

ANDROID

DISASTER  
RESILIENCE  
NETWORK

# Exchange

Volume 2 Issue 2

## Third annual conference of the ANDROID network

350 people gather at MediaCity UK to explore the concept of resilience as a useful framework of analysis for how society can cope with the threat of natural and human induced hazards



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[www.disaster-resilience.net](http://www.disaster-resilience.net)



Lifelong  
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Programme

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## About ANDROID

ANDROID is an Erasmus academic network. It aims to promote co-operation and innovation among European Higher Education to increase society's resilience to disasters of human and natural origin. The network's teaching and research is concerned with what resilience is, what it means to society, and how societies might achieve greater resilience in the face of increasing threats from natural and human induced hazards. The network will create a European approach that will help us understand the attributes that enable physical, socio-cultural, politico-economic and natural systems to adapt, by resistance or changing, in order to reach and maintain an acceptable level of functioning. The network will also raise awareness and promote a common understanding among stakeholders of the importance of disaster resilience education and the essential role of European HEIs in improving society's ability to increase disaster resilience.

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## Editorial

Welcome to this second issue of ANDROID Exchange's second volume, the regular newsletter of the ANDROID Disaster Resilience Network, a global inter-disciplinary consortium that seeks to promote co-operation and innovation, and increase society's resilience to disasters of human and natural origin. ANDROID is supported by a grant obtained from the EU Lifelong Learning Programme, under the Erasmus networks action.

The ANDROID network began almost three years ago and this issue reports on the progress we have made in some of key activities and planned outputs.

This issue begins with a review of the third annual conference of the ANDROID network, which was held at MediaCity in Salford, UK. Held alongside the 4th International Conference on Building Resilience, the event attracted over 350 delegates from academia, policy and practice. The issue highlights some of the key events that took place during the conference, including a steering committee meeting of the UNISDR Making Cities Resilient campaign, and the second ANDROID residential doctoral school.

Many of the ANDROID workpackage teams presented findings during the conference and the issue also includes a brief update on each work, package and links to more detailed papers and reports.

As usual, we have updates from two of our regular contributors to Exchange: the UNISDR Making Cities Resilient Campaign and the International Journal of Disaster Resilience in the Built Environment. Both are important partners for the network and we encourage you to explore recent developments.

There is also news on the launch of 'Horizon 2020', the EU flagship programme for Research and Technological Development. With an overall budget of EUR 80 billion (LKR 14,000 billion) over the period 2014-2020 the programme is one of the most significant in its kind.

Finally, Prof. Marinko Oluic from GEOSAT Ltd, a key partner in the ANDROID network, provides an introduction to spatial information (including remote sensing) in disaster management, risk reduction and disaster resilience.

Don't forget, you can also use Exchange to provide updates on your own institution's work in this field. We very much welcome your contributions.

Professor Richard Haigh & Professor Dilanthi Amaralunga



# Network News

## Third annual conference of the ANDROID network

The third annual meeting of the ANDROID network was held alongside the 4th International Conference on Building Resilience.

The conference was organised by: the Centre for Disaster Resilience, University of Salford, United Kingdom; the Global Disaster Resilience Centre, University of Huddersfield, United Kingdom; and the ANDROID Disaster Resilience Network, a project of the EU Lifelong Learning Programme.

It was also organised in association with: the United Nations International Strategy for Disaster Risk Reduction (UNISDR); the International Journal of Disaster Resilience in the Built Environment; the Asian Disaster Preparedness Center (ADPC); the UK Foreign and Commonwealth Office; the United Nations Development Programme (UNDP); the Intergovernmental Oceanographic Commission (IOC) of UNESCO; the United Nations Human Settlements Programme (UN-HABITAT); Collaborative Action towards Disaster Resilience Education (CADRE); Collaborative Action towards Societal Challenges through Awareness, Development, and Education (CASCADE); and, the Royal Institution of Chartered Surveyors (RICS).

The four-day event attracted more than 350 academics, researchers, practitioners and policy makers. There were four keynote addresses, which provided a global perspective and vision for disaster resilience research. They were given by Jerry Velasquez, who is Chief of the Advocacy and Communications Section and Head of the Making Cities Resilient Campaign of the UN Office for Disaster Risk Reduction; Dan Lewis (pictured on page 4), the Chief of Urban Risk Reduction, UN-Habitat, Kenya; Professor Siri Hettige, of the University of Colombo in Sri Lanka; plus Professor Janaka Ruwanpura, who is Vice-Provost (International), University of Calgary, Canada.

As well as providing an opportunity for ANDROID members to interact, review progress on the workplan, and share results, the aim of the conference was to explore the concept of resilience as a useful framework of analysis for how society can cope with the threat of hazards, helping to understand the attributes that enable physical, socio-cultural, politico-economic and natural systems to adapt. Themes included the built environment, communication, disaster risk, healthcare facilities, plus governance and education in the wake of disaster.

At the start of the conference, representatives of the 10 authorities which make up Greater Manchester, attended an official ceremony in which they pledged their support to the Making Cities Resilient campaign.

Another dimension of the conference was that it hosted the 2014 meeting of the United Nations International Strategy for Disaster Reduction's Making Cities Resilient campaign steering committee, plus the ANDROID residential doctoral school. This

has 40 participants and aims to provide an interdisciplinary platform for doctoral candidates worldwide to harness and develop their capacity in disaster resilience.

Margareta Wahlström, Special Representative of the Secretary-General of the United Nations for Disaster Risk Reduction commented: "The Conference came at an exciting time in global efforts to build resilient communities and a resilient planet. In the UK, dynamic public/private sector partnerships and a vibrant academia have contributed significantly to this international process."

### Conference themes

The conference included contributions from industry practitioners, researchers and academics. The themes of the conference linked to the goals of the ANDROID network:

#### 1. Resilience

Conceptual understanding of resilience  
Overall systems resilience  
Measurement of resilience

#### 2. Built environment

Structural mitigation  
Infrastructure  
Sustainable development  
Shelter and housing

#### 3. Communication

Community engagement and participation  
Inter-disciplinary working and partnerships  
Digital media  
Knowledge management

#### 4. Disaster risk

Multi-hazard scenarios  
Risk assessment, monitoring and evacuation

#### 5. Healthcare facilities, infrastructure and system resilience planning

Emergency planning and disaster response  
Community resilience planning for emergency preparedness  
Social determinants of health  
Health and wellbeing of disadvantaged and socio-economically excluded populations  
Health system resiliency planning

#### 6. Social resilience

Livelihoods  
Social protection and vulnerability  
Social support processes  
People, displacement and security

#### 7. Governance

Local government and disaster risk reduction  
National planning  
Role of NGOs  
Evidence based policy-making

#### 8. Education

Capacity building  
Lifelong learning



Photograph: Dan Lewis, the Chief of Urban Risk Reduction at UN-Habitat in Kenya, delivering his keynote address

### Update on ANDROID workplan

The third annual conference also marked an important milestone as it was the last scheduled meeting in the current 3 year ANDROID workplan. As a result, the event provided an ideal opportunity to share the findings of the network's many activities.

ANDROID set out to achieve its objectives through a series of inter-linked projects, identified as work packages (WP) and led by a sub-group of international partners. This section describes these projects and highlights key outputs achieved to date. Many of these outputs were presented during the conference, but they can also be downloaded from [www.disaster-resilience.net](http://www.disaster-resilience.net) or accessed via the referenced publications indicated.

