, which started with the Burrard Inlet Group (City of Vancouver, District of West Vancouver, District and City of North Vancouver, is now potentially going to be extended to another contiguous group: Surrey, Delta and Langley; it is also supporting development of a model Development Permit Area (DPA) bylaw for coastal infrastructure); we will also be assisting the City of Surrey in the first public engagement activities on a coastal risk assessment for sea level rise in Metro Vancouver, a process that will focus on the Crescent Beach neighbourhood – as part of the planning for this, the City is referring extensively to Dr. G. Oulahan's PhD thesis, research on Crescent Beach. CCaR project deliverables are also contributing to the Lower Mainland Flood Management Strategy being developed by the Fraser Basin Council, which is analyzing vulnerability to riverine and coastal flooding in 23 municipalities – ACT, SFU is assisting with the policy conclusions for Phase 1 of this project, which will include reference to Y. Klein's article on Barriers and Drivers for Planning for Climate Change Adaptation in the region.

Based on the initial work on quantification of resilience measures completed under the CCaR project, Dr. Simonovic is continuing to work on the application and modification of the measure to use in two major research projects: a) Hydropower Infrastructure Resilience – CRD with BC Hydro (2015-2019). Many of Canada's hydropower infrastructure systems are reaching the end of their serviceable life. Major investments in the coming years will be required to renew and upgrade these critical infrastructure systems. It is important that decision makers have a good understanding of current system performance in order to optimize operations and develop strategies for re-engineering these systems in the future. Resilience is a dynamic numerical measure of system performance and adaptation capacity that covers the time from the beginning of an undesirable event to full system recovery from it. Using resilience as a metric to measure system performance offers a major advantage over traditional methods that seek to estimate probabilities, which are essentially a static measure of risk that does not take time variance into consideration. b) Linking Hazard, Exposure and Risk Across Multiple Hazards – CRD with Chaucer (2015-2010). This research program aims to better characterize and weight the exposure associated with three natural hazards - earthquake, flood and wind - for Canada and around the globe. The specific objective is to define

a common framework and currency that allows for the assessment and comparison of natural catastrophic risk across different hazards and provide pragmatic means that fills gaps in current risk management processes of the insurance industry. In this research we will introduce and use resilience measure as replacement for risk. Experience and data from the insurance industry and from available public science will be leveraged to find pragmatic means to calculate and compare resilience across disciplines and fill gaps in the risk management framework for government science and the (re)insurance companies. The benefits of the proposed research will include new ways to quantify resilience around the world in order to better understand, mitigate and hedge exposure of urban/suburban areas to natural catastrophes.

During the CCaR, Dr. McBean linked his studies of coastal cities at risk with his research under the MEOPAR (Marine Environmental Observations, Prediction and Response) NCE. Two graduate students (PhD, B. Vogel; MA, J. Raikes) worked across the projects. MEOPAR is up for renewal and if successful, he will bring in the CCaR team. Internationally, McBean is Co-Chair of the Future Earth (FE): Research for Global Sustainability Programme and MEOPAR is now part FE Oceans Knowledge Action Network and the network of CCaR will be used to connect globally. He also connects this with Integrated Research on Disaster Risk, a global program that Manila and Bangkok teams are part of.

Two outputs from the **Bangkok** team were developed. The Urban Resilience Game promotes urban resilience awareness from individual future visions of the city, from consideration of a semi-built to developing city. It allows players to gain experience in assessing risk profiles, opportunities and solutions based on micro-situations of the cities and large events such as flooding and stimulates thinking and the making of connections between various issues and cooperation with other cities for creating urban resilience, as well as providing an example of a deliberative tool. BMA has expressed interest in adopting the urban resilience game to be part of teaching at all BMA schools. The Vensim Urban System Flood Resilience Model is based on spatial and temporal data, demonstrating interactions of multi-dimensional factors influencing flooding due to runoff and coastal sea level rise. Flooding is understood as a short-term phenomenon, and where an event whose impacts are assessed through the categorization of the city into four zones: coastal, semi-urban, urban-core, and flood plain. The Urban System Flood Resilience Model can be used to offer a more comprehensive view of Bangkok's current risk profile as well as to demonstrate how increased long-term urban resilience can be achieved through policies that reduce social vulnerability and improve infrastructure. It is a closed model - a structure in which there is at least one complete causal relationship within the system. Outputs can be translated into a spatial risk map.

The **Manila Observatory (MO) and Ateneo de Manila University (AdMU)** are presenting the new curriculum for a Master of Disaster Risk and Resilience degree for approval of the university. The degree will begin to be offered in 2017. Initial funding of CCAR v2 of 10M pesos (\$C 280,000) will be made available in the last quarter of 2016 for the purpose of advancing transdisciplinary research and action laboratories using systems thinking. This co-laboratory will support for the design and testing of DRR and CCA solutions, which may be associated with the fulfillment of the degree program. Continued engagement with partner universities on research and teaching in the areas of climate and disaster resilience in coastal cities is being supported by external funders and the university-generated funding. The MO continues to be engaged in the review of the National Disaster Risk Reduction and Management Law and the drafting of the National Space Development Program. Among other contributions to the latter, the Observatory was the sole contributor of human security and development parameters for the mission design of commissioned microsatellites. The Department of Interior and Local Government has expanded its consultation with the CCAR team members in order to engage them directly in designing resilience strategies for local government units through their Local Climate Change Adaptation Planning (LCCAP) process. Regionally, an alliance with the Pan-Asia Risk Reduction fellowship program resulted in the production of its first

Knowledge Brief. The paper on a “Design Framework for a Decision Support System for Highly Urbanized MegaCities: Case Study for Metro Manila”, was authored by Dr. G. T. Narisma, the Physical Sector Team Leader for CCAR. This work presents an evidence-based framework for a decision support system for extreme events in coastal megacities such as Metro Manila. This will be developed further for the pilot application in selected cities in cities and municipalities. The alliance with PARR partners such as START, continues this year with the immersion of representatives from MO’s Philippine government partners in NCDR, Taiwan. Philippine private sector partnership is being broadened through the appointment of a CCAR team member as technical adviser to the Philippine Disaster Resilience Foundation. In light of the CCAR work, the Observatory was selected as the work theme leader for science education and training for UNISDR ARISE Philippines. It is also represented in the UNISDR Asia Science and Technology Academia Advisory Group that aims to support the implementation of the Sendai Framework for Disaster Risk Reduction. This group is involved in preparing contributions to the Asian Ministerial Conference on Disaster Risk Reduction. The UNISDR ARISE DRR Science and Business Forum will also be held in November 2016. This is expected to encourage and facilitate further collaboration between science and technology, industry and government on systems-based approaches to urban resilience and recovery.

AdMU and MO are advancing a research partnership and PhD student training, with: 1) UK-College London on “Disagreeing on Resilience and Advancing Disaster Risk Reduction”), and 2) International Institute of Environment and Development (IIED) and University of Amsterdam on “Environmental Risks, Social Inequality: Focus on SMES in Metro Manila”. They contributed to the Philippine Institute of Development Studies’ Annual Policy Conference on “Risks, Shocks and Resilience.” CCaR research in **Lagos** was not able to achieve the development of the CRSM because of non-existence of required data at the level of localities for spatial analysis and mapping of vulnerabilities, including lack of a city map with delineation of sub-units of local government areas. A mapping of newly created Local Council Development Areas to make 57 spatial sub-units of the State from the original number of 20 LGAs has only recently been produced but more work and data are needed.

<b>Annex 1: List of Current Team Members</b>					
Name (Last, first)	Name of Organization (for universities please include the department)	Role (e.g. Principal investigator, co-applicant, partner organization representative)	Country	Joined (mm/yyyy)	Departed (mm/yyyy)
McBean, Dr. Gordon	University of Western Ontario, Department of Geography	Principal Investigator	Canada	04/2011	
Davies, Dr. James	University of Western Ontario, Economics	Canadian team researcher, expertise in economics	Canada	04/2011	

Simonovic, Dr. Slobodan	University of Western Ontario, Engineering	Canadian team researcher, system dynamics modelling expert	Canada	04/2011	
Lannigan, Dr. Robert	University of Western Ontario	Canadian team researcher, health expert	Canada	04/2011	
Mortsch, Linda	University of Waterloo	Canadian team researcher, adaptation expert	Canada	04/2011	
Harford, Deborah	ACT, Simon Fraser University	Canadian team researcher, adaptation expert	Canada	04/2011	
Stewart, Dr. Ronald	University of Manitoba	Canadian team researcher	Canada	04/2011	
Paul Whitfield	Formerly, Environment Canada		Canada		
Doberstein, Dr. Brent	University of Waterloo, Department of Geography and Environmental Management	Canadian team researcher; expertise working in SE Asia sites	Canada	05/2012	
Dr. Su-Yin Tan	University of Waterloo, Dept. of Geography and Env. Management	Canadian team researcher; expertise in GIS, spatial data analysis and statistics	Canada	09/2014	
Mitchell, Dr. Carrie	University of Waterloo, School of Planning	Canadian team researcher; expertise working in SE Asia sites	Canada	09/2013	
Oulahen, Dr. Gregory	University of Western Ontario, Department of Geography	Network Manager	Canada	09/2011	08/2013
Joakim, Dr. Erin	University of Waterloo, Faculty of Environment	Network Manager	Canada	09/2013	04/2016
<b>Bangkok</b>					

Nuntavarn Vichit-Vadakan	School of Global Studies <sup>2</sup> , Thammasat University	Researcher	Thailand	02/2012	
Nitaya Vajanapoom	School of Global Studies, Thammasat University	Researcher	Thailand	02/2012	
Panee Cheewinsiriwat	Faculty of Arts, Chulalongkorn University	Researcher	Thailand	03/2012	
Areerat Patnukao	Faculty of Arts, Chulalongkorn University	Researcher	Thailand	03/2012	
Marc Van Der Putten	School of Global Studies, Thammasat University	Researcher	Thailand	03/2013	
Uma Langkulsen	School of Global Studies, Thammasat University	Researcher	Thailand	03/2013	
Thuttai Keeratipongpaiboon	Thammasat University	Researcher	Thailand	03/2013	
Suphannada Lowhacha	Thammasat University	Researcher	Thailand	03/2013	
Richard Cooper	SEA START RC, Chulalongkorn University	Network Manager/Researcher	Thailand	03/2013	
Nij Tontisirin	Faculty of Architecture and Planning, Thammasat	Researcher	Thailand	04/2014	
<b>Manila</b>					
Ms. Antonia Loyzaga	Manila Observatory	Team Leader and Principal Researcher	Philippines	05/2012	

2 Previously based at School of Public Health, Thammasat University

Dr. Emma Porio	Dept. of Sociology and Anthropology, Ateneo de Manila University	Team Leader and Principal Investigator, Sociologist	Philippines	05/2012	
Dr. Gemma Narisma	Manila Observatory/ Dept. of Philippines, Ateneo de Manila University	Co-Team Leader, Principal Researcher- Climate Scientist	Philippines	05/2012	
Dr. May Celine Vicente	Manila Observatory	Principal Investigator-Geomatics Expert- Exposure and Vulnerability	Philippines	05/2012	
Dr. Fernando Siringan	University of the Philippines – Diliman	Principal Investigator-Marine and Coastal Geologist	Philippines	05/2012	
Ms. Jessica Bercilla	Manila Observatory	Principal Investigator-Science Policy Liaison	Philippines	05/2012	
Dr. Charlotte Kendra Gotangco	Manila Observatory/ Dept. of Environmental Science, Ateneo de Manila University	Project Coordinator/Research Associate- Systems Dynamics Modeling	Philippines	05/2012	
Ms. Deanna Marie Olaguer	Manila Observatory	Project Administration	Philippines	05/2012	
Dr. John Wong	Ateneo School of Medicine and Public Health	Researcher/Health Sectoral Consultant	Philippines	05/2012	
Dr. Ramon Clarete	School of Economics, University of the Philippines-Diliman	Researcher/Economics Sectoral Consultant	Philippines	05/2012	
Dr. Philip Arnold Tuaño	Dept. of Economics, Ateneo de Manila University	Project Research Associate	Philippines	05/2012	
Mr. Justin Charles See	Dept. of Sociology and Anthropology, Ateneo de Manila University	Systems Dynamics Consultant	Philippines	05/2012	
<b>Lagos</b>					

Dr. I. Adelekan	Department of Geography, U. of Ibadan	Team leader and Principal Researcher	Nigeria	05/2012	
Dr. Bolanle Wahab	Department of Urban and Regional Planning, U. of Ibadan	Researcher	Nigeria	05/2012	
Dr Eme Owoaje	Dept. of Community Medicine, U. of Ibadan (Health)	Researcher	Nigeria	08/2012	
Dr Mayowa Fasona	Dept. of Geography, U. of Lagos (GIS Mapping)	Researcher	Nigeria	11/2012	
Dr Victor Ilechukwu	Dept. of Urban and Regional Planning, U. of Lagos)	Researcher	Nigeria	12/2011	12/2013
Mr Ayansina Ayanlade	Just completed his PhD thesis at Kings College, London	Researcher	Nigeria	01/2013	12/2013
Uchendu, Obioma	Dept of Community Medicine, U. of Ibadan	Team member- Health	Nigeria	05/2013	
Oyeranti, Olugboyege	Dept of Economics, U. of Ibadan	Co-Investigator-Economic	Nigeria	11/2013	06/2015
Oladeji, K.	Dept of Geography, U. Of Ibadan	Network Manager	Nigeria	01/2013	12/2013
Olalekan Taiwo	Department of Geography, U. of Ibadan	Researcher	Nigeria	04/2015	

<b>Annex 2: Main Research Components/Projects</b>				
Project title	Project lead(s), Affiliation	Location of research (if geographically located)	Specific project-level research objectives	Status (start/finish, mm/yy)
<b>Objective A – Advance Knowledge of Climate Change Adaptation and Disaster Risk Reduction</b>				

A1 – Characterize climate-related hazards, vulnerability and risk:				
VANCOUVER				
Characterize physical hazards	Dr. R. Stewart	Vancouver	- Overall objective is to characterize and understand extreme meteorological events that pose a risk to Vancouver in the current and future climate, by: i) Determining the occurrence, trends and driving mechanisms of extreme meteorological hazards (precipitation, winds, temperature) including modulation from mesoscale processes and spatial variability ii) Examining the impact of projected increases in temp. and moisture/assessing through the use of a transfer function to statistically adjust selected historical events iii) Comparison of results between mid-latitude (Vancouver) and tropical locations	Work is ongoing on characterizing evolution of future hazards; occurrence, trends and driving mechanisms research completed
Sea level rise modelling	Dr. S. Simonovic	Vancouver	- Mapping sea level rise for the Metro Vancouver coastal area through the development of a methodology that integrates three main components of sea level rise (1. global - climate change; regional - vertical land movements, glacial isostatic adjustments; 2. natural tidal movements; and 3. effects of storm surge)	Completed
Inundation Mapping	Dr. S. Simonovic	Vancouver	Inundation mapping for Metro Vancouver under a number of climate change scenarios	Completed
Manila				
Climate and Extreme Weather Analysis in Metro Manila	Narisma	Manila	Key Questions: Climate and extreme weather analysis Are models able to capture extreme events for near real time risk analysis? What are the projected changes in climate averages, extremes and variability due to both global warming and local land use?  Expected Outputs: Paper on meteorological analysis and climate simulations for Chapter and paper on hazards and integrated risk analysis Hazard and risk maps for Metro Manila	Completed
River Morphology	Siringan	Manila	Key Question:	Completed

and Flood Modeling			<p>What are the observed changes in river morphology (including constrictions) and how will these impact flooding in Metro Manila?</p> <p>Expected Outputs:  Map of Metro Manila waterways  Paper on waterways analysis</p>	
RS-GIS-Based Exposure and Vulnerability Analysis	Vicente	Manila	<p>Key Questions:  Where are the people located (exposure), especially the urban poor (most vulnerable) community?  Where are the critical hotspots in Metro Manila because of human exposure and physical hazards (elevation, distance to rivers)?</p> <p>Expected Outputs:  Maps of land use and land cover for Metro Manila</p>	Completed
<b>LAGOS</b>				
Characterize climate related drivers of floods	Adelekan	Lagos	<ul style="list-style-type: none"> <li>- Literature review on occurrence, impacts and advanced warning of past flood events in Lagos</li> <li>- Analysis of extreme rainfall for two stations (Ikeja and Lagos Island) was undertaken for the period 1971 to 2011 and temporal pattern of heavy precipitation analyzed.</li> <li>- Sea level rise characterization of the coast of Lagos using satellite altimetry derived sea level anomalies has been undertaken for the period 1993-2011 (Philips, 2014)</li> </ul> <p>Temperature extremes in Lagos metropolis (1971-2013) was also examined using a suite of nine climate change indices derived from observed daily minimum and maximum temperature data, changes in temperature extremes for two climate stations (Ikeja and Lagos Island) during the period 1971 to 2013.</p>	Lit. review completed June 2012; Rainfall and SLR analysis completed
Characterize non-climate related drivers of floods	Adelekan/ Wahab	Lagos	<ul style="list-style-type: none"> <li>- Assessment of land subsidence along Lagos coast through the use of Digital Elevation Models (Edem, 2014)</li> <li>- Lit. review of wetland loss in Lagos</li> </ul>	DEMs from 2006 & 1968 completed; Lit.

