

The victims of climate change

The social impact of climate change at the Vietnamese side of the Mekong River Delta

by

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Abbreviations

CDM:	Clean Development Mechanism
CPV:	Communist Party of Vietnam
HRW:	Human Rights Watch
IPCC:	Intergovernmental Panel on Climate Change
MARD:	Ministry of Agriculture and Rural Development
MONRE:	The Ministry of Natural Resources and Environment
MRC:	Mekong River Commission
NTP-RCC:	National Target Program to Respond to Climate Change
SRES:	Special Report on Emission Scenarios
UNDP:	United Nations Development Programme
WWF:	World Wide Fund for Nature

1. Introduction

Over the past five decades, Vietnam experienced a significant change in climate¹. Manifested in increasing average temperature about 0.5 – 0.7 C (MONRE 2009:p.2), a changing rainfall pattern, decreasing number of cold fronts (MONRE 2009:p.5) and rising sea level by 20 cm (MONRE 2009:p.6). Research points out that “since 1950 the region has seen more hot days and warm nights and fewer cool days and nights.” (WWF 2009:p.5) It is also evident, that in “recent years, there were more typhoons with higher intensity [and abnormal movement] affecting Viet Nam.” (MONRE 2009:p.6)

In the past, all these observations, which are understood as indicators of climate change” (WWF 2009:p.5), had already negatively impacted Vietnam’s agriculture, industries and, most importantly, the population. “With its long coastline and location in the midst of the northwest Pacific Ocean’s typhoon belt, the United Nations Development Programme (UNDP) considers Vietnam to be one of the 10 countries worldwide most at risk to tropical cyclones.” (WWF 2009:p.10) Especially, the poorer parts of the population are at risk to lose their livelihoods, as they don’t have the resilience to absorb the risk and to adapt.

This paper will focus on the present and future social impacts of climate change in the Mekong River Delta which is home for 20 million people (Delta Alliance)² and one of the most productive and intensively cultivated areas in Asia.³ Unfortunately, the delta is one of the most affected regions in Vietnam. It is barely above mean sea level and has an extensive coastline. This means “even small increase in global sea levels can cause large-scale devastation, when monsoon winds combine with high tides creating storm surges”. (WWF 2009:p.8)

The IPCC⁴ 5th Assessment Report assumes that climate change and the associated changes in sea levels, precipitation, temperature, and river flows continue. (Latif 2013:p.5) Therefore, it expects drastic and detrimental impacts of climate change on Vietnamese people, especially for these, who are living in the Mekong River Delta. (Zink 2013:p.124) The Government of Vietnam shares these concerns and initiated the National Target Program to Respond to Climate Change (NTP-RCC) including one program with the aim to develop and update climate change scenarios to “assess climate change impacts, to develop and implement their respective responding action plans.” (MONRE 2009:p.2)

One of these scenarios, developed by the Ministry of Natural Resources and Environment (MONRE)⁵, forms the basis for this paper, which will discuss the possible social impacts for the coming 90 years. The objective is to provide an overview of the worst affected population groups in the delta and explain their particularly vulnerable position to climate change.

¹ “Climate Change is a consequence of global warming but not the only one. It is a change in weather patterns, rainfall, storms, etc. over time.” (Adve 2013:p.4)

² This calculation does not include Ho Chi Minh City.

³ The Mekong River Delta accounts for about half of Vietnam’s yearly rice production(WWF 2009:p.18), about 75 percent of the country’s cultured fish production and about 80 percent of the Vietnamese total shrimp production. (The World Bank 2010:p.52)

⁴ The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) in 1988 to assess the science, impacts and socioeconomics in terms of climate change and to provide proposals for adaptation and mitigation.

⁵ MONRE can be considered as “the lead government ministry [of Vietnam] in the war on climate change. [...] Its main competitor in this respect was the Ministry of Agriculture and Rural Development (MARD)” (Zink 2013:p.154). Therefore, this paper prioritises the data delivered by MONRE.

Considering the rapid transformation of Vietnam, after the Doi Moi-reforms were initiated in 1986, which converted the country “from one of the poorest countries to a ‘little tiger’ economy” (Zink 2013:p.188), it becomes clear that it is highly speculative to say something about Vietnam and the Mekong River Delta in 2090. This should be taken into account while viewing the following pages.

