UNITED NATIONS **E/CONF.99/IP.10**

ECONOMIC AND SOCIAL COUNCIL

Ninth United Nations Regional Cartographic Conference for the Americas
New York, 10-14 August 2009
Item 7(b) of the provisional agenda
Spatial Data Infrastructures

Geo-Information for Mitigating Large Scale Disasters in the Asia-Pacific Region*

* **Prepared by Greg Scott, President, Permanent Committee on GIS Infrastructure for Asia & the Pacific (PCGIAP), and Alanna Simpson, Geoscience Australia**

Geo-Information for Mitigating Large Scale Disasters in the Asia-Pacific Region

Greg SCOTT, Geoscience Australia, President PCGIAP
Alanna SIMPSON, Geoscience Australia

Summary

The Asia-Pacific region experiences some of the world's worst natural hazards with frequent earthquakes, volcanic eruptions, cyclones, floods, landslides and annual monsoons. It also represents 60% of the world's population, includes 56 countries as defined by the United Nations, a huge geographic area with diverse levels of economic and social development, and includes many of the world's megacities – those with more than 8 million people. The largest increases in population have occurred in the region's poorest areas, where people are most vulnerable and the impact of natural disasters is greatest. So the number of people exposed to hazard risks, and therefore natural disasters, in the region is very high.

The 17th United Nations Regional Cartographic Conference for Asia and the Pacific (UNRCC-AP), held in Bangkok in September 2006, discussed at length the tragic events of the 2004 Boxing Day tsunami in which over 200,000 people died amid widespread destruction in Indonesia, Sri Lanka, India, Thailand, and on the east coast of Africa. In response to this discussion, and realizing that geo-information and related tools to support disaster management and natural hazard research are likely to be a much higher priority for the PCGIAP in the future, a Resolution was formulated. The objective of the Resolution, ***the role and use of geo-information for mitigating large scale disasters in the Asia-Pacific region***, was to 'make more effective and efficient use of geo-information by decision makers for disaster monitoring, assessment and management, and the realization of improved environmental and sustainable development decision making, and the challenges of lack of adequate resources facing National Mapping Organizations'.

Much has been done by many nations in response to the 2004 Boxing Day tsunami, particularly in the areas of monitoring, instrumentation, early warning, and education and awareness. Today, integrated tsunami warning systems monitor the Indian Ocean 24/7, and huge successes have been achieved in raising community awareness of early warning to potential tsunamigenic events. Much has also been achieved in applying geo-information to disaster mitigation and reduction. However, these achievements are variable, often uncoordinated and not widely appreciated or recognised by many decision makers. The development of national and regional spatial data infrastructures will provide the governance and technological framework for the provision of the fundamental seamless, consistent and authoritative spatial data to support these decision makers. To achieve this, nations will need to demonstrate the functionality and usefulness of agency-specific data infrastructures first and then gradually build up to local and national capability with appropriate governance and 'buy-in'.

With the above Resolution providing the context, rather than record a simple brief update of the many recent activities and achievements in the Asia-Pacific region, this paper describes Australia's response to the 2004 Boxing Day tsunami, efforts and progress made in the past 3-4 years, and reports on a number of 'best practice' activities contributing to the mitigation of large scale disasters in the Asia-Pacific region. Although not captured in detail in the paper, our presentation will provide specific examples of the application and significant role of geo-information in disaster risk management and reduction.

Introduction

Natural disasters can significantly compromise development progress, reduce the effectiveness of aid investments, and halt or slow progress towards the achievement of the Millennium Development

Goals (MDGs). For example, progress on MDG 1–halving poverty and hunger by 2015–may be halted or reversed as a result of a natural disaster. This presents a significant threat to development and has considerable implications for international aid programs.

There is overwhelming evidence that natural disasters disproportionately affect developing countries. Between 1991 and 2005, more than 90% of natural disaster deaths and 98% of people affected by natural disasters were from developing countries.[1] Moreover, disasters are increasing in number and size every year due to a number of factors including rapid population growth, urbanisation and climate change. The December 2004 'Boxing Day' Indian Ocean tsunami provided a catastrophic reminder that the Asia–Pacific region is not immune from large scale natural disasters. Although the region is knowingly traversed by one-third of the world's subduction zones, capable of producing the world's largest earthquakes and tsunamis, the enormity of this single event took humanity by surprise.

Why do natural hazard events, such as earthquakes, tsunamis, cyclones, and floods, become natural disasters? Often, the hazard phenomena are completely out of our control. We cannot prevent or reduce the likelihood of these events happening, nor influence how intense or frequent they may be. While disasters are generally triggered by a natural hazard event, the impact on communities is a direct result of vulnerability related to complex development factors, along with poverty, disability and gender inequality.

So what can we do? A risk management approach can determine the likelihood of a given natural hazard event, how vulnerable the community may be, and what mitigation strategies can be applied. The challenge to this approach is managing the risk and likelihood of rare events. For example, should we be most concerned about relatively frequent and lower impact hazards, such as the near-annual flooding of the Mekong Delta in Southeast Asia, or comparatively rare but often catastrophic disasters, such as the 2004 Boxing Day tsunami? Both types of events seriously compromise development progress, and an all-hazards approach is optimal, but in a world of limited resources what event has the highest priority from year to year?

By definition, large scale disasters will be those that are unlikely, have long return periods, and are indeed catastrophic in their nature. That is, they may never happen and are 'low likelihood – high consequence' events. So having strategies in place to mitigate such events is often difficult to justify, especially in developing nations. However, the dilemma for risk managers and emergency responders is that relatively infrequent, high-magnitude, natural disasters, such as the 2004 Boxing Day tsunami, are the events most likely to overwhelm the capacities of local and national governments, and thus require significant international humanitarian assistance.

Disaster Risk Reduction – Principles

With increasing recognition that disasters erode hard-won development gains, international policymakers have focused on disaster risk reduction[2] as an area of emerging priority nationally, regionally, and globally. In January 2005, just three weeks after the Boxing Day tsunami, the UN World Conference on Disaster Reduction was held in Kobe, Japan. At the conference, 168 countries, including Australia, adopted the Hyogo Framework for Action 2005–2015[3], a blueprint for global disaster reduction efforts. For the first time, the world had a common global agenda for reducing the risk of disasters.

---

[1] OFDA/CRED International Disasters Database EM-DAT.

[2] UNISDR defines disaster risk reduction as: The reduction of disaster risks and adverse impacts of natural hazards, through systematic efforts to analyse and manage the causes of disasters, including through avoidance of hazards, reduced social and economic vulnerability to hazards, and improved preparedness for adverse events.

[3] Document available online at UNISDR: http://www.unisdr.org/eng/hfa/hfa.htm.

The Hyogo Framework outlines a commitment to a substantial reduction of disaster losses, in lives as well as the social, economic and environmental assets of communities and countries, and lays five priorities to achieve this:

1. Make Disaster Risk Reduction a Priority
2. Know the Risks and Take Action
3. Build Understanding and Awareness
4. Reduce Risk
5. Be Prepared and Ready to Act

There are many perceptions and definitions of risk, but in broad terms disaster risk refers to the impact of natural hazards on communities, infrastructure, agricultural lands, economic indicators, etc. Disaster risk reduction programs aim to reduce the vulnerability (and enhance the resilience) of communities to the adverse effects of natural hazards. A key step in reducing vulnerability is the development and delivery of natural hazard ***impact or risk*** information. Maps are frequently produced showing regions of high hazard - regions that are more or less likely to experience earthquakes, floods, cyclones, and so on. However, to really understand the potential impact of a natural disaster on a community, province, country, or region it is necessary to move beyond this understanding of just hazard to a more comprehensive understanding of the risks posed by natural hazards to its communities. For example, rather than simply identifying which areas have the highest chance of an earthquake or flood, risk assessments can provide information on which communities are most vulnerable to earthquakes or how many people would be left homeless by a 1 in 100 year flood or a magnitude 6.5 earthquake. A risk assessment approach is one that allows decision makers to really understand, and quantify, the potential issues associated with natural hazards.

The concept of risk combines an understanding of the likelihood of a hazardous event occurring with an assessment of its impact, and can be articulated in the following way:

Risk = Hazard x Exposure x Vulnerability

The approach to the assessment of the risk to a community is conducted by establishing the nature of a hazard, and examining the exposure of the community to that hazard to determine its vulnerability. The impact of a hazardous event depends on the elements at risk (exposure), such as population or buildings and their associated vulnerability to damage or change as a result of the event. Estimating risk is an uncertain science because it involves forecasting events for which the time and the location may be largely unknown. However, this uncertainty is captured mathematically in terms of probability. The objective is to reduce the risk by informed decision making based on this (decision support) analysis.

The total risk may be decreased by reducing the size of any one or more of the three contributing variables, the hazard, the elements exposed and/or their vulnerability. This can be illustrated by assuming the dimension of each of the three variables represents the side of a triangle, with risk represented by the area of the triangle. In the risk triangle above, the larger, yellow area portrays each of the variables as being equal while in the smaller, green hachure space the total risk has been mitigated by halving both exposure and vulnerability. The reduction of any one of the three factors to zero consequently would eliminate the risk.

In terms of mitigation, reducing the specific hazard or threat, especially for large-scale events, is almost impossible. However, we can significantly reduce the levels of exposure, and hence vulnerability, to the event. Geo-information can play a significant role in not only contributing to, but also determining exposure and vulnerability.

Disaster Risk Reduction – Geo-Information

Geo-information technologies have a vital role to play in all phases of disaster risk management and reduction. Regardless of the scale and nature of the event, the reduction of the uncertainty associated with disasters is dependent largely on the availability of appropriate information. Geo-information has the potential to be at the forefront in the information needed because many of the decisions made in the risk management process have a spatial context. While geo-information (GIS) has been used over the past decade as a tool to address specific aspects of the risk management problem, there are few examples of integrated risk management applications. There are obvious advantages in developing a fusion between a philosophy of risk management and the power of GIS as a decision support tool to provide the analytical 'engine' which drives the hazard risk assessment process. It also provides the most potent form of risk communication through its capacity to provide a visual representation of disaster risk scenarios. One of the advantages in adopting a more holistic risk management approach is that the vast majority of data needed to prevent, prepare for, respond to, and recover from a disaster can be accumulated, tested, validated and used ***before*** the disaster event becomes a reality. That is to say, the information and the various risk management processes it supports, become sustainable.

The range and variety of information needed to fuel a comprehensive risk analysis is enormous. Whilst there are many sources now available from which such information can be captured or derived, much of it with the essential spatial and temporal attributes needed, there remain important gaps. For example, our knowledge of hazard phenomena and the processes that drive them are far from perfect. Therefore it is necessary to develop appropriate modeling and analysis techniques to fill the knowledge gaps. The behavior of some hazards, such as floods, have an established body of modeling research behind them, whilst others, such as cyclones and earthquakes, especially in intra-plate areas such as Australia, are as yet, less well served.

However, there are ongoing and consistent factors that are challenging the establishment and use of geo-information in disaster risk management: the nature and culture of disaster management, and the lack of appreciation/recognition/availability of geo-information tools. Disaster management, and especially the crisis response period, presents unique requirements. Many actors are involved and must coordinate their activities; decisions have to be made quickly and often under extreme pressure; there is a lot of uncertainty, due to lack of timely information; and decision making is often based on experience and intuition rather than information. Similarly, to be fully utilised the GIS tools require data that is often dispersed across different organisations, information systems, formats, and applications, that are devoted to completely different business requirements. It is commonly stated that the real barriers to the use of geo-information in disaster management are the difficulties in making the data available in a timely manner that is fit for purpose in an interoperable or common operating environment.

As a bare minimum and to ensure a sustainable level of geo-information, core fundamental data that ideally resides within a spatial data infrastructure (SDI) framework must be collated. Notwithstanding the technical challenges, the availability and accessibility of appropriate base data (e.g. topographic maps) are critical to the development of a hazard map, irrespective of the hazard of interest. For example, to determine if intense rainfall is likely to cause flooding, the location and properties of low-lying topographic features, such as rivers, lakes and floodplains, is required. Similarly, to model the impact of a tsunami, high resolution data characterising both offshore bathymetry and onshore topography is necessary, as certain geomorphic features in this environment can amplify tsunami waves.

For hazard and risk assessments to be truly useful, and for communities to develop evacuation plans and provide planners with information to reduce risk, the following types of fundamental geo-information are required:

- the profile of the land: topography, bathymetry, coastline shape and characteristics etc;
- natural hazards: the characteristics, frequency and extent of different natural phenomenon;
- exposure: the location and attributes of community elements that are exposed to natural hazards, such as location of residential structures and critical facilities (eg. roads, schools) and the attributes associated with these elements (eg. type of construction, number of residents, cost of construction etc); and
- vulnerability: such as spatially located demographic information, the ability of a residential structure to withstand different natural hazards (eg. at what wind speed will a given building type collapse?) etc.

It is important to recognise that capturing and maintaining this data within an SDI is a challenge in many parts of the world, and Australia is no exception. However, any steps made to address this challenge will result in more accurate and rapidly available hazard, and ultimately, risk information. The leverage is that the combination of these datasets allows the risk or impact from natural hazards to be understood, and thus supports policy makers, disaster managers, planners in national, provincial and local government agencies to reduce community vulnerability to the hazards.

Disaster Risk Reduction – AusAID Policy Framework

Adopting the Hyogo Framework blueprint, the Australian Government, through the Australian Agency for International Development (AusAID), made a decision in 2007 to enhance the humanitarian response, preparedness and capacity of partner governments in the region. In particular, this decision recognised a need for improved natural hazard risk assessments in developing countries, realising that an improved understanding of the frequency, location and magnitude of sudden-onset natural disasters will help the Australian Government and AusAID better plan and prepare for natural disaster response.

The activities supported by AusAID in the region mostly contribute to the achievement of Priority 2 of the Hyogo Framework, *Know the Risks and Take Action*. To reduce vulnerability to natural hazards countries and communities must be able to identify, understand and take action on the risks that they face. To achieve an understanding of risk, investment is required in scientific, technical and institutional capabilities to observe, record, research, analyse, forecast, model and map natural hazards. Countries then need to use this information to develop effective early warning systems.

AusAID recognised that by ‘virtue of our location and capacities’ Australia plays a leadership role in the Asia-Pacific region with regard to emergencies, and proposed ‘an enhanced emergency response capacity’ as one of the future directions of the Australian aid program. This enhanced capacity refers both to Australia’s humanitarian response to natural disasters and complex emergencies, as well as ensuring the long-term sustainability of development and economic growth through disaster risk reduction. The Humanitarian and Policy Section at AusAID is responsible for supporting this enhanced capacity.

As a first step in this process, AusAID commissioned Geoscience Australia[4] in 2007 to undertake a preliminary natural hazard risk assessment of the Asia-Pacific region, identifying those countries at greatest 'risk' from natural disasters. The results of this study informed the development of a stronger and more focussed response capacity as well as provided the basis for working with AusAID country programs to integrate disaster risk reduction into development programs. This study also identified important gaps in our knowledge of natural hazard risks, and made recommendations for further investigations required to inform decision making required to effectively mitigate risks.

Released in June 2009, *Investing in a Safer Future: A Disaster Risk Reduction policy for the Australian aid program*[5] provides the framework for the full integration of disaster risk reduction into Australia's aid program – to assist developing countries to reduce poverty and achieve sustainable development in line with Australia's national interest. The policy has one overarching goal, reduced vulnerability and enhanced resilience of countries and communities to disasters. This is supported by four outcomes:

1. Disaster risk reduction is integrated into the Australian aid program;
2. The capacity of partner countries to reduce disaster risks is strengthened in line with the Hyogo Framework for Action;
3. Leadership and advocacy on disaster risk reduction are supported and enhanced; and
4. Policies and programming for disaster risk reduction and climate change adaptation are coherent and coordinated.

Disaster Risk Reduction – Australian Programs

1. Rabaul Volcanological Observatory Twinning Program

Since the devastating eruption of the Rabaul volcano in Papua New Guinea in 1994, AusAID and Geoscience Australia (GA) have worked collaboratively with the Rabaul Volcanological Observatory (RVO) to mitigate the potential impacts of volcanic disasters. The current RVO twinning program has ensured that AusAID investment and RVO gains made during the earlier programs are maximised through the ongoing working relationship between RVO and GA.

One aim of the program is to enable RVO to provide reliable early warnings of destructive volcanic events to national and local authorities responsible for the safety of communities. Early warnings can minimise loss of life and economic disruption. The program has had demonstrable success in enhancing RVO's capacity to provide early warning, and RVO is a platform for Papua New Guinea's disaster management capacity. In addition to its monitoring capability, RVO has a highly effective public awareness program targeted at communities vulnerable to volcanic events.

A new phase of the RVO Twinning Program will build on existing achievements and ensure that RVO maintains and strengthens its operational and early warning capacity through: an upgrade and modernisation of its technology and equipment; enhanced telecommunications technology; development of an information management system on a secure computer-based network for archiving and retrieval of fundamental volcanological information; geohazards staff training, including in priority geo-information skills; monitoring equipment upgrade; and expansion of public awareness activities and update of materials and equipment.

2. Australian Tsunami Warning System (ATWS)

Following the 2004 Boxing Day Tsunami, the Australian Government funded the creation of the Australian Tsunami Warning System (ATWS) in the 2005-2006 Federal Budget. Australia is surrounded by 8,000 kilometres of active tectonic plate boundary capable of generating tsunamis with

[4] Geoscience Australia, as a whole-of-government partner, is able to serve as a technical arm to AusAID's policy development and implementation, with a particular strategic advantage in being able to understand, model and map natural hazards and climate change impacts.
[5] Document available online at: www.ausaid.gov.au/publications

the potential to reach our coastline within two to four hours. One third of earthquakes worldwide occur along these boundaries, a fact that reinforces the long-standing Australian scientific consensus on the need for an Indian Ocean Tsunami Warning System and clearly demonstrated by the tsunami of December 2004. The ATWS plays a major role in the operation of an international tsunami warning system for the Indian Ocean. The system also serves to warn Australians of tsunamis that may impact our coasts, both east and west, as well as provide leadership for regional tsunami warning in the southwest Pacific. The ATWS capability involves four major components: a monitoring capability; an analysis capability leading to the ability to issue an alert; a communication capability to broadcast the alert; and trained emergency response personnel and an educated public.

Jointly operated around the clock by GA and the Bureau of Meteorology, with Emergency Management Australia handling the public awareness and disaster response aspects of the system, the ATWS is an end-to-end system covering planning and preparation, monitoring, detection, warning and response aspects. Since 2005, a network of seismic stations, sea level gauges, and deep water gauges have been installed in order to monitor and rapidly detect earthquakes in the region with the potential to generate tsunamis ('tsunamigenic' earthquakes). A 24/7 warning centre has been built where the network data is gathered and analysed for warnings, and a suite of tsunami risk modelling studies has been conducted to provide an understanding of the hazard and subsequent impact to input to tsunami planning and response. These studies have complemented a range of community awareness and education activities that have sought to increase the public's understanding of tsunami. Through AusAID, support to the Indian and Pacific Ocean tsunami warning systems has also been a key part of the project.

3. Study of Natural Hazard Risk in the Asia-Pacific Region – Designed for AusAID Prioritisation

An increasing recognition of the role that natural disasters play in slowing, halting or reversing development progress led to AusAID, commissioning GA in 2007 to undertake a desk-top study of natural-hazard risk in the Asia-Pacific region. The study determined coarse and preliminary estimates of the frequency and potential impact for rapid-onset hazards. From this preliminary study, the highest risk countries in the Asia-Pacific region – in terms of the range of hazards and their potential impact on populations - were determined to be Indonesia, the Philippines, China, Burma, India, Pakistan, Bangladesh, Vanuatu, Papua New Guinea and the Solomon Islands. Other key conclusions from this study include:

1. It seems inevitable that the 21st Century will see the occurrence of one or more 'mega-disasters' in the Asia-Pacific region. That is, a disaster that affects more than 10 million people.
2. Indonesia, the Philippines, Bangladesh and China stand out as having very large populations exposed to multiple hazards, with a high potential for massive, single-event impacts.
3. Pacific countries have a high potential for catastrophic disasters that may affect large proportions of their populations, overwhelming their national capacity to respond.
4. The gaps in natural hazard information available for developing countries are vast, especially when compared to developed countries, and are often large enough to preclude any meaningful hazard/risk assessment (eg. there was insufficient data available to determine natural hazard risk in East Timor).

4. The Australian-Indonesia Facility for Disaster Reduction

In late 2008 the Prime Minister of Australia and the President of Indonesia agreed to form a Partnership for Regional Disaster Reduction that will involve Australian and Indonesian collaboration on innovative scientific solutions and forward-looking analysis to build more effective disaster mitigation, preparedness and response in Indonesia and regionally through the Asia-Pacific Economic Cooperation (APEC) and the Association of Southeast Asian Nations (ASEAN). This Partnership has become operational through the establishment of the Australia-Indonesia Facility for Disaster Reduction (AIFDR).

The Facility will be located in Jakarta to take full advantage of the strong relationship established between Indonesia and Australia following the 2004 Boxing Day tsunami, and in recognition of the fact that Indonesia is one of the most disaster prone nations in the Asia region. The AIFDR will help develop more effective disaster risk reduction in Asia, including through regional bodies such as APEC and ASEAN, by delivering three work streams which will provide targeted and appropriate:

- scientific research to ascertain risk and vulnerability to natural disasters in the Asia region;
- training needs assessments, training and capacity building for disaster risk reduction (DRR) priorities in Indonesia and the Asia Region; and
- forward thinking research and analysis on Asia specific DRR issues.

The AIFDR will have an initial focus on supporting and developing DRR capacity in Indonesia with a rapidly expanding focus to support DRR initiatives in the broader Asia region. In their joint media release the President of Indonesia and the Australian Prime Minister stated that "Australia and Indonesia will develop and sustain the Facility's relationship and collaboration with ASEAN, ASEAN Regional Forum, APEC, SAARC[6], the United Nations, the Red Cross/Red Crescent movement and regional disaster management mechanisms and programs".

5. Strengthening Natural Hazard Risk Assessment Capacity in the Philippines

The preliminary natural hazard risk assessment of the Asia-Pacific region, identifying those countries at greatest 'risk' from natural disasters, found that the Philippines have very large numbers of people at high risk from multiple natural hazards. Responding to this, AusAID and GA undertook a scoping mission to the Philippines in June 2008 to investigate opportunities for support. This mission revealed a desire from technical agencies for assistance and mentoring, and also a genuine need from other government agencies for improved natural hazard risk information. Subsequent consultations realized the development of a program of support to technical agencies, known as the Collective Strengthening of Community Awareness for Natural Disasters (CSCAND) Agencies[7], in the Philippines.

The overarching goal of this Activity, now known as 'Strengthening Natural Hazard Risk Assessment Capacity in the Philippines', is to develop long-term partnerships between Philippine technical agencies, AusAID and GA in order to better understand, and in the longer term reduce, the risk from natural hazards. The mode of aid delivery and implementation arrangements are conceptually similar to a twinning program with a focus placed on developing new, and strengthening existing, partnerships – partnerships that ultimately support the development of new natural hazard risk information. As such, GA's primary role is not to conduct detailed natural hazard risk analysis, but rather to provide support and access to technical expertise, methodologies and appropriate tools so that this capability is built within the Philippines. The initial focus of this activity was to enhance the earthquake impact/risk assessment capability within the Philippine Institute of Volcanology and Seismology (PHIVOLCS).

At the request of AusAID's Humanitarian and Policy Section and the Philippines Country Program, GA has recently (June 2009) developed a further Activity Proposal that provides additional support to the previous Activity being implemented by the Government of the Philippines and GA. With a goal to reduce the natural disaster risk of vulnerable communities in the Philippines, the Activity's objective is to increase capacity of Philippine CSCAND agencies to assess risk and the potential impact from natural hazards. This Activity will support the achievement of the above goal and objective through:

[6] South Asian Association for Regional Cooperation.

[7] The CSCAND agencies include: Mines & Geosciences Bureau (MGB), Philippine Institute of Volcanology and Seismology (PHIVOLCS), Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), National Mapping and Resource Information Agency (NAMRIA, and the Office of Civil Defence (OCD) which is part of the National Disaster Coordinating Council (NDCC).

1. The provision of technical support to the Philippine National Mapping and Resource Information Agency (NAMRIA) to enhance the production and delivery of base data for natural hazard mapping and information;
2. Initial discussions and the development of a national strategy to produce a national exposure information system[8] for the Philippine Government. This database will ultimately support the assessment of the impact of natural disasters, climate change and inform Government planning decisions;
3. The collaborative development of engineering vulnerability models for multiple hazards for residential structures in the Philippines. These models allow the impact of natural hazards on residential buildings to be assessed and ultimately support the development of updated building codes; and
4. The collaborative design of an Activity with the Philippine Atmospheric and Astronomical Services Administration (PAGASA) that will support PAGASA to assess severe wind impact associated with typhoons in the Philippines.

There are important geo-information implications and aspects for technical support to NAMRIA in developing strategies, procedures and processes that improve the production and delivery of base data for natural hazard mapping and information. Key to developing natural hazard risk information is the ability to access appropriate base datasets (eg. topography, bathymetry etc). This has become a significant challenge for the CSCAND agencies who are tasked with developing natural hazard information, a challenge highlighted during the June 2008 scoping mission and during the development of a Risk Assessment Options Paper[9].

The ability of NAMRIA to deliver on-time base data sets, in part through the implementation of a SDI, was highlighted as the greatest priority for the base data sets component of the Options Paper – determined through a prioritisation workshop held in March 2009. GA and NAMRIA have identified some preliminary steps that can be taken to improve the efficiency of base data development and delivery. These include:

1. More efficient and appropriate validation of mapping data that is converted from paper to digital form;
2. Development of a strategy for a NAMRIA spatial data infrastructure – this will promote more appropriate data storage and facilitate access to existing data sets – thus minimising duplication within NAMRIA; and
3. A small pilot project that implements one aspect of a spatial data infrastructure, which will allow NAMRIA to understand what is involved in this process and allow lessons to be fed into Option 2 outlined above.

Appropriate management and maintenance of spatial data has been clearly identified as a significant challenge in the Philippines, through responses to questionnaires and in reports produced by the Inter-Agency Task Force on Geographic Information (IATFGI) and the UN-supported Permanent Committee on GIS Infrastructure for Asia and the Pacific. The lack of a suitable, functioning National Spatial Data Infrastructure affects the ability of agencies to discover available data, access it in appropriate formats, understand the benefits and limitations of different datasets, and so forth. Unfortunately whilst producing additional base datasets will undoubtedly be useful to many of the agencies, in the absence of a functioning spatial data management system this will simply compound the problem of spatial data management.

---

[8] A significant gap in the assessment of natural hazard risks and impacts is the availability of comprehensive exposure information - ie. where people live, building construction type and replacement cost, demographic information (age, gender, income etc), infrastructure, critical facilities etc. This information can be integrated into a spatial database that then can be interrogated depending on the information required (eg. If sea level increased by 0.5 m, how many homes in a particular area would be impacted and what would the economic and social impact be?).

[9] Simpson, A. and Dhu, T. (2009) Enhancing natural hazard risk assessment capacity in the CSCAND agencies – an Options Paper. Geoscience Australia. Professional Opinion 2009/04

Contact:
Mr. Greg Scott
President PCGIAP
Group Leader, National Mapping & Information Group
Geospatial and Earth Monitoring Division
Geoscience Australia
GPO Box 378, Canberra 2601
AUSTRALIA
Tel: +61 2 6249 9132
Fax: +61 2 6249 9921
Email: Greg.Scott@ga.gov.au
Web: www.ga.gov.au