

TeMA

Journal of
Land Use, Mobility and Environment

The special issue collects the proceedings of the Session "Smart and Resilient Cities: Ideas and Practices from the South of Europe" of the European Conference On Climate Adaptation (ECCA), held in Copenhagen in May 2015. The contributions shed light on the relationships between the emerging paradigms of Smart City and Resilient City, providing hints for developing integrated strategies in the face of climate change.

TeMA Journal of Land Use, Mobility and Environment offers papers with a unified approach to planning and mobility. TeMA has also received the Sparc Europe Seal of Open Access Journals released by Scholarly Publishing and Academic Resources Coalition (SPARC Europe) and the Directory of Open Access Journals (DOAJ).

SMART AND RESILIENT CITIES IDEAS AND PRACTICES FROM THE SOUTH OF EUROPE

SPECIAL ISSUE ECCA 2015



print ISSN 1970-9889 e-ISSN 1970-9870
University of Naples Federico II

TeMA

Journal of
Land Use, Mobility and Environment

Special Issue ECCA (2015)

SMART AND RESILIENT CITIES

IDEAS AND PRACTICES

FROM THE SOUTH OF EUROPE

Published by

Laboratory of Land Use Mobility and Environment
DICEA - Department of Civil, Architectural and Environmental Engineering
University of Naples "Federico II"

TeMA is realized by CAB - Center for Libraries at "Federico II" University of Naples using Open Journal System

Editor-in-chief: Rocco Papa
print ISSN 1970-9889 | on line ISSN 1970-9870
Licence: Cancelleria del Tribunale di Napoli, n° 6 of 29/01/2008

Editorial correspondence

Laboratory of Land Use Mobility and Environment
DICEA - Department of Civil, Architectural and Environmental Engineering
University of Naples "Federico II"
Piazzale Tecchio, 80
80125 Naples
web: www.tema.unina.it
e-mail: redazione.tema@unina.it

TeMA. Journal of Land Use, Mobility and Environment offers researches, applications and contributions with a unified approach to planning and mobility and publishes original inter-disciplinary papers on the interaction of transport, land use and environment. Domains include: engineering, planning, modeling, behavior, economics, geography, regional science, sociology, architecture and design, network science and complex systems.

The Italian *National Agency for the Evaluation of Universities and Research Institutes* (ANVUR) classified TeMA as scientific journal in the Area 08. TeMA has also received the *Sparc Europe Seal for Open Access Journals* released by *Scholarly Publishing and Academic Resources Coalition* (SPARC Europe) and the *Directory of Open Access Journals* (DOAJ). TeMA is published under a Creative Commons Attribution 3.0 License and is blind peer reviewed at least by two referees selected among high-profile scientists. TeMA has been published since 2007 and is indexed in the main bibliographical databases and it is present in the catalogues of hundreds of academic and research libraries worldwide.

EDITOR IN-CHIEF

Rocco Papa, University of Naples Federico II, Italy

EDITORIAL ADVISORY BOARD

Mir Ali, University of Illinois, USA

Luca Bertolini, University of Amsterdam, Netherlands

Luuk Boelens, Ghent University, Belgium

Dino Borri, Polytechnic University of Bari, Italy

Enrique Calderon, Polytechnic University of Madrid, Spain

Roberto Camagni, Polytechnic University of Milan, Italy

Derrick De Kerckhove, University of Toronto, Canada

Mark Deakin, Edinburgh Napier University, Scotland

Aharon Kellerman, University of Haifa, Israel

Nicos Komninos, Aristotle University of Thessaloniki, Greece

David Matthew Levinson, University of Minnesota, USA

Paolo Malanima, Magna Graecia University of Catanzaro, Italy

Agostino Nuzzolo, Tor Vergata University of Rome, Italy

Rocco Papa, University of Naples Federico II, Italy

Serge Salat, Urban Morphology and Complex Systems Institute, France

Mattheos Santamouris, National Kapodistrian University of Athens, Greece

Ali Soltani, Shiraz University, Iran

ASSOCIATE EDITORS

Rosaria Battarra, National Research Council Institute of Studies on Mediterranean Societies, Italy

Luigi dell'Olio, University of Cantabria, Spain

Romano Fistola, University of Sannio, Italy

Adriana Galderisi, University of Naples Federico II, Italy

Carmela Gargiulo, University of Naples Federico II, Italy

Thomas Hartmann, Utrecht University, Netherlands

Markus Hesse, University of Luxemburg, Luxemburg

Seda Kundak, Technical University of Istanbul, Turkey

Rosa Anna La Rocca, University of Naples Federico II, Italy

Houshmand E. Masoumi, Technical University of Berlin, Germany

Giuseppe Mazzeo, National Research Council Institute of Studies on Mediterranean Societies, Italy

Nicola Morelli, Aalborg University, Denmark

Enrica Papa, Ghent University, Belgium

Dorina Pojani, University of Queensland, Australia

Floriana Zucaro, University of Naples Federico II, Italy

EDITORIAL STAFF

Gennaro Angiello, PhD student at University of Naples Federico II, Italy

Gerardo Carpentieri, PhD student at University of Naples Federico II, Italy

Stefano Franco, PhD student at Luiss University Rome, Italy

Raffaella Niglio, PhD student at University of Naples Federico II, Italy

Laura Russo, PhD student at University of Naples Federico II – Italy

Andrea Tulisi, PhD at University of Naples Federico II, Italy

Special Issue ECCA (2015)

SMART AND RESILIENT CITIES IDEAS AND PRACTICES FROM THE SOUTH OF EUROPE

Contents

- 3** EDITORIAL PREFACE
A. Galderisi, K. Firus
- 7** **Adaptation to Climate Change:
Barriers in the Turkish Local Context.**
O. Balaban, M. Senol Balaban
- 23** **Understanding How and Why Cities Engage with Climate Policy:
an Analysis of Local Climate Action in Spain and Italy**
S. De Gregotio Hurtado, M. Olazabal, M. Salvia, F. Pietrapertosa,
E. Olazabal, D. Geneletti, V. D'Alonzo, S. Di Leo, D. Reckien
- 47** **Policies of Resilience in the New Institutional Process .
The Case-Studies of Palermo and Siracusa in the South of Italy**
F. Trapani, L. Minozzi
- 63** **European Cities Dealing with Climate Issues:
Ideas and Tools for a Better Framing of Current Practices**
R. Papa, A. Galderisi, M. Vigo Majello, E. Saretta
- 81** **Smartness and Urban Resilience. A Model of Energy Saving**
C. Gargiulo, F. Zucaro
- 103** **The Potential of Periurban Areas
for the Resilience of Metropolitan Region**
A. Colucci

123 **Public Private Partnerships for Italian Resilient Communities**
P. Pelizzaro

135 **Exploring Issues Limiting the Use of Knowledge in Disaster Risk Reduction**
J. Norton, F. Atun, M. Dandoulaki



How to cite item in APA format:

Norton, J., Atun, F., Dandoulaki, M. (2015). Exploring issues limiting the use of knowledge in Disaster Risk Reduction. *Tema. Journal of Land Use, Mobility and Environment*, 8 (Special Issue ECCA 2015), 135-154. doi: <http://dx.doi.org/10.6092/1970-9870/3032>



EXPLORING ISSUES LIMITING THE USE OF KNOWLEDGE IN DISASTER RISK REDUCTION

J. NORTON^a · F. ATUN^b · M. DANDOULAKI^c

^a Development Workshop France (DWF), France
e-mail: john.norton@dwf.org; URL: <http://www.dwf.org/>

^b Politecnico di Milano, Department of Architecture and Urban Studies, Italy
e-mail: funda.atun@polimi.it; URL: www.dastu.polimi.it

^c Harokopio University, Department of Geography, Athens, Greece.
e-mail: mdand@tee.gr; URL: <http://www.hua.gr/index.php/en/>

ABSTRACT

This paper highlights issues that appear to have hampered the development and use of knowledge and discusses what these imply for applying (or not) the concept of smart cities in different contexts. The conclusions are based on the findings of four sets of work in the context of the KNOW-4-DRR project. From the findings of these activities, it emerges that although there are differences in context, risk and culture, there is a surprising degree of commonality in opinions about why there is insufficient development and application of knowledge for disaster risk reduction, despite the large volumes of information developed on this subject. As regards ICTs, findings suggest that technology, although useful, is not the sole solution for knowledge-based decision making for DRR. In this respect the benefits of smartness in cities are uncertain and depend on the context, where the employment of simpler or more traditional means can be more appropriate for enabling knowledge.

