

Assessing Future Resilience to Natural Hazards – The Challenge of Capturing Dynamic Changes under Conditions of Transformation and Climate Change

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ABSTRACT: When assessing future climate change risks, many initiatives tend to focus on (expected) changes in the domain of natural hazards, while – in terms of exposed elements – current socio-economic, political or cultural characteristics are often extrapolated without assessing possible changes in detail. This is to a great extent due to the fact that the respective trends are extremely difficult to forecast with respect to quantity and in particular quality. However, developments in these spheres can alter vulnerabilities and adaptive capacities of distinct population groups drastically, often in detrimental ways. This is of particular relevance in developing countries and emerging economies under comprehensive social and economic transformation which affects major development trends - such as rapid urbanization, growing socio-economic disparities or changing social security networks, but also changes in health care provision, building regulations or risk awareness. Predicting possible progress-scenarios of those trends and evaluating the respective impacts on the resilience and adaptive capacity of communities remains a necessary exercise, even though being highly challenging. It is only through adding this dynamic component that the full picture of future climate change risks and adaptation requirements can be drawn and adequate action taken.

Based on empirical research, the presentation uses the example of Vietnam to explore methodologies and experiences in assessing the dynamics in potential vulnerability pathways with respect to natural hazards and climate change. Vietnam serves as an instructive example as it is a country under rapid socio-economic and political transformation, urbanisation and severe exposure to climate change related hazards. The presentation argues that assessing and forecasting the trends under scrutiny is not an easy task, however, that there are sound scientific ways of approaching this question. It, therefore, calls for increased efforts to integrate dynamic elements into vulnerability and risk assessments and scenarios.

Keywords: Dynamic Resilience, Transformation, Vulnerability Scenarios, Risk Governance, Vietnam

1. INTRODUCTION

The assessment of – what is called – future risks of climate change impacts has received increased attention in recent years. Numerous studies have undertaken modelling-based analysis of different climate change hazards (most importantly sea level rise) in order to assess the intensity, frequency and/or extent of climate hazards and the resulting exposure of population, infrastructure and other assets. The resolution of different approaches ranges from global studies comparing entire countries (e.g. Dasgupta 2007, McGranahan et al. 2007) through to regional analysis, focusing, for example, on certain parts of Asia (e.g. Yusuf & Francisco 2009) and finally towards the local scale focusing, for instance, on single deltas or coastal cities (e.g. Carew-Reid 2008; for a review of selected city-specific studies see Birkmann et al. forthcoming). Those studies contribute essential insights into the bio-physical dimensions of climate related hazards and have helped to direct attention towards the threats linked to those hazards as well as towards the need for responses.

Yet, when seen from a comprehensive perspective of climate change *risk*, the focus on assessing future *hazards* contributes only to one side of the equation and needs to be supplemented with the other side, i.e. with the assessment of future vulnerabilities and adaptive capacities of exposed populations and elements as well as with the creation of new or emerging exposures. Drawing from an understanding of risk, in which the risk results from the concurrence of potentially damaging threats (i.e. the hazard) and vulnerable elements, this call for a comprehensive risk assessment, hence, presupposes that trends and future development pathways in socio-economic, political and cultural conditions shaping future vulnerabilities and adaptive capacities of different exposed population groups and economic sectors are drawn, assessed and evaluated (see Figure 1). This perspective has so far not been receiving sufficient attention in the realm of climate change analysis.

This neglect is to a great extent caused by the fact that the respective underlying developments in the political, socio-economic and cultural domains are extremely dynamic, depend upon multiple factors and feedback mechanisms and are, hence, very difficult to forecast. However, changes in those domains can have a substantial impact on the resilience and adaptive capacities of affected population groups and economic sectors and, therefore, deserve increased attention and more rigorous efforts for assessment. This is particularly true for countries which are currently and in future undergoing comprehensive socio-cultural, economic, demographic, political and environmental transformation processes including, for example, rapid urbanisation, economic liberalisation policies, changes in health care and social welfare systems or land reforms. Those transformations can have very diverse impacts on different population groups and economic sectors, potentially leading to strong disparities in

resilience and adaptive capacities and implying increased challenges, not only for groups towards the lower end of the spectrum, but also for comprehensive policy making and adaptation management.

One of the countries where these developments could be observed most clearly over the recent years and are expected to intensify in future is Vietnam. Based on empirical research, the country is, therefore, used in this paper as a case study for deriving lessons learned with respect to the possibilities and restraints to assess future resilience pathways.

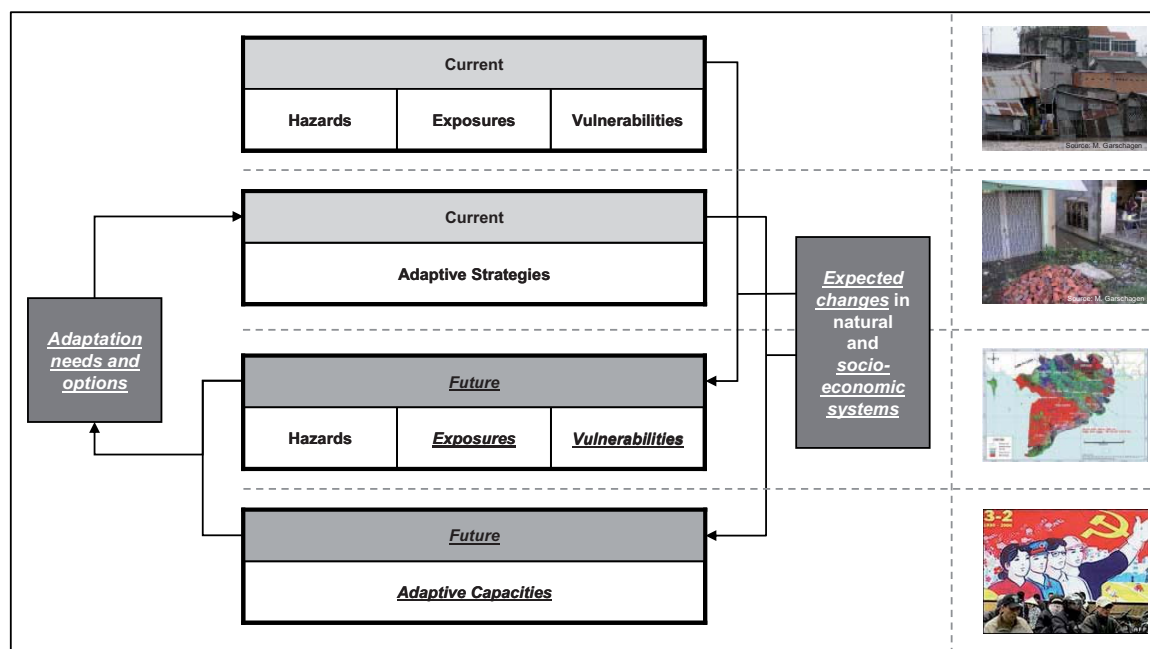


Fig. 1: Elements for assessing current and future risks to climate hazards (Source: figure adapted from Smit and Wandel 2006; images on right hand side (top to bottom): own picture Garschagen 2009; own picture Garschagen 2009; SRV 2009; bbc.uk.com); elements in normal script indicate fields with substantial ongoing scientific efforts; underscored elements in italic script indicate fields that deserve increased attention

2. APPROACH AND METHODOLOGY

In order to explore possibilities and limits of assessing future resilience pathways and scenarios with respect to (climate change related) natural hazards, two branches of analysis have been linked in this paper using the particular example of processes revolving around urbanisation in Vietnam. Firstly, current patterns of vulnerabilities as well as coping and adaptation capacities to existing hazards are analysed amongst different socio-economic groups. This analysis is mainly based on empirical research at household level in Can Tho City located in the Mekong Delta. Findings and lessons learned are generated as well as scaled up and adjusted according to future development projections and climate change hazard scenarios.

Secondly, this first leg of analysis is then linked to national-level assessments of social and economic developments as well as major policy trends and potential future policy lines in Vietnam and their impact on the afore-mentioned vulnerabilities and coping or adaptation capacities at household level. This second part of the analysis is based on the examination of policy white papers, official policy visions and master plans (such as the long-term strategic policy planning of different sectors and branches in Vietnam) and, in addition, around 30 interviews with decision makers and political cadres at national and provincial level, academics and experts from civil society.

Considering the embracing nature of vulnerability and resilience discourses, a comprehensive analysis that tries to assess future resilience pathways as a whole would have to cover a wide spectrum of fields and sectors such as health care, education or economic development but also building codes, land use planning or land title reforms. Given the scope of this contribution, however, the nexus of urbanisation, land use planning, land reform and (forced) resettlement is used here for illustration and for fuelling the conceptual and methodological discussion.

2. CASE STUDY: URBANISATION AND RESETTLEMENT POLICY IN VIETNAM

Vietnam has been undergoing a substantial urbanisation process in the recent past which is expected to intensify in future. While around the time of the official commencement of the political and economic renovation process (*doi moi*) in the mid-1980s less than 20 percent of Vietnam's population was living in urban areas (accounting for some 11.5 million people), the figure has gone up to nearly 30 percent in 2009 (equalling more than 26 million people) (UN/DESA 2008). Estimates predict that based on today's numbers the urban population will almost double in size by 2035 and will contribute 57 percent to the country's population by 2050, then equalling some 68 million people (*ibid.*). Increasing urbanisation thereby affects resilience to climate hazards of different population groups in multiple ways through regulating trends and conditions of, for example, large-scale exposure, built environment and physical susceptibility, economic activity and income earning, health provisioning or disaster management capacities. Urbanisation, therefore, simultaneously implies chances and challenges with respect to achieving high resilience to climate hazards. High densities of population and infrastructure can, for example, allow for efficient implementation of protection infrastructure or emergency responses. Yet, when not managed properly, the same high densities can also imply problems such as increased damage potential, risk of diseases spreading or threats of cascading effects related to combined natural and man-made hazards. Hence, the question of whether challenges can be tackled successfully and opportunities tapped depends heavily on (present and future) policy and management directions and on their effective implementation. Under conditions of political transformation and liberalisation, however, this field has become more complex as the spectrum of relevant stakeholders and actors widens, leading to shifts in influence and power structures away from formal governmental planning institutions towards developers and land speculators within the private sector. With respect to future political developments two opposing directions are, therefore, possible: First, the trend in power shift will continue further, thereby, limiting the possibility for pro-active urban planning and management; or, second, the government will attempt to assert its authority and tighten the reins towards increased regulation and stricter planning. The direction taken will eventually affect the resilience of various population groups in multiple ways.

The Master Plan for the Development of Vietnam's Urban Centres up to the year 2020, for example, strives to limit the sprawl and growth of the country's major urban centres owing to raising concerns with respect to manageability and infrastructure provisioning. The policy strategy, therefore, envisages the establishment of new industrial zones as growth poles and to divert businesses and labour migrants away from the big cities (in particular Ho Chi Minh City and Hanoi) using tax incentives and other financial instruments. In this context, land use zoning within the framework of master-planning is understood as an important instruments for steering future developments and – particularly in the context of climate change – for limiting hazard exposure. For the case of sea level rise, the latter, for example, implies that new developments are set out to be located in areas of relatively high elevation while low elevation areas are not designated to new developments (for a detailed analysis of zoning and other envisaged mechanisms laid out in Vietnam's National Target Programme to Respond to Climate Change, see Garschagen 2010).

Yet, it has to be seen how far the approaches of zoning and incubating satellite projects will be effective in attracting investors, businesses and working migrants or whether other pull-factors of existing urban areas will still outweigh those incentives, leading to rather uncontrolled developments in the cities that make proactive management of exposures, protective infrastructure and the provisioning of physical and social infrastructure (like adequate and safe housing, drainage systems, schools or hospitals) increasingly difficult. Experiences from Ho Chi Minh City, Can Tho and other cities in Vietnam suggest that the effectiveness of pro-active and comprehensive urban planning and land use zoning is indeed increasingly challenged by action of developers from the private economic sector who are given increasing influence within the transforming fabric of the countries political economy. Having analysed recent adjustments to the urban master plans of Ho Chi Minh City and Can Tho City, it has become evident that, in many cases, private developers and land speculators have pushed into areas that had originally not been earmarked for new developments due to high hazard exposure or infrastructure bottlenecks. Urban master plans, therefore, have had to be amended and changed *ex post*, leading to problems in terms of, for example, public infrastructure development, resource allocation, administrative capacity development and future climate hazard exposure.

Another example for the diverse and dynamic pathways with respect to future resilience pathways can be found in the endeavours for urban upgrading and related resettlement which have to be seen in the context of overall socio-economic development and transformation. Vietnam has over the last decade undertaken substantial efforts (for example in collaboration with the World Bank) to upgrade or remove urban slums, which are – besides their accumulation of man-made hazards – often characterised by high exposure to natural hazards given the fact that they are in many cases located along water-ways or in wastelands. One of the most prominent strategies for upgrading the housing situation of those households living directly on or next to the water has, thereby, been to resettle the inhabitants into newly established resettlement clusters. While, in theory, resettlement decreases the exposure (and vulnerability) to flooding and other natural hazards and brings about an improvement in physical living conditions, research (in Can Tho City) reveals that it in fact often implies new social and economic risks for the affected households due to poor implementation, a neglect of social and economic considerations and insufficient financial mechanisms. Given the high discrepancies between the compensation for the old land and house and the costs for the new plot in the resettlement area, many households can in fact not afford to move into the new resettlement areas. They are, hence, forced to move out to other provinces with lower land prices or into other slum-like settlements within the city. In combination with related disruptions in income earning opportunities and social security networks, this type of development, in most cases, does not contribute to a reduction in vulnerability but rather leads to a decrease in baseline resilience. This problem can in particular be observed amongst those households who had been lacking land-title in the original location and, hence, had not been entitled for compensation or only for

reduced rates thereof – with lack of land title being an indirect result of land reforms in the context of political transformation over the previous three decades.

Of those households that can afford to stay in the new resettlement areas, a high percentage have to take out bank loans or borrow money from relatives in order to be able to pay for the costs of the new house and land plot. The result is often an increase in financial vulnerability. Given the distance between the new and the old location and the different environment in the newly established residential area, additional disruptions with respect to income generation can be observed, in particular for those households which previously had earned income from activities related to establishing shops in their houses or from working in (other) areas of the informal sector including, for example, as street vendors.

4. DISCUSSION, CONCLUSIONS AND OUTLOOK

The discussion of shortcomings in the current conceptual discourse on future climate change risks in combination with the case study analysis on urban trends in the context of socio-economic and political transformation in Vietnam has underlined the complexity and difficulties of comprehensively assessing possible future developments in the socio-economic sphere and their impact on dynamic resilience pathways of different population groups. Hence, increased efforts are needed in future from the wider scientific community. It is only through adding this component to the assessment and modeling of future climate change hazards that comprehensive risk evaluations can be achieved which inform decision making in the field of adaptation governance. The case study analysis of the urbanization-planning-resettlement nexus illustrated that developing those outlooks are fraught with high uncertainties which vary and increase along the lines of time scales, policy domains and geographical focus. Yet, it is argued here that – despite being a complicated scientific undertaking – the development of future resilience scenarios, focusing in particular on developments in the socio-economic and political spheres, are not only possible but can be of great benefit for exploring and addressing key factors influencing resilience and for providing decision support. Illustrating alternative scenarios and the respective effects (e.g. regarding the question of whether or not the envisaged policies for slowing down the growth of Vietnam's largest cities will be effective) is thereby of great use from an analytical as well as normative perspective. It supports the identification of problems and solutions (analytical dimension) and it helps to shape an understanding of which future pathway is desirable and which trade-offs have to be taken in order to get there (normative dimension). As the case study analysis above shows, scenarios of alternative futures (e.g. whether or not to experience sprawl into exposed areas, or regarding the long-term resilience of resettled people) thereby also helps to prevent an often prevailing “black and white thinking” with respect to specific adaptation solutions such as resettlement. Such static thinking often implies that certain actors are either completely pro or contra those measures. Focusing on long-term resilience scenarios, on the other hand, fosters a more balanced view which encapsulates both opportunities and challenges and which helps to identify key parameters which are decisive for achieving positive or negative long-term resilience outcomes. The case of compensation schemes within resettlement projects, for example, illustrates that rather small changes in financial compensation and the consideration of wider socio-economic sustainability can make great differences with respect to long-term effectiveness. Also in this example, the development of alternative scenarios that project possible long-term development pathways would be considered of great use.

Yet, the case study presented above only illustrates one relevant field amongst many that have influence on the wider resilience landscape of different socio-economic groups at risk of climate change. Hence, increased scientific efforts are required in the future to also approach scenario developments in other domains (in Vietnam and other countries), including, for example, health care, demographic transitions, migration, dependencies on global economies, agricultural intensification, shifts in the economic profile towards the secondary and tertiary sector, transformations in public social security networks, changes in disaster risk management or the increasing influence and agency of civil society institutions. In this context, future initiatives also need to pay increased attention to interlinkages and feedbacks between different research domains that so far are too often applying a rather static and exclusive pre-analytic framework which is lacking an integrative view. Focusing on the Mekong Delta, initial efforts have in this respect been undertaken to integrate the often prevailing exclusive foci in research and policy making on *rural* vs. *urban* sets of problems into one integrative approach emphasizing mutual interlinkages and the particular importance of hybrid peri-urban areas (Garschagen et al. 2010) – however, those efforts are far from being sufficient and need to be extended and supplemented by studies on similar interactions in additional spheres.

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