Integrative Risk and Security Research
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Coping with Disasters and Climate Extremes - Challenges & Cooperation Potential

Research Contributions to the 2013 DAAD Alumni Summer School

Edited by Celia Norf, Christiane Grinda, Tobias Blätgen & Alexander Fekete

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Foreword

Based on experiences with recent droughts, earthquakes, floods and tsunamis, the 2013 DAAD Alumni Summer School conceived effective Disaster Risk Reduction (DRR) and Climate Change Adaption (CCA) as interdisciplinary tasks for social and natural sciences. For accomplishing cross-cultural, cross-disciplinary and cross-institutional learning the organizing institutions, the Cologne University of Applied Sciences (CUAS) and the United Nations University - Institute for Environment and Human Security (UNU-EHS) invited 20 Alumni from 17 different countries but also from different research and practical backgrounds to Bonn and Cologne in November 2013.

We thank DAAD for the funding opportunities, untiring administrative support and invitation to the alumni network and webinar platform. We also thank Prof. Dr. Lars Ribbe and Dr. Udo Nehren from the Cologne University of Applied Sciences - Institute for Technology and Resources Management in the Tropics and Subtropics (ITT) and Prof. Dr. Jakob Rhyner, Dr. Jörn Birkmann, Dr. Matthias Garschagen and Dr. Jörg Szarzynski from the United Nations University - Institute for Environment and Human Security (UNU-EHS) for their continuous scientific input before, during and after the seminar. At Cologne University of Applied Sciences we would also like to express our gratitude for enabling such research and seminars to the president, Prof. Dr.-Ing. Christoph Seeßelberg, the International Office, Dr. Elisabeth Holuscha, and, last but never least, the team of students that helped us prepare the event.

We especially thank all participants of this Summer School for making this seminar a fruitful and inspiring experience and look forward to future collaboration.

This first volume of a novel series on “Integrative Risk and Security Research” is one cornerstone of documenting and thereby sharing some of the research conducted in the context of our 2013 seminar. At the same time, we aim at continuing this excellent starting point in further joint research and networking.

The character of this series aims at addressing research that is ‘integrative’ in the sense of what is currently termed ‘holistic’ risk management or risk governance research, but also in what is coined ‘inter- and transdisciplinary’ research. This also integrates natural and man-made types of hazards as well as a perspective on impacts on humans, eco- and social systems, infrastructure and other sectors and organization types. Much of the work we present will be ‘work in progress’ that invites comments from the reader and shall serve as a stimulus for advancement of the work presented here, but also offer opportunities for further joint authorships.

Fachhochschule Köln
Cologne University of Applied Sciences

UNITED NATIONS UNIVERSITY
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DAAD Deutscher Akademischer Austausch Dienst
German Academic Exchange Service

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Introduction

In facing recent natural and man-made disasters Disaster Risk Reduction (DRR) and Climate Change Adaption (CCA) calls for integrative thinking and learning across cultures, disciplines and institutions. In times of increasing complexity, insecurity and uncertainty thinking outside the box becomes essential. This first volume of "Integrative Risk and Security Research" invites the reader to look beyond common perspectives of DRR and CCA and relates climate change and natural disasters with interdisciplinary and bottom-up policy making.

Nishara Fernando bridges this gap in common relocation strategies and presents a people centred policy guideline that mitigates **past relocation failures in Sri Lanka**.

Agustin Miranda analyses **cities as ecosystems** that need balance to survive and evaluates the potential of eco-projects and green architecture to achieve a sustainable urban development in the Argentinian city Córdoba.

Pan Tao looks at **climate change impacts Shanghai** faces and its strategies to adapt. He underlines that Shanghai city should integrate an adaptation strategy into its urban development strategy and thus taking the chance to shape the next generation of the city.

Vicente Sandoval analyses different **discourses on scale for the interpretation of the social production and reproduction of risk** within and through different geographical scales. He explores general implications involved in the aftermath of two disasters in Chile, the Chaitén volcano eruption in 2008 and the Maule earthquake in February 2010.

Bishawjit Mallick uses the results of an **empirical study conducted at southwest coastal Bangladesh** during 2009 and 2010. It underlines the importance of disaster preparedness planning as a holistic approach that includes individual vulnerability monitoring based on the cultural, socio-economic, political and environmental context of those affected.

Alexander Fekete, Christiane Grinda and Celia Norf present a **survey on resilience as a recent research and policy agenda** in context to climate change related hazards and adaptation policies in different countries.

Lastly Alexander Fekete presents a collection of certain aspects and **open questions** in risk management and risk governance science dealing with natural and man-made risks, including climate change with special focus of the sustainability and evaluation of research and development projects and implementations.

Bridging the Missing Gap: People Centred Policy Guidelines to Minimize Relocation Failures: Case of Sri Lanka

Nishara Fernando

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Introduction

Acquisition of peoples' homes and lands for private and public development projects (high ways, dams and reservoirs, ports, roads and urban renewal etc.) or as a strategy to reduce people's exposure to natural hazards (floods, earth slips) or disasters (tsunami) displace people. Although the relocation of such displaced people into unfamiliar new settlements situated far from their previous place of residence without their consent seemed to be the sole option at the given time and circumstances, such interventions have not been very successful in Sri Lanka (Muggah 2008). It is mainly due to increased impoverishment of families after relocation as they were mainly unsuccessful in coping with multiple risks (Cernea 2000) (landlessness, homelessness, joblessness, food insecurity, marginalization, increased morbidity, mortality, food insecurity, lack of access to common property resources and disruption to existing social capital) and multi-dimensional stresses (physiological, psychological and social-cultural) generated as a result of "relocation shock" that may continue through the different stages of relocation (prior to, immediately after and two years after) (Scudder 1981, 2005). In addition, relocation impacts on the cultural landscape and the identity of communities (Sorensen, 1996). In this context, the available international and local literature on involuntary (forced) relocation emphasizes the need to reduce various relocation related risks and stresses (from landlessness to land base relocation, from joblessness to re-employment, from homelessness to reconstruction, from marginalization to social inclusion, from loss of access to restoration of community assets and services, from social disarticulation to networks and community building) (Oliver-Smith 2009, 2010; Modi 2009). In the planning stage, careful implementation and management of relocation processes by adhering to the national and international frameworks and policies, better funding, political will, pre-displacement research and long term monitoring are interrelated vital factors to make relocated communities secure and sustainable after involuntary (forced) relocation (Fernando 2012; Fernando & Punchihewa 2013; Fernando et al. 2010; Hettige et al. 2004; Birkmann & Fernando, 2007; Birkmann et al. 2007). These factors will assist the relocated people to at least reconstruct the social, economic and cultural lives in the new location by not only providing adequate protection from relocation related risks but also through opening up a wide range of new opportunities.

An ideal program would not forcibly relocate any community by uprooting them from their residence of origin for any reason/s. However, in reality involuntary relocation becomes inevitable owing to unavoidable circumstances under justifiable grounds. In this context, it is vitally important to identify ways of minimizing stresses and risky situations that could emerge as a result of involuntary (forced) relocation that make the prospective beneficiaries insecure and vulnerable of becoming affected by poverty or chronic poverty (Fernando 2012; Fernando 2006).

Against the above backdrop, this article makes an attempt to propose some guidelines for involuntary relocation which include the role of three stakeholders, namely the state, the development partners and the displaced people or the beneficiaries. The Sri Lankan past experience shows that relocation projects have not been guided by common guidelines other than project specific guidelines which resulted in some successes and failures. These outcomes, no doubt, stress the need for having proper guidelines. The guidelines

discussed in this article make an attempt to address the emerging need to have proper guidelines on the one hand and to minimize the widening gap at policy level on the other.

The author intends to publish these guidelines not only in English language but also in Sinhala and Tamil languages as well with the intention of addressing a wider range of audience including planners, policy makers, implementers, politicians, academia, students, donors, displaced people, relocatees and most importantly the general public of the country. Accordingly this would be able to raise awareness on the relocation process while proposing a sustainable program for the relocation and a planned process of relocation of affected communities. Published and unpublished documents have been refereed in addition to the interviews conducted with various officials of government, semi government, non-government organizations and researchers to construct the guidelines. The draft guidelines were further reviewed by some experts in the relevant field and their comments have also been incorporated while constructing the final guidelines.

The proposed guidelines are generally applicable for people who are displaced as a result of development need or disasters induced by political decisions which regulate and govern forceful eviction. Therefore, a detailed resettlement action plan is necessary to facilitate the number of families displaced and relocated. This should be tailored to suit the local requirements under circumstances of social justice. These guidelines should be applied at inception of the planning stage of the relocation process. The proposed guidelines are presented in three stages of the relocation process namely, prior to displacement (Pre-relocation), immediately after relocation and two years after relocation.

Objectives of the policy guidelines

1. To devise a mechanism that would enable the communities to successfully cope with various risks and stresses generated as a result of the shock of involuntary relocation and the relocation process.
2. To make the prospective relocatees aware of the relocation process (or stages of relocation) with a time frame agreed upon to complete the successful relocation process by affected persons and implementing agencies.
3. To make the relocation process to be participatory, transparent and accountable.
4. To assist particularly the most vulnerable groups (female headed households, hidden female headed households, households with disabled, chronically ill members, poor households) to be successfully adapted to the new location, restore their livelihoods in order to improve their living standards. The program should ensure that the displaced people improve or at least restore their previous standard of living (Cernea 2000).
5. To ensure the people affected due to involuntary relocation programs to be promptly compensated. Also raise awareness among the people about the process for redressing their grievances to facilitate easy access and quick response to resolve issues.

The conceptual foundations of the identified guidelines

The main conceptual foundations for the guidelines identified as: the concept of forced relocation, including two theoretical models, namely (1) Thayer Scudder's (1981, 2005) Stress and Settlement Process and (2) Michael Cernea's (2000) Impoverishment Risks and Reconstruction Model, for resettling displaced people and the concept of vulnerability focusing both on the external (exposure) and the internal sides (coping). The elements of the constructed analytical framework are discussed below.

In an attempt to explain the analytical framework in Figure 1, it is appropriate to begin with a discussion of the external shocks. This is in two forms (1) natural or manmade disasters or development projects destroyed various common properties at the regional level (roads, railways, schools, hospitals, etc.) on one hand and destroyed lives and various types of assets at the household level; (2) the forced relocation of affected communities into new settlements, mainly in a location far from their previous place of residence.

As a result of *forced relocation*, the displaced people do not have any option other than settling in the given new settlements outside the original place of residence. Those forcedly relocated people are exposed to various risks and stresses, which are further discussed under the context (difficulty in accessing the common property resources (sea, city etc.) to earn an income, lack of employment opportunities in new settlement areas, lacks of proper infrastructure, poor-quality of housing and fragmented relationships with the host community, which sometimes even lead to physical conflicts). In this context, forced relocation is believed to have directly impacted on five types of *household assets* (social, financial, human, physical and natural) which are vital to employ successful livelihood strategies (enhancement and coping) to secure household livelihoods.

External intervention, here refers to direct (allocation of government land to build settlements or to give financial support to construct houses, buy land, give food rations and money to buy kitchen utensils, construction of common services, etc.) and indirect (request private banks to give low-interest loans to start new income-earning activities, provide tax concessions for private organizations as a tool to encourage them to become involved in settlement construction, etc.), involvement of national government, provincial and local authorities adopting various policies, legislation and institutions to strengthen the household-asset base as well as access to them. This is in addition to various types of assistance from international and national NGOs and from other private organizations to help strengthen the household-asset base and assist with the relocation process. The assistance was mainly in the form of constructing houses and donating furniture, household electrical equipment and other capital equipment (fishing boats, nets, out-boat and in-boat engines, bicycles etc.) to help improve the existing income-earning activities, or to start new forms of income generating activities.

The final outcome of the various household-level strategies employed, as opposed to various forced relocation-related risks and stresses could be that the household becomes either more secure or more vulnerable. This, in turn, would be a direct feedback for households and for government, other international non-governmental organizations (INGOs)/NGOs and private organizations in relation to their external interventions. However, the purpose of the guidelines is to provide proper strategy to minimize various risks and stresses face by relocatees in the relocation process (pre-relocation, immediately after relocation and two years after) and make them secure.

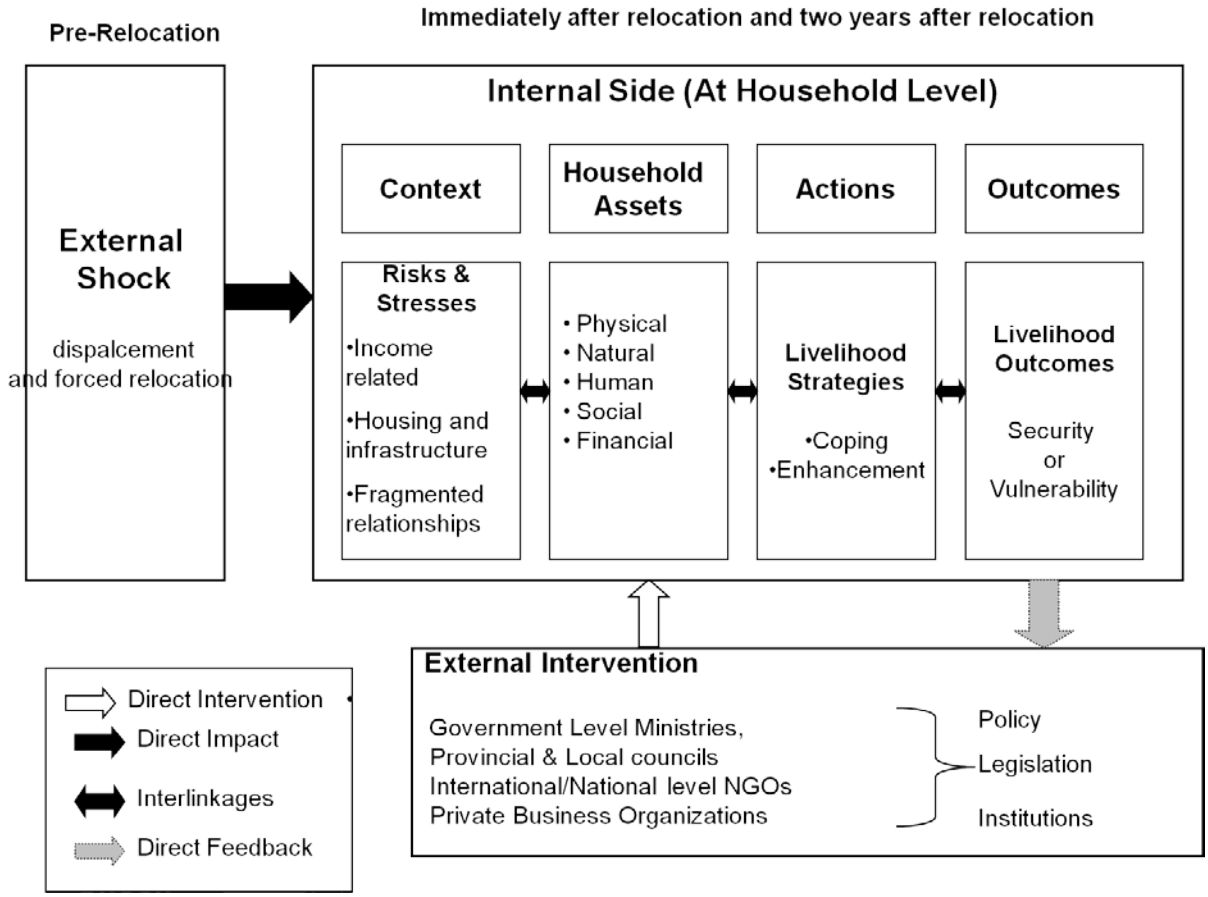

Figure 1: Analytical Framework
Source: Fernando 2013

Guidelines

As it is mentioned above, the policy guidelines can be systemized under prior to relocation, immediately after relocation and two years after relocation.

Prior to relocation

The pre- relocation phase needs to concentrate on the aspects of removing or minimizing the risks leading to displacement. Considering the fact that displacements by disasters, either man-made or natural and development- induced are unavoidable in certain cases, pre- planning of contingencies for relocation should be available which would contribute to minimizing adverse impacts on the social, cultural and economic aspects of prospective relocatees.

Vulnerability reduction and early warning

It is vital to minimize the number of families going to be relocated by avoiding or minimizing the adverse impacts of causes of displacement, through developing proper early warning systems or any other vulnerability reduction strategies to prevent natural hazard related displacement and relocation.

- Well-conceived evacuation plans and programs should be in place
- Efficient process should be evolved in pertaining to utilizing local resources to manage displacement and temporary internal migration.

Data and information base

- *A resource database* would facilitate an efficient relocation process that results in minimum harm to the concerned people, natural resources and budgetary concerns. A resource database should include the skill pool to be deployed during a need, relevant stakeholders along with focal points to coordinate with, natural and physical resources to access.
- *Land database:* A database of available lands to be acquired as alternative lands for relocation, for permanent housing and transitional housing would enable speedy relocation, thereby limiting the length of period of transition.
- *Socio-economic database:* Affected people need to be relocated preferably close to the location of original settlement so that the affected people will continue to have access to social networks, access to services and common property resources which would minimize the adverse impacts on their lives and the way of life. The data base should include demographic, socio-economic and cultural characteristics. It should also comprise gender specific information. This data base will also assist to identify the most vulnerable populations who need more attention in the process of relocation.
- *Socio-economic database on native communities:* It is important to have such information base on the native community in order to minimize conflicts, competition and to enhance compatibility. The quality of the physical environment of the relocation area is a vital aspect to be considered.

Public information and consultation

- The government should provide relevant information to the prospective relocatees and the general public about vulnerabilities, and opportunities for future development and have continuous consultation so that public concerns are lobbied at respective levels.
- Regular public information and consultations would complement the databases mentioned above.

Compensating affected communities

It is essential to assist the affected people to submit their claims for compensation due to acquisition of their land, structures, perennial crops and their economic losses. This can be implemented either by implementing agency or with the assistance of non-governmental organizations. It is also important to assist the displaced people to properly manage their compensation. Establishing a Grievance Redress Committee under the chairmanship of Divisional Secretaries to find solutions for their grievances is also important.

An action must be taken by the implementing agency to establish inter-ministerial committee comprising of representative of relevant ministries for the project to expedite the completion of the project.

Awareness program for offices of implementing agencies should be conducted on relevant existing policies (National Policy for Payment of Compensation, National Involuntary Resettlement etc.), acts (Land Acquisition Act No.09 of 1950 with its subsequence amendments) ordinances (Land Ordinance), rules, regulations (regulations 2008 for payments of compensations) and others (a guide for public officers on good practices on Land Acquisition and implementation of the National Involuntary Resettlement Policy published by the Ministry of Land and land Development in 2013 and Ex-gratia package for the people affected by the Road Development Projects).

Immediately after relocation

Considering the fact that displacements by disasters, either man-made or natural and development-induced are unavoidable in certain cases, pre-planning of contingencies for relocation should be made available which would cause least impact on their social, cultural and economic aspects. This section includes different approaches when relocating in temporary, transitional and permanent shelters that should be provided.

- *Standardization:* Nationally accepted standards should be adopted when constructing temporary, transitional and permanent shelters. However, availability of resources such as material, land, labor are depending on the location should allow flexibility for practically sound implementation of relocation program and processes. Affected persons should be provided with quality assured temporary and transitional shelters until they move into the new settlements and permanent shelter with necessary individual and common infrastructure facilities. The size of house should be determined by taking into consideration the number of individuals in respective household prior to the need for relocation. The entitlement of tenants should also be clearly stated.
- *Participation:* Participation of the prospective relocates, both men and women should be a prerequisite as it is an essential provision for the prospective occupants of the house to make decisions on site selection, design, material, labour etc. one hand and also enhances the transparency and accountability. Provincial Councils and local authorities along with the Divisional and District Secretariats through their grassroots level Officers, the Grama Niladharis (Village level Administrative Officer), Social Service Officer, Samurdhi Officer etc. should play a proactive role in the relocation process from the very inception of the planning stage. The host community should be involved in the relocation process as a strategy to ease any tensions and conflicts between host and relocated communities and this will make the relocated communities to have smooth integration with the host community. Both relocated communities and host community should have access to common property resources and common infrastructure facilities used by host community prior to relocation and new common infrastructure facilities built in new relocation settlements.
- *Infrastructure:* If the affected persons are to be relocated into a donor built settlement, it is important to obtain consent for housing structures, construction materials on one hand and should inform common infrastructure facilities (access roads, street lights, community centres, religious places etc.) in addition to other necessary facilities to the settlement (bridges, transportation, garbage disposal, postal services etc.) irrespective of whether houses are built by donors or by affected families using the monetary compensation that they get from the organization on the other hand. All common infrastructure facilities in the settlement and to the settlement should be provided before relocating the affected families into it. Local councils should also be provided with required funds to improve their services to the relocated communities.
- *Land titles:* Land loss should be replaced by new land of comparable value. Deeds should be granted promptly provided for new land. In the absence of land, cash compensation should be paid for all affected persons. Compensation for all other lost assets (movable and immovable) should be based on full replacement cost and should be paid promptly. Project execution agencies should bear the cost of compensation. Families who do not have secure land title should receive fair and just treatment
- *Information:* Prospective relocates being informed through a language that they can understand about the relocation process from the beginning would enhance the overall outcome of the

projects. Full recovery from stress and risks generated as a result of relocation is a right of the affected person and it is also the duty of the project implementers to assist them to completely recover and improve their quality life.

- *Funding:* Proper financing for sound relocation is important. Under financed relocation process will adversely affect those relocates. However, proper financing depends on political will. In other words, resources can be mobilized when there is a political will. Money alone would not solve all relocation related problems either. Absence of adequate financial compensation would lead to relocation failures.
- Participatory monitoring and evaluation and regular participatory progress reviews at every stage should be made mandatory for the success of relocation.
- *Restoration of livelihood*: Any disruption to family and individual income on one hand and increased family expenses (transportation, electricity, gas etc.) that could occur due to relocation should be considered. Therefore, local employment mobilization programs to enhance family income should be implemented.
- *Vulnerable groups*: Attention should particularly be given to displaced women, children, elderly and people with special needs.

Two years after relocation

Reviewing of socio-economic, demographic and other relevant data from each and every member of the relocated families is important and needs to be updated regularly (at least annually) until five years after relocation. This can be useful in the future for project monitoring and impact evaluation purposes. Social Impact Assessment (SIA) and Environment Impact Assessment (EIA) should be conducted compulsorily. Such reports have to be examined by a multi-disciplinary expert group. Identification of different levels of vulnerable families (most, middle and least) by conducting a vulnerability assessment (considering not only inherent factors such as ethnicity, gender, caste, income earing activities etc. but also other socio-economic, demographic, environmental etc. factors) among the affected families is useful for further improvements. These assessments will assist the relocation implementers to know who should be given more attention and assistance in order to make the process a success from the beginning of the relocation process without making them further marginalized and more vulnerable after relocation.

Roll out programs should effectively have provisions for individual families to take their own decisions. In order to support this process, establishing local level community based organizations or linking the existing community based organizations in the host communities to the relocates should be done.

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Potential of Eco-project and Green Architecture to Achieve a Sustainable Urban development. The Case of Córdoba, Argentina.

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Abstract

The conservation of and the respect for nature and its ecosystems is a key matter for sustainable development, not only because they are essential elements of human habitats, but also because they provide value as a resource. In this way, it is necessary to relate the idea of nature and the city with the symbiosis between human kind and the environment.

The incorporation of notions such as nature, flora, fauna and renewable energy to the city and its urban planning began in the last few years through the creation of sustainable urban parks and the incorporation of green to architecture. This outlook considers the city as an ecosystem that needs balance to survive. From the standpoint of urban planning, it is necessary to generate synergy in order to obtain that balance.

Nature and Planning

Biodiversity and natural renewable resources constitute a future, biological life insurance for human beings. In this sense, the preservation of species under threat of extinction and the continuous functioning of whole ecosystems are the major subjects of focus. This implies a change in the prevailing mentality which focuses on the immediate future, as well as recognizing that the well-being and progress of future generations is based on the good relationship between cities and nature (Leff 2005).

Cities are dynamically involved in processes of change. Cities have always lead social development and proposed innovations. But cities are also the place where the first symptoms of crisis emerge, where undesired and unpredictable behaviors occur. Acknowledging this character and dealing with its implications are the task of urban policies and its most important tool, urban planning (Vogt 2008, pp. 136).

Conservation of nature is of high importance in cities and represents a challenge to urban planning, in order to achieve a balanced relationship between urban development and its sustainability. This balanced relationship can only be obtained through an urban and regional plan that includes ecological, social, political and economic factors. Any plan that does not include nature, that is to say, the ecological space of a region, cannot be considered sustainable because it endangers the future of the coming generations, especially regarding to natural resources and climate changes. A true plan should include not only the social aspects of a region, but also its cultural identity, diversity and ethnicity in order to obtain the necessary participation and level of acceptance. Finally, political and economic aspects must be taken into account. For the viability of any regional planning, the political will to elaborate necessary legal tools and acquire available economic resources, whether private or public, are essential.

Converging all isolated measures to the principle of sustainability implies the effective resolution of complex situations and the determination and integration of economic, ecologic and social results of urban action (urban planning action) (Vogt 2008, pp. 137).

The idea of nature in cities seems unfamiliar for many people. Even though we live on a planet full of cities, where the level of development relates directly to the level of urbanization, "people do not relate nature to the brutal reality of a city, but to a romantic rural image" (Frith 2004, pp. 165).

This belief about reality contrasts the reality imposed by the excessive agricultural exploitation of the last years, heightened by the increase in agricultural commodities. In the particular case of Argentina, farms and forests, where we thought that the flora and fauna were safe, are being destroyed by industrial agriculture. On the contrary, cities start to house space of refuge for nature. The ecological conditions within urban areas are often better than in rural areas because of intensive, poisoning detrimental agricultural activities. Regarding the maintenance of biodiversity, we should expect more from cities and its green spaces than from rural areas (Timmermans 2001).

The Case of Córdoba City

In Córdoba city, old areas have been renewed. Examples are the "Cañada" stream, the Zoo and the Sarmiento Park which were finished in the early twentieth century and which are the "green lung" of the city. In addition, new areas have been created, like the Free Environmental University, the Botanical garden and San Martin park. These last three belong to the Secretary of Environmental and Sustainable Development of the Municipality of Córdoba and are instruments used to perform actions of environmental management. The Free Environmental University offers an "environmental education program for residents of Córdoba city". The Botanical garden and the San Martin park perform protecting activities, recovering natural ecosystems, broadcasting and teaching their practices.

The Environmental University is located in a gully called "Quebrada del Infiernillo", currently one of the few urban reservoirs of flora and fauna left in Córdoba city. It functions as a tutoring centre of environmental, global and urban issues related to nature, through non-formal education of different environmental, urban and rural practices, according to latest findings available. Their main objective is to stop environmental knowledge from being exclusive to scientific and academic communities, and to extend it to all citizens, promoting the right of access to knowledge (Municipality of Cordoba 2014).

The Botanical garden is a natural space that preserves the regional biodiversity while promoting education for the conservation of the flora and the respect for natural resources. It extends over six acres, set along thematic walks. It hosts 3680 examples of 413 species in living collections and a Biodiversity Interpretation Centre (CIB) in design stage (Municipality of Cordoba 2014).

San Martin park is the only natural park in Córdoba city. It aims at caring and preserving the native flora and fauna of the ecosystem of "El Espinal". It is located in the northwest area of the city, delimited to the north and east by the Suquia River, to the south by the "Canal Maestro del Sur". Its extension is of 134 acres, containing 80 species of plants and 45 animal species, 37 of which are birds. This park, as Sarmiento Park, is one of the "green lungs" of the city (Municipality of Cordoba 2014).

Córdoba city has changed its way of taking advantage of natural space during this decade. Part of this change has been made through urban re-functioning. The enterprise relates partly to a change of attitude in the community and the political will to develop such manifestations. At the end of the 90's and the beginnings of year 2000, the city of Córdoba developed a low-density, urban growth that has now started to fade. That kind of low-density growth, in gated communities or in private residential areas in the periphery, brought about social consequences resulting in fragmentation and segregation. Foremost, they represented a serious threat towards nature as those developments lacked respect towards ecology and the affected areas. Development plans were not devised in attention to the environment, but solely based on economic profit criteria. This particular type of urban growth produced greater land erosion and several problems regarding urban infrastructure, besides the damage to natural environments, its flora and fauna.

The urban development spawned by such low-density growth has been substituted, to a certain extent, by new urban proposals and projects that put forward the value of nature in the city and which try to create spaces that promote social interaction in the centre of the city or nearby.

The aim is to incorporate nature to all those urban areas capable of preserving it, creating "eco-barrios" or "eco-villas" that include green roofs, natural draining systems and porous surfaces in parking lots and walkways. In simple terms, such developments allow nature to participate in urban infrastructure.

The green roof system deserves a special comment. Some of its main advantages are:

- Flood control
- The cooling of buildings in the summer and the increase in humidity
- The absorption of air pollution and noise
- Biodiversity control
- Aesthetic appraisal
- Leisure / free time opportunities
- (Project "BedZED in London", Frith 2004)

Moreover, in a green roof, the photosynthesis of plants transfers' solar energy in bio-molecules, releasing Oxygen and water steam; the leaves retain the suspending air particles and offer shadow; the roots make a rain-water filtration system that prevents ground erosion and sedimentation (IGRA 2009). Green roofs are devices of urban intervention that make possible the permanent and sustainable design and re-design of cities. They assure harmony between urban environment and the surrounding landscape through the design of the fifth façade.

Final comments

In a broad sense, we can assert that it is necessary to spread awareness that nature plays an essential role in human development, through both formal and non–formal education, and that all changes put through education must be guided to stimulate participation and commitment of every actor involved.

Within this framework of integration, we should acknowledge that the city is the environment of human beings, regardless of size and population. Therefore, it is not possible to develop sustainably without proper planning for the city, nor can there be sustainable development with disrespect for environment, the use of renewable resources and the conservation of other species.

This reflects the need to relate and integrate the conservation of nature and urban development. The incorporation of nature to urban planning and to architecture must try to satisfy the needs of inhabitants compromising neither development possibilities nor resources for future generations. We strive to obtain constant balance and harmony between urban spaces and natural spaces, a symbiosis between built environment and natural environment.

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Climate Change Adaptation Strategy in Shanghai: Coping with Urbanization and Disaster Risk Reduction

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Abstract

As a coastal megacity, Shanghai is vulnerable when facing climate disruptions. Since 1990s, Shanghai's temperature has dramatically increased with a rate of 0.5°C/10a, which is 6.7 times higher than the global rate. Urbanization has been a major contributor to Shanghai's climate change. Although Shanghai city has drawn its climate adaptation strategies in its 5-year plan, climate adaptation work in Shanghai is still in its early stage. This paper summarized climate change facts and impacts on the city, and its adaptation strategies. The paper further suggests Shanghai city should integrate an adaptation strategy into its urban development strategy, which shapes the next generation of the city.

Introduction

Shanghai is the largest city in China, located in the eastern coastal plain at an average altitude of 4.0m N.N. The city population is 23 million, having a high density of 16,800 person/ km^2 in the urban area. Shanghai has a humid subtropical climate and experiences four distinct seasons. The annual precipitation is approximately 1,100 mm which is not evenly distributed. Three days of rainstorms could contribute 25% of the total annual precipitation (Fang et al. 2012). Summers are hot and humid, with an average of 8.7 days exceeding 35 °C and the hottest temperature was ever recorded at 40.8 °C on August 7, 2013 (Shanghai Meteorology Service Center 2013). The impact of human activities on local climate has been particularly prominent in the last three decades of fast urbanization and industrialization. Heat waves, intensified storms, invasion of salty sea water have threatened the city. For instance, it was estimated that inner-city flood is causing approximately 1 billion RMB ($160 million USD) annual loss to the city (Chen et al. 2008). More than flood damage, the other hazards damage including heat, drought, etc., could further lift up the overall cost. Therefore, in the year 2012, Shanghai city government released a 5-year plan (2011-2015) on Energy Conservation and Climate Change, which includes climate change adaptation strategies at the first time.

Climate change facts in Shanghai

Rainfall

According to the data from the national weather station, the annual precipitation in Shanghai increased with a rate of 7.0mm/10a (Eastern China Meteorological Center 2012) and the annual precipitation days decreased with a rate of 3d/10a (Fang et al. 2012). Considering less rainy days with higher quantities of precipitation, the intensity of storm events was obviously increasing over the past 30 years.

Temperature

Between the year 1873, the first meteorological record year in Shanghai, and the recent year 2007, Shanghai's average temperature has increased with a rate of 1.39°C/100a. Until 1980s, the temperature increasing rate had been similar to the global trend. However, since the 1990s when Shanghai was accelerating its urbanization process by opening up the development of Pudong district, the temperature has dramatically increased with a rate of 0.5°C/10a, which is 6.7 times higher than the global rate (Figure 1

and 2). In 2013, there have been 33 days exceeding 35°C, breaking the 100-year record (Shanghai Meteorology Service Center 2013). The heat-island effect has been clearly observed. The temperature increase in the urban area is 2.5 times higher than that in suburban area (Eastern China Meteorological Center 2012). Urbanization has been a major contributor to the local climate change.

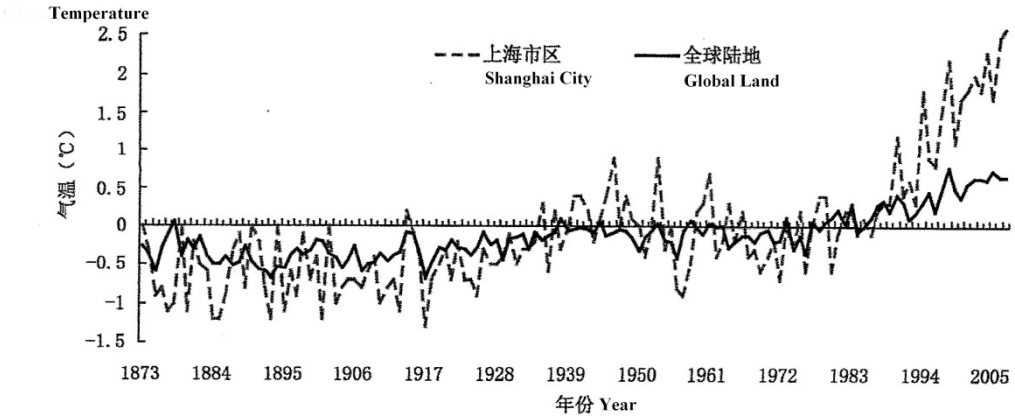

Figure 1: Comparison of temperature change between Shanghai city and global land since year 1873
Adapted from Eastern China Meteorological Center 2012

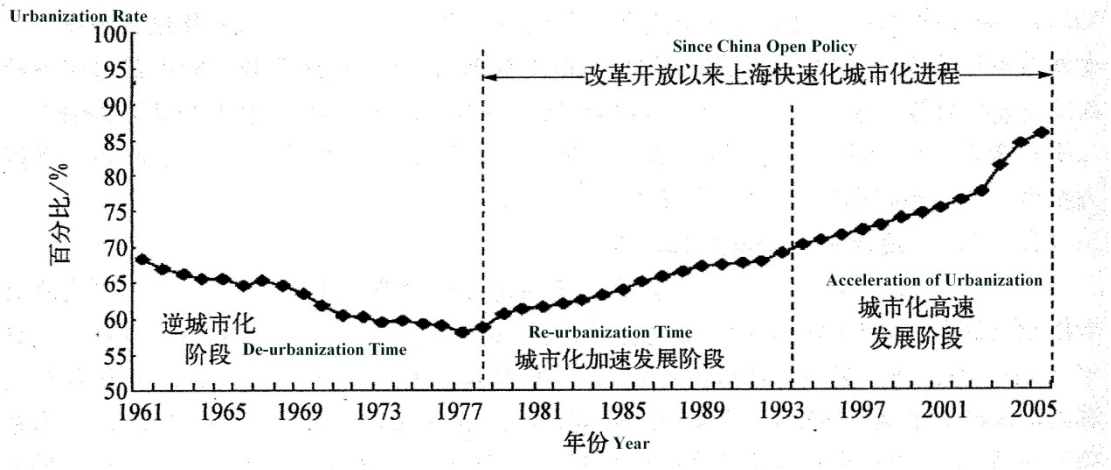

Figure2: Shanghai urbanization process since year 1961
Adapted from Wang & Wang 2010

Climate Change Impacts

Sea level rise

The observation data showed that Shanghai average coastal sea level has risen 115mm since 1978 (Wang & Zheng 2013). And the sea level rising rate is 4.7 mm/a, much higher than other coastal regions in China. In 2000, severe typhoons which hit China´s eastern coast caused damage of 11.2 billion RMB (ca. $1.7 billion USD) (Wang & Zheng 2013). The Shanghai flood wall was designed for prevention of 1000-year sea tide at 5.86m. If sea level rises by 50 cm, the 1000-year tide will be at 6.36m, which will not only damage the coastal flood facilities but also decrease the inner-city drainage capacity by 20% (Wang & Wang 2010). Another negative effect is saltwater intrusion. If the sea level rises up 50 cm, sea water will be pushed to upstream by 5.5 km and then the security of water supply won't be assured.

Increase in energy consumption

Under the double effects of global warming and the heat-island effect, Shanghai has experienced continued high temperature days in the recent summers. The air-conditioning uses 35% of the total electricity load. The statistics showed that every centigrade increase of peak temperature will result in 377 MW increase of electricity load (Wang & Zheng 2013). If average temperature increases by 1°C, it results in an additional 23 billion kWh energy consumption annually.

Agriculture production

Shanghai's frost free period has increased from 248 days to 282 days (Eastern China Meteorological Center 2012), which is somehow good for the growth of winter crops. However, the increase of humidity and warming will also increase the activity level of pests and viruses, which cause problems to the crops along the year.

Public health

Longer and higher temperature days will increase mortality rate. Heat waves have complicated air pollution problems. Certain warm climate diseases such as Malaria and Schistosomiasis have now higher possibilities to be epidemical in Shanghai region (Wang & Zheng 2013).

Critical infrastructures

Extreme weather events can disrupt or destroy the critical infrastructures in many ways. Quantitative studies are urgently needed for policy makers to understand the consequences linked to climate disruption.

Strategy for climate adaptation

In the Shanghai's 12th Five Year Plan on Energy Conservation and Climate Change (Shanghai city 2012), climate change adaptation has been linked closely to disaster risk reduction (DRR). A short term goal of this plan by year 2015 is to build capacity in adaptation and DRR. The key measures are summarized as follows:

- Establish an efficient DRR system: Categorize hazards levels in different color in order to alarm general public with a distinguished warning sign. Each category of hazards has clearly defined countermeasures. Disaster emergency shelters will be planned according to population density across the city. An early warning system will be installed across city departments.
- Improve weather forecast services: For instance, when the highest (red) category storm is forecasted, the instant information will be officially disseminated to public through all the media channels including social media. Companies should allow employees staying at home with full salary.
- Upgrade infrastructure standards: According to the climate change impact assessment, adjust the security standards of critical infrastructures such as electricity supply, water supply, drainage, gas, heating and telecommunication, etc.
- Increase capacity of drainage systems in the important flooding control areas. Strengthen adaptation capacity in coastal areas. Set tidemarks in sensitive areas. Establish DRR scheme including ecological measures.

Suggestion

As a coastal megacity, Shanghai is vulnerable when facing climate disruptions. Climate change has long term impacts on city infrastructures and people's living. Climate change adaptation work in Shanghai is still in its

early stage. When its current 5-year plan is being implemented by 2015, the policy makers should have clearer pictures on how to make the city more resilient. Since urbanization is a major contributor for local climate change, this paper suggests Shanghai city should integrate an adaptation strategy into its urban development strategy, which shapes the next generation of the city.

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Discussing the Aftermath of Two Disasters in Chile: The Question of Scale

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Introduction

This essay emerges as personal outcome from the reflections and insights during the DAAD Alumni Summer School 2013 "Coping with Disasters and Climate Extremes" held in Cologne and Bonn, Germany. Both the combination of international experts during the summer school and the progress of my own PhD's dissertation encouraged me to develop this essay.

In practical terms, this essay aims to analyse different discourses on scale in order to use them as lens to interpret the social production and reproduction of risk within and through different geographical scales.

In order to tackle this issue, this essay explores general implications involved in the aftermath of two disasters in Chile: the Chaitén volcano eruption in 2008 and the Maule earthquake in February 2010. In this regards, this essay questions: what possible linkages emerge between the discourse on the social production of risk and the question of scale?

In so doing, the essay adopts a vulnerability approach to address the production of risk as socially constructed concept –based mainly on works from Ben Wisner et al. (2004), Omar D. Cardona (2006) and Camillo Boano and Ragnhild Lund (2011). Likewise, the essay will discuss two main discourses on scale – from geographers to global-city theorists – meanwhile by the end of the essay, it contrasts general views of the aftermath of these two disasters in Chile.

On addressing the analysis of scale, the main source will emerge from literature review and the use of discourse analysis methods, mainly on books and journal articles. As result of this analysis, a theoretical framework will be set up in order to approach the question of scale within post-disaster context by analysing the aftermath of disasters in Chile. In addition, the review of recovery and reconstruction processes will be mainly through exploring journal articles as well as archival records produced by authorities but also by NGO's; reports, statistics, informs, among others. Moreover, media archives will provide a valuable material in the case of Chaitén.

The question of scale

The starting point for analysing the question of scale lies on the tension between the so-called 'traditional' and 'critical' perspectives. The early works of Neil Brenner during 1990's and then in 2000's provide a historical standpoint of the emergence of critical perspectives against the traditional views on geographical scale.

Brenner (1998) starts his analysis under the assumption that during many years most of social researchers have neglected the question of scale, specially under the 1980´s and 1990´s rounds of globalization and capitalism restructuring.

> *"[T]he problematic of [geographical] scale and its social production was still generally subordinated to analyses of spatial practices within fixed geographical scales: the local, the urban, the regional, the national and/or the global" (Brenner 1998, pp. 459).*

On the other hand, Montello (2001) argues that geographical scale is indisputably about size, "either relative or absolute". Montello summarizes three meanings of scale given by geographers based on the work of

Hudson (1992) and Lam and Quattrochi (1992). First, scale as a cartographic definition. This meaning implies the "depicted size of a feature on a map relative to its actual size in the world" (Montello 2001, pp. 14771). This is the most common understanding about scales, examples could be 1:5 or 1:3000 scale representations which can be found in maps or models. Second, the analysis scale, which refers to "the size of the unit at which some problem is analyzed" (Montello 2001, pp. 14771). For instance, if a research on genetics includes a representative sample from the entire indigenous population in Chile, necessarily it must conceive its geographical unit of analysis at national level, so the study applies at national scale. The third meaning is the phenomenon scale, which considers "the size at which geographic structures exist and over which geographic processes operate in the world. It is the 'true' scale of geographic phenomena" (Montello 2001, pp. 14772). According to Lam and Quattrochi (1992), for geographers it is widely assumed that the scale matters and often concepts in geography reflect that phenomena are scale-dependent; "Vegetation stands are smaller than vegetation regions and linguistic dialects are distributed over smaller areas than languages" (Lam and Quattrochi 1992: 90). However, geographers are also aware that diverse phenomena can interact at multiple geographical scales (Lam & Quattrochi 1992).

Somehow, Lam and Quattrochi's work captures the Brenner's critique on that the studies of geographical scales and its social production had been subordinated to the analysis of fixed geographical scales. Likewise, global-city theorists such as Swyngedouw (1992) and Brenner (1998) provide other suggestive intellectual views on the question of scale based on the profound economic, social, political and cultural –but also environmental– changes and transformations entailed by globalization since 1960´s and 1970´s. Under globalization, Brenner argues (1998), the role of geographical scales emerges either predominant and constitutive of hierarchies and boundaries of "densely intertwined, overlapping forms of territorial organization [such as states and cities]" (Brenner 1998, pp. 461).

> *"In the literature on geographical scale, the state has been understood largely through its role as the organisational-territorial locus of national scale... [Brenner elaborates] a broader conceptualisation of the territorial state not only as a site within which geographical scales are produced but as an important institutional precondition, agent, mediator and outcome [of the geographical scale]... [Thus], territorial state is itself multiscalar form of capitalist territorial organisation that encompasses national, subnational and supranational [simultaneously"*[1] (Brenner 1998, pp. 469).

In short, Brenner examines the historical geography of state under different rounds of capitalist restructuring –from 1890s to post-1970s. In so doing, Brenner explains that the state has played different roles in the capital circulation over this period, characterizing the *multiscalar* role of the state during the last decades.

Brenner's examination of the *multiscalar* role of the state is congruent with Wisner's *et al.* (2004) observations of the 'root causes' and 'dynamic pressures' intervening in the production of vulnerability, risk and disaster. Brenner's analysis is also consistent with Pelling's (2003) explorations on 'global pressures' acting on the construction of risk.

There are many angles from which global-city researchers have theorized and analysed geographical scales under globalization, but in general they agree in the fact that the study of cities, specifically global cities, should not be longer subordinated only to the study at one single scale.

Finally, this essay summarizes the global-city researchers approaches on the question of geographical scale by quoting Smith (1992) and Swyngedouw (1992) who have described geographical scale as follows:

[1] Brenner provides empirical information on the multiscalar role of the state in his article "Building Euro-regions..." (2000), and the multiscalar role of cities as forms of territorial organisation in "Globalisation as reterritorialisation" (1999).

> *"The making of places implies the production of scale in so far as places are made different from each other; scale is the creation of difference not so much between places as between different kinds of places. […] The construction of scale is not simply a spatial solidification or materialisation of contested social forces and processes; the corollary also holds. Scale is an active progenitor of specific social processes... Scale demarcates the sites of social contest, the object as well as the resolution of contest" (Smith 1992, pp. 64).*

In Swyngedouw's words:

> *"Geographical scales are both the realm and the outcome of the struggle over control over space"(Swyngedouw 1992, pp. 60).*

The aftermath of two disasters in Chile

Chaitén Volcano Eruption

In May 2008, the Chaitén volcano located 10km inland from the city of that name erupted and caused the evacuation and subsequent displacement of the entire city population, around 7000 inhabitants, including public officials and emergency personnel (De la Barrera *et al.* 2011). In the first day, Chaitén city's inhabitants were evacuated mainly to Puerto Montt and Castro. Ten days after the evacuation, the explosion of the volcano's dome caused *lahars* and floods that left the city totally uninhabitable (Lara 2009). Economic losses were estimated in US$12 million only by insured public buildings and other US$36 million were directed to social support for evacuated –and displaced– people (Lara 2009).

Chaitén disaster became evident after the delay of authorities for delivering a plan in the next months and years. One year after of the eruption, three reports (Moreno & Lara 2008; Moreno *et al.* 2008; SERNAGEOMIN 2009) commissioned by the Chilean government determined that the current location of Chaitén is highly prone to new eruptions and seismic activities. Due to the latter, in January 2009 the government announced that there will be no reconstruction of Chaitén (Muñoz 2009) and there will be no investment of any kind in the historic location but alternative plans based on the displacement of Chaitén to other safer zones will be developed. Two years after the eruption, in 2010, Santa Barbara was chosen as the location of the New Chaitén (Ramirez 2010), however the same year a massive earthquake stroke the southern-central area of the country killing around 500 people, affecting other one million people, and producing more than US$30 billion in losses (EM-DAT 2013), and plans for the relocation of the New Chaitén were stopped (Ramirez 2010).

By 2011 more than 250 people had returned to Chaitén, living without access to basic services such as potable water and electricity (Paz 2011) as well as health and security services. Likewise, people who decided to move to other towns and cities felt overwhelmed by debt and other economic problems, and had problems in integrating themselves into their new communities (Paz 2011).

In the case of people who decided to return to Chaitén, it seems clear that they are at higher risk than other Chaitén's inhabitants who decided to stay in host cities. The latter can be explained because of the location, the proximity to the volcano, the isolation of the city due to the destruction of key transport and communication infrastructure, and so on. However, analyzing with more details, neither returned people and displaced people have been able to at least restore their pre-disaster lives, on the contrary, they are at more risk than before. What this essay discusses is that the lack of authorities´ coordination both regional and national for addressing either the reconstruction or displacement of the city, have undermined people´s opportunities for recovery after the disaster. From a geography perspective, scale risk seems placing at local

level, within Chatién's urban frame, neglecting the fact that political processes both at regional and national level have participated in the production of that risk. However, from a social-construction-of-risk perspective, and devising the PAR model (Wisner et al. 2004), the production of risk seems to be nested in the lack of authorities coordination and will to solve the problem, among others rather than physical and merely local. So, although risk can emerge locally it is important to consider the possibility that underlying factors on the production of vulnerability can be nested and unfolded from, and through other geographical scales. Likewise, it is important to see that the Chaitén disaster is not only located within city's boundaries but it became a regional –and also national– issue when displaced people could not return to Chaitén or found alternative solutions even five years after the volcano's eruption.

Maule, Chile Earthquake 2010

In February 2010, an earthquake with a magnitude of 8.8 Richter scale, stroke southern-central Chile affecting six regions which inhabit around 80 percent of the country's total population (INE 2002). In January 2011, the Chilean Ministry of Internal Affairs (Ministerio del Interior de Chile 2011) announced the final death toll of 525 victims and 25 people missing. According to MarketWatch WSJ (2010), the "economic damage in Chile could range between $15 billion and $30 billion, about 10% to 15% of the country's GDP". Likewise, the Casen Post-Earthquake Survey (Larrañaga and Herrera 2011) demonstrated that 8.8 percent of the total six-regions' population resulted with their homes destroyed or severely damaged by the events –1,150 million people and more than 350,000 houses–, and affecting especially poor people. This report also revealed that poorer people in Chile have a three times higher probability for being affected by physical events than richer people in the same area, mainly because of building materials, location in disaster prone areas and weak social network to cope with post-disaster effects.

In total 200,000 people were displaced into temporary shelters, from which 1,300 families were still living in those "temporary" solutions, mainly in Maule and Bio-Bio regions, by 2012 (Perasso 2011).

Although authorities recognize the role of poverty in the production of vulnerability and therefore risk, in general neglect underlying factors beyond boundaries of affected areas. For instance, the uneven urban development throughout the country as result of a geographical centralization policies during last decades – e.g. Santiago concentrates one-third of total Chile's population, 40% of national GPD, among others (Brehme 2010).

Thus, the question of scale in the production of risk emerges here supported by the rise of vulnerability approaches. Questions about how decades of geographical centralization based on neoliberalism policies in Chile has placed people, who live far away from the Chilean capital and its development, at risk? Brehme (2010) pointed out that economic pressures for regional competitiveness were drivers of land-use planning corruption in Concepción, where several buildings were built in disaster prone areas and which finally resulted destroyed by the earthquake in 2010.

Closing remarks

Since disaster risk may be conceived as non-natural phenomena and therefore social, political, economic and environmental dimensions are analytically implicated into the production and reproduction of risk, we should no longer conceive "spatial scales as pre-given and 'natural' arenas of social interaction" (Brenner 1998: 460). In other words, geographical scales have been interpreted in disaster risk studies as merely "arenas" where social, political, economic and environmental dimensions take place. And this interpretation

neglected the fact that these traditional and historical conceptions of geographical scales have dramatically changed since the modern globalization irruption along with the last economic-capitalist global restructuring came on the scene. Moreover, much of disaster studies have predominantly explored risk within a single scale; urban, regional or global. Whereas most of disaster risk studies on vulnerability focus largely on urban scale because the concentration of assets, people and values, specific studies on insurance and hazards focus mainly on regional and global levels. The question of geographical scale under the assumption of an integrated multilevel approach in which global, regional and urban socio-economic and political systems are active participants of the production of risk is needed. Thus, efforts to integrate differential geographical scales within a single analytical framework are relatively rare within the paradigm of government agendas' development. However, disaster risk studies encompass and connect an ample range of methodological insights that would permit to address these issues effectively in the future.

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Societal Dealings with Cyclone in Bangladesh

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Introduction

The effects of climate change is necessitating a variety of adaptation measures strongly depending on the local and regional circumstances (Wisner & Luce 1993; IPCC 2012; Janssen & Ostrom 2006; Birkmann & Teichman 2010). Furthermore, the effects of climate change affect both different economic sectors as well as different spatial entities to a different extent (UNFCCC 2007; IPCC 2014; IPCC 2012). This discrepancy is rooted in the different reactions, action potentials and actions of the people concerned, depending on culture, politics, economic power, etc. It reveals the necessity of developing adapted planning measures and raises the question of how the societies and their stakeholders in the affected countries – primarily developing countries – can respond to natural hazards, especially when it comes to prevention and coping with the hazard's impacts (Mallick 2011; Cannon 2008). In that context, it is important to not only determine the most functional measure, but also the one most appropriate in terms of economic and social adaptation and adaptability(Mathbor 2008; Cannon, Twigg & Rowell 2004). As there is no comprehensive model including the entire spectrum of a disasters' functional chain, in the present work, a risk research model on "state and transition" (Westoby, Walker & Noy-Meir 1989) is adapted to assess the vulnerability of households to a natural hazardous event. This analytical model is described based on the empirical study at southwest coastal Bangladesh during 2009 and 2010.

The following sections are organized as: section 2 states the analytical model, section 3 debriefs the empirical settings and study design, section 4 shows the results and section 5 concludes with general discussion.

Analytical Model

A modified version of 'state-and-transition' model (Westoby et al. 1989) is applied in order to recognize the households' response to cyclones (Figure 1). It is assumed that at a point of time t=0 ("pre-event steady state"), households are in a stable residential state. The households' capacity (e.g. tangible assets and intangible property assets, workforce) to react to external disruptions is defined as threshold of this condition. Exogenous shocks (such as cyclones or floods) trigger off coping actions, for instance reconstruction measures or actions to replace goods. However, by the kind and extent of damages exogenous shocks provoke, they may exceed the households' capacity to preserve their original state, provoking the households to switch over from one stable condition to another. This transition can be compared to the flight path between two points. The restrictive conditions of poverty link-up the single phases of this temporal sequence. Assuming that humans act on rational motives is a simplification. Disruptions may also provoke shocks and triggers of panic-driven irrational reactions that cannot be described by the introduced model. Next to material and physical conditions, the actors' mental conditions even sometimes play a decisive role. To include this condition is a desideratum of research. The present concept offers points of contact to achieve this objective.

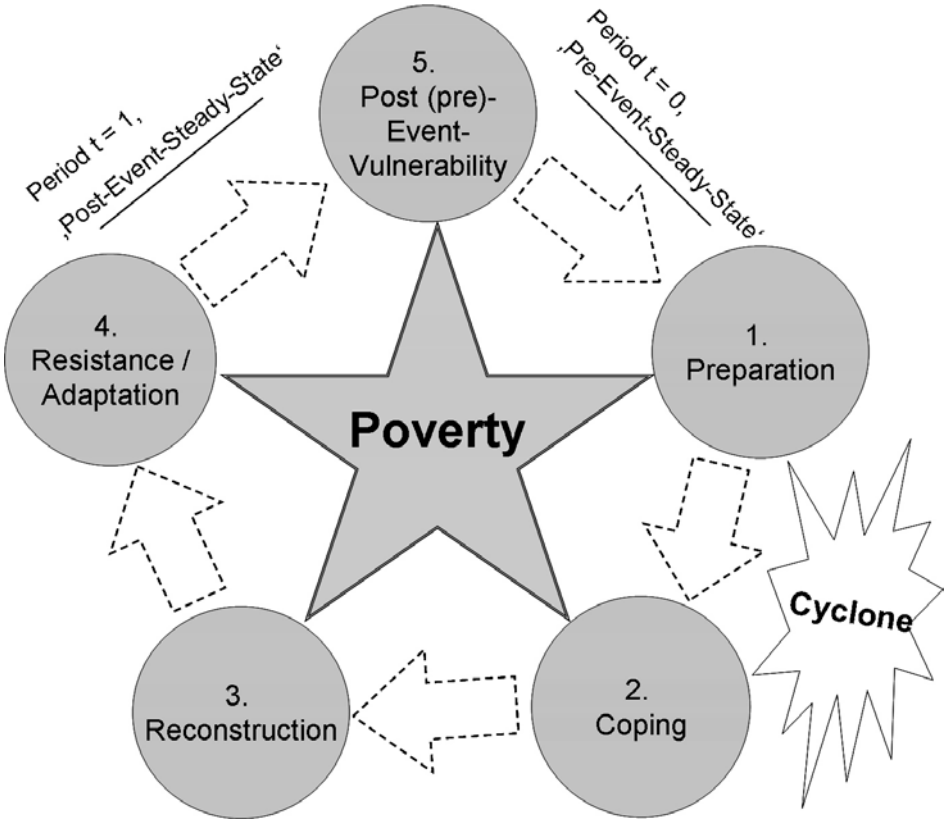

Figure 1: Modified "State and transition model" of Westoby et al (1989) as analytical concept of cyclone impact analysis

Phase 1 describes the preparedness about cyclone; phase 2 clarifies the immediate consequences and livelihood scenarios during the event; phase 3 explores the relief and rehabilitation activities are taken both by the affected individual or external supports. Phase 4 states the ways to an ultimate resistant situation. In respect of this model the societal handlings with cyclone Aila of 2009 and cyclone Sidr of 2007 in south coastal Bangladesh are described in this paper. This analysis will enhance the dialogue between different approaches to vulnerability and resilience research, fathoming a multitude of partially highly different processes relying on different methods and on different spatial scales. In this work, a detailed discussion of the interdependency of these processes on different spatial and temporal scales is dispensable.

Empiricism: Southwest coastal region of Bangladesh

The research area is the south-western coastal zone of Bangladesh, a global hotspot for climate change adaptation research (Dasgupta et al. 2010; Akter & Mallick 2013; DMB 2010; Ayers et al. 2014). Regular cyclones from the Bay of Bengal with devastating effects (Mallick, Rahaman & Vogt 2011; Islam & Peterson 2009), inundations caused by the large rivers of the North(Takagi et al. 2007; Mirza 1998), increasing salinization of the groundwater and soils (Gain, Uddin & Sana 2008; Rahman, Lund & Bryceson 2011), the highest population density of any territorial state worldwide with upward trend, the problematic implications of the increasing international economic integration and thus dependency on the global market coincide in this southwest coast of Bangladesh.

The southwest coastal area of Bangladesh covers 47,211square kilometres, 32 per cent of the country's geographical area(PDO-ICZMP 2004). More than 36.8million people (BBS-GoB 2013)—28per cent of the country's total population—constitute more than 6.85 million households (BBS–GoB, 2013). In terms of

administration, 19 of 64 districts are considered to be coastal districts, but it was not possible to conduct an empirical study to all over 19 districts. This study covers only 3 districts, namely Khulna, Satkhira and Bagerhat districts; a total of 48 villages of these three districts were selected based on their severity by cyclone Sidr of 2007 and cyclone Aila of 2009. The empirical research consisted of household survey (in person interview) and group discussion in the study villages.

Household survey

The household survey targeted the household head and aimed to maintain gender balance among respondents. Hence, a total of 1555 respondents were chosen carefully from the selected villages. Trained interviewers administered the questionnaire in June–August 2009. To finalize the questionnaire, which was tested by researchers and data collectors, a two-day discussion session was arranged with experts and data collectors from the Coastal Research Foundation (CRF) in Khulna, Bangladesh. A household interview usually lasted 30 minutes on average. No type of compensation was available to respondents. A stratified random sampling procedure was used to select respondents. First, villages of interest were identified according to the degree of devastation. Second, the total sample was distributed among the selected villages according to their total number of households. Third, a respondent from every eighteenth house along the main road was chosen for interview. If the household head was absent, a member was invited to answer the questions; failing that, a respondent from the next nearest house was interviewed.

The questionnaire consists of one general section and three specific sections. Section one asks the adaptive measures and strategies they had taken; section two describes their opinion about disaster management operations and their future plans; the third section deals with specific socio-demographic situation before and after Aila; and finally the general section describes the demographic information of the respondents. Cyclone related questions were aimed at examining the extent and nature of the impacts of cyclone on life and livelihood, including the aftermath inundation situation.

Group discussion

In addition to the household survey, several focus-group discussions also were convened. The sessions were conducted with survivors and adhered to the standard rules of participatory learning and action (PLA) (Chevalier and Buckles 2008). Different sessions focused on different subjects. The discussions covered the impact of cyclones on different occupational groups, coping mechanism during and after cyclone Aila and cyclone Sidr, and information regarding household activities during normal and extreme events years. They were also asked about the effectiveness of relief and rehabilitation programs organized by different GOs-, NGOs- stakeholders in their locality. In discussions with implementers, local, national and international institutions, efforts were taken to get a better understanding of the way programs were decided, of the way they were implemented and accepted by the local population, and the possible improvements that can be brought to the action. The issues examined in this paper were assessed in the discussion of mobility pattern analysis during Cyclone Aila and social mapping of institutional supports.

Results

Pre-event steady state

Applying the analytical model (fig. 1), results of the empirical researches are carried out.

The majority of the respondents were Muslims (96per cent). The average age of the respondents was reported as 45years (a minimum of 17and a maximum of 80 years). Approximately 33 per cent were illiterate

and only 14 per cent had attained university-level education. Only 3.5 per cent were identified as landless. The observed household size (6.2members per family) in the studied villages was higher than the national house-hold size (5.6members per family) (BBS–GoB, 2013). Although agro-based farming and activities were the main livelihood sources, a total of 31per cent of the respondents were day labourers. Average monthly income was around USD 100 before the cyclone event.

Considering this basic profile of the respondents, firstly, the "pre-event steady state" is introduced by means of an exemplary result on the "cyclone shelter" (CS). Cyclone shelters are the refugee center, where the victims can seek refugee during cyclone or tidal surges. The government of Bangladesh has treated cyclone shelter as an important instrument of mitigating cyclone induced damages and losses in the coastal region of Bangladesh (Mallick 2014). Literature shows that people were not interested to take refugee at those cyclone shelter due different types of reasons (Mallick, Rahaman, and Vogt 2011; Karim and Mimura 2008; Nasreen 2004; Paul 2009b; Paul 2009a). Particularly, it is evident that locational suitability of those shelter plays the vital role in decision-making in seeking refugee at cyclone shelter. Therefore, it is essential to determine the shelters' socio-spatial location. For this purpose, a GIS based spatial analysis was conducted (Figure 2).

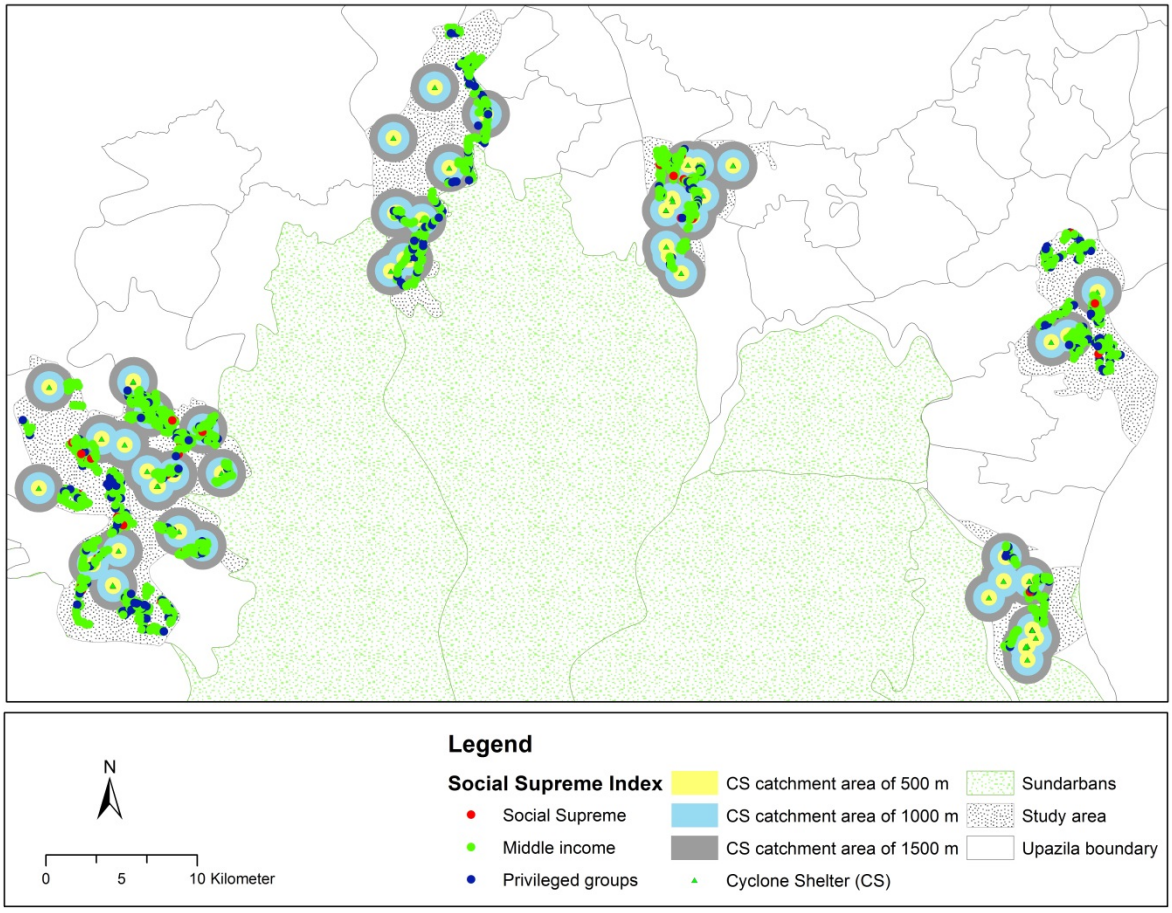

Figure 2: Spatial distribution of SSI and catchment area of cyclone shelters
Source: own illustration according to LGED 2009 with field research data of 2009, 2010

Figure 2 shows a graphic illustration of the result. The circles represent the catchment areas of the single cyclone shelter within a radius from 500 to 1500 meters (smaller to bigger). Dots are the location of interviewed households. The respondents are classified according to their socio-economic characteristics, namely land ownership, per capita income and investment in residential house construction, into three different group: "Social Supreme"- those are rich and powerful at the community, "middle income" – those

are mostly deprived from traditional development activities and "privileged" – those are poor but get more attention by all development partners. For details of this classification readers are refer to read Mallick's research paper on "Cyclone shelters and their locational suitability: an empirical analysis from coastal Bangladesh" (Mallick 2014). Here, red dots represent the group of "social supreme", blue dots the group of "privileged" and light green dots the group of "middle income)" respondents. It turns out that only rarely, the members of the Social Supreme group are residing outside the catchment area. Considering a radius of 1.5 kilometres, in general, 90 percent of all respondents' households are close to a cyclone shelter; considering a catchment area of 1 kilometre, 65 percent of them are close to a cyclone shelter; yet, only 25 percent of the surveyed households live within a distance of 500 meter from the cyclone shelter. Above, there are households which are even located outside of the defined catchment areas of cyclone shelters. It is evident here that as the catchment area decreases the closeness to the cyclone shelter of Social Supreme group also increases (Table 1).

Catchment area of cyclone Shelter	**% of Social Supreme inside the catchment (3% of the sample)**	**% of middle income inside the catchment (79% of the sample)**	**% of privileged inside the catchment (18% of the sample)**
500 meter	60	35	45
1000 meter	87	55	72
1500 meter	97	73	80

Table 1: Distribution of respondents groups according to the cyclone-shelter catchmen
Source: Author's field survey 2009 and 2010

In the next step, the plinth height of the respondents' residential houses was included into the analysis. In case of the crevasses that often occur during storm surges, the inland residential areas are flooded. The average height of a storm flood is between 3 to 4 meters above mean sea level (Dasgupta et al. 2009). Therefore, the floor of the dwellings which are usually blocked during the storm surge must be built at least 4 meters above sea level. The higher a plinth of a house, the less its inhabitants are affected by the impacts of a flood. By means of the digital elevation model and the plinth height above the ground it was found out that the average plinth height is only 3.5 meters above sea level. If the embankments along the coast break or are overtopped by tidal-surges, living space is highly imperilled to be inundated by flood waves above 3.5 meters. Except for the embankments' dike peaks; there are only few areas that are situated higher than 4 meters above sea level. Considering the spatial distribution it is now possible to deduce the probabilities of a dwelling's destruction including the whole sequence of effects.

Preparedness

Exemplarily, the next step of the analytical concept integrates a cyclone preparation measure. Some of the basic information of the respondents is presented in Table 2. The reception of early warnings is pre-requisite for the inhabitants to take preparatory actions in case of an imminent disastrous incident. The survey reveals that approximately all respondents had received the early warning, whereas only 30 percent took action for preparedness, but why? Answer of this question depends on the earliness of receiving early warning (Table 2). Less than 1 percent received early warning more than 24 hours before the event, and therefore, they were

prepared for the cyclone. Among this group, for instance, 53 percent tied up their houses' roofs to trees, whereas others removed their food to a safe place.

Particulars	Indicators	Value
Categories of residential house	% Kutcha	59
	% Semi-pucca	39
	% Pucca	2.1
Adequacy of per capita floor area ratio	% Inadequate floor area ratio for the family	92.2
	% Adequate floor area ratio for the family	7.8
Plinth level category (in meter)	% Less than 1 meter	49.3
	% 1.00 – 1.50 meter	38.1
	% More than 1.5 meter	12.5
Cost of residential house (RH) construction category	% Less than 400 USD	15.4
	% 400 – 650 USD	72.2
	% More than 650 USD	12.4
Accessibility to cyclone shelter/primary school	% Comfort accessibility (less than 10 minutes)	39.2
	% Moderate accessibility (10 - 30 minutes)	39.6
	% Hard to reach (more than 30 minutes)	21.2
Accessibility to drinking water sources	% Comfort accessibility (less than 10 minutes)	70.1
	% Moderate accessibility (10 - 30 minutes)	28.8
	% Hard to reach (more than 30 minutes)	1.1
Able to understand the early warning	% Understand early warning	71.8
	% Do not understand the early warning	28.2
Earliness of receiving early warning	% Preparation is not possible (less than 6 hours)	77.6
	% Hard to be prepared (7 to 24 hours)	22.3
	% Possible to be prepared (more than 24 hours)	0.2

Table 2: Summary statistics of respondents
Source: Derived from field data of 2009 and 2010

Why have so few respondents been able to prepare themselves for the cyclone? Two explications were most often mentioned: the respondents either indicated not to have had enough time or to have felt helpless. The biographical interviews reveal that many inhabitants had been surprised by the onset of the cyclone. Shahabuddin, a 70-year old man from the village of Sharankhola reported: "It came all of sudden, we felt paralyzed". The second example was provided by a 38-year old woman, Karuna Bala Dashi from the village of Koyra. She said: "When cyclone Aila hit, the water rose hip-high within 20 to 30 minutes. All of us got on our boats and reached for the few things we could rescue."

Coping

In the framework of this study it is essential to know where the affected people stayed during the cyclone, where they have searched for and found a safe place, and which have been the shelters in the research area. As mentioned earlier, cyclone shelters are important refuges and are the basis for the country's prevention concept. Why did not the victims of cyclone try to reach a cyclone shelter? The group discussions and

household surveys gave information on this question. The group has collectively discussed and appreciated the distance to the shelters and how often they had been used. The result shows only a minority of inhabitants sought refuge in the cyclone shelters, although they offered sufficient intake capacity. Why it is so? The results of a principal component analysis offer explications why the minority of inhabitants did not use the shelters: the reception of the early warning plays the most important role, followed by the individual household's preparedness. Surely, condition of the respondents' dwelling plays a key role in their decision-taking. People assume that they can still take measures even on the flood-waves arrival if they perceive a concrete endangerment of their property. However, this is not possible from a distant shelter as the social status is decisive, too, for instance farmers or day-labourers. Eventually, it was reported during field survey that due to cultural reasons, women take less often refuge in cyclone shelters than men. Individual positive experience with cyclones however encourages people to search for refuge in a cyclone shelter.

Reconstruction and rehabilitation

When a cyclone has passed the region, the victims must overcome the consequences, traumata and damages in order to be able to live on. It is not always possible for them to cope with these challenges on their own as resources are either inexistent or have been destroyed as well. Humanitarian organizations and, as most important factor, government should support them in this situation. Sometimes, also private initiatives offer emergency relief. However, in the research area, these measures of emergency assistance are unevenly distributed in terms of space, which can only partly be explained by differing accessibility. Political and social assessment and the distribution of power play a major role. Emergency relief projects are first and foremost implemented at places where they can be geared towards the media that is close to minimizing traffic connections or hotel, guest houses. In such preferential areas, donors compete while the peripheral regions hardly benefit from any emergency assistance.

In recent years, the Government of Bangladesh and other development partners in the country (namely United Nations Development Programme (UNDP) Japan International Cooperation Agency (JICA), German Society for International Cooperation (GIZ), European Union (EU), etc.), was planned about 1.4 billion USD on spending for the recovery from the damage of cyclone Sidr and Aila. The question is how those funds were distributed amongst the victims. 57% of respondents of the survey believe that local politicians have used their power in the distribution of relief. Similar results are derived from group discussions and biographical interviews.

External supports and response to affected society sometimes are also observed as "dependency on others" that increases the expectation of external supports. Particularly, if someone keep getting help from others, he/she lose his/her own ability to reduce/deal with a risk, if there are many different ways that the victims can benefit them or use their better chance. And long term, they expect a lot of them and thus to calculate the best way. This assumption is summarized using a biographical interviews, the respondent, Mr. Alam Mia on Majherchar village Southkhali Union, had said:

"Why should I rebuild my broken house? After Cyclone Sidr came many NGOs to build my house. At that time I made a mistake because I have accepted the support of the charity Caritas Bangladesh. If I had taken the house of the organization Muslim Aid, today I had a very good house. I wait this time until they come to me, or even going to try to go to them."

This interview shows that the long-term expectations of external assistance increases. But if there is no more relief, the affected people should continue to live and for this they must also work to secure their livelihoods, same as their inheritance did during 1950s when there were literally no external aid programs available.

Resistance/Adaptation

However, even if the emergency relief organizations stop their programs, people must live on and secure their livelihood. How do the people affected react on this situation? They could sell their own resources, for instance, 17 percent of the respondents have sold their crops, cattle or jewellery. 14 percent of the interviewees have changed their employment due to the extent of damages, their dependency on the exploitation of the Sundarbans and the limited opportunities to participate in reconstruction works. In most cases, the farmers have worked as fishermen, as in the wake of the cyclone Aila, farmlands were inundated and could not be longer be cultivated. Yet not all the affected could follow this strategy and therefore took out a loan, which became the main source of income to secure their livelihood. About 80 percent of the surveyed households have taken out loans from different mortgagees such as NGOs, banks or local money lenders. Some of them have borrowed money because an emergency relief organization has asked them to do so. Actually, aid organizations have often created microcredit programs after the end of the emergency relief, which became one of the most important sources of income helping the impoverished inhabitants to survive. Some of the inhabitants have left the village. Those who had received only little help and had borrowed substantial amounts of money have most often migrated to nearby towns. 34 percent of the surveyed households reported that at least one of their family members had left the village. This situation which recurs after every similar incident explains for the rapid growth of cities and also leads to a gradual change of the affected society.

Discussion

The results in selected communities show that socio-economic conditions of the surveyed households are the most important factors in coping with the effects of cyclones. This means that if the households in the communities are technically, socially and economically strong enough, they can resist with adverse consequences of cyclone. However, results shows that relief efforts were exploited by those in power. It means those in power or those considered as “social supreme” have a very big influence on the local decision making process. They support their dependent groups and reinforce this. This leads to social marginalization as a result of a disaster and also to strengthening of “patron-client-dependency” in the society. The current state of the coastal society is also a result of social processes during the frequent devastating cyclones or other natural events. In addition, the social power of different actors has a strong spatial pattern, corresponding to affects resulting from the reaction of those affected and mitigated. These spatial patterns are an important key to understanding the effects of any kind of disaster, as well as the subsequent relief and prevention measures. Therefore, for disaster preparedness planning a holistic approach of underpinning the concept of individual vulnerability monitoring is important, where the vulnerability is defined on the cultural, socio-economic, political and environmental context of the victims. The results of this research demonstrates the need for such a spatially differentiated analysis and planning, including a vulnerability atlas in the sense of a comprehensive database, are the most useful measure for analysis and development of plans and measures. This kind of analysis should be a helpful guide for the development of concepts and strategies for future risk management. It will also be an instrument that shows temporal monitoring of the effects of disasters and relief and thus can also be used to evaluate policies for external interventions.

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Increasing Hazards – Increasing Policies – Increasing Usage of Resilience? Survey amongst the Participants of the 2013 DAAD Alumni Summer School

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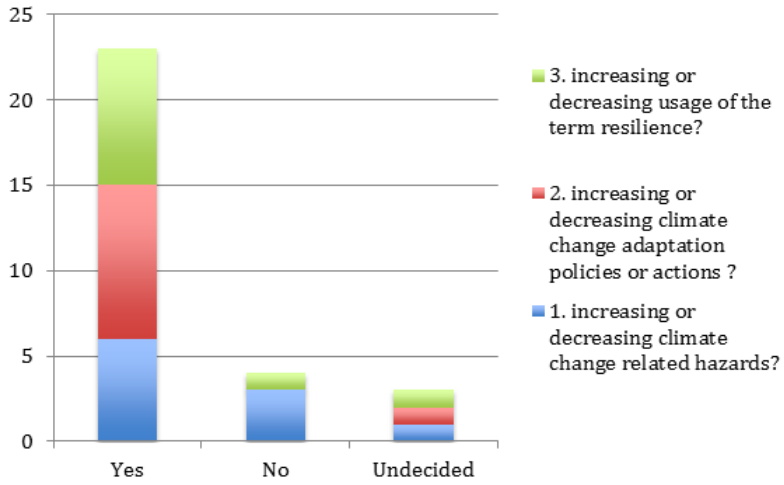

Figure 1: The nominal survey results, conducted per email on April 23-25 2014, in overview

Question 1: Are there any indications in your working environment or in your country in general of: Increasing or decreasing climate change related hazards?

No

Bangladesh: "No increase of CC related hazards. The situation has not changed much. We even have a very lovely spring with sufficient rain so far, but there have been regions hit by hail already."

Indonesia: "It is supposed that climate change related hazards decrease in Indonesia. Indonesian Government Program provided people some actions to be aware of them, i.e. National and Regional Action Movements on Greenhouse Effects."

Moldova: "No increase of CC related hazards. The situation has not changed much. We even have a very lovely spring with sufficient rain so far, but there have been regions hit by hail already."

Yes

Chile: "In Chile there is an increasing of CC related hazards as well as awareness by people and authorities about those."

China(A): "According to China National Climate Center, rainfalls increases by 4% than average standard in China, while distributed unevenly in 2013. Overall temperature increased by 0.6℃ compared with average standard. Particular, 31 Typhoon generated in the Northwest Pacific and South China Sea area, 5.5 incidences more than normal number. Example of extreme weather in 2014: floods, landslides and geological events resulting from melting snow have affected north-western Xinjiang since early March. It also suffered from a rare April snow."

China(B): "The scientific evidence are still not solid to link hazards with climate change."

Ghana: "There is increasing climate change related hazard. The country Ghana is seeing more floods at some geographical locations and more drought at other places"

Ruanda: "Yes."

Turkey: "Though, it is related to information technologies and social media news, or real hazard events, the registered climate change related hazard numbers are increasing. And the visibility of CC events' effects are increasing in country range."

Undecided

South Africa: "For this do you mean in science in general? Or in popular media? Again I have no idea... I guess I can't comment on this one! Unless I did a quick search for the term, because my answer would be completely biased."

Question 2: Are there any indications in your working environment or in your country in general of: Increasing or decreasing climate change adaptation policies or actions?

No

None

Yes

Bangladesh: "Yes - increasing CCA policies. First of all, the Government is preparing a new Strategy for Agriculture for 2010-2014. Then we have increasing interest from the part of Ministry of Environment. There is also a great acceleration regarding this subject generated by foreign structure (GIZ, World Bank)."

Chile: "Yes. In the last years, and specifically this year, several public policies have been announced towards the mitigatory measures such as a strict control over CO2 emissions and protection of ecosystems."

China(A): "There is improvement in policy, for example:

- Official release of "The national strategy for adapting to climate change" in November 2013, identifying adaptation objectives, key tasks, the regional pattern and safeguards measures. Under this guideline, regional administrations have issued according climate change adaptation policy and targets, such as Chongqing, Shanghai and Gansu.
- Call for enhancing data collection and evaluation on extreme weather and disasters since 2013 August
- Interestingly, a lot focus of climate strategies have emphasized on smog problem. Green Paper on Climate Change issued by CSA also largely focused on smog, although it recognizes pollution is the major cause other than climate change. Accordingly, most climate change working groups are also focusing on fighting smog problem."

China(B): "China has adaptation strategy in its climate change white paper. Some pilot projects are undergoing."

Ghana: “There is an increase in climate change adaptation actions.”

Indonesia: “It is supposed that Indonesian Government is more concern on Climate Change Adaptation by administering and implementing regulations or policies, e.g. many companies which are responsible for forest fire cases are brought to the court and got punished.”

Moldova: “Yes - increasing CCA policies. First of all, the Government is preparing a new Strategy for Agriculture for 2010-2014. Then we have increasing interest from the part of Ministry of Environment. There is also a great acceleration regarding this subject generated by foreign structure (GIZ, World Bank)."

Ruanda: “Yes.”

Turkey: “Especially in last decade in Turkey, there is an increase on climate change adaptation policies or actions. These are visible with ‘Turkey’s National Climate Change Adaptation Strategy and Action Plan’ which published in 2012.”

Undecided

South Africa: “I would guess at the moment that CC hazards are pretty much as frequent as they have been in my adult experience (10 years). It’s a little difficult to tell with biased press only reporting certain events in the world.”

Question 3: Are there any indications in your working environment or in your country in general of: Increasing or decreasing usage of the term resilience?

No

China(B): “Even hard to find a really good translation for resilience.”

Yes

Bangladesh: “Yes - increasing.”

Chile: “Yes. An increasing of the term resilience. Both by scholars and authorities, the term resilience have been used in media and academic circles. However, I have found that both groups often misuse the term, using it as synonym of 'resistant'.”

China(A): “The graph below is search result on CNKI (China National Knowledge Infrastructure): publication numbers with key words: Climate change + resilience. It shows obvious increasing research focus on resilience in climate change. However, in the mass media, it seems that mostly used term is “Adaptation” (适应). Resilience is either mixed with “Adaptation” or referred as non-mainstream word 恢复力.”

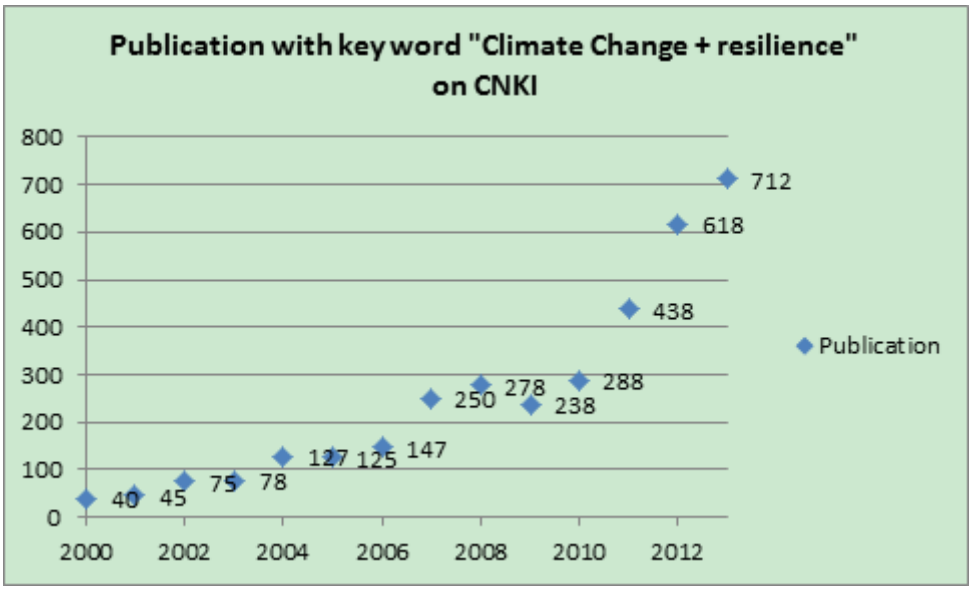

Figure 2: Number of publications with key words "Climate Change + resilience" available on China National Knowledge Infrastructure (CNKI)

Ghana: "There is an increase in the usage of the term resilience."

Indonesia: "It is supposed that the usage of resilience term increases. By advocating and disseminating knowledge people in vulnerable areas are ready to cope with hazards and will have short duration of traumatic period."

Moldova: "Yes - increasing."

Ruanda: "Yes."

Turkey: "Turkey stands on disaster prone regions. So Turkish academicians and citizens are familiar to the term resilience. But in last decade the term resilience is commonly used with Climate Change events."

Undecided

South Africa: "No idea... I would guess they are increasing. My experience is completely limited to South Africa, plus a little of Belgium at the moment, but I really don't follow their politics/policies regarding CCA at all. There is also a large gap in SA between policy makers and the rest of us (civilians/scientists etc). So I really don't know exactly whether policies/actions are increasing in a positive way towards CCA..."

Open Research Questions within the Scope of Disaster, Risk and Crisis Management in the Context of Coping with Disasters and Climate Extremes

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This article is a collection of certain aspects and open questions in risk management and risk governance science dealing with natural and man-made risks, including climate change.

Disasters are the extreme end of the spectrum on a scale of concerns, worries, incommodities, emergencies, crises and catastrophes. Disasters are often matters of concern for whole societies, but remain abstract until they are experienced in close vicinity ("in your backyard"), resulting in fatalities, and/or creating awareness of previously unknown or unregarded risks.

Dealing with disasters is dealing with uncertainties

Dealing with hazards such as earthquakes, floods, hurricanes, sabotage or technical failures can be a regular task for some communities or countries; hence the people are often used to cope with them. In other countries or communities, such hazards can seem very distant, merely known by global media coverage. However, coping with disasters remains an on-going challenge on all scales, i.e. for all people, communities or countries. This is due to the dimensions of their impacts, cross-sectoral cascading effects, complexities, and specifically to their 'surprise factor'. Dealing with disasters is therefore a matter of dealing with uncertainties - uncertainties in timing, spatial extend, damage impact, recovery speed and governance options. Climate change related uncertainties are certainly one recent field of showcasing the struggle of coping, managing and governing climate change impacts.

Open research questions:
How can we 'measure' and how can we communicate uncertainties?
Is uncertainty a trend in disaster research and policy, but also in the media?

New institutions emerge

Dealing with uncertainty is a rising task for multiple sectors and stakeholders: For people struggling with deciding over survival, income and political security, but also for decision-makers in civil protection, emergency response, security politics or elsewhere. It would be an interesting research study to just document, which institutions have been newly erected in past decades and how many have been stimulated by crises or disaster events. For example, Climate Change funds, emission certificate institutions, financial crises regulatory bodies, critical infrastructure protection institutions, the department of homeland security in the USA, natural disaster monitoring centres at regional, national and even international level, this list could be continued. This form of what we might term 'uncertainty governance' at the governmental or administrative side is paralleled in the private sector. Risk management and dealing with uncertainties also is a task for the private sector and has been in the focus for a long time already, for instance, of insurances, financial institutions or other strategically oriented businesses. Still, new jobs and departments constantly

emerge within industries such as infrastructure operators or enterprises of many kinds in reaction to upcoming new crisis event and related novel security and risk concepts.

Open research question:
How can the importance and growth of risk and uncertainty as a research and industry sector be measured?
Given that uncertainty will presumably always prevail - how can society find other mechanisms of dealing/accepting it that are not addressed by any (political or economic) institution that tries to "sell products"?

Integration remains a challenge

The range of institutions and fields dealing with disasters and crises is as vast as is the range of hazards and potential impacts. So it should be no surprise that despite many activities in 'integrated management' and newly emerging institutions, many disciplines and departments remain separate. For example, certain research institutions deal only with natural hazards, whereas others address man-made hazards and technical failures as well as industrial accidents or critical infrastructure failures. This separation goes further even within departments devoted to natural hazards only, who separate into divisions of either dealing with one 'sector' such as environmental or economic or societal. But increasingly, overarching concepts and institutions can be found.

Open research questions:
How can natural and man-made hazard approaches be effectively merged?
And, what are the pros and what are the cons of merging both?
Therefore, must there be limits of integration and is there an emerging need for more specialisation?

Integrating pre-event with post-event activities

Risk management is often separated from crisis management just because of the different focus on a virtual timeline of how a crisis unfolds. Linked to the well-purported disaster cycle, built on the life cycle model, some institutions or even departments within one and the same institution deal solely with the pre-crisis event phase, and others with the phases during and after the event. The phases of the disaster cycle are often labelled as prevention, preparedness, response, and recovery. However, the cyclic model is currently much criticised as manifesting a circular world model, wherein previous states are reinforced, while in reality, changes and modifications often take place and should therefore be taken into account. Linking risk and crisis management is important for overcoming this division not only because this separation is artificial and unrealistic, but also, since many activities, tools and concepts for dealing with crisis response have to be planned well in advance. Consequently, linking risk and crisis management is crucial for integrating both worlds and making them more effective.

Open research questions:
Does disaster preparedness and planning in advance really pay of?
If yes, how can we communicate the benefits of planning in advance to decision makers?
Are risk and crisis management united by cyclic risk frameworks or is their separation rather manifested?

Integrated risk management and the rise of resilience

Examples for integrative or holistic frameworks are integrated risk management, or the field of risk governance, which is very closely related. In fact, the core frameworks of either risk management (cf. ISO 31010) or risk governance (cf. IRGC 2009) are almost identical. Another current driver of joining both ex-ante and ex-post phases of crises is the burgeoning field of resilience. While many researchers and practitioners criticise the problems of definition and the unclear separation from previous concepts such as vulnerability or traditional disaster management (Paper XXX), the impact of resilience in stimulating new discussions about uniting those fields is an important side-effect of such debates.

Open research questions:
What are the opportunities for integration through the use of the resilience concept?
Is resilience just a trend and overrated?
What is the next trend after resilience?

Disasters as drivers of innovation?

Disasters and crises can be regarded as drivers of innovation, not only visible by the rise of new research fields, managing bodies and 'buzz-words' such as vulnerability or resilience. New hazards and interdependencies are constantly emerging. Our civilisations become more and more global and interconnected. Especially decision-makers, politicians and managers find it increasingly difficult to keep up with the speeds of developments. One specific challenge is dealing with the variety of risks. Especially climate change is a driver of innovation to think about how to deal with uncertainties, but there are also other fields that influence cross-sectoral and holistic thinking about risks and (in-)securities.

Open research questions:
Are disasters only negative or do they also open up new opportunities? For whom is it an opportunity? Under which circumstances can these opportunities be really used?
How much are extreme events important drivers of research and decision-making within the climate change field?

Critical infrastructure resilience

Critical infrastructure resilience and the increasing dependency of modern societies on supply infrastructures such as water, energy, food, and information is another important and growing field within risk and uncertainty research and policy.
In general, disasters, crises and risks are very closely related to changes. Trends and changes bear uncertainty inherently within them, and crises are often just visible signs or converging points to look into the state of the development of a community or society. While developments such as climate change, growing internet- and mobile connectivity, demographic change, ethnic conflicts are generally known, it is often a failure, that makes them visible. For example, cross-country electricity blackouts in Europe made decision-makers aware of the growing dependency, but also interconnectedness of dependencies. In other countries, power blackouts are more of a daily problem and therefore part of daily-life experience. But other failures and hazards such as civil conflicts or natural disasters may then be the public eye-openers on previously dormant risks.

Open research questions:
How much have our societies become vulnerable to infrastructure supply interruptions?
Is critical infrastructure research a leverage to integrate previously separated fields of research and decision-making?

The known unknowns of knowledge

Donald Rumsfeld famously made us aware of the scales of limits of knowledge related to uncertainties; the 'known knowns', 'known unknowns', or even the 'unknown unknowns'. The scale of what separates known from unknown is different for every person or community. In one city, river floods may be the annual norm. However, extreme floods exceeding the previous heights or tacking place with increasing frequency, for instance as possibly linked to climate change, may catch people by surprise. Unknowns may be linked to previous accustomed and acquired levels of experiences. With an increasingly global media society however, we learn about the possibility of risks that happen elsewhere and therefore might one day also affect our own village. There is a seemingly untiring need for more knowledge, but does more knowledge and experience solve the problems associated with risks?

Open research questions:
What are the known knowns in your community and what are the known unknowns?
What measures exist to approach the unknowns?
Is there awareness and visible action towards managing the unknowns?
Does more knowledge and experience solve the problems associated with risks?

More knowledge solving the problems?

Science is about contributing to the body of knowledge, but also about new things and applications according to Richard Feynman, and back in 1963 he discussed the uncertainties of science, the uncertainty of values, the challenges of old ideas and those of specialisation and different departments of knowledge (Feynman 1998 The meaning of it all). It seems natural to request more knowledge about uncertain paths of how climate change will develop. But the challenge often associated with disasters is the conundrum that more knowledge about risks does not automatically result in behaviours according to what would be expected on a rational basis. For instance, people who had already experienced several floods or hurricane severity to a certain flood height might refuse to evacuate, based on their experience or specific interests. And risk analysts are often frustrated when presenting their results to decision-makers who listen to their advice but then decide based on their gut feeling. Therefore, knowledge and learning are in the focus of risk research, especially on challenges such as gaining access to information, integrating top-down and bottom-up communication streams, integrating different knowledge fields and so on. So, understanding behaviour is crucial in directing knowledge, not just for risk assessments but also for risk communication between all stakeholders, between and to the people, to private sector, governments etc. But how can knowledge be used more effectively?

Open research questions:
Are we more secure when we know more or even all about certain hazards and risks?
Does 'big data' really solve problems or does it make us more vulnerable?

How can human behaviour factors help to make risk governance more effective?

Pros and cons of adaptation, risk management and resilience

Raising awareness of both pros and cons of matters such as climate change adaptation measures is an important task. While many adaptation measures are very positive and important drivers not just for improving ecosystem conditions, emerging green economies, one needs also to be aware of possible mal-adaptations that may take place, such as costly energy systems with a low life cycle, or unintended side effects such as new risks at new construction sites or unexplored technologies. The same type of honest assessments of pros and cons needs to be undertaken also for other fields such as risk management or resilience policies and measures. One important field is making the pros and cons of risk assessment methodologies more transparent, such as challenges of scale, spatial assessments, vulnerability indicators or classifying communities as vulnerable and risk hot spots.

Open research questions:
What are the impacts of vulnerability and resilience on disaster risk policies?
What are the known unknowns about vulnerability and resilience research?
What are the pros and the cons and how can we communicate them?

Loss and damage initiatives

Acknowledging the limits of risk planning and cooperating with new emerging fields such as the loss and damage is a current initiative within the IPCC negotiations. L&D policy have come up since some countries take an evidence base of revealed L&D related to CC as a starting point for fresh input to the IPPCC negotiations. Again, it seems necessary to combine both worlds, the pre-event with the during- and after event research and policies, rather than keeping them separate.

Open research questions:
Are loss and damage initiatives impeding the achievements of vulnerability and resilience research or fostering them?
What needs to exist in your community to document climate change related losses and damages?

Evaluation of research and development projects and implementations

Increasingly, institutions are interested in finding evidence about the effectiveness and sustainability of research and development projects in the context of risk and security studies. This is due to the high amount of research funding spent on risk assessments, the implementation of more and more risk guidelines such as at European Union, United Nations or at national levels. Loss and damage is just one proponent of efforts towards measuring the evident impacts of disasters. For instance, the Stern report (Stern report 2007) is just another example of a long tradition of finding economic evidence. However, besides economic figures, the demand on finding criteria to assess the effectiveness of research and applied risk mitigation measures rises.

Open research questions:
How can research project implementations be made sustainable?
How can effectiveness and sustainability be evaluated?

Sustainability of networking activities such as summer schools

Events such as the ASS serve not just to gather knowledge, to compare different experiences with climate change and disasters, but also to identify the rise of new job fields, education streams in academia and integrative research and development concepts, but especially for building up new networks mainly driven by personal contacts that are crucial for establishing trust and understanding. One challenge that remains is how to make such a network sustainable. Another opportunity is to combine the various knowledge and experiences from 17 countries on disasters and climate extremes and to expand it to more people and maybe even countries in the future. This could be an experience database on risks, crises and changes.

Open research questions:

How can we make sure conferences and their results have sustainable outcomes?

What are the opportunities and what are the limits of knowledge transfer between countries and even continents?