A final conclusion is that no matter how useful, knowledge itself is not a panacea for DRR. Decision-making is invariably influenced by conflicting priorities, objectives and constraints, and not necessarily in all stakeholders' interests or even reflecting their objectives. For example in the midst of the Greek economic crisis, disaster risk awareness and acceptability are becoming less a matter of DRR information and knowledge and must rather be addressed with a view to the new hierarchy of risks (socio-economic, health, emerging) generated by the crisis. However, acknowledging the complexity of the issue should not stand in the way of much needed efforts towards enabling knowledge for DRR with all the tools available in today's changing world.

KEYWORDS:

disaster risk reduction, knowledge, communication, smart cities, civil society

1 INTRODUCTION

Information and communication are increasingly becoming a matter of interest in contemporary cities and especially in areas of higher vulnerability. Before becoming knowledge, information is transferred via communication tools. With this, conceptual variants, such as the smart city, intelligent city, or creative city, are readily used and reused. In a broad definition, a city may be called 'smart' "when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory government" (Caragliu et al. 2009 as referred to in Schaffers et al. (2011). Of special interest for this paper is a knowledge-based conceptual vision of the smart city, centered on people's information and knowledge of people, in order to improve decision-making processes, as has been suggested by Negre et al. (2015).

Recently, there are several studies focused on better management of knowledge in Disaster Risk Reduction. White et al. (2001), is the milestone article that stresses on the increasing social and economic losses after each disaster, although we know more about Disaster Risk Reduction. The growing literature on the subject tries to find a reason behind the increasing number of losses and to provide solutions. Mercer et al. (2010), Gaillard and Mercer (2012) state that there is a need to concentrate on integration of indigenous and scientific knowledge. Besides, Engel et al. (2014) focus on the cultural differences. Another group of researchers concentrate on developing applicable knowledge management systems. The latter include the Know-4-DRR project group (Menoni et al. 2014, Weichselgartner and Pigeon 2015, Spiekermann 2015), as well as Tom de Grove et al. (2013), and Cash et al. (2003).

Within this notion, this paper focuses on disaster risk reduction (DRR) as a means to mitigate the erosion of sustainable economic growth and quality of life caused by disasters. Our effort is to understand what has hampered the use of knowledge that has been developed so far by various stakeholders, in conjunction or disjunction from each other, in order to make appropriate decisions for risk mitigation and further on to transform these decisions into practice.

In this frame, and despite considerable progress made in DRR over the last decades, and whilst a great deal of both information and knowledge about DRR and CCA exists, such information and knowledge is not necessarily available to those who need it most, or at least it is not available in a form or in a timely manner conducive to helping concerned stakeholders make use of it in actions to reduce risk and adapt to the challenges of climate change (Norton et al, 2014).

Does this mean that smart access to information and related systems may not, at least not yet, always be the right way to go? Does it suggest at least that to go in a more balanced way giving attention to both existing and new ways of communication and information and knowledge management? This is reflected in the paradox that the immense enlargement of disaster-related research and the increase of scientific activities have so far had limited impact on reversing the upward trend in disaster damage (Spiekermann et al, 2015) and precisely expressed by White et al. (2001) as "knowing better and losing even more". It raises the question about who actually 'knows better', and about how best to share this?

When considering risk and disaster risk reduction, an inherent feature of the challenge of disaster risk reduction and, even more so, that of addressing both known and as yet unknown consequences of climate change, is the issue of uncertainty. Whilst there will always be things that are not fully understood, given the complexity of world systems (Brodine, 2013) and consequently there will always be degrees of uncertainty, so too we can see that at a more focussed level related to the quality of information and knowledge, and the way it flows between and within stakeholder groups, the quality of this communication also directly contributes to either generating or reducing uncertainty in the DRR decision-making and response process.

2 THE CASE MATERIAL - METHODOLOGY AND THE QUESTIONS.

The authors individually employed a wide range of research tools to tackle the issue of information and knowledge use.

Firstly, based on case studies of disaster events, and actions both before and after these, there has been an effort to map and assess information and knowledge flows from and to different stakeholder groups in different contexts of risk and vulnerability, to examine where information and knowledge flows support, or not, disaster risk reduction by different stakeholder groups within and between different social groups. The authors asked the project partners submitting these case studies to focus on a set of questions, listed in the next section, to explore what happened in the flow of information and the sharing of knowledge.

Secondly, surveys were performed in Istanbul and Mexico City, addressing the same questions (see below) about information flows and knowledge development for DRR put to representatives of civil society, private and public sectors, scientists and NGO's in order to obtain different contextual views.

Thirdly, further analysis was carried out through focus group discussion in Athens (Know-4-DRR Deliverable 2.4. Dandoulaki et al, 2014). The Athens work considered in particular the impact of current economic crisis on disaster risk reduction and climate change adaptation and the various fallout impacts on practices and society that have changed as a result of crisis.

Finally, a Living Lab exercise in Vietnam over a period of two years, building on the NGO 'Development Workshop France's' 25-year experience promoting the preventive strengthening of houses and public buildings to resist the impact of floods and typhoons (Norton et al. 2015) in Vietnam and neighbouring countries, has contributed one source of multi-stakeholder experience and views on information flows and knowledge development in areas with frequent disaster events.

3 MAPPING INFORMATION AND KNOWLEDGE FLOWS IN DIFFERENT SITUATIONS OF RISK AND DISASTER

3.1 METHODOLOGY AND ANALYSIS

Eleven cases providing information on both European and non-European events and experience were used as a basis for the mapping of information and knowledge flows from and to different stakeholder groups in a spectrum of contexts of risk and disaster, to examine where information and knowledge flows support, or not, disaster risk reduction by different stakeholder groups and within and between different social groups. A series of questions were put to project partners who had provided disaster-related case studies in order to identify possible answers. How is "available" knowledge used? Has the information sent been received, understood, and acted open by various actors in at risk environments?

The case studies¹ are listed below:

- Severe floods along the ELBE river, Germany, August 2002;
- Relocation of landslide survivors in Chiapas State, Mexico, 2005 and subsequent years;
- The Lorca earthquake, Spain, 11th May 2011;
- Typhoon events, 2006 & 2009, Vietnam;
- Ilia forest fires, August 2007, Greece;
- Kalamata earthquake, Greece, 1986;
- Sea level rise & Climate Change Adaptation, Greece;
- Flood event in the Salzach catchment, Austria, June 2013;
- Umbria Flood event, Italy, November 2012;

¹ The case studies were provided by partners in the EU FP7 Project n° 603807 'KNOW-4-DRR'

- La Faute-sur-Mer flood disaster, Atlantic Coast, France, February 2010;
- People-centred tsunami early warning, Padang, West Sumatra.

The case studies considered, in broad terms, communication and knowledge development between four stakeholder groups: the Public Sector, Scientists, the Private Sector, and Civil Society, including households and individuals.

