Matthias Garschagen

Risky change?

Vulnerability and adaptation between climate change and transformation dynamics in Can Tho City, Vietnam

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Band 15

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Flooded street in Can Tho City, Vietnam. © Matthias Garschagen

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ABBREVIATIONS

CCA	Climate change adaptation
CCCO	Climate Change Coordination Office of Can Tho City
CFSC	Committee for Flood and Storm Control
CTC	Can Tho City
CTU	Can Tho University
DARD	Department of Agriculture and Rural Development
DOC	Department of Construction
DOLISA	Department of Labour, Invalids and Social Affair
DPI	Department of Planning and Investment
DONRE	Department of Natural Resources and the Environment
DRM	Disaster risk management
DUPA	Department of Urban Planning and Architecture
FDI	Foreign direct investment
FGD	Focus group discussion
GSO	General Statistics Office
HDI	Human Development Index
IPCC	Intergovernmental Panel on Climate Change
MARD	Ministry for Agriculture and Rural Development
MDI	Mekong Delta Development Research Institute, Can Tho University
MKD	Mekong Delta
MOC	Ministry of Construction
MONRE	Ministry for Natural Resources and the Environment
MPI	Ministry for Planning and Investment
MMR	Mixed methods research
n/a	Data not available
NDMP	Natural Disaster Mitigation Partnership
NGO	Non-governmental organization
NTP-RCC	National Target Programme to Respond to Climate Change
PACCOM	People's Aid Coordination Committee
PC	People's Committee
PUA	Participatory urban appraisal
SRV	Socialist Republic of Vietnam
UNISDR	United Nations International Strategy for Disaster Risk Reduction
UN-DESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNU-EHS	United Nations University – Institute for Environment and Human Security

USD	US Dollars
VIAP	Vietnamese Institute of Architecture and Planning
VND	Vietnamese Dong
VNS	Vietnam News
WISDOM	Water-Related Information System for the Sustainable Development of the Vietnamese Mekong Delta

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ABSTRACT

This study is motivated by the observation of surprising gaps in the current scholarship on societal risk related to natural hazards and the projected impacts of climate change. Despite the increasing body of literature on this topic, the details of how human vulnerability – as a key component of risk – but also adaptive capacity – as a key component for risk reduction – emerge and progress as part of social processes still tend to be poorly understood, both empirically and theoretically. A distinct lack of attention can particularly be observed with respect to exploring the ways in which vulnerability and adaptation are linked through causal structures and feedbacks. Rifts and conflicts in this relation therefore often go unnoticed even though they render the barriers and limits to vulnerability reduction. In addition, the dynamic pathways of the vulnerability-adaptation-nexus in highly transformative countries and emerging economies need to be analyzed much more thoroughly. Understanding the effects of wider transformation dynamics on the causal fabric of vulnerability and adaptive capacity is not only of great scientific interest but also of practical relevance in order to facilitate adequate and preventive vulnerability reduction and mitigation within the framework of risk governance. Vietnam provides a case of prime relevance in this context given its ongoing reform process and the implied changes in economic, social, cultural and political terms, while being also considered a global hot spot of exposure to natural hazards and the expected climate change impacts. Urban areas deserve increased attention in this respect given that they are typically the forefront of transformation processes with growing demographic and economic importance and with a particularly complex fabric of actors and interests.

Against this background, the study presented here has a two-fold objective. Firstly, it aims to advance the conceptual framing and theoretical explanation of vulnerability and adaptation dynamics, focusing especially on the linkages and feedbacks between the two under conditions of socio-economic and political transformation and environmental change. Secondly, the study seeks to fill existing knowledge gaps on household level vulnerability profiles and the adaptive capacity of state and non-state actors towards current and projected natural hazards in Vietnam's cities. Specifically Can Tho City, as the demographic and economic centre of the highly flood- and typhoon-prone Mekong Delta, serves as case study providing the major source of empirical data.

The research process is based on a mixed methods approach, combining qualitative and quantitative methods and building on the interaction of inductive and deductive reasoning in the process of knowledge generation and theory development. Altogether, the work draws on 14 months of field work in Vietnam. Primary empirical data was generated through 55 semi-structured household interviews, complemented by participatory urban appraisal activities, as well as two household surveys covering a total of 742 households. In addition, 71 expert in-

terviews were conducted with decision makers from the national to the local level in the party-state bureaucracy as well with Vietnamese researchers and stakeholders from other national and international organizations. The discussion of preliminary results and the promotion of science-policy-interaction were achieved through five stakeholder workshops in Can Tho City.

The research allowed for developing an advanced conceptual model of the causal structures and processes linking vulnerability and adaptation dynamics. This model draws on earlier achievements from within the three strands of vulnerability, adaptation and resilience research but it is mainly nurtured by the identification of remaining ontological and even epistemological gaps within as well as between these schools. By bridging the divides, the model makes a contribution to connecting the existing theoretical perspectives, thereby, not only facilitating the formulation of synchronized policy recommendations but also enabling scientific engagement with the blind spots that can be identified in hitherto approaches. That is, the model allows for unpacking the black box of adaptation processes because it mirrors adaptive capacity directly to the factors constituting vulnerability, i.e. exposure, susceptibility and the lack of capacity to cope. Therefore specific and generic adaptive capacity is differentiated, depending on their reach and scope. In contrast to the normatively guided approaches predominant in the existing conceptual literature, the model allows for the analysis of internal conflicts, trade-offs and limits in adaptation processes which can result from contradictory effects on the individual vulnerability factors. Yet, the model rejects an oft-applied deterministic notion of the relationship between adaptive capacity and adaptation action. Rather, it draws on action- and structuration-theory to include agentive and structural factors which, in interaction, can enable but also inhibit the accumulation of adaptive capacity and/or its activation into adaptation action. Given this level of detail, the model facilitates dynamic analytical perspectives, focusing on the shifts in the fabric of vulnerability and adaptation along with wider societal transformation processes. This aspect is heavily neglected to date given the snapshot character predominant in most of the published vulnerability assessments.

The framework, in conjunction with the mixed methods approach, allowed for an integrative empirical analysis in Can Tho City. The findings show that the ongoing socio-economic and political transformation process has ambiguous and socially differentiated effects on the potential for reducing vulnerability through adaptation. These ambiguities result from the fact that, in many respects, the country's reform process yields contradictory effects on the different factors for vulnerability and adaptation considered in the conceptual model. The macro-economic growth since the beginning of Vietnam's reform process (*đổi mới*) has not automatically lead to a general reduction in vulnerability towards natural hazards in Can Tho City but to increasing risk disparities. The changing political economy has resulted in shifts in the way risk management is negotiated and shared between state and non-state actors. Despite the continued paternalistic rhetoric of the party-state apparatus as care-taker, considerable mismatches between state and non-state adaptation action have been found. They cause increas-

ing difficulties for some groups to compensate for the lack of public support through individualized risk reduction measures. Self-reinforcing effects that deteriorate vulnerability conditions can therefore be observed, especially in low-income groups. Yet, the findings underscore that a purely neo-classical explanation on adaptive capacity assets would fall short of recognizing the agentive factors (e.g. around risk perception and prioritization) and the structural factors (e.g. around institutional security and the access to resources) that shape adaptation decisions and the question of whether and how adaptive capacity can be accumulated and turned into adaptation action. Both domains have been found to be heavily transformed by the reform process, often resulting in new barriers for effective adaptation.

The findings enabled the formulation of practical recommendations which not only suggest options to improve specific adaptation measures, but which also call for adaptive changes in the deeper institutional fabric of risk governance paradigms applied in the country. Given the country's contested political framework, these recommendations will not be easy to implement. However, the research findings clearly reveal that palliative solutions that ignore these more fundamental dimensions will not be sufficiently capable of tackling the deeper root causes that currently perpetuate and re-produce social vulnerability in Can Tho and in Vietnam's cities more generally.