			- Review patterns of solid waste generation completed and preliminary field surveys have been completed (Ezeji, 2014)	review on wetland loss completed
A2 – Understand decision-making processes in governance and society:				
Policy Scan	Deborah Harford/Linda Mortsch	Vancouver	<ul style="list-style-type: none"> <li>- Scan of municipal, provincial and federal policy related to flood mgmt and CCA (report completed in Fall 2014)</li> <li>- Determine policy options to reduce vulnerability to climate hazards</li> <li>- Interviews with experts and practitioners at various jurisdictional levels conducted to highlight policies that facilitate or constrain the mainstreaming of climate change information into policy and decision-making for planning and adapting to flood hazards</li> </ul>	Policy scan completed, finalizing journal article for submission; interviews completed; analysis and report have been completed.
Managed retreat comparison	Brent Doberstein	All cities	<ul style="list-style-type: none"> <li>- Comparison of managed retreat adaptation strategy across all cities</li> <li>- interviews for Metro Vancouver</li> <li>- framework for Intercomparison</li> <li>- presentation at International Disaster and Risk Conference (IDRC Davos 2016), Davos, Switzerland, 27 Aug-1 Sept, 2016</li> </ul>	
Risk Communication and Governance Analysis for Metro Manila	Loyzaga and Bercilla	Manila	<p>Key Question: How does the current risk governance landscape (e.g. policies and decision-making processes), contribute to the adaptation and resilience in Metro Manila cities?</p> <p>Expected Outputs: Review paper of Lessons Learned from urban studies/projects in the region and elsewhere Technical paper on communication strategies including recommendations Technical paper on communication chain and decision-making including recommendations Policy paper profiling the status of adaptive programs LGUs in the study area and comparative study on the mainstreaming and implementing findings of the research</p>	

Assessment of institutional capacity to address CC & flood risks	Adelekan & Wahab	Lagos	<ul style="list-style-type: none"> <li>- Identify local institutions of relevance and contact with key stakeholders initiated</li> <li>- Examine institutional structures and policies to address urban development, climate change and flood risk</li> </ul>	Completed, report in progress
Understand decision process guiding urban development	Adelekan & Wahab	Lagos	<ul style="list-style-type: none"> <li>- Examine regulatory frameworks guiding urban development by the private and public sector</li> <li>- Examine private sector and civil society involvement in urban planning regulation enforcement and compliance in flood prone areas</li> <li>- Appraisal of synergy among government agencies and departments in urban development</li> <li>- Analysis of urban development completed for the period 1984-2011</li> </ul>	Completed
Understand decision processes for flood planning and mgmt.	Adelekan & Wahab	Lagos	<ul style="list-style-type: none"> <li>- Examine decision processes of flood planning and management by city officials</li> <li>- Assessment of public perceptions of flood risk in different flood affected areas of Lagos through household surveys (n = 1000)</li> </ul>	Completed
A3 – Define, qualify and quantify the relationships between climate impacts, adaptation strategies and socio-economic implications				
VANCOUVER				
Health/disease impacts	Dr. R. Lannigan, Dr. S. Simonovic	Vancouver	<ul style="list-style-type: none"> <li>- Determine a baseline burden of disease and composite health index methodology that is relevant for each city</li> <li>- Map the baseline burden of disease for Vancouver (Owringi et al., 2013, 2014abc)</li> </ul>	Completed
Social Vulnerability	L. Mortsch	Vancouver	<ul style="list-style-type: none"> <li>- Create a social vulnerability index (SoVI) for dissemination areas within Metro Vancouver, “ground-truth” and survey with local practitioners to develop a new weighting approach (Oulahen et al, 2015)</li> <li>- Conduct residential survey in select neighbourhoods to investigate perceptions of risk and attitudes towards hazard mitigation (Oulahen et al., 2015)</li> <li>- Generate social vulnerability and resilience index (SVRI) inputs to City Resilience model for years 1996, 2001, 2006, 2011 (Joakim et al., 2015, in preparation; Damude et al., 2015)</li> <li>- GIS mapping analysis and comparison of Vulnerability and Resilience Index in Surrey, BC (Shao, 2015)</li> </ul>	SoVI complete for 2006 data; Residential survey complete; SVRI framework complete, metrics developed and provided to modelling team in July 2015; final stakeholder

			- Stakeholder workshop to advance uptake of vulnerability, resilience concepts in Metro Vancouver (Bulley et al. 2016)	workshop January, 2016 <b>Completed</b>
Economic Impacts	Dr. J. Davies, Western University	Vancouver	- Create dynamic CGE model to quantify economic impacts of hydrometeorological disasters (Gertz & Davies, 2016) - Conduct economic analysis on the costs of flooding, estimate capital damage due to flooding due to different scenarios, and project economic effects of flooding in Metro Vancouver - Analyze economic accounting for flood costs in a theoretical framework (Davies, 2015)	CGE model completed, analysis in progress
<b>MANILA</b>				
Systems Dynamics Modelling of Flood-Related Leptospirosis in the Philippine National Capital Region	Wong	Manila	Aim: Map out the health care system and identify important relationships and resilience patterns of the local health care system in a flood event.  Expected Output: Paper on a healthcare index/indicator for Metro Manila	Completed
A Multi-Sectoral Systems Approach for Economic Analysis of Metro Manila	Clarete/ Tuaño	Manila	Goals: Understanding the dynamics of economic impacts of disasters in Metro Manila through the use of a computable general equilibrium model Quantifying the effects of typhoons on regional output and other salient economic indicators.  Expected output: A policy analysis paper for Metro Manila	Completed
A Social Vulnerability assessment of	Porio	Manila	Goal: Assess the social vulnerability, social networks, and adaptive strategies of communities in flood-prone areas in Metro Manila from the perspective of the communities.	Completed

Metro Manila communities			Expected output: A technical paper describing the assessment of exposure and vulnerability	
<b>LAGOS</b>				
Vulnerability Assessment	Adelekan/ Fasona/ Taiwo	Lagos	<ul style="list-style-type: none"> <li>- Identify flood affected localities in 2011 and 2012 and identify high, medium and low frequency areas</li> <li>- Vulnerability of buildings and selected facilities to flooding due to exposure within setbacks of lagoons, rivers/drainage canals and the Atlantic coastline was assessed and corresponding population at risk estimated at the level of local government areas of the city respectively.</li> <li>- Use population statistics and quantitative methods to assess social vulnerability</li> <li>- Social vulnerability indices computed and mapped at local government level level of using survey and census data. Indices computed at locality level using survey data provided indicators of social vulnerability but mapping was not possible due to lack of base map at ward level. Population and socio-economic statistics at locality/ward level for Lagos is also not existing.</li> </ul>	Completed
Assessment of health risks from floods	Owoaje & Uchendu	Lagos	<ul style="list-style-type: none"> <li>- Survey of health impacts conducted and analyzed (Uchendu, 2014).</li> <li>-</li> </ul>	Completed
Economic impact of floods	Oyeranti	Lagos	<ul style="list-style-type: none"> <li>- Provide an overview of the direct and indirect economic impacts and costs of flooding, and repercussions on regional and national economy</li> <li>- Use CGE model to estimate the impacts of flooding on economic agents (e.g. households, firms, govt), including outputs, employment, capital stock, and consumption</li> <li>- Analyze the effects of flooding under possible scenarios of options for adaptation</li> </ul>	On-hold
<b>Objective B – Develop Strategies and Methodologies for Climate Change Adaptation</b>				
<b>B1 – Integrate adaptation and disaster risk reduction strategies and knowledge-based actions</b>				
Communicate with local	All	All cities	<ul style="list-style-type: none"> <li>- Develop communication platforms through stakeholder consultation</li> <li>- Raise awareness of integrative nature of CC issues</li> </ul>	In progress

governments and stakeholders			- Influence policy to mainstream adaptation strategies - Establish working groups	
Workshops and meetings	All	All cities	- Use workshops and meetings to transfer knowledge related to CC issues and adaptation	In progress
Develop toolkits	All	All cities	- Contribute to handbooks and toolkits for DRR and CCA	In progress
<b>B2 – Construct inter-disciplinary simulation models to develop, test and validate these knowledge-based actions</b>				
“City Resilience” System Dynamics Model	Dr. S. Simonovic,	Methodology delivered to all study cities; Vancouver model development in progress	- Create “City Resilience” spatial system dynamics model (integrated system dynamics simulation with GIS spatial analysis) that captures economic, social, physical and health characteristics - Contribute to the characterization of resilience and the dynamic treatment of this measure (Simonovic & Peck, 2013; Peck & Simonovic, 2013) - Develop spatial system dynamics resilience modeling framework (Peck & Simonovic, 2014)	In progress (on schedule)
Manila System Dynamics Models	Dr. Kendra Gotangco, Justin Charles See	Manila	The main objective of SD modelling is to deepen the analysis of Metro Manila as a coastal city at risk by applying a systems perspective. A multi-disciplinary and trans-disciplinary approach is implemented by integrating insights drawn from the respective research methods of the physical, social, economic, organizational and health sectors. Lastly, a new tool for measuring and tracking resilience is explored using quantitative system dynamics modeling platform. This tool is adapted for applications across the different sectors and is meant to complement existing methods and help form a solid decision-support base for confronting the problem of risk vs. resilience.	Socio-economic, organizational, and health models have been completed.
<b>Objective C – Enhance Practitioner and Academic Capacity and Transfer Knowledge:</b>				
<b>C1 – Increase the numbers of highly-qualified people in Canada and abroad by mobilizing, exchanging and translating knowledge</b>				
Student training	All	All cities	- Graduate students involved in research, training and knowledge transfer	In progress, ongoing
Course content	All	All cities	- Research outputs integrated into course content, presentations, and teaching programs	In progress, ongoing
<b>C2 – Transfer knowledge and capacity to a broader selection of communities and situations through workshops and partner projects</b>				

Partnerships with stakeholders/ organizations	All	All cities	- Engage wider society to understand vulnerabilities, risk reduction and climate change adaptation strategies - Establish learning consortiums and collaboratives to develop two-way knowledge transfer	In progress, ongoing
Meetings and workshops	All	All cities	- Develop preparedness to cope with potential future extreme events and uncertainties	In progress, ongoing

### Annex 3: Research Output Bibliography

Indicate the number of items per category (3.1 to 3.11) and list research outputs below.

<i>Research Outputs</i>	<i>Number</i>
<i>3.1 Journal Articles (published/accepted)</i>	Total: 40; Canadian team, 28; international team, 12
<i>3.2 Journal Articles (submitted)</i>	Total: 15; Canadian team, 9; international team, 6
<i>3.3 Conference Papers</i>	Total: 211; Canadian team, 119; international team, 92
<i>3.4 Presentation (non-academic)</i>	Total: 151; Canadian team, 68; international team, 83

<i>3.5 Book Chapters</i>	Total: 30; Canadian team, 10; international team, 20
<i>3.6 Books</i>	Total: 2; Canadian team, 0; international team, 2
<i>3.7 Theses</i>	Total: 12; Canadian team, 4; international team, 8
<i>3.8 Databases (GIS, and other information systems)</i>	Total: 1 Canadian team for Vancouver
<i>3.9 Websites, social media (Facebook, Twitter), multimedia (YouTube, others)</i>	Total: 12: Vancouver 2, Bangkok 4, Manila 2, Lagos 1, International 3
<i>3.10 Media coverage. Articles in local or international media</i>	Total: 100; Vancouver, 6, Bangkok 29, Manila 47. Lagos 18
<i>3.11 Other</i>	Total 9: Vancouver 3, Bangkok 2, Manila 3, Lagos 1

## Research Output Bibliography

\*Citation: author(s), date, title, publisher/weblink if available)

### 3.1 Journal Articles (published/accepted)

- Adelekan, I. O. (2015): Flood risk management in the coastal city of Lagos, Nigeria. *Journal of Flood Risk Management* 9(3), 255-264 doi: 10.1111/jfr3.12179
- Adelekan, I.O & Asiyambi, A. P. (2016): Flood risk perception in flood-affected communities in Lagos, Nigeria. *Natural Hazards* 80(1), 445-469.
- Ajibade, I., Armah F, Zubedaar V, Luginaah I, McBean G, & Tenkorang E. (2014) Assessing the bio-psychosocial correlates of flood impacts in coastal areas of Lagos, Nigeria. *Environmental Planning and Management*. DOI:10.1080/09640568.2013.861811
- Ajibade, I., McBean., G, & Bezner-Kerr R. (2013) Urban flooding in Lagos, Nigeria: Patterns of vulnerability and resilience among women. *Global Environ Change*. 23 (6): 1714-1725
- Ajibade, I., Armah F, Zubedaar V, Luginaah I, McBean G, & Tenkorang E. (2015) Assessing the bio-psychosocial correlates of flood impacts in coastal areas of Lagos, Nigeria. *Environmental Planning and Management*. 58 (3) 445-463
- Ajibade, I., F. Armah, V. Zubedaar , I. Luginaah & McBean, G. (2015): Self-reported experiences of climate change in Nigeria: the role of personal and socio-environmental factors. *Climate*. 3, 16-41 doi:10.3390/cli3010016
- Ajibade, I. and G. McBean, 2014: Climate extremes and housing rights: a political ecology of impacts, early warning and adaptation constraints in slum communities. *Geoforum*, 55: 76-86
- Ajibade I., F. Armah, V. Zubedaar , I. Luginaah and G. McBean, 2014: Individual and socio- environmental factors associated with the experience of climate change in coastal communities in Nigeria. *Environmental Hazards: Human and Policy Dimensions*.
- Boamah S, Armah. F, Kuuire, V, Ajibade.I, Isaac Luginaah I, McBean G (2015) Does previous experience of floods stimulate the adoption of coping strategies? Evidence from cross sectional surveys in Tanzania and Nigeria. *Environments*, 2, 565-585
- Cooper R.T. (2014) Open Data Flood Mapping of Chao Phraya River Basin and Bangkok Metropolitan Region. *British Journal of Environment and Climate Change*, 4(2). URL: <http://www.sciencedomain.org/issue.php?iid=603&id=10>.
- Davies, J. B. (2015) Economic analysis of the costs of flooding, *Canadian Water Resources Journal*, 41, 2014-219 DOI: 10.1080/07011784.2015.1055804
- Doberstein, B. & Tadgell, A. (2015). Guidance for ‘managed’ relocation. *Forced Migration Review* Special issue on “Climate change, disasters and displacement” 49: 27-30.

- Gotangco, C. K., J. See, J. P. Dalupang, M. Ortiz, E. Porio, G. Narisma, A. Yulo-Loyzaga and J. Bercilla. (2015) “Quantifying resilience to flooding among households and local government units using system dynamics: a case study in Metro Manila”. *Journal of Flood Risk Management*. doi: 10.1111/jfr3.12222.
- Joakim, E. Mortsch, L., Oulahan, G., Harford, D., Klein, Y., Damude, K., Tang, K. (2016). Using System Dynamics to Model Social Vulnerability and Resilience to Coastal Hazards. *International Journal of Emergency Management*. 12(4):366–39, DOI: <http://dx.doi.org/10.1504/IJEM.2016.079846>
- Joakim, E., Mortsch, L.D., & Oulahan, G. (2015). Using Vulnerability and Resilience Concepts to Advance Climate Change Adaptation. *Environmental Hazards*, DOI:10.1080/17477891.2014.1003777.
- Lechner, S., Jacometti, J., McBean, G. and Mitchison, N, 2016: Resilience in a complex world – avoiding cross-sector collapse. *International Journal of Disaster Risk Reduction* 19 (2016) 84–91
- Marome, W. (with A. Patandwarhan, A. Patankar and E. Porio) (2013) Impacts of Extreme Weather Events and Implications for Adaptation Planning for Coastal Cities, *APN Science Bulletin* (3): 16-75.
- McBean, G.A., 2012: *Environment and Water for Life – In Canada and Around the World*. Human Evolution/Global Bioethics, Vol. 27- n. 1-2
- McBean, G.A., 2012: *Integrating disaster risk reduction towards sustainable development*. Current Opinion in Environmental Sustainability, 4, 122-127.
- Neuwirth, C., Peck, A., & Simonovic, S.P. (2015). Modeling structural change in spatial system dynamics: A Daisyworld example. *Environmental Modeling and Software*, 65: 30-40. (<http://www.sciencedirect.com/science/article/pii/S1364815214003521>).
- Neuwirth, C., Hofer, B., & Peck, A. (2015). Spatiotemporal processes and their implementation in Spatial System Dynamics models. *Journal of Spatial Science*. (<http://www.tandfonline.com/doi/pdf/10.1080/14498596.2015.997316>).
- Oulahan, G. (2016). The production of unequal vulnerability to flood hazards: A conceptual framework for hazards research in Canada’s cities. *The Canadian Geographer*, 60(1), 82-90. <http://dx.doi.org/10.1111/cag.12232>
- Oulahan, G., D. Shrubsole, and G. McBean. 2015. Determinants of residential vulnerability to flood hazards in Metro Vancouver, Canada. *Natural Hazards*, 78(2), 939-956. DOI: 10.1007/s11069-015-1751-5
- Oulahan, G. (2015). Flood insurance in Canada: Implications for flood management and residential vulnerability to flood hazards. *Environmental Management*, 55(3), 603-615. DOI:10.1007/s00267-014-0416-6
- Oulahan, G., Mortsch, L., Tang, K., and Harford, D. (2015). Unequal vulnerability to flood hazards: “Ground truthing” a social vulnerability index of five municipalities in Metro Vancouver, Canada. *The Annals of the Association of American Geographers*, 105(3), 473-495. <http://dx.doi.org/10.1080/00045608.2015.1012634>

- Owringi, A.M., R. Lannigan, & S.P. Simonovic. (2015). Mapping climate change-caused health risk for integrated city resilience modeling. *Natural Hazards*, 1582-1589. DOI 10.1007/s11069-014-1582-9 (<http://link.springer.com/article/10.1007/s11069-014-1582-9>).
- Owringi, A.M., R. Lannigan, & S.P. Simonovic. (2014). Interaction between Land Use Change, Flooding and Human Health in Metro Vancouver, Canada. *Natural Hazards*, 72(2), 1219 – 1230. DOI: 10.1007/s11069-014-01064-0.
- Pennesi, K., J. Folliott & G.A. McBean, 2012: *Towards the Integration of Local and Scientific Knowledge in Weather Services for the Canadian Arctic*. Mitigation and Adaptation of Strategies for Global Change DOI 10.1007/s11027-011-9351-5
- Porio, E. (2016) *Risks and Resilience in a Rapidly Unfolding World: What Does it Hold for our Sociological Practice?* Current Sociology, Sage Publications.
- Porio, E. (2016) *Decentralization and Networked Governance: Citizen Participation and Local Power Elites in Metro Manila in Citizenship and Governance*, H. Schenk Nordholdt and W. Berenschot (eds.), Netherlands: Springer Publications.
- Porio, E. (2015). *Sustainable development goals and quality of life targets: Insights from Metro Manila in Global Futures*. London: Sage Publications.
- Porio, E. (2014), *Climate Change Vulnerability and Adaptation in Metro Manila: Challenging Governance and Human Security Needs of Urban Poor Communities*, *Asian Journal of Social Sciences*. Netherlands: Brill Publishers.
- Porio, E. (2012). *Decentralization, Power and Networked Governance Practices, Metro Manila in Space and Polity*, 16:1, 7-27. London: Routledge Publications.
- Raikes, J., and G. McBean, 2016: *Responsibility and liability in emergency management to natural disasters: A Canadian example*. *International Journal of Disaster Risk Reduction* 16 (2016) 12-18
- Raikes, J., and G. McBean, 2017: *Natural Disaster Management: Behaviour and Response in the City of Vancouver and District of Maple Ridge, British Columbia, Canada. Regional Environmental Change · June 2017 DOI: 10.1007/s10113-017-1179-4*
- Simonovic, S.P., and Peck, A. (2013). *Dynamic Resilience to Climate Change Caused Natural Disasters in Coastal Megacities – Quantification Framework*, *British Journal of Environment and Climate Change*, 3(3): 378-401.
- Simonovic, S.P. (2016) “From risk management to quantitative disaster resilience: a paradigm shift”, *International Journal of Safety and Security Engineering*, 6(2):85-95.
- Stewart, R.E., Betancourt, D., Davies, J.B., Harford, D., Klein, Y., Lannigan, R., Mortsch, L., O’Connell, E., Tang, K. and Whitfield, P.H., (2017): *A multi-perspective examination of heat waves affecting Metro Vancouver: now into the future. Natural Hazards* (2017) 87:791–815 DOI 10.1007/s11069-017-2793-7
- See, J. and Porio, E. (2015). “Assessing Social Vulnerability to Flooding in Metro Manila using Principal Component Analysis”. *Philippine Sociological Review*. 63, (Special Issue), 53 – 80.

Tadgell, A., Brent Doberstein, B. and Mortsch, L., (2017): Principles for climate-related resettlement of informal settlements in less developed nations: a review of resettlement literature and institutional guidelines. *Climate and Development*, <http://dx.doi.org/10.1080/17565529.2017.129140>

### **3.2 Journal Articles (submitted)**

Ajibade, I. Agboola, J. Pelling M, and Garschagen M (forthcoming, 2016) Sustainability transitions: exploring risk management and the future of adaptation in Lagos. *Journal of Extreme Events*

Ajibade, I., (forthcoming, 2016) Distributive justice and human rights in climate policy: The long road to Paris. *The Journal of Sustainable Development Law and Policy*.

Ajibade, I., & McBean G. (2016, in review) Is urban resilience and adaptation mutual? Emerging lessons from Eko Atlantic City Project. *International Journal of Disaster Risk Reduction*

Cooper R.T. (in review) A practicable and reproducible framework for projecting future local-scale extreme precipitation. *Climate Risk Management*.

Cruz, F.T. and G.T. Narisma, (2015, in review) WRF simulation of the heavy rainfall during Tropical Storm Ketsana: A sensitivity study, *Meteorology and Atmospheric Physics*, submitted 2015.

Gertz, A. and Davies, J.B. (2016): A CGE Framework for modelling the economics of flooding and recovery in a major urban area. *Risk Analysis*.

Klein, Y., Mortsch, L., Oulahen, G., Joakim, E., and Harford, D. (In Review). Barriers and drivers of planning for climate change adaptation: The view from Metro Vancouver across levels of government. *Journal of Environmental Policy and Planning*.

Kuure V; I. Ajibade, F. Armah, I. Luginaah and G. McBean, 2015 (in review): Does experience of climate-induced events shape perceived images of climate change? Evidence from Lagos, Nigeria" *Regional Environmental Change*

Wahab, B. and Ojelowo, S. (2016, in review) Building contraventions and incidence of flood in the Lagos metropolis, Nigeria. *Journal of Environmental Planning and Management*.