What several of the case studies indicated is that whilst there is learning and progress about pre- and post-disaster performance at public sector and scientist level, overall, at civil society level, there appears to be much less information usefully sent *by* higher level stakeholders, including the public sector and scientists, but that even less is received from civil society stakeholders. As such, although the information exists, it does not adequately constitute “knowledge that can be acted on”, particularly at local levels. There are also insufficiencies in the degree of feedback that reaches up *to* the “higher level” stakeholders and decision makers among the stakeholder groups consisting of scientists and the public sector. Overall there are indications of a gap between these different stakeholder groups. Quite often, one group of people, for example, researchers or Public service ‘information senders’ do not know what became of their information. They may also not know what knowledge and information is developed by other people even within their own stakeholder group – e.g. scientists not communicating between themselves - , and they are very often unaware of the measures employed locally by civil society to address DRR. For this reason, the focus of questions addressed to KNOW-4-DRR partners on knowledge flows, were aimed to determine what happened to information ‘sent’, and how and why it was used (or not used) by the different stakeholders with differing priorities, needs and capacities. The case study providers were asked to focus on the following questions:

What?	What information was sent by this stakeholder about the identified risk or hazard (or event) in this case study?
How?	How was this information sent? How often? Was the information fragmented in this process and did this hinder its use? How?
To whom?	Who was the information sent to (to which initial target stakeholders)? Was there an indication that the message/information was received?
Onward transfer?	Was the information passed on by a receiving stakeholder to other/additional stakeholders (e.g. from the local authority to households)? Was information shared/networked?
What action? By whom?	How was the information used? Did it influence any decision-making or not? How and who by?
Why not?	If information was not, or was only partially, used by this stakeholder to influence decision-making or action, why was this? E.g. Other priorities: finance, etc.
Feedback?	Was there feedback from this stakeholder (recipient) to the sender of information? Did feedback/evaluation influence subsequent policy/actions?
Uncertainty?	Did the information help reduce risk or uncertainty? How and why?
Wisdom?	Did information become knowledge/wisdom?

The resulting information received from case study providers enabled the authors to develop a “snapshot” of what happened to the information flow and knowledge development in circumstances and related actions that led up to each disaster event, what communication occurred as the event unfolded, and what then followed in its aftermath. Note that the cases do not necessarily reflect the longer term loops of changes and wisdom that might have gone on to improve subsequent resilience and disaster risk reduction, but the cases have shown that whilst lessons are indeed learned and improvements are made, communication to and from the private sector and civil society is insufficient. For example, in the 2013 Salzach Catchment flood event in Austria, the meteorological service (ZAMG), as reported by the University of Salzburg, said that faced with a large number of partners, they

assumed that the information sent had reached these partners, confirmation being in the form of signs of responsive action (Norton et al, 2014)

To complete the mapping exercise, the authors considered that it was vital to present case study information visually, as graphic visualisations more readily convey meaning that can be lost in text. We mapped each case study as a single-page graphic, on a matrix that brings together the stakeholders in four groups on the Y axis, and, on the X axis, a simplified version of the Disaster Management Cycle Phases to show at which point in the Disaster Management Cycle (DMC) information was transmitted, to whom and how, and whether it helped decision-making in a DRR context. Between the X and Y axes, data (drawn from the case material) was inserted in the form of notes to which a visual analysis was added using the following symbols:

-  a blockage – no decision-making
-  unsure result
-  knowledge leads to action
-  information flow (up or down)
-  an alert for a situation/context which is altering the environment or context, and is thus potentially changing decision-making attitudes and priorities
-  Media hub
-  Knowledge acquired but not wisdom

The intention has been to be able to see quickly where blockage occurs or action is taken on the basis of the information transmitted. An example of one of the European case studies is provided on the following page.

To a certain extent, the actual detail in the notes is less important than the snapshot impression – is there a problem or not?

An example table is provided on the next page, and one can see in this case study provided by the Harokopio University of Athens (Dandoulaki et al, 2013), on the forest fires in Greece in 2007. Past forest use linked to turpentine harvesting; now undergrowth cutting neglected & little local participation. Poor preventive action makes firefighting harder. The fires caused huge losses. Afterwards lessons learnt for fire prevention. But uncontrolled urbanisation keeps fire risk high.

Prior to the fires, in the critical period when structural and non-structural mitigation and early warning could have taken place, there were quite considerable failures in transmission and reception of information; positively, there was then better learning and improvement in the recovery phase of the event.

Once completed, the 'information flow' tables were reviewed to highlight answers to the question: did information help decision-making and a DRR outcome or not?

Here the Figure for the Ilia Forest Fires is included.

STAKEHOLDERS		ILIA FOREST FIRES, AUGUST 2007, GREECE: DISASTER MANAGEMENT PHASES							
		Before the fires	Early warning	During the event - action	Recovery & reconstruction	Period after recovery			
Public sector	National Civil Protection authority	Annual warning about forest fire risk & advice ↓	NCP daily forest fire warning on web site ✓		Central govt calls for donations Iliia disaster generated changes for Forest Fire management ✓	New risk reduction plans ✓	Adaptation options promoted	Min Env promotes public education	
	Local authorities	Message OK; but Forest Fire Risk not a priority; lack funds, so often no action ✗	Municipality & services issue daily fire warning correctly	Alert signal not linked to efficient mobilization & management system ✗	Role of state agencies reduces traditional community engagement in preventing fires ✗	Bureaucracy simplified ✓	Local authorities gain experience & bring changes ✓✓	Municipality gets key role in evacuation	Municipal Forest Fire campaign & environment centers ✓
	Forest service (FS)	Tension between old FS & new GFS blocks knowledge sharing after transfer of responsibilities to GFS ✗							
	Greek Fire service (GFS)								
Scientists	Risk experts	Published Climate Change scenarios but did not influence policy or decision making ✗			Scientists/civil society prepare reconstruction plans; NOT USED ✗	Forest fire mitigation studies may be used in future ?	Experts advocate for change in Forest fire approach ?		
Private sector	Media			Media communicate about prevention measures ?	Media created fear & insecurity ✗	Media spreads call for donations. ✓	Media promoted reforestation by volunteers. ✓		
	Volunteers						Volunteers given legal status as result of disaster ✓		
Civil society	NGO & Citizen associations	NGO deliver information about CCA impacts & adaptation actions ✓ ?				Donations	NGO active in raising public awareness on CC agenda & prevention policies ✓	NGO work on forest fire assessment, for future use. ?	
	Communities/ Households / individuals	Forest management linked to turpentine production ceased, prevention culture & community response lost. Clearing of undergrowth not maintained. Change in socio-economic situation & uncontrolled urbanisation increase risk; houses surrounded by undergrowth & trees exposed to fire risk. ⚠		Media info not used: People do not know how to confront forest fires, only have theoretical knowledge ✗		Media encourage volunteers ✓ Old forest management knowledge declines; Despite repeated fires, awareness of forest knowledge may have decline ⚠		Public more aware of prevention measures ✓	

Fig. 1 Information flow: Iliia forest fires, August 2007

3.2 THE OUTCOME FROM MAPPING THE CASE STUDIES

“INFORMATION THAT HAD A NEGATIVE OR LOW IMPACT”

DID THE INFORMATION HELP DECISION-MAKING AND A DRR OUTCOME? WHO FOR?

- Multiplicity of organizations and agencies dealing with aspects of the disaster management cycle.
Several of the case studies indicate that the multiplicity of services and agencies - at national and sub-national levels of authority and amongst various departments and services - has hindered efficient DRR decision-making and has also been one of the sources of confusion felt amongst subsidiary stakeholders.
- Top-down strategy and policy too theoretical and difficult to implement.
The case studies linked concern about macro-level decision-making in DRR strategy with concern that top-down DRR policy, planning and instructions are based on broad brush theory resulting in instructions and action plans that were not easy to operate locally, highlighting a gap between decisions coming from central and even decentralised government on the one hand, and the realities of local implementation needs and capacity on the other.
- Information too little or late, sometimes incorrect or not understood by target stakeholder.
Information about what action to take that can become useful knowledge to inform decisions about DRR; the results have often been found to be inadequate, e.g., that people did not fully appreciate the risk, that there was no time to take any action, or that they were ill informed. And plainly, especially for rapid onset disasters when early warning is not possible, there is the important need to develop and maintain long-term awareness of both the risk and required risk reduction actions.
- Stakeholder capacity building and awareness raising.
Several case studies indicated that for the dissemination of information to be useful for target stakeholder decision-making about DRR, more attention needs to be paid to stakeholder capacity building and related awareness-raising regarding the need for preventive action and thus what action to take. This means doing more to enable stakeholders to correctly interpret and understand information that is being disseminated, so that they will be in a position to consider what it means for them and what action could be taken in their local context and circumstances.
- One way information flow/insufficient feedback.
There is recognition that the flow of information should be considered as a flow of information in many directions, an exchange of information, with information and lessons learned returning to inform and improve the quality of data and information that will then, in turn, contribute to knowledge about DRR and CCA. The case studies suggested that this does not happen nearly enough. There is insufficient feedback and exchange.
- Loss or absence of knowledge: the value of local or indigenous knowledge about risks and responses:
Local collective and indigenous knowledge is still seen as being of great importance (Sendai 2015). Concern was raised in the case studies that indigenous knowledge and practice are being lost or undervalued, and there are examples of people coming into new environments, for example in the “la Faute sur Mer” flood disaster case (Pigeon, 2013), where people did not know of the risks, nor did they know what to do in the event of a disaster.
- Media as an uncertain communication interface
Media as an uncertain communication interface.
In the process of transferring information to other stakeholders, and especially to the private sector and civil society, the most cited method used is communication through the interface of public and social media. A 2007 survey by scientists following the Ilia forest fires (Karanikola et al., 2013)

suggested that “during the awareness raising period, the mass media is a most effective communication tool”. But the case studies actually highlighted that the role of, and the quality of information imparted through, public media has given mixed results, both bad and good, sometimes being too late or inaccurate.

