

Book of abstracts

2017 i-Rec Conference on Disaster Recovery and Reconstruction for Refugees and Displaced Population

**RECONSTRUCTION AND RECOVERY
FOR DISPLACED POPULATIONS
AND REFUGEES**

65.3 Million
people worldwide are forcibly displaced

1 person = 450,000

8th i-Rec June 1-2
International Conference
www.adersim.info.yorku.ca/irec2017

YORK UNIVERSITY
TORONTO, CANADA. **2017**



 International Federation
of Red Cross and Red Crescent Societies

Contents

PLENARY SESSION 1.....	5
PROMOTING SAFER BUILDING: USING SCIENCE, TECHNOLOGY, COMMUNICATIONS AND HUMANITARIAN PRACTICE TO SUPPORT FAMILY AND COMMUNITY SELF-RECOVERY	5
SETTLEMENT POLICIES FOR SYRIAN REFUGEES IN LEBANON AND JORDAN: AN ANALYSIS OF THE BENEFITS AND DRAWBACKS OF ORGANIZED CAMP	7
SESSION 1: DESIGN FOR REFUGEE SPACES REFUGEE CAMPS AND TEMPORARY SPACES 1.....	8
URBANISM OF EMERGENCY: USE AND ADAPTATION OF PUBLIC OPEN SPACES IN DISASTER-INDUCED RESETTLEMENT SITES	8
FROM EMERGENCY TO INTEGRATION? THE SPATIAL CONTROVERSY OF RECEPTION CENTRES .	9
PARTICIPATION PATHWAYS TO INCREASED SOCIAL CAPITAL IN HUMANITARIAN SHELTER PROJECTS	10
SESSION 2: VULNERABILITY REDUCTION, COMMUNITY PARTICIPATION, THE WHOLE COMMUNITY (INCLUSIVE) AND COPING STRATEGIES IN POST DISASTER RECOVERY AND RESETTLEMENT.	11
REDUCING THE VULNERABILITY OF INTERNALLY DISPLACED POPULATIONS THROUGH TACTICAL URBANISM: A CASE OF RESEARCH AND IMPLEMENTATION IN COLOMBIA.....	11
COMMUNITY PARTICIPATION TO IMPROVE DISASTER RECOVERY. AN EXPERIENCE FROM NEPAL EARTHQUAKE	12
PLANNING FOR WHOLEOF-SOCIETY RESETTLEMENT: EXPLORING RESETTLEMENT AGENCIES' EXPERIENCES PLANNING FOR SYRIAN REFUGEE RESETTLEMENT.....	13
LEARNING ABOUT SOCIAL POLICES AND COPING STRATEGIES FOR FORCIBLY DISPLACED PERSONS FROM THE MONTSERRAT VOLCANIC CRISIS	14
SESSION 3: THEORETICAL AND SOCIO-POLITICAL ISSUES OF POST-DISASTER RECONSTRUCTION POLICIES AND PLANNING.....	15
PRIORITISING TRANSFORMATION: POLITICAL, SOCIAL OR TECHNOLOGICAL TRANSFORMATION – WHICH COMES FIRST?	15
SUSTAINABLE FUTURES AND THE PROCESS OF SHELTER AND SETTLEMENT: A DESIGN THEORY PERSPECTIVE	16
ESTABLISHING A CONCEPTUAL FRAMEWORK OF POST-DISASTER RISK REDUCTION AND RELOCATION DECISION MAKING	17
THE IMPACT OF RELOCATION POLICIES ON DIFFERENT HOUSEHOLD GROUPS – THE CASE OF BAM.....	18



PLENARY SESSION 2: THE MAN-MADE CAUSES OF DISASTERS.....	22
EFFECTS OF NATURAL DISASTERS ON DISPLACED WORKERS	22
GRIEVABLE LIVES? VULNERABILITY AMONG THE ROHINGYA OF RAKHINE STATE, MYANMAR	23
SESSION 4: DESIGN FOR REFUGEE SPACES REFUGEE CAMPS AND TEMPORARY SPACES 2.....	24
MULTILEVEL INFORMALITY: SPATIAL CONTROL AND ORGANIZATION IN THE TOI MARKET IN KIBERA (NAIROBI)	24
AMPHIBIOUS RETROFIT: AN ALTERNATIVE TO FLOOD-INDUCED DISPLACEMENT	25
SHELTERING STATUS AFTER 1 YEAR OF THE MULTIPLE DISASTER IN FUKUSHIMA	25
LESSONS FROM POST DISASTER RECONSTRUCTION IN ODISHA – A CASE OF ODISHA DISASTER RECOVERY PROJECT	26
SESSION 5: CLIMATE CHANGE AND CONFLICTS INDUCED DISPLACEMENT.....	27
ANALYSING FLOOD FATALITIES IN VIETNAM USING NATIONAL DISASTER DATABASE FROM 1989 TO 2015 AND REGRESSION METHODS	28
REINFORCING BOTTOM-UP INITIATIVES FOR CLIMATE CHANGE ADAPTATION IN LATIN AMERICA AND THE CARIBBEAN	29
SIMULATING POPULATION DISPLACEMENT FOR HUMANITARIAN RESPONSE	30
ICT AND MOBILE APPLICATIONS FOR DISASTER RISK AND INCREMENTAL HOUSING; THE CASE OF NGOS IN RIO DE JANEIRO	31
SESSION 6: I-REC DEBATE SESSION	33
SHOULD REFUGEES BE SHELTERED AND CONTAINED IN ORGANIZED CAMPS OR IN URBAN AND RURAL AREAS?	33
APPENDIX: ADDITIONAL PAPERS.....	34
HOW TO DESIGN AND IMPLEMENT SPACES FOR CHILDREN AFTER DISASTERS; CASE STUDY BAM CITY	34
LANDSCAPE FOR REFUGEES AND DISPLACED PEOPLE. THE IMPACT OF SYRIAN REFUGEES IN LEBANON	35
SUITABILITY OF DIFFERENT DECISION-MAKING METHOD APPLIED FOR THE SUSTAINABLE POST-DISASTER TEMPORARY HOUSING ANALYSING	36
CITY RESILIENCE MEASUREMENTS: AN INVESTIGATION INTO UNISDR AND ROCKEFELLER TOOLS	37
BUILDING A NEW CITY IN 7 YEARS: THE CASE OF CANAAN, HAITI	38
IN AND OUT OF DISASTER ZONE: THE CASE OF MIGRATION	39
IMPACT OF SOCIAL CHARACTERISTICS OF COMMUNITIES ON WATER SUPPLY SYSTEM RESILIENCE	40



ADAPTATION TO CLIMATE CHANGE IN CUBA. RESETTLEMENT EXPERIENCE IN CARAHATAS ... 41

**CONSIDERING THE SUSTAINABILITY OF POST-DISASTER HOUSING: LIMITATIONS AND
REQUIREMENTS 42**

**FOCUSING ON INTELLIGENT ENERGY PRODUCTION AND ENERGY EFFICIENCY IN CITIES IN THE
PROCESS OF DESIGNING SHELTERS AFTER DISASTER, CASE STUDY: BUSHEHR 43**

PLENARY SESSION 1

PROMOTING SAFER BUILDING: USING SCIENCE, TECHNOLOGY, COMMUNICATIONS AND HUMANITARIAN PRACTICE TO SUPPORT FAMILY AND COMMUNITY SELF- RECOVERY

JUN 1ST, 08:30 – 10:00 ROOM: **HNE 038**

Authors

Bill Flinn, CARE International UK (Flinn@careinternational.org)

John Twigg, Overseas Development Institute

Tiziana Rossetto, University College London

Susanne Sergeant, British Geological Survey

Abstract

Poorly constructed buildings are often the largest cause of injury, trauma and death in a disaster. Most disaster-affected families rebuild their homes with little or no external support. Shelter assistance provided by humanitarian organisations rarely reaches more than 30% of affected households within the first year after a major disaster, and is often significantly lower.¹ Much of that support is in the form of temporary housing which may last only a few years. Of the world's 60 million refugees and IDPs, only 30% are housed by international organisations: the remainder are also self-recovering, in rented accommodation, hosted by friends and family, sleeping rough or in home-made makeshift shelters. ²

There has been very little substantive research and writing on shelter selfrecovery.³ As a result, humanitarian policy makers and shelter professionals lack

understanding of self-recovery processes: they do not know how to offer the most appropriate and effective support. This presentation reports on a project to identify and explore key gaps in our knowledge and understanding of shelter self-recovery after disasters. The research findings will inform humanitarian and other actors' strategies to intervene more effectively to support self-recovery and the construction of safer houses. The initiative is a partnership between the Overseas Development Institute, University College London, the British Geological Survey and



CARE International UK. It is supported by the UK government's Global Challenges Research Fund through the Natural Environment Research Council. The project takes a multi-disciplinary approach, involving specialists in the physical and social sciences, structural engineering and humanitarian assistance. Through this, it seeks to develop a shared understanding of how self-recovery takes place, the drivers and barriers to self-recovery, disaster-affected households' choices and decision-making processes regarding recovery, and the effects of different influences on these (for example, livelihood priorities, finance, culture, local/indigenous technical knowledge, the roles of local governance and institutions, the physical environment and the availability of different forms of assistance). The project also examines how scientific, engineering and construction knowledge currently support self-recovery and how this can be improved. We will present the initial findings from fieldwork in April-May 2017 at a number of different sites in Nepal (looking at recovery since the 2015 earthquake) and the Philippines (recovery following typhoons, particularly Haiyan in 2013 and Haima in 2016), focusing on the implications of this research for self-recovery processes. Although this is a pilot study, it is valuable in providing empirical research findings to support the emerging debate on this important yet neglected topic.

**SETTLEMENT POLICIES FOR SYRIAN REFUGEES IN LEBANON AND JORDAN: AN
ANALYSIS OF THE BENEFITS AND DRAWBACKS OF ORGANIZED CAMP**

JUN 1ST, 08:30 – 10:00 ROOM: HNE 038

Authors

Faten Kikano, PhD candidate affiliated to the IF Research Group (grif), Université de Montréal.

Email: faten.kikano@umontreal.ca

Gonzalo Lizarralde, PhD, Director of the IF Research Group (grif), Université de Montréal.