Ojelowo, S. and Wahab, B. (2016, in review) Municipal solid waste and flooding in the Lagos Metropolis, Nigeria. *Journal of Environment and Development*.

Omole, O. and Adelekan, I. (2016, submitted) Observed trends and changes in temperature extremes over Lagos. *Weather and Climate Extremes*.

Porio, E. (2016). Risk and Resilience in Metro Manila: Interrogating Climate Impacts and Governance in Coastal Cities, *Philippine Journal of Development Studies*.

Tadgell, A. Mortsch, L & Doberstein, B. (2016 submitted). Assessing the feasibility of resettlement as climate change adaptation for informal settlements in Metro Manila, Philippines. *Development and Change*.

### **3.3 Conference Papers**

Adelekan, I. O. (2016) Transport systems and wellbeing in Nigeria: socio-economic development and environmental change. Africa Voices Series, University College London. 20 January 2016.

Adelekan, I.O. (2015). Moderated panel session “Rethinking Urban Resilience in Africa: Perspectives from experts and city officials” Urban Resilience Forum, African Union, Addis Ababa, Ethiopia. 19 November 2015.

Adelekan, I. O. (2015). Urban climate resilience in Lagos. Paper presented at the CCaR Annual Meeting, 26 March 2015, Bangkok, Thailand.

Adelekan, I. O. (2015). Lagos: Research update (Social sector) Paper presented at the CCaR Annual Meeting, 27 March 2015, Bangkok, Thailand.

Adelekan, I. O. (2015). Lagos: Research update (Hazard sector) Paper presented at the CCaR Annual Meeting, 27 March 2015, Bangkok, Thailand.

Adelekan, I. (2014). Disaster risk management and gender issues. Paper presented at the conference on ‘Disaster Risk Management: How Prepared is Nigeria? Ijebu-Ode, Nigeria. May 2014.

Adelekan, I. (2014). Enabling the management of flood risks in the coastal city of Lagos. 2nd Global Forum on Urban resilience and Adaptation. Bonn, Germany. 20 May 2014.

Adelekan, I. (2013). Planet under Pressure. London, March 2013. Paper presented: West African Cities of the 21st Century and Global Environmental Change.

Adelekan, I. (2012). Transdisciplinary Intercultural Ecological Research for Sustainability (TIERS) Jena West, Germany, June 2012. Paper presented: Integrated Global Change research in West Africa: Flood vulnerability studies.

Adelekan, I. (2012). Eighth Annual Meeting of African Science Academies (AMASA 8), Lagos November 2012. Paper presented: Climate Change, Extreme Weather and Disaster Risk in West Africa. Adelekan, I. O. (2014). Building capacity for managing flood risks in the coastal city of Lagos. Accepted for oral presentation at the Resilient Cities 2014 Congress, 29-31 May 2014, Bonn, Germany.

Adelekan, I. O. (2014). Flood risk management by public and private agents in the coastal city of Lagos. Accepted for oral presentation at the 6<sup>th</sup> International Conference of Flood Management, 16-18 September 2014, Sao Paulo, Brazil.

Agam, N., & S.P. Simonovic. (2014). Development of Inundation Maps for the Vancouver Coastline Under a Changing Climate. *Proceedings, IDRiM 2014 Conference - Building Disaster Resilient Communities*, 30 October – 1 November 2014, Western University, London, Ontario, Canada. (second place - award for the best Conference paper).

- Ajibade I. (2016) Is Urban resilience and adaptation mutual? Emerging lessons from Eko Atlantic City, Presentation, URBAN ARK Conference, Mzuzu University, Lilongwe, Malawi. February 1-3.
- Ajibade, I. & McBean, G. (2014). A critique of adaptation strategies to storm surges and sea level rise. Presentation, Canadian Association of Geographers (CAG), Brock University, St. Catherine, ON, May 26-30
- Ajibade, I & McBean, G. (2014). Discourse analysis of urban planning and adaptation to sea level rise: A case study of Eko Atlantic City in Nigeria. Presentation, American Association of Geographers. (AAG), Tampa, Florida, April 8-13.
- Ajibade, I. (2013). Climate extremes and slum communities: where does adaptation begin? Paper, 4<sup>th</sup> Global Forum on Urban Resilience & Adaptation: The Resilience Cities Congress, Bonn, Germany, May 31-June 2.
- Ajibade, I. (2013). Living between vulnerability and disaster: the untold stories of women on the frontlines of climate change in Nigeria. Presentation, American Association of Geographers. (AAG), Los-Angeles, California, April 9-13.
- Ajibade, I. (2012). Vulnerability to Climate Extremes and the Right to Adequate Housing: Experience of Slum Communities in Lagos, Nigeria. Presentation, Canadian Association of Geographers- Ontario Division (CAGONT) University of Toronto – Scarborough, October 13.
- Ajibade Idowu and G. McBean (2013). Living between vulnerability and disaster: the untold stories of women on the frontlines of climate change in Nigeria. Presentation, American Association of Geographers. (AAG) April 9, Los-Angeles, California.
- Ajibade, Idowu (2012). Vulnerability to Climate Extremes and the Right to Adequate Housing: Experience of Slum Communities in Lagos, Nigeria. Presentation, Canadian Association of Geographers- Ontario Division (CAGONT) October 13, University of Toronto – Scarborough
- Betancourt, D., R. Stewart and P. Whitfield (2014). Extreme Events Affecting Vancouver Across a Range of Spatial and Temporal Scales. CCaR Vancouver workshop, February.
- Betancourt, R. and R. Stewart (2013). On the spatial variability, trends and physical explanations of hydrometeorological extremes in the Vancouver, British Columbia region. Canadian Meteorological and Oceanographic Society Congress, Saskatoon, May (accepted)
- Betancourt, D., 2013: Understanding spatial variability and trends in extreme weather at the local level, Departmental seminar, University of Manitoba, April.
- Betancourt, D. and R. Stewart, 2013: Spatial variability and trends in extremes over the Vancouver region. CCaR Workshop, Manila, February.
- Cooper R.T., Cheewinsiriwat P., Trisirisatawong I., Marome W., Nakhapakorn K. (2014) Flood management in Bangkok: advancing knowledge and addressing challenges. International Conference on Flood Management, Sao Paulo, Brazil, 16-18 September 2014.
- Dalupang, J. P. (2014). Unpacking Knowledge Systems in Disaster Risk Reduction and Management and Climate Adaptation of Metro Manila Cities. Paper presented at the Philippine Sociological Society National Conference, General Santos City, South Cotabato, October 15-16.
- Dalupang, JP (2012a) Integrating Environmental Education into Integrated Science Courses in the K-12 Curriculum: A Workshop on Adapting Ideas

from Native Seasons, Project Wet, Wild, and Learning Tree into the Filipino Context. 24<sup>th</sup> Biennial Conference of the Asian Association for Biology Education. National Institute of Physics, University of the Philippines-Diliman, 5-9 December 2012.

- Dalupang, JP (2012b) Climate Change Adaptation and Rice Production Technologies in the Philippines. The 11th Conference of the Asia Pacific Sociological Association (APSA). Ateneo de Manila University, October 22-24, 2012.
- Doberstein, B. 2014. Climate change-related relocation in lesser developed country cities: a review of existing guidelines for informal settlements. August, 2014, 5th International Disaster and Risk Conference: Global Risk Forum, Davos, Switzerland.
- Doberstein, B, Rutledge, A., Ajibade I, and Tadjell, A (2016) “*Managed Retreat for Climate Change Adaptation and Disaster Risk Reduction: A Comparison of Three Coastal Megacities*” 6<sup>th</sup> International Disaster and Risk Conference IDRC Davos, Switzerland, August 30, 2016.
- Gertz, A. and Davies, J.B. (2014). A CGE Framework for modeling the economics of coastal flooding and recovery. Canadian Economics Association annual meetings, May 29-June 1, 2014.
- Klein, Y. (2014). Barriers and Drivers of Planning for Climate Adaptation. Livable Cities Forum -Building Resilient Communities. April 4, 2014. Vancouver BC, Canada.
- Lamond, J. and Adelekan, I. O. (2016): Mitigation of climate risks through adaptation and urban management in Nigerian cities. Proceedings of the International Conference on Urban Risks. Lisbon. 30 June-2 July 2016.
- Lannigan, R., Owrangi, A., & Simonovic, S. (2014). An Approach to Developing a Composite Measure for Human Health as an Input to a Dynamic Systems Model for Investigating City resilience. Invited presentation at the *Special session Coastal Cities at Risk*, 6th International Conference on Flood Management, ICFM6, Floods in a Changing Environment”, Sao Paulo, Brazil, September 16 - 18, 2014.
- Lannigan, R., Owrangi, A., & Simonovic, S. (2014). Developing a composite human health impact map for a metropolitan area. Canadian Association of Geographers annual meeting, St. Catharine’s, Brock University, May, 2014.
- Loyzaga, A. (2016). Regional and Local Efforts on Implementation of the Sendai Framework for Disaster Risk Reduction. 23rd Pacific Science Congress, Academia Sinica, Taipei, Taiwan.
- Loyzaga, A. (2015). Role of Higher Education Institutions in Advancing Disaster Risk Knowledge and Capacity Building. Presented at the World Conference on Disaster Risk Reduction, Sendai, Japan, March 2015.
- Loyzaga, A. (2015). Lessons From Haiyan: Perspectives on the Value of Science and Technology in Effective Risk Communication. Presented at 5th Asian Network on Climate Science and Technology (ANCST) Workshop on Climate Change and Disaster Resilience – Post Sendai 2015, Manila, October 2015.
- Loyzaga, A. (2015). Panel Speaker at the Regional Action on Climate Change 7, Pre-Conference Meeting, Science and Technology in Society (STS) Forum, 12th Annual Meeting, Kyoto, Japan, October 2015.

- Loyzaga, A. (2014). Building an Economically Resilient ASEAN: Perspectives from the Climate and Disaster Risk Research Community. Presented at the 2nd Asian Business Conference, Asian Institute of Management, Makati, June 2014.
- Marome W. (2013) Urban Risk and Vulnerabilities of Coastal Megacity of Bangkok, Thailand. On-line Proceedings of the Resilient Cities 2013 Congress: Article 5. Available at: [resilient-cities.iclei.org/resilient-cities-hub-site/congress-publications/on-line-proceedings-2013//index.php](http://resilient-cities.iclei.org/resilient-cities-hub-site/congress-publications/on-line-proceedings-2013//index.php)
- Marome, W. and Angkarattanapichai, K. (2015) Urban Risk and Resilience of Coastal Megacity of Bangkok Metropolitan Region, Thailand , Urban and Regional Planning Academic Symposium (URPAS) 2015, Thammasat University.
- McBean, G. (2016) Invited Speaker, UNISDR Science & Technology Conference on the Implementation of the Sendai Framework for Disaster Risk Reduction 2015--2030, 27 January 2016.
- McBean, G. (2016) The International Council for Science – Sciences for a Sustainable Future. Invited Plenary Presentation to 25<sup>th</sup> KAST International Symposium on “Future Earth for Sustainable Development Goals in Asia” Seoul, Korea, April 25, 2016
- McBean, G. (2016) The role of science, technology and innovation in achieving the 2030 Development Agenda”, Keynote Address, Commission on Science and Technology for Development (ECOSOC CSTD)-Geneva, May 9, 2016.
- McBean, G. (2016) Science and Technology for a Sustainable Future Earth. Invited Presentation to the Montenegrin Academy of Sciences and Arts, International Conference Technology + Society =? Future, May 19–20, 2016, Podgorica, Montenegro.
- McBean, G. (2016) Weather, Climate and Ocean Sciences for a Sustainable Future Earth. Plenary Presentation. CMOS, Fredericton, May 2106.
- McBean, G. (2016) Integrated Research for Reducing Disaster Impacts for a Sustainable Future Earth. Invited Plenary Presentation. Pacific Science Conference, Taipei, June 2016.
- McBean, G. (2016) La Science et les Objectifs de Développement Durable. Premier Ecole d’Ete des Objectifs de Developpement durable. Marseille, July, 2016
- McBean, G. (2016) Managing interactions across SDGs: a tool for policymakers. Opening speaker. Side Event. High-Level Political Forum on Sustainable Development, under the auspices of UN-ECOSOC, New York, July, 2016
- McBean, G. (2016) International priority setting for research and research funding - Future Earth. Opening Speaker in Special Plenary. Inaugural Global Food Summit. Greening the Global Food Supply Chain through Innovation in Food Science and Technology. 18<sup>th</sup> World Congress of Food Science and Technology, Dublin, Ireland, August, 2016.
- McBean, G. (2016) Science, Technology and Innovation for Meeting the Challenges for a Sustainable Future Earth. Keynote Speaker, Session II. 2<sup>nd</sup> Asian Innovation Forum, Seoul, Korea, August 2016.
- McBean, G. (2016) Opening Comments. Second Meeting of the Global Forum of National Advisory Councils, Seoul, Korea, Sept. 2016.

- McBean, G. (2016) Science for Urban Well-Being in a Future Earth. Opening Plenary Speaker. Forum on Ecological Civilization and Green Development, Xiamen, China, Sept. 2016.
- McBean, G. (2016) Panelist. Panel I – The industry of tomorrow: how socio-environmental values influence production and consumption’s patterns. CNI Sustainability Forests & Biodiversity: new business models for the industry of tomorrow, Rio de Janeiro, September 2016.
- McBean, G. (2016) Speaker. Climate change: Science, policy & the road beyond. Responding to global policy challenges. 2nd International Network for Government Science Advice Conference: Science and Policy Making: towards a new dialogue. Brussels, 29-30 September 2016.
- McBean, G. (2016) Panelist. High-level special session on climate change and water. Budapest Water Summit 2016, Budapest, November 2016
- McBean, G. (2016) International Science: ISCU, IIASA and Canada, Invited special lecture, IIASA, Laxenburg Austria, January 22, 2016
- McBean, G. (2016) Climate Change and a Sustainable Future Earth. Invited Lecture, UOIT, Post-Paris Breakfast Briefing & EV Workshop, Ajax, Ont., January 7, 2016
- McBean, G. (2016) Invited Speaker, UNISDR Science & Technology Conference on the Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030, 27-29 January 2016
- McBean, G. (2015) Integrated Research to Reduce Risk and Sustain Development. Invited Opening Keynote Presentation. Tokyo Conference on International Study for Disaster Risk Reduction and Resilience, Tokyo, January 14, 2015
- McBean, G. (2015) Invited Opening Keynote Presentation. Tohoku University Memorial Conference to the Great East Japan Earthquake, Sendai, Japan, March 10th, 2015
- McBean, G. (2015) Panelist. World Conference on Disaster Risk Reduction, Working Session, Disaster Risk in the Financial System. Sendai, Japan, March 16<sup>th</sup>, 2015.
- McBean, G. (2015) Panelist. Science and Technology Community Major Group Commitments -Implementation of the post-2015 Framework and Roadmap. World Conference on Disaster Risk Reduction, Working Session, Applying Science and Technology to Disaster Risk Reduction Decision-making. Sendai, Japan, March 15<sup>th</sup>, 2015.
- McBean, G. (2015) The changing context and landscape of risk, including economics of disasters. The World Meteorological Organization Symposium on Multi-Hazard Early Warning Systems (MHEWS) and Service Delivery. Tohoku University’s International Research Institute of Disaster Science, Sendai, Japan, 16 March, 2015.
- McBean, G. (2014) Urban Resilience on a Changing Earth. Invited Presentation to Health and Wellbeing in the Changing Urban Environment: A Systems Analysis Approach. Xiamen, China, December 9, 2014
- McBean, G. (2014) Integrating disaster management and climate change. Invited Presentation. IDRiM 2014 (Integrated Disaster Risk Management) Conference, London, ON, 30 October 2014

- McBean, G. (2014) Keynote Response – Science (response to presentation of Prince Charles) UN Hyogo Framework for Action, Financial & Private Sector Disaster Resilience Global Summit, Hosted by the International Insurance Society, Sponsored and arranged by Willis Group, June 25th 2014, London, UK
- McBean, G. (2014) Climate Change Impacts and Adaptation in Canada. Presentation to 2014 Environmental, Energy and Resources Law Summit, Ottawa, May 30, 2014
- McBean, G. (2014) Climate Change in Canada – What to Expect. Presentation to Climate Change and Health Vulnerability in Middlesex-London, Workshop, March 27, 2014, London, Ontario
- McBean, G. (2014) Climate Services to Support Risk-Informed Decision-Making for Building Resilience to Weather Extremes in a Changing Climate. International Panel Discussion invited panelist). A Joint Session of the Ninth Symposium on Policy and Socio-Economic Research; the 14th Presidential Forum; and the 26th Conference on Climate Variability and Change. 4 February 2014. American Meteorological Society Annual General Meeting, Atlanta, USA
- McBean, G.A., 2013: Improving Collaboration Between Science Providers. Invited presentation to UK Government workshop on Building global resilience to natural hazards: Translating science into action, 28-30 January 2013, Wilton Park, UK.
- McBean, G.A., 2013: Managing Coastal Risk in Your Coastal Community. Invited presentation to UNESCO-IOC/WMO ICAM Technical Working Group Meeting. 7-9 January 2013, Jeju Island, Korea
- McBean, G.A., 2013: Our changing climate ... what disaster management practitioners need to know. Invited Presentation to World Conference on Disaster Management, Toronto, June 25, 2013
- McBean, G.A., 2013: Climate Change, Disasters, and Urban resilience. Invited presentation to: International Conference on “Challenges of Urbanization and Development in Africa in Context of Climate Change” – Arusha, 24-26 July 2013
- McBean, G.A., 2013: Climate change: integrated research on disaster risk and resilience of coastal cities at risk. Distinguished invited lecture, University of Dar es Salaam, 22 July 2013.
- McBean, G.A., 2013: On Future Earth, Sustainability and IRDR. Invited Presentation to Young Scientists Conference, Taipei, Taiwan, 22 October 2013,
- McBean, G.A., 2013: Coastal Cities: Risks from Climate Change and Natural Hazards. Invited Presentation to Regional Climate Change Forum. Science and Technology in Society Forum, Kyoto, Japan, 5/10/2013
- McBean, G.A., 2013: Future Earth, an International Program for Sustainability Science. Invited Presentation to IX Convencion Internacional sobre Medio Ambiente y Desarrollo. Havana, 8-12 July 2013
- McBean, G., 2013: Science and Technology in the Service of Disaster Risk Reduction. Invited Presentation, World Science Forum, Rio de Janeiro, 26 November 2013

- McBean, G., 2013: Bridging the Divide between the Scientific Community and Policymakers on Climate Issues. Invited Presentation, Arctic Futures Symposium, 16 October 2013, Brussels, Belgium
- McBean, G., 2013: Addressing the Sustainability of Coastal Mega-Cities. Invited presentation, Beijing Symposium on Global Change – 2013 - Global Change and Sustainable Development. September 2013, Beijing, China
- McBean, G.A., 2013: How do government policy and decisions about capacity/resourcing affect the integrity of science advice? Invited presentation to Canadian Society of Ecology and Evolution Conference, May 13, 2013, Kelowna, BC
- McBean, G.A., 2012: Integrated Research on Disaster Risk: Context for Coastal Cities at Risk Project. Invited Presentation to International Workshop on Cities and Climate Change, 29 October 2012, Shanghai, China
- McBean, G.A., 2012: The importance of early warning systems in disaster risk reduction and climate change adaptation. Presentation to Fudan University, Shanghai, 31 October 2012
- McBean, G.A., 2012: Coastal Cities at Risk - Climate Change Adaptation. Presentation to Regional Climate Change 4<sup>th</sup> Workshop, Kyoto, Japan, 6 October 2012
- McBean, G.A., 2012: Measures Against Disasters. Speaker and Session Chair, Science and Technology in Society Forum, Kyoto, Japan, October 8, 2012
- McBean, G., 2012: Coastal Cities at Risk (CCaR): Building Adaptive Capacity for Managing Climate Change in Coastal Megacities Presentation to Planet Under Pressure. London UK, March 2012
- McBean, G., 2012: Taking an Integrated Approach to Disaster Risk Reduction. Presentation to 8<sup>th</sup> International Symposium on Social Management Systems – SSMS 2012. 2-4 May 2012, Kaohsiung, Taiwan
- McBean, G., 2012: Seeing the Future Through Better Knowledge of the Present. Presentation to XXII International Society of Photogrammetry & Remote Sensing Congress. Melbourne, 26 August 2012
- McBean, G., 2012: A Changing Climate and Disaster Risk Reduction. Invited Presentation to: National Science and Technology Centre for Disaster Reduction, Taipei, 1 May 2012.
- McBean, G., (2012). Addressing the Climate Change Risks to Coastal Cities. Presentation to University of Melbourne. 27 August 2012.
- Mortsch L.D. (2015) Vulnerability Assessment and Governance: Research contributing to the challenge of adaptation implementation, Social Vulnerability Workshop, Vancouver, BC, February 2015.
- Mortsch L.D. (2015) Climate change adaptation: Moving from incremental to transformative change,” Toronto, Ontario, World Disaster Management Conference, June 4, 2015.