- Decision-making influenced by other priorities, objectives and constraints not necessarily in the interest of the vulnerable.

Decision-making in times of crisis (Dandoulaki et al, 2014) is but one example where collective and individual decision-making for DRR may be a low priority, and the Faute Sur Mer flood disaster in 2010 (Pigeon, 2013) showed that the desire for economic and population growth in the commune took priority.

“INFORMATION THAT HAD A POSITIVE IMPACT” (DECISIONS MADE/ACTION TAKEN, KNOWLEDGE ACQUIRED & USED).

- In the majority of the cases studied, but not all, the reported disaster event has been a catalyst in bringing about legal, institutional and social change in both awareness and practical knowledge related to DRR and, by extension, has improved the exchange of knowledge and the development of wisdom to support DRR. Many of the measures taken are inscribed in new legislation and one can expect such action to have sustained results.
- Although the case studies are limited in the time period they cover, there are nevertheless indications that there is a general evolving improvement in DRR procedures. For example, in both Europe and South East Asia, there are indications that disaster risk management structures and practice are being rationalised, including information sharing. In particular, efforts have been made to simplify the coordination of information that has to be disseminated in the period before, during, and after disaster events.
- There have been increases in inter-disciplinary work, with examples between universities and public institutions, between insurers and governments. All the parties concerned have tended to become more aware of the risks and of the need for an exchange of information about knowledge and the lessons learned. This was confirmed after the Iliia forest fire event in Greece in 2007 which generated changes in Forest Fire management (Norton et al, 2014). In the case studies there have also been improvements in multi-stakeholder involvement.

4 FACE TO FACE QUESTIONNAIRES, WITH RESPONDENTS IN ISTANBUL (TURKEY) AND MEXICO CITY (MEXICO), TALKING TO PEOPLE FROM THE PUBLIC AND PRIVATE SECTORS, SCIENTISTS, AND CIVIL SOCIETY

4.1. METHODOLOGY AND ANALYSIS

The face to face questionnaire surveys used the same questions, slightly reformulated to allow multiple-choice answers. Here too, somewhat unexpectedly, there are common points in the responses despite the differences in context and culture.

Overall, the details concerning hazard and associated risk and vulnerabilities, what was done in preparation, what actually happened, and what was communicated – or not – is only an indicator of a bigger picture of the shortcomings or successes of communicating information and knowledge for DRR action and, hopefully, of moves towards climate change adaptation.

4.2 A SHORT SURVEY IN ISTANBUL

Istanbul is located in the Northwest part of Turkey, in the "Marmara Region", surrounded by the Black Sea on the north, the Marmara Sea on the south, and the "Bosporus Strait" in the middle, connecting the two seas. Istanbul is the largest city in Turkey, among the largest urban agglomerations in Europe, and among the largest cities in the world with a population of 13,483, 052 people (TUIK, 2011). Today Istanbul is the primary city of Turkey as it covers an area of 5,512 kilometres square, with 18% of Turkey's population and 23% of the GDP (IMM, 2008).

However, this uniquely located cultural, commercial and economic centre of Turkey is under risk of seismicity due to the North Anatolian fault line which lies under the Marmara Sea. This fault line is one of the most active boundaries in the world and resembles the San Francisco fault line in terms of characteristics of seismic activity. The two recent earthquakes on this fault line occurred in 1999 with magnitudes of 7.4 and 7.2 on the eastern part of Istanbul. The recent earthquakes have increased risk of a major earthquake with an epicentre close to Istanbul due to an east-to west progression of earthquakes along this fault line. Apart from causing extensive damage, these two earthquakes also raised the issue of the vulnerability of structures in this region and the faults in the existing emergency system of Turkey in general.

In the Istanbul case, the respondents for the survey were chosen carefully. The first step of the survey includes exploratory interviews conducted during the conference in August 2014. The second step includes online questionnaires sent to people through emails. The participants of the online questionnaires had again been carefully chosen. In total, 17 subjects participated in the survey regarding the information flow and knowledge production in the newly constructed DRR system after the 1999 Marmara Earthquake.

On one hand, the results are in line with those obtained from the case studies in Europe, but on the other, they also include some local issues that can be seen only in Istanbul due to the particular historical and political background of the country. There are three prominent issues deserving to be mentioned here. These three issues concern "outreach of the information to public", "lack of coordination" and "implementation".

First of all, "can outreach of the information to the public really help to increase public awareness?" Respondents from public organizations mentioned their concerns about this issue. In the case of Istanbul, there is a huge gap between the information available to the public and the amount of information received by the general public. Having information available for public access does not mean that the public knows about it, or that they will receive sufficient and correct information. Lay people's general tendency is to ignore information regarding DRR, although their awareness of risk is very high (Atun, 2013; Atun 2014). Both the organizations which provide information and the general public need to collaborate on this issue. One of the respondents suggested that there should be pilot studies conducted by the experts with the involvement of the public to set an example for further studies.

Secondly, several respondents stressed the lack of coordination between the various organizations. Due to Istanbul's vulnerability to major earthquake risk since the 1999 Marmara earthquake, the system in Turkey has moved from post-disaster response to disaster risk reduction. There are several organizations both from public and private organizations working to achieve the same aim. However, there is a need for better collaboration between those organizations if they are to implement plans and policies successfully. To achieve better collaboration, trust-building activities are necessary, especially between NGO's and public institutions.

Last but not least, one of the respondents from a private organization pointed out an interesting issue regarding the implementation of the disaster risk reduction projects. He stressed that the disaster-risk reduction-related projects conducted in Istanbul aim to construct disaster resilient modern living areas. However, according to the respondent, those projects should have a society-centric approach. In Istanbul

there are regeneration projects implemented in the areas most vulnerable to earthquake. The common characteristic of those areas is that they are socially depressed. Inhabitants of those areas can no longer afford to live in the same areas after regeneration, as the newly constructed modern buildings attract high income groups. As a result of this, owners of the vulnerable building stocks are forced to leave their neighborhoods. It may be said that the regeneration projects conducted in the high level risk areas decrease structural vulnerability in the area, but at the same time, these projects may cause an increase of social vulnerability not related solely to the earthquake.

4.3 ROUND TABLE DISCUSSION AND FOCUS GROUP INTERVIEWS IN MEXICO CITY

During the Mexico City workshop on "Gathering Knowledge between Latin America and Europe on Disaster Risk reduction and Climate Change Adaptation" at Ciesas, in Mexico City, (April 2015) one of the activities was a round table discussion where we conducted the questionnaires and afterwards the discussion with the representatives of the four stakeholder groups: scientists, NGO's, the public and private sectors. The KNOW-4-DRR participants had already presented the key points aligning Vietnam and Europe that were presented at the end of section 4.1. 'Considering Europe and Vietnam.'

