

## Chapter 9

# Dynamic Resilience of Peri-Urban Agriculturalists in the Mekong Delta Under Pressures of Socio-Economic Transformation and Climate Change

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**Abstract** Globally and in Vietnam, coupled social-ecological systems in the peri-urban fringes are amongst the most dynamic as well as strained systems as they are at the same time drivers and results of comprehensive transformation processes. Based on a literature and policy review, we argue that – globally and especially in Vietnam – there is a neglect of the specific needs and challenges faced by populations in the peri-urban interface. At the same time, the chapter suggests that, in the Mekong Delta in particular, agriculture-based population groups in the peri-urban areas are at risk of being negatively affected by overlapping trends of (a) socio-economic transformation (including, e.g. liberalisation or urbanisation), (b) biophysical degradation (including, e.g. pesticide residues in water bodies) and (c) climate change impacts. This hypothesis is tested based on empirical research in one of the most rapidly urbanising districts in the Mekong Delta, that is, Cai Rang District in the peri-urban fringe of Can Tho City. We find that formerly agriculture-based population groups in this district are facing substantial decreases in resilience due in particular to the effects of expropriation, relocation and inadequate compensation schemes. In addition, the population of the district will experience changes in water-related pollution patterns as sources of contaminants are likely to shift from mainly agrichemicals pollution to microbiological contaminations and pollution from other ‘new’ pollutants such as endocrine disruptors, all linked to changes in land use patterns and industrialisation. On top of this, climate change is in the future likely to imply increasing difficulties for those groups which – in view of the already deteriorated baseline resilience – pose substantial risks of tipping into a crisis situation due to a lack of resources and options for adaptation and coping. This can be true for single households, extended family networks or entire groups (e.g. populations in specific relocation clusters). Yet, the chapter argues that resilience effects may not be understood in a functionalistic or deterministic manner, meaning that entire systems *per se* will inevitably move along a given resilience

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trajectory. Rather, a review of overlaying trends in Vietnam as well as empirical case study analysis shows that resilience pathways are highly dynamic and depend on small-scale factors setting the directions. Resilience, therefore, can be differentiated between households or individuals. Acknowledging the importance of those small directive elements within resilience pathways opens up opportunities for resilience management and governance.

**Keywords** Resilience • Peri-urban interface • Agriculture • Transformation • Climate change • Vietnam

## 9.1 Introduction

Agriculture is amongst the land use types with the most direct and intensive interactions between humans and their biophysical environment. Over the last decades, various theoretical schools have developed which allow us to illustrate the dependencies of humans on ecosystem goods and services and which focus on sustainable environmental management (e.g. human ecology, political ecology, footprint research; Young 1974; Blaikie and Brookfield 1987; Robbins 2004; Wackernagel and Rees 1996; Millennium Ecosystem Assessment 2005). Land use management plays a key role in these discourses. However, in many studies the regions with most intensive land use transformations are left out from analysis: that is, the peri-urban interface with its dynamic hybrids of urban and rural land use patterns. Yet, these areas play an increasingly important role. First, they are of substantial quantitative relevance given strong urbanisation trends globally and, in particular, in developing countries and emerging economies. Second, peri-urban areas in developing countries often suffer from (a) growing biophysical and socio-economic stress resulting from agricultural intensification, (b) utilisation for urban waste disposal and (c) economic and social transformation – often coming along with land reforms or resettlement – which imply significant livelihood challenges for the original (often agriculture-based) population.

In addition to this existing stress, climate change will add to the perturbations in peri-urban areas as negative impacts on both rather rural and rather urban profiles are likely to be felt simultaneously. As with agriculture in other settings, peri-urban agricultural producers will feel the impacts of climate change in very direct terms due to the fact that changes in temperature-, precipitation- and flooding-patterns directly influence agricultural production. At the same time, peri-urban areas are at great risk with respect to environmental-technical-disasters related to man-made or natural hazards (of which the latter can be induced or intensified by climate change). For example, industrial production units or waste dumps – which bare a substantial risk of environmental pollution if flooded or destroyed by storms – are often located in the outskirts of cities. In addition, peri-urban areas are likely to be at the forefront with respect to receiving the increasing numbers of migrants who

will no longer be able to sustain their livelihoods in rural areas due to climate change and who move into urban areas in search of new income sources. They in turn compete for land and increase both the pressures for the original population and the stress on biophysical systems.

Despite this present and future stress on peri-urban social-ecological systems, the resilience of peri-urban agriculture-based populations and their capacities to respond to existing and future challenges are in many parts of the world not well understood. Yet, a detailed understanding of these processes is necessary in order to allow for adequate policy and decision making. This is of particular importance since the reasonable management of those areas can make the difference between achieving a (rather) sustainable coupled social–ecological urban-hinterland system or an unsustainable and highly vulnerable system.

This chapter, therefore, generates lessons learned from an in-depth, interdisciplinary analysis on the resilience of households in Cai Rang District, Can Tho City. This district is one of the most rapidly transforming peri-urban areas in Vietnam, which in turn is one of the countries most intensively affected by overlaying dynamics of socio-economic transformation, ecosystem change, urbanisation and climate change risk.

## **9.2 The Peri-Urban Interface: Neglected Hybrid in an Ontologically Dichotomous Landscape**

In much of the conventional scientific and political discourse, the terms ‘urban’ and ‘rural’ are used to represent mental conceptions of some archetype landscapes and related characteristics (Simon et al. 2006). These archetype conceptions are very often used in a dichotomous and mutually exclusive manner, thereby, constituting the pre-analytic vision for much of the past and current policy making, planning or research – often lacking critical validity- and reality-checks. Yet, in an increasingly urbanising world – in particular in developing countries – this ill-perceived dichotomy has to be challenged as it systematically contributes to a neglect and misconception of the peri-urban interface, that is, where the city fringes intermingle with their hinterland to build hybrid mosaics of land use, economic activity, demographic density, administration, socio-cultural dispersion and biophysical environments.