### Inter-disciplinary doctoral school (WP3)

WP3 aimed to develop HEI capacity for research and teaching by establishing an EU-based Doctoral School that is open to all interested doctoral candidates from Europe and beyond. The ANDROID Doctoral School is a fully coordinated, innovative, and international interdisciplinarity doctoral teaching and research programme focused on the most salient issues and features shaping society's ability to tackle the challenges posed by disaster risk. To date (September 2014), the School has provided two online and two residential innovative research training programmes aimed at honing the students' skill set and drawing on the wide disciplinary base of the network's partners to promote inter-disciplinary working for doctoral students. In particular, the School has raised awareness and understanding of inter-disciplinary methodologies and good practice, and promoted coordination of education across Europe. The two residential doctoral schools resulted in the publication of formal proceedings.

### Capturing and sharing innovative approaches to inter-disciplinary working (WP4)

WP4 aimed to gather information on the state of art and practice in the field of disaster resilience and promote co-operation and interdisciplinary methodologies in research and education. A survey was carried out by means of a questionnaire focusing on disaster-resilience projects and on the main challenges faced in interdisciplinary working. The results of the questionnaire (Faber et al, 2014), which collected 57 answers from more than 20 European countries and few extra European countries as well, allow for three main considerations: i) projects involved 5 different disciplines as average and geography and sociology were present in the majority of the projects; ii) the level of interconnection between disciplines seems intermediate, meaning that information and methods are exchanged, but a full integration of methods and concepts into a common shared language and system of axioms is missing; iii) the lack of a common framework and common terminology represents a major barrier to good interdisciplinary work. The results highlight the role played in disaster-resilience design by social and cultural aspects, which are instead not often adequately considered in the practice. The establishment of an education on resilient design of urban system, which includes both social and technological aspects, emerges as a possible solution to overcome barriers to interdisciplinary work and improve the efficacy and quality of resilience design.

### Surveying European education to map teaching and research programmes in disaster resilience (WP5)

WP5 aimed to establish the current teaching and research capacity among European HEIs in the field. In the subsequent survey (Perdikou et al, 2014), 96 participants directly related to disaster resilience education responded. The findings suggest that disaster resilience related educational programmes across

Europe are enjoying rapid growth and there is still potential for further growth. The field is also multidisciplinary in nature and involves a variety of organisations, including academia, professionals, governmental organisations and research institutions. The survey also found that the multidisciplinarity nature of these programmes will prepare specialists for organizational positions with a good, broad knowledge. However, the knowledge will not be deep enough for many detailed spheres. Therefore the specialists must also be able and ready to cooperate with many other branches/organizations and specialisations.

### **Analysing the capacity of European public administrators to address disaster risk (WP6)**

WP6 aimed to establish the capacity of local government's public administrators in European urban areas to address disaster risk. The team conducted a survey of the capacity at both national and local levels. The survey respondents represented organisations with total disaster resilience personnel of approximately 19,000 people.

Of these people, only 13% reportedly held an educational qualification in a disaster resilience field. A majority of the organisations (68%) were reported to be interested in their staff obtaining disaster resilience-related academic qualifications. In terms of progress in implementing the HFA priority actions, the majority of respondents reported moderate progress having been made. With regard to all 5 of the national actions and all 7 of the local level actions, a majority of respondents indicated that the necessary capacity to fulfil the actions existed so that the non-completion of the actions was due to other factors (e.g. time, other priorities, etc.) rather than being a consequence of capacity constraints. Those respondents who did report the existence of capacity constraints indicated that the financial resources dimension of capacity presented the greatest challenge to their organisations (at both local and national levels). The capacity dimension most directly reflecting the demand for disaster resilience education, staff knowledge and skills, was ranked as the third most pressing constraint facing local level organisations after financial resources and staff availability. For national level public administrations, staff knowledge and skills, was one of four capacity dimensions considered to be equally pressing in second place behind financial resources (the other three being staff availability, systems and infrastructure and legal framework).

The survey has thus given insight into the relative demand for academic qualifications within European public administrations and the degree to which staff knowledge and skills have affected the implementation of disaster resilience initiatives.

### **Emerging research and teaching concerns in disaster resilience (WP7)**

WP7 selected Venice and its territory as an emblematic case study of a region that could be affected by cross-border disastrous events. A case study was carried out not only as an engaging exercise, but with the purpose to provide a reference point for scientists and teachers interested to translate multifaceted knowledge into specific solutions. A series of papers have been written (Indirli et al, 2014; Knezic, 2014; Borg, 2014; Kaluarachchi, 2014), which deepen respectively hazard, vulnerability/resilience, and mitigation about the site taken into consideration.

### **Developing and hosting OERs for disaster resilience education (WP8)**

WP8 aimed to develop innovative educational resources in order to support capacity building for improving societal resilience to disasters. It has set out to achieve this by developing an Open Educational Resources (OER) platform to host digitised materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research. The platform is based on a set of Open Educational Resource standards defined by the project team (Haigh, 2013), which set out the platform, accessibility and inclusion, rights management, and approaches for ANDROID network members to describe, manage, and share learning resources online.

### **Developing a roadmap for European education**

A major output of the first ANDROID workplan, due for completion in late 2014, is the development of a roadmap for European education in developing societal resilience to disasters. The roadmap will collate the major findings that arise from the network's survey and analysis projects in order to set an agenda for educational policy in the field.

This report will not be about predicting the future. Instead, its starting point will be simply to consider some of the greatest challenges and opportunities for education in the 21st century in helping society address the threat posed by hazards of natural and human origin. The report will consider society's requirements in terms of skills and scientific advances. It will also consider the existing capacity of European HEIs to meet these requirements. Finally, the report will consider what needs to happen in education policy to help address this key European and global challenge. The report will be a major output for the network that can be disseminated to key stakeholders, and also form the basis of the network's future activities.

### **Further reading on ANDROID activities and outputs:**

All of the following papers and reports are available with open access from [www.disaster-resilience.net](http://www.disaster-resilience.net) or a special issue of Procedia Finance and Economics that was published alongside the conference :

Faber, M.H., Giuliani, L., Revez, A., Jayasena, S., Sparf, J. and Mendez, J.M. (2014) "Interdisciplinary approach to disaster resilience education and research". In: R Haigh & D Amaralunga (eds.). Procedia Economics and Finance: International Conference on Building Resilience 2014, 8th - 11th September. 2014, Salford, UK.

Haigh, R. (2013) ANDROID Open Educational Resource Standards. ANDROID Disaster Resilience Network.

Indirli, M., Knezic, S., Borg, R., Kaluarachchi, Y., Ranguelov, B., Romagnoli, F. and Rochas, C. (2014) "The ANDROID case study; Venice and its territory: a general overview". In: R Haigh & D Amaralunga (eds.). Procedia Economics and Finance: International Conference on Building Resilience 2014, 8th - 11th September. 2014, Salford, UK.

Kaluarachchi, Y., Indirli, M., Ranguelov, B. and Romagnoli, F. (2014) "The ANDROID case study; Venice and its territory: existing mitigation options and challenges for the future". In: R Haigh & D Amaralunga (eds.). Procedia Economics and Finance: International Conference on Building Resilience 2014, 8th - 11th September. 2014, Salford, UK.

Knezic, S., Scudeller, M., Indirli, M., Romagnoli, F., Kuznecova, T. and Perdikou, S. (2014) "The ANDROID case study; Venice and its territory: identification of hazards and impact of multi-hazard scenarios". In: R Haigh & D Amaralunga (eds.). Procedia Economics and Finance: International Conference on Building Resilience 2014, 8th - 11th September. 2014, Salford, UK.

Perdikou, S., Horak, J., Palliyaguru, R., Halounová, L., Lees, A., Ranguelov, B. and Lombardi, M. (2014) "The current landscape of disaster resilience education in Europe". In: R Haigh & D Amaralunga (eds.). Procedia Economics and Finance: International Conference on Building Resilience 2014, 8th - 11th September. 2014, Salford, UK.

## Greater Manchester joins UK campaign

Alongside the 3rd annual conference of the ANDROID network, the Greater Manchester region (including conference host city Salford) became the first UK city to join the UN's Making Cities Resilient Campaign and has been recognized as a "Role Model for Total Resilience" because of its focus on implementing the Campaign's entire ten-point checklist for building resilience to disasters.

Margareta Wahlström, the head of the UN Office for Disaster Risk Reduction (UNISDR), said: "It is a milestone for the Making Cities Resilient Campaign which we launched four years ago and which has over 2,000 members across the globe. The UN is happy to welcome the UK's second largest conurbation into the campaign as an example of a city where land use, planning and disaster risk reduction go hand-in-hand. The Greater Manchester Resilience Forum is a text-book model of how to design a multi-agency partnership coordinating civil contingencies activity for a large urban area.

"It's a major boost to the campaign that the Greater Manchester Combined Authority and its member boroughs have agreed to be a role model for Total Resilience and to take part in city-to-city learning which will benefit other members of the campaign who can learn a lot from studying good practice here.

"This recognition for Greater Manchester further solidifies the UK's reputation as a global leader in the area of building resilience to disasters. The UK government recently took part in the first-ever peer review of its performance in implementing the international agreement on reducing disaster risk, the Hyogo Framework for Action. This has encouraged others to follow suit and boosted discussions on how to measure progress in building resilience."

Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Stockport, Tameside, Trafford and Wigan make up the Association of Greater Manchester Authorities (AGMA) and each is being confirmed today as a member of the Campaign with a signed certificate from Ms. Wahlström who is also the Special Representative of the Secretary-General for Disaster Risk Reduction.

Councillor Mike Connolly, leader of Bury Council and AGMA lead on disaster risk management, said: "Greater Manchester contains several large rivers and is exposed to a number of climate-related and severe weather risks. Flooding is acknowledged as a major hazard, along with heat waves, storms, gales and high winds.

"Understanding the importance of preparing for disasters, rather than simply responding to them, is absolutely crucial for towns and cities in the 21st century. By taking part in the Making Cities Resilient Campaign, authorities across Greater Manchester are demonstrating that their resilience plans have been gauged against the strongest benchmark available. It also means we are able to build closer links with other cities and organizations across the world and we can become role models for other urban areas."

An important aspect of ANDROID is building links between Higher Education Institutes and other sectors, including local government. The conference provided an ideal opportunity for

ANDROID partners to interact with representatives from the ten boroughs of Greater Manchester, and to emphasise links between research currently being undertaken by ANDROID members and the practical challenges being faced by local authorities tackling disaster risk in their local communities.

### Some snapshots of Greater Manchester's Approach to Total Resilience:

- As part of its submission to become a member of the Making Cities Resilient Campaign, Greater Manchester provided an impressive range of case studies from the ten boroughs illustrating best practice in disaster resilience how they are implementing the "Ten Essentials" of the Making Cities Resilient Campaign.
- A key initiative has been the decision three years ago to establish a shared civil contingencies service to lead emergency planning and to provide expertise in emergency response. Following a fire at a waste transfer site off the M60 motorway, Greater Manchester's emergency services worked for 21 days to extinguish the fire and a joint strategy has been agreed to work on minimizing the health, environmental and economic impacts of fires.
- All ten borough authorities have produced Core Strategies/Local Plans on land use as Greater Manchester plans for significant economic growth. An evidence base is under development for how much land will be needed for housing and employment growth into the early 2030's.
- Greater Manchester also has ambitious targets to address the challenges of climate change as set out in its Climate Change Strategy (2011-2020). Developments must consider the location and impacts on infrastructure, biodiversity and open space, together with constraints such as flood risk, demonstrate good environmental performance on waste management and efficient water management.
- Greater Manchester lists 64 specific risks on its community risk register and has a mature community engagement programme in place e.g. every year 60,000 home fire risk assessments are carried out by the Greater Manchester Fire and Rescue Service and this has led to a 33% decrease in fires.
- Greater Manchester recognizes that the natural environment contributes to economic resilience and quality of life. Grassroots community groups are supported in protecting the environment. An investment of £14.5 million is being made in tackling local environmental problems.
- The EcoCities Project, a joint initiative between the University of Manchester and property company, Bruntwood, looks at the impacts of climate change and how to adapt to future scenarios, recognizing changes in population, land use patterns and economic activity.
- Trafford Council has dedicated resources to combat fuel poverty by supporting 300 to 400 people to stay warm during the winter through a network of volunteers, a helpline and winter chill packs including extreme temperature, smoke and carbon monoxide detectors, hot water bottles, soups, socks and hats.
- The new police station in Bury is on a flood plain but is built on raised foundations ensuring that the building will remain operational during a flood event and the main access road has also been raised.
- Safe schools and health facilities are key concerns across the boroughs e.g. in Lower Broughton, Salford, River View Primary School has been built on stilts with a higher level escape route running a metre above ground level. In addition to fire drills, an annual flood evacuation drill is organized for the children.



*Photograph: representatives from the Greater Manchester region with Margareta Wahlström, the head of the UN Office for Disaster Risk Reduction (UNISDR), after becoming the first UK city to join the UN's Making Cities Resilient Campaign and recognized as a "Role Model for Total Resilience"*

## Conference papers published in an issue of Procedia Economics and Finance

Over 120 full papers presented at the conference, many of them by ANDROID partners, have been published in an issue of Procedia Economics and Finance.

Launched in February 2012, Procedia Economics and Finance is an e-only product focusing entirely on publishing high quality conference proceedings. Procedia Economics and Finance enables fast dissemination so conference delegates can publish their papers in a dedicated online issue on ScienceDirect, which is then made freely available worldwide.

Conference proceedings are accepted for publication in Procedia Economics and Finance based on suitability and are required to meet certain criteria, including relevance to an international audience and covering highly cited or timely topics.

Accepted manuscript for the conference were governed by a creative commons license: CC BY-NC-ND.

Procedia Economics and Finance offers a single, highly recognized platform where conference papers can be hosted and accessed by millions of researchers. Authors then know where to go to keep abreast of the latest developments in their field. All proceedings appear online, on Science Direct, and are freely available to all users.

Papers can be accessed from the Procedia homepage:

<http://www.journals.elsevier.com/procedia-economics-and-finance>

## Proceedings of the First ANDROID Residential Doctoral School now available

The Proceedings of the first ANDROID Residential Doctoral School is available for download at:

[www.disaster-resilience.net/images/Docs/ds1\\_proceedings.pdf](http://www.disaster-resilience.net/images/Docs/ds1_proceedings.pdf)

The ANDROID Doctoral School is a fully coordinated, innovative, and international interdisciplinary doctoral teaching and research programme focused on the most salient issues and features shaping society's ability to tackles the challenges posed by natural and human induced hazards. The ANDROID Doctoral School provides complementary and innovative research training programmes aimed at honing the students' skill set. The Doctoral School organized its first residential school to coincide with the network's conference in October 2013, aiming to actively engage the students in presenting and discussing their research projects. Doctoral researchers were encouraged to develop and submit an original piece of research which was then peer reviewed by experts within the field.

### Work Package Team

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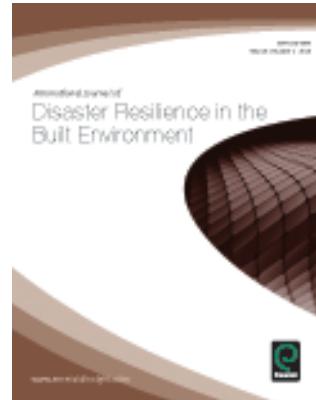
## Infrastructure Renewal and Reconstruction

Special issue now published in the International Journal of Disaster Resilience in the Built Environment

Guest Edited by:

Dr Paul Barnes & Professor Ashantha Goonetilleke, Centre for Emergency & Disaster management, Queensland University of technology, Brisbane, Australia.

ANDROID partner, the International Journal of Disaster Resilience in the Built Environment, has just published a special issue entitled 'Infrastructure Renewal and Reconstruction',



### Guest Editorial

Emergent risk-related phenomena such as climate change, public and animal health disease, the increasing hyper-complexity of embedded information-communications-technology (ICT), and emergent inter-dependencies within and across systems of infrastructure, create significant problems of governance for the private and public sector alike. (U.S. Govt., 2004:2, OECD: 2003, 2006). Unmitigated disturbances from such sources have the potential to generate cascading impacts propagated along unexpected pathways and fault lines throughout commercial and institutional segments of established and establishing economies.

The potential for the rapid spread of damaging consequences can render a comprehensive understanding of a disaster's context beyond the grasp of competent authorities (Lagadec, 2004). Coping with disasters are a challenge for government, business and communities with a full range of consequences often difficult to anticipate. In hindsight, the speed and severity of disruptions and extent of damage often suggests that there were deficiencies in the agility of first, second and allied response agencies to both, make-sense of the complexity and respond to wide area disasters. Such criticism may be unfounded because within the context of modern disaster situations, institutions would be unlikely to face single incidents but rather a series of systemic disruptions, often appearing concurrently.

In order to achieve efficient and effective outcomes there is a need to develop improved synergies in the protection of critical infrastructure and assets, implementing crisis management and business continuity capabilities, and importantly, ensuring the safety of communities. One way to deal with such complexity may come in the form of enhanced institutional agility: supported by requisite levels of preparation and planning for response to emergency situations and practiced sets of protocols for recovering essential services. Arguably enhancing such agility entails institutions possessing suitable capability at the right time (or being able to access it) and deploying it in an interoperable manner over an extended period. While such actions seem obvious combining them into effective, reliable and strategic disaster management arrangements can be challenging.

Incidents associated with natural hazards are increasing in complexity, duration and cost with related catastrophes

accounting for significant portions of the insured losses globally. In 2008, 81% of processed insurance claims, some USD 52.5 billion, of were due to natural disasters. Other than the attack on the US World Trade Centre in 2001, the top 40 most costly insured losses from 1970 to 2009 have been attributed to natural catastrophes.

Damage caused by disasters impacts the built and natural environments as well as the viability and health of communities. Rapid, accurate and relevant information is needed post-disaster in order manage recovery of communities and the reestablishment of essential services and related infrastructure. Equally, real-time data about on-the-ground conditions are critical during disaster response phases in order to ensure the safety and well-being emergency responders and members of the affected communities

A key factor central to these increasing losses is urbanisation. In 1950 30% of the world's population lived in major cities. By the year 2000 this had increased to 47% with further expected growth to 50% by the end of 2007. Projections suggest that city-based densities will edge towards 60% of the global total by 2030. Such rapidly increasing urbanisation, in both developed and establishing economies, challenges options for governance and planning, as well as emergency management.

Notwithstanding detailed preparation and planning for disaster events, significant cumulative financial losses remain a key concern as a counterpoint to urban density, highly concentrated populations, and concentrated infrastructure systems. Such urban landscape factors are prevalent along coastal areas of Southeast Asia. Natural hazards continue to be significant threats in this region and a high priority for most Association of Southeast Asian Nations (ASEAN) member economies reside within or in close proximity to the Pacific 'Ring of Fire'. While noted more for volcanic activity, reaching from the north to south Asia a relatively significant prevalence of seismic phenomena adds to vulnerability.

In fact both South and North Asia exhibit this vulnerability nexus between Urbanisation and natural hazards. In 2008 Asia alone accounted for 41.5% of world's catastrophes and 97.9% of total victims. For example, the devastating 2004 Indian Ocean (Asian) Tsunami hit twelve countries with an estimated 280,000 victims and USD 14million worth of property losses. More

recently losses from the March 2011 Japanese earthquake and tsunami have been estimated at USD 210 billion.

This special edition presents a selection of articles based on papers delivered at the 9th annual conference of the International Institute for Infrastructure Renewal and Reconstruction (a Consortium of approximately 18 Universities), held at the Queensland University of Technology in Brisbane Australia from July 8-10, 2013. The intent of the conference, entitled "Risk-informed Disaster Management: Planning for Response, Recovery and Resilience," was to examine themes relevant to enhancing planning for risk-informed response and recovery as well as developing a dialogue on resilience in infrastructure systems and communities affected by disasters.

Given also that Australia is a member of Asia-Pacific Economic Cooperation (APEC) economies and is an affiliate of activities related to the ASEAN economies the conference sought also to capitalise on detailed activities across South and North Asian economies related to preparation for disasters but also the national experience of recent disasters. While not limiting the importance of international disasters a high percentage of the papers presented at the Conference focused on Oceanic/Asian experiences of disaster.

The papers selected for this special edition cover a range of issues important in disaster management generally but specific to the Asia-Pacific region. They range from discussion of aspects of pre-disaster land use and urban design planning with the inclusion of local communities of interest in such activities. Consideration of early warning messages is also considered as are the roles of non-government organisations in response and disaster risk reduction arrangements. A final area of great importance, the role(s) of social networks in enhancing community resilience in post-disaster contexts is also included.

In the first paper, Tri Mulyani Sunarharum, Mellini Sloan and Connie Susilawati present the results of a preliminary scoping study on effective participatory planning methods applied to flood risk management in Jakarta, Indonesia. As a scoping study it provides background relevant to the challenges faced in planning for contemporary Jakarta and uses Multi-Criteria Decision-Making (MCDM) support systems infused with geospatial information - to aid in engagement with communities and improve decision-making outcomes.

Elizabeth Maly and Eiko Ishikawa examine issues of relocation of communities as part of recovery and remediation after the Great East Japan Earthquake. Specific challenges of rezoning residential land affected by the tsunami and efforts to relocate residents to other less hazardous residential areas relocation in Japan are discussed in context to post-disaster relocation projects in other countries.

Natainia Lummen, Yuki Tominaga, Takafumi Tsukamoto and Takaomi Hokamura emphasise the importance of flood modelling to inform both disaster mitigation efforts and predictive modelling of impacts in their assessment of Flood Disaster in the Tatsuda Area, of Kumamoto city, Japan. This paper details options for incorporating such technical knowledge into early warning procedures, thus enhancing community safety.

In the fourth paper, Yoko Akama, Susan Chaplin and Peter Fairbrother examine the role of social networks in community

preparedness for bushfires in Australia. Presenting the results of ongoing research on social networks of residents living in fire-prone rural area in a specific region in Australia investigates how knowledge related to bushfire flows within a community, either in preparation for, or during a hypothetical emergency. The work presents visual representations of networks community-based networks and details their creation: albeit in a very specific locality in Australia. The results further suggest how people's emergent roles and their inter-relatedness with one another helps to build adaptive capacity and greater awareness of the risks they face from fire.

Remaining with a community focused theme, Julie Molloy and Tal Fitzpatrick examine the Role of NGOs specifically not-for-profit and community/service organisations in building sustainable community resilience to create stronger partnerships and more significant opportunities for the sector to engage in resilience building activities.

The sixth paper by Tania Somasundaram and Belinda Davies examines consideration of improvements in evacuation centre operations in disaster-affected communities. It details the development, content and application of a 'Preferred Sheltering Practices for Emergency Sheltering in Australia' and the roles of various organisations in relation to emergency sheltering.

The final paper by Ignacio Correa-Velez and Augustine Conte explores the experiences of a cohort of men from refugee backgrounds that were affected by significant flooding event in southeast Queensland Australia. The paper suggests that previous refugee experience helped them to cope better during and after the floods, and for some, providing assistance to others during the floods impacted positively on their relationship with their neighbours. It further suggests that attention be paid to including awareness of strengths and capabilities of refugees when developing disaster response strategies at the neighbourhood and community levels.

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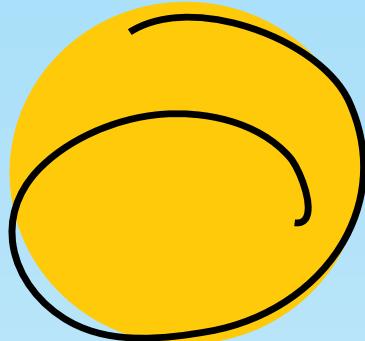
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International Strategy for Disaster Reduction



United Nations



## Making Cities Resilient

## My City is Getting Ready



[www.unisdr.org/campaign/resilientcities/](http://www.unisdr.org/campaign/resilientcities/)

# Development of the post-2015 framework for disaster risk reduction

## Post-2015 Framework

The Hyogo Framework for Action (HFA) has provided important guidance to reduce disaster risk and strengthen cooperation across stakeholders at multiple levels. However, its implementation has also highlighted important gaps in the formulation of goals and priorities for actions. For example, while priorities 1,2,3 and 5 were often deemed to be directly actionable and specific, priority 4 has proven to be challenging. As a result, a post-2015 framework for disaster risk reduction is now being developed to update and reorder the strategic goals and priorities, giving appropriate visibility to all levels and placing greater emphasis on stakeholders and their role in advancing the priorities.

Since the adoption of the HFA, countries in all regions have been reporting steady progress in strengthening their institutional, legislative and policy frameworks. Many have suggested that this has contributed to decreasing mortality risk, especially from floods and tropical storms. Progress has also been made in risk assessment, education, research and public awareness, and many countries have been increasing their investments in risk reduction, as well as developing risk-transfer mechanisms. Such reports suggest that the HFA has been an important instrument in raising institutional awareness and understanding, while also instilling political will.

Despite this positive evaluation, biennial reports of countries on the HFA implementation indicate that exposure of people and assets in all countries have been increasing faster than vulnerability has been decreasing. This has resulted in new risk and increasing disasters losses, with significant socio-economic impact in the short, medium and long terms, especially at the local and community level.

The Co-Chair's pre-zero draft of the post-2015 framework for disaster risk reduction notes that, "There are risk factors which have not received sufficient attention and indeed constitute underlying risk drivers. Factors such as unequal economic development, poorly managed urban development and ecosystems, poverty and inequality, weak participatory governance, weak enforcement, insufficient local capacities, inadequate and inappropriate policies and resources, conflicts, and climate change and variability compound disaster risk and hence the levels of disaster loss." Despite progress, there is evidently much work ahead and these factors can certainly inform future research agendas.

Perhaps of most relevance to the ANDROID network, the pre-zero draft also identifies an important role for academia and research, who are encouraged to, "focus on the evolving nature of risk and scenarios in the medium and long terms; increase research for local application and support to local communities and authorities' action; and support the interface policy-science for effective decision making."

This judgment aligns well with ANDROID's remit. Since starting in 2011, ANDROID has set out to promote co-operation and innovation among European Higher Education to increase society's resilience to disasters of human and natural origin. It also has a strong emphasis on inter-sectoral cooperation.

The pre-zero draft can be downloaded from:  
<http://www.wcdrr.org/preparatory/post2015>

## Third UN World Conference on DRR

The Third UN World Conference on Disaster Risk Reduction will be held from 14 to 18 March 2015 in Sendai City, Miyagi Prefecture, Japan. Several thousand participants are expected, including at related events linked to the World Conference under the umbrella of building the resilience of nations and communities to disasters.

The United Nations General Assembly Resolution for 2013 on International Strategy for Disaster Reduction states that the World Conference will result in a concise, focused, forward-looking, and action-oriented outcome document and will have the following objectives:

- To complete assessment and review of the implementation of the Hyogo Framework for Action;
- To consider the experience gained through the regional and national strategies/institutions and plans for disaster risk reduction and their recommendations as well as relevant regional agreements within the implementation of the Hyogo Framework of Action;
- To adopt a post-2015 framework for disaster risk reduction;
- To identify modalities of cooperation based on commitments to implement a post-2015 framework for disaster risk reduction;
- To determine modalities to periodically review the implementation of a post-2015 framework for disaster risk reduction.

The Third UN World Conference on Disaster Risk Reduction and its preparatory process welcome the participation and contributions of all relevant stakeholders, including parliaments, civil society, the International Red Cross and Red Crescent Movement, non-governmental organizations, national platforms for disaster risk reduction, focal points for the Hyogo Framework for Action, local government representatives, scientific institutions and the private sector, as well as organizations of the United Nations system and intergovernmental organizations.

Further information about the conference can be found at:  
<http://www.wcdrr.org/conference>

### The ANDROID Disaster Resilience Network is linked to a global campaign that aims to make cities more resilient to disasters.

The Making Cities Resilient: 'My City is getting ready!' campaign, launched in May 2010, addresses issues of local governance and urban risk. With the support and recommendation of many partners and participants, and a Mayors Statement made during the 2011 Global Platform for Disaster Risk Reduction, the Making Cities Resilient campaign will carry on beyond 2015.

See [www.unisdr.org/campaign/resilientcities/](http://www.unisdr.org/campaign/resilientcities/) for further information.

# HORIZON 2020

'Horizon 2020' is the EU flagship programme for Research and Technological Development. With an overall budget of EUR 80 billion (LKR 14,000 billion) over the period 2014-2020 the programme is one of the most significant in its kind. This is in addition to the private investment that this money will attract.

It is also most open to international cooperation. It aims to boost knowledge-driven economies through research and innovation and promises new breakthroughs, discoveries and world-firsts by taking great ideas 'from the lab to the market'. By coupling research and innovation, Horizon 2020 is helping to achieve the aim of securing Europe's global competitiveness with its emphasis on excellent science, industrial leadership and tackling societal challenges.

The programme consists of three separate pillars, addressing key priorities where there is clear Union added value.

By 2050, the world population may reach nine billion people, and two fifths of that population will be over 50 years old. Three quarters of the global population will live in cities, and over 60% will live in small households - alone or with just one other person. These profound demographic changes will take place in the course of just a few decades. How can we find sustainable solutions to problems such as energy supplies, global warming, public health, security or water and food resources?

Investing in quality and relevant research and technological development is the key to supporting resource efficiency and diversity, protecting the environment, combating poverty and social exclusion... in short, to creating a better society for citizens.

Horizon 2020 reflects these policy priorities of the Europe 2020 strategy and addresses major concerns shared by citizens in Europe and elsewhere. A challenge-based approach will bring together resources and knowledge across different fields, technologies and disciplines, including social sciences and the humanities. This will cover activities from research to market with a new focus on innovation-related activities, such as piloting, demonstration, test-beds, and support for public procurement and market uptake.

Priorities for funding include sciences, industrial leadership and global challenges.

## 1. Excellent Science

## 2. Industrial Leadership

## 3. Societal Challenges

Horizon 2020 aims to solve some of society's biggest challenges, from ageing populations to the need for clean energy, and keep Europe's economy competitive over the long term. It provides €31.5 billion of research funding under societal challenges. Accordingly, the third pillar of Horizon 2020 is built upon the concerns of citizens and society combined with EU policy objectives. Funding focuses upon seven societal challenges, several of them that directly link to increasing societal resilience.

<p><b>Challenge 1 - Health, Demographic Change and Wellbeing</b></p> <p>Responding to this challenge, research and innovation (R&amp;I) under Horizon 2020 is an investment in better health for all. It aims to keep older people active and independent for longer and supports the development of new, safer and more effective interventions. R&amp;I under Horizon 2020 also contributes to the sustainability of health and care systems. During the first two years (Work Programme for 2014/15), the EU will invest in Personalising health and care, and Coordination activities.</p> <p>R&amp;I supported by Personalising health and care will:</p> <ul style="list-style-type: none"> <li>improve EU's understanding of the causes and mechanisms underlying health, healthy ageing and disease;</li> <li>improve EU's ability to monitor health and to prevent, detect, treat and manage disease;</li> <li>support older persons to remain active and healthy and</li> <li>test and demonstrate new models and tools for health and care delivery.</li> </ul> <p>R&amp;I supported by Coordination activities will leverage Member State activities in areas including neuroscience, cancer, systems medicine. Several activities not included in the 2014/15 work programme will also be part of this challenge, notably the Innovative Medicines Initiative, the European and Developing Countries Clinical Trials Partnership (EDCTP), and the Active and Assisted Living Programme.</p>	<p><b>Challenge 5 - Climate Action, Environment, Resource Efficiency and Raw Materials</b></p> <p>Activities in this Challenge will help increase European competitiveness, raw materials security and improve wellbeing. At the same time they will assure environmental integrity, resilience and sustainability with the aim of keeping average global warming below 2°C and enabling ecosystems and society to adapt to climate change and other environmental changes. This Challenge funds research and innovation with the following specific objectives:</p> <ul style="list-style-type: none"> <li>to achieve a resource – and water - efficient and climate change resilient economy and society</li> <li>the protection and sustainable management of natural resources and ecosystems</li> <li>a sustainable supply and use of raw materials, in order to meet the needs of a growing global population within the sustainable limits of the planet's natural resources and eco-systems</li> </ul> <p>Research and innovation under this challenge will cover the broad lines of activities of Fighting and adapting to climate change; Protecting the environment, sustainably managing natural resources, water, biodiversity and ecosystems; Ensuring the sustainable supply of non-energy and non-agricultural raw materials; Enabling the transition towards a green economy and society through eco-innovation; Developing comprehensive and sustained global environmental observation and information systems; and Cultural heritage.</p>
<p><b>Challenge 2 - Food Security, Sustainable Agriculture and Forestry, Marine and Maritime and Inland Water Research, and the Bioeconomy</b></p> <p>The EU has recognised that a transition is needed towards an optimal and renewable use of biological resources and towards sustainable primary production and processing systems. These systems will need to produce more food, fibre and other bio-based products with minimised inputs, environmental impact and greenhouse gas emissions, and with enhanced ecosystem services, zero waste and adequate societal value. Agriculture, forestry, fisheries and aquaculture, together with the bio-based industries, are integral parts of the European economy and society. Relying on the use of limited natural resources, these sectors produce and process biological resources to satisfy the demand of consumers and a wide range of industries for food, feed, bio-energy and bio-based products. While they enhance Europe's self-reliance and provide jobs and business opportunities essential for rural, coastal and marine areas, these sectors are also facing significant challenges which require solutions based on research and innovation.</p>	<p><b>Challenge 6 - Europe in a Changing World - Inclusive, Innovative and Reflective Societies</b></p> <p>Europe faces huge challenges in reducing inequality and social exclusion. Reducing inequalities and social exclusion in Europe (80 million people at risk of poverty, 14 million young people not in education, employment or training), overcoming the economic and financial crisis and tackling unemployment (12% in EU and above 20% of youth unemployment in 2012) are crucial challenges for the future of Europe. Supporting inclusive, innovative and reflective societies is a prerequisite for a sustainable European integration. In this context, this Societal Challenge of the Horizon 2020 programme aims at fostering a greater understanding of Europe, by providing solutions and support inclusive, innovative and reflective European societies with an innovative public sector in a context of unprecedented transformations and growing global interdependencies. This will promote coherent and effective cooperation with third countries.</p>
<p><b>Challenge 3 - Secure, Clean and Efficient Energy</b></p> <p>The Energy Challenge is designed to support the transition to a reliable, sustainable and competitive energy system. To make the transition to a competitive energy system, the EU needs to overcome challenges such as increasingly scarce resources, growing energy needs and climate change. The Challenge is structured around seven specific objectives and research areas:</p> <ul style="list-style-type: none"> <li>reducing energy consumption and carbon footprint</li> <li>low-cost, low-carbon electricity supply</li> <li>alternative fuels and mobile energy sources</li> <li>a single, smart European electricity grid</li> <li>new knowledge and technologies</li> <li>robust decision making and public engagement</li> <li>market uptake of energy and ICT innovation</li> </ul>	<p><b>Challenge 7 - Secure Societies – Protecting Freedom and Security of Europe and its Citizens</b></p> <p>This Challenge is about undertaking the research and innovation activities needed to protect citizens, society and economy of the EU as well as its infrastructures and services, prosperity, political stability and wellbeing. The primary aims of the Secure Societies Challenge are:</p> <ul style="list-style-type: none"> <li>to enhance the resilience of EU society against natural and man-made disasters, ranging from the development of new crisis management tools to communication interoperability, and to develop novel solutions for the protection of critical infrastructure</li> <li>to fight crime and terrorism ranging from new forensic tools to protection against explosives</li> <li>to improve border security, ranging from improved maritime border protection to supply chain security and to support the Union's external security policies including through conflict prevention and peace building</li> <li>and to provide enhanced cyber-security, ranging from secure information sharing to new assurance models</li> </ul>
<p><b>Challenge 4 - Smart, Green and Integrated Transport</b></p> <p>This challenge aims to boost the competitiveness of the European transport industries and achieve a European transport system that is resource-efficient, climate-and-environmentally-friendly, safe and seamless for the benefit of all citizens, the economy and society. The Challenge will contribute to four key objectives, each supported by specific activities. They are:</p> <ul style="list-style-type: none"> <li>a resource efficient transport that respects the environment</li> <li>a better mobility, less congestion, more safety and security</li> <li>a global leadership for the European transport industry</li> <li>a socio-economic and behavioural research and forward looking activities for policy making</li> </ul>	<p>The European Commission website contains detailed information about Horizon 2020  <a href="http://www.ec.europa.eu/programmes/horizon2020/">www.ec.europa.eu/programmes/horizon2020/</a></p>

# Spatial information in disaster management, risk reduction and disaster resilience

**Prof. Marinko Oluić from GEOSAT Ltd, a key partner in the ANDROID network, provides an introduction to spatial information (including remote sensing) in disaster management, risk reduction and disaster resilience.**

It is rightly to say that the 21st century is the century of the Urban- Settlements, because half of the Earth's inhabitants live within urban areas. It has been predicted that by 2050, about 70 percent of the world's population will reside in urban areas (UN, 2008, and 2011). Rapid urbanization causes the increase of urban risk of natural disasters as well.

Natural disasters such as earthquakes and floods have the ability to affect many people, not only through financial destruction they cause, but also through death, injury and homelessness. It can also cause drastic changes to the living environment, provoking large-scale human migration. Earthquakes may be known as the most prevailing natural hazards, because earthquakes occur very frequently, around 5 million times annually, including 18-20 strong earthquakes above M,7.0, and 100-200 strong earthquakes with M,6.0-6.9 (Huadong et al., 2009).

According to statistical data, in the last decade only, from earthquakes and their tsunamis, around 800,000 people lost their lives, along with serious economic damage.

Nowadays, human society has a rich knowledge in fighting against natural disasters. Spatial analysis of densely populated centres is necessary in order to conceptualize urban growth patterns, essential for land-use planning and urban-growth modelling and natural hazard mitigation. Satellites around the Earth have formed an Earth observation system for floods and earthquake. They can observe in the real- time and grasp the disaster development signs, then early warning or even forecasting of disaster's occurrence could be skilfully done.

A densimetric mapping technique is one potential solution for mapping population density relative to residential land-cover. Densimetric mapping depicts quantitative areal data using boundaries that divide the area into zones homogenous land use and land cover: classify homogeneous zones of high, low, and non-urban land cover. GIS-based analysis uses to assess demographic sensitivity and population exposure. Geographic information system (GIS) technology is a powerful data management tool that strings together unconnected data sources for quicker analysis, organization, and sharing of information. Best practices showed that from the beginning of disaster GIS played an important role in relief efforts. GIS maps acted as guides to affected areas and were used to coordinate emergency services and rebuilding (Cygan & Patterson, 2010)

Geo-information for disaster and risk management service for rapid flood mapping, of flooding and landslide events, for earthquake risk assessment and loss estimation studies is to assess the natural hazard and consequent risk due to the earthquake quantitatively.

An improvement of earthquake preparation and response, implementation of seismic mitigation measures, enabling accurate post-earthquake alerts and rapid assessment of direct and indirect losses, increase of public and administrative awareness on earthquake risk and increase of earthquake insurance usage at the city level, decreased the number and quantity in losses.

A disaster risk management approach is leading to an outcome of strengthened resilience, and optimized use available resources.

Spatial - based information using in earthquake problems could be divided into three phases: pre-, co- and post-seismic activities.

## Information provides on pre- earthquake occurrences

In order to be able to reduce human losses to natural hazards, it is necessary to know where such losses can occur and what caused them. Now, more than half of the world's large cities, with populations ranging from 2 to 15 million are located in areas at high risk of seismic activity (UNISDR, 2011).

Earthquake disaster mitigation aims to protect the public against the possible impact of future earthquake events. New technologies have given us tools to reduce the effects of natural hazards and minimize the destruction they cause.

Recently the rapid provision of high-quality radar and optical satellite imagery has enabled quick and detailed evaluation of disaster areas. Satellite remote sensing has many merits such as wide coverage, and repeated observation and lack of restrictions from space. Remote sensing and GIS/Web-GIS are increasingly recognized as useful tools for facing the challenges of inventory data development for mega-cities. Satellite and aerial imagery have enormous potential to provide detailed information at different resolutions, across a range of time periods (Nolte et al., 2010)

Nowadays, over 50 environmental satellites orbiting around the Earth give us very useful information. There is an increasing use of Earth observation (EO) technologies in post disaster damage assessment. EO technologies utilize information from space and airborne systems through sensors. From decades of work on disaster relief EO can provide considerable help especially using methods of optical and microwave technologies. Optical sensors have a long history and their technical advantage gives them an irreplaceable role in EO. However, microwave sensors have day-and night capability and are not affected by cloud conditions, rain or darkness, impeding the work of radar sensors. The most frequently used microwave sensor is Synthetic Aperture Radar (SAR).

In terms of earthquake disaster mitigation and relief, remote sensing data are used for regional structural/tectonic mapping (mapping of active faults and seismogenic structures) and investigation of the small areas (cities and their environs). They are important for emergency relief logistics, estimation of settlement and structural vulnerability (eg. building design)

# Disaster Risk Reduction and Management

and exposure (e.g. proximity to active earthquake zones). Space data also contribute to damage mapping using high-resolution satellite imagery, and they are of immense importance for relief agencies that need to locate victims and assess risk. SAR interferometry is increasingly used for the mapping of seismic ground deformation, providing the information on pre-, co- and post-seismic deformation. They contribute to better understanding of active fault mechanics, dynamics and strain (Huadong & et al., 2009).

It is necessary to carry out pre-disaster planning and establish relations between the participating entities; the strategy can be prepared before the disaster and activated when needed. The full scale pre-disaster effort can help in creation of more lively and disaster resistant communities. It is necessary to increase investment in disaster risk reduction at the local level and ensure that national growth does not increase local risks. The aim of the socio-economic impact module is to quantify socio-economic effects of earthquakes. There is also need to calculate probabilistic and event-based financial losses.

Remote sensing makes available forecast early warning, emergency response related information; helping end-users

*Below: A Disaster Support System Web-GIS application. The screens portray several snapshots of a flooding management support system in Bolivia.*

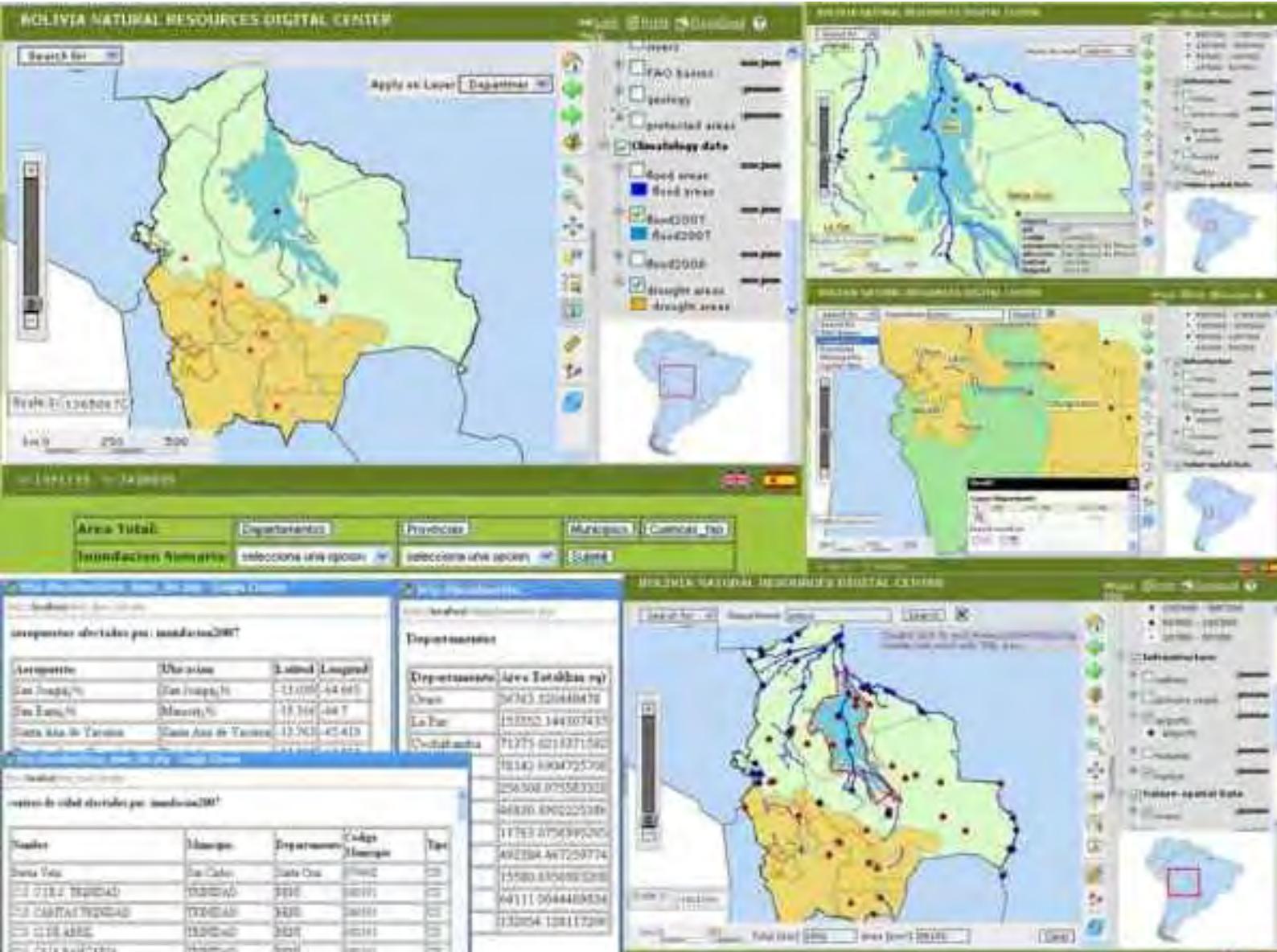
to build capacity to use all space-based information made available to support emergency events by existing mechanisms and initiatives (support early warning system: monitoring, emergency response as well as early recovery).

It is very important to carry out applicable research on active fault (e.g. create a 3D map of the active fault system), exploration, earthquake disaster forecasts and emergency decision making in cities: city condition, building types, facility types, lifeline projects, population, economic belt and scale.

Using Geographic Information Systems (GIS) for mapping and spatial data analysis of disaster risk reduction related hazard exposure, vulnerability and risk. It is important to research on the effects of an earthquake on essential infrastructure, such as: tank towers, bridges, dams, underground pipelines, communication systems, power supply systems, water and gas supply systems and buildings (there are scientific problems).

## Co-earthquake seismic activities

In the first hours and days of an earthquake emergency for having the right information is very critical. It is vital to have right picture of what has happened and who are the people



effected. To have such information it is necessary to do the planning. It is well known that the earthquake disaster often occurs very suddenly in only several dozen of seconds or few minutes, and often without obvious warning signs, as people are unaware of the event until it hits them. Strong earthquake may result in collapsed houses, fires, and can cause damage to power and water supplies, road traffic and communication can be seriously damaged, and it can cause tsunamis in the coastal regions.

The earthquake can cause deaths, injuries, and cut of electricity, communications, transportations and water supplies. In such chaotic situation people are in confusion and they are not able to think and work rationally.

Losses from natural hazards could be measured in two ways: economic losses from damaged buildings and community infrastructure; and human deaths and injuries.

The elements at risk consist of the building stock, population and infrastructure. They are currently being compiled by individual countries.

There is not substitute for real-time data and information in the aftermath of disaster. Post event activities require quick and accurate information about damage and casualties to coordinate a response to the catastrophe. Damage information is vital as an independent source of loss estimation and to determine insurance claims. Needed information could be provided through the high resolution satellite and aerial imagery in real-time.

One of the most important challenges for the policy makers and aid providers is to make homes available to the homeless victims in an as short as possible period (e.g. to construct as many as possible homes in 2-4 weeks after disaster).

An evaluation procedure of sanitary vulnerability of a territorial system falling within a high seismic risk area, related to casualty treatment capability of hospitals after an earthquake. Provide services and situational updates on items such as the number of wounded, available staff on-site, and additional staffing requirements needed.

### **Post disaster damage assessment**

Earthquake risk assessment and loss estimation studies; seismic risk assessment will be obtained using the existing or updated databases. The elements at risk consist of the building stock, population, and infrastructure!

For that purposes, geospatial and space-based information could be used, as a way of contributing to the resilience of nations to disasters. It is well known that the strong earthquake may result in collapse of houses, fires, and damage to power and water supplies, and cause a large number of human victims. The question is how can we reduce human losses to natural hazards, when we do not know where such losses occur and what caused them. An answer could be the improvement of earthquake preparation and response, implementation of

seismic mitigation measures, enabling accurate post earthquake alerts and rapid assessment of direct and indirect loses. For post-disaster, satellite and aerial imagery has been accepted as a valuable source for understanding human and geophysical aspect of disasters (Gillespie & Adams, 2008). There is not substitute for real-time data and information in the aftermath of disaster Post-quake activities require quick and accurate information about damage and casualties to coordinate a response to the catastrophe. Damage information is very important as an independent source of loss estimation and to determine insurance claims. For humanitarian relief, estimates of affected population and casualties are critical for planning relief and response activities (Note et al., 2010). High quality satellite imagery has enabled quick and detailed evolution on disaster area. Based on satellite images it is possible to register and identify fully- situation in the hit area: to recognize the parts of the city which is destroyed and to do the mapping of parts which are more and less damaged; to identify community objects of infrastructure: roads, electricity power, pipelines, water supply, to recommend the best way to evacuate people and to suggest the best place for a location etc.

In such situation the GIS-based earthquake loss estimation tool is very useful. Geo-referenced risk model could be Internet-based earthquake loss estimation tool important for emergency managers and responders. Post earthquake reconstruction on Haiti provided helpful information, based on experience, for the purpose of future analysis of reconstruction plans, design proposals review, submitted for the building better Communities programme, including assigning different seismic design levels reduce fatalities /Haiti Earthquake Success Story-USEHAZUS/. The technical approaches to our urban earthquake threats allow us to build smarter and safer, and to reduce existing disaster potential. The question is how to involve multi-stakeholders in local disaster risk reduction, how to enhance early warning systems, and make cities resilient?

Among other things, it is of a paramount importance to raise the public awareness regarding the earthquakes and their subsequent cause of events. Governments and their citizens should be aware of the benefits of urban risk reduction. Pre planning and attributing assignments to a vast number of citizens and authorities, with detailed instructions of who is doing what, are vital. This could imply the establishment of local association of citizens closely related to local authorities responsible for behaviour in case of catastrophe. Apart from that, early warning system and response and water risk management should be established.

### **Summary**

Natural disasters, particularly those caused by earthquakes and floods, are in increase and are reported to bring a devastating economic loss and human suffering.

The suddenness and destructin of earthquakes often result in rescue decisions being delayed, chaotic situation, confusion of people who are unable to think, make plans and work rationally.

Science and new technology has given us tools to reduce

effects of natural hazards and minimize the destruction they cause. Advanced Earth observation and the role of spatial information technologies, including remote sensing and GIS in disaster management and risk reduction has been widely used in this field; including the information collected on the ground. Satellite imagery and aerial photography has many merits, especially high-resolution satellite images (optical and microwave sensors). They are suitable for large scale terrain mapping and detailed investigation of the small area (cities and their environs). Spatial-based information using in earthquake problems could be divided into pre-quake, co- and post seismic quake. Earthquake disaster mitigation aims to protect the public against the possible impact of future earthquake events. Remote sensing will make available early warning, emergency response related information.

In the first time of an earthquake emergency for having the right information is essentially important. Such information can provide adequate satellite images obtained in real-time.

Post-quake activities require quick and accurate information about damage and casualties to coordinate a response to the catastrophe. In that case satellite data obtained in real time are not substitute. It is necessary to raise the awareness of citizens and governments at all levels for the benefit of reducing urban risks.

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# Write for ANDROID Exchange

The ANDROID Disaster Resilience Network provides an opportunity for people to share knowledge and experience. ANDROID Exchange is written by the ANDROID membership for the ANDROID membership, and also for other readers working with national and international NGOs, UN agencies, government and donor institutions, academics, and independent consultants.

We, the Editors of ANDROID Exchange, welcome contributions from ANDROID Members and Associate Members. We are also pleased to consider articles submitted by anyone involved in some way in increasing societal resilience to disasters. If you have knowledge and experience to share, please consider making a contribution.

The scope of contributions should be consistent with the aims of ANDROID. The network's teaching and research is concerned with what resilience is, what it means to society, and how societies might achieve greater resilience in the face of increasing threats from natural and human induced hazards. Typically, we welcome contributions in the following categories (word counts are advisory):

- News and reports from activities and events linked to the Network (100 - 500 words)
- Reports on developments in the field / projects that are being investigated by partners – these do not have to be activities directly linked to the Network, but should be relevant to Network members (100 - 500 words)
- Useful Resources – relevant publications, websites (up to 20 - 40 words)
- Upcoming events (20 words)

We welcome suggestions for alternative types / styles of contribution. If you have an idea for an article that you would like to develop, the Editors would be pleased to discuss it with you - send an email to [android@disaster-resilience.net](mailto:android@disaster-resilience.net).

The Editors reserve the right to edit any contribution.

This edition of ANDROID exchange was edited by Professor Richard Haigh.

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