The round table discussion started with the state of the notion of knowledge. The participants all agreed that knowledge is produced in academia, and in the Latin American approach, 'local knowledge' does not exist. They prefer the term of "*saber*" instead of saying local knowledge, which means "*to be informed*" in English. One respondent went on to say that the role of academics is to focus on ways to increase knowledge. Regarding one of the participant's recent research projects, in Latin America, 40% of the research projects are produced in universities. However, one problem is that the research topics are chosen without considering current needs, and most of the time the interest of the researchers and their ability or the funding agencies' wishes, dictate the form of the research. So, it is possible that the knowledge produced is not needed in the field, where somebody solves the existing problem with the tools they already have. Secondly, a problem is that knowledge is easily lost when the research project finishes. The question raised at this point is thus how to close the gap between real knowledge demand with the production of the knowledge, and how to prevent knowledge being lost.

Indeed, some organizations have tried to bridge the gap between knowledge demand and production by including local partners. However, one respondent stated that the success criterion in the academic system is the number of publications, not their effort to work with and collect local information from the local actors. This vision does not encourage academics to involve the stakeholders directly, as this is very demanding. Another barrier to effective knowledge production is institutional segmentation. Having a complex system with different actors negatively affects the production of knowledge. Besides, there are two different epistemological communities for DRR and CCA knowledge, and according to one of the respondents, knowledge transfer does not occur between these two communities.

The discussion on the understanding of risk continued, on one hand regarding the understanding of risk in DRR and CCA communities, and on the other hand, the understanding of risk among non-experts. The agreed point was that in both directions there is no common understanding of what we are dealing with. Regarding the former, some of the respondents stated that disaster risk reduction is ignored like some other types of risk, such as the cigarette industry, where despite the fact that people know that smoking kills they continue smoking. There is encouragement to continue bad practices. In terms of laymen, there are several economic and social segments within the society. For example, what does risk mean for very poor people, for example? Within the community, people are concerned about unemployment. When you go to local level, locals say that the problems are illnesses, immigration and land degradation. So, the question that has to be raised is "what is the place of DRR in the problems mentioned?"

One of the respondents underlined the gap between humanitarian aid volunteers/staff and local people. In DRR, people from different cultural backgrounds with different approaches try to communicate, so, he asked whether it is possible to construct an absolute view of knowledge which can be understood by people using different logical chains and terminologies.

"People working on humanitarian aid never understood the logic of the people who are living in a risky place. I wonder whether we can construct an absolute view of knowledge?" (Anonymous)

These considerations indicate that disasters don't connect with the reality of people during their daily routine. Another example can be given from Brazil. One of the respondents from a public institution indicated that they are currently conducting a research project to collect memories and perceptions about historical disasters. As there are no volcanoes and no major earthquakes in Brazil, the respondent said that there is a need to change the mentality of stakeholders regarding risks before trying to apply DRR strategies.

Last but not least, all the respondents agreed on power relationships as one of the major barriers. As in the following, there are several statements coming from the respondents regarding the difficulty of power relations in Latin America. All the statements have been kept anonymous.

- "There is a political influence on how we produce and use knowledge". (Anonymous)
- "Power relations are very hard in Latin America. There is a lack of governance and there is violence at the local level. It tells you what you can do, and what you cannot do." (Anonymous)
- "Science is not objective. Governments defend some specific interest in the social sector. That's why we think saliency is important." (Anonymous)
- "Nobody asks about doing research on tax policy. That's because the tax system responds to certain interests. There are increasing numbers of non-academic institutions generating knowledge and producing huge amounts of documents without passing through peer review – and they have enormous impact (e.g. World Bank literature is considered as 'scientific literature')" (Anonymous)
- "In the institutions people are hired by governments. They already know the answers that need proof." (Anonymous)

One final remark during the discussion was that DRR is a specific social sector in Latin America, one that is almost powerless in a power game. There are many reasons for them to agree that DRR is not a priority. The crucial issue, as suggested by one of the respondents, is to think about how it is possible to change this status quo and how to change this beyond the law.

At the end of the discussion, asked if the participants agreed or not with the conclusions aligning Europe and Vietnam (see end of section 7.1), the replies from Latin American participants agreed with the points aligning Vietnam and Europe based on both European and Vietnamese findings in the KNOW-4-DRR project.

5 FOCUS GROUP DISCUSSION ON THE RELATIONSHIP BETWEEN THE USE OF KNOWLEDGE AND DRR IN THE ERA OF ECONOMIC CRISIS IN GREECE

This case has considered the socio-economic crisis in Greece and its impact on enabling knowledge for DRR. A main challenge for the task at hand has to do with trying to understand how things change while they are changing. Here too there is an inherent uncertainty related to crisis and its evolution.

This uncertainty then adds to the uncertainties associated with global trends and emerging risks associated with disaster risk and climate change. Hence there was a need to conduct research in order to bring up first hand input. To do this it was decided to first identify the main issues to be further investigated and then to attempt to bring together key informants from different fields to exchange views on those issues in an organised manner.

5.1 METHODOLOGY AND ANALYSIS

Three focus groups were organised: the first group with scientists from different fields of expertise, roles and experiences, the second with people from the public sector with various backgrounds and dealing with different sectors and phases of a disaster, and the third with civil society entities. Due to the characteristics of the private sector in Greece, it was decided that a focus group discussion would not be the appropriate method to draw useful insights. Instead, a literature review and an internet search were used. The discussion developed around the following series of topics:

- a. Crisis and disaster risk
- b. Knowledge production, diffusion, maintenance and use in times of crisis
- c. DRR/CCA policies and their implementation in the midst of crisis
- d. The use of knowledge in DRR/CCA policies and their implementation in the crisis era.

5.2 ENABLING KNOWLEDGE FOR DRR IN A TIME OF ECONOMIC CRISIS – THE GREEK CASE

Although each group of stakeholders brought up different insights, one may establish some common notions.

- The current economic (and subsequently social, institutional and political) crisis, with both positive and negative effects, is reproducing existing strengths and weaknesses in the social system. By being a part of that system, entities dealing with DRR face a number of differentiated threats and, in parallel, are also being challenged by some opportunities which they are currently exploring.
- Everyday short-term considerations prevail over long-term strategies and planning. Thus DRR and climate change adaptation lose ground to emergency management. This visible shift calls for convergence between the separated practice and academic communities concerning civil protection, civil defence, and security on the one hand and disaster risk reduction, climate change, and the environment on the other.
- The environment, and especially disaster risk reduction, has lost much of its predominance in the public sphere. Disaster risk negotiates its position with socioeconomic risks and emerging risks. Disaster risk awareness and acceptability are becoming less a matter of information and knowledge, and must be handled within the new risk milieu: crisis.
- Fiscal and economic constraints compel us to set aside the quality of infrastructure and environmental concerns. Quality of life is compromised and so too is disaster risk reduction as part of it.
- Acute shortages in the national budget result in dependency on EU funding and dominance of European policy priorities regarding CCA and DRR to which concerns and interests at a local and national level are forced to adjust.
- Brain drain, merging and abolishing public entities, staff reduction and mobility, forced retirements etc. generate a real concern about data, information and knowledge maintenance and updating.
- In a crisis environment, decisions are hasty and are taken under stress; the political agenda leaves out science. Although knowledge, creativity and inventiveness could be especially beneficial in policy making, evaluation and implementation during times of crisis, this is not the case especially as regards DRR/CCA.

6 THE VIETNAM LIVING LAB: KNOWLEDGE TRANSFER BETWEEN STAKEHOLDERS IN CENTRAL VIETNAM FACED WITH REGULAR TYPHOONS AND FLOODS

6.1. BACKGROUND ON THE DWF PROGRAMME IN VIETNAM

The study in Vietnam builds on the DRR experience gained by DWF in Central Vietnam since 1989. DWF's work has promoted the concept and practice of preventive strengthening of houses and small public buildings so that they can resist the impact of typhoons, whirlwinds and floods. It encourages national and local authorities, local builders and families to integrate the key principles of safer construction into new building and in the retrofitting of existing buildings, especially those of the poor and the very poor. Communication of principles of safe construction and ideas about preventive action to reduce risk and losses are central to this effort. Prevention based on applying generic principles of safety is slightly different from applying regulations and codes for construction, the former encouraging people to understand and apply good and proven practice that can make a large variety of buildings safer against given risks, whilst the latter more often apply to formal sector buildings and less often respected in the realities of the informal sector. For very poor communities, the application of safe construction principles has a greater chance of social appropriation compared with building codes, for various reasons related to poverty and the often incremental process of house building by the poor.