The peri-urban interface is thereby at the same time driver and result of cross-scale global change phenomena (comprising ecological, social, economic and cultural dimensions) (Johnston et al. 2002), as manifested in site-selections of diverse economic actors as well as in various flows of people and resources. This can, for example, include inbound migration of (rural) poor in search of cheap and accessible grounds for settlements (often informal or illegal). At the same time, there might be urban rich and upper middle-class people who are looking for uncongested sites for housing and leisure activities (often linked to the desire of being ‘surrounded by nature’). In addition, industrial enterprises increasingly

choose to build production sites in the peri-urban areas as the infrastructure inside cities is inadequate or land prices might be too high. Moreover, the urban fringes often host critical infrastructure elements such as airports, ring roads, power stations, transmitter stations, waste dumps or sewage treatment plants.

The above-mentioned aspects make clear that defining the peri-urban interface through static threshold indicators (e.g. population density or percentage-shares in land use patterns) would only be of limited use and would be prone to producing a false sense of clear-cut demarcations and uniform entities. Key elements for defining and grasping the complex peri-urban interface and the respective areas rather have to be seen in (a) a continuum understanding and (b) a process understanding (Simon et al. 2006: 10). This implies that, 'theoretically, a peri-urban zone may change in width and the steepness of what we might call its rural-urban gradient over quite short periods of time, depending on the nature of pressures within the growing metropolis and of migration towards it' (ibid.).

Despite the fact that this hybrid landscape constitutes the environment for a rising number of people, particularly in the global South, remarkably little attention has been given to the question as to how far it shapes livelihoods in the peri-urban areas. It has been noted that much of the published work on livelihoods focuses on an (allegedly) purely urban or purely rural setting, even though the livelihood framework in general recognises that livelihood strategies often embrace hybrid activities in rural, peri-urban and urban areas (Simon et al. 2006: 8). In this context it has also been argued that, in developing countries, poor people in the peri-urban interface are particularly vulnerable as they are affected by the 'worst of both worlds' (Birley and Lock 1998) since the peri-urban interface is subject to the negative externalities of both, the nearby urban and rural areas (Allen 2006: 30). Very often, peri-urban poor depend heavily on natural resources and ecosystem services as their livelihoods are in most cases (entirely or partly) based on agriculture, horticulture, animal husbandry, forestry or fishery. Hence, these groups are to a great extent affected by environmental degradation in the peri-urban fringes. They, thus, often face a double burden from this degradation, that is, the impacts on the livelihood base in addition to direct health risks (Allen and Davila 2002). At the same time, poor peri-urban dwellers are likely to suffer from steep increases in land prices that can in many parts of the world be observed in the course of urban sprawl and growth. Very often, those dwellers are, therefore, priced out by middle- or upper-income groups and the business sector or are even expropriated by the government, often with poor and insufficient compensation regimes, in particular in cases of unclear or informal land title. Resulting from this, the affected groups are in many cases forced into temporary shelters and lose their opportunity for subsistence farming or income generation (Allen and Davila 2002).

These problems are aggravated by the fact that peri-urban areas face substantial challenges with respect to policy formulation and implementation. First, the peri-urban interface as defined above usually comprises areas within different administrative units. They are frequently located in parts within the boundaries of urban administrative units and rural districts, respectively. Hence, responsibilities,

e.g. for land use zoning, infrastructure development or environmental management, are distributed amongst different authorities resulting in a fragmented planning and management landscape that hampers integrative planning (Simon et al. 2006: 12). Second, Davila noted that environmental management for the peri-urban area is often ‘falling between the stools’ not only with respect to geographical dimensions but also in regard to the conceptions and configurations of planning and management (Davila 2006: 45). Policies with a primarily spatial focus (such as urban or regional master plans) in most cases do not comprise an explicit environmental dimension and are usually designed on the basis of territorial boundaries that do not follow the logic and organisation of ecosystems (ibid.). Many sectoral or macroeconomic policies, on the other hand, are lacking an explicit environmental focus, despite having a great impact on the environment in peri-urban areas. Poverty reduction strategies or socio-economic development plans often do not give explicit consideration to environmental issues but rather to the strengthening of market mechanisms, production and trade – which do depend on and affect environmental conditions, especially in the peri-urban fringe (Davila 2006: 50).

However, although policies directed towards the peri-urban interface *per se* are lacking, it has been argued that the response should not be to call for exactly these. To do so would risk adding another layer of actors, new bureaucracy and additional fiscal and regulatory burdens and would complicate integrated planning and management even further (Davila 2006: 53). Rather, policy-makers should call for a greater awareness of the specific needs and challenges faced by peri-urban ecosystems and populations and towards the effects that many spatial and sectoral policies imply for the peri-urban interface. In this context, increased consideration needs to be given to impact assessments and the integration of policies and plans across horizontal, vertical and sectoral divides.

### 9.3 Vietnam: Dimensions of Transformation, Climate Change and Resilience Effects

In the recent past, Vietnam has been undergoing multifaceted transformation processes in the economic, political, social, cultural and environmental domains which influence each other in multiple ways and which have strong impacts on the specific development pathways and vulnerabilities of different population groups. Those changes and resilience effects manifest themselves in particular in the country’s peri-urban areas, due to the speed, magnitude and new qualities of overlaying processes in these regions.

Vietnam is also highly exposed to various future climate change impacts. These will likely have substantial (potentially devastating) impacts on the resilience of certain population groups – that means on the balance between, on the one hand, the level of stress and the magnitude and frequency of perturbations these groups are exposed to, and, on the other hand, their capacities to cope and adapt.

The following paragraphs explore the dimensions of transformation in detail. One section is devoted each to transformations within the agricultural sector and urbanisation, respectively. Climate change risk will be illustrated in some more detail. Finally, the resulting resilience landscape for Vietnam is sketched out. The latter will be done in rather general terms here, in order to prepare the grounds for the more specific analysis on dynamic resilience pathways within the peri-urban case study presented afterwards.