Email: gonzalo.lizarralde@umontreal.ca

Abstract

Six years after the eruption of the Syrian conflict, Lebanon and Jordan adopted divergent policies in hosting over 2 million Syrian refugees. Whereas Jordan has allowed organized camps, Lebanon adopted a non-encampment policy, leading refugees to spread informally in almost 2000 locations, with only a few camps authorized. This study examines the reasons that led to the adoption of these policies in both countries and their effects on the refugee and host populations. It also analyzes the conditions of refugees in organized camps in both contexts through two comparative case studies: First, in Zaatari, a camp in Jordan with almost 80 000 refugees. Second, in the Union of Relief and Development Associations (URDA) camp in Lebanon, which hosts about 2000 refugees. Data was collected during fieldworks in Jordan in 2015 and in Lebanon in 2015, 2016, and 2017 through field observation and discussions with 41 actors, including camp managers and refugees. The results show that most refugees in Zaatari live in harsh conditions in a context of inequality and restricted freedom. Refugees in the URDA camp live in more favorable conditions and receive increased security, aid and free services. Whereas previous assessments have established that urban refugees in Jordan enjoy better conditions than those in camps, and urban refugees in Lebanon often live in poor conditions, in constant fear and insecurity, empirical findings showed here challenge the paradigm that strongly criticizes encampment. They suggest that, in specific conditions, organized camps can represent a better solution than refugee settlements in urban areas.

SESSION 1: DESIGN FOR REFUGEE SPACES REFUGEE CAMPS AND TEMPORARY SPACES 1

JUN 1ST, 10:30 – 12:00 ROOM: **HNE 038**

**URBANISM OF EMERGENCY: USE AND ADAPTATION OF PUBLIC OPEN SPACES IN
DISASTER-INDUCED RESETTLEMENT SITES**

Authors

Dr **Sandra Carrasco**, Research Fellow, Faculty of Architecture Business and Planning, University of Melbourne, Australia. (sandra.carrasco@unimelb.edu.au)

Dr **David O'Brien**, Senior Lecturer, Faculty of Architecture Business and Planning, University of Melbourne, Australia. (djobrien@unimelb.edu.au)

Keywords: public open spaces, disaster-induced resettlement, community interaction and adaptation.

Abstract

Post-disaster reconstruction projects in areas with high pre-disaster vulnerabilities can lead to both temporary and permanent resettlement outcomes. During this complex process efforts are centred to the provision of housing and basic infrastructure. In general, the limited land available leads to restricting the approach for the spatial design of the settlements to the optimization of the land and allocation of the maximum number of houses possible. Open spaces in these settlements are rarely considered during the planning and implementation of the projects and consequently there is little scholarship of community space.

However, the importance of these open spaces to the community, and the liveability of these new settlements, depends on the interactions which spontaneously takes place in these areas. This study explores the different uses and characteristics of these open spaces in temporary and permanent resettlement sites established in the aftermath of major disasters in Japan, and the Philippines. This study addresses the limitations of the urban planning undertaken in the aftermath of disasters and compares this to the longer term urban space that emerges spontaneously in an attempt by the residents to improve their community.

It was observed that in all the cases, the planning of open and public spaces was not a priority for the governments and the other stakeholders involved in settlement design. However, this study reveals that resettled communities appropriate any available open spaces and transform these spaces to accommodate their needs and cultural preferences, this reflects the vital role of these spaces as urban elements for convergence of the multiple socio-cultural activities towards the recovery and revitalization of the disaster affected communities.

FROM EMERGENCY TO INTEGRATION? THE SPATIAL CONTROVERSY OF RECEPTION CENTRES

Authors

Gisella Calcagno, Dept. of Architecture at University of Florence. (gisella.calcagno@unifi.it)

Roberto Bologna, Dept. of Architecture at University of Florence. (roberto.bologna@unifi.it)

Keywords: *asylum, reception centres, transitional spaces, spatial controversy, spatial conflict.*

Abstract

The Mediterranean migrant/refugee crisis is stressing the capacity (in terms of numbers) and capability (in terms of performances) of European reception systems to guarantee adequate standards of living to asylum seekers and refugees (as for the provision of housing in kind), threatening the protection provided by the right of asylum. The study analyses the spatial phenomenon of “reception centres”, formally instituted by arrival countries (transit or destination ones) to accommodate needy applicants during the asylum procedure, which are spreading across the European borders capes to immediately supply “n. places” for the “n. arrivals”. For the forcibly displaced and mobile populations (forced migrants) reception centres are transitional spaces where the first negotiation of vulnerable belongings takes place, and where the transition from emergency to integration should start. For this reason, the theme of inclusion of asylum seekers and refugees is gradually emerging in many urban agendas.

The topic is carried out through a literature review, which characterises the exceptional status of the asylum seeker and the contradictory nature of hospitality, affecting reception and its spatial practice. A comparative analysis matched European reception centres’ standards (normative) and conditions (reports), in order to contextualize the Italian case study: the mapping controversies method (follow, document and map) is used to critically understand spatial processes and practices within and around Italian reception centres. Finally, the study collected innovative and experimental reception models, emerging in the current architectural discourse on the theme.

Results depict the heterogeneous spectrum of inadequate spatial solutions for reception, which reflects the lack of shared/qualitative standards and of strategic/contingency scenarios able to meet basic human rights within a sustainable and resilient urban development.

The study outline how the spatial controversy of reception is strictly linked with the political issue, but also depends on the spatial agency of local host communities, whose choices influence, in positive or in negative, the irreducible spatial conflict of the everyday life in the centres.

Can architecture should take care of the spatial problem of refugees’ reception? Can spatial agency mediate conflicts within reception centres? Answering to its autonomous task to continuously adapt the built environment to the challenging needs of the changing society... yes, it should.

PARTICIPATION PATHWAYS TO INCREASED SOCIAL CAPITAL IN HUMANITARIAN SHELTER PROJECTS

Authors

Aaron Opdyke, University of Colorado Boulder. (aaron.opdyke@colorado.edu)

Amy Javernick-Will, University of Colorado Boulder. (amy.javernick@colorado.edu)

Keywords: *shelter, participation, social capital, qualitative comparative analysis.*

Abstract

While a rising number of conflicts continue to capture the spotlight, globally, natural disasters displace twice the number of people as conflicts, and have resulted in the displacement of 200 million people in the last 8 years. Sheltering internally displaced persons (IDPs) affected by disasters is a complex challenge that involves a diverse range of stakeholders, including NGOs, governments, and affected populations. Past research has noted the important role of household participation in humanitarian shelter projects, due, in part, to its potential to strengthen community social capital; however, ambiguous definitions of participation have led to conflicting evidence of such benefits. In particular, past research has done little to deconstruct participation, leading to disjointed theory.

This research analysed 19 humanitarian shelter projects following Typhoon Haiyan in the Philippines, to address the question of how household participation leads to increased community social capital. Using fuzzy-set qualitative comparative analysis, we identified 10 participation archetypes in the planning, design, and construction phases of shelter projects and analysed the impact of the participation conditions on social capital outcomes. We identified and calibrated participation conditions based upon 210 semi-structured interviews with NGOs, governments, and households over 4 field visits spanning 3 years and calibrated social capital outcomes from surveys administered to 360 households and community leaders.

We found two pathways of participation that led to higher social capital in communities. The first pathway included the ability of households to select the location of their shelter and conducting damage assessments based upon pre-determined organization criteria rather than household consensus of needs. This pathway reinforces the importance of location in building social cohesion and suggests that more objective methods to assess damage and identify priorities for assistance may mitigate internal community conflicts resulting from aid assistance. The alternative, second pathway, included household and government input into needs assessment and sweat equity. This pathway demonstrates when household priorities were emphasized in programming, collective action through sweat equity was the primary mechanism to create social bonding in shelter programs. Importantly, the two pathways demonstrate that social capital can be the result of differing archetypes of participation in disaster recovery processes. Organizations seeking to increase social capital within communities should consider the impact of connecting different forms of participation across phases of shelter programs.

SESSION 2: VULNERABILITY REDUCTION, COMMUNITY PARTICIPATION, THE WHOLE COMMUNITY (INCLUSIVE) AND COPING STRATEGIES IN POST DISASTER RECOVERY AND RESETTLEMENT.

JUN 1ST, 1:00 – 2:30 ROOM: **HNE 038**

REDUCING THE VULNERABILITY OF INTERNALLY DISPLACED POPULATIONS THROUGH TACTICAL URBANISM: A CASE OF RESEARCH AND IMPLEMENTATION IN COLOMBIA

Authors

Stefania Arango, Universidad del Valle, Cali, Colombia. (stefania.arango@correounivalle.edu.co)

Gonzalo Lizarralde, Université de Montréal, Montréal, Canada. (gonzalo.lizarralde@umontreal.ca)

Benjamín Herazo, Université de Montréal, Montréal, Canada. (bj.herazo.cueto@umontreal.ca)

Adriana López, Universidad del Valle, Cali, Colombia. (adriana.lopez@correounivalle.edu.co)

Keywords: *vulnerability; Risk reduction; Green infrastructure; Tactical urbanism.*

Abstract

Colombia is the country with the second largest Internally Displaced Population (IDP); notably due to rural violence derived from a 50-year long conflict between the government and military groups. Internally displaced person flock to Yumbo to find new opportunities in local industries. Yet this migration process has not been accompanied by timely and inclusive urban and housing development. As a consequence, informal settlements today constitute half of Yumbo's urban fabric. Informal settlements and slums in peri-urban areas in Yumbo are constantly affected by floods, droughts, landslides, erosion, and deforestation. In order to mitigate these risks, the municipality and public service companies have recently built new infrastructure such as canals, retaining walls, and urban drains. However, flood events and disasters are still frequent.

This research and implementation project examines the advantages and limits of tactical urbanism as a way to: (a) reduce the vulnerability of this displaced population, (b) implement green infrastructure to mitigate natural hazards, and (c) protect the ecosystem while producing social benefits. Based on an extensive literature review, it analyses both theoretical concepts and successful cases to recognize the representative elements that can be incorporated in the area of influence of the Yumbo river. A review of the principles of tactical urbanism suggests that these initiatives can potentially be improved by local authorities through financial and technical support and, in some successful cases, replicated in other similar contexts. In order to feed ongoing debates held among stakeholders interested in disaster risk reduction in Yumbo, two pertinent locations are identified for potential interventions. These results can constitute the basis for revising policies for disaster-risk reduction in Yumbo.

COMMUNITY PARTICIPATION TO IMPROVE DISASTER RECOVERY. AN EXPERIENCE FROM NEPAL EARTHQUAKE

Authors

April Aryal, University of Auckland, Auckland, New Zealand. (aary953@aucklanduni.ac.nz)

Suzanne Wilkinson, University of Auckland, Auckland, New Zealand. (s.wilkinson@auckland.ac.nz)

Alice Chang-Richards, University of Auckland, Auckland, New Zealand.
(yan.chang@auckland.ac.nz)

Keywords: *disaster; community; build back better; community resilience; social capital.*

Abstract

A community-based recovery planning is a process where the recovery is enhanced by using social capital, placing the community at the center. The community is composed of the knowledgeable people, friends, and the family members and their expertise and the capacity to aid recovery should be central to recovery processes. The transfer of experience and knowledge is very important for the recovery as the process could be accelerated using ancient and traditional knowledge coupled with modern technologies. A better recovery is unlikely without the active participation from the community. This study focuses on the post-disaster recovery based on the community participation following the Nepal Earthquake. It aims to understand the role of active community participation and its implications for improving recovery. This research is based on the practical implications from the case study of Nepal. The outcomes of this research are from observations after the devastating earthquake of Nepal on April and May of 2015. The active community participation was seen after the earthquakes of Nepal (25 April and 12 May 2015). The volunteers were active for the immediate rescue and the locally available materials were used to construct the temporary shelters and the community was active in preparing food and distribution of water supply. Findings include the importance of social relationship and trust, respect and value for each other, which were the tools during the emergency and even after the disaster. Building better community cohesiveness and assisting community-based recovery helps withstand future disasters. Social cohesion, social bonds, relationships, communications, neighbourhood, and festivals are important for the recovery, and this paper shows that without a focus on community, recovery will worse than expected.

**PLANNING FOR WHOLE-OF-SOCIETY RESETTLEMENT: EXPLORING RESETTLEMENT
AGENCIES' EXPERIENCES PLANNING FOR SYRIAN REFUGEE RESETTLEMENT**

Authors

Catherine Kenny. (catherinekenny1@gmail.com)

Keywords: *resettlement; Syria.*

Abstract

Canada's Syrian refugee resettlement initiative galvanized the country and led to a whole-of-society response from the public and other community partners. For resettlement agencies (non-governmental organizations responsible for overseeing the initial resettlement of refugees), managing relationships among these multiple partners and sectors, as well as offers of goodwill from community members, was essential to the success of the project. This presentation will focus primarily on the relationship between resettlement agencies and the federal government to highlight successes and challenges that resettlement agencies experienced, including inadequate and untimely funding increases and difficulties effectively harnessing community energy. These challenges can be linked back to broader neoliberal restructuring of the (re)settlement sector, characterized by—among other things—decreased funding, increased employment precarity and high rates of employee stress. Therefore, while the relationship between resettlement agencies and the federal government was open, transparent, and collaborative throughout the planning and implementation of this initiative, broader structural weaknesses went unaddressed and were even exacerbated within resettlement agencies.

My data was collected through a close analysis of fourteen semi-structured interviews I conducted with Resettlement Assistance Program service provider organization (RAP SPO) employees. I also interviewed various government officials and other settlement and refugee/immigrant NGO workers to gain a broader understanding of the organizational contexts involved in planning for this resettlement initiative.

LEARNING ABOUT SOCIAL POLICIES AND COPING STRATEGIES FOR FORCIBLY DISPLACED PERSONS FROM THE MONTSERRAT VOLCANIC CRISIS

Authors

Jack L. Rozdilsky, Associate Professor, Disaster and Emergency Management Program, York University. (rozdilsk@yorku.ca)

Keywords: *Forced Displacement, Volcanic Hazards, Montserrat.*

Abstract

This presentation focuses on issues of recovery, reconstruction, and forced displacement caused by natural disaster. Specifically, a case study of the experiences of the eastern Caribbean island of Montserrat will be presented as a contemporary example of forced displacement due to volcanic hazards. Montserrat provides us with a direct example of the multidimensionality and complexity of a situation where both population displacement and disaster-related recovery and reconstruction take place simultaneously. Prior to the volcanic eruption sequence starting in 1995, approximately 10,000 persons resided on Montserrat. Much of that population lived in close proximity to what was thought (in the past) to be a low risk volcano. As the volcanic activity quickly increased, directly threatening the island's population centres on the southern portion of the island, nearly 70% of the island's total population was either evacuated under emergency conditions or individuals who were able to fled on their own recognizance. Those few persons who could not (or would not) leave relocated to the island's north on a temporary basis. The eruptions subsequently destroyed the southern two-thirds of the island, making it difficult for those persons who left to return and the on-island temporary relocations became permanent. Today, Montserrat is coping with the circumstances by focusing all urban development activity in the northern zone of the island, the land area furthest from the volcano. The southern portion of the island exists as a volcanic hazard exclusion zone with zero population. In the subsequent years since the violent eruptions of the late 1990s and early 2000s, many displaced persons have been unable to return to their homes, in part due to land and resource constraints. These persons have become a group of permanent displaced persons who originally fled the volcano approximately 20 years ago. In the present day, the types of volcanic activities that have impacted the local population in the past have generally subsided and the volcanic hazard is closely monitored. Reconstruction and new building have taken place in the island's north, where approximately 5,000 persons now reside. The Montserrat case study shows us a relatively recent example of a natural disaster forced displacement where enough time has passed that we can now begin to consider some of the longer-term social impacts of that crisis. While Montserrat represents a very finite case of forced displacement, lessons learned from the circumstance have the potential to help us to improve the formulation of social policies and coping strategies for forcibly displaced persons.

SESSION 3: THEORETICAL AND SOCIO-POLITICAL ISSUES OF POST-DISASTER RECONSTRUCTION POLICIES AND PLANNING

JUN 1ST, 3:00 – 4:30 ROOM: HNE 038

PRIORITISING TRANSFORMATION: POLITICAL, SOCIAL OR TECHNOLOGICAL TRANSFORMATION – WHICH COMES FIRST?

Authors

Oluwadunsin M. Ajulo, University of Newcastle Australia. (oluwadunsin.ajulo@uon.edu.au)

Jason Von Meding, University of Newcastle Australia. (jason.vonmeding@newcastle.edu.au)

Patrick Tang, University of Newcastle Australia. (patrick.tang@newcastle.edu.au)

Keywords: *transformation, adaptation, disasters.*

Abstract

Researchers on the study of disasters have come to a conclusion that in order to reduce the vulnerability of populations to disasters, it is necessary to look beyond just adaptation because with just adaptation, it may be impossible to build the resilience of the most vulnerable populations. This view is held because while adaptation seeks to maintain the status quo and existing political and social systems, transformation questions existing systems and social norms that breed vulnerability. Transformation has been identified as a better way to adapt to disasters and build resilience. This concept advocates for a paradigm shift in the way things are normally done in communities and governance and for equitable distribution of wealth and justice in communities. There are few examples of communities within which transformation is evident and these changes have been observed to occur in three dimensions; political, social and technological. The aim of this research is to identify which of the three dimensions of transformation is most important in addressing pressing disaster risks and their success rates. This is important because study has shown that transformation, although recommended by researchers for adaptation, has so far been ambiguous and difficult in its implementation. This is so because among several other factors, there is no clear-cut standard upon which transformation is judged, it is hard to tell if either of the three dimensions or a combination of the three is what counts as transformation and what the criteria for determining the need for transformation in communities are. Researchers like Lonsdale have acknowledged the importance of a balance of the three dimensions in achieving transformation, however, starting the transformation with the least possible risks and stress to the community has been a challenging task. This research will be based on secondary data sources from books, journals and internet sources. The research methodology is a comparative analysis study of various communities that have or are transforming by using any of the three approaches and how successful the transformation has been in disaster risk reduction. Measurement of success will be based on reports of researchers that have carried out a study in the area and feedback from residents of the communities affected.

SUSTAINABLE FUTURES AND THE PROCESS OF SHELTER AND SETTLEMENT: A DESIGN THEORY PERSPECTIVE

Authors

Liz Brogden, Urban Informatics Research Lab, Queensland University of Technology, Australia.
(liz.brogden@qut.edu.au)

Keywords: Design; Post-disaster Shelter; Architectural Education; Sustainability; Design Futuring.

Abstract

The 2004 Indian Ocean Tsunami prompted arguably the largest relief and recovery operation ever seen. This event exceeded the capacity of agencies to address the need for adequate shelter and settlements, and prompted widespread evaluation of the humanitarian system. Prior to this, architects contributed minimally to the task of humanitarian aid (Aquilino, 2011; Charlesworth, 2014a), and where they were involved it was typically in a technical or logistical capacity rather than as design professionals (Charlesworth, 2014b). A rapidly changing shelter sector has been calling for greater engagement from private industry and the incorporation of specialist skills and knowledge. As a result, a growing number of architects are pursuing careers in the humanitarian field. This is paralleled by the emergence of a number of postgraduate degrees with a shelter and settlements focus since 2011 (Davis, 2011).

This paper reviews current literature in the areas of post-disaster shelter and settlements, illustrating that the architectural profession has a responsibility to contribute toward positive outcomes for displaced refugee populations, and humanitarian practice. With vague career pathways and a lack of exposure to this crucial area of practice in architects' formative years, the reciprocal value of incorporating humanitarian-focused design projects within the main curriculum of architectural education is argued. This paper discusses Design Futuring (Fry, 2009) theory to explore how it can provide a theoretical framework to support existing discourse describing shelter and settlements as both products and processes that are capable of bringing about sustainable futures over time. This research can inform approaches to architectural education and research focusing on shelter and settlements design, representing a new area of theory-based inquiry.

ESTABLISHING A CONCEPTUAL FRAMEWORK OF POST-DISASTER RISK REDUCTION AND RELOCATION DECISION MAKING

Authors

Shaye Palagi, PhD Student, Department of Civil, Environmental, and Architectural Engineering, University of Colorado Boulder. (shaye.palagi@colorado.edu)

Ali Mostafavi, Assistant Professor, Zachry Department of Civil Engineering, Texas A&M University. (mostafavi@tamu.edu)

Amy Javernick-Will, Associate Professor, Department of Civil, Environmental, and Architectural Engineering, University of Colorado Boulder. (amy.javernick@colorado.edu)

Keywords: post-disaster relocation, agent-based modeling, Typhoon Haiyan, Philippines.

Abstract

In post-disaster contexts, organizations and agencies must make risk-reduction decisions for affected communities. Especially in developing communities, these decisions often involve relocation; however, relocation can have harmful socioeconomic side effects and frequently fails to separate people from the original, and new, hazards. There is a need to better understand the decision-making processes of relocation implementers to facilitate consideration of these additional effects and hazards. Existing work often neglects the dissociated nature of decisions made by multiple agencies with distinctive goals, directives, and constraints. Agent-based modeling (ABM), a simulation technique capable of capturing social interaction and disaggregated priorities and constraints, has the potential to address this gap. Recognizing the potential of ABM to improve our knowledge of relocation implementation and future relocation efforts, we clarify what type of ABM is most appropriate for modeling post-disaster relocation decision making and ask: What are the components of the model's foundational conceptual framework?

Following a discussion of past ABM-applications and the potential of ABM in disaster research, we select an empirical, heuristic-based participatory modeling approach. We then abstract elements of the decision-making processes, particularly key agent classes and interactions, to build a credible conceptual framework. We focus on the implementation decisions for the relocation of over 16,000 families displaced when Typhoon Haiyan tore through Tacloban City in the Philippines in November 2013. The conceptual model is informed by an analysis of 37 interviews with decision makers impacting Tacloban City's relocation projects as well as several months of observation from volunteer service with the city government. By specifying and characterizing different decision-making elements and interactions, we build a defensible empirical framework that could be computationally implemented in an ABM simulation to obtain emergent insights regarding post-disaster relocation decision-making processes.

THE IMPACT OF RELOCATION POLICIES ON DIFFERENT HOUSEHOLD GROUPS – THE CASE OF BAM

Authors

Mahmood Fayazi, Université de Montréal. Member of the IF Research Group (grif).
(mahmood.fayazi@umontreal.ca)

Gonzalo Lizarralde, Université de Montréal. Director of the IF Research Group (grif).
(gonzalo.lizarralde@umontreal.ca)

Keywords: *Housing reconstruction, relocation, informal settlement, residential complex, Bam, Iran.*

Abstract

In the last few decades, researchers have extensively examined variables behind the successes or failures of housing recovery programs. Over time, a consensus has been reached regarding the frequent drawbacks of relocation policies. Empirical evidence confirms the disruptive impacts of relocation policies on survivors' livelihoods, recovery, and wellbeing. However, there are still significant knowledge gaps about the impact of relocation policies in different household groups. This research aims at exploring how and why reconstruction policies lead to varied recovery levels among different household types.

This study is based on the detailed, longitudinal, qualitative case study of the housing reconstruction program conducted after the earthquake that struck the city of Bam, Iran, in 2003. The event claimed approximately 22,400 lives, destroyed nearly 93% of urban buildings, and left more than 75,000 homeless (Statistic Center of Iran, 2003). To reconstruct the city and help affected families to recover, the Iranian government adopted two major policies: a) providing financial and technical aid package for houses owners, tenants, and members of extended families to rebuild new houses (owner-driven policy), and b) providing residential complexes located in the periphery of the city (agency-driven policy) (Fallahi, 2007). This study specifically examines affected households' experience in relocation to the city outskirts, settling either in residential complexes provided by authorities or in the new informal settlements that emerged after the disaster. For this purpose, the researchers collected data from different sources of evidences, including: five separate field trips to Bam (between July 2004 and July 2014); more than 10 interviews with officers and authorities in Bam and Tehran and 70 interviews with residents in Bam; and more than 32 reports and six policy documents. This triangulation of collected data enabled the researchers to create a coherent narrative of the events and decisions made in the reconstruction project during 10 years.

Results highlight how reconstruction policies affected households in various ways and resulted in different levels of recovery. By providing financial (5% interest loans of about \$10,750 US) and technical (design, material, and control) means of support, the recovery and reconstruction program helped more than 80 percent of residents rebuild their houses in the city (Fayazi et al.,

2017). The prerequisite for receiving the grant was to own a destroyed house or land in the city or to be able to use a plot of land with the agreement of its owner (NDTF, 2014; Tafti & Tomlinson, 2013). Three years after the disaster, investigations showed that: 1) single family house owners (about 32% of the population), 2) extended family house owners (about 12% of the population), and 3) members of extended families, pre-disaster apartment owners, and tenants who could buy a piece of land or receive agreements to split lands (about 36% of the population) could use the technical and financial supports and rebuild their houses (Fayazi & Iizarralde, 2017).

For several reasons, however, this policy insufficiently addressed the most vulnerable households and low-income tenants in particular. Given rising inflation at that time and the fact that pre-disaster tenants, extended family members, and apartment owners had to pay for purchasing land as well, this policy helped only wealthier households (Omidvar et al., 2010). Those extended family members who could neither afford land nor split their parents' land had to stay in temporary shelters (about 5% of the population). The adopted policy also failed to reach the majority of tenants (Tafti & Tomlinson, 2013). While few better-off tenants could shift their tenure to ownership, others stayed in the temporary housing camps or migrated from the city to new informal settlements (Fayazi, 2017).

Inadvertently, the adopted policy led to the relocation of low-income families to the outskirts of the city and the formation of a new informal settlement. In fact, with hopes of receiving funds to build new houses, some pre-disaster tenants rushed to buy land at low prices in the outskirts of the city, in Janbazan Town. However, the municipality did not give them permission to construct new houses in this area. It is estimated that more than 100 affected families carried their prefabricated temporary housing units from the camps to Janbazan and formed an informal settlement. (Figure 1)



Figure 1: Informal settlement (Janbazan) in the outskirts of the city. Source: author 2014

Three years after the disaster, about 15 percent of the population, including a significant number of the most vulnerable and low-income households, were still living in temporary housing camps, and the initially adopted policy could not reach them. In response, the Iranian government built 50 multi-storey residential complexes located on the eastern side of the city called Razmandegan Town. In total, residential complexes contain 4,300 apartment units (Figure 2). Different pre-disaster conditions, priorities, and needs paved the way to various levels of recovery among the

inhabitants of residential complexes. While pre-disaster informal settlers were considered eligible for financial aid and enjoyed ownership of their new apartments, pre-disaster tenants and apartment owners who could not afford a piece of land and who were economical, socially, and emotionally dependent on their neighbours, extended family, and communities, were adversely affected after settling in residential complexes in the city outskirts.



Figure 2: Residential complexes in the periphery of the city (Razmandegan Town). Source: author 2014

The empirical results show that recovery and relocation policies seldom helped all different beneficiary groups recover in the same way and lead to unexpected heterogeneities. Housing recovery policies pushed different groups of households to relocate and settle in the outskirts of Bam. From the theoretical point of view, findings reveal an association between households' pre-disaster socio-economic status and the impact of reconstruction and relocation policies in their recovery. The owner-driven reconstruction policy failed to cover low-income tenants and excluded most of the extended families members. Thus, the reconstruction policy exacerbated social gaps and increased vulnerabilities and inequalities by encouraging low-income tenants to buy land and rebuild their houses in a new informal settlement. Also, residential complexes in the outskirts of the city increased transportation costs, expelled members of extended families from their communities, and limited their capacity to receive support from family and friends. From the practical point of view, results show that authorities can minimize the negative impact of relocation policies by targeting policies to specific household groups instead of applying the same approach to different social groups.

References

- Fallahi, A. (2007). Lessons learned from the housing reconstruction following the Bam earthquake in Iran. *Australian Journal of Emergency Management*, The, 22(1), 26.
- Fayazi, M. (2017). *The Impact of Post-Disaster Housing Reconstruction Programs on Households' Recovery: Housing Reconstruction Program after the 2003 Bam Earthquake in Iran*. (Ph.D.), Université de Montréal



Fayazi, M., Arefian, F. F., Gharaati, M., Johnson, C., Lizarralde, G., & Davidson, C. (2017). Managing institutional fragmentation and time compression in post-disaster reconstruction—the case of Bam. *International Journal of Disaster Risk Reduction*, 21, 340-349.

Fayazi, M., & Lizarralde, G. (2017). The Impact of Post-Disaster Reconstruction Policies on Different Beneficiary Groups: The Case of Bam, Iran. *Housing Studies* (In press).

NDTF. (2014). The minutes of the National Disaster Task Force (NDTF) meetings on 03 April. 2004. Tehran, Ministry of Interior Affairs.

Omidvar, B., Zafari, H., & Derakhshan, S. (2010). Reconstruction management policies in residential and commercial sectors after the 2003 bam earthquake in Iran. *Natural Hazards*, 54(2), 289-306.

Statistic Center of Iran. (2003). Summary of Bam Statistic. Tehran: Statistic Center of Iran

Tafti, M. T., & Tomlinson, R. (2013). The role of post-disaster public policy responses in housing recovery of tenants. *Habitat International*, 40, 218-224.

PLENARY SESSION 2: THE MAN-MADE CAUSES OF DISASTERS

JUN 2ND, 8:30 – 10:15 ROOM: **HNE 038**

EFFECTS OF NATURAL DISASTERS ON DISPLACED WORKERS

Authors

Dr **Yan (Alice) Chang-Richards**, Department of Civil and Environmental Engineering, the University of Auckland. (yan.chang@auckland.ac.nz)

Dr **Erica Seville**, Resilient Organisations, New Zealand, Email: erica.seville@resorgs.org.nz

Prof **Suzanne Wilkinson**, Department of Civil and Environmental Engineering, the University of Auckland. (s.wilkinson@auckland.ac.nz)

Associate Prof. **Bernard Walker**, Department of Management, Marketing and Entrepreneurship, University of Canterbury. (bernard.walker@canterbury.ac.nz)

Keywords: *natural disaster, displacement, workforce, livelihood, recovery.*

Abstract

The state of the issue to be address: Natural disasters can have significant impacts on the workforce in affected regions. There are often widespread disruptions to labour supply due to displacement of people from their jobs, either by disrupting their place of work or by disrupting a worker's ability to attend work. This research aims to investigate the patterns of impact that disasters have on the workforce, and the employment and livelihood issues that emerge during post-disaster recovery.

Research methods: By using comparative case study approach, this research compares recent disaster events, including the June 2013 Southern Alberta floods in Canada, the 2010 and 2011 Queensland floods in Australia, the 2010 and 2011 Canterbury earthquakes in New Zealand, the 2011 Great East Japan Earthquake and Tsunami in Japan, and the 2008 Wenchuan earthquake in China.

Results: It was found that common disaster effects on displaced workers included: job and worker displacement; loss of income; disruptions to workers' livelihoods; and creating additional participation barriers, particularly for females, youth, and individuals with lower skill sets. Comparison of different disaster events also revealed insights into how disasters can change the local labour market structure post-disaster. General economic conditions, sectoral structure, as well as business and individual coping mechanisms all influence livelihood outcomes for the affected workers.

Practical and/or theoretical implications: The multiple aspects of disaster impact on different socio-demographics make it a complex undertaking for policy makers, firstly to identify these groups and individuals, and secondly, to provide the support that is needed to address the barriers to their employment participation. As the post-disaster rebuild progresses in Queensland (Australia), Canterbury (New Zealand) and Tohoku (Japan), coordination of employment and livelihood initiatives with housing and other welfare policies is critical for ensuring that job opportunities are available to everyone, especially those with disadvantage.

GRIEVABLE LIVES? VULNERABILITY AMONG THE ROHINGYA OF RAKHINE STATE, MYANMAR

Authors

Johnson, T., University of Newcastle, Australia.

Von Meding, J., University of Newcastle, Australia. (jason.vonmeding@newcastle.edu.au)

Gajendran, T., University of Newcastle, Australia. (Thayaparan.Gajendran@newcastle.edu.au).

Forino, G., University of Newcastle, Australia. (Giuseppe.Forino@newcastle.edu.au)

Keywords: vulnerability, IDP, Rohingya, Myanmar, refugees.

Abstract

There has been intercommunal conflict and violence between the Muslim and Buddhist population of Rakhine State, Myanmar, for decades. Since 2012 there has been recurring conflict, resulting in the Muslim Rohingya population of the State being largely confined to certain villages and IDP camps. There are ongoing reports of violence in Rakhine State, including evidence of escalating state-sponsored violence in the 2016 crackdown, and most of the internally displaced people (IDPs) have little or no access to food and shelter. Affected residents now have restricted movement, limited trade opportunities and are living in makeshift housing. These oppressive realities have left Muslim communities in an exceptionally vulnerable and critically unstable situation. Although these communities are frequently at risk from flooding, they also face extremely destructive cyclones from time to time (e.g. Cyclone Nargis in 2008 killed over 100,000 people in Myanmar). The research aims to identify the key contributing factors to vulnerability in Rakhine State. We studied 3 different communities and investigated their vulnerability and risk in relation to cyclone hazards in particular; an IDP camp, a village built independently and a village built by an external organisation. These communities were chosen to ensure that the findings are representative of the various living conditions in Rakhine. The research project adopted a mixed methods approach, involving cases studies with multiple data sources. This paper presents preliminary results from a part of the study; a quantitative analysis of the questionnaire data (N=100) gathered from the 3 communities. Our data identifies clear differences between the 3 communities and provides evidence of the key drivers of vulnerability in Rakhine State. We are able to suggest critical pathways towards reducing risk and moving communities towards safety, health and sustenance. The research will make a valuable contribution to the effectiveness of disaster risk reduction efforts in Rakhine State and will contribute to ongoing advocacy effort for the Rohingya people of Myanmar.

SESSION 4: DESIGN FOR REFUGEE SPACES REFUGEE CAMPS AND TEMPORARY SPACES 2

JUN 2ND, 10:45 – 12:00 ROOM: HNE 038

MULTILEVEL INFORMALITY: SPATIAL CONTROL AND ORGANIZATION IN THE TOI MARKET IN KIBERA (NAIROBI)

Authors

Georgia Cardosi, PhD candidate, IF Research Group – grif, Faculté de l'aménagement, Université de Montréal (CA).

Gonzalo Lizarralde, Professor at Faculté de l'aménagement, Director of the IF Research Group – grif, Université de Montréal (CA). (gonzalo.lizarralde@umontreal.ca)

Susan N. Kibue, Senior Lecturer at School of Architecture and Building Sciences, Jomo Kenyatta University of Agriculture and Technology (Kenya). (director@sabs.jkuat.ac.ke)

Keywords: Informal urbanism, Informal markets, Nairobi, Spatial organisation, Hierarchic organization.

Abstract

Studies in informal urbanism have long attempted to understand the nature and characteristics of informal settlements and slums in cities of developing countries. In the 1960's, informality was regarded from within the formal-informal dichotomy and as a temporary phenomenon to be eradicated. Later on, in the 1970's and 1980's, informality was conceptualised as a natural response to the gap left by formal urbanisation in services and housing provision and it was increasingly seen by experts as a solution, rather than a problem. More recently, the interdependency between formal and informal has been emphasized, as well as the existence of 'order' within the apparently chaotic structure of informal settings. Some authors have even hypothesised a rhizomic growth model for informality. Yet, despite new knowledge about urban informality, most scholars and practitioners still locate it in a continuum that ranges from total formality to total informality. Based on new empirical evidence, this article challenges the formal-informal dichotomy and continuum and examines the mechanisms that make informality work.

A longitudinal case study was conducted between 2004 and 2016 in the Toi market, at the border of the Kibera slum in Nairobi (Kenya). Empirical evidence about the market's spatial organization and social issues was obtained through: 58 semi-structured interviews with market traders, 5 informal conversations and 3 focus groups with market leaders, informal conversations with 2 representatives of local community based institutions (Muungano Support Trust and Jamii Bora) and 3 Nairobi City County officials. Fieldwork also relied on statutory documentation obtained from the Nairobi City County. Results show that informality in the Toi Market is organized through hierarchical structures, that control, organize and transform the physical space. These structures work at the local level, however, they are often closely linked to formal governance structures and public institutions, which represent the top level of the pyramid. These results have relevant theoretical implications as they pave way to new approaches to urban informality, not as a

phenomenon parallel to formal planning, but as an integral part of a unique process. It is apparent that practical implications are that future analysis of informal communities must carefully consider the links existing at each and every level of informality with formal structures in order to fully understand the social and political dynamics and the opportunities to design more appropriate urban planning and design interventions.

AMPHIBIOUS RETROFIT: AN ALTERNATIVE TO FLOOD-INDUCED DISPLACEMENT

Authors

Elizabeth English, Associate Professor, University of Waterloo. (ecenglish@uwaterloo.ca)

Keywords: *amphibious architecture, flood mitigation, disaster resilience, climate change adaptation, buoyant foundation, amphibious retrofit.*

Abstract

Amphibious architecture refers to an alternative flood mitigation strategy that allows an otherwise-ordinary structure to float on the surface of rising floodwater rather than succumb to inundation. An amphibious foundation retains a home's connection to the ground by resting firmly on the earth under usual circumstances, yet it allows a house to float as high as necessary when flooding occurs. Amphibious foundations make homes resilient; resilient homes are the bases for resilient communities.

SHELTERING STATUS AFTER 1 YEAR OF THE MULTIPLE DISASTER IN FUKUSHIMA

Authors

Kenji Koshiyama, Professor, Kansai University, Japan. (k-koshi@kansai-u.ac.jp)

Keywords: *nuclear accident, long distance evacuation, The east Japan earthquake disaster, shelter status.*

Abstract

In the Great East Japan Earthquake 2011, not only the severe housing damage caused by the tsunami but also the phenomenon of wide-area evacuation from the nuclear power plant accident were observed. The confusion at the initial evacuation brought the wide-area long-term sheltering for victims and the delay of resettlement in the damaged area after 6 years. The difference between refugees of lost housing by physical destruction and those who evacuate from the nuclear accident appears in their satisfaction with shelter activity by the distance to move. A research report pointed that the level of satisfaction was higher as the evacuation distance was longer, and probably it was related unknown fear to the nuclear.

Generally, in Japan, the construction of prefabricated housing with due date by public sector near the damaged area is the main method of the temporary housing provision after disaster. However, the difficulty of prefabricated housing construction, because of both lack of space and required number exceeding supply capacity, led to using a new method of temporary housing provision, 'Private Rental Housing As Temporary Public Housing'. As result of which, shelters for victims were provided maximum 120,000 units all over Japan. (Reconstruction Agency,2016)

This study clarified that there were problems of life circumstance and uncertainly way for recovery to be led by those characteristics. First, this paper pointed out the whole temporary housing provision plan and its characteristics by reading research documents, reports and papers about the Fukushima evacuation. Second, a questionnaire survey data (10,082 valid responses) shows the status of sheltering life at one year after the disaster through analysis of current housing address, damage level of disasters, attitude for nuclear damage, change of work and economical condition, transformation of human relationship and outlook for future.

According to results of analysis, residents living in the Rental Housing As Temporary Housing had good physical house condition for shelter after disaster, however many of them had lost and changed their work in the new settlement. Additionally, they were forced to live in a new environment and adapted for it. Temporary housing provision after disaster couldn't limit the constructive issue. It is important that provision plan should include their life recovery process and the assistant for their adaptation of new environment.

LESSONS FROM POST DISASTER RECONSTRUCTION IN ODISHA – A CASE OF ODISHA DISASTER RECOVERY PROJECT

Authors

Teja Malladi, Indian Institute for Human Settlement. (tmalladi@iihs.ac.in)

Garima Jain, Indian Institute for Human Settlement. (gjain@iihs.ac.in)

Keywords: post disaster reconstruction, recovery, Odisha, cyclone Phailin, preparedness.

Abstract

It is traumatic to return to a completely damaged house after experiencing a deadly disaster and to face a difficult task of rebuilding one's life from scratch. Even with early warnings and past experience, many people refuse to evacuate, as losing their productive assets in a disaster could be as devastating, and often people who make such decisions are poor and vulnerable. With years of planning and preparation, the Government of Odisha, evacuated over million people to safe shelters in Very Severe Cyclone Storm "Phailin" that made landfall in October 2014. Though the number of human casualties was low when compared to a similar event that hit the state in the year 1999, the damage to the houses and livelihoods were massive.



With significant achievement in the preparedness, Government of Odisha immediately focused on recovery process following the disaster. This paper focuses on the case of 'Odisha Disaster Recovery Project' which built more than 16,000 houses through owner driven construction approach in the cyclone affected districts of Ganjam and Khordha in Odisha. The government followed both in-situ construction and relocation approaches for provision of housing, and this paper focusses on the impacts of these approaches on the affected families, based on the field surveys and interviews with the beneficiaries and other stakeholders. The paper will try and assess the case through its decisions making process and implementation, and reflect on the following outcomes with respect to these processes. We will also highlight some of the innovative processes such as mason training programme and multi-hazard insurance systems that have been incorporated in the project.

The key findings from the research suggest that the overall outcomes for the people have been positive when the initial participation is higher and people have been involved with the decision-making process through its design and implementation. Besides, it is also evident that there are certain characteristics of the original settlement and the type of intervention undertaken that affect the specific outcomes for the resettlements.

SESSION 5: CLIMATE CHANGE AND CONFLICTS INDUCED
DISPLACEMENT

JUN 2ND, 1:30 – 2:45 ROOM: **HNE 038**

ANALYSING FLOOD FATALITIES IN VIETNAM USING NATIONAL DISASTER DATABASE FROM 1989 TO 2015 AND REGRESSION METHODS

Authors

Chinh Luu, University of Newcastle, Newcastle, NSW, Australia. ThiDieuChinh.Luu@uon.edu.au

Jason Von Meding, University of Newcastle, Newcastle, NSW, Australia.
Jason.VonMeding@newcastle.edu.au

Sittimont Kanjanabootra, University of Newcastle, Newcastle, NSW, Australia.
Sittimont.Kanjanabootra@newcastle.edu.au

Keywords: *Flood fatalities; Flood damage; Vietnam; Multiple regression analysis; Random forests.*

Abstract

Flood damage data shows that Vietnam is vulnerable to flood hazards, which have had a severe impact on the people of Vietnam over many years, particularly regarding an unacceptably high death toll. However, it still lacks a systematic research on flood fatalities in Vietnam. Therefore, we conducted this study, exploring the national disaster database of Vietnam (DANA) with two objectives: (1) providing an overview on flood fatalities in Vietnam, (2) investigating damage-influencing factors related to flood fatalities. Records covering 27 years from 1989 to 2015 indicated that at least 14,927 persons had been killed in floods in Vietnam. The analysis results of regression methods showed that housing impacts had the greatest influence on the flood fatalities in Vietnam. The results can provide a recommendation for government policies on improving the housing quality for the poor in flood-prone areas.

REINFORCING BOTTOM-UP INITIATIVES FOR CLIMATE CHANGE ADAPTATION IN LATIN AMERICA AND THE CARIBBEAN

Authors

Gonzalo Lizarralde, Université de Montréal, Montréal, Canada. (gonzalo.lizarralde@umontreal.ca)

Benjamin Herazo, Université de Montréal, Montréal, Canada. (bj.herazo.cueto@umontreal.ca)

Danielle Labbé, Université de Montréal, Montréal, Canada. (danielle.labbe@umontreal.ca)

Lisa Bornstein, McGill University, Montréal, Canada. (lisa.bornstein@mcgill.ca)

Adriana López, Universidad del Valle, Cali, Colombia. (adriana.lopez@correounivalle.edu.co)

Andres Olivera, Universidad Central Las Villas, Santa Clara, Cuba. (aolivera@uclv.edu.cu)

Hernán Ascui, Universidad del Bio-Bio, Concepción, Chile. (hascui@ubiobio.cl)

Holmes Páez, Universidad Javeriana, Bogotá, Colombia. (paez.holmes@javeriana.edu.co)

Karine Bouchereau, Université d'Etat d'Haïti, Port-au-Prince, Haïti, (kjbouchereau@yahoo.fr)

Mélanie Robertson, International Development Research Centre, Ottawa, Canada. (mrobertson@idrc.ca)

Keywords: *disaster-risk reduction; climate change; informal settings; resilience, Latin America.*

Abstract

Adaptation to climate change and variability (CCV) in Latin America and the Caribbean is characterized by a double paradox: 1) whereas informal settlements in the region are typically vulnerable to water-related risks associated with CCV (floods, draughts, landslides, erosion, deforestation etc.), they are also effective incubators of bottom-up, informally-driven mechanisms of adaptation; 2) these strategies are very often initiated and led by women, who constitute a particularly vulnerable group, but also play a crucial role in building the social fabric that make such adaptation possible. Nonetheless, it is not yet fully clear what specific role informal strategies play in disaster-risk reduction in the region. This project identifies adaptation strategies developed by local leaders in informal settings in small/medium-sized cities in Latin America and the Caribbean and reveals how these strategies can be: scaled up to increase their impact; transferred between contexts to enhance innovation; and integrated into policy to guarantee sustained change. The methodology focuses on identifying bottom-up adaptation strategies in response to the fragile relationships between human settlements and water in Colombia, Cuba, Haiti, and Chile. Early results of this project show that: a) women play a significant role on bottom-up DRR initiatives in the face of CCV; yet they are poorly represented in formal institutions and plans; b) significant tensions in the use of water resources exist in these areas where local decision-makers face significant challenges in implementation; and c) fragmentation between government and communities typically prevails in the region; nonetheless, local universities play a crucial role in linking bottom-up local initiatives and resources to formal plans and policies. These results can help create a more integrated resilience agenda at the municipal level, capable of integrating valuable (albeit informal) local resources.



SIMULATING POPULATION DISPLACEMENT FOR HUMANITARIAN RESPONSE

Authors

Ali Asgary, Associate Professor of Disaster & Emergency Management, York University.

(asgary@yorku.ca)

Adriano Solis, Associate Professor of Logistics Management & Decision Sciences, York University.

(asolis@yorku.ca)

Hadi Rezvani, Disaster Management Researcher and Analyst, York University.

Jenaro Nosedal, Postdoctoral Fellow, Disaster & Emergency Management, York University.

(jnosedal@yorku.ca)

Keywords: *population displacement, humanitarian response, simulation.*

Abstract

The displacement of large numbers of people in times of crises represents a challenge for governments and humanitarian agencies. Provision of basic needs and services for displaced people, delivering critical aid such as shelter, food, and medical health in dynamically changing environments (i.e. unpredictable number of people, in scattered locations) are very difficult undertakings. Computational studies investigating the refugees' movements are scarce in the academic literature. Existing research on evacuation models focuses in micro modeling and simulation of small systems (i.e. one building) on the other hand available research and studies about migration have been developing macro models that focuses on longer space and time scales to simulate the behaviour of individuals influenced by economic variables.

This research seeks to gain understanding of the population flows by analysing empirical data and develop models that allow prediction and simulations of the Individual Displaced People (IDP).

ICT AND MOBILE APPLICATIONS FOR DISASTER RISK AND INCREMENTAL HOUSING; THE CASE OF NGOS IN RIO DE JANEIRO

Authors

Martins, A.Nuno, Universidade de Lisboa, Faculty of Architecture, CIAUD Research Centre.
(nunomartins@fa.ulisboa.pt)

Carvalho Conrado.

Ramos, José A.S.

Gorecka, Dominika.

Estevão, Mariana.

Keywords: slum upgrading, incremental housing, GIS mapping, disaster risk reduction, mobile applications.

Abstract

According to the 2016 statistics of the International Telecommunication Union, in the developing countries, while the access to Internet is still low and commonly below 25%, the number of people using mobiles is close to 90%, and the number of mobile-broadband subscriptions keeps growing at double digit rates reaching a 41% penetration. Following these trends, online collaborative digital mapping tools and open source mobile applications for engaging community members in the process of disaster risk reduction, recovery, resettlement and slum upgrading, have been subject of research in academia and housing policy interest. Despite the difficulties to pass from the stage of theory to practical results these Information and Technological Communication (ICT) tools have proven useful whenever they are acquired by local groups as part of their social agenda, as shown in the processes conducted by the UNICEF Innovation Lab in Rio de Janeiro. In the past decade, since the emerging of smartphones and in particular in the past five years, with the expansion of 3G wireless mobile telecommunications technology, the delivery of GIS mapping and 3D simulation tools focusing on disaster risk, building pathologies surveys and incremental housing have been the goal of several innovative projects from partnerships comprising diverse institutions that provide assistance to local communities.

This research aims at discussing in which ways local NGOs, universities, private companies and the local communities can co-design, co-develop and co-implement user-friendly ICT to approach risk and housing issues using as a case study the ongoing work carried out by the NGO 'Soluções Urbanas' (SU) (Urban Solutions) in Brazil. Since 2009, SU is devoted to providing housing improvements at the favela (slum) Morro Vital Brazil, in Niterói, in the state of Rio de Janeiro. Since 2014, SU has been developing technology to map disaster risk reduction measures and incremental housing issues. The paper will discuss the use of GIS software and cutting-edge graphical user interface applications able to run on mobile devices in order to geo-reference and storing information about risk and survey of the houses. The goal of the project is to develop a



mobile application to support householders in finding the best solutions for improving and incrementing their houses, regarding construction efficiency as well as related costs and micro financial services.

First results highlight the innovative role played by NGOs in slum upgrading and aid self-help processes. By exploring and combining, with the support of researchers and the private sector, web platforms, geo-reference database and mobile applications for smartphones to achieve stronger communication interfaces, collaborative mapping tools, and architectural model simulations, local-based NGO, can reach a large range of the population in a short amount of time and make it easier to analyse housing issues that prevent slum-dwellers of living in healthy and safe homes. Also, by providing householders information, opportunity, practical solutions and financial scenarios for rebuilding, incremental housing and risk reduction measures, while giving them a sense of inclusion, NGO can use mobile telecommunications as a force multiplier in achieving goals of community empowerment and reducing spatial inequality.

SESSION 6: I-REC DEBATE SESSION

JUN 2ND, 3:00 – 4:30 ROOM: HNE 038

SHOULD REFUGEES BE SHELTERED AND CONTAINED IN ORGANIZED CAMPS OR IN URBAN AND RURAL AREAS?

Abstract

The Canadian Disaster Resilience and Sustainable Reconstruction Research Alliance (Œuvre Durable for its acronym in French) and i-Rec (Information and Research for Reconstruction) organize a debate that explores the following question: Should refugees be sheltered and contained in organized camps or in urban and rural areas? Whereas some specialists consider camps as effective solutions that offer protection and essential services for refugees and forcibly displaced populations, others see them as places of control, segregation, and movement restriction. The former typically argue that camps facilitate administrative tasks and aid distribution, and help providing a legal and institutional status to refugees. They also contend that by settling refugees in camps, host governments can address more easily security concerns, attract donations, and distribute responsibilities among international humanitarian organizations such as UNHCR. Defenders of camps also emphasize that camps managed by international institutions help protecting refugees from exploitation and marginalization. Finally, they point to the fact that by settling refugees in camps, governments and humanitarian organizations are able to reduce competition over limited services, affordable housing, and jobs, potentially minimizing tensions between refugees and the local population. However, several scholars and practitioners see in camps a solution that further isolates refugees, limiting their access to labor markets and hindering their social integration. Despite initial planning and expectations, camps often become permanent (or last for many years) becoming an expensive solution for host governments and humanitarian organizations. They typically blame camps for negative secondary effects on refugees' mental health and education and for creating social and physical environments that facilitate crime, sexual abuse, and violence. In response, these experts and scholars believe that settling refugees in urban and rural areas prevent these drawbacks and ensure refugees' socio-economic integration within host communities. Moreover, they point to the importance of refugees' freedom to enter the labor market, find decent housing, and establish social ties with host communities – all of which, they believe, is easier to obtain in regular urban and rural areas. This activity will challenge different viewpoints and examine common controversies. It aims at developing more nuanced, sophisticated and elaborated arguments about refugee settlement policies and solutions.

APPENDIX: ADDITIONAL PAPERS

HOW TO DESIGN AND IMPLEMENT SPACES FOR CHILDREN AFTER DISASTERS; CASE STUDY BAM CITY

Authors

Hedye Gamini, Shahid Beheshti University, Tehran, Iran. (Hedye.gamini@gmail.com)

Hamid Amouzad Khalili, University of Melbourne, Australia. (hamouzad@student.unimelb.edu.au)

Keywords: post-disaster planning and design; child-friendly spaces; earthquake in Bam; content analysis.

Abstract

The Bam earthquake catastrophe has had many negative effects on children. The purpose of establishing post-disaster "child-friendly spaces" is to provide an opportunity for children by designing safe spaces, in addition to creating good physical and psychological conditions that will be effective in helping children to rehabilitate faster after disasters. Bam city, after the horrible earthquake in 2003, was an example of a situation in which a child-friendly approach was considered, and governmental and international organizations and NGOs became involved there and constructed several child-friendly spaces. It seems that, 10 years after the earthquake, an assessment of child friendly spaces' impacts is particularly important. Methodology included qualitative-assessment based approaches and the content analysis method was adopted. In this study, interviews and group meetings were conducted, including presence of children who became juvenile and adolescent during the ten years after of earthquake, along with parents and educators working in child friendly spaces; and thus, comments of children in relation to child friendly spaces were collected and analysed. Results indicate that despite most children being completely satisfied with these spaces, there are still challenges in the optimal planning and design of such spaces. For example, there are proposed strategies including localization of activities, considering the effect of climate on design and also the use of indigenous architectural knowledge, as well as paying attention to secure pathways for children. Providing furniture, interior design and suitable equipment for children, separating health services, use of resistant and waterproof tents and colourful ones with age-appropriate and happy schemes and also increasing green space in addition to the closed spaces were requested by children as feedback on the post-disaster child friendly space design of Bam.

LANDSCAPE FOR REFUGEES AND DISPLACED PEOPLE. THE IMPACT OF SYRIAN REFUGEES IN LEBANON

Authors

Maria Gabriella Trovato, Landscape Design and Ecosystem Management Department American University of Beirut. (mt63@aub.edu.lb)

Keywords: mass migration; Landscape as mediator; Syrian refugees; Landscape perspective; Informal Settlements.

Abstract

Lebanon is host to nearly 1.2 million Syrian refugees, representing around a quarter of the country's total population. With the massive influx since the start of the Syrian crisis in March 2011, Lebanon has seen refugees settling in every corner of the country, putting a huge strain on stretched services and infrastructure (Dunmore, 2015). The country represents a particular case study when compared with the others affected by the Syrian migratory afflux. Lebanon is the only country that, since the beginning, did not adopt a clear strategy of intervention and, until today, refuses the establishment of formal camps as per UNHCR suggestion and help, fearing a repetition of the country's experience with Palestinian refugee camps. About 42,000 illegal tents (ITs) are scattered in the country in close to 1,500 locations throughout Lebanon. Erected in different areas of Lebanon, the informal settlements are enclaves of migrant seeking to establish communities and ground connections.

The new risk landscape, accentuated by exponential rates of Syrian immigration, represents one of the emergencies this part of the world is facing now.

The research questions and investigates the role of landscape design in remediating the environmentally disrupted landscape envisioning scenarios at varying phases within the lifecycle of the area. It synthetically reports the experience of three events that I led to improve my research on the topic of 'Landscape in emergency and the refugee settlement'. The methodology was based on fieldwork, semi-structured interviews, landscape uses determined in guided walkthroughs, readings and interpretations of the traces founded on site, time evolution, implementation of site specific interventions on the open spaces of one Its on the Bekaa Valley (Lebanon). One of the most evident results of the experiences held in Lebanon is the shift on the attention from the physical space, considered by itself, to the interpretation and creation of a sense of community. In the case of displaced by disaster condition, individuals are forced to live together, day by day, and share restricted areas without knowing each other, and with no freedom in choosing neighbourhood, quality and typology of space, etc. First attempt of our research and practical experience on the ground was to define and formulate a definition of community that could fit to the particular situation we encountered to be able to design and implement public space projects to enrich the collective imaginary and memory. While we were not able to impose a sense of community, we worked on the physical to establish connections and relationships among the individuals and the groups in the settlement.

SUITABILITY OF DIFFERENT DECISION-MAKING METHOD APPLIED FOR THE SUSTAINABLE POST-DISASTER TEMPORARY HOUSING ANALYSING

Authors

S. M. Amin Hosseini, Dept. of Civil and Environmental Engineering, Universitat Politècnica de Catalunya. (seyed.mohammad.amin.hosseini@upc.edu)

Oriol Pons, Dept. of Architectural Technology, Universitat Politècnica de Catalunya. (oriol.pons@upc.edu)

Albert de la Fuente, Dept. of Civil and Environmental Engineering, Universitat Politècnica de Catalunya. (albert.de.la.fuente@upc.edu)

Keywords: *sustainable post-disaster temporary housing; Natural disasters; emergency management; MCDM; MIVES.*

Abstract

Increasing the population of the urban areas by 2050, especially in areas highly prone to natural disasters, could potentially threaten all vulnerable cities in the face of probabilistic a natural disaster. Alternative temporary housing (TH) needs to be assessed as an important factor of local resiliency after natural disaster. Additionally, there are several factors, which represent all the different parties involved in this process. However, these factors, which are in/directly related to each other, can have antithetical impacts on the different cases. Thus, to determine sustainability TH needs a decision-making model with the capacity to deal with this complicated multifaceted process. Furthermore, this model should be customizable, because a strategy, which has been applied to a previous case, can yield different results for another case.

In this sense, this study aims to present a suitable decision-making method for choosing the most sustainable TH alternative. To this end, general requirements of the decision-making process for dealing with TH selection are specified and organized based on the assessed cases. Finally, all possible decision-making methods are assessed to determine the most suitable one based on correspondence between the methods and requirements.

The study concluded that it is necessary to select a suitable technique with value functions based on the utility theory concept that leads to achieve more accurate results. Furthermore, these research results have been found using the Integrated Value Model for Sustainable Assessment (MIVES), which embraces the value function concept based on the utilities theory concept. MIVES, which has proved to create an opportunity for decision-makers to prioritise easily and quickly, can be applied for different locations with diverse characteristics without being limited by the present conjuncture.

CITY RESILIENCE MEASUREMENTS: AN INVESTIGATION INTO UNISDR AND ROCKEFELLER TOOLS

Authors

Heiman Dianat, The University of Auckland, Centre for Disaster Resilience, Recovery and Reconstruction (CDRRR), New Zealand. (h.dianat@auckland.ac.nz)

Suzanne Wilkinson, Professor at The University of Auckland, Director of Centre for Disaster Resilience, Recovery and Reconstruction (CDRRR), New Zealand. (s.wilkinson@auckland.ac.nz)

Peter Williams, CTO, Big Green Innovations, IBM, United States.

Emma Hunt, Civil Defence and Emergency Management, Auckland Council, New Zealand.

Keywords: resilience measurements, urban resilience, disaster planning, UNISDR, Rockefeller.

Abstract

In recent years with increasing urban challenges associated with the impacts of climate change, natural disasters, population growth, and changing urban forms, a focus on long-term resilience of cities to ensure ability to absorb shocks and withstand stresses is essential. Cities need to have comprehensive resilience plans, in which resilience indicators in terms of infrastructure, economics, social, and natural environments are measured, analysed and used to inform decision making. There has been some effort to create systematic tools to measure resilience in urban areas. Several scorecards and measurements have been created, each with strengths and limitations. However, there is a lack of evidence based analysis of these assessment tools. Without such analysis, it is difficult to choose the appropriate tools or rely on their findings. This paper reports an investigation into the current three most recognised disaster resilience assessment tools, two by United Nations International Strategy for Disaster Risk Reduction (UNISDR Scorecard and new Local Urban Indicators (LUI)) and another by Rockefeller Foundation (The City Resilience Framework (CRF)). The paper reviews and analyses existing plans, implementation processes of the tools as well as their contribution in developing resilience strategies. The results of this study will help planners and decision makers choose the right tool among the options available and also develop or/and combine them to make them more useable for individual cities.

BUILDING A NEW CITY IN 7 YEARS: THE CASE OF CANAAN, HAITI

Authors

Anne-Marie Petter, Ph. D. Student at Université de Montréal, Montréal, Canada. (anne-marie.petter@umontreal.ca)

Dr. Gonzalo Lizarralde, Professor at Université de Montréal, Montréal, Canada. (gonzalo.lizarralde@umontreal.ca)

Dr. Danielle Labbé, Professor at Université de Montréal, Montréal, Canada. (danielle.labbe@umontreal.ca)

Anna Konotchick, Architect. American Red Cross. (anna.konotchick@redcross.org)

Keywords: voluntary internal displacement; post-disaster self-recovery strategies; spontaneous space planning; land management; informal settlements.

Abstract

Canaan, the "promised land" located in the outskirts of Port-au-Prince was, before the 2010 Haitian earthquake, a vacant territory. Today it is home to more than 200 000 people who fled the inhospitable camps and slums of the capital in quest of better living conditions. In March 2010, the Haitian government declared the zone as public utility to build formal internally displaced population (IDP) camps. A massive voluntary relocation of people followed. Despite its informal character (the settlement does not even have an administrative status), Canaan is set to become the country's third largest urban agglomeration and a unique example of rapid voluntary displacement after disasters. It is crucial to understand what contributed to the emergence and consolidation of this unprecedented urban phenomenon, an emblematic display of post-disaster self-recovery strategies.

By adopting a case study methodology, and various data collection tools that include a comprehensive residents' survey (with more than 1000 respondents) and fifty semi-structured interviews with local officers, community leaders and civil society, this research project examines the underlying factors of the voluntary displacement, and the spontaneous adaptive strategies, adopted by Canaan's community. Results reveal that with scarce State and NGO support, and despite the lack of basic infrastructure, Canaanites have built a functional city, avoiding reproducing the undesirable characteristics of Port-au-Prince slums. Public spaces, a functional urban grid, community services, public services, schools, commercial activities and housing have been built informally in the settlement. There are also about 100 community-based organisations and nine neighbourhood associations which constantly conduct social activities in the area and plan solutions in response to basic needs. There is, however, a common perception that there is only "anarchy" and "improvisation" in the planning and development of Canaan" - a view that is widely popular among Haitians and foreigners working in Haiti. Our study shows that illegal groups and land mafias have a significant power in the area. Nonetheless, the rather simplistic and one dimensional representation of the settlement as "anarchic" is misleading and it is feeding stigmatisation, poor policymaking, and insufficient investment.

From a practical point of view, the results of this study can help support future social programs and policy aimed at urban development in Canaan. From a theoretical perspective, they contribute to the understanding of informal settlements' space planning and land management.

IN AND OUT OF DISASTER ZONE: THE CASE OF MIGRATION

Authors

Didem Güneş Yılmaz, Queen's University Belfast, Belfast · Centre for Architecture and Construction Management . (didem.yilmaz@btu.edu.tr)

Keywords: *natural disasters, migration, post-disaster recovery, Van earthquake, eastern Turkey.*

Abstract

We are living in the era of disasters, either in shape of war-conflict as man-made, or in natural shape as quite a result of climate change. In both ways, disasters leave people in challenging situations, homeless, in shortage of food, in economic hardship, with losses from family and neighbours. These challenges often result in migration, temporarily or permanently, or sometimes increase the existing pattern. Studies suggest that natural disasters cause displacement of more people than what wars cause. However, the consequences of natural disasters are often underestimated, because they have local impact and are deemed temporary as it is seen recoverable through reconstruction of the built environment destroyed. For example, after the Nepal earthquake in 2015 the number of people seeking job outside the country to sustain an income increased. It is estimated that the Typhoon Haiyan in 2013 displaced over four million people and accelerated the cross-border economic migration in Philippines. It is seen that it nearly takes a decade to settle down the migration trend. The Kobe Earthquake in 1995 was a milestone for Japan, and had over one-and-a half million population before the disaster. A report reveals that the population was finally covered back to this level in the end of 2004. Ten years after the 2004 Indian Ocean tsunami, people were back to their villages to reunite with their families. These examples can be multiplied with an example from Turkey as well. The Van earthquakes in late 2011 affected thousands of people and caused dislocations. The efforts to rebuild the city and villages flattened by the disaster were noteworthy but not enough to prevent the increase in migration out of Van, which already suffers severely as a province in the east of the country. This paper aims to uncover the pattern in Van before and after the earthquake effect and discusses the findings in relation with the review of the literature. The dataset cover a timeframe between 2010 and 2016, and obtained from the Turkish Statistical Institute. The data is comparative in terms of urban and rural settlements and age groups.

IMPACT OF SOCIAL CHARACTERISTICS OF COMMUNITIES ON WATER SUPPLY SYSTEM RESILIENCE

Authors

Behrooz Balaei , Department of Civil and Environmental Engineering, Faculty of Engineering, The University of Auckland, Auckland, New Zealand (b.balaei@auckland.ac.nz)

Suzanne Wilkinson, Department of Civil and Environmental Engineering, Faculty of Engineering, The University of Auckland, Auckland, New Zealand (s.wilkinson@auckland.ac.nz)

Regan Potangaroa, School of Architecture, Victoria University, New Zealand (regan.potangaroa@vuw.ac.nz)

Keywords: *resilience, resilience measurement, water supply system, social factors.*

Abstract

Measuring resilience of water supply system has been a serious concern of researchers as well as decision makers due to these systems' criticality in public health, especially after disasters. However, most studies in this area have focused on the physical vulnerability of water systems and the social characteristics of the communities have been neglected. This paper sought to consider the key social factors affecting water systems' resilience to disasters as well as the relevant indicators to measure them. Although a number of social attributes of the communities can affect water system functionality during business as usual period, this study focuses on the characteristics of the individuals and societies that can facilitate or toughen the post-disaster recovery process. A mix of close- and open- ended questions has been used to collect experts' opinions from a variety of relevant perspectives and backgrounds such as sociologists, water engineers, etc. to address the objectives of the study on the basis of a water supply system resilience measurement framework. The interviewees have been selected from a wide spread range of countries and cultures such as New Zealand, Iran, United Kingdom, and Vanuatu to achieve a variety of opinions and judgements. The findings show that individual demands and capacities, individuals' involvement in the community, and cultural characteristics play vital role in water systems' resilience to disasters. The research results provide recommendations mostly to public sectors on fostering resilience of water systems to disasters through improving societies' crucial characteristics.

ADAPTATION TO CLIMATE CHANGE IN CUBA. RESETTLEMENT EXPERIENCE IN CARAHATAS

Authors

Gonzalo González Camacho, Universidad Central “Marta Abreu” de Las Villas.

Andres Olivera Ranero, Universidad Central “Marta Abreu” de Las Villas. (aolivera@uclv.edu.cu)

Keywords: *climate change, resettlement, social participation.*

Abstract

In Cuba, adaptation to climate change is a challenge for sustainable development in the medium and long term. The permanent rise of the mean sea level is the threat of greater implications, more than 120 coastal settlements will be permanently affected. The situation becomes more complex when under these risk conditions, a hurricane of high category occurs. In this scenario, the fishing settlements predominate, characterized by their great tradition and capacities of resilience based on their ways of life linked to the sea. The problematic is given by the positioning of social actors on the subject, on the one hand, the policy of the Cuban State to protect lives and property, and on the other, the popular view about their habitat and refusal to be relocated. The challenge at present is to achieve a consensus in decision-making based on government-population differences, in consideration of existing laws and policies, which propose to phase out these villages according to their degree of involvement.

The research proposes a methodological strategy for habitat resettlement, which takes into account the characteristics of the Cuban context in particular, regulatory frameworks, territorial planning instruments, actors' matrix, as well as the forms and moments of participation. The results of its partial implementation are presented in a coastal settlement called Carahatas, located to the north of the province of Villa Clara. There, it has managed to link the government, state institutions and population, to define the future of this community, that is destined to disappear according to current projections. Preliminary results show that it is a complex process, due to the centrality that persists in the Cuban municipal management model, also from the limited economic conditions to face any executive decision and from the sensitization and treatment that the population has received for decades. However, under these conditions, results have been obtained that differ from the current situation in other coastal towns of Cuba, and mark a way forward from the satisfactory fulfilment of this particular experience.

CONSIDERING THE SUSTAINABILITY OF POST-DISASTER HOUSING: LIMITATIONS AND REQUIREMENTS

Authors

S. M. Amin Hosseini, Dept. of Civil and Environmental Engineering, Universitat Politècnica de Catalunya. (seyed.mohammad.amin.hosseini@upc.edu)

Oriol Pons, Dept. of Architectural Technology, Universitat Politècnica de Catalunya. (oriol.pons@upc.edu)

Albert de la Fuente, Dept. of Civil and Environmental Engineering, Universitat Politècnica de Catalunya. (albert.de.la.fuente@upc.edu)

Keywords: *post-disaster housing, sustainability, temporary housing, research trends.*

Abstract

The increase of natural disasters frequency and population who live in areas prone to natural hazards are leading to concerns about socio-environmental impacts. This situation is generating more attention to sustainability of post-disaster housing (PDA). On the other hand, providing huge amount of accommodations for displaced population (DP) aftermath of natural disasters in short time and under pressure of emergencies is critical issue in terms of sustainability concepts. Additionally, as multifaceted PDH contains intertwined factors with sometimes-antithetical impacts, sustainability of this issue is not acquired simply. Nonetheless, emergency management and decision-makers need to have a definite platform to adjust the decisions based on the sustainability framework. To this end, this study aims at (1) considering the sustainability concept of PDH that have been presented in previous researches and, (2) design a new general approach to deal with this issue, necessities, existent limitations and impediments to achieve this purpose, sustainable PDH and recommendations for future research in this area.

The results obtained allow confirming that the different type of temporary housing (TH) could be sustainable provided all factors are considered from very beginning stages of planning phase until end life of alternatives. Additionally, as sustainability index can vary for different areas based on diversity of features, properties, and concerns, it is possible a sustainable alternative for a specific case cannot satisfy by no means (in no way) stakeholders of another case. Furthermore, some parts of PDH sustainability issue have been formed based on myths and prejudices that must be identified with pinpoint accuracy in order to realize truths.

FOCUSING ON INTELLIGENT ENERGY PRODUCTION AND ENERGY EFFICIENCY IN CITIES IN THE PROCESS OF DESIGNING SHELTERS AFTER DISASTER, CASE STUDY: BUSHEHR

Authors

Hedyeh Gamini, Shahid Beheshti University, Tehran, Iran. (Hedye.gamini@gmail.com)

Jalal Faraji, Shahid Beheshti University, Tehran, Iran. (jalalfaraji1988@gmail.com)

Keywords: designing after disaster; smart city of energy; contributed energy resources; sustainable architecture; zero home.

Abstract

Background and Purpose: Today there are a world-wide efforts to reduce the consumption of Fossil Fuels. In recent years, designing issues and developing smart cities with the approach of sustainable building has been introduced. This article proposes to build the smart city after disasters in the case of reconstruction with the viewpoint of development, and also consider sustainable architecture and usage of renewal energy resources.

Method: In this article, it is assumed that in the city of Bushehr a disaster has been occurred and almost all of the critical infrastructure of the city destroyed. Therefore, it is suggested to rebuild the city based on the idea of smart city. Try to rely on sustainable architecture approach in the construction of smart cutie's energy, renewal energy resources and technologies, in the process of reconstruction. In this regard a smart grid electricity for the area of Bushehr is designed and developed a variety of sources of energy supply and is economically evaluated.

Findings: This article by referring to the objectives of the smart cities clears the role of smart homes in the phase of reconstruction and also examine the sustainable architecture as the part of smart cities that are built after disasters in. In this regard, smart cities can be built, after or pre-disaster to prevent damaging critical infrastructure and the most important of them urban electricity network. The result of this study is to improve the use of resources of energy production in Bushehr's building with sustainable architecture approach.

Conclusion: It seems that one of the best and most practical solutions after or pre-disaster is planning to have smart cities with sustainable architecture. Therefore, solving these problems requires good management and correct connection of modern architecture and traditional and combines them with renewable energy.