ZUSAMMENFASSUNG

Ausgangspunkt der hier vorliegenden Arbeit ist die Beobachtung, dass trotz der rapide gewachsenen Anzahl an Publikationen und Forschungsprojekten zu sozialen Risiken im Kontext von Naturgefahren und Klimawandelfolgen beachtliche Problemfelder offen bleiben. Besondere Schwierigkeiten wirft nach wie vor die Beantwortung der Frage auf, wie sich Verwundbarkeiten in sozio-ökonomischen Systemen dynamisch fortentwickeln und wie diese Dynamiken kausal mit der Fähigkeit von Akteuren und Institutionen zusammenhängen, sich an gefahrenbehaftete Lebensbedingungen anzupassen. Forschungsbedarf besteht hier sowohl in empirischer als auch theoretischer Hinsicht. Vor allem in Transformationsländern ist ein besseres Verständnis der Effekte des ökonomischen, sozialen, kulturellen und politischen Wandels auf Verwundbarkeiten und Anpassungsfähigkeiten notwendig, um vorausschauende Handlungsempfehlungen geben zu können. Vietnam bietet mit seinem anhaltenden Reformprozess und den massiven gesamtgesellschaftlichen Umwälzungen ein höchst relevantes Beispiel. Städtische Räume sind von speziellem Interesse in diesem Zusammenhang. Sie nehmen eine Vorreiterrolle im Transformationsprozess des Landes ein und weisen daher besonders dynamische Verwundbarkeitsveränderungen auf. Zugleich konzentrieren sie zunehmend Bevölkerung und Infrastruktur in Lagen mit hoher Exposition gegenüber Hochwasser- und Taifunereignissen.

Vor diesem Hintergrund verfolgt die Arbeit zwei Hauptziele. Zum einen strebt sie an, die konzeptionelle Erfassung und das theoretische Verständnis von Verwundbarkeits- und Anpassungsdynamiken zu verbessern. Im Fokus stehen hierbei die kausalen Wechselwirkungen beider Bereiche unter dem Einfluss von Transformationsprozessen. Zum anderen geht es im speziellen Hinblick auf den vietnamesischen Kontext darum, Verwundbarkeiten und Anpassungsfähigkeiten gegenüber momentanen sowie zukünftig erwarteten Naturgefahren zu ermitteln. Die Analyse umfasst dabei Anpassungsmaßnahmen staatlicher sowie nichtstaatlicher Akteure und fragt nach dem Verhältnis beider Bereiche.

Die Arbeit basiert auf einem ‚Mixed Methods'-Ansatz, in dem qualitative und quantitative Methodiken zur empirischen Analyse kombiniert und deduktive sowie induktive Herangehensweisen in der Theoriebildung berücksichtigt werden. Die empirischen Primärdaten wurden erhoben durch 55 semi-strukturierte Haushaltsinterviews, die Anwendung von ‚Participatory Urban Appraisal'-Methoden, zwei standardisierte Haushaltsbefragungen (n=742) sowie 71 Experteninterviews mit Entscheidungsträgern aus staatlichen Behörden, nicht-staatlichen Organisationen und Forschungseinrichtungen. Vorläufige Ergebnisse wurden während des Forschungsprozesses im Rahmen von fünf ‚Stakeholder Workshops' reflektiert und diskutiert. Insgesamt basiert die Arbeit auf 14-monatiger Feldarbeit in Vietnam.

Durch den ‚Mixed Methods'-Ansatz konnte ein vertiefendes konzeptionelles Modell im Hinblick auf die Zusammenhänge und Wechselwirkungen zwischen Verwundbarkeits- und Anpassungsdynamiken entwickelt werden. Dieses Modell nimmt Bezug auf vorangehende Forschungsleistungen im Bereich der Verwundbarkeits-, Anpassungs- und Resilienzforschung. Es speist sich aber v.a. aus dem Ansporn, verbleibende Lücken zwischen den Forschungsfeldern zu schließen. Diese bestehen momentan in semantischer und taxonomischer, v.a. aber in epistemologischer Hinsicht. Die integrative Sichtweise des hier entwickelten Modells ermöglicht nicht nur eine tiefere analytische Schärfe, sondern trägt auch zur Formulierung umfassenderer Handlungsempfehlungen bei. Dies wird durch die – bisher vernachlässigte – analytische Ausdifferenzierung von Anpassungsprozessen erreicht, indem Anpassungsfähigkeit direkt mit den internen und externen Faktoren von Verwundbarkeit in Verbindung gesetzt wird, d.h. mit Exposition, Anfälligkeit und dem Mangel an Bewältigungskapazität. Solch eine Ausdifferenzierung ist von zentraler Bedeutung für das Verständnis von Anpassungsprozessen, da diese in der Realität nicht auf die abstrakte Verwundbarkeit als solche abzielen, sondern direkt auf ihre einzelnen Faktoren wirken. Das entwickelte konzeptionelle Modell ermöglicht daher die Analyse von potentiell-möglichen, inhärenten Zielkonflikten und (unintendierten) Nebenwirkungen auf andere Verwundbarkeitsfaktoren. Dieser Aspekt findet in bestehenden, zumeist normativ geprägten, Ansätzen nicht ausreichend Berücksichtigung. Aggregierte Verwundbarkeitseffekte von Anpassung sind daher oft weniger eindeutig als postuliert. Zugleich legt das Modell eine Unterscheidung generischer und spezifischer Anpassungskapazitäten nahe, die sich durch ihre Reichweite auf die unterschiedlichen Verwundbarkeitsfaktoren definieren. Der Gefahr einer (implizit) mechanistischen oder gar deterministischen Sichtweise auf den Zusammenhang von Anpassungskapazität und Anpassungshandlung wird hierdurch entgegengewirkt. Das Modell integriert Gedanken der Strukturationstheorie von Giddens und der Handlungstheorie Werlens und berücksichtigt die Wechselwirkung von individueller Handlung und strukturellen Rahmenbedingungen in Anpassungsprozessen. Beide Bereiche haben Einfluss darauf, wie Anpassungskapazitäten aufgebaut und/oder in Anpassungshandlung umgesetzt werden (können). Diese Feingliedrigkeit des Modells erlaubt es, die Dynamiken in Verwundbarkeitsmustern und Anpassungskapazitäten zu entschlüsseln und zukünftige Trends im Zusammenhang mit allgemeineren wirtschaftlichen, sozialen und politischen Wandelprozessen abzuschätzen. Letzteres ist v.a. im Hinblick auf Transformationsländer ein höchst relevanter – jedoch bislang stark vernachlässigter – Aspekt.

Das Modell ermöglichte in Kombination mit dem ‚Mixed Methods'-Ansatz eine tiefgründige empirische Untersuchung in Can Tho City. Die Ergebnisse zeigen deutlich, dass Vietnams Transformationsprozess im Zuge der fortdauernden Reformbemühungen vielschichtige und sozial differenzierte Auswirkungen auf die Fähigkeit verschiedener Akteursgruppen hat, ihre Verwundbarkeiten gegenüber Naturgefahren durch Anpassung zu vermindern. Die bedeutendsten Naturgefahren umfassen in den Untersuchungsgebieten sowohl momentan auftretende Hochwasserereignisse als die zu erwartenden Klimawandelfolgen. Letztere bein-

halten v.a. einen Anstieg in Häufigkeit und Intensität von Hochwasserereignissen sowie das verstärkte Auftreten von Taifunen. Uneindeutige Verwundbarkeitseffekte resultieren v.a. aus den unterschiedlichen Einflussrichtungen des Transformationsprozesses auf die verschiedenen im Modell identifizierten Faktoren von Verwundbarkeit und Anpassungsfähigkeit. Das durch den Reformprozess ermöglichte ökonomische Wachstum hat daher in Can Tho City nicht – wie häufig postuliert – automatisch zu einem all-umfassenden Rückgang an Verwundbarkeit gegenüber Naturgefahren geführt. Vielmehr ist es zu Verschiebungen in den Anpassungskapazitäten und -verantwortlichkeiten gekommen, v.a. durch eine zunehmende Individualisierung des vormals stärker staatlich ausgerichteten Risikomanagements. Sozio-ökonomisch schwächere Gruppen haben daher zunehmend Mühe, die nötigen Ressourcen für einen Abbau ihrer Verwundbarkeit aufzubringen. Gleichzeitig unterstreichen die empirischen Ergebnisse aber, dass eine rein neo-klassische Perspektive auf Anpassungskapazitäten unzureichend ist. Vielmehr zeigt die Forschung in Vietnam, dass weitere Faktoren für die Umsetzung von Anpassung ausschlaggebend sind. Diese umfassen sowohl die Parameter des individuellen Handelns (z.B. die Risikowahrnehmung und Präferenzsetzung) als auch die externen Strukturen (z.B. der institutionelle Rahmen für Landnutzungsrechte). Beide Bereiche erleben im Zuge des Transformationsprozesses tiefgreifende Veränderungen, welche in vielerlei Hinsicht zu neuen Anpassungsbarrieren führen.

Aus den Ergebnissen der Arbeit werden Handlungsempfehlungen abgeleitet. Diese zielen nicht nur auf konkrete Anpassungsmaßnahmen ab, sondern zeigen die Bedeutung tiefgreifender Veränderungen in den institutionellen Rahmenbedingungen von Risiko-‚Governance'. Vor dem Hintergrund des sozio-politischen Systems in Vietnam wäre es jedoch naiv zu glauben, dass solche Veränderungen reibungslos vorangetrieben werden könnten. Dennoch zeigen die Forschungsergebnisse deutlich, dass eine Reduzierung auf oberflächliche Lösungsansätze – wie häufig in Projekten der Klimawandelanpassung zu beobachten – mittelfristig nicht in der Lage sein wird, den Triebfedern von sozialer Verwundbarkeit in Can Tho City und in anderen Städten Vietnams entgegenzuwirken.

1. INTRODUCTION AND RATIONALE

Why could it be reasonable and useful to write a book that is conceptually concerned with the dynamics of vulnerability and adaptation related to natural hazards while focusing empirically on urban areas in Vietnam, being amongst Asia's most rapidly transforming countries? One might expect that after more than two decades of vulnerability research and the more recent surge in scientific and political attention devoted to risks in the context of climate change, little room has been left for unanswered questions. Indeed, past scholarship has considerably advanced the ways how risk in human-environment interaction is framed. It is no longer explained exclusively by the characteristics of hazards in the natural or geo-physical environment but is widely conceived as being co-produced by human-made vulnerabilities. In this vein, attention has been brought to the fact that human vulnerabilities are constructed socially, politically, economically and culturally, leading to stratified vulnerability outcomes and eventually to risk differentials from global to local scales. Therefore links between vulnerability and human development have been stressed conceptually and explored empirically. On the same token, the capacity to adapt to current natural hazards as well as to the projected impacts of (global) environmental change are increasingly being framed in relation to cross-scale differentials in terms of overall asset endowments, most notably considering economic, human and institutional capital stocks. Thus, also ethical questions around the re-distribution of resources for adaptation are slowly moving into the foreground of risk debates, thereby, drawing attention to the contested arenas in which those capacities are being shaped socially, assessed scientifically and negotiated politically across different scales and stakeholders.

On a global level, for example, long-term data has revealed not only an increase in the number of disasters related to natural hazards – particularly in Asia – but also a distinct pattern of impact disparities. While high income countries have been facing the highest financial losses, the so-called developing world has been experiencing by far the highest human suffering in terms of fatalities, hardship and livelihood disruption (cf. 2.1). A similar pattern is commonly being expected with respect to the impacts from anthropogenic climate change, giving the topic its sensitive ethical and political dimension. Also at lower scales, research on past disasters around the globe has shown that it is often the resource-poor or otherwise marginalized population groups that suffer the most from the impacts of natural hazards. This clearly reiterates the importance of social dimensions in the production and outcomes of risk.

However, despite this knowledge and the achievements that have been made in risk research over the last decades many questions of key concern remain open or are not even being asked – and maybe the recent, climate change related, hype in scientific endeavors focusing on vulnerability and adaptation bears the risk of

hastiness and the reproduction of the supposed scientific consensus rather than its critical reflection, deconstruction and advancement.

The first of the observed gaps relates to the causal linkages between vulnerability and adaptation. While it is increasingly recognized that both concepts are closely coupled through the role that adaptation is ought to play for reducing or preventing current and future vulnerabilities, these relations have to date been largely covered in an idealized way through abstract and normative postulations on how vulnerability reduction and adaptation could and should work – rather than in critical empirical engagement. Therefore the ways in which adaptation can, or cannot, contribute to vulnerability reduction, depending on the given context, remain poorly understood analytically. Particularly thin remains the empirical and theoretical engagement with the challenges, barriers and conflicts that might be hidden in the deeper epistemological and normative layers of these concepts and in the nitty-gritty of their implementation. Hence, a coherent theoretical integration that would facilitate a detailed elaboration of the causal links and feedbacks between vulnerability and adaptation is largely lacking to date.

Secondly, there is still a predominant view that frames future risks in human-environment interactions as foremost being shaped by environmental changes, particularly in the climatic sphere. In fact, it seems that with climate change discourses this dominant view currently experiences some sort of renaissance, thereby providing the main impetus for the recent surge in scientific engagement with climatic risks. It is predominantly argued in this line of thinking that that the expected increase in geo-physical hazards needs to be responded to by human adaptation which, in turn, requires scientific guidance on how societies can best adjust. This reasoning cannot be considered wrong but it rests on an imbalanced framing and neglects an important part in the equation – therewith putting the validity and usefulness of the entire perspective on the line. Besides the multi-scale environmental changes, vulnerability and adaptation needs to be conceived as being embedded primarily in the social realm and, hence, in socio-economic changes and transformation processes (see chapter 3.2. for a discussion on different interpretations of the term transformation). These processes are prone to imply not only changes in the capacities to deal with future hazards but also in the mindsets regarding soft cognitive issues related to the perception and acceptance of risks and the conception and design of considered response measures. Adding this second dimension of embeddedness to the framing of vulnerability and adaptation is of conceptual and analytical importance in order to capture the real life conditions of the respective actors as they enable but also restrict their approaches to dealing with risk. In addition, the acknowledgement of this double embedding constitutes an important base-layer for exploring the dynamics in future pathways of vulnerability and adaptive capacity in their relation to broader socio-economic, political and cultural transformation processes. Currently, most assessment approaches in the field of environmental change apply an implicit imbalance as they combine future projections of climatic hazards with current patterns of socio-economic vulnerability, e.g. by combining sea level rise scenarios for the year 2100 with current population distributions. In addition, the assessment of vulnerability often

tends to be reduced to an analysis of those vulnerability factors having materialized in past disaster events. Therefore, much more attention is needed to explore the potentiality of harm related to possible but not yet experienced hazard events. This aspect adds to the aforementioned need for more forward-looking and dynamic perspectives in vulnerability research.

Thirdly, current scholarship on vulnerability and adaptation[1] tends to be divided into, on the one hand, research focusing on state-led or formal modes of risk management and, on the other hand, vulnerability and adaptive capacity in the private or non-state spheres. While the former is often concerned with large scale adaptation measures, the latter is more commonly associated with a focus on small-scale processes most notably at household or community level. However, much less attention has been paid to the question how those two spheres interact and cross-fertilize – or hamper – each other.

The study presented here draws on empirical research in Vietnam's Can Tho City in an attempt to respond to these deficits and to advance current approaches. Vietnam serves as a highly relevant case study given that the country is undergoing a rapid socio-economic transformation related to the ongoing reform process. In addition, it has in the past suffered substantially from disasters related to natural hazards while also being discussed as becoming one of the global hot spots in terms of the projected impacts of climate change. This constellation necessitates a dynamic and potentiality-oriented analysis of vulnerability and adaptation, relating them not only to environmental changes but primarily to the cross-scale changes in the socio-economic, political and cultural domains. The question for Vietnam's political transformation further turns it into a highly relevant case study for analyzing also the dynamic interplay between state and non-state actors in their attempt to negotiate, reduce and mitigate risk.

Within Vietnam, the Mekong Delta makes for a particularly interesting case given that it is one of the country's most hazard-prone regions, most notably related to flooding and typhoons. The study concentrates in particular on Can Tho City, the rapidly growing demographic and economic centre of Mekong Delta, located around 130 kilometers southwest of Ho Chi Minh City. Vietnam's urban areas make for research objects of particular interest, given that urbanization can be considered a key dimension of the country's transformation process, simultaneously being a prime driver and result of it. Choosing Can Tho City further pays tribute to the fact that in Vietnam as well as globally research on small and mid-sized centers remains to be largely underemphasized despite the growing demographic and economic importance of these cities. As a result, considerable deficits in terms of understanding the processes in the mid-sized urban segment can be observed. In addition, focusing an emerging economy like Vietnam also helps to

1 The concepts of vulnerability, adaptation and risk can in general be applied to a wider range of different contexts. However, given the focus of the research presented in this thesis, they are used here to refer to the context of natural hazards if not otherwise stated. For the sake of readability, this might not be specified every single time the terms vulnerability, adaptation or risk will be used throughout this document.

bridge yet another gap in the current literature: Even though it has been widely shown that vulnerabilities towards natural hazards is often highest in the least developed countries, it is far less understood how the causal links between vulnerability, economic growth and human development change in emerging economies. Particularly debated remains the question whether urbanization and of the overall transformation process leads to positive or negative vulnerability effects. This question comprises two levels as it can be interpreted in terms of national or even global aggregates in vulnerability trends as well as in terms of the social stratifications therein.

In combination of all these identified gaps, the thesis presented here has two-fold objective:

Firstly, on a theoretical level, it sets out to review, contrast and discuss the different scholarly streams focusing on risk in human-environment-interaction and to provide an advanced integrated framework that helps to bridge existing gaps and to guide the detailed analysis of formerly neglected linkages, especially between vulnerability and adaptation.

Secondly, the research aims at understanding the patterns of household level vulnerability towards current and future natural hazards in urban Vietnam, especially Can Tho City, and the capacities and measures for adaptation at household and governmental level, paying particular attention to their linkages and dynamics within the context of socio-economic transformation. This way, the research attempts to contribute to analyzing the currently contested question whether the ongoing transformation process leads to an increase or decrease in vulnerability related to natural hazards.

It is argued here that due to the inflationary rise in scientific literature contributed from different directions, a careful and critical reflection and a sorted own perspective (objective 1) is needed to guide the empirical analysis (objective 2). However, the two elements are considered to co-evolve in an integrated and iterative manner throughout the research process. The research process presented here has passed through a number of such cycles, causing the interplay of inductive and deductive research elements (cf. chapter 5). Table 1.1 provides the main research questions and the sub-questions in terms of theoretical, empirical and methodological dimensions.

Two main research questions:
Which vulnerabilities and adaptive capacities related to current and projected natural hazards can be identified among urban and peri-urban residents in Can Tho City and how are the dynamics in these vulnerabilities and capacities influenced by state action and the ongoing socio-economic and political transformation processes in Vietnam?
How can this analysis help to advance the understanding of vulnerability-adaptation-linkages in a theoretical level, in particular with regards to providing an integrated and coherent conceptual model that helps to fill current knowledge gaps?

Table 1.1: Main research questions and subordinate questions (continued on the next page)

A. *Theoretical and conceptual sub-questions:*
1. How can risk, vulnerability and adaptation be framed conceptually; which achievements have been made and which shortcomings and gaps do remain in the current conceptual approaches? 2. How can these deficits and gaps be overcome with an advanced integrated conceptual framework? 3. How useful is the framework developed here? Which improvements does it bring? Which challenges do remain?
B. Empirical and context-specific sub-questions:
1. Which risk management and adaptation approaches are applied by state organizations in Can Tho City in the context of current and future natural hazards at meso-scale (i.e. the city scale) and micro-scale (i.e. particularly the household level)? Which opportunities but also challenges do they imply and how effective are they? 2. Which vulnerability patterns and adaptation capacities can be identified amongst the residents in Can Tho City and which differences exist between different social groups – and why? 3. Which factors shape the single components of vulnerability (exposure, susceptibility and coping capacity) at household level and which influence does the ongoing socio-economic and political transformation have on these factors? 4. Which adaptive capacity and adaptation action can be identified for mitigating the current and future vulnerability along its three components? How do these capacities and actions vary socially? How might the capacities develop in future with the ongoing transformation processes in Can Tho City and Vietnam at large? 5. How are state and non-state risk management and adaptation measures linked and how do those links change with the ongoing socio-economic and politic transformation? Where are gaps; where are overlaps; where are mismatches? 6. What can be learned from the analysis of current vulnerabilities and response mechanisms with respect to the vulnerability and the adaptive capacity of both government institutions and private actors in terms of future natural hazards expected in the context of climate change?
C. Methodological sub-questions:
1. How can not-yet manifested vulnerabilities to future hazards be assessed? 2. How can dynamic changes in vulnerability be assessed, particularly in terms of future trends? 3. Where are the epistemological and practical limits of such future-oriented and potentiality-focused vulnerability assessments? 4. How can the 'real' mechanisms of decision making be identified and assessed in Vietnam's political culture?

Table 1.1: Main research questions and subordinate questions (continued)

The structure of the book results from the objectives and research questions: Chapter 2 provides the theoretical and thematic embedding. The most relevant schools of thought on risk in human-environment-interaction – notably around the concepts of vulnerability, adaptation and resilience – are reviewed and reflected (chapter. 2.1) and their relations, gaps and mismatches examined (chapter 2.2).

Chapter 2.3 even increases the theoretical depth by asking how social theory on action can help to understand vulnerability and adaptation of human actors in social systems. Based on this theoretical fundament, particular attention is given to exploring urban particularities of risk and vulnerability, specifically concerning the question how urbanization might contribute to amplify and/or reduce risk (chapter 2.4). Related thereto the role of urban risk management and governance will be examined and their conceptual framing reflected (chapter 2.5).

Based on the identification of mismatches, gaps and deficits within as well as between these different schools, an integrative framework is developed (chapter 3) to advance the wider conceptual discourse and to structure the empirical analysis. The framework in particular aims at providing an integrative perspective on how adaptation relates to the specific structures and processes shaping the fabric of vulnerability. In addition, it frames vulnerability and adaptation in a dynamic way as being rested in environmental changes but particularly in socio-economic transformation processes from global to local scales.

Accordingly, the main objective of chapter 4 is to analyze the general risk landscape of Vietnam and especially the Mekong Delta, paying particular attention to the question whether and how risk is changing with the ongoing socio-economic (and political?) transformation of the country. Besides exploring disaster risk and projected climate change impacts and the respective policies (chapters 4.1 and 4.2), special attention is therefore given to the vulnerability effects of this transformation (chapter 4.3), to potential changes in the political system (chapter 4.4), the implications of state-society relations for local risk and adaptation governance (chapter 4.5) and the specific vulnerability-urbanization-linkages in the country (chapter 4.6). Drawing on that foundation, the relevance of choosing Can Tho City as a case study is discussed (chapter 4.7). The last sub-chapter in this section synthesizes the current state of risk assessments in Can Tho City and elaborates on the remaining gaps which contribute to the rationale for this study (chapter 4.8). These chapters are based on the analysis of secondary literature and statistical data.

Subsequently, the methodology for the collection and analysis of the empirical data is provided, paying particular attention also to the limits and barriers of doing social science related fieldwork in Vietnam and the strategies that had been applied in response (chapter 5).

Chapter 6 then presents the empirical findings, structured in two main parts. Firstly, state-led risk management activities, their effects and limits are analyzed, particularly in the three most relevant policy domains of disaster risk management, urban planning and management, and climate change adaptation (chapter 6.1). Secondly, vulnerability and adaptation at household level is analyzed in detail, concentrating in particular on the effects of the afore-analyzed governmental measures (chapter 6.2). Hence, particular attention is given to the interplay and feedbacks, but also inconsistencies and gaps, between governmental and non-governmental adaptation – a highly dynamic field within the transforming Socialist Republic of Vietnam.

Chapter 7 synthesis and discusses the main findings in terms of their contribution to understanding risk dynamics in Can Tho City and Vietnam (7.1); to pushing the methodological and epistemological boundaries or risk science (7.2); and to advancing the wider conceptual and theoretical discourse, related particularly to the contribution of the advanced integrative model developed here (7.3). Based on these lessons, recommendations for science and practice are drawn (7.4). The final chapter (8) distills key conclusions and provides an outlook.

An integrative perspective is necessary to answer the research questions posed here. This is not only because risk is situated at the interface of environmental and social processes, but also because the topic relates more generally to different scholarly streams, which need to be understood and interpreted against their respective epistemology and methodology, e.g. climate change adaptation studies, vulnerability research, urban studies, Southeast Asian studies, transformation research etc. It is argued here that geographical research provides a powerful lens and tool-kit to achieve an integrative perspective. In fact, advancing such integrative perspectives at the interface of society-environment-research potentially constitutes one of the core capacities of geography and has even been discussed as one of the main legitimizations of geographical research more generally (Weichhart 2005).

2. THEORETICAL BACKGROUND AND THEMATIC EMBEDDING

As illustrated in the introduction, the topic of this thesis is situated at the interface of different streams of scholarship, notably under the umbrella-concepts of risk, vulnerability, adaptation and resilience. This chapter provides a background on these streams and elaborates how they stimulated and guided the research presented here. Thematic and theoretical dimensions are herewith on purpose discussed in an integrated manner. In contrast to many other studies which tend to present these two domains in separation, the integrated presentation is deemed necessary here as it matches the scientific morphogenesis in this field, where theoretical innovation has always gone hand in hand with innovative thematic and empirical knowledge generation. However, despite their theoretical and empirical achievements over the last decades, considerable deficits and gaps remain within, as well as between, the different schools – contributing heavily to the rationale of this study. Through unveiling the achievements but also shortcomings in the current theoretical and empirical literature, this chapter (2) provides the springboard for the advanced integrative conceptual framework (developed in chapter 3), which helped guiding the empirical analysis (cf. 6) and serves as a basis for reflecting the findings (cf. 7). The structure of this chapter has been illustrated in the above introduction (cf. 1) and shall – in contrast to later chapters – not be directly repeated in this opening paragraph.

2.1. RELEVANT DISCOURSES ON RISK IN HUMAN-ENVIRONMENT INTERACTIONS

The overarching theme of risk resulting from the interaction of humans and their bio-geo-physical environment has, over the last few decades, been approached from different schools of thought, each with its own background in terms of disciplines of origin, guiding paradigms, scientific traditions, epistemological perspectives and applied methodologies. Three main branches can be discerned, i.e. (1) risk and vulnerability, (2) adaptation and (3) resilience approaches which shall be addressed in the three following sub-sections.

2.1.1 Vulnerability and hazards

"Not every windstorm, earth-tremor, or rush of water is a catastrophe. […]
It is the collapse of the cultural protection that constitutes the disaster proper."
(Carr 1932: 211)

2.1.1.1. Paradigm shift: from hazard focus to vulnerability

Over the last decades, conceptual approaches on how to understand and deal with risk associated with human-environment interaction have undergone a considerable enhancement and paradigm shift. Until well into the 1970s, risk discourses revolving around natural hazards and disasters were largely based on physicalist perspectives (see in detail Pelling 2001: 174; Wisner et al. 2004: 10). Risk and the potential for damage were mainly understood in terms of hazard probabilities, including in particular the interplay of magnitude (or intensity) and frequency. In this line of thinking, hazards were mainly framed as harmful elements of the physical environment and caused by forces exogenous to man (Burton and Kates 1964). Disasters were, hence, predominantly perceived as the result of 'the violent forces of nature' (Wisner et al. 2004: 10).

In terms of behavioral aspects, this school of thought was largely rooted in the human ecology theory of the 1920s which was for the first time explicitly applied to the context of natural hazards in White's[2] seminal work on floods in the United States (1945). Following an environmentally-deterministic conception, the main interest was on the human adjustments deemed necessary as people occupy hazard zones, yet, focusing largely on individual and re-active behavior in response to hazards; rather than on the wider socio-economic and political structures shaping such behavior (Pelling 2001: 174; Mitchell 1999: 42). Hewitt critiqued in his seminal work (1983) that in the 'dominant view' of the time the "initiative in calamity is seen to be with nature, which decides where and what social conditions or responses will become significant" (p. 5).

Accordingly, attention of scientists and practitioners had for a long time been gravitating around controlling or 'taming' the physical environment through monitoring, forecasting and structural (engineering based) response measures[3] (Hewitt 1983: 5; Pelling 2001: 174; Hilhorst and Bankoff 2004; Handmer 2003; Felgentreff and Dombrowsky 2008). This paradigm has been described as a tech-

2 Interestingly, White was a geographer, as are many influential scientists in this field quoted throughout this and the following sub-chapters, including, for example, Hewitt, Wisner, Cutter, Cannon, Liverman, Handmer, Pelling, Watts, Bohle, Alexander, Glade or Pohl.

3 Yet, some early pioneers in human ecology-oriented hazard research – notably Gilbert White – cautioned already during the 1930s and 1940s that protection infrastructure and especially dykes can in fact have opposing effects on risk and damage levels since the implied sense of security triggers additional exposure, e.g. through new developments in the flood plains which can be flooded in case of dyke failure (White 1945; Felgentreff and Dombrowsky 2008; Pohl 2008).

nocratic approach, also referred to as 'technological fix'. However, Hewitt reminds us that it should not be understood in too narrow terms as exclusively an "obsession" with engineering solutions, since it also implies a perspective according to which social, economic and political factors around human action and management "can be and usually are approached technocratically" (1983: 8). This paradigm yields the question whether such a control-oriented understanding of natural hazards is particularly likely to entrench itself within centrally organized state-bureaucracies, as can be found in the Socialist Republic of Vietnam (cf. 4), which are often rooted in the belief that the physical as well as the social realm can be steered and managed technocratically. Chapter 6.1 therefore explores whether such a linkage can be found in Can Tho City and what the implications for risk management and adaptation ventures are.

However, despite the dominance of the technocratic view until well into the 1980s, Hewitt's influential compendium (1983) acknowledges that there had been scattered accounts of social science analyses since the early 1970s which disagreed with this 'dominant view' (p. 7). But Hewitt also observes that the mainstream social sciences continued to conduct fairly narrow studies concentrating on direct socio-economic and behavioral relations, e.g. on hazard-specific risk awareness or on the implementation of emergency measures. By doing so, they failed to consider the wider social conditions allowing for disasters and therewith – as Hewitt argues – they even reinforced the geophysicalist and technological reductionism of the dominant view[4] (1983: 7). Importantly, also the implicit environmental determinism in the human ecology school – i.e. the conception that hazard-related human behavior is predominantly considered to be determined by the characteristics of the hazard – widely persisted despite the emerging critique (Felgentreff and Dombrowsky 2008: 17).

Yet, from the mid 1970s and more intensively the 1980s onwards, scientists advocating critical social theory increasingly challenged the risk explanations of the dominant view and promoted a paradigm shift towards focusing on social vulnerabilities (e.g. O'Keefe et al. 1976; Sen 1981; Hewitt 1983; Susman et al. 1983; for more comprehensive reviews see Pelling 2001; Cutter et al. 2009; Hilhorst and Bankhoff 2004: Handmer 2003; Oliver-Smith 1999; Müller-Mahn 2005). Largely inspired by approaches from the growing schools of political economy and later political ecology, these works in essence argued that risk and disasters are not determined purely by the natural hazard but are co-produced by social, economic, political and cultural structures and processes that generate socially stratified preconditions of human populations to be harmed by natural hazards, i.e. their vulnerabilities (Blaikie et al. 1994; Mitchell 1999: 43).

The fundamental risk formula of "Risk = Hazard (x) Vulnerability" was therefore coined which provides one of the most widely accepted and shared conceptions to this date (cf. Table 2.3). In addition, the previously neglected human influence on the intensification of the 'natural' hazards themselves (e.g. through

4 Interestingly, Hewitt did not flinch from drawing on his own earlier work for illustrating the shortcoming of the dominant view.

river regulation or zero tolerance policies towards forest fires) received increasing interest (Pohl 2008). The resulting call for a comprehensive paradigm shift is best captured by the title of O'Keefe et al.'s (1976) early seminal paper "Taking the naturalness out of natural disasters" – ironically published in Nature.