### ***9.3.1 Political and Economic Transformation***

In response to chronic agricultural and industrial underproduction, thriving black markets, declining purchasing power, and the impending breakdown of the centrally controlled economy, the government of Vietnam initiated an economic and political reform process in the late 1970s towards a more market-oriented economy (Luong 2003: 8 et seq.; Dang 2007: 10 et seq.). Several plenary sessions of the Party Central Committee as well as Party Congresses during the late 1970s and early 1980s passed directives and decrees that implicitly initiated a shift towards a market-based economy. However, the breakthrough happened at the 6th Party Congress (December 1986) which embraced renewal (*doi moi*) of the political, economic, social and cultural system as an official policy line (Trong 2007: 25). The *doi moi*-process was continued in the late 1980s and 1990s with numerous additional legislative and regulative reforms, which strengthened the influence and freedom of private economic activity in the fields of, for example, investment, trade and property rights or land titles. The result has been strong economic growth with an average of 8% annually between the years 1990 and 1997 and with the number of private domestic enterprises rising from 318 to 5,714 between 1988 and 1998 (Luong 2003: 11).

### ***9.3.2 Urbanisation***

In combination with the economic transformation in the context of *doi moi*, Vietnam has over the last decades been experiencing a strong push towards urbanisation, which is expected to continue or even intensify in the future. While in 1985 (i.e. shortly before the official commencement of *doi moi*) less than 20% of the country's population was living in cities and towns (equalling some 11.5 million people), the figure has risen to nearly 30% in 2010 (accounting for over 26 million) (UN/DESA 2008). With the average annual urban growth rate only slowly falling from 2.9% (for the decade 2010–2020) to 1.7% (2040–2050), Vietnam's urban growth is expected to remain substantially above the Southeast-Asian average over the next decades. This means that an expected 42, 49 and 57% of the country's population will be urban by 2030, 2040 and 2050 respectively, then equalling some 46, 58 and 68

million people (*ibid.*). Cities and towns will both increase their density of population, buildings, and infrastructure as well as spread in their geographical extent. Regarding the latter, it has been estimated that currently around 100 km<sup>2</sup> of land are converted from agriculture to urban land use every year (Coulthart et al. 2006: x).

Because of the combination of densification and sprawl as well as the related effects of resource consumption and pollution, cities will have an increasing environmental impact on their own territory as well as on the surrounding peri-urban and rural hinterlands. At the same time, the concentration of populations and infrastructure can imply opportunities for a more sustainable land-use given the potential scale effects and synergies (e.g. with respect to transportation, cooling of buildings or sewerage infrastructure). Good planning and management in particular in peri-urban and urban areas is, therefore, of increasing importance with respect to overall (i.e. cross-sector and cross-scale) sustainable development of the country.

Urbanisation in Vietnam has to be seen in close correlation to the sensitive question of the (normative) role of cities within the social and economic fabric of the Socialist Republic. As with many other non-European socialist governments, the Vietnamese political elite for a long time had an ambivalent attitude towards urbanisation – which, given the specific history of Vietnam, contributed to different urbanisation pathways in the North and South of the country; the effects of these can be observed until today (c.f. Drakakis-Smith and Kilgour 2001: 220 et seq.). On the one hand, there has been recognition that urbanisation is an important prerequisite for the promotion of industrialisation which is in turn key to building up an independent economy and a strong national defence (Turley 1977: 624). On the other hand, the Vietnamese economy has long been heavily based on agriculture. Urban industries have played a comparatively minor role and agriculture has been a major defining element in the national identity. Linked to this, the socialist movement in Vietnam was very much rural-based (Drakakis-Smith and Kilgour 2001: 219) – which is certainly linked to the importance of agriculture in the country's social fabric and national history even before the arrival of socialism. In particular, Southern cities (and especially Ho Chi Minh City) were, after the reunification, seen as 'lairds of American imperialism and its puppets', which has in the early years contributed to an anti-urban bias amongst many cadres of the reunified socialist Vietnam (Turley 1977: 622).

This ambiguity translated for a long time in a somewhat vague and inexplicit handling of urban areas and their specific development challenges. The questions of whether urbanisation should be rather stimulated or prevented by official policy and how much attention should be given to funding and developing urban areas were therefore not answered coherently for many years. Resulting from this was a poor administrative and legal framework for the planning and management of urban areas which in combination with an overall lack of financial resources (internally as well as in regard to foreign investment) led to an 'urban neglect' within the first years after reunification, resulting in substantial shortcomings with respect to infrastructure and housing development (Yeung 2007: 272 et seq.; Coulthart et al. 2006). In addition, outside the large cities like Ho Chi Minh City, Hanoi or Da Nang, urban management and planning was often not recognised as a profession in its own



right. Hence, medium-sized and small cities were despite substantial (informal) growth and specific urban challenges often administered by political cadres with a background in rural management.

In 1998, after more than 10 years of substantial economic growth following the commencement of *doi moi*, the national government passed an Orientation Master Plan for Urban Development to 2020, which collated an explicitly urban development strategy in response to the challenges for sustainable development of Vietnam's cities (SRV 1998). The plan sets out the goal of a more balanced urban development in which the growth of the large urban agglomerations shall be slowed down in order to prevent excessive regional disparities and the emergence of mega-urban areas that grow beyond control. At the same time, small and medium cities shall be fostered and specific cities promoted as industrial hubs, constituting locomotives of economic growth. Competitive elements in the search for national funds have been strengthened in tandem with substantial financial and administrative decentralisations. These decentralisations have in the following years been further supported through additional legislative reforms, most importantly the Amendment to the State Budget Law (2002), the new Land Law (2003), the new Law on Construction (2003) and the new Law on Urban Planning (2009) (SRV 2002, 2003a, b, 2009, respectively) which all entail shifts of tasks and responsibilities of urban planning and management from the national government to administrations on the provincial and district level. In spite of the increased attention towards urban areas and development challenges, peri-urban areas with their specific conditions and needs continue to be neglected and still fall through the cracks of rural and urban policy. The Orientation Master Plan, for example, does not give explicit consideration to the peri-urban interface, nor does the new Law on Urban Planning.

### 9.3.3 *Agriculture*

Given its high importance for the country's economy, its key role as a basis for livelihoods and its great normative significance within the ideological fabric of the Republic's political system, the agricultural sector is of particular importance for being able to understand Vietnam's development and renewal process as well as the resulting resilience effects.

Agriculture plays a key role in the economy of Vietnam and the Mekong Delta is the most intensively farmed area in the country. The Delta provides the majority of the production of various commodities (GSO 2009a, b). Yet, the extent of productive agricultural land is threatened in two ways: first by climate change impacts (see below); second by urbanisation, as many rural areas (particularly – but not only – Can Tho City) are transformed into peri-urban areas and peri-urban areas become more urbanised.