- Mortsch L.D. (2015) Vulnerability assessment and governance: Research contributing to the challenge of adaptation implementation, Vancouver, BC, Understanding and Assessing Social Vulnerability: A Collaborative Workshop February 6, 2015.
- Mortsch L.D. (2015) The Coastal Cities at Risk (CCaR) Project: Research advancing climate change adaptation planning and implementation in Metro Vancouver, Canada. Paris, France, Our common future under climate change, July 8, 2015.
- Narisma G.T. (2013a) Rapid Risk and Needs Assessment Training for the Armed Forces of the Philippines, 16-20 December 2013, Manila Observatory and Camp Aguinaldo, Resource Person and Organizer.
- Narisma G.T. (2013b) Climate change and Disaster Training for the National Disaster Risk Reduction Management Council, 5-6 September 2013, Manila Observatory, Resource Person and Organizer.
- Narisma GT, (2013c) Disaster a Risk Window to Climate Change, International Sustainability Conference 2013 (ISCO 2013) Post Rio+20 on WEHAB+3: A Southeast Asian Perspective, 29-30 October 2013, Vistana Hotel, Penang, Malaysia.
- Narisma G.T. (2013d) Understanding Climate Change, Orientation on climate change for IFAD-funded projects, 19 July 2013, Convention Hall, NIA Compound, Quezon City (Invited).
- Narisma G.T. (2013e) Climate and the Changing Metro Manila Landscape, 15 December 2012, Ateneo de Manila Grade School Parents, Ateneo de Manila University, Speaker.
- Narisma G.T. (2012a) Climate, Land Use, and Local Meteorology, Roundtable discussion on Flood control and drainage and water supply and sewerage (sanitation): closing the MDG gaps now, NAST, 8 October 2012, Traders Hotel Manila, Pasay City, Speaker (Invited).
- Narisma G.T. (2012b) Disaster Management, Climate Change and Environment: Creating a Culture of Safety and Security in Southeast Asia, The 2nd National Women's Summit: Women's Active Citizenship in an Era of ASEAN Integration, Miriam College, Women and Gender Institute, 24 September 2012, Miriam College, Quezon City, Speaker.
- Narisma G.T. (2012c) August 2012 Southwest Monsoon Climate Event, Ateneo de Manila Grade School Faculty and Staff, 17 September 2012, Ateneo de Manila University, Loyola Heights, Quezon City, Resource Person.
- Narisma G.T. (2012d) Climate Change Hazards and Vulnerability for the Philippines, The Green Challenge: What's the Score, 9th Green Forum, Green Architecture Advocacy Philippines, 7 September 2012, PICC, Roxas Blvd., Manila, Speaker (Invited).
- Narisma G.T. (2012e) Special Lecture on "Ensuring the Well Being of the Filipino Family by Understanding Climate Change", Miriam College Higher Education Unit Alternative Classes, 5 September 2012, Diliman, Quezon City, Speaker (Invited).
- Narisma G.T. (2012f) Climate Change and Disaster Risk, 1'M Blue Eco-Safe Driving Program, Haribon Foundation, 30 July 2012, Ayala Museum, Makati City, Speaker.

- Narisma G.T. (2012g) Executive Course on International and National Humanitarian Systems on Case Study: Post Ondoy Integrated Risk Assessment and the Coastal Cities at Risk Project, e Social Work Department under the College of International, Humanitarian and Development Studies (CIHDS) of Miriam College, 23 May 2012, Resource Speaker.
- Narisma G.T. (2012h) Extreme Weather Disasters in Metro Manila, Roundtable discussion on Business Continuity Planning, UNISDR (United Nations Office for Disaster Risk Reduction)-Manila Observatory-Ateneo de Manila University, 3 May 2012, Ateneo Professional Schools, Ateneo de Manila University, Speaker.
- Narisma G.T. (2012i) “Risk Science and Innovation for Localized Impact Assessments”, Regional Forum on Effective Disaster Risk Reduction and Climate Change Adaptation in Greater Metro Manila Area, Organized by Senator Loren Legarda, Chair, Senate Committee on Climate Change, 16 March 2012, Bulwagang Amoranto, Quezon City Hall, Quezon City
- Narisma G.T. (2012j) Climate Change Science and Impacts, Philippine Institute of Environmental Planners (PIEP), 27 January 2012, UP School of Urban and Regional Planning, UP Diliman, Quezon City, Resource Person.
- Narisma G.T. (2012k) Climate Change: Impacts and Vulnerability, Asian Medical Students Association-Philippines National Medical Student’s Conference 2012, Discussion on “Seizing Opportunities: Issues for Urgent Mitigation”, 31 March 2012, UP College of Medicine, Resource Person.
- Ojolowo, S. (2015): Irregular urban development and municipal solid waste as determinants of flooding in Metropolitan Lagos, Nigeria. Staff/student seminar, Department of Urban and Regional Planning, Faculty of the Social Sciences, University of Ibadan. 18 August, 2015
- Oulahen, G., Shrubsole, D., and McBean, G. (2015). Determinants of residential vulnerability to flood hazards in Metro Vancouver. Canadian Association of Geographers (CAG) conference. June 2, 2015. Simon Fraser University, Vancouver, British Columbia.
- Oulahen, G. (2015). Flood insurance in Canada: Implications for flood management and residential vulnerability to flood hazards. Association of American Geographers (AAG) conference. April 23, 2015. Chicago, Illinois.
- Oulahen, G. (2014). Social vulnerability to flood hazards in Metro Vancouver, Canada. Integrated Disaster Risk Management (IDRiM) Society Conference. November 1, 2014. Western University, London, Ontario, Canada.
- Oulahen, G., Mortsch, L., Tang, K., and Harford, D. (2014). Unequal vulnerability to flood hazards: “Ground truthing” a social vulnerability index of five municipalities in Metro Vancouver, Canada. Canadian Risk and Hazards Network (CRHNet) Symposium. October 23, 2014. Toronto, Ontario.
- Oulahen, G., Mortsch, L., Tang, K., and Harford, D. (2014). Unequal vulnerability to flood hazards: “Ground truthing” a social vulnerability index of five municipalities in Metro Vancouver, Canada. Canadian Association of Geographers conference. May 27, 2014. Brock University, St. Catharines, Ontario.

- Owringi, M.A. Lannigan, R., Simonovic. (2015). Mapping climate change-caused health risk for the city of Metro Vancouver. Invited presentation at the *Social Vulnerability Workshop*, SFU, Vancouver, British Columbia, Canada, February 2015.
- Owringi, A., R. Lannigan, & S.P. Simonovic, (2014). An Approach to Developing a Composite Measure for Human Health as an Input to a System Dynamics Model for Investigating City Resilience. *Electronic Proceeding of the 6th International Conference on Flood Management*, pp.9, September 16-18, Sao Paulo, Brazil, available online <http://www.abrh.org.br/icfm6/proceedings/papers/PAP014987.pdf>
- Owringi M. A., Lannigan R., Simonovic S. P. (2014) Mapping climate change-caused health risk for the city of Metro Vancouver , ICLEI, Vancouver, Canada, April.
- Owringi M. A., Lannigan R., Simonovic S. P. (2013) Assessment of climate change health impacts for coastal megacities, CSCE 21<sup>st</sup> Canadian Hydrotechnical Conference, Banff, Alberta, May.
- Owringi. A., Lannigan. R., Simonovic, S.P., McBean. G. (2012) Health impacts of Floods due to climate change in coastal cities. *Transcending Borders Towards Global Health-Conference*, 27-29 April 2012, London, Ontario, Canada.
- Owringi. A., Lannigan. R., Simonovic, S.P. (2012). Assessment of climate change health impacts for coastal megacities 4<sup>th</sup> International Disaster and Risk Conference IDRC, 26-30 August 2012, Davos, Switzerland.
- Oyeranti, O. (2015). Disaster Resilience: Economic Viewpoint-Lagos, Nigeria. Paper presented at the CCaR Annual Meeting, 27 March, 2015, Bangkok, Thailand.
- Peck, A., and S.P. Simonovic (2015). Climate change influenced riverine flooding and sea level rise on Canada's west coast. *Proceedings, 22nd Canadian Hydrotechnical Conference, Water for Sustainable Development : Coping with Climate and Environmental Changes*, Montreal, Quebec, Canada, April 29 – May 2, 2015, 8 pages.
- Peck, A., and S.P. Simonovic (2014) Resilience Framework for Adaptation to Climate Change in Coastal Mega Cities, ICLEI's Livable Cities Forum (LCF) 2014: Building Resilient Communities, Vancouver, April.
- Peck, A., S.P. Simonovic (2013) Keynote lecture, Spatial Dynamic Resilience to Climate Change Caused Natural Disasters - Quantification Framework , 5th International Conference on Geoinformation Technologies for Natural Disaster Management, Mississauga, October.
- Peck. A., and S.P. Simonovic (2012) Coastal megacities at risk: dynamic resilience to climate change caused natural disasters. 2<sup>nd</sup> European Conference on FLOODrisk Management, 20-22 November 2012, Rotterdam, The Netherlands.
- Porio, E. (2016). Assessing Social Vulnerabilities of Metro Manila: Implications for Managing Climate Change and Building Resilience Among Local Governments/Communities, presented to the Asian Climate Change Adaptation Conference, Asian Development Bank, March 25-28, 2016. (International)
- Porio, E. (2016). Coastal Cities at Risk: Characterizing Vulnerability, Building Adaptive Capacity and Urban Resilience, presentation in the Ateneo-Center for Asian Studies-Kyoto University Conference on Asian Platform for Disaster Research, March 9-10, 2016.

- Porio, E. (2016). Interrogating Risk and Resilience in Climate Disasters Research: Focus on Coastal Cities at Risk, paper presented in the IPC-Kyoto Conference on Disasters and Society, Feb. 9-10, 2016.
- Porio, E. (2016). Interrogating the Risk-Resilience Nexus in Climate Adaptation in Metro Manila, a special lecture before the General Assembly of the National Research Council of the Philippines, University of the Philippines, May 20, 2016.
- Porio, E. (2016). Sustainability and Climate Resilience in Metro Manila: Challenges and Prospects for Risk Governance in Development/Service Provision, Paper presented in the Green Growth Seminar, Lee Kuan Yew Policy Center, National University of Singapore, June 7, 2016
- Porio, E. (2016). Climate Disasters and Community Resilience: Challenging Governance and Human Security Needs, paper presented at the National Social Science Congress, Lyceum of the Philippines University, Batangas City.
- Porio, E. (2016). Coastal Cities at Risk: A MULTI-SECTORAL SYSTEMS APPROACH in Characterizing Vulnerability, Building Adaptive Capacity and Resilience, paper presented at the International Science Consortium and New York University Conference on SDGs, Sept. 21, 2015.
- Porio, E. (2016). Social Capital, Trust Networks and Resilience of Health Systems: Intersections of Community Structure and Geo-Physical Vulnerabilities of Places/Cities. Research report presented before the Eastern Samar DILG Officials, Planners and Health Officers, Ironwood Hotel, Tacloban City, Feb 12, 2016.
- Porio, E. (2016). The Sendai Framework on DRR, Paris Climate Treaty and Implications for National and Local DRR-CCA Actions: Reflections from “Coastal Cities at Risk” (CCaR) Project, paper presented before the National Conference of the Local Government Academy and the Association of DRRMOs in the Philippines, LGA Academy, UP Los Banos, Jan. 22, 2016.
- Porio, E. (2016). Assessing Social Vulnerabilities and Disaster Risks: Systems Thinking, Intersectionalities and Trans-Disciplinary Action in Building Community Resilience, paper presented before the CCaR Consultations and Validation Workshops with partner LGUs, CSOs and Private Sector, Heyden Hall, Manila Observatory, Jan. 17, 2016.
- Porio, E. (2016). Asian Prosperity, Rising Inequality and Climate Risks in Metro Manila, paper presented in Global Governance and Urbanism Conference, Prof. Saskia Sassen (organizer), Columbia University, November 18, 2015
- Porio, E. (2016). Climate Adaptation, Vulnerability and Resilience in Manila: Inter-sectionalities of Ecological and Social Vulnerabilities, Fulbright Lecture at Hofstra University, November 16, 2015.
- Porio, E. (2016). Climate Change, Systems Thinking and Trans-disciplinary Action for Urban Resilience, City University of New York and UN SDGs Conference, Rosenthal Pavilion, City University of New York, New York, Sept. 21, 2015.
- Porio, E. (2015). Mainstreaming Climate Policies into National Urban Policies and Development: Key Challenges and Issues, UN-ESCAP Expert Group Meeting on Mainstreaming Climate Policies into National Urban Framework, March 17-18, 2015.

- Porio, E., et. al. (2015). Characterizing Social Vulnerabilities of Metro Manila: Implications for Managing Climate Change and Building Resilience, presented in the CCaR Annual Meetings, Bangkok, March 25-28, 2015.
- Porio, E. (2015). Key Urban Dimensions in the Asia Pacific: Towards A New Social Development Agenda, UN Expert Group Meeting , Bangkok, Thailand, Feb 2-3, 2015.
- Porio, E. (2015). Assessing the Socio-economic Impacts of Ketsana in the Philippines: Approaches and Methodologies Paper presented in the 2015 International Workshop on Typhoon and Flood(IWTF)-APEC Experience Sharing on Hazardous Weather Events and Risk Management, National Applied Research Laboratories , Taiwan Typhoon and Flood Research Institute, Taipei, May 27-29, 2015.
- Porio, E. (2015). Social Costs Related to Disaster Risk Reduction and Loss Mitigation Presented at the Advanced Institute on Disaster Risk Reduction and Loss Mitigation, IRDR, UCSU, Academia Sinica, Taipei, April 20-25, 2015
- Porio, E. (2015). Social Capital/Trust Networks, Post-Disaster Recovery and Community Resilience, Presented in the forum, "Not Business as Usual II: Science, Community and Practitioners Conversations on Yolanda and the Challenge of the New Normal", organized by Manila Observatory and Ateneo de Manila University in partnership with Christian Aid and Aksyon Klima-Philippines, La Breza Hotel, August 25, 2015.
- Porio, E. (2015). Livelihood Vulnerability in Cities: Interrogating the Intersections of Culture, Disaster Risk and Power, South African Sociological Association Conference and International Sociological Association, Clinical Sociology Interim Conference, University of Johannesburg, South Africa, June 28-July 1, 2015.
- Porio, E. (2015). Rapid Economic Development, Expansion and Social Inequality in Asia, paper presented at the Annual Global Development Network Conference, The Hyatt, Morocco, June 10-15, 2015.
- Porio, E. (2015). Assessing the Socio-economic Impacts of Ketsana in the Philippines: Approaches and Methodologies, Paper presented in Paper presented in the 2015 International Workshop on Typhoon and Flood (IWTF -APEC Experience Sharing on Hazardous Weather Events and Risk Management, National Applied Research Laboratories , Taiwan Typhoon and Flood Research Institute, Taipei, May 27-29, 2015.
- Porio, E. (2015). Social Costs of Disaster Loss and Mitigation, paper presented in "2015 Advanced Institute on Disaster Risk Reduction and Loss Mitigation", IRDR International Center of Excellence, Academia Sinica, Taiwan, April 22-25, 2015.
- Porio, E. (2015). Crafting Alternative Spaces and Urban Resilience in Metro Manila: Contradictions in Community-Based Initiatives and Risk Governance, paper presented in Alternative Urban Spaces: Cities by and for People Conference, Asian Research Institute, National University of Singapore, April 27-28, 2015.
- Porio, E. (2015). Human Security and Development: Implications for Institutional Planning, presented in the Manila Observatory Strategic Planning, SEAMEO-Innotech, April 9, 2015.

- Porio, E. (2015). Managing Change in a Multi-Cultural Contexts: Focus on Resource Conflicts and Climate Disasters, presented in the Philippine Youth Leadership Program, US Embassy, April 9, 2015.
- Porio, E. (2015). Characterizing Social Vulnerabilities of Metro Manila: Implications for Managing Climate Change and Building Resilience. International Conference on Coastal Cities and Managing Climate Change, Chulalongkorn University, March 26-29, 2015.
- Porio, E. (2015). Mainstreaming Climate Policies into National Urban Policies and Development: Key Challenges and Issues. Paper presented in the UN-ESCAP Expert Group Meeting on Mainstreaming Climate Policies to National Urban Policies, UN-ESCAP Headquarters, Bangkok, Thailand, 17-18 March 2015.
- Porio, E. (2014). Urban Transitions, Poverty-Inequality and Development in Asia: Pol-Eco Contestations and the New Normal. Paper presented at the Asian Pacific Sociological Conference, University of Cheingmai, Thailand, Feb. 15-16.
- Porio, E. (2014). Science-Practice Interface: Interrogating Climate Vulnerability, Disaster Reduction and Urban Resilience in Metro Manila/Asian Cities, presented at the 2<sup>nd</sup> plenary session at the World Weather Open Science Conference, Montreal, Canada, August 16-22, 2014.
- Porio, E. (2014). Social-ecological and Meteorological transitions: Intersectional challenges and Responses in Metro Manila, Paper presented at the panel on "The Collaboration Across Disciplinary and Practitioner Boundaries: Breaking Barriers and Building Bridges" World Weather Open Science Conference, Montreal, Canada, August 16-22, 2014.
- Porio, E. and A. Yulo-Loyzaga. (2014). Climate Change Mitigation and Adaptation in Metro Manila Informal Settlements: A Case Study. Submitted to the Urban Climate Change Research Network Second Assessment of Climate Impacts on Cities, Earth Institute, Columbia University, December 1, 2014.
- Porio, E., J. See and J. P. Dalupang. (2014). Assessing Social Vulnerability to Climate Change in Metro Manila. Paper presented in the Asia Pacific Sociological Conference, University of Chiang Mai, Thailand, February 15-16.
- Porio, E., A. Yulo-Loyzaga, and J. See. (2014). Mainstreaming CCA-DRR in River Management: Key Principles and Challenges. Paper presented at the 2<sup>nd</sup> International River Summit, Marikina Convention Center, November 19-21, 2014.
- Porio, E., A. Yulo-Loyzaga, M. Ortiz, and J. See. (2014). Climate Change Mitigation and Adaptation in Metro Manila Informal Settlements. Paper presented at the ISA-RC 46 Integrative Session, Addressing Social Inequality Before, During and After Crisis, XVIII World Congress of Sociology, Yokohama, Japan, July 13-19, 2014.
- Porio, E. (2014). Key Urban Dimension in the Asia Pacific Region: Intersecting the New Normal into the New Social Development Agenda, Paper presented at the UN-ESCAP Experts Meeting, UN-ESCAP Preparations Meeting for the Asian Urban Forum, UN Building, Bangkok, Thailand, Dec 2-3, 2014.
- Porio, E. (2014). Characterizing Social Vulnerability to Climate Change and Disasters in Metro Manila. Paper presented at the Philippine Sociological Society National Conference, General Santos City, South Cotabato, Philippines. October 15-16.