Despite quite notable diversity in terms of specific regional, thematic or theoretical interests, the new approaches therefore agreed on calling for increased attention to vulnerability as overarching theme. This call included to focus particularly on the structures and processes which make certain social groups (from national to local level) more prone to being harmed than others, even if exposed to comparable natural hazards. That is because next to the above-illustrated conceptual re-orientation there had been increasing recognition of the global differences in terms of impact patterns that societies experience from disasters related to natural hazards. Contrasting different impact types over the last three decades, Figure 2.1 illustrates that low income countries bear the major burden in terms of fatalities incurred by disasters, while economic losses and especially the insured economic losses are concentrated in higher income countries (see also IPCC 2012; UNISDR 2013, 2004; CRED 2013a,b). These fundamental differences in terms of impact patterns are amongst the strongest indication for the very different vulnerability constellations in the respective societies. Along with the simultaneous observation of strong impact disparities even within these countries, increased scientific efforts were therefore called for, in order to enable an improved scientific understanding of the emergence and perpetuation of these vulnerabilities that would – so the hope – allow for adequate action on vulnerability reduction.

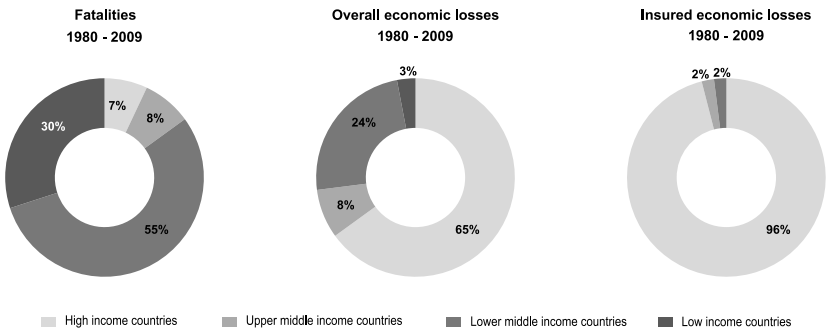


Figure 2.1: Global impacts of disasters related to natural hazards between 1980 and 2009, own draft, based on data from Munich Re (2011a)

Hence, since the late 1970s and particularly the 1980s, an increasing number of scientists devoted attention to the contested power relations and socio-political institutions which cause inequalities in access to and distribution of resources, in turn resulting in differentiated exposure, susceptibility and response capacity with

respect to natural or man-made hazards (Chambers 1989; see below for definitions on the terms). Ground breaking contributions (conceptual and empirical) to vulnerability science were made by Marxist-influenced political ecology (notably, Hewitt 1983; Susman et al. 1983) as well as by entitlement theory, particularly in the context of famines (notably, Sen 1981), and other conceptual work on food security (notably, Watts and Bohle 1993; Bohle et al 1994). The essence of these early schools, that jointly pushed for the new vulnerability paradigm, can be inferred from Cannon (1994) who concludes that "in order to understand the relationships between humans and nature, it is more important to discern how human systems themselves place people in relation to each other and to the environment than it is to interpret natural systems" (p. 15).

2.1.1.2. Vulnerability models and frameworks

On the back of these pioneering contributions, a number of models and conceptual frameworks have been developed which sketch out ontologies of the subcomponents, dimensions, structures and processes of vulnerability in order to guide its analysis and reduction. Vulnerability frameworks have thereby developed from different scientific traditions, resulting in a significant diversity in vulnerability approaches that reflects the rich multiplicity of contributions. This diversity persists even despite the numerous attempts to synchronize the different schools and come to a shared conceptual framework and lexicon that would allow for more integrated vulnerability assessments and a clearer communication of key messages to policy makers[5]. The variety of vulnerability approaches is not only mirrored by the increasing number of vulnerability definitions (see, for example, the glossary in Thywissen 2006). An even stronger indication is the fact that also the numerous attempts to review and categorize vulnerability approaches come to very different conclusions in terms of grouping the existing approaches along the lines of epistemology, main objectives, underlying research tradition and/or methodology (see in detail Timmerman 1981; Liverman 1990; Bohle et al. 1994; Cutter 1996; Liverman 2001; Weichselgartner 2001; Alexander 2006; O'Brien et al. 2004b, 2007; Müller-Mahn 2005; Adger 2006; Birkmann 2006a; Eaking and Luers 2006; Füssel and Klein 2006; Füssel 2007; Hufschmidt 2011; Bohle and Glade 2008; Pohl 2008; Cutter et al. 2009).

Recognizing the challenges in finding a standard approach to categorizing vulnerability research, the following broad categories have been suggested in the above-cited review articles[6]:

5 One prominent example of such a forum is the establishment of the international Expert Working Group for Measuring Vulnerability which met for the first time back-to-back with the World Conference on Disaster Reduction in Kobe in 2005.

6 This categorization of vulnerability frameworks should not be confused with approaches to risk in general. Grouping scientific schools on risk would result in a larger set. This is because additional approaches would have to be considered such as Beck's 'Risk Society' and 'World Risk Society (Beck 1986, 2008) focusing on the generation of risk in modern (West-

(1) Approaches which interpret vulnerability in the context of 'development, livelihoods and entitlement' studies;
(2) approaches in the tradition of 'hazard research, disaster risk and human ecology';
(3) approaches trying to integrate the first two schools; and
(4) approaches in the context of 'global environmental change and climate change'.

Given the vast amount of literature published in this field, the review of these four groups cannot be exhaustive here. It is therefore restricted to those contributions that have proved most influential for framing the research concept for this study (chapter 3).

Vulnerability in the context of development, livelihoods and entitlements

The first group (or lineage) of approaches is mainly rooted in two schools of thought which have developed in close cross-fertilization. Firstly, it emerged out of the, above specified, early critique of the 'dominant view' (Hewitt 1983) in geophysicalist approaches. This critique was advanced in particular by scientists working on development and livelihood questions from the emerging perspective of political ecology. They re-framed human-environment interactions towards an emphasis on the socio-political production of not only social but also environmental conditions that allow for the intensification of vulnerability and risk (cf. Hewitt 1983; O'Keefe et al. 1976; and for more detailed reviews Cutter et al. 2009; Felgentreff and Dombrowsky 2008; Pohl 2008).

Secondly, vulnerability thinking in this lineage is in parallel grounded in food security and famine research. Sen's entitlement theory, published in 1981, can be considered a milestone contribution in this context. Analyzing the great Bengal famine in 1943, he was able to prove that this famine was not primarily caused by a shortage of food production but rather by institutional and economic shifts which lead to a deterioration of the exchange entitlements of poor population groups (cf. Sen 1981; see for a longer review Bohle and Glade 2008). Building on Sen's main arguments Chambers (1989) compiled his seminal work "Vulnerability, coping and policy" in which he frames vulnerability as a two-headed phenomenon having an external side of hazard-, stress- and shock-exposure and an internal side, meaning a lack of coping capacity (p.1). Watts and Bohle (1993) expanded this framing to argue that the space of vulnerability is spanned by the actors' lack of potentiality, lack of capacity and exposure, all of which in turn depend on the wider context of entitlement, empowerment and the political economy in the given context. This causal structure of vulnerability has been widely adopted and is also of great relevance to the conceptual framing of the study presented here. This is because it emphasizes that a detailed analysis of vulnerability

ern) societies – yet not making explicit use of the vulnerability concepts – or Renn's 'Risk Governance' (Renn 2008).

needs to draw on different theoretical perspectives, enabling the consideration and combination of complementary causal explanations.

Bohle (2001) later linked this framing even more comprehensively to different schools of social science theory and developed the widely cited meta-framework of the double structure of vulnerability. Drawing on Chambers earlier work (1989), the framework suggests that the vulnerability of people can only be understood by linking the analysis of their internal coping capacities and measures (informed by action theory, models of access and conflict research) with their structural exposure to external stresses and hazards (informed, for example, by human ecology, policy economy and entitlement theory). Vulnerability is hence to be understood as a highly dynamic and relational – rather than an absolute – phenomenon (Watts and Bohle 1993). Recognizing this double structure of vulnerability provides an essential perspective for the analysis and understanding of the Vietnamese case study context presented here. It allows especially to explore how the relations between internal and external dimensions of vulnerability and response capacities change under conditions of wider socio-economic and institutional transformation – as will be shown in more detail in chapters 3, 6 and 7.

Next to these causal frameworks of vulnerability, the generation and dynamic progression of vulnerability has been further investigated through the lens of the widely cited Pressure and Release Model, published in the influential book "At Risk" by Blaikie et al. (1994) and its second edition by Wisner et al. (2004). In this book, the four authors combine elements of their previous work on political ecology, development, livelihood studies and natural hazards to call for the above-introduced paradigm shift in which risk (and the potential for disaster) needs to be understood as the product of hazard and vulnerability (R=HxV). The Pressure and Release Model concentrates in particular on the vulnerability dimension and differentiates three components which together shape its progression (Figure 2.2). Firstly, systemic and institutional root causes can comprise, for example, limited access to resources, exploitive structures and lack of power. Secondly, dynamic pressures comprise destabilizing processes at various scales that are inadequately governed and regulated such as rapid urbanization or ecosystem degradation. In combination, root causes and dynamic pressures can lead to, thirdly, unsafe conditions, i.e. states of high vulnerability, meaning a high pre-disposition to experience harm when being exposed to a hazard. Yet, despite these conceptual claims for a long-term perspective, Miller et al. (2010) find that in practice vulnerability studies often fail to apply a dynamic perspective as they "often present a snapshot of vulnerability at a particular time, such as immediately after a disaster" (p. 11).

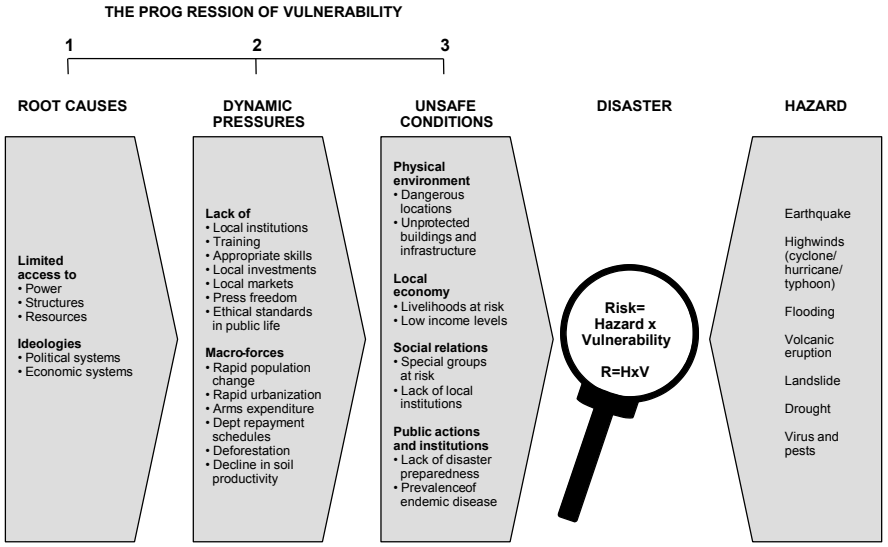


Figure 2.2: The Pressure and Release Model, Wisner et al. (2004: 51)

One of the major – and for the time of publication truly progressive – achievements of the Pressure and Release Model is its emphasis on the depth of political implications that one has to consider if taking vulnerability reduction seriously. The model underscores that while vulnerability is always context-specific, the root causes and dynamic pressures leading to specific unsafe conditions (and eventually risk or disaster) are often remote from the actual situation in question, serving as indirect drivers. Eventually, local vulnerabilities are often rooted in the very set-up of larger political and economic systems at national or even global level. The authors argue that identifying these linkages is of key relevance for risk reduction and mitigation – in other words for releasing pressures, as the model's name suggests. However, at the same time, this insight implies that real efforts for (local) vulnerability reduction might not suffice with local palliative vulnerability reduction measures but eventually call for drastic changes in the larger political and economic systems altogether (Birkmann 2006a: 31). This makes a critical engagement with vulnerability – in the sense of a 'critical theory' or 'critical geography' – highly political and might involve practical challenges for doing vulnerability research altogether. What if, for instance, the research on Vietnam presented here revealed that, in terms of the vulnerability root causes, the government is oftentimes rather part of the problem, than a part of the solution? Which implications would this have for not only doing participatory research in the country, but also very practically for receiving the necessary research permissions or for discussing vulnerability reduction measures jointly with relevant governmental stakeholders? Chapter 5.4 and 7.2 will discuss such questions in more detail and

will underscore the deeper social and political implications of vulnerability research as suggested in the Pressure and Release Model.

Through framing risk as the interaction of hazards and vulnerabilities, the Pressure and Release Model can be considered a bridge between hazard and political ecology approaches (Adger 2006: 270). However, Cutter et al. (2009) correctly note that the model tends to treat the hazard as externally given and fails to address the interaction between human and natural systems in the production of hazards (p. 4) – which is a link that is of particular importance in urban environments, e.g. with respect to the intensification of flooding due to soil sealing or the intensification of extreme precipitation events due to the heat-island-effect (cf. 2.4).

Nested in those wider perspectives on vulnerability, a number of approaches have been developed to explore the detailed structures and processes of vulnerability at smaller scales including community, household and individual levels – as is the focus of much of the empirical work presented here. Emphasis has thereby been put on the tenet that vulnerability should not be considered as something out of the ordinary but needs to be seen as an integral part of people's everyday realities. It is hence argued that vulnerability analysis needs to be cognizant of the surrounding livelihood conditions.

Therefore, many vulnerability approaches draw on the livelihood framework (Carney 1998; DFID 1999) as an additional layer for conceptual and analytic structuring (e.g. the access model by Wisner et al. 2004). The livelihood framework has its main roots in action-oriented (rural) development studies and was developed to guide the analysis of how people establish and sustain their day-to-day livelihood – and where deficits for doing so exist (Chambers and Conway 1992). It therefore integrates, as its name suggests, the focus on livelihoods and sustainability. Livelihoods are therein understood to comprise the "capabilities, assets and activities required for a means of living" (Chambers and Conway 1992: 7). Of central importance in the framework are the five types of tangible and intangible capitals (or assets) which people use for obtaining livelihoods but which also condition the internal capacities that people have to avoid or reduce vulnerabilities and to induce adaptation to hazards:

(1) Human capital (e.g. skills, knowledge, health condition);
(2) Social capital (e.g. social networks, institutions, reciprocity, trust);
(3) Physical capital (e.g. infrastructure, technology, equipment for production);
(4) Financial capital (e.g. income, savings);
(5) Natural capital (e.g. natural resources for production or recreation).

The different capitals can be combined and re-combined into capital portfolios depending on the context. One of the central questions is therefore whether and how deficits in one type of capital can be substituted by other capital stocks – and how these exchange relations might dynamically change with socio-economic or institutional transformation as in the case of Vietnam. This question is of key relevance, for example, with respect to the configuration of adaptive capacity portfolios (see chapter 2.1.1.4) or the coping measures dynamically applied in a given

hazard or stress situation which might lead to shortages in specific capital stocks and to the activation of other capitals.

Importantly, the capitals (or assets) do not translate directly into livelihood strategies and outcomes but are shaped – i.e. activated but also truncated or blocked – by so-called transforming structures and processes such as legal regulations, institutional boundaries or cultural norms. It is these transforming structures and processes which regulate, for example, the access to the capital sources or influence the extent to which these assets can in fact be capitalized on. This dimension has, therefore, a considerable conceptual overlap with the above-illustrated external side of vulnerability (Bohle 2001) and carries the potential to re-produce vulnerabilities and inhibit vulnerability reduction (Twigg 2001). However, the explanations on the internal dynamics of capital balancing and the detailed effects of transforming structures and processes remain rather abstract in the original framework (Haan and Zoomers 2005). Exploring these important questions in more detail, therefore, constitutes one of the major goals of this research, which is mirrored not only in the conceptual framework (cf. 3.2) but also in the empirical analysis (cf. 6.2).

Vulnerability in the tradition of hazard research, disaster risk and human ecology

While the vulnerability research in the context of development and livelihood studies applies a broad perspective and understands vulnerability as necessarily linked to larger socio-economic and political configurations, the vulnerability focus in hazard and disaster risk research is usually more narrow and largely confined to the specific hazards or disasters. This has to be seen in relation to the fact that this lineage is often more closely linked to practical disaster risk management and/or natural science approaches which place greater emphasis on the actual hazard situation and the specific disaster manifestation than focusing on the societal root causes of vulnerability (cf. Müller-Mahn 2005, 2008).

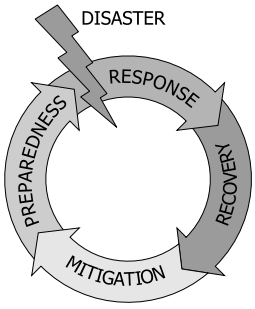


Figure 2.3: The disaster risk cycle, according to Cutter & Gall (2008: 356).

The widely-used disaster risk cycle (Figure 2.3) illustrates the key elements or stages of such direct disaster risk management approaches, i.e. response, rehabilitation/reconstruction, prevention/mitigation and preparedness (Dikau and Weichselgartner 2005; Elverfeldt et al. 2008). Vulnerability aspects can be linked to all four phases of this cycle. However, vulnerability reduction is most commonly associated with risk prevention and mitigation, thereby underemphasizing that vulnerabilities can also exist with respect to the lack of response capacities, the lack of rehabilitation/reconstruction capacities and the lack of preparedness. Yet, it is interesting to see that most of the literature on the disaster risk management cycle does not explore the conceptual links between vulnerability and the phases of disaster risk management in detail. This shortcoming certainly underscores the different traditions behind the two concepts, with the cycle being more strongly rooted in concrete disaster risk reduction which, for a long time, had been dominated by technocratic and re-active approaches to 'managing' disasters. In this context, the notion that the disaster risk cycle can – or should – guide disaster risk management has been criticized. It has in particular been argued that the cyclic model pays too little attention to the question of how learning from past disasters can be fostered and can lead to changes in the system so as to reduce vulnerabilities – in contrast to simply recovering and rebuilding back to the old state (Miller et al. 2010). Also, the question of how far disasters can in fact open up windows of opportunity to initiate institutional change that allows for profound alterations in the causal structures of vulnerability has been widely neglected in the traditional disaster management field (Birkmann et al. 2010a). In addition, the cycle mainly refers to sudden onset or singular events (e.g. typhoons, river floods, earthquakes) but provides little guidance for how to deal with creeping or continuous hazards and the resulting risk (e.g. sea level rise or salinization). The cycle therefore offers some conceptual guidance for parts of the empirical research presented here – particularly for the aspects directly linked to conventional disaster risk management (cf. 6.1.1) – but needs to be augmented with other conceptual streams in order to accommodate a wider context of hazards, vulnerability dimensions and adaptation processes (cf. 3).

In addition to the above-referenced schools on natural hazards and disaster risk reduction, there is a broader lineage of disaster research that deals with a wide range of environmental, technical and mixed disasters. This research largely concentrates on high income countries and on the technical and organizational management of specific disaster scenarios as well as on related societal negotiations of risk-taking. Parts of this school link their research to the vulnerability concepts presented above but interestingly a review of the literature suggests that the main stimuli have diffused from the vulnerability literature into this disaster literature rather than the other way around. Therefore, this broader disaster literature will not be reviewed here in detail. Comprehensive introductions can be found, for example, in Dombrowsky (1998, 2008), Quarantelli (1995, 1998), Gilbert (1998), Porfiriev (1998).

Connective vulnerability approaches

Reviewing the first two schools, Cutter concluded with respect to her own work in the North American context that "many of the existing theoretical constructs were either too limiting or too diffuse to be of practical use to the problems examined" (1996: 535). She therefore proposed a vulnerability model which set out to bridge between the internal social construction of vulnerability and the hazard-exposure oriented explanation of vulnerability. The suggested way of achieving this bridge is to integrate causal vulnerability explanations from both perspectives into the joint analysis of vulnerability in specific locations. Hence, the linking element in her 'hazard of place' model is the "vulnerability of specific places and the people who live there […] for it is the place that forms the fundamental unit of analysis for any geographer" (p. 536).

When reviewing the relevance of this model a number of points come to mind, especially in the context of the research presented here. Reiterating the role of spatiality and the fact that the vulnerability of people depends on the characteristics of the places they live in is important, as is the integration of the two above perspectives. The model thereby particularly allows for analyzing the exposure to multiple overlapping hazards in one place (Cutter et al. 2009; see also O'Brien et al. 2004a), as it can be observed many parts of the Mekong Delta (cf. 4.1). Yet, at the same time the model itself provides little guidance for analyzing the causal relations in peoples' behavior in response to such hazard exposure. Particularly the link to an underlying social theory that could help to explain social action and the production of internal vulnerability seems underemphasized. In addition, the links between the model's epistemic objects such as 'social fabric' and 'geographic context' remain rather fuzzy. Hence, while Cutter argues that the "simplicity of the hazards of place model suggests wide application" (1996: 537), it is argued here that this simplicity and vagueness may render the model itself as too diffuse to be of specific practical use. For the context of this study, the model therefore helped to direct attention to relevant questions (see above) but it is of limited use for precisely conceptualizing or even operationalizing vulnerability and adaptation.

Also Alexander (2006) illustrates that risk results from the interaction of physical hazards and societal vulnerabilities and, hence, needs to be analyzed through the combination of natural and social science lenses. His framing therefore shares some major arguments with the pressure and release model (see above). However, it gives more consideration to the role of the specific hazard characteristics and allows for a more direct link to the level of (potential or materialized) harm. The model is therefore very informative for the multi-hazard context in the case study presented here since it reminds the researcher that even though the main interest may be on the social production of vulnerability, the analysis of this production process needs to be sensitive to the variations in vulnerability depending on the specific hazard – or hazard mixture – in question. In other words, Alexander's framework urges the researches to set emphasis on the question of 'vulnerability to what?'. Reiteration that this question should play a

central role in any vulnerability research remains of particular importance when bringing to mind the recent surge in vulnerability studies, often applying the term in a very broad or unspecific manner without clearly defining which vulnerabilities, and to which hazards, are in focus.

Vulnerability in the context of global environmental change and climate change

The youngest of the vulnerability lineages reviewed here emerged in the context of global environmental change and especially climate change research (cf. Liverman 1990, 2001). Along with the predominant systems perspective in these schools of thought, vulnerability is mostly framed as a property of the system or system components in question. Timmerman (1981), for example, defines vulnerability in his early but influential review as "the degree to which a system may react adversely to the occurrence of a hazardous event" (p. 21). For him, vulnerability is closely linked to resilience, i.e. "the measure of a system's capacity to absorb and recover from the occurrence of a hazardous event" (ibid.)[7].

In a collaborative effort, key researchers within global environmental change research and sustainability science have developed a comprehensive framework for guiding the analysis of vulnerability (Turner et al. 2003; see Figure 2.4). Through its sub-categorization of vulnerability factors the framework has contributed important conceptual inspiration for the analysis presented here, especially for the conceptual framing (cf. 3.2) and empirical operationalization (cf. 5; 6). It is designed to capture vulnerability linkages in so-called coupled human-environment systems. Drawing on earlier work within the 'development, livelihoods and entitlements' tradition, the authors emphasize the need to not only consider hazard exposure – which can be defined in this context as the "degree, duration and/or extent in which the system is in contact with, or subject to, the [hazard]" (Gallopín 2006: 296). Rather, Turner et al. urge for paying increased attention also to the influence that sensitivity and resilience have on the overall vulnerability of the system or system component in question. The authors define sensitivity as "dose-response […] of the system exposed" (Turner et al. 2003: 8074) which can be understood as the "degree to which the system is modified or affected by an external disturbance or set of disturbances", i.e. by a hazard or a set of hazards (Gallopín 2006: 195). Interestingly, resilience is, in the framework, seen as a sub-component of vulnerability – with an inverse relationship, meaning that increasing resilience can contribute to decreasing vulnerability. It is in this context defined as the "system's ability to bounce back to a reference state after a disturbance […] and the capacity of a system to maintain certain structures and functions despite disturbance" (Turner et al. 2003: 8075).

7 Departing from these definitions, one of Timmerman's main questions is what happens if a system has such high vulnerability and low resilience that it collapses when confronted with hazardous events of a high intensity.