In rural and peri-urban areas of the Mekong Delta, intensive agricultural production has already had impacts on ecosystems. For example, pesticide monitoring programmes that were conducted in 2008 and 2009 at field outlets and in channels



used for irrigation, in one strictly rural area in An Long District, Dong Thap Province, and one peri-urban area in Cai Rang District, Can Tho Province, indicated that a broad range of recently used pesticides are co-occurring at detectable levels in these systems (Toan et al. 2009). This can potentially have direct negative effects on aquatic ecosystems. But more importantly, this could have negative repercussions on human health as ongoing studies (research of Pham Van Toan, in UNU-EHS 2010) show that pesticides are detected in drinking water samples from water taken out of canals – which during the dry season are a major source for drinking water.

Going through an urbanisation process automatically implies land use changes. These are not restricted to agricultural land being set aside for urban land uses (e.g. buildings, infrastructures), but may as well imply shifts in production systems on the land that remains devoted to agriculture. An example could be a shift from rice production to fruit tree orchards: With improved access to markets, fruit can be sold more easily and provide higher returns to farmers. Shifts in land use patterns in rapidly urbanising areas such as Cai Rang imply pollution problems too. For example, with the loss of agricultural land, pesticides – as pollutants to the water system – may be progressively replaced, for instance, by bacteriological contaminations linked to inadequate sewerage systems which service new infrastructure developments. Aquatic ecosystems and people who rely on these may then progressively be exposed to new pollution problems. The link between ecosystems, the services they provide to communities, and the social component of this coupled system can be disrupted, requiring some adaptation from the communities.

Shifts in pollution problems can occur concomitantly with effects of climate change. If we focus on the agricultural sector only, Sebesvari et al. (Chap. 13, this volume) show the various ways in which climate change can affect pesticide pollution problems through the many interconnected processes of land use change, pest occurrences and farmers' behaviour. Concomitant changes can also take place if pollution problems shift from, for example, pesticide pollution to bacteriological pollution. At the same time, populations in maladapted peri-urban areas may face increased flooding problems linked either to the effects of the combination of sea level rise and changes in discharge patterns of the Mekong River or changes in rainfall patterns that may overwhelm drainage systems; flooding in general can intensify or multiply the problems of pollution. Here again, communities and ecosystems will have to adapt, if a relationship between them is to be preserved.

### **9.3.4 Climate Change Risk**

A number of recent studies identify Vietnam to be amongst the countries most at risk from climate change impacts (e.g. Dasgupta et al. 2007; McGranahan et al. 2007; Carew-Reid 2008). With its long coastline and large deltas featuring high concentrations of population, agriculture and industry, Vietnam has high degrees of exposure to intensifying natural hazard such as floods or typhoons. In addition,

underlying creeping changes in precipitation patterns and temperature but also sea level rise and resulting salinisation of water bodies and soils pose substantial risks, especially to agricultural production. The Mekong Delta in particular faces substantial risks given its low-lying topography and its key function in terms of agricultural production for Vietnam and the global food market.

According to the Climate Change and Sea Level Rise Scenarios developed by the Ministry of Natural Resources and Environment, a sea level rise of 75 cm – under a medium emission scenario expected until 2100 – would directly inundate 19% of the Delta, based on current protection measures and hydraulic infrastructure (MoNRE 2009). However, indirect impacts such as salinisation and changing hydrological regimes would affect a much larger share of the Delta. The same scenario would imply an increase in the annual mean temperature of 2.0°C by 2100 for the southern parts of Vietnam (ibid.). Overall annual rainfall would increase by 1.5% on average in Southern Vietnam with larger seasonal fluctuations, with larger precipitation decreases in the dry season and concomitant increases in the rainy season (ibid.: 27).

A combination of these and other changes on a regional-scale (changing monsoon and El Nino patterns and human activity such as hydraulic infrastructure for embankments or hydropower stations) and changes in flood patterns have already been observed. These changes are expected to be ongoing, which is likely to increase the frequency as well as magnitude of extreme flooding events (Tran et al. 2008; Wassmann et al. 2004; CFSC 2004). Moreover, typhoon activity – so far predominant in the northern and central parts of Vietnam (Kleinen 2007; Kelly et al. 2001) – is expected to intensify also in southern Vietnam (CFSC 2004).

### 9.3.5 Resilience Landscape

In all, the transformation processes described above result in a complex resilience landscape with overlaying, yet differentiated resilience effects for particular population groups. While Vietnam has experienced average economic growth rates of 7.5% over the last years and a general decrease in poverty rates (c.f. Carew-Reid 2008) the market liberalisation reforms under *doi moi* and accompanying land reforms have led to an increase in socio-economic disparities (Taylor 2004; Adger 2000a; Waibel 2005) and produced high numbers of landless farmers, particularly in the Mekong Delta (Marsh and MacAulay 2006). Statistical surveys have, for example, shown that the number of landless households has increased from 12,500 in 1994 to around 1,000,000 in 1998 (ibid.: 7). It has in addition been shown that strong correlations exist between poverty on the one hand and land title and size on the other (Tuan 2010). In this respect, Marsh and MacAulay further note that the general decrease of people living in poverty – which is observed across different measurement approaches – has to be taken with caution since ‘a high percentage of the population is bunched just above the poverty line and a relatively small deterioration in living standards would be sufficient to push them below the poverty line again’ (2006: 8).

Many studies emphasise that poverty is not to be mistaken as an equivalent measure to vulnerability or resilience, but that it certainly describes an important factor of vulnerability. Poverty regulates access to an increasing basket of services and assets within the socio-economic fabric as it changes in the direction of a market-based economy and the individualisation and privatisation of social security networks (Taylor 2004), including in particular reforms in health care coverage and social insurance schemes (c.f. Ekman et al. 2008; Wagstaff 2007).

