

## 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-

interviews 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 nicht-staatlicher 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 Strukturierungstheorie 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 Verwundbarkeits-effekte 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 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<sup>1</sup> 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 political 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 of 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).