KNOWLEDGE BRIEF

PARR | Pan Asia Risk Reduction Fellowship Program

Design and Framework for a Decision Support System for Highly Urbanized MegaCities: Case Study Metro Manila

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INTRODUCTION

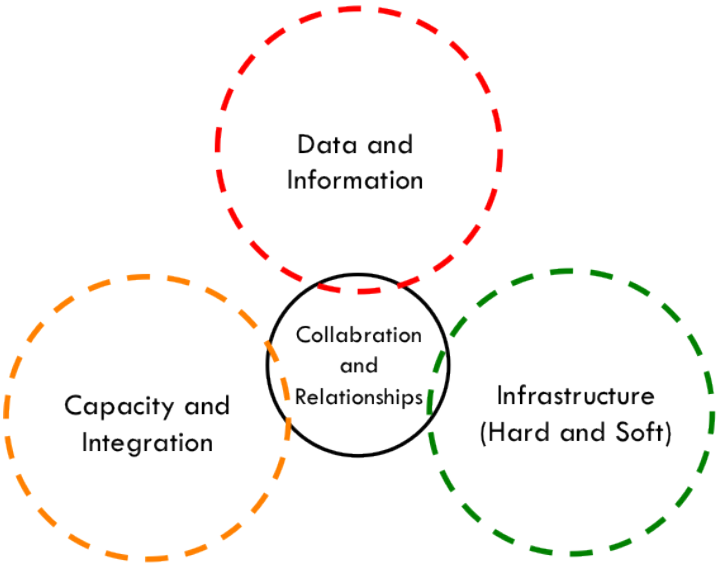
Metropolitan urban areas are at high risk to disasters because of high exposure and vulnerabilities. Metro Manila especially has been ranked as the second most at risk city to future changes in climate in the 2013 Maplecroft climate change vulnerability index, which assessed not only exposure to hazards but also: "the sensitivity of populations; development; natural resources; agricultural dependency; research and development; government effectiveness and education levels" (Maplecroft's Climate Change and Environmental Risk Atlas product news, http://maplecroft.com/about/news/ccvi_2013.html, accessed 15 November 2014). Metro Manila has rapidly developed within the last 30 years and currently has a population of around 12million people, many of which live in low elevation coastal zones and river flood plains, in an area of about 600 square kilometers. It is comprised of 16 cities and 1 municipality and the complexity and incoherence of this "multi-local governance" structure heightens its vulnerability to extreme events. In the most recent Word Risk Report (2014), which focused on cities being at risk, the Philippines was ranked number two in countries with the highest urban risk.

The severe impacts of tropical cyclones, highly intense rainfall, earthquakes and other extreme events affect the people and functioning of the metropolis and are not limited to one or two cities. A decision support system (DSS) that approaches the urban complexity of Metro Manila as an integrated socio-ecological system will help manage and reduce risk to long term changes in climate and the disastrous effects of extreme weather events. The Taiwan National Science and Technology Center for Disaster Reduction (NCDR) has established in recent years that an effective DSS can inform and significantly reduce the impacts of extreme events.

OBJECTIVE AND SIGNIFICANCE OF THE STUDY

The objective of this project is to create the design and framework of a decision support system for extreme events for Metro Manila. The system is intended to be an integrated platform for assessing hazards, exposure and vulnerabilities. This project highlights the learning of the PARR fellow during the visit to the NCDR, which was geared towards enhancing the Manila Observatory's approach for effective science information communication towards risk reduction. Given the high exposure and pre-existing vulnerabilities of Metro Manila to current and future hazards (due to extreme events), it is important to begin exploring the potential establishment of a holistic and integrated decision support system that is applicable especially to highly urbanized megacities such as Metro Manila.

Figure 1 General structure for translating the integrated risk framework into a decision support system for disaster risk reduction and resilience.



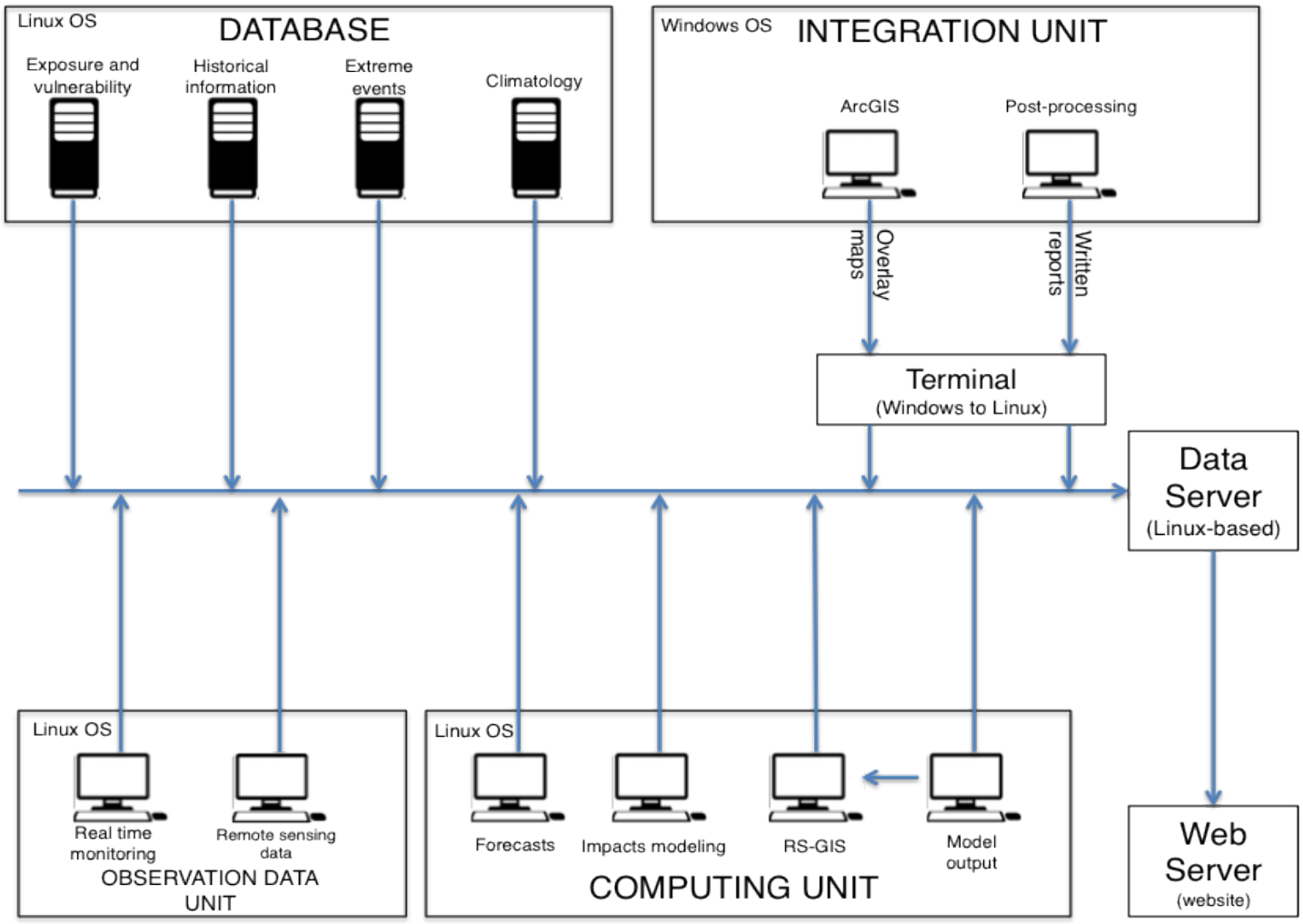
RESEARCH APPROACH

The design and framing of the DSS was done through consultations with experts, which include physical and social scientists, RS-GIS experts, and practitioners of disaster risk management. A key element of the project was a stakeholder engagement workshop that involved participants from the local government units of the cities of Metro Manila, the Metro Manila Development Authority, the Department of Interior and Local Government, and the National Disaster Risk Reduction Management Council. The goal of the workshop was to: a) illustrate an example and the importance of a decision support system for disaster risk management; b) design and establish a preliminary suggested data and information content of a DSS suitable for an urban megacity, and c) to sketch and evaluate the design and framework for the platform for sharing information and system data flow. The workshop, through invited presentations, discussed the importance of a DSS that integrates both the natural and social sciences and the relevance of a DSS on the Philippines disaster risk reduction management system. Dr. Colin Hsin-Chi Li of the Policy and Socio-Economic System Division of NCDR was a key resource person in the workshop. Dr. Li illustrated the decision support for disaster risk in Taiwan and the development and application of the Taiwan Typhoon Loss Assessment System.

RESULTS OVERVIEW AND DISCUSSIONS

Enriched by the research and collaborative engagements of the Manila Observatory in Metro Manila through its current involvement in the project "Coastal Cities at Risk (CCaR): Building Adaptive Capacity for Managing Climate Change in Coastal Megacities" as part of the International Research Initiative on Adaptation to Climate Change (IRIACC), key datasets on hazards (such as climate

Figure 2 An example of a potential set up for a starting physical backbone for a decision support system.



and weather extreme events and flood footprints), exposure (population density and key infrastructure locations), and vulnerabilities (urban poor locations and expansion) have been collected and established. However, it is important to consider a general structure for translating these data for the integrated risk framework into a decision support system for disaster risk reduction and resilience. This project identifies three potential pillars, which centers on collaboration and relationships. Figure 1 shows that equally important to data and information, are infrastructure, and capacity and integration. Infrastructure is needed for the DSS to function and covers not only the physical hardware and system (as shown in Figure 2) but also the soft infrastructure, i.e. the offices, institutions that will be involved and will dynamically maintain and ensure the sustainability of the system. Capacity and integration refers to establishing an integration framework (as was illustrated by NCDR) of which the implementation will fundamentally depend on human and technological capacity.

The results of the workshop illustrated key points and inputs in this general structure from the stakeholders. The workshop tackled two basic questions for the stakeholders: a) "Considering your current implementation processes of disaster risk reduction management functions, if a DSS is to be established, where would it be best located?" and; b) "What will you need to set up a DSS?". The participants believe: a) that local government units have existing offices and functions that can implement a DSS, including the

city disaster risk reduction and management offices, and the research and planning divisions; b) that there should be a strengthening of human capacity that will focus on implementing the DSS and that proper hardware and software and reliable infrastructure (e.g. power and internet connectivity) should be in place, and; c) that community based assessments and high resolution local data are critical for local decision making. The participants identified resource management, financial and political support, and the development of standards as key factors for the possible implementation of a DSS. Lastly, flood hazards, typhoon tracker, and financial burden or potential loss calculations and data, and pre-identification and pre-positioning of resources and needs were mentioned by the stakeholders as fundamental information that should be in the DSS.

It was encouraging to see that the stakeholders were convinced that establishing a DSS is very much doable given proper coordination and available data and information. One the stakeholders said that the workshop "reminded them of what they should do and that it was good see the example from NCDR". The participants from the Metro Manila Development Authority highlighted the need for partnerships and that the DSS goes beyond "ownership" but rather moves towards "co-ownership".

RECOMMENDATIONS

Given the initial results and positive response on the design and framework of a decision support system for disaster risk reduction and management, it is recommended that:

- The discussions with the key stakeholders of Metro Manila be continued and that the framework be continuously refined and improved given feedback and more detailed information from the local government units, key government agencies, and potential users.
- The organizational / institutional system or soft infrastructure be designed, which will help establish roles, functions, and flow of information
- A basic and simple DSS can be developed that can include a small set of pre-identified priority data and information

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