A further factor contributing to the complex resilience landscape is to be found in intensifying export orientation and the integration into global commodity markets, which besides growing export revenues also imply soaring dependencies on global food markets, and, hence, increased vulnerability to price fluctuations. In this respect, agricultural producers in Vietnam are subject to what Adger et al. call nested and teleconnected vulnerabilities in the sense that vulnerabilities of people within one place can be linked and influenced through, for example, shifts in policies or market trends originating in other (distant) places (Adger et al. 2009). Lynn et al., therefore, call for a paradigm shift towards focusing on ‘hot systems’ instead of using the conventional and more static notion of ‘hot spots’ (Lynn et al. 2010). O’Brien and Leichenko have linked the pressures that climate change and globalisation can simultaneously have on agricultural communities and have introduced the concept of double exposure, the idea that each of those trends may create perturbations that no longer can be considered separately but which interact and overlay to create a new, complex nexus of increased exposure and vulnerability (O’Brien and Leichenko 2000). All these conceptual approaches give fruitful guidance for exploring and understanding the interactions of overlaying processes that create the dynamic and complex resilience landscape that is specific to Vietnam and especially the peri-urban areas in the Mekong Delta.

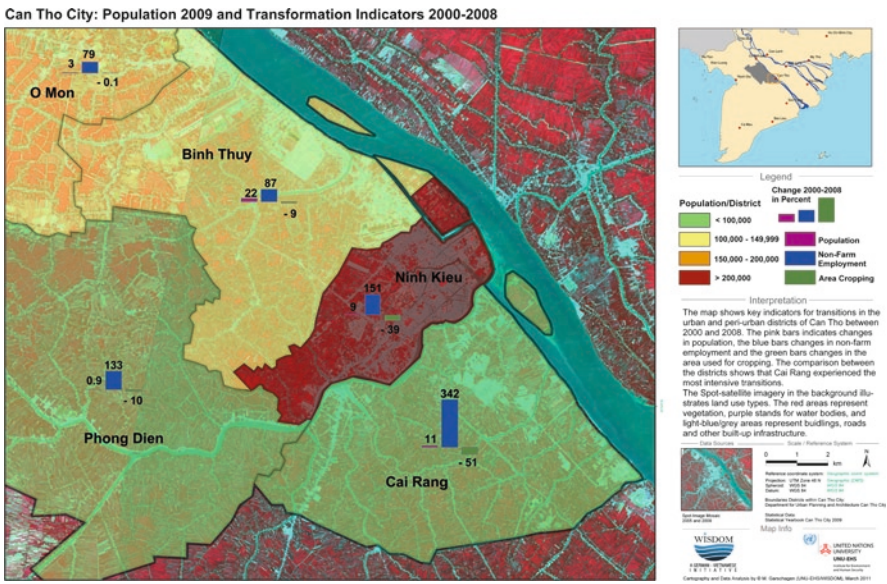
In addition, the intensification of agriculture can – as shown above – imply substantial risks of ecosystem degradation, putting at risk particular agricultural population groups which directly depend on the productivity of those services – a problem which has been observed to be of increasing relevance in the Mekong Delta (Ni et al. 2001). In combination with climate change impacts, those degradations may pose the risk of unexpected feedbacks in coupled social-ecological systems, including, for example, pest outbreaks or sudden drops in carrying capacity. Such events could in turn cause decreases in productivity and yield, putting the livelihood bases of agricultural populations at risk.

Investigators who have given attention to natural hazards and climate change have further argued that transformations in the political system and related shortcomings with respect to the layout and implementation of political decentralisation have caused a reduction in collective action for risk management, despite the emergence of civil institutions which have begun to shape a new landscape of institutional adaptation (Adger 1999; Tran et al. 2008). As a result, increased vulnerabilities can be observed amongst those groups who do not have sufficient resources to substitute the formerly socialised elements of risk management with action on an individual or household level (Adger 2000a). In addition, climate change requires increased efforts and resources for adaptation, which will likely exceed the capacities

of certain population groups, increase their baseline vulnerability, and increase their risk of tipping into serious crises in cases of extraordinary natural hazards (Garschagen et al. 2009).

### 9.4 Case Study: Cai Rang District

Cai Rang District is one of nine districts within Can Tho City, which is the biggest city and economic centre of the Mekong Delta, located about 180 km southwest of Ho Chi Minh City (compare Fig. 9.1). In 2009, Can Tho City had a total population of 1.19 million, of which 86,000 were living in Cai Rang. This district belongs to the less populated districts of Can Tho, peripheral to the neighbouring Ninh Kieu District at the urban core of the Province and accounting for 244,000 inhabitants (compare Fig. 9.1). However, Cai Rang has recently commenced the significant build-up of residential and industrial developments, which will make it one of the most rapidly urbanising districts in the Mekong Delta over the next several years. The development master plan until 2025 envisages developing Cai Rang into an urban-port-industrial zone by 2025 (SRV 2006). This plan includes the development of new residential quarters for 120,000–150,000 people, covering an area of 700–800 ha, in particular in Hung Phu, Hung Thanh and Phu An wards (ibid.: 5.b). Furthermore, two industrial parks (called Hung Phu I and II) are planned, covering



**Fig. 9.1** Map of selected districts in Can Tho City and selected transformation indicators from Statistics Office Can Tho City 2010

an area of 600–700 ha. Attached to these, a new port (Cai Cui Port) is being built at the Hau River in the south of Cai Rang; this is planned to become a seaport, capable of handling large-sized ocean freight vessels. The port will become the commercial gateway that makes the shipment of goods produced in the Mekong Delta much easier and will improve the competitiveness of the agricultural and industrial producers in the region. In addition to development for residential and economic uses, the master plan sets aside 120 ha for a new cultural centre, as well as land for several other facilities such as commercial centres, hospitals, and golf courses or roads (SRV 2006). One particular characteristic of the district's development is the new bridge for Highway 1 (connecting the Mekong Delta to Ho Chi Minh City) across the Hau River lands in Cai Rang. This is causing many important distributor roads as well as new parts of Highway 1 to run through the district, and these infrastructure changes will likely have a catalytic effect on Cai Rang's formal as well as informal economic development.

Until the recent past, the majority of Cai Rang's population based their livelihoods on a combination of (a) agricultural activities (for subsistence purposes and as the main contributor to income generation), (b) other activities in the industry, service, or trade sector (often being located in the urban core of Can Tho, i.e. in Ninh Kieu District or adjacent wards of Cai Rang and Binh Thuy) or (c) on remittances or social welfare (compare Fig. 9.1). By and large, the livelihoods of Cai Rang's population is characterised by the aforementioned mixture of income-earning activities in the peri-urban interface and this does not fit into prevailing conceptions of rural versus urban livelihood patterns.

Because many of the new developments have already been under construction for a couple of years, transitions in the land use statistics of Cai Rang can already be observed. In particular, the area for cropping has been shrinking substantially, amounting to a reduction of more than 50% between 2000 and 2008 (Statistics Office Can Tho City 2010) (compare Fig. 9.1). Our field observations and discussions with households in 2008 revealed that some agricultural land was left uncultivated or orchards were left unattended because land was earmarked for development, despite the fact that construction (of roads, bridges or residential areas) had not yet started. Related to this, the number of people employed in the non-farm sector increased almost 350% between 2000 and 2008, with the population growing 11% during the same period of time (Statistics Office Can Tho City 2010) (compare Fig. 9.1).

Current and future land use change dynamics will directly and indirectly impact the environment and the provisioning of ecosystem goods and services. Large portions of Cai Rang are currently a major construction site where environmental norms are likely not respected to the letter. In addition to construction-related pollution, land use changes will alter land and water pollution patterns in various ways. As already indicated above, our research related to pesticide pollution clearly showed that agrichemicals can be found in concentrations exceeding water quality guideline values for some of the monitored compounds. This is because pesticide management is absent in the intensive agricultural system in place in Cai Rang which includes rotations of vegetable crops with rice as well

as fruit orchards (research by Pham Van Toan, in UNU-EHS 2010). With some land left fallow and fruit orchards left un-managed, the quantity of agrichemicals used in the district (or at least in some localities of the district) is most likely lower than under normal circumstances. This can currently have beneficial impacts for land and water ecosystems as well as on human health. But given the current development trends, new types of contaminants or higher concentrations of contaminants are likely to emerge, including microbiological contaminants should untreated sewerage be poured directly into the canal and river systems. Emerging contaminants such as endocrine disruptors, which can be found in urban and industrial settings in the Mekong Delta – but less so in Cai Rang as of now (Hoa N.T., PhD researcher in the WISDOM project, data not yet published) – could also become prevalent. This could make it increasingly difficult for the remaining farmers (who have managed to sustain their agricultural land and production) to rely on the available water for drinking and irrigation purposes. Finally, with urbanisation has come the sealing of land surfaces. Should urban development patterns in Cai Rang follow the same approaches of those in Ninh Kieu District, the infiltration capacity of soils will drastically decline. With the potential aggravating effects of climate change on slow-onset tidal flooding as well as on the intensity and frequency of heavy rain events in the region, flooding will most likely affect the district in a more pronounced way in the future. Padgham (2009) identified flooding as one of the highest risk factors for peri-urban agriculture together with access to water for irrigation and the potential magnification of urban heat island effects. This could lead to secondary impacts including additional pollution of land and water systems in the region through the inundation of infrastructures such as petrol stations, construction sites, and the like. The remaining farming communities in the region are therefore likely to have to deal with different types of water pollution in the long run (both for irrigation and consumption purposes) and a likely increase of seasonal flooding caused by the double constraint of climate change and urbanisation. They will also have to adapt their farming practices to deal with potentially increased pest problems linked to climate-change-related increases in extreme climate events, changes in soil water contents, and other factors (see, e.g. Padgham 2009).

In addition to the stress added to local livelihoods through those environmental issues, agriculturalists in Cai Rang face substantial economic pressures caused by peri-urban developments. The statistics on land use change dynamics given above already point towards what appears to be the most pressing challenge in the moment: Many former residents in the agricultural sector lose their agricultural land and have to resettle away from their original plot of land. Underlying this situation is a complex political economy including elements of being priced out, expropriated, relocated and poorly compensated. Long before the current construction master plan had been officially approved by the Prime Minister in September 2006, private property developers and real estate companies started to acquire land plots from farmers and other residents. Many of the households interviewed in 2009 reported that respective transactions with those companies go back 6–9 years (i.e. between the years 2000 and 2003).



As all land in Vietnam eventually belongs to the people (i.e. it is property of the state), the legislative framework for land transactions in the context of new developments establishes that the government gives the right to the developer (either a private company or the state itself in cases of roads, harbours and other public developments) to build the development as specified in the construction master plan. The developer then has to arrange the clearance of the land as well as the compensation for it in dialogue with the former land holders. The latter are under the Land Law entitled to have long-term individual land use rights, including the right to lease, transfer and mortgage land. The clearance and compensation procedure is supported by a site clearance committee with strong involvement of the local government which is supposed to mediate between the interests of the developer and the former residents or users. In addition, the government publishes a yearly updated price list as a yardstick for compensation rates in specific locations and for different land use categories. In theory, these should be a close representation of the actual market value of the respective land plots (for a more detailed description of the legal framework regarding compensation refer to the Land Law of 2003 (SRV 2003b) and the Circular 114/2004/TT-BTC on determining land prices or Han and Vu (2008)).

In Cai Rang, two schemes of compensation have been applied which in many cases are combined to build one hybrid mode. The first approach envisages that households receive monetary compensation representing the value equivalence of the land as well as of special assets such as the house or fruit trees. This scheme is locally referred to as 'money for land'. The second scheme in general aims at compensating in kind with a new plot of land and a house within a new residential cluster constructed by the developer ('land for land'). In addition, a very common hybrid form in Cai Rang envisages that households receive monetary compensation and can use this for purchasing a plot of land and/or a house in the new residential cluster.