Within this an important part of this strategy is related to getting people to believe that preventive action is possible, useful and affordable. Communication to those who need knowledge of what to do is a key in developing a change in attitudes and ideas about safety. To do this, various stakeholders have participated in ways of communicating ideas about safety in construction and the need for it, and have developed concepts using both old - for example, puppetry and theatre - and new means - increased use of mobile phones and TV for practical messages on what to do - that help lodge the idea of prevention better in the longer term memory; one of the challenges being that of encouraging people to undertake prevention work in periods of the year when it may not seem like a priority.

This mix of old and new communication - always evolving - is most pertinent to the debate about the pros and cons of emerging smart information management systems working alongside older and still valid knowledge sharing approaches: when does emerging media tools such as the use of smart phones convey adequate and actionable information, and when does actionable communication still require face to face contact and door to door visits? Where one has a growing gap between the less vulnerable wealthy middle class and the highly vulnerable poor, this issue is most important.

6. 2. THE LIVING LAB IN VIETNAM - METHODOLOGY AND ANALYSIS

The Living Lab in Vietnam - building on the tasks in the KNOW-4-DRR project and also inspired by the GNDR²/DWF "Action on the Front Line" programme - was constituted as a stakeholder interaction initiative where 'external' stakeholders had long term collaborative links in communities exposed to typhoons and floods, and where there has been an opportunity to work and interact with various implicated stakeholders each with different responsibilities and needs related to a specific hazard or disaster event.

Underpinning the format of the Vietnam Living Lab were the same questions used before for the development and analysis of the case study material and questionnaires mentioned earlier in this paper.

The grass roots "Living Lab" has included enquiry and consideration of how the exchange of information and the co-production of knowledge between various social/institutional groups might more successfully take place or, on the contrary might be hampered under differing circumstances.

² Global Network for Disaster Reduction

The surveys, community meetings and workshops were held in the provinces of Thua Thien Hue and Quang Binh. These activities tracked and assessed the evolution of communication, communication channels and the efficiency or inefficiency of information transfer. They have considered the development of knowledge for disaster risk reduction and in recent years, the search for a better understanding of how to interact/act on climate change and adaptation to climate change. In this Living Laboratory experience, the aim has been to consider and understand the barriers and bridges for information transfer and knowledge development and then to see how communications systems and their success are evolving. This evolution is pivotal to understanding how different stakeholders in Vietnam can be better engaged in the DRR (and CCA) process. The "Laboratory" has covered an eight year period of experience, always considering the flow – or not - of information and knowledge:

Firstly, the DW Vietnam team prepared a benchmark case study to set the overall scene before, during and after, typhoons in 2006 and 2009: typhoon Chanchu (May 2006) and typhoons Xangsane (October 2006) and Ketsana (September 2009) that hit central Vietnam and caused severe damage.

Then in 2013 the team surveyed recent experience after typhoons Wutip (09/13) and Nari (10/13) that hit Quang Binh province and Thua Thien Hue provinces in central Vietnam to provide a contemporary view of information flow and knowledge development on the issues of DRR and CCA, and went back several times to talk to families and local authorities.

Finally, a workshop in September 2014 in Hue, Central Vietnam brought together many different stakeholders, from villagers up to Ministry representatives, to consider the results.

This proved interesting. The observations not only aligned with findings from the field surveys, but interestingly, also aligned with findings from the case studies mentioned earlier in this paper and addressing other societies and regions of the world. (Norton, 2014)

In Vietnam, on the one hand the growing use of newer media opportunities over the past ten years is able to deliver better quality information. Today, most families have a television and watch the evening news. The press, TV and mobile phones have all become important tools in knowledge development. The communication *possibilities* are getting 'smarter'. But against this, the gap between the rich and the poor (as of 2011 still over 12 % live below the poverty line (UNData, 2013)), and the urban-rural gap in Vietnam in particular, remains very significant. This has various consequences related to the safety of poor families and how information about action in emergencies, and for preparedness and prevention can be delivered efficiently to these groups. The Living Lab shows that delivering information to poor and vulnerable families still relies very heavily on direct contact and house-to-house visits. But then, the same can still be said in Europe, for example during the Elbe floods in 2002 in Germany, for this event the case study material suggested that the same kind of direct household communication was also necessary.

In Vietnam, a presentation by Nguyen Thien Nhan (President of the Vietnam Fatherland Front Central Committee (Nhan, 2015)) on the way cities are changing as rural-urban migration becomes a fact of life, he recognised that smart cities technology may certainly be very beneficial (as being tested in several cities in Vietnam). But he suggested that there are issues such as population growth and environment, health, traffic and housing that remain hurdles, and he suggested that these require political will, administrative skill and the participation of citizens. The implication is that alongside smart cities there is a lot to be done that that addresses more fundamental issues linked to socio-economic constraints and values, and these require a mix of old and new information management approaches.

7 DISCUSSION OF RESULTS FROM THE VARIOUS RESEARCH ACTIVITIES

7.1 CONSIDERING EUROPE AND VIETNAM

In reviewing the findings of the Living Lab in Vietnam alongside the findings in the European case studies referred to earlier, one can observe the differences in the socio-economic and political systems that variously condition DRR development in Europe and in Vietnam:

- Europe: democracy, freedom of speech and the ability to critique State interventions in writing, in cartoons and on the street suggest greater opportunities for stakeholder engagement for change and thus for better DRR. But not always, since the environment in which disasters take place is increasingly complex: financial crises, uncertainty and conflicting interests and objectives, increased complexity of risks and associated requirements are just some examples that compound risks and vulnerability - the Université de Savoie case study on the “La Faute sur Mer/Xynthia 2010 catastrophe” that left many dead is only one example of conflicting interests (Pigeon, 2013). Mobilizing social engagement and knowledge sharing in bringing about better safety can still be considered inadequate in many instances.
- Vietnam: an authoritarian political system with low potential for political and social expression; at the same time very considerable experience and concern about the safety and protection of all members of society with an excellent preparedness record. But overall, there remains a separation between instructions on what to do and the means to act on the one hand, and still insufficient lessons that could be learnt from what people at the frontline of risk actually do to protect themselves.

However, between these two different contexts, the various case studies actually suggest that there are quite strong similarities in terms of the delivery of information on DRR and CCA and the development of viable knowledge suited to today's needs across most cases – and the mapping of the exchange of knowledge to support DRR (Norton et al, 2014) supports this conclusion.

Some key points aligning Vietnam and Europe align with a wider summary in 7.2.:

- a multiplicity of agencies with different responsibilities and aims does not always contribute to well-coordinated and clear decisions about DRR and emergency actions; there are some signs of rationalization but more needs to be done; communication is still often poor and does not enhance knowledge development;
- top down strategies criticized as being too theoretical and at times difficult to implement on the ground
- information on extreme weather events criticized for not always being accurate or timely enough, and information sent out is not always understood by the local stakeholders;
- problems of terminology; scientific and even weather warning information not always understandable
- insufficient community feedback;
- loss of local and indigenous knowledge;
- divergent objectives and priorities;
- need to enhance the role of social media in delivering good and useful information, progress being made;
- slowness in knowledge sharing and interdisciplinary work, but getting better;
- lack of resources for local action.

These are all areas where both local stakeholders and representatives of the public sector, scientists and civil society agree that greater awareness of the issues will contribute to improving the quality and delivery of information, and the development of knowledge that leads to a safer environment.

7.2. COMPARISON AND COMMONALITY OF OPINIONS

Considering the various case studies and surveys that have been carried out by the authors and partner organisations in the KNOW-4-DRR project, it goes without saying that there are many variations in each context, be it exposure to particular hazards and risks, the political situation, or the socio-economic nature of the region and its population; when each disaster event is considered, one sees specific shortcomings (and some successes) in the way information for DRR and/or CCA has been handled and how knowledge has, or has not, developed and been put into use.

Thus, on a larger scale, there are different economic and political systems and problems regarding DRR and CCA. However, when one zooms in especially to the opinions of lay people, one realizes that although systems and context are different, they have great similarities in the perception of information development and sharing and of knowledge and understanding at local scale.

We have considered these opinions in three states:

- **Dissemination** – Whether information is proactively disseminated or not. Whether there are established mechanisms for dissemination;
- **Cooperation** – Whether knowledge is shared amongst stakeholders;
- **Implementation** – Whether knowledge is enacted and decisions implemented.

To do this, we drew on the findings of the initial Case studies plus the Istanbul, Latin American and Vietnamese surveys.

Overall, there are of course differences of opinion in every case based on experience, so one person says, “Personally, I received the information that I need to accomplish my task too late”.

Whilst another says, “Personally, I received incorrect information”

But there are a number of common views, of which the most frequent is that interdisciplinary collaboration is necessary, and this is reflected in the findings of the Vietnam Living Lab, where working with, and bringing together, people from different stakeholder groups, and people and groups in different social and economic situations brings great wealth to understanding where communication information sharing and knowledge development can be enhanced. The most common opinions are:

- **the multiplicity of organizations** involved does create difficulty for the implementation of disaster risk reduction policies;
- most of the time, disaster risk reduction **policies are top-down – they can be very difficult to implement locally**;
- decisions regarding disaster risk reduction policies are **too theoretical/not grounded on true local needs**;
- **information flow is one way**, which, among other things, represents a big difference between NGO behaviour and the Private sector but, above all, the failure of the Public Sector to listen to local opinion and concerns;
- **knowledge is often lost** because of lack of sharing and implementation; problems of information being inaccurate when passed on by intermediary communicators, including the media;
- **difficulty in understanding the terminology being used**, e.g., a weather alert may use terms that lay people do not understand;
- There has been an **improvement in the quality of data and information** in recent years but errors and lateness persist;
- Awareness of **DRR and the gradual importance of CCA** are rising among stakeholders but it is **often not a priority** when compared to other and often day-to-day priorities, so that DRR action, for example, habitually takes place too late and, as a consequence, often in a rather haphazard manner.

These already serve as pointers for further action at the levels of scientific research and knowledge development and dissemination

8 CONCLUSIONS

Extended research using a range of methods and techniques was used to identify what hinders the use of knowledge for disaster risk reduction in settings with a different culture, economy, political and socio-economic context and in different risk and disaster situations.

The findings reveal a variety of barriers, many of which depend on context and hazard. However, there are also unexpected shared features, which in turn point to areas where more attention should be paid in research, and to the nature and quality of communication, timeliness and the pertinence of such communication of information and knowledge. For example, there is a broad consensus that the multiplicity of organisations involved in DRR and CCA and often with similar responsibilities, contributes to difficulties in delivering clear, coherent and consistent messages and in turn makes the implementation of disaster risk reduction policies harder; there are frequent examples of difficulties with terminology, so information may be received but not understood.

Whilst this commonality exists when one focusses on the local scale, it is true that other voices suggest, for example in the recent **European Climate Change Adaptation Conference (ECCA) 2015**, that a different geographic spread might have produced more diverse results.

Overall one can see that there are serious issues about the quality of communication and the usefulness of the information imparted and its ability to develop actionable DRR knowledge that can also be of increasing importance for CCA.

If there a general difficulty in terms of actionable knowledge development for DRR and CCA, this becomes even more critical in times of crisis. But we can also see that overall, with over half the world population now living in cities, urbanisation too develops its own forms of crisis and uncertainty, especially for those forced to live in vulnerable areas of urbanised cities.

A criticism made in the Hue Workshop and emerging from the case study surveys is that information flow is one way, and is often not grounded on true local needs, making instructions difficult to implement.

Knowledge and information flows often indicate insufficient feedback and exchange. There seem to be more difficulties in this when other priorities prevail. There are assumptions in the public sector, on the part of service providers and scientists that the act of sending information, publishing it or indeed simply making it available on the Internet fulfils a task of "communication", when in reality in many instances no such assumption can be made. This leaves open the question of 'uncertainty' about who has, or has not been informed in a manner that could lead to decision-making and DRR action. The case studies provided a good deal of comment about "not knowing what to do" and of "information not containing useful guidance". A study after the Iliia forest fires in Greece in 2007 (see table 1) indicated that whilst "during the awareness raising period mass media is a most effective communication tool", two-way communication and discussion are suggested as being an important tool when encouraging stakeholders to embark on new or innovative actions that need explanation, understanding and conviction (Karanikola et al., 2013).

What then of the smart city, where many parts are vulnerable and where the opportunities to meet and exchange and where two-way communication potential may be even more constrained than it was in the past? There is in effect a need for smart communication that bridges the gap between sending out information on the one hand and enabling knowledge development and consequent action on the other.

ICTs could facilitate information. However they too are subjected to organisational, institutional, legal, structural and intrinsic barriers that hinder information and knowledge use. Hence, investment in ICTs should be seen in connection with the broader knowledge and information production and management

framework. Moving on from this, greater use of new social and classic media can also facilitate knowledge development for DRR and awareness of actions for CCA, but we have seen that the media interface between information providers and the desired end user audience can on the one hand be unreliable (e.g. news provided late or misinterpreted), suggesting that more interaction between the public sector, scientists and media would lead to better understating of the issues well in advance of events, thus at the very time when one should be encouraging DRR, but on the other hand, it is also clear that professional communicators have a great potential for improving the quality and viability of the information communicated. (TiConUno, 2014). Faced with challenges to improve knowledge development for DRR and CCA, there are ever-developing ITC and media opportunities that need to emulate past information, communication and knowledge development that not only addressed the technical and practical issues of DRR and CCA, but integrated the social and cultural aspects of communication, exchange and knowledge development that was couched in the framework of local needs and realities. This remains a challenge.

Last but not least, no matter how useful, knowledge itself is no panacea for DRR. Decision-making is invariably influenced by conflicting priorities, objectives and constraints, not necessarily in the interests of all stakeholders or even their objectives. For example, in the midst of the economic crisis, disaster risk awareness and acceptability are becoming less a matter of information and knowledge and must be addressed with a view to the new hierarchy of risks (socio-economic, health, emerging) generated by the crisis. However, acknowledging the complexity of the issue should not stand in the way of much needed efforts towards enabling knowledge for DRR.

ACKNOWLEDGEMENTS

We would especially like to thank the local interview partners and key informants for their input. We would like to thank Patrick Pigeon and Fernando Briones for their collaboration during the Round Table Discussion in Mexico City. In addition, we would like to thank Bruna De Marchi, Maria Jose Jimenez, Mariano Garcia Fernandez and Scira Menoni for their continuous help and comments on the questionnaires and also, Thymios Karymbalis, Yorgos Melissourgos and Sophia Skordili for their contribution to the research concerning the Greek crisis. We are grateful to all partners in KNOW-4-RR for their generous contribution regarding the case studies. The research leading to these findings has received funding from the European Union's Seventh Framework Programme (FP7/2013-2015) under Grant Agreement n° 603807 (KNOW-4-DRR).

REFERENCES

- Atun, F. (2013). Enhancing Resilience of Transportation Systems in Case of Disasters. *Ph.D. Thesis, Politecnico di Milano, Department of Architecture and Urban Studies, PhD. Program in Spatial Planning and Urban Development, 25th Cycle*. March 2013.
- Atun, F. (2014). Improving Societal resilience to Disasters. A case study of London's Transportation System. *Springer*. ISSN 2282-2577
- Brodine. M. (2013). The real scientific uncertainties about climate change. *Accessible at: <http://peoplesworld.org/the-real-scientific-uncertainties-about-climate-change/>*
- Cash, D. W., W. C. Clark, F. Alcock, N. M. Dickson, N. Eckley, D. H. Guston, J. Jäger, and R. B. Mitchell. (2003). "Knowledge Systems for Sustainable Development." *PNAS*, 100 (14): 8086-8091.
- Dandoulaki, M., T. Karymbalis, G. Melissourgos, S. Skordili, and K. Valkanou (2014). Analysis of main fragmentation issues within different stakeholder groups – Part 4. Knowledge in the private sector and the civil society. *Know-4-DRR Deliverable 1.2*. [online] www.know4drr.polimi.it

- Dandoulaki, M., T. Karymbalis, G. Melissourgos, and S. Skordili (2014). From decision to implementation: Barriers and bridges for implementing mitigation and adaptation measures and strategies in times of financial, institutional and political crisis. *Know-4-DRR Deliverable 2.4*. [online] www.know4drd.polimi.it
- De Grove, T., K. Poljansek, D. Ehrlich (2013). Recording Disaster Losses. Recommendations for a European Research. *JRC Scientific and Policy reports. Joint Research Centre, European Commission*.
- Engel, K., G. Frerks, J. Warner, and B. Weijs. (2014). "Flood Disaster Subcultures in The Netherlands: the Parishes of Borgharen and Itteren." *Natural Hazards*, 73 (2): 859-882.
- Gaillard, J. C., and J. Mercer. (2012). From Knowledge to Action: Bridging Gaps in Disaster Risk Reduction. *Progress in Human Geography*. 10.1177/0309132512446717.
- IMM, Istanbul Metropolitan Municipality, (2008). [online] http://www.ibb.gov.tr/en-US/Pages/Home_Page.aspx
- Karanikola P., S. Tampakis, E. Manolas, and G. Tsantopoulos et al. (2013). Analysing the Impacts of Information in the Prevention of Forest Fires in Greece. *Journal of Spatial and Organizational Dynamics*, 1 (2): 71-81
- Menoni, S., J. Weichselgartner, M. Dandoulaki, N. Valkanou, M. J. Jimenez, M. Garcia Fernandez, S. Kienberger, R. Spiekermann, P. Pigeon, F. Briones, J. Norton, and R. Nussbaum (2014). Enabling knowledge for disaster risk reduction and its integration into climate change adaptation. *Input paper prepared for the Global Assessment Report on Disaster Risk Reduction 2015*.
- Mercer, J., I. Kelman, L. Taranis, and S. Suchet-Pearson. (2010). Framework for integrating Indigenous and scientific Knowledge for Disaster Risk Reduction. *Disasters*, 34: 214–239
- Negre, E., C. Rosenthal-Sabroux, and M. Gasco (2015). A knowledge- based conceptual; vision of smart city. *IEEE*, 48th Hawaii International Conference on System Sciences. DOI 10.1109/HICSS.2015.279
- Negre, E., C. Rosenthal-Sabroux, and M. Gasco (2015). A Knowledge-Based Conceptual Vision of the Smart City. *HICSS 2015, 2015 48th Hawaii International Conference on System Sciences (HICSS)*, pp. 2317-2325, doi:10.1109/HICSS.2015.279
- Nhan, N. T. (2015) Smart cities to shape Vietnam's future. *Vietnam investment Review*, [online] <http://www.vir.com.vn/07/09/2105>
- Norton, J., G. Chantry (2011). "Impact Study on Developing Local Capacity to Reduce Vulnerability and Poverty - Disaster Risk Reduction in Central Vietnam" *Building & Social Housing Foundation*, available at <http://www.bshf.org/published-information/publication.cfm?thePubID=E0FC8AB8-15C5-F4C0-999B59AB589F5DE9>
- Norton, J., G. Chantry (2015). The "Living Lab" experience: knowledge transfer between stakeholders in central Vietnam faced with regular typhoons and floods. *KNOW-4-DRR Task 3.2 Final report*. [online] www.know4drd.polimi.it
- Norton, J., G. Chantry (2014). Mapping exchange of knowledge to support DRR" *KNOW-4-DRR Deliverable 2.1*. [online] www.know4drd.polimi.it
- Pigeon, P. (2013). Applying the disaster stakeholder matrix to the case of La Faute sur Mer disaster, Feb. 2010. *UNISAVOIE*, Case Study submitted to KNOW-4-DRR project.
- Schaffers, H., N. Komninos, M. Pallot, and B. Trousse, M. Nilsson, and A. Oliveira (2011). Smart cities and the future internet: Towards cooperation frameworks for open innovation. In: J. Domingue et al. (Eds.): *Future Internet Assembly*, LNCS 6656, pp. 431–446, 2011. Accessible at: SpringerLink.com
- Spiekermann, R., S. Kienberger, J. Norton, F. Briones and J. Weichselgartner (2015). The Disaster-Knowledge Matrix – Reframing and evaluating the knowledge challenges in disaster risk reduction. *International Journal of Disaster Risk Reduction*, 13 (2015) 96-108
- TiConUno. (2014). Guidelines to develop a communication activity for radio and web-TV. *KNOW-4-DRR deliverable 3.5*.
- TUIK. (2011). Turkey's statistical yearbook. *Turkish Statistical Institute*. [online] <http://www.turkstat.gov.tr/>
- UN Data (2013). [online] <http://www.un.org.vn/en/about-viet-nam/basic-statistics/167-basic-statistics.html?tmpl=component&print=1&layout=default&page=>
- Weichselgartner, J., and P. Pigeon (2015). The role of knowledge in disaster risk reduction. *International Journal of*

Disaster Risk Science, (2015) 6:107–116. DOI 10.1007/s13753-015-0052-7

White, G., R. W. Kates, and I. Burton (2001). Knowing Better and Losing Even More: the Use of Knowledge in Hazards Management. *Global Environmental Change, Part B: Environmental Hazards* 3 (3–4): 81–92.

IMAGE SOURCES

Cover image 1: Development Workshop France.

Fig. 1: Harokopio University of Athens, Greece (Data) & Development Workshop France (Analysis table)

AUTHORS' PROFILES

John Norton

President, Development Workshop France (French NGO) specialising in human settlements development problems in less developed countries; masters in Architecture (DIP.AA). Director and co-founder in 1973 of 'Human Settlements Development Workshop'. John Norton has a principle role in policy, strategy and programme development, project organisation and implementation and management of interdisciplinary teams over 40 years in SE Asia, Africa and the Middle East. Programmes include disaster risk reduction & hazard impact mitigation; environmental and energy resources management; rehabilitation and revitalization of communities, including educational facilities; rural and urban planning; income generation, particularly with women; capacity building & training at grass roots and professional levels; promotion of the use of local resources and skill development, and the strengthening of interaction between civil society and local authorities. As well as developing capacities in communities to address emerging issues and rapid changes, he has worked on EU FP7 research including the KNOW-4-DRR project, the EU/Mexico Fonciyct Risk and Vulnerability Network, and has published widely on all aspects of his work.

Funda Atun

Funda Atun has a PhD in Spatial Planning and Urban Development from Politecnico di Milano (2013). She is currently a research fellow at Politecnico di Milano in a Horizon 2020 Project, named EDUCEN: European Disasters in Urban centres: a Culture Expert Network (Cities, Cultures, Catastrophes). In addition to being the author and co-author of several articles/book contributions, she is the author of the book called "*Improving Societal Resilience to Disasters. A case study of London's Transportation system*". Her research interest includes disaster risk management, earthquake risk assessment, flood risk assessment, land use planning, transportation systems prone to disasters and complex system approaches.

Miranda Dandoulaki

Dr. Miranda Dandoulaki is practiced in disaster risk reduction and disaster management. She has studied civil engineering (NTUA 1981). She holds an MSc in regional development (Panteion University 1988) and a PhD in urban planning (NTUA 2008), both relating with earthquake protection. She has worked for Earthquake Planning and Protection Organization of Greece (1994-2002) and has served as Vice Director of the European Centre for the Prevention and Forecasting of Earthquakes of Hazards Major Hazards Agreement of CoE. In the years 2004-2008 she was employed as a scientific officer in the Institute for the Protection and Security of the Citizen of EC/Joint Research Centre in the field of security of critical infrastructure. She is currently appointed by the Greek National School of Public Administration as studies and research officer. Dr. Dandoulaki has considerable field experience in disaster management and has acted as a consultant to local authorities. She has research experience and has published in books and scientific journals.