- Porio, E. and P. Dacera (2014). Adaptation to Flooding and Resilience Building in Pasig-Marikina Basin: Intersections of Social, Political-Economic and Place-Based Vulnerabilities. Paper presented at the Philippine Sociological Society National Conference, General Santos City, South Cotabato, October 15-16.
- Porio, E. (2014). Socio-Ecological Transitions and Social Inequality in Philippine Cities. Paper presented in the Early Career Sociologists Conference Organized by the International Sociological Association at the University of Tokyo, July 7-8, 2014.
- Porio, E. (2014) Urban Transitions, Poverty-Inequality, and Development in Asia. 2014 Asia Pacific Sociological Association (APSA) Conference, Chiang Mai, Thailand, February 15-16, 2014.
- Porio, E. (2012) Vulnerability, Adaptation and Resilience to Floods and Other Climate Change Effects: Focus on Local Governance and Urban Poor Communities, paper presented in 10th ASEAN Inter-University Seminars, organized by the National University of Singapore and Universiti Dar Es Salaam, Brunei, December 10-13. Audience: 150 professors and graduate students from ASEAN countries, England and Australia.
- Porio, E. (2013) Cities at Risk: Floods and the Construction of Vulnerability and Precarity to Climate Change-Related Effects in Metro Manila, International Congress on “Beyond Crisis: Sociology Facing New Forms of Risk, Uncertainty and Precarity” University of Basque Country, Bilbao, Spain, March 10-14. Audience: 50 delegates from Asia, Africa, Latin America, USA and Europe.
- Porio, E. (2013) Vulnerability, Adaptation and Resilience to Floods and Change Impacts Among Marginal Communities and Local Governments in Metro Manila. Paper presented in the ISA Conference on Social Analysis and Intervention: Improving Lives and Communities, University of Complutense, Madrid, Spain, March 16-20. Audience: 60 delegates from Asia, Africa, Latin America, Europe and USA.
- Porio, E. (2013) Vulnerability, Adaptation and Resilience to Floods Among Marginal Communities: Special Focus on KAMANAVA Flood Basin. Paper presented to the First KAMANAVA Conference on Society and Culture, University of the East (Caloocan), February 8, 2013. Audience: About 500 students and professors, local officials from the Commission on Higher Education, students and faculty from the whole UE System.
- Rutledge, A. (2015). The Consideration of Managed Retreat as a Climate Change Adaptation Strategy in Vancouver. Paper presented at the Canadian Risks and Hazards Network symposium, Calgary, Alberta, November 4-6, 2015
- Rutledge, A. 2016. Opportunities and Constraints for Coastal Adaptation in Metro Vancouver. In conference proceedings, Canadian Association of Geographers Ontario (CAGONT 2016). Waterloo, Ontario. October 29<sup>th</sup>, 2016
- Rutledge, A. 2016. Pathways for Coastal Adaptation in Metro Vancouver. In Proceedings, International Disaster and Risk Conference (IDRC Davos 2016), Davos, Switzerland, 27 Aug-1 Sept, 2016.
- See, J. and E. Porio. (2014). Assessing Social Vulnerability to Flooding in Metro Manila Using Statistical Analyses and System Dynamics Modeling. Paper presented at the Philippine Sociological Society National Conference, General Santos City, South Cotabato, October 15-16.

- See, J. and E. Porio (2016). “Quantifying Social Vulnerability and Resilience to Flooding in Metro Manila using Principal Component Analysis and System Dynamics Modeling”. *Sixth Joint US-Japan Conference on Mathematical Sociology and Rational Choice*. Sheraton Seattle Hotel, WA, United States.
- See, J. and E. Porio (2013) “Measuring Social Vulnerability to Flooding in Metro Manila Using City-Level Demographic Data.” International Young Scientists Conference on Integrated Research on Disaster Risk, Future Earth, and Sustainability. Academia Sinica, Taipei, Taiwan, October 22-24, 2013.
- See J., E. Porio and John Paolo Dalupang. (2014a) “Measuring Social Vulnerability to Flooding among Metro Manila Cities.” International Conference on Environmental Science and Technology (ICEST) 2014 Houston, Texas, USA, June 9-13, 2014 (Accepted Abstract)
- See, J, E. Porio, and John Paolo Dalupang. (2014b) Social Vulnerability Measurements to Flooding Using A Multilevel Principal Component Analysis. 2014 Asia Pacific Sociological Association (APSA) Conference. Chiang Mai, Thailand, February 15-16, 2014.
- Simonovic, S.P. (2016), guest lecture, “Practical Resilience Metric for Analyses of Infrastructure Systems”, Department of Civil Engineering, The University of Manitoba, Winnipeg, April.
- Simonovic, S.P. (2016), keynote lecture, “Quantification of resilience to water scarcity, a dynamic measure in time and space”, 7th International Water Resources Management Conference of IAHS ICWRS, Bochum, Germany, May.
- Simonovic, S.P. (2016), invited lecture, “Quantification of resilience for water resources risk management”, Risk 2016, 10th International Conference on Risk Analysis, Crete, Greece, May.
- Simonovic, S.P. (2016), guest lecture, “From Risk Management to Quantitative Resilience: A Paradigm Shift”, Technical University of Denmark, Department of Environmental Engineering, Copenhagen, Denmark, August.
- Simonovic, S.P. (2016), invited lecture, “The Beauty of Resilience - Leaving the Chamber of Risks, Chaucer Seminar, That calls for Understanding Risk”, Chaucer, Copenhagen, Denmark, August.
- Simonovic, S.P. (2015). Guest lecture, “From Disaster Risk Management to Quantitative Resilience: A Paradigm Shift”, Faculty of Security Studies, University of Belgrade, Belgrade, June 22, (in Serbian).
- Simonovic, S.P. (2015). Guest lecture, “From Disaster Risk Management to Quantitative Resilience: A New Approach”, Academy of Criminalistics and Police Studies, Belgrade, Serbia, December 15, (in Serban).
- Simonovic, S.P. (2014). Keynote lecture, “Modeling Resilience to Climate Change in Space and Time”, DailyMeteo.org/2014 Conference, Belgrade, Serbia, June.
- Simonovic, S.P. (2014). Keynote lecture, “Talking about floods in the middle of a drought”, 6th International Conference on Flood Management, ICFM6, Floods in a Changing Environment", Sao Paulo, Brazil, September 16 - 18, 2014. (YouTube video <https://www.youtube.com/user/slobodansimonovic?feature=mhee>)

- Simonovic, S. P. (2014). From Flood Risk Management to Quantitative Flood Disaster Resilience: A Paradigm Shift. *Electronic Proceeding of the 6th International Conference on Flood Management*, pp.8, September 16-18, Sao Paulo, Brazil, available online <http://www.abrh.org.br/icfm6/proceedings/papers/PAP014995.pdf>
- Simonovic, S.P. (2014). From Disaster Risk Management to Quantitative Disaster Resilience - A Paradigm Shift. Guest lecture at National Taiwan University, Taipei, Taiwan, April.
- Simonovic, S.P. (2014). Cities and Climate Change – Resilience Modeling. Invited lecture at the Sciences and Cities – Connect, The 2nd Annual Ontario Climate Consortium Symposium, London, Ontario, May.
- Simonovic, S.P. (2014). Coastal Cities at Risk – Resilience Simulator. Invited lecture at the Shanghai Climate Research Center, Shanghai. China, May.
- Simonovic, S.P. (2014), “Modeling Resilience to Climate Change in Space and Time”, Proceedings of DailyMeteo.org/2014 Conference, June 26-2, Belgrade, Serbia, CD ROM Proceedings, pp. 30-34, ISBN 978-86-7518-169-9.
- Simonovic, S.P. (2014). From Disaster Risk Management to Quantitative Resilience: A Paradigm Shift. Invited presentation at the *Special Session Coastal Cities at Risk*, 6th International Conference on Flood Management, ICFM6, Floods in a Changing Environment", Sao Paulo, Brazil, September 16 - 18, 2014.
- Simonovic, S.P. (2014). From Disaster Risk Management to Quantitative Resilience: A Paradigm Shift. Guest speaker at the *DNV GL*, Oslo, Norway, October 30, 2014.
- Simonovic, S.P. (2013). Invited lecture, “Building Adaptive Capacity for Managing Climate Change in Coastal Megacities”, Department of Mechanical Engineering, University of Western Ontario, London, November.
- Simonovic, S. P. (2013) Invited lecture, “Dynamic Resilience to Climate Change Caused Natural Disasters in Coastal Megacities – Quantification Framework”, China Institute of Water Resources and Hydropower Research (IWHR), Beijing, China, April.
- Simonovic, S. P. (2013) Invited lecture, “Dynamic Resilience to Climate Change Caused Natural Disasters in Coastal Megacities – Quantification Framework”, Department of Hydraulic Engineering, Tsinghua University, Beijing, China, April.
- Simonovic, S.P. (2013) Keynote lecture, “From Disaster Risk Management to Quantitative Disaster Resilience: A paradigm shift”, 4<sup>th</sup> Conference of the International Society for Integrated Disaster Risk Management (IDRiM 2013), Northumbria University, Disaster and Development Centre, Newcastle, UK, September.
- Simonovic, S.P. (2013) Distinguish speaker lecture, 2013 ASCE FAU Chapter Professional Speaker Seminar, “Managing Natural Disasters: Methods and Tools for a Systems Approach”, Department of Civil, Environmental and Geomatics Engineering, Florida Atlantic University, Boca Raton, Florida, February.

- Simonovic, S.P. (2012) Distinguish speaker lecture, 2012 ASCE FAU Chapter Professional Speaker Seminar, Building Adaptive Capacity for Managing Climate Change in Coastal Megacities, Department of Civil, Environmental and Geomatics Engineering, Florida Atlantic University, Boca Raton, Florida, February.
- Simonovic, S.P. (2012) Invited lecture, "Modeling Dynamic Resilience to Climate Change Caused Natural Disasters", *Friday Forum*, Institute for Catastrophic Loss Reduction, Toronto, October.
- Simonovic, S.P. (2012). Invited lecture, "Understanding City Resilience through System Dynamics Simulation", Advanced Institute on Data for Coastal Cities at Risk, IRDR International Centre of Excellence, Academy of Sciences, Taipei, Taiwan (October)
- Stewart, R.E., 2013: On weather-climate extremes and natural hazards over Canada. CMOS Congress, Saskatoon.
- Tadgell, A., Abrahams, Z., Chan, J., Ayesha, J., Yahya, A. and Doberstein. (2014). Hazards and vulnerabilities, climate change adaptation and disaster risk reduction in Metro Manila, Philippines. Poster presented at the second annual Ontario Climate Consortium symposium. 13 May, 2014 London, Ontario
- Tadgell, A., Doberstein, B and Mortsch, L. An examination of managed retreat as an adaptation strategy to climate change: A case study of resettlement in Metro Manila, Philippines. August, 2014, 5th International Disaster and Risk Conference: Global Risk Forum, Davos, Switzerland.
- Tadgell, A. Doberstein, B. and Mortsch, L. Managed retreat as climate change adaptation and disaster risk reduction in Manila. November 2014, International Development Studies Network (DevNet) Conference, Dunedin, New Zealand.
- Uchendu, O. C. (2015) CCaR Project Lagos Health Research Update. Paper presented at the CCaR Annual Meeting, 27 March 2015, Bangkok, Thailand.
- Wahab, B., Ojolowo, S., Adelekan, I. and Fasona, M. (2014) Building contraventions and incidence of flood in the Lagos metropolis. Paper presented at the 6th International Conference of Flood Management, 16-18 September 2014, Sao Paulo, Brazil.

### **3.4 Presentation (non-academic)**

- Adelekan, I. O. (2016). Current trend in disseminating information on flooding issues. Ibadan Urban Flood Management Project Stakeholders Engagement Workshop. 22 March 2016.
- Adelekan, I. O. (2016). Coastal Cities at Risk-Lagos: Highlights of research findings. CCaR Lagos media workshop. 14 July 2016.
- Adelekan, I. (2014) "Cities at Risk: Building Capacity for Managing Climate Change and Disasters in Coastal Megacities". Invited paper - 2014 Annual Retreat of the Fire Office Committee of the Nigerian Insurers Association. 24 April, 2014. Ijebu-Ode, Nigeria.

- Adelekan, I (2011) Public Lecture: “Climate Change, Weather Extremes and Society” Seventeenth Faculty Lecture, Faculty of the Social Sciences, University of Ibadan. 25 May 2011.
- Adelekan, I. (2013) The Coastal Cities at Risk project. Presentation to CCaR stakeholders meeting. 17 December, 2013. Lagos, Nigeria.
- Adelekan, I. O. (2014) The role of Nigerian insurance industry in flood preparedness and adaptation. Paper presented to the Fire Office Committee of the Nigerian Insurers Association. 28 February, 2014. Lagos, Nigeria.
- Betancourt, D., (2013) Understanding spatial variability and trends in extreme weather at the local scale. Presentation to University of Manitoba Dept. of Environment and Geography. Coastal Cities at Risk Public Panel and Dialogue. Segal Room #420, SFU Vancouver, 515 West Hastings Street. March 8, 2012 from 7:00 – 9:00 pm.
- Cheewinsiriwat P, Trisirisatayawong I (2014) Coastal Cities at Risk: Bangkok Hazards Research: Sea Level Rise. Presentation at CCaR Annual Meeting, Vancouver, March 2014.
- Cheewinsiriwat P, Trisirisatayawong I (2014) Coastal Cities at Risk Public Panel and Dialogue. Segal Room #420, SFU Vancouver, 515 West Hastings Street. March 8, 2012 from 7:00 – 9:00 pm.
- Cooper RT (2013) Open Data Flood Risk Mapping of Chao Phraya River Basin and Bangkok Metropolitan Region. Bangkok Metropolitan Administration. 22 November 2013.
- Cooper RT (2014) CCaR Project Bangkok Hazards Research: River Runoff. Presentation at CCaR Annual Meeting, Vancouver, March 2014.
- Cruz FT and Narisma GT (2012) Exploring the Impact of Urbanization in Metro Manila on Rainfall During Tropical Storm Ketsana, Asia Oceania Geosciences Society-American Geophysical Union (WPGM) Joint Assembly, 13 Aug 2012, Resorts World Convention Centre, Singapore, Oral Presentation.
- Dado JB, Mero RD, Narisma GT, and Cruz FT (2012) The Impacts of Urbanization Expansion in Metro Manila on the Southwest Monsoon Rainfall, Asia Oceania Geosciences Society-American Geophysical Union (WPGM) Joint Assembly, 13 Aug 2012, Resorts World Convention Centre, Singapore, Oral Presentation.
- Dalupang, JP (2012c). Climate Change Adaptation and Food Production Technologies in the Philippines.” First National Conference on Research in Climate Change and Variability. Traders Hotel Manila, Pasay City, 27 September 2012. Poster Presentation.
- Dalupang, JP (2012d) The Vulnerabilities of Southeast Asian Countries to Global Warming. Research @ DLSU: Science and Technology Conference 2012. De La Salle University, Manila, February 16, 2012.
- Damude, K. (2015). Metrics for Social Resilience in Metro Vancouver. Coastal Cities at Risk Understanding and Assessing Social Vulnerability: A Collaborative Workshop. Feb 5, 2015. Simon Fraser University, Vancouver, British Columbia.
- Damude, K. (2014). Metrics for Social Resilience in Metro Vancouver. Nov. 7, 2014. Coastal Cities at Risk Canadian Team Meeting. University of Western Ontario, London, Ontario.

- Damude, K. (2014). An interactive discussion reviewing metrics for social resilience for use in Metro Vancouver. Oct 5, 2014. Coastal Cities at Risk Canadian Social Vulnerability Team Meeting. Nov. 6, 2014, University of Waterloo, Waterloo, Ontario.
- Folorunsho, R. (2013) Climate Change and Coastal Cities. Presentation to CCaR stakeholders meeting. 17 December 2013. Lagos, Nigeria.
- Gotangco, C. K. (2016) “Quantifying Resilience to Flooding among Households and Local Government Units using System Dynamics: A Case Study in Metro Manila”. *Framing the Sustainable Humanosphere in Southeast Asia: A Dialogue between Social and Natural Scientists*. Ateneo de Manila University, March 18, 2016.
- Harford, D. (2012) Coastal Cities at Risk: Social Vulnerability in Metro Vancouver, CAR Taipei
- Harford, D. (2013) Climate Change Adaptation: Leadership Opportunities, Annual General Meeting of the Suzuki Elders, Vancouver
- Harford, D. (2013) Climate Change Adaptation and Sea Level Rise, Canadian Media Research Consortium, UBC, Vancouver
- Harford, D. (2013) Meeting of water/energy nexus researchers from Hiroshima University, Kyoto, Japan
- Harford, D. (2013) Not Waiting For Noah workshop, BCWWA, Vancouver
- Harford, D. (2013) Melting Ice, Rising Seas and Extreme Weather Events, Centre for Natural Hazards Research (CNHR), SFU
- Harford, D. (2013) Melting Ice, Rising Seas, Ethics for Breakfast, Vancouver
- Harford, D. (2013) Metro Vancouver and Rising Seas, Cool Drinks, North Vancouver
- Harford, D. (2013) Climate Change Adaptation in Metro Vancouver, Resilient Cities, Bonn
- Harford, D. (2013) Metro Vancouver update, CCaR international meeting, Manila
- Harford, D. (2014) Coastal Cities in a Changing Climate, CCaR, Vancouver
- Harford, D. (2014) Coastal Cities at Risk: Metro Vancouver, Livable Cities Forum, Vancouver
- Harford, D. (2014) Coastal Cities at Risk: Aspects of Vulnerability and Resilience for Vancouver, Canada, ICFM6, Sao Paulo, Brazil
- Harford, D. (2015) Climate Change, Its Impacts, and Examples of Responses, CoreLogic Stakeholders Meeting, Toronto
- Harford, D. (2015) Climate Change and the Need for Risk and Vulnerability Assessment, Langara College, Vancouver
- Harford, D. (2015) Climate Change Overview, Model UN meeting, Vancouver
- Harford, D. (2015) Climate Change, Water, and Collaborative Governance, Blue SFU, Vancouver
- Harford, D. (2015) Building Adaptive Capacity for Managing Climate Change in Coastal Megacities, CCaR, Bangkok
- Harford, D. (2015) Climate Change, Ecosystems and Adaptation, MEOPAR, Vancouver

- Joakim, E (2016) “Vulnerability”, Vancouver, BC, A Coastal Cities at Risk (CCaR) Workshop on Vulnerability, Resilience and Adaptation Concepts and Practice, January 29, 2016.
- Joakim, E (2016) “Resilience”, Vancouver, BC, A Coastal Cities at Risk (CCaR) Workshop on Vulnerability, Resilience and Adaptation Concepts and Practice, January 29, 2016.
- Klein, Y. (2015). Barriers and Drivers of Planning for Climate Adaptation: Policy Scan Results. Coastal Cities at Risk Understanding and Assessing Social Vulnerability: A Collaborative Workshop. February 6, 2015. Simon Fraser University, Vancouver BC, Canada.
- Langkulsen, U. (2014) CCaR Project Bangkok Health. Presentation at CCaR Annual Meeting, Vancouver, March 2014.
- Laninhun, A. (2016). The role of media in climate risk communication and agenda setting for building resilience to flooding in Lagos. CCaR Lagos media workshop. 14 July 2016.
- Loyzaga, A. (2016). Build Back Stronger: Addressing Risk and Human Vulnerability in the Philippines. Presentation at IRP's International Recovery Forum 2016, Hotel Okura, Kobe-Hyogo, Japan. January 26, 2016.
- Loyzaga, A. (2016). Presentation at Disaster Preparedness and Response Program: Enhancing Preparedness in the AFP Households and Communities, April 12-14, 2016
- Loyzaga, A. (2016). Presentation at the Private Sector Engagement in Disaster Recovery: An Orientation on Pre-Disaster Recovery Planning, Asian Institute of Management, Makati City, Philippines. April 29, 2016.
- Loyzaga, A. (2016). Presentation at the ASTAAG Meeting and Workshop on Science and Technology for Disaster Risk Reduction, Putrajaya Shangri-La Hotel, Malaysia. May 23-24, 2016.
- Loyzaga, A. (2015). Re-thinking Urban Resilience: Perspectives from Metro Manila. Presentation at Shell Powering Progress Together Asia 2015, Centennial Hall, Manila Hotel, Philippines. February 26, 2015.
- Loyzaga, A. (2016). Build Back Stronger: Addressing Risk and Human Vulnerability in the Philippines. International Recovery Forum, Kobe, Japan.
- Loyzaga, A. (2015). Panel Moderator at the Science and Technology in Society (STS) Forum, 12th Annual Meeting, Kyoto, Japan, October 2015.
- Loyzaga, A. (2015). From Hazards to Disasters: Understanding Vulnerability and Risk, When Hazards Become Disasters: How can CSOs/NGOs Help with Increasing Resilience?, Presented at the Philippine Council for NGO Certification, Quezon City, October 2015
- Loyzaga, A. and JR Villarin, SJ. (2015) DRR Research: Transitioning from Disaster Prevention and Mitigation to Disaster Preparedness. Presented at the APEC 9th Senior Disaster Management Officials Forum, Asia Pacific Economic Cooperation, Iloilo, September 2015.
- Loyzaga, A. (2015). Presented at the Asian Development Bank Evaluation Learning Event: Think Sustainable, Act Responsible, Mandaluyong, September 2015.

- Loyzaga, A. (2015). Risk Reduction Approaches to Church Structural Integrity Assessment. Presented at the Earthquake Preparedness Seminar, Caritas Manila, Mandaluyong, September 2015.
- Loyzaga, A. (2015) Social Vulnerability in Metro Manila: Implications for Preparedness and Response. Presented at the Earthquake Resilience Conference in cooperation with the Carlos P. Romulo Foundation for Peace and Development and the Zuellig Family Foundation, Makati, May 2015.
- Loyzaga, A. (2015). Engagement of Public and Private Sectors for DRR: Experiences from the Philippines. Presented at the 8th APEC Emergency Preparedness Working Group Meeting, Asia Pacific Economic Cooperation, Boracay, May 2015.
- Loyzaga, A. (2015). The Role of Scientific Research Institutions in Building Resilient Societies: From Risk Reduction to Recovery. Presented at the Inter Graduate School Program for Sustainable Development and Survivable Societies, Kyoto University, Japan, January 2015.
- Loyzaga, A. (2015). Lessons from Haiyan: Where Do We Go from Here?. Presented at Readiness and Resilience: Lessons Learned One Year after Typhoon Haiyan in Center for Strategic International Studies, Washington DC, November 2014.
- Loyzaga, A. (2014). Metro Manila: Coastal City at Risk. Presented at the TEDxDILG, Ateneo School of Government, Quezon City, October 2014.
- Loyzaga, A. (2014). Resilience Imperative: Prepare, Adapt, Transform. Presented at the Resiliency Conference: Partnerships for Disaster and Climate Resilience in cooperation with the Carlos P. Romulo Foundation for Peace and Development and the Zuellig Family Foundation, Makati, July 2014.
- Loyzaga, A. (2014). Science for Transformation towards Sustainability. Presented at the Ateneo Sustainability Conference in collaboration with the Ateneo de Manila University, Quezon City, July 2014.
- Loyzaga, A. (2014). Metro Manila: City at Risk. Presented at the Asian Ministerial Conference on Disaster Risk Reduction in Bangkok, Thailand, June 2014.
- Loyzaga, A. (2014) Panelist at the Local Government Academy-Department of Interior and Local Government Philippines-Japan Local Administration Seminar, Makati, May 2014.
- Loyzaga, A. et al. (2014). Characterizing Vulnerability in Metro Manila: Coastal City at Risk, paper presented in the Coastal Cities at Risk Mid-Term Conference in Vancouver, Canada, March 16-21, 2014.
- Loyzaga, A. and Porio, E. (2013) Assessment of Climate Vulnerability: Perspectives and Methods. Presented in Research cluster on Environment, Society and Sustainable Development seminar. Faber Hall, Ateneo de Manila University. June 2013. (80 people)
- Loyzaga, A. (2013a) The Role of Science in Disaster Risk Reduction and Climate Change Adaptation. Executive course on Climate Change & Disaster Science Training. September 5-6, 2013.
- Loyzaga, A.. (2013b) Coastal Mega-cities at Risk. Conference on Peri-Urban Development and Water Security. Crowne Hotel, Kathmandu, Nepal, June 18-21, 2013.

- Loyzaga, A. (2013c) Coastal Mega-cities at Risk: Metro Manila present at National Capital Region Disaster Risk Management planning workshop at Metro Manila Development Authority headquarters, May 28, 2013.
- Kanchana N (2014) CCaR Project City Resilience Simulator. Presentation at CCaR Annual Meeting, Vancouver, March 2014.
- Marome W. (2014) Mapping and Measuring Social Vulnerabilities in Bangkok. Presentation at CCaR Annual Meeting, Vancouver, March 2014.
- Marome W. (2014) Bangkok Metropolitan Region's Flood Resilience Plan. Presentation at RAND, US, November 2014.
- Marome, W. (2015), Land Use Management in Disaster Risk Reduction : River basin and land use lessons from Bangkok, Thailand
- McBean, G. (2016) The Making of Climate Science and Policy: An Insider Perspective. March 23, 2016, Ivey Business School
- McBean, G. (2016) "Responding to Climate Change". Invited Presentation to Canadian Council of Legislative Auditors( CCOLA), Environment, Energy and Natural Resources Group, April 6, 2016, Toronto
- McBean, G. (2016) Science for a Sustainable Future Earth. Invitation presentation to Universite Aix Marseilles. France, April 11, 2016
- McBean, G. (2014) Our global climate is changing: Canadians' roles in addressing the issue. Invited Presentation. Hamilton Third Age Learning, Hamilton, October 10, 2014
- McBean, G. (2014) Climate Change, Weird Weather Is the New Norm. Invited Presentation, Nature in the City, January 28, 2014, London, Ontario
- McBean, G.A., 2013: Building Resilience, Gaining Benefits – Adapting to Extreme Weather in a Changing Climate. Invited Keynote Presentation to: A.D. Latornell Conservation Symposium – 2013, Nov 20-23, 2013, Allison, Ontario
- McBean, G.A., 2013: Climate Change Adaptation and Natural Disaster Resilience. Presentation to CCACoP Webinar, August 6, 2013
- McBean, G.A., 2013: Reducing Risks, Gaining Benefits – Coping with Weird Weather in a Changing Climate. Invited presentation to Bacon & Eggheads Breakfast (MPs and Senators and others), 18 April, 2013, Ottawa.
- McBean, G.A., 2013: Our Changing Climate. Why it matters. Presentation to Western Wildlife Conservation Society. March 20, 2013. Western
- McBean, G.A., 2012: An Introduction of Coastal Cities at Risk – CCaR and CAR. Invited Opening Presentation to 2012 Advanced Institute on Data for Coastal Cities at Risk, Taipei 22 October, 2012
- McBean, G., 2012). An Introduction of Coastal Cities at Risk – CCaR and CAR. Presentation to 2012 Advanced Institute on Data for Coastal Cities at Risk, Taipei, 22 October, 2012
- McBean, G., and D. Harford, (2012). Vancouver Case Study. Presentation to 2012 Advanced Institute on Data for Coastal Cities at Risk, Taipei, 22 October, 2012
- McBean, G., (2012). The importance of early warning systems in disaster risk reduction and climate change adaptation. Presentation to Fudan University. Shanghai, 31 October, 2012

- McBean, G., (2013). Managing coastal risk in your coastal community. Intergovernmental Oceanographic Commission-World Meteorological Organization Workshop on Coastal Hazards. Jeju Island, Korea, 7-9 January 2013
- McBean, G., (2013). Developments in Research on Climate Change and the Future Earth Project. Presentation to UK Public Health Agency, 28 Jan 2013
- McBean, G., (2013). Improving collaboration between science providers. Presentation to Building global resilience to natural hazards: Translating science into action. 28-30 January 2013. Workshop of the UK Foreign and Commonwealth Office
- McBean, G. (2012). The CCaR project. Presentation to CCaR conference. March 7, 2012. Vancouver.
- McBean, G. (2012). Coastal Cities at Risk Public Panel and Dialogue. Segal Room #420, SFU Vancouver, 515 West Hastings Street. March 8, 2012 from 7:00 – 9:00 pm.
- Mortsch, L (2014) “Use of Geographic Information systems in Social and Wetland Vulnerability Assessment”, Nanjing University, Nanjing, China, April 22, 2014
- Mortsch, L (2016) “Linking Vulnerability and Resilience: Supporting Implementation of Climate Change Adaptation”, Vancouver, BC, A Coastal Cities at Risk (CCaR) Workshop on Vulnerability, Resilience and Adaptation Concepts and Practice, January 29, 2016.
- Mortsch, L (2016) “Supporting Implementation of Climate Change Adaptation in the Grand River Watershed: Linking Vulnerability & Resilience - Lessons from the Coastal Cities at Risk (CCaR) Project, Cambridge, ON, Grand River Water Management Plan Implementation Committee, May 4, 2016.
- Mortsch, L (2016) Advancing climate change adaptation planning and implementation in Metro Vancouver, Canada: Insights from the CCaR project, Mississauga, ON, University of Toronto Mississauga, Geography Department's Csillag Speaker Series, Sept. 28, 2016.
- Mortsch, L (2015) “Climate change adaptation: Moving from incremental to transformative change,” Toronto, Ontario, World Disaster Management Conference, June 4, 2015
- Mortsch, L (2015) “Vulnerability assessment and governance: Research contributing to the challenge of adaptation implementation,” Simon Fraser University, Vancouver, BC, Understanding and Assessing Social Vulnerability: A Collaborative Workshop February 6, 2015
- Mortsch, L (2015) The Coastal Cities at Risk (CCaR) Project: Research advancing climate change adaptation planning and implementation in Metro Vancouver, Canada”. Paris, France Our Common Future under Climate Change" 7-10 July 2015.
- Mortsch, L. (2015). Vulnerability Assessment and Governance: Research contributing to the challenge of adaptation implementation, Coastal Cities at Risk Understanding and Assessing Social Vulnerability: A Collaborative Workshop. February 6, 2015. Simon Fraser University, Vancouver BC, Canada.
- Mortsch, L (2012) Coastal Cities at Risk: Social Dimensions, London, CCaR Training Session, London, ON, April 2012

- Mortsch, L (2012) Coastal Cities at Risk CCaR: Assessing Social Vulnerability in the City of Vancouver, City of Vancouver City Hall, Vancouver, June 11, 2012
- Mortsch, L (2012) Coastal Cities at Risk CCaR: Assessing Social Vulnerability in the City of Surrey, City Hall, Surrey, June 12, 2012
- Mortsch, L (2012) Coastal Cities at Risk CCaR: Assessing Social Vulnerability in the City of Richmond, City Hall, Richmond, June 13, 2012
- Mortsch, L (2012) Coastal Cities at Risk CCaR: Assessing Social Vulnerability in District of North Vancouver, City Hall, District of North Vancouver, June 14, 2012
- Mortsch, L (2012) Coastal Cities at Risk CCaR: Assessing Social Vulnerability in the Corporation of Delta, City Hall, Delta, June 15, 2012
- Mortsch, L (2013) Coastal Cities at Risk CCaR: Building Adaptive Capacity For Managing Climate Change in Coastal Megacities – Perspectives on Social Vulnerability and Resilience, IRIACC – FACE Project meeting, Irstea, "National Research Institute of Science and Technology for Environment and Agriculture" Lyon, France, Nov. 29, 2013.
- Narisma, G. (2012) Extreme Southwest Monsoon: 6-9 August 2012, Ateneo de Manila University Grade School Faculty and Staff, 17 September 2012, Ateneo de Manila University High School Faculty and Staff.
- Narisma, G. (2012) Roundtable discussion on Business Continuity Planning, UNISDR-Manila Observatory-Ateneo de Manila University, 3 May 2012, Ateneo Professional Schools, Ateneo de Manila University
- Narisma, G. (2012) Executive Course on International and National Humanitarian Systems on “Case Study: Post Ondoy Integrated Risk Assessment and the Coastal Cities at Risk Project”, e Social Work Department under the College of International, Humanitarian and Development Studies (CIHDS) of Miriam College, 23 May 2012
- Narisma, G. (2012) Regional Forum on Effective Disaster Risk Reduction and Climate Change Adaptation in Greater Metro Manila Area, March 16, 2012, Bulwagang Amoranto, 3rd Floor, Quezon City Hall
- Narisma GT, (2012a) Coping with Climate Change and Environmental Degradation: Theories and Practicable Options, Sophia University, Tokyo, Japan, Association of Jesuit Colleges and Universities in Asia Pacific (AJCU-AP) Regional Consortium on Environment and Climate Change, 23 Mar 2012 - 24 Mar 2012, Speaker.
- Narisma GT (2012b) Speaker as part of the panel on Best Practices in the Asia-Pacific Region, APEC Workshop on Climate Change Adaptation the Asia-Pacific: Observations and Modeling Tools for Better Planning, 16-17 August 2012, Four Seasons Hotel, Singapore.
- Narisma GT, (2012c) Climate Change in Asia-Pacific - Risks and Opportunities", Plenary Speaker Dr. David McCauley, Head of the ADB Climate Change Program Coordination Unit, Asian Development Bank (ADB) Leadership Program for Climate Change and Sustainable Development, 10-14 September 2012, Asian Development Bank, Metro Manila Philippines, Panelist (Invited).

- Narisma GT, J.B. Dado, F.T. Cruz, and M. Villafuerte, (2013a) Analysis of the performance of RegCM3 downscaling over multiple locations in the Philippines International Workshop on Downscaling 2013, International Congress Center (EPOCHAL TSUKUBA), Tsukuba, Ibaraki, Japan, 1-3 October 2013., Invited Oral Presentation.
- Narisma, GE., Porio, E. and A. Yulo-Loyzaga. (2013) Visualizing Disaster Statistics: Climate Change Adaptation and Public-Private Partnerships in the Philippines. 12th National Convention on Statistics. EDSA Shangrila Hotel, October 1-2, 2013.
- Narisma GT (2014) Climate and land use impacts on rainfall during the southwest monsoon season in the Philippines, 21 January 2014, Climatology Laboratory, Department of Geography, Tokyo Metropolitan University, Invited Talk.
- Ojolowo, S. (2015) “Irregular urban development and municipal solid waste as determinants of flooding in metropolitan Lagos”. Seminar presentation, Department of Urban and Regional Planning, Faculty of the Social Sciences, University of Ibadan. August 18, 2015.
- Oladipo, E. O. (2013). City Visioning for Building Resilience to Climate Change. Presentation to CCaR stakeholders meeting. 17 December, 2013. Lagos, Nigeria.
- Oulahen, G. (2015). Assessing social vulnerability to flood hazards in Metro Vancouver. Coastal Cities at Risk Understanding and Assessing Social Vulnerability: A Collaborative Workshop February 4, 2015. Simon Fraser University, Vancouver, British Columbia.
- Ortiz, M. (2013) Preparing to meet the challenge of Climate Change, “Prepare U: Local Governance Orientation for Local Chief Executives”. University of the Philippines National College for Public Administration and Governance. August 2013.
- Ortiz, M. (2013) Climate Change and its impacts, Community Development Masters Course, University of the Philippines College of Social Work and Community Development. July 2013.
- Panee C, Itthi T (2013) Simulated Sea Flood of Coastal Greater-Bangkok. Bangkok Metropolitan Administration. 22 November 2013.
- Porio, E. (2015). Social Vulnerability, Sustainability and Informality in Metro Manila. Paper presented at the MIT Design Studio. Alabang City, Metro Manila.
- Porio, E. and A. Yulo-Loyzaga. (2014). Coastal Cities at Risk: The Case of Metro Manila. Paper presented at the Canadian Association of Geographers’ Conference, Brock University, Canada, May 27-28, 2014.
- Porio, E., J. See and J. P. Dalupang (2014). Characterizing Social Vulnerability and Building Adaptive Capacity and Resilience in Metro Manila. Paper presented in the International Conference on Coastal Cities at Risk: Climate Change Vulnerability and Adaptation, Vancouver, Canada, March 2014.
- Porio, E. and J. See. (2015). Coastal Cities at Risk Research: Implications for Disaster Management and Governance in Metro Manila. Far Eastern University, January 23, 2015.

- Porio, E., A. Yulo-Loyzaga and J. See. (2014). Mapping Climate Vulnerability in Metro Manila: Building Adaptive Capacity and Resilience, paper presented in the Philippine Studies Association Conference, Philippine Studies in the 21<sup>st</sup> Century: Mapping the Shifting Terrains of Inquiry, National Museum of the Philippines, City of Manila, November 15-16, 2014.
- Porio, E. (2014). Reexamining Quality of Life Indicators, Livability and Urban Sustainability in Metro Manila and Asian Cities. Paper presented at the Ateneo Institute of Sustainability Livable Cities Conference.
- Porio, E. (2014). Mainstreaming Climate Change Policies into Urban Development in the Philippines, presentation at the UN-ESCAP, Oct. 12-13, 2014.
- Porio, E. (2014). Building Social Capital, Constructing Resilience and Excellence in Local Governance in Our Cities. Paper presented in the TEDX Talks organized for the Anniversary Forum by the Department of Interior and Local Government (DILG), Social Development Complex, Ateneo de Manila University, October 10, 2014.
- Porio, E. (2014). Social Capital Research in Metro Manila: Implications for Post-Yolanda Recovery and Resilience Building in Leyte and the Visayas Islands. Paper presented in the Institute of Social Research and Development Studies' Anniversary Conference, "Post-Haiyan Recovery and Resilience Building: Achievements and Promises", Visayas State University (ISRDS-VSU ) Anniversary, Sept. 17, 2014, Baybay, Leyte.
- Porio, E. (2014). Social Capital and Its Role in Post-Yolanda Rehabilitation and Recovery: Updates and Implications for Metro Manila Local Governments. Paper presented in the forum, "Coastal Cities at Risk Research Project: Building Strategic Partnerships with MM Local Governments", CTC 201, Ateneo de Manila University, part of the ADMU-Manila Observatory-Kings College Partnership
- Porio, E. (2014). Ignatian Partnerships: Building, Mobilizing Knowledge for Climate Resilience and Sustainability Among the Urban Poor, paper presented at the Ateneo Sustainability Forum: Pathways Towards a More Sustainable Society, Leong Hall, Ateneo de Manila University, July 3, 2014.
- Porio, E. (2014). Gender, Slum Poverty, and Climate Change in Flooded Riverlines in Metro Manila. Paper presented in the ADB Meeting on Gender and Climate Change, Asian Development Bank, April 26, 2014.
- Porio, E. (2014). Social Capital and Its Role in Post-Yolanda Rehabilitation and Recovery, Paper presented in the forum, "Not Business as Usual: Conversations on Post-Yolanda Rehabilitation and Recovery", organized by Manila Observatory and Ateneo de Manila University in partnership with Christian Aid and Aksyon Klima-Philippines, Faber Hall 302, January 28, 2014.
- Porio, E. (2014). Cities at Risk: Constructing Risk, Vulnerability and Precarity in Metro Manila, paper presented in the University of Basque Country, Bilbao, Spain, January 15-16, 2014.
- Porio, E. and J. See (2012) Narratives of Vulnerability and Climate Change Adaptation in Metro Manila. The 11th Conference of the Asia Pacific Sociological Association (APSA). Ateneo de Manila University, October 22-24, 2012.

- Porio, E. (2013) Linking Local Knowledge to Policy-making Process: Climate Change Vulnerability and Resilience Among Marginal Communities and Local Governance Systems in Metro Manila. Education Anthropology Network Conference. University of the Philippines, September 24, 2013.
- Porio, E. (2013) Linking Local Knowledge to Policy-making Process: Climate Change Vulnerability and Resilience Among Marginal Communities and Local Governance Systems in Metro Manila. Education Anthropology Network Conference. University of the Philippines, September 24, 2013.
- Porio, E. and Loyzaga, A. (2013) Climate Change Vulnerability Assessment in Metro Manila: Perspectives and Methodologies, paper presented in the Conference on Peri-Urban Development and Water Security, Crowne Hotel, Kathmandu, Nepal, June 18-21, 2013.
- Porio, E. and Loyzaga, A. (2013) Climate Change Vulnerability Assessment in Metro Manila: Perspectives and Methodologies, paper presented in the Conference on Peri-Urban Development and Water Security, Crowne Hotel, Kathmandu, Nepal, June 18-21, 2013.
- See, J., E. Porio, and John Paolo Dalupang. (2014c) Multivariate Analysis of Social Vulnerability to Flooding among Urban Poor Households in Metro Manila Riverine Communities. Philippine Population Association Annual Scientific Meeting. Clark Freeport Zone, Pampanga, January 20-21, 2014.
- Simonovic, S. (2012) Development of the CCaR urban resilience model. Presentation to CCaR conference. March 7, 2012. Vancouver.
- Simonovic, S.P. (2012) Understanding City Resilience through System Dynamics Simulation. Presentation to 2012 Advanced Institute on Data for Coastal Cities at Risk, Taipei, 22 October, 2012
- Simonovic, S.P. (2012) System Dynamics Simulation of Flood Evacuation. Presentation to 2012 Advanced Institute on Data for Coastal Cities at Risk, Taipei, 22 October, 2012
- Simonovic, S.P. (2012) Assessment of Climate Change Caused Flood Risk – City of London Case Study. Presentation to 2012 Advanced Institute on Data for Coastal Cities at Risk, Taipei, 22 October, 2012
- Stewart, R.E., (2013) Precipitation and climate. Presentation to University of Manitoba Faculty of Environment, Earth and Resources.
- Tadgell, A., Doberstein, B. and Mortsch, L. (2014) Managed Retreat as Climate Change Adaptation. Coastal Cities at Risk (CCaR) Update Meeting. Nov. 7, 2014, London, Ontario, Canada
- Tang, K and Oulahan, G. (2014) Coastal Erosion Assessment Using GIS and LiDAR Data: A Case study from Crescent Beach, Surrey, BC, Canada, Coastal Cities at Risk (CCaR) Update Meeting. Nov. 7, 2014, London, Ontario, Canada
- Vicente, May Celine T.M. (2013) Sentinel Asia Data Analysis Node (DAN) Updates, Report.” 1<sup>st</sup> Joint Project Team Meeting for Sentinel Asia STEP3 (JPTM 2013) and DPN/ DAN/ Organizer meeting. Grand Millenium Sukhumvit Hotel, Bangkok, Thailand, November 26-29, 2013.

### 3.5 Book Chapters

- Adelekan, I. O. (2015): Disaster risk management and gender issues. In: Balogun, O.Y and Aderogba, K. A. (Eds.) Environment, Risks and Management. Proceedings of the Conference on 'Disaster Risk Management: How Prepared is Nigeria?' Tai Solarin University of Education, Ijebu-Ode, 151-163. ISBN: 978-978-949-010-3
- Ajibade, I. and Olawuyi D. (2014) Climate Change Impacts on Housing and Property Rights in Nigeria and Panama: Toward a Rights-based Approach to Adaptation and Mitigation. Elena Lopez-Gunn and Dominic Stucker (eds.) *Adaptation to climate change through water resources management: Capacity, Equity and sustainability*, Earthscan Publication, New York. Chapter 13.
- Ajibade, I. and Olawuyi D. (2013) Water-related Impacts of Climate Change on Property and Housing Rights in Panama and Nigeria: Proposals for a Rights-Based Approach to Mitigation and Adaptation in *Adaptation to climate change through water resources management: Capacity, Equity and sustainability*, edited by Elena Lopez-Gunn and Dominic Stucker. Earthscan Publication, New York.
- McBean, G.A., 2016: Science and Technology for a Sustainable Future Earth. Proceedings International Conference - Technology + Society = Future. Montenegrin Academy of Sciences and Arts, May, 2016, Podgorica, Montenegro, 37-49.
- McBean, G.A., and Hackmann, 2016: Transformative Research for a Sustainable Future Earth. Proceedings, 15<sup>th</sup> Congress on Logic, Methodology and Philosophy of Science (CLMPS 2015), August 2015, Helsinki, Finland (submitted).
- McBean, G.A., 2017: *Climate adaptation/mitigation*. The International Encyclopedia of Geography. Edited by Douglas Richardson, Noel Castree, Mike M. Goodchild, Audrey Kobayashi, Weidong Liu and Richard A. Marston. © 2017 John Wiley & Sons, Ltd. Published 2017 by John Wiley & Sons, Ltd. DOI: 10.1002/9781118786352.wbieg0094
- McBean, G.A., 2015: *Climate Change: Adapting to the Risks in a Changing Climate*. Resource and Environmental Management in Canada, Fifth Edition, edited by Bruce Mitchell, Oxford University Press, 24pp
- McBean, G.A., 2014: *Forward. Adapting to Climate Change: Lessons from Natural Hazards Planning*. B. Glavovic and G. Smith (eds). Vii-xi, Springer 461 pages, ISBN-10: 9401786305
- McBean, G.A., 2014: *The grand challenges of integrated research on disaster risk*. In: Extreme Natural Hazards, Disaster Risks and Societal Implications. Eds: A. Ismail-Zadeh, J. U. Fucugauchi, A. Kijko, K. Takeuchi and I. Zaliapin. Cambridge University Press, 15-25. ISBN 978-1-107-03386-3
- McBean, G.A., 2013: *Hydrometeorological Hazards*. Encyclopedia of Natural Hazards, P. T. Bobrowsky (ed.), Springer, ISBN: 978-90-481-8699-0, pp 497-508.
- McBean, G.A., 2012: *Exploring the dimensions of integrated landscape management*. In A New Paradigm of Sustainability: Theory and Praxis of Integrated Landscape Management. I. Scheunemann and L. Oosterbeek (eds.). IBIO, Rio de Janeiro, ISBN 978-85-60840-11-3; pp 155-162
- McBean, G.A., 2012: "The intersection of policies on disaster mitigation, climate change and international development". In Reducing Risk Through Partnerships. Haque and Etkin (eds) Queen's McGill Press, ISBN 9780773539631, 93-107.

- McBean, G.A., 2014: *Forward. Adapting to Climate Change: Lessons from Natural Hazards Planning*. B. Glavovic and G. Smith
- Porio, E. (2014), Climate Adaptation in Metro Manila: Community Risk Assessment and Power in Community Interventions, *Clinical Sociology and Community Interventions*. Netherlands: Springer Publications. Note: The chapter was awarded a Certificate of Achievement as part of the Outstanding Book Publication Award given by the International Sociological Association (ISA-RC46) during ISA-Vienna Forum, July 10-15, 2016.
- Porio, E. (2016). Asian Prosperity and Social Inequality: Reflections on Social-Ecological Transitions and Governance of Cities *in* Global-Regional Systems: Alternative Futures for Democracy and Cities in Asia, W. Boike, C. Wungaeo and S. Wungaeo, eds., Palgrave Publications (Berlin).
- Porio, E., A. Yulo-Loyzaga. (2016), Climate Impacts on Housing and Informal Settlements, book chapter in Second Assessment by the Urban Climate Change Research Network (UCCRN) Climate Change Impacts on Cities, slated for publication by Cambridge University Press (2015).
- Porio, E., D. Riecken et al. (2016), Climate Hazard Impacts and Social Inequality, chapter 4 in Second Assessment by the Urban Climate Change Research Network (UCCRN) Climate Change Impacts on Cities, Cambridge University Press (2016).
- Porio, E. with G. McBean, S. Cutter, et al.(2015). Global Risks: Pool knowledge to Stem Losses from Disasters *in* Nature, Vol 522, Issue 7556 (June 2015).
- Porio, E. with G. McBean, S.Cutter, et al. (2015). Disaster Risks Research to Promote Disaster Risk Reduction and Management. Paris: International Science Council (ICSU) and International Social Science Council (ISSC).
- Porio, E. (2015). Sustainable Development Goals and Quality of Life targets: Insights from Metro Manila *in* Current Sociology, Sage Publications (London).
- Porio, E., Loyzaga, A, et. al, (forthcoming, October 2016), Housing and Informal Settlements chapter *in* Urban Climate Change Assessment, Cynthia Rosenweig, et al., (eds.), Urban Climate Change Research Network, Earth Institute, Columbia University and Cambridge University Press. *Note: To be launched during Habitat 111, Lima, Peru.*
- Porio, E. (forthcoming). Urban Transition, Poverty and Development in the Philippines. New York: Edwin Muellen Publications.
- Porio, E. (forthcoming 2016). Asian Prosperity and Social Inequality: Reflections on Social-Ecological Transitions and Governance of Cities *in* Global-Regional Systems: Alternative Futures for Democracy and Cities in Asia, W. Boike, C. Wungaeo and S. Wungaeo, eds., Palgrave Publications (Berlin).

- Porio, E. (forthcoming 2016), Decentralization and Networked Governance: Citizen Participation and Local Power Elites in Metro Manila in *Citizenship, Democracy and Governance in Asia*, W. Berenschot and Henke Schuldt Mulder (eds.), Leiden: Leiden University Press.
- Porio, E. and K. Knadeau (forthcoming November 2016) *Gender, Faith and Resilience to Climate Change and Disasters*, Netherlands: Springer Publications.
- Porio, E. (forthcoming 2016). *Crafting Alternative Spaces and Urban Resilience in Metro Manila: Contradictions in Community-Based Initiatives and Risk Governance in Alternative Urban Spaces: Cities by and for People*. Amsterdam: Amsterdam University Press.
- Porio, E., D. Riecken et al. (forthcoming 2016), Climate Hazard Impacts and Social Inequality, chapter 4 in *Second Assessment by the Urban Climate Change Research Network (UCCRN) Climate Change Impacts on Cities*, slated for publication by Cambridge University Press (2015).
- Porio, E. (2013), Vulnerability on Flooded Riverlines in *Metro Manila in Environments of the Poor* (Aris Ananta, Armin Bauer (eds). Singapore: ISEAS Press
- Porio, E. (2014), Decentralization and Networked Governance: Citizen Participation and Local Power Elites in Metro Manila in *Citizenship and Governance*, H. Schenk Nordholdt and W. Berenschot (eds.). Netherlands: Springer Publications.
- Porio, E. (2014), Re-examining Quality of Life Indicators and Urban Sustainability in Metro Manila in *Futures of Sociology, Society and Culture*, Markus Schulz (ed.), New York: Sage Publications.
- Porio, E. (2014). Climate Change Adaptation in Metro Manila: Community Risk Assessment and Power in Community Interventions in *Community Interventions*, Jan Fritz and Jacques Rheume (eds.), Springer Publications (Netherlands), pp.149-166.

### **3.6 Books**

- Porio, E. and K. Knadeau (forthcoming 2017) *Gender, Poverty and Resilience to Climate Change and Disasters*, Netherlands: Springer Publications.
- Loyzaga, A. (2013) Chapter reviewer for “Megacities and the Coast Risk, Resilience and Transformation” Edited by Mark Pelling, Sophie Blackburn. Routledge – 2013 – 248 pages.

### **3.7 Theses**

- Adeyefa, A. A. (2015). Social vulnerability to floods in Lagos metropolis. M.Sc. Geography, University of Ibadan, Nigeria.
- Ajibade, Idowu M. (2013). "Climate Change and Human Rights: A Case Study of Vulnerability and Adaptation in Coastal Communities in Lagos, Nigeria." *University of Western Ontario - Electronic Thesis and Dissertation Repository*. Paper 1559. <http://ir.lib.uwo.ca/etd/1559>

- Bethune, A. (2012). *Coastal Cities at Risk: How intergovernmental relations influence climate change adaptation policy in Canada*. MA, Political Science, University of Western Ontario, 75 pp.
- Dado, J.M. (2013). "The effects of urban expansion in Metro Manila on the Southwest Monsoon Rainfall". 2013 Masters thesis, Ateneo De Manila University.
- Edem, M. U. (2014). "Assessment of land subsidence in the city of Lagos" Master's Thesis, University of Ibadan
- Ezeji, M. (2014). "Drainage management and flood control in Lagos metropolis". Master's Thesis, University of Ibadan
- Gertz, A. (2015) - *Structural Change and Climate Policy in Developing Countries*. The University of Western Ontario, PhD Dissertation.
- Jamandre, C.A. (2013). "Satellite Rainfall Validation and Assimilation into a Weather Forecast Model". 2013 Masters Thesis, Ateneo De Manila University
- Ojolowo, S. (2016). *Irregular urban development and municipal solid waste as determinants of flooding in metropolitan Lagos*. PhD Thesis, University of Ibadan.
- Oulahen, G. (2014). *The production of unequal vulnerability to flood hazards in Metro Vancouver, Canada*. The University of Western Ontario, PhD Dissertation.
- Owringi, Mohammad Amin. (2015). *An Approach to Developing a Spatio-Temporal Composite Measure of Climate Change-Related Human Health Impacts in Urban Environments*. The University of Western Ontario, PhD Dissertation. Electronic Thesis and Dissertation Repository. Paper 2998.
- Phillips, Victor A. (2014). "Assessment of sea level rise along the coast of Lagos using satellite altimetry." 2014 Masters thesis, University of Ibadan, Nigeria
- Raikes, Jonathan (2015). *Conceptualizing Response Capacity and Flood Action in the City of Vancouver and District of Maple Ridge*, British Columbia, Canada. Western University, Canada
- See, J. (2015). "Assessing Social Vulnerability to Flooding in Metro Manila using Statistical Analyses and Systems Dynamics Modelling". 2015 Masters Thesis, Ateneo de Manila University.
- Shao, Jingya (2016). *Mapping Social Vulnerability and Resilience in Surrey, BC*. 2016 Master's Research Paper, University of Waterloo, 58 pp.
- Tadgell, A. (2015). *Last but not least: Resettlement as a climate change adaptation strategy in Metro Manila, Philippines*. 2015 Master's thesis, University of Waterloo, 111 pp.
- Wibe, J. (2012). *Essays on International and Environmental Economics*. Unpublished PhD thesis. Department of Economics, Western University.

### **3.8 Databases (GIS, and other information systems)**

Geospatial database of social resilience metrics developed from Statistics Canada archive for Metro Vancouver; consists of 5 year time series (1991-2011) of Dissemination Area (DA) and Census Tract (CT) level data from Statistics Canada - Jan 2015

Reference data base of vulnerability and resilience literature from hazards and climate change research domains completed in Feb 2015

A GIS data set including ortho-imagery, LiDAR data, DEM, Hyperspectral imagery for the City of Surrey

Social vulnerability indices for Vancouver, Richmond, Delta, District of North Vancouver, and Surrey

Social Resilience Indices for Metro Vancouver

### **3.9 Websites, social media (Facebook, Twitter), multimedia (YouTube, others)**

CCaR international project website: [www.coastalcitiesatrisk.org](http://www.coastalcitiesatrisk.org)

CCaR regional website: <http://www.start.or.th/iriacc-project>

CCaR LinkedIn group: [http://www.linkedin.com/groups/Coastal-Cities-Risk-CCaR-Programme-4699934?trk=my\\_groups-b-grp-v](http://www.linkedin.com/groups/Coastal-Cities-Risk-CCaR-Programme-4699934?trk=my_groups-b-grp-v)

CCaR 2013 conference and annual meeting in Manila: <http://ccar2013manila.wordpress.com>

CCaR Lagos city website: <http://www.ccar-lagos.org/> 1.

Manila Observatory Facebook Page. <http://facebook.com/manila.observatory>. This page regularly posts updates and its information is shared frequently by various users and other pages.

ACT, SFU website blog posts:

<http://act-adapt.org/accelerating-sea-level-rise-explained-in-plain-language/>

<http://act-adapt.org/act-ed-in-manila-for-coastal-cities-at-risk-ccar-team-meeting/>

<http://act-adapt.org/jakarta-to-complete-giant-sea-wall-in-2020/>

<http://act-adapt.org/ccar-and-social-vulnerability-what-is-it-about-and-why-is-it-important/>

<http://act-adapt.org/deborah-harford-speaks-to-vancouver-sun-about-rising-sea-levels-throughout-metro-vancouver/>

<http://act-adapt.org/coastal-cities-at-risk-how-will-they-adapt-to-converging-climate-change-impacts/>

<http://act-adapt.org/facing-the-challenge-mapping-floodplains/>

<http://act-adapt.org/bc-releases-draft-adaptation-guidelines-for-sea-dikes-and-coastal-flood-hazard-land-use/>  
<http://act-adapt.org/act-hosts-climate-change-impacts-on-coastal-cities-conference/>  
<http://act-adapt.org/millimetres-turning-into-centimetres-for-pacific-islanders/>  
<http://act-adapt.org/rising-ocean-temps-raise-health-questions/>  
<http://act-adapt.org/leaving-a-warming-arctic-first-hand-account-of-climate-change-and-the-effect-on-bowhead-whales/>  
<http://act-adapt.org/seas-could-rise-up-to-1-6-meters-by-2100-study/>  
<http://act-adapt.org/vancouver-in-the-research-spotlight-as-one-of-world's-most-vulnerable-cities-to-rising-sea-levels/>  
<http://act-adapt.org/clean-air-task-force-leads-meeting-of-eight-nations-to-plan-response-to-arctic-climate-changes/>  
<http://act-adapt.org/act-executive-director-presents-at-taipei-coastal-cities-at-risk-conference/>

Bangkok team online:

Facebook - <https://www.facebook.com/aloudbangkok>

Website- <http://aloudbangkok.wordpress.com/>

You Tube – <http://youtube.com/user/aloudbangkok>

You Tube – 3 more VDO clips from capacity building projects were uploaded

- 1) Visioning Bangkok 2040 (part 1) [http://www.youtube.com/watch?v=HcV\\_VnZxmwc](http://www.youtube.com/watch?v=HcV_VnZxmwc)
- 2) Visioning Bangkok 2040 (part 2) <http://www.youtube.com/watch?v=Lj8TPGEHQoQ>
- 3) Communication and Risk Management <http://www.youtube.com/watch?v=uwTSAvLmloo>

On-line simulation game – New Bangkok: Earth Change, We Adapt

<http://apps.facebook.com/newbangkok/Aloud Bangkok:>

CCaR, 2012. “Bangkok Floodings” Aloud Bangkok/ <http://goo.gl/eMBT2>

CCaR APTU, 2012, "NEW BANGKOK" Earth Change, We Adapt teaser, Youtube /<http://www.youtube.com/watch?v=LDPvWhSsnTM>

***3.10 Media coverage (Articles in local or international media)***

Adelekan, I. O. (2015) Climate change: impacts and solutions. Interview on BCOS Television AM120. December 2, 2015.

- Adelekan, I. O. (2015) Climate change: a general overview. Interview on Nigerian Television Authority (NTA) Ibadan Views and Reports. December 5, 2015.
- AIT (2016) Coastal Cities at Risk Lagos. News report- AIT News July 16, 2016
- AIT (2016) Feature on the CCaR Lagos media workshop on the television program AIT Environment Today. July 20, 2016.
- Ateneo de Manila University (2013) International conference on disaster risk and climate change adaptation in coastal megacities: <http://www.admu.edu.ph/ls/soss/socio-anthro/news/ls-research-updates/international-conference-disaster-risk-and-climate>
- Bangkok Aloud (see above section): see articles posted below.
- Business Mirror (2013) Scientists hold intl meeting on disaster risk reduction in coastal megacities. <http://businessmirror.com.ph/index.php/features/science/9990-scientists-hold-intl-meeting-on-disaster-risk-reduction-in-coastal-megacities>
- Business World. (2013) Why don't they evacuate? November 14, 2013 <http://www.bworldonline.com/weekender/content.php?id=79393>
- CNN (2013) Philippines gets more than its share of disasters. <http://edition.cnn.com/2013/11/08/world/asia/philippines-typhoon-destruction>
- Daily Trust (2016) Lagos plants 6 million trees to combat climate change. July 20, 2016  
<http://www.dailytrust.com.ng/news/environment/lagos-plants-6-million-trees-to-combat-climate-change/156045.html>
- Econigeria (2016) Saving coastal cities at risk. July 21, 2016  
<http://econigeria.com/saving-coastal-cities-at-risk/>
- Ekocitymagazine (2016) Lagos is committed to flood-free environment. July 15, 2016  
<http://ekocitymagazine.com/blog/2016/07/15/lagos-committed-flood-free-environment/>
- Ekofm (2016) Ambode committed to flood free Lagos-commissioner. July 14, 2016  
<http://ekofm.lagosstate.gov.ng/2016/07/14/ambode-committed-flood-free-lagos-commissioner/>
- GMA News Online (2013) MO, ADMU host scientists meeting on climate change in coastal megacities <http://www.gmanetwork.com/news/story/297479/cbb/mo-admuhost-scientists-meeting-on-climate-change-in-coastal-megacities>
- Bond FM (2016) The adverse effect of flooding in Lagos. Interview granted by Dr Adeyinka Laninhun in Yoruba language on the programme 'Adele Bare' Bond FM 92.9. July 14, 2016.
- Burrows, M. (2012). Rising seas, storm surges due to climate change await Lower Mainland. The Georgia Straight. March 8, 2012. Found online at <http://www.straight.com/article-630921/vancouver/rising-seas-storm-surges-await-region>
- Business Day (2016). "Lagos coastline being at risk of being overrun by flood, experts warn" Business Day newspaper July 17, 2016. Page 5.

International Innovation (2014) Building Resilience. Vol. 126, 81-83.

Interaksyon (2015). COP 21: Paris Climate Talks Hinge on Trust, Finance. December 9, 2015. <http://interaksyon.com/article/121224/cop-21--paris-climate-talks-hinge-on-trust-finance>.

Journal Online: <http://www.journal.com.ph/index.php/news/national/25079-disaster-resilientdevelopment-planning-in-coastal-cities-urged>

MAPTV (2016). Environment Commission Decries Lagosians' Bad Attitudes Towards Environmental Safety. July 15, 2016.

<http://mapnews.tv/environment-commission-decries-lagosians-bad-attitudes-towards-environmental-safety/>

Malaya News: <http://www.malaya.com.ph/index.php/special-features/agriculture/23715-a-most-versatile-crop>

Manila Bulletin (2016). Hans Sy, business leaders join hands for disaster risk reduction efforts. April 1, 2016. <http://www.mb.com.ph/hans-sy-business-leaders-join-hands-for-disaster-risk-reduction-efforts/>

Manila Bulletin (2013). Website Provides Metro Weather Info, *Manila Bulletin*, July 1, 2013, National News, Page A-4.

McBean, G. (2012). Dr. McBean interviewed on Vancouver's CKNW radio. March 8, 2012.

Mindanews (2015). More Automated Stations Installed in Mindanao. July 12, 2015. <http://www.mindanews.com/top-stories/2015/07/more-automated-weather-stations-installed-in-mindanao/>

Narisma, G., Lorenzo, G., Simpas, J., Ortiz, M. (2013), Traffic nightmare: New normal? Philippine Daily Inquirer, July 6, 2013. <http://opinion.inquirer.net/55991/traffic-nightmare-new-normal>.

National Geographic (2013) 5 Reasons the Philippines Is So Disaster Prone <http://news.nationalgeographic.com/news/2013/11/131111-philippines-dangers-haiyan-yolanda-death-toll-rises/>

National Geographic (2014) Manila Observatory: Front-Line View of Climate Change, and the Poverty-Risk Connection <http://energyblog.nationalgeographic.com/2014/02/05/manila-observatory-front-line-view-of-climate-change-and-the-poverty-risk-connection/>

Ortiz, M., Lorenzo, G., Narisma, G., and Simpas, J. (2013a), How Much Rain Fell in Metro Manila on June 30, 2013?, [http://www.observatory.ph/cgi-bin/publications/pub\\_details.py?p=143](http://www.observatory.ph/cgi-bin/publications/pub_details.py?p=143)

Ortiz, M., Lorenzo, G., Narisma, G., and Simpas, J., (2013b). Study: June 17 Metro gridlock result of heavy rain, bad timing, Rappler.com, June 25, 2013. <http://www.rappler.com/science-nature/32085-study-june-17-traffic-heavy-rain-rush-hour>

Ortiz, M., Lorenzo, G., Narisma, G., and Simpas, J., (2013c). Traffic nightmare: The new normal for the rainy season? Rappler.com, June 25, 2013. <http://www.rappler.com/science-nature/32087-monday-traffic-nightmare-the-new-normal-for-the-ra>

- Ortiz, M., Lorenzo, G., Narisma, G., and Simpas, J., (2013d). June 17 traffic nightmare: The new normal for the rainy season?, Philippine Star, June 27, 2013.
- Ortiz, M. (2013). Reducing the risk of disasters. Rappler. 29 May 2013. Accessible at: <http://www.rappler.com/move-ph/30198-let-us-reduce-the-risk-of-disasters>
- People's Television: <http://www.ptv.ph/index.php/rss-feed-news/2459-legarda-urges-disasterresilient-development-planning-incoastal-cities>
- Philippine Daily Inquirer (2015). Asian countries urged to plan for sustainable urbanization. Feb. 15, 2015. <http://globalnation.inquirer.net/118708/asian-countries-urged-to-plan-for-sustainable-urbanization>
- Philippine Star (2016). Powering progress together: Imagine our world. March 8, 2016. Powering progress together: Imagine our world. <http://www.philstar.com/starweek-magazine/2015/03/08/1431084/powering-progress-together-imagine-our-world>
- Philippine Star (2013) <http://www.philstar.com/nation/2013/02/02/904045/forum-set-disasterrisk-reduction-climate-change>
- Philippine Star (2013) Climate scientist one of 2013 outstanding women in nation's service. <http://www.philstar.com/headlines/2013/11/12/1255875/climate-scientist-one-2013-oustanding-women-nations-service>
- Philippine Star (2013) Manila Observatory, Ateneo partner to aid int'l climate scientists. <http://www.philstar.com/science-and-technology/2013/10/17/1245960/manila-observatory-ateneo-partner-aid-intl-climate>
- Philippine Star (2014) Manila Observatory analyzes LPA that affected Mindanao. <http://www.philstar.com/science-and-technology/2014/01/23/1281797/manila-observatory-analyzes-lpa-affected-mindanao>
- Philippine Star (2014). Yolanda: Unanswered questions and politics. November 14, 2014. <http://www.philstar.com/business/2014/11/14/1391511/yolanda-unanswered-questions-and-politics>
- Posting of Processed Radar Imageries of TC Trami/Maring for Greater Manila, International Disaster Charter (IDC) and Sentinel Asia websites, August-September 2013
- Preventionweb (2016). Nigeria: Group partners media on flood resilience in Lagos. July 18, 2016 <http://humanitariannews.org/20160718/nigeria-group-partners-media-flood-resilience-lagos>
- Radio Nigeria Network News report on Coastal Cities at Risk-Lagos. July 15, 2016.
- Radio One 103.5 FM (2016) Interview granted by Ibidun Adelekan on Media Watch Live. July 13 2016
- Rappler (2016). Shell: Powering Progress Together Forum. March 3, 2016. <http://www.rappler.com/brandrap/finance-and-industries/122544-shell-ppt-2016>
- Rappler (2015). The changing normal in Philippine climate. November 25, 2015. <http://www.rappler.com/move-ph/issues/disasters/114004-changing-normal-philippine-climate>

- Rappler (2015). Shell Powering Progress Together Forum 2015: Resilience in an urban perspective.  
 May 4, 2015. <http://www.rappler.com/brandrap/stories/92090-shell-powering-progress-together-resilience-urban-perspective>.
- Rappler (2013) Some of PH's poorest provinces along Yolanda's path. <http://www.rappler.com/nation/43182-poverty-yolanda>
- Rappler (2013) How do you solve Metro's Flood Problems? Septmber 11, 2013. <http://www.rappler.com/nation/37292-flood-management-metro-manila>
- Rappler (2014) The calamity of mistrust. 2 Feb 2014  
<http://www.rappler.com/move-ph/ispeak/49183-calamity-mistrust-social-capital>
- Rappler (2013) Post-Yolanda: 'Desolate, abandoned' survivors need order 13 November 2013  
<http://www.rappler.com/nation/43552-looting-tacloban-yolanda-haiyan>
- Rappler (2013) South Metro bears brunt of Rain, Rappler.com, August 19, 2013.  
<http://www.rappler.com/nation/special-coverage/weather-alert/36749-aug18-monsoon-rainfall-mani>
- Rappler (2013) Rainfall levels in Metro still rising – Observatory, August 20, 2013. <http://www.rappler.com/nation/special-coverage/weather-alert/36840-manila-observatory-rainfall-data>
- RC 09 Social Transformations and the Sociology of Development a Research Committee of the International Sociological Association July 2014.  
 Newsletter Fall/Winter 2013-2014 [http://www.isa-sociology.org/pdfs/rc09newsletter\\_winter\\_2013.pdf](http://www.isa-sociology.org/pdfs/rc09newsletter_winter_2013.pdf)
- SciDev (2013) Rebuilding from Super Typhoon Haiyan's devastation <http://www.scidev.net/asia-pacific/disasters/feature/rebuilding-from-super-typhoon-haiyan-s-devastation.html>
- Smartmoney (2016) Create intervention fund for insurance industry on high risk disasters, Climatologist urges FG. July 20, 2016  
<http://smartmoney.ng/create-intervention-fund-insurance-industry-high-risk-disasters-climatologist-urges-fg/>
- Sun Star Manila (2013) Super Typhoon Yolanda: The recipe of a perfect tropical cyclone  
<http://www.sunstar.com.ph/manila/feature/2013/11/18/super-typhoon-yolanda-recipe-perfect-tropical-cyclone-314285>
- Sun Star Manila (2013) Storm surge: Biggest threat from tropical cyclone. <http://www.sunstar.com.ph/breaking-news/2013/11/11/storm-surge-biggest-threat-tropical-cyclone-313195>
- Sun Star Manila (2014) Pagasa: Heavy rains still expected in Mindanao. <http://www.sunstar.com.ph/breaking-news/2014/01/21/pagasa-heavy-rains-still-expected-mindanao-324286>

Sun Star Iloilo (2015). First automated weather station installed in Iloilo City/ May 30, 2015. <http://www.sunstar.com.ph/iloilo/local-news/2015/05/30/first-automated-weather-station-installed-iloilo-city-410354>

Sun Star Zamboanga (2016). Zambo to Host National Climate Confab, January 28, 2016. <http://www.sunstar.com.ph/zamboanga/local-news/2016/01/28/zambo-host-national-climate-confab-454223>

The Guardian (2013) Coastal Cities can become more resilient, say experts. 23 December, 2013: 49. (National Newspaper)

The Guardian (2016) Group partners media on flood resilience in Lagos. 18 July, 2016. <http://guardian.ng/property/group-partners-media-on-flood-resilience-in-lagos/>

The Nation (2016). Government committed to flood-free Lagos, says commissioner. 18 July 2016, p. 4. <http://thenationonlineng.net/govt-committed-flood-free-lagos-says-commissioner/>

The OML Center (2013) OML Center Joined CCaR 2013 International Scientific Meeting <http://www.omlopezcenter.org/news/oml-center-joined-ccar-2013-international-scientific-meeting>

UCA News (2012) Coastal climate change in spotlight <http://www.ucanews.com/2012/03/02/coastal-climate-change-in-spotlight/>

Bangkok's 'Aloud Bangkok' articles:

Marome, W.A. (2011) "Visioning Bangkok and sharing about climate change and floods", Aloud Bangkok / <http://goo.gl/qfdql>

Pumhiran, N.P. (2011) "Food security, resilience and climate-smart adaptation", Aloud Bangkok/ <http://goo.gl/R6Au2>

Supaporn, W. (2011) "Solution for sinking Bangkok: moving out everything or just the power?" Aloud Bangkok/ <http://goo.gl/nwRx3>

Suwanarit, A. (2011) "Watery lesson learnt: from the great flood to sustainable design and planning", Aloud Bangkok/ <http://goo.gl/QWaWo>

Fighto (2012) "Rising oil price, so what?" Aloud Bangkok/ <http://goo.gl/QQI1N>

Fighto (2012) "Mind or Money?: the most valuable thing for flood victims" Aloud Bangkok/ <http://goo.gl/MQ1Nh>

Fighto (2012) "Siam-Lido-Scala: the memorable place for generations" Aloud Bangkok/ <http://goo.gl/zuDRI>

Fighto (2012) "A proper housing style in Thai context: Traditional or Modern?" Aloud Bangkok/

Kolsolsak, M (2012) "The new economic city" Aloud Bangkok/ <http://goo.gl/hvlw5>

Kolsolsak, M.P (2012) "Addressing flood by changing the capital city" Aloud Bangkok/ <http://goo.gl/n5JoF>

Kolsolsak, M.P (2012) "Things about market" Aloud Bangkok/ <http://goo.gl/gSsAk>

Kolsolsak, M.P (2012) A sidewalk shopping" Aloud Bangkok/

Marome, W.A (2012) “Bangkok urban development: From the 1st national plan to present” Aloud Bangkok / <http://goo.gl/3ssTI>

Supaporn, W (2012) “Opening the door to ASEAN: Will Bangkok be minimised?” Aloud Bangkok/ <http://goo.gl/omIHv>

Supaporn, W (2012) “The strongest flood barrier” Aloud Bangkok/ <http://goo.gl/DCE3v>

Suwanarit, A (2012) “Building living landscapes – future developments must respect nature” Aloud Bangkok/ <http://goo.gl/k62wd>

Suwanarit, A (2012) “The Urban Evolution in Tung Rangsit and Bangkok’s Green Suburb Dynamic (Part I)” Aloud Bangkok/ <http://goo.gl/4Bv3n>

Suwanarit, A (2012) “The Urban Evolution in Tung Rangsit and Bangkok’s Green Suburb Dynamic (Part II)” Aloud Bangkok/ <http://goo.gl/73ZPL>

Suwanarit, A (2012) “The Urban Evolution in Tung Rangsit and Bangkok’s Green Suburb Dynamic (Part III)” Aloud Bangkok/ <http://goo.gl/RaKl7>

Supaporn, W (2012) “Disaster and Communication during Crisis” Aloud Bangkok/ <http://goo.gl/PZx9D>

Fighto (2013) “Walkway for Who?” Aloud Bangkok/ <http://goo.gl/ABu4r>

Fighto (2013) “21-12-12: End of the World?” Aloud Bangkok/ <http://goo.gl/s2wcY>

Fighto, (2012) “Bangkok Traffic City” Aloud Bangkok/ <http://goo.gl/csJtV>

Fighto, (2012) “Who to Blame for Flooding?” Aloud Bangkok/ <http://goo.gl/sSZcj>

Fighto (2012) “Starbucks and Urban Public Space” Aloud Bangkok / <http://goo.gl/3TMC5>

Kolsolsak, M.P (2013) “Unhealthy Urbanite” Aloud Bangkok/ <http://goo.gl/mEp5u>

Kolsolsak, M.P (2013) “What Should we do with Ampawa?” Aloud Bangkok/ <http://goo.gl/URJ2O>

Kolsolsak, M.P (2013) “Garbage: Value Stuff or Waste?” Aloud Bangkok/ <http://goo.gl/lqOLx>

### **3.11 Other**

Adelekan, I. O. (2013): Private sector investment decisions in building and construction: increasing, managing and transferring risks: case study of Lagos. Background paper for the Global Assessment Report 2013 on Disaster Risk Reduction, UNISDR, Geneva, Switzerland. Available at: <http://www.preventionweb.net/english/hyogo/gar/2013/en/bgdocs/Adelekan.%202012.pdf>

Agam, N., and S.P. Simonovic (2015). Development of Inundation Maps For The Vancouver Coastline Incorporating the Effects of Sea Level Rise and Extreme Events, *Water Resources Research Report no. 091*, Facility for Intelligent Decision Support, Department of Civil and Environmental Engineering, London, Ontario, Canada, 103 pages.

- Bulley, D., D. Harford, E Joakim, L. Mortsch, G. Oulahan (2016). Vulnerability, Resilience and Adaptation Concepts and Practice Workshop Report, Climate Change Resilience Thinking Workshop for Local Governments, January 29, Vancouver, BC.
- Damude, K. & Mortsch, L. (2015). Draft report: Methods for measuring social resilience in Metro Vancouver, Canada. Coastal Cities at Risk (CCaR): Ontario, Canada:pp.1-9.
- Forseth, P. (2012). *Adaptation to sea level rise in Metro Vancouver: A review of literature for historical sea level flooding and projected sea level rise in Metro Vancouver*. Published by Adaptation to Climate Change Team (ACT). 35 pages.
- Gotangco et al. (2014). City Resilience Simulator Development Report. Internal report for CCaR annual project meeting.
- Johnson, C., Adelekan, I., Arefian, F. Boshier, L., Jabeen, H., Kataria, S., Marome, W.A. and Zerjav, B. ,2012. *Private Sector Investment Decisions in Building and Construction: Increasing, Managing and Transferring Risks*. Geneva, Switzerland: UNISDR.
- Klein, Y., Mortsch, L.D., Oulahan, G., Joakim, E., Harford ,D., Damude, K. (2014) Barriers and Drivers of Planning for Climate Change Adaptation: The View From Metro Vancouver Across Levels Of Government.
- Manila Observatory (2012) An integrated risk assessment of the effects of tropical cyclones in Metro Manila: Tropical Storm Ketsana and Future Applications. A Technical Report submitted to the United Nations Educational, Scientific and Cultural Organization (UNESCO).
- Marome, W.A.,2012. Private Sector Investment Decisions in Building and Construction: Increasing, Managing, and Transferring Risks: A Case Study of Thailand. Geneva, Switzerland: UNISDR.
- Peck, A. and S.P. Simonovic (2014). Coupling System Dynamics with Geographic Information Systems: CCaR Project Report, *Water Resources Research Report no. 086*, Facility for Intelligent Decision Support, Department of Civil and Environmental Engineering, London, Ontario, Canada, 60 pages. ISBN: (print) 978-0-7714-3069-5; (online) 978-0-7714-3070-1.
- Peck, A. and S.P. Simonovic (2013) Coastal Cities at Risk (CCaR): Generic System Dynamics Simulation Models for Use with City Resilience Simulator, *Water Resources Research Report no. 083*, Facility for Intelligent Decision Support, Department of Civil and Environmental Engineering, London, Ontario, Canada, 50 pages. Available at: <http://www.eng.uwo.ca/research/iclr/fids/publications/products/83.pdf>
- Peck A. And S.P. Simonovic (2014) Coastal Cities at Risk (CCaR): Generic Spatial System Dynamics Simulation Model for Use with City Resilience Simulator, *Water Resources Research Report no. 086*, Facility for Intelligent Decision Support, Department of Civil and Environmental Engineering, London, Ontario, Canada, pages.
- Porio, E. (2012) Enhancing Climate Change Adaptation Through Integration to Long-Term Development Plans and Disaster Management: The Case of Metro Manila. Report submitted to *the Asia Pacific Network*, Tokyo, Japan.
- Rutledge, A. (2015) Climate Change Adaptation in Vancouver: An assessment of Managed Retreat as an Adaptation Strategy. Unpublished background study, 31pp.

### ***3.12 Other Media***

Television Appearances by the Manila Team: Talkback Tina Palma, Umagang kay Ganda, Headstart Karen Davila, Personage Channel 4, Probe (Che Che Lazaro presents)

Other newspaper articles for Dr. Gemma Narisma can be found in Manila Bulletin (as part of TOWNS coverage), Philippine star (as part of TOWNS coverage), Rappler (MO is regularly “interviewed” for input on current climate and disaster issues) – our technical reports are also often picked up by Rappler

Café Scientifique – Mind Museum