Using semi-structured household interviews in Cai Rang in 2009, a number of shortcomings in the implementation of the land clearance and compensation schemes can be identified which imply substantial challenges and livelihood problems for the respective households. First, the compensation offered is considered inadequate by the majority of households interviewed. A commonly reported point of criticism is that the compensation rate is much below the actual prices for land use certificates in the respective area at the given time. Hence, the amount of money received (in the case of monetary compensation) was stated to be insufficient for purchasing an adequate plot of land elsewhere in return. Interestingly, this criticism was also registered with respect to the plots of land and/or houses in the new residential cluster, due to a stark difference in the compensation per square metre on the one hand and the price for the plot in the residential cluster on the other. The compensation scheme of one of the private developers, for example, sets out that land plots of 60 m<sup>2</sup> are reserved in a new residential cluster for those households that have to be relocated. In the hypothetical case that such a household had a plot of 60 m<sup>2</sup> residential land prior to the resettlement, the household can get the exact amount with the new plot in the residential cluster and, additionally, compensation for rebuilding the house, with the latter rate depending on the type of house in the old location as well as on the rebuilding and construction rates



defined by the local authorities under the pricing scheme. However, if the original plot of residential land was smaller than 60 m<sup>2</sup>, the household has to pay the difference for buying the new 60 m<sup>2</sup> parcel. The price for this was defined to be 2.5 million VND under the given scheme, of which the local People's Committee contributes 50%. However, the compensation rate for the old land is – under the same scheme – only 500,000 VND, resulting in a difference of 750,000 VND/m<sup>2</sup>, a cost that has to be borne by the household itself. In addition, the compensation rates for the housing stock were reported to be insufficient for rebuilding an adequate house of the same size and quality. The compensation of additional agricultural land is handled separately under this scheme with a one-time compensation of 150,000 VND/m<sup>2</sup>. On the one hand, this money can be used in order to support the purchase and construction of the land parcel and house for residential purposes. On the other hand, this compensation was stated to be much too low, considering that it served as a basis for long-term income generation in most households and that the purchase of adequate plots of agricultural land would be much more expensive, if available in the close vicinity at all.

Second, the vast majority of affected households stated that they experienced substantial delays between the transfer of the land title and the actual payment of compensation as well as the resettlement or the finalisation of resettlement areas – all potentially leading to significant microeconomic problems. As indicated above, most of the households transferred the official land use title between the years 2000 and 2003. However, much of the new residential areas have only been developed (clearance of land plots, construction of roads, drainage and sewerage systems, hauling of electricity connections etc.) years later, in most cases not before 2007. While most of the households affected by this delay were permitted to remain living on their old land until the actual date of resettlement, the transfer of agricultural land implied that agricultural production was no longer, or only in very limited terms, permitted or possible during those years. This caused a loss of income generation for the affected households, given the lack of alternative income sources. Many of the affected households were, therefore, forced to use up their savings, e.g. the first instalments of the compensation money, which were in fact meant for constructing houses or for purchasing land titles in the new place. Alternatively, they had to take on debts, most often with relatives due to the lack of access to bank loans.

Thirdly, in addition to those hard economic facts, most households interviewed expressed concerns in an additional dimension revolving around emotional bonds to their original land as well as social networks. The loss of the land threatens the continuation of the old income-earning activities and the foundation of personal and community identity – in particular for the case of farmers, but also within the localised service or trade sector. Resettlement also in most cases contributes to a dissolution or reshuffling of social networks and, therefore social capital, be it with respect to, for example, the schools of the children, long-grown neighbourhood and family bonds, or the circle of customers in business relations. Many households stated their strong opposition to being relocated and would prefer to stay in the old place if they were given the choice.

## 9.5 Discussion: Dynamic Pathways in Resilience

The review of large-scale trends resulting from transformation and climate change in Vietnam in combination with the case study analysis of developments in the peri-urban areas of Cai Rang reveals the complex interaction of trends and developments at various scales and their particular influence on peri-urban populations, often comprising rather negative effects and challenges for the livelihood regimes of these groups.

However, the case study analysis also shows that shifts in the resilience<sup>1</sup> of peri-urban population groups against the background of transformation trends and climate change can be influenced by many small circumstances. Specific resilience pathways of single households are therefore the result of the particular combination of decisions, events and access-portfolios with which the respective household is faced. Every one of these factors, thereby, works as a type of switch setting the direction for another section of the individual resilience pathway. For the analysed case study district, the chain or conglomerate of relevant elements influencing resilience directions would, for example, include the following questions: How far do environmental degradation processes affect agricultural production? Have water resources, even if polluted before the transition process, become unusable for agricultural and other uses – or if they are used, what health threats do they pose? Is the agricultural production of the household affected by surrounding production or construction sites? Can diversification of rural livelihoods be envisaged? Is the household at all located within the area earmarked for new projects? Is the developer the state or a private company? If it is a private developer, which company is it, meaning which specific compensation scheme will be applied? Did the household live on a parcel for which it had a land use certificate or not? Is the compensation scheme linked to this title and how big are the compensation differences for those plots with certificates and those without? Is the household free to choose between ‘money for land’ or ‘land for land’ or is only one option possible due to resource constraints? When the household prefers to move into the new residential cluster, was the old land patch big enough to be able to afford this? Does the compensation and relocation happen fast enough to withstand the effects of income loss and inflation? When is a point reached where all savings or compensation instalments are depleted due to inflation and rise in land prices? How do global food prices change over the same time and how does this affect the revenue ratio of agricultural-based households? If the household receives a new plot of land, how exposed is this new plot to flooding and other natural hazards, particularly against the background of climate change-related trends?

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<sup>1</sup>Comprehensive overviews of different schools of resilience thinking and their specific epistemological as well as ontological perspectives have been provided, for example, by Folke (2006), Janssen et al. (2006) or Gallopin (2006) and shall not be repeated here. For the context of our argument, resilience can sufficiently be defined in rather broad terms as the ability of a system or actors in a system to cope with stress and disturbance resulting from social, economic, cultural, political or environmental change and to reorganise so as to retain essential functions of the system (adapted from Walker et al. (2004) and Adger (2000b)).

These elements or switches within resilience pathways can be conceptualised as tipping points. The differences which appear on first sight rather small or unimportant may have a comparatively large effect on the overall livelihood and resilience situation of the given household (e.g. for the illustrated compensation scheme, the question whether the plot of land is a little bit smaller or larger than the land size in the resettlement cluster may have a substantial financial effect and may be decisive to the question whether or not the household can afford to settle in the relocation cluster). The chain of critical elements exemplified above indicates that households are at risk of steering into significant crises situations if they experience an accumulation of circumstances in which switches are set towards negative developments – that is if they, for instance, do not have land certificates and, at the same time, happen to be located within the project area of a developer who strictly only compensates for those households who do have such land title.

Yet, at the same time, the notion of switches and dynamic pathways evolving from this analysis challenges much of the conventional thinking in resilience and tipping point discourses. Resilience is often thought of as a rather monolithic characteristic of one particular system or group in the sense that, for example, farmers in *the* given area share the same resilience characteristics and parts that are coalesced in one binding system. This pre-analytic vision often implies strong (implicit or explicit) functionalistic or monocausal notions in the sense that, for example, certain population groups that have similar socio-economic characteristics and share the same biophysical landscape (and hazards) will move along the same development pathway and eventually end in a similar (often deteriorated) situation. While this observation might be true for certain empirical cases, regions or systems, it is certainly not true for all of them, as the analysis of very differentiated and dynamic resilience pathways in Cai Rang has shown.

Further, the notion of overlaying and interacting processes that affect resilience has so far mainly focused on researching and conceptualising those cases where all the interacting processes work in the same direction. Particular attention has been directed towards deteriorations in resilience, mainly in the sense of cascading effects which eventually lead to the collapse of a given system (Abel et al. 2006; Kinzig et al. 2006). Intermediate options where only some elements are negative and others point in positive directions, are under-represented in the prevailing conceptual discourse. The above-mentioned case related to water pollution can serve as an example of how this might work; in some parts of Cai Rang the occurrence of agrochemicals will decrease due to land use change while endocrine disruptors and other new contaminants from urban waste, industrial waste and sewerage could increase. Similarly, relocation can – if sufficiently implemented – also imply substantial advancements for the affected people with respect to, for example, access to electricity, water supply or sanitation infrastructure.

An additional – and in the view of the authors highly important – point has to be seen in the relevance and applicability of resilience thinking for policy making. It has been noted that resilience thinking is widely considered to be conceptually and analytically appealing; however, by and large it so far gives little concrete and applicable guidance for decision making, for example, on how to

avoid tipping into a crisis or collapse in a given coupled social-ecological system in which overlapping power relations and actions are at work (Garschagen 2010; Renaud et al. 2010). It is also of relevance to note that tipping points are so far predominantly discussed with respect to rather big systems – with the discussion originating from the analysis of global systems in the fields of climatology and oceanography. The threats of tipping points in those large-scale systems, however, seem to have been overwhelming in relation to the implementation of policy responses on the ground – let alone regarding the identification and distribution of responsibilities.

The notion of small-scale tipping points, in the sense of turning points in the trajectories of household-level resilience pathways as presented here, in contrast, allows for the clear identification of cause–effect relations and, therefore, of responsibilities for specific elements in this resilience landscape. This conceptual and analytic notion has strong and direct relevance for developing concrete response options and countermeasures. It divides over-generalised and unwieldy challenges to and possibilities for resilience into small pieces which are much easier to manage and for which concrete solutions can be found comparatively easily. Working on this scale also helps to uncover responsibilities of different actor groups as well as options and capacities for solutions amongst these groups (e.g. the time frame for the implementation of compensation and the issuance of new land titles are within the responsibilities of the developer; however, the local government can through the clearance committee – in theory – influence the timing and implementation of those decisions).

Identifying and explicitly analysing turning points and potential tipping points in resilience trajectories surely cannot be seen as a panacea for solving all the problems related to issues of power struggles in the complex political economy or political ecology at work. It is argued here, however, that explicitly uncovering these turning points and their potentially negative effects is a first step towards strengthening important attributes conventionally understood to be amongst the defining elements of good governance, that is, transparency and accountability in decision making (c.f. UNDP 1997). This way, the notion of dynamic resilience pathways can have a guiding role in fostering integrative planning and management approaches in the process of comprehensive governance.

## 9.6 Conclusions and Outlook

This chapter brought together elements from different disciplines for exploring resilience trajectories of peri-urban farmers in the Mekong Delta. An emphasis was placed on dynamic continua as well as grey-shades between static or dichotomous viewpoints in policy making and research. This holds true, for example, for the focus on the hybrid peri-urban interface; for exploring resilience effects of certain developments in both positive as well as negative directions; for acknowledging fragmented and often contested responsibilities as well as the agency of different actors

in a transforming actor landscape; and, most importantly, for conceptualising tipping points and resilience pathways as the result of the interaction of many small factors with multiple possible pathways for different agents (rather than applying a deterministic understanding of a monolithic system moving as a whole into one pre-defined direction).

It is argued here that a strong emphasis on such continuum thinking is necessary for effectively approaching the complex and highly dynamic developments and challenges in Vietnam and in particular within the peri-urban agricultural sector, which is and will be heavily affected by the overlapping impacts of socio-economic transformations (including significant urbanisation) and climate change. Challenges to the peri-urban interface in Vietnam, which so far have not been sufficiently addressed in research and policy making and which continue to be falling through the cracks of horizontally and sectorally fragmented administration and planning, need to be addressed more thoroughly in the future. The comprehensive focus on socio-economic transformation (and related development questions) and climate change impacts, further, calls for increased efforts to link these two spheres. Finally, the explicit focus on what we have called turning points or switches in individual resilience pathways advances the conceptual resilience discourse. This is too often characterised by a rather deterministic system thinking, and pays little attention to differences in household-level resilience amongst groups that are conceived as sharing identical levels of resilience due to being part of the same larger system. Our viewpoint allows for concrete guidance with respect to resilience assessment and policy making as it splits up the domain of household-level resilience into smaller elements, which then become possible to address and manage. The explicit focus on these switches helps to identify responsibilities for respective action as well as shortcomings and challenges. Identifying these shortcomings is the first step for effectively addressing and improving the related problems (with often relatively small changes being necessary to induce large improvements, as the example of compensation schemes has shown). This process deserves great attention in countries like Vietnam, where the spectrum of actors is rapidly transforming due to socio-economic and political change which in turn is increasing the need for mediating the responsibilities and rights of different stakeholders. However, at the same time this last point is likely to be one of the biggest challenges in Vietnam, as the transparency of decision-making processes and mechanisms for public participation remain highly contested.

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