2. The World Markets scenario as basis for further analysis

In March 2000, the Working Group III of the IPCC accepted the Special Report on Emissions Scenarios. This report contains four Special Report on Emission Scenarios (SRES)⁶ which help to understand the driving forces that may influence future emission outcomes.(IPCC 2000:p.8) The use of one of these scenarios is essential for my research as the climate change-issue is considered as a part of a very complex dynamic system that makes it difficult to make forecasts. Therefore, to get a better idea of possible impacts of climate change, the different scenarios include a broad spectrum of driving forces, from demographic to technological and economic developments. Even the “Sea level rise scenarios for Vietnam”, published by MONRE, is based on the IPCC Special Report on Emissions Scenarios and delivers data for Vietnam in terms of the SRES scenario families A2, B1 and B2. Depending on the chosen scenario, the research takes different data for the change in annual average temperature, annual rainfall or the sea level rise in account.

In connection with the present paper I refer to the *World Markets scenario* (A1). This model expresses the “worst case” impact of climate change as a result of an ongoing globalization and an approach of entrepreneurs and policy makers with focusing on an economic growth. I chose this scenario, because at the moment, I do not see many signs for a global radical paradigm shift in terms of these capitalistic tendencies and behaviors. Furthermore, I believe in a progressive opening of the Socialist Republic of Vietnam as, among others, I notice the strong economic efforts of Vietnam within the international community⁷ and the increasing importance of a continuous improvement of living conditions as basis for legitimacy for the CPV. (Charaby/Poma Poma 2012:p.185) Unfortunately, the data for the *World Market scenario* are missing in the MONRE-document. Instead, the “Sea level rise scenarios for Vietnam” takes the intermediate scenario, the *National Enterprise scenario* (A2), of the high scenario group as “worst case”. (MONRE 2009:p.11)⁸ The *National Enterprise scenario* does not estimate this kind of wealthiness as the World Markets scenario does and is more inward looking. Similar to the World Markets scenario it focuses on economic development – which is more important than environmental quality – and it is oriented towards consumption. (Hall 2006:p.1043)

This working paper will use the delivered data by MONRE in terms of the *National Enterprise scenario* (A2), but discusses the social impacts of climate change according to the *World Markets scenario* (A1). The following pages keep in mind that the used MONRE-data tends to downplay the expected impact of climate change as they belong to the A2-scenario.

⁶ The four SRES scenario families are: A1 (rapid economic growth in a homogeneous world), A2 (regionally oriented economic development in a heterogeneous world), B1 (global environmental sustainability in a homogeneous world), and B2 (local environmental sustainability in a heterogeneous world).

⁷ In 2012, Vietnam’s GDP consisted of 80 percent of exports of goods and services. (The World Bank 2014)

⁸In addition to the fact that data for the “worst case”-scenario (A1) are missing, I have noticed that in general the data delivered by MONRE are looking optimistically at the future, compare, for example, to the Dry- and Wet-scenario presented by the World Bank (see The World Bank 2010). In terms of the sea level rise, MONRE use data belong to A1F1-scenario - a World Markets scenario based on fossil intensive energy technologies.

3. The rising sea level as an obvious threat to the people in the Mekong River Delta

In the first place the consequences of climate change for the Mekong River Delta are manifested in sea level rise, floods, salinity and storms. (The World Bank 2010:Table ES-1) Especially, the increasing sea level poses a long-term threat to the people. Yet in this century, it could lead to an unprecedented mass migration in Vietnam.

According to the fossil intensive World Markets scenario (A1F1) by MONRE, it is expected that in general the sea level rise – relative to the period of 1980 to 1999 – amounts to 33 cm in 2050, 57 cm in 2070, 71 cm in 2080, 86 cm in 2090 and one meter in 2100. (MONRE 2009:p.15) In case of the Mekong Delta, the measurements revealed that the relative sea level has increased 6mm per year over the last century. (WWF 2009:p.8) Simultaneously, the IPCC regards in terms of the A1 scenario a “Human-induced subsidence” as more likely. (IPCC 2007) Even now, a land subsidence from groundwater abstraction and sediment losses from upstream dams was observed in the region. (WWF 2009:p.8) In this connection, one can say that climate change is not the only factor in the problems faced by Vietnam.⁹

In the MONRE-document, I couldn't find any sign for an inclusion of an expected land subsidence into the delivered data for a relative sea level rise.

Even though over 40 percent of the Mekong River Delta-area is flooded annually in late June until late December (MRC 2010), the expected sea level rise by MONRE combined with rainy season storms and wind driven waves pose a major threat to the local population.

When the delta was colonized it was important to have a direct connection to the canals. The river port was a supreme factor in the settling and urbanisation of the delta. Therefore, the majority of houses face to the river (MRC 2010) and are thus directly endangered by a rising sea level.¹⁰ If the sea level increases as predicted, the damage to roads and bridges will be significant. The quality and quantity of water resources will be shifting. This in turn can result in an increased risk and quantity of water borne diseases such as malaria and dengue fever and in a reduction in productivity of rice fields, plantations, reef fisheries, aquaculture etc.¹¹ The health of many people could be affected by malnutrition, unsafe water, and health care disruption. In particular, young children, pregnant women, elderly people and people with disabilities disabled people will suffer under these conditions. All of these factors will require people to move away from the Mekong River Basin¹², which is home, across all riparian states, to over 65 million people. (MRC 2014) This creates a great political potential for social and political conflict, as the affected people will try to find new places to stay.

According to the inundation map of the Mekong River Delta delivered by MONRE, it is expected that 12.8 percent (5133km²) of the current Vietnamese delta area will be permanently flooded, if the sea level rises to 65 cm. (MONRE 2009:Appendix 15) In terms of the fossil intensive World Markets scenario (A1F1) this is likely to be the case in the years between 2070 and 2080. (MONRE 2009:p.15) In analogy to this, 19 percent (7580 km²) of the Vietnamese Mekong River Delta will be permanently flooded caused by a sea level rise of 75 cm (MONRE 2009:Appendix 16) in the years between 2080 and 2090, and 37.8 percent (15116 km²) of the area will be affected by a sea level rise of one meter (MONRE 2009:Appendix 17) in 2100. The flooded territory will spread at the west

⁹ “The science doesn't say climate change is the root of flooding and salination problems, but politicians may need to say that climate change is the problem in order to do what they need to do. Deforestation, mangrove eradication, and canals in the Mekong delta are much more scientifically convincing explanations for the problems.” (Zink 2013:p.142)

¹⁰ Contrary to the Red River Delta, the Vietnamese people in the Mekong Delta did not need to build a similar comprehensive system of dikes as the Mekong divide in nine branches and therefore the flow was slower. (MRC 2010)

¹¹ BY the end of the century, about half (- 1.4 million ha) of the delta's agricultural lands will be inundated. (WWF 2009:p.8).

¹² During the flood 2000, 80 percent of villagers and 20 percent of the animals had to be evacuated, while 70 percent of rice field and plantation areas were flooded. (MRC 2011)

coast of Vietnam, southern side of the Bassac River. According to the inundation map of the Mekong River Delta, the provinces, which are for the most part permanently flooded, might be Hau Giang (population: 769.700 people), Kiên Giang (population: 1.726.200 people), Cà Mau (population: 1.217.100 people) and subsequently, by a sea level rise of one meter, Sóc Trăng (population: 1.301.900).¹³ On an average the proportion of the rural population in terms of the total population of Hau Giang, Kiên Giang, Cà Mau and Sóc Trăng is about 73 percent.¹⁴

Over and above the rural population, people in the big cities such as Ho Chi Minh City¹⁵ or Can Tho are endangered too by climate change and the rising sea level. The rapid urbanisation and the spread of suburbs into rice fields and wetlands are increasing the vulnerability of townspeople as “the water retention capacity of the surrounding landscape is lost”. (WWF 2009:p.20) In the case of a sea level rise of one meter, 23 percent of Ho Chi Minh City would be inundated. (see MONRE Sealevel Appendix 14) In 2013, Ho Chi Minh City was Vietnam’s largest city with about 7.990,100 million inhabitants (General statistics of Vietnam 2013) and the city’s population is expected to grow to 13.9 million in 2025. (New Geography 2012)

To say this in clear terms: The predicted sea level rise of one meter endangers, I assume, the homes of roughly seven million people in the Vietnamese Mekong River Delta – if you take the current population numbers in account and integrate Ho Chi Minh City to the Mekong Delta area. This calculation excludes the people who will be forced to leave their homes as it is too difficult for them to manage their livelihood. Le Thanh Sang, Professor and vice director of the Southern Institute of Sustainable Development at the Vietnam Academy of Social Sciences, expects in terms of a sea level rise of about one meter in 2100, that 31 percent of the area and 26.7 percent of the population of the Mekong River Delta will be affected (Le 2008:p.11). Without the consideration of Ho Chi Minh City he was speaking about 4.786.600 affected people¹⁶, out of an assumed total population of the Mekong River Delta of 17.903.711 people. (Le 2008:p.15)

4. The poor as particularly vulnerable group affected by climate change

The World Markets scenario provides “a rapid introduction of new and more efficient technologies” (MONRE 2009:p.7) and a “large infrastructure growth” (IPCC 2007) which could culminate in effective adaptation and protective measures for the areas threatened by climate change and the rising sea level. Furthermore, there are forecasts which consider Vietnam as a fast growth economy in the next 40 years (Ward 2012:p.4) and it is more likely that a wealthy society is able to protect itself against the risks of climate change. However, the A1 scenario also represents a “more reactive adaptation response” and a “lower priority of the hazard risk management”. (IPCC 2007)“There will be a tendency to provide coastal management (and many other services) through markets rather than through government. This means that protection against the risks of flooding will to a great extent be determined by ability to pay.” (Hall 2006:p.1040)

Already now, poor people¹⁷ – who are living in dilapidated shelters, in precarious sanitary conditions and spend the major part of their income for food – suffer particularly from the consequences of climate disasters. The

¹³ The numbers of inhabitants are delivered by General statistics office of Vietnam. (2010)

¹⁴ The proportion of rural population is calculated by using the figures of General statistics office of Vietnam (2010 b): Hau Giang: 74%; Kiên Giang: 73%; Cà Mau: 78%; Sóc Trăng: 67%.

¹⁵ Contrary to other notions, I will consider Ho Chi Minh City as part of the Mekong Delta, among others, as I expect that waves of immigrants from the delta area will move to Ho Chi Minh City.

¹⁶ I have not noticed in the PowerPoint slides a further definition of “affected people”.

¹⁷ According to the Decision No. 09/2011/QĐ-TTg, poor households in rural areas have a monthly income per person of below 400,000 VND and below 500,000 VND for urban areas. The Ho Chi Minh City People's Committee raised the poverty line in terms of HCMC to 1,000,000 VND per month. (Dan Tri 2014)

change in average temperatures and rainfall patterns which affects the food production, their workplaces and homes. Also the World Bank-document "Economics of Adaptation to Climate Change" refers to this fact when it writes that "[t]he lowest 20 percent of households [in Vietnam] – either urban or rural – arranged by household expenditure per person will experience larger reductions in real standards of living due to climate change than the top 20 percent of households." (The World Bank 2010:p.20)

According to the World Markets scenario, it is conceivable that this difference of level of protection between rich and poor people becomes more evident in the future. The top earners could be more able to safe their property by expensive technologies or moving in well-protected residential complexes by paying increasing rents, while people with less income inhabit the less-protected houses in the most affected areas.

In summary, it can be said that poor people are a particularly vulnerable group of the population affected by climate change. In relation to the latter the above-mentioned World Bank-document speaks of "social vulnerability" which depends on the "access to resources". (The World Bank 2010:p.77) For me, this kind of resources could be land¹⁸, suitable possibilities to earn, clean water and sanitation, healthy foods, government services, education¹⁹, information and sources of support or also credits and financial services. In contrast to the World Bank, I consider this access to resources in connection with the phenomenon of social exclusion of poor people, as a limited access to resources makes it more difficult for people to participate in social and cultural life. Poor people are constantly working to feed their families. They cannot develop their full potential and therefore they have restricted opportunities for breaking the cycle of poverty. Poverty and social exclusion must be conceptualised in the context of one another.

The term "social vulnerability", used by the World Bank, seems to be more comprehensive compared to the use of the appellation "poor people", as on the first glance, it does not only focus on the criterion of property and income. But in the end, in the World Markets scenario the amount of the personal income is decisive for the standard of living, the health care or the protection of even people with disabilities or elderly people, women or children. Or to put it in another way, money gives you access to all other resources and the restricted access to resources plus the subsequent social exclusion describe poverty. Therefore, instead of using the term of "social vulnerability", the following pages will work with words such as "the poor", "poor people" etc.

"Compared to Vietnam's seven other geographical regions, the Mekong Delta region has the largest number of low-income people in Vietnam (4 million) and the second-highest level of landlessness in the country." (HRW 2009:p.21) According to the "poverty map of Vietnam at district level" (The World Bank 2010: figure 12) the incidence of poverty is about 30-50 percent. The poverty is heightened in rural area and affects primarily farmers. While Sóc Trăng and Trà Vinh have the highest rate of poor people in the total population, Can Tho and Long An are having the smallest number. (Vuong 2011:p.12) According to Duy Quoc Vuong, the main cause of poverty in the Mekong River Delta is a lack of land. (ibid.)

¹⁸ On the record the land belongs to the people of the Socialist Republic of Vietnam. The farmer can borrow it and therefore, the farmer has to pay ten percent of the harvest to the state. (New Atlantis Full Documentaries 2013)

¹⁹ "While the Mekong Delta has a higher percentage of primary and secondary schools than Vietnam's seven other regions, it has the second lowest adult literacy rate and the lowest level of public school enrollments in Vietnam." (HRW 2009:p.25)

5. Particular vulnerable groups within the group of the poor

Within the group of the poor it is possible to filter out special groups, which are more vulnerable to climate than other classifications of poor people. On the previous pages some of these special groups were already indicated. They can be characterised by a particularly limited access to relevant resources.

5.1. Employees in climate-dependent sectors

In a society of the World Market scenario, where the intensity of government services will be rather low, the access to suitable possibilities to earn and / or the access to land should be the most important factor for the social vulnerability in terms of climate change.²⁰ Beyond the unemployed, people working in climate-dependent sectors form the most endangered group by climate change. In the Mekong Delta area these kinds of sectors can be identified as agriculture, forestry, fisheries and aquaculture. They deliver primarily jobs to the rural population which is already most affected by poverty (see chapter 4). It can therefore be said that climate change endangers the poor to be even poorer.

5.1.1. Agriculture

Despite Vietnam's rapid rate of industrialization since the initiation of the Doi Moi-reforms, agriculture still remains a major economic sector in the country. Especially for the Mekong River delta, agriculture is one of the most important sectors for livelihood and food security. In 2009, 51 percent of the employed work forces, active in the Mekong River Delta, were involved in the agricultural sector. (Garschagen 2012:p.84) The Mekong River Delta provides the largest share of sugar cane, vegetable and rice production in Vietnam. (The World Bank 2010: Table 9) The latter is by far the region's most important crop. 90 percent of the rice exports²¹ are generated in this area. (Garschagen 2012:p.84) The production of cultivated rice and other agricultural products depends to a large extent on climate conditions. Therefore, climate change can have a major impact on food security and economic growth or rather on the livelihood of many people in the Mekong River Delta.

For example, rainfall, or better said, a seasonal reversing wind called the summer monsoon is necessary for the irrigation of rice-fields. (New Atlantis Full Documentaries 2013) "Annual flooding of the paddy fields is required for the rice crop to succeed, [but] unusually heavy flooding or severe droughts cause farmers to lose their entire crop [...]." (WWF 2009:p.18) Beyond the rainfall, the air temperature plays a major role for a profitable harvest. The World Bank estimated that "yields will decline by 0.6 tons per ha per 1 °C increase on average temperature." (The World Bank 2010:p.40) Until 2100, MONRE expects an increase of average temperatures in the South of Vietnam by about 2.6°C.²² (MONRE 2009: Table 3) Furthermore, MONRE's "Sea level rise scenarios for Vietnam" predict that natural disasters such as typhoons, floods, and droughts become more severe and frequent in the next decades, which in turn leads to a decrease of agricultural products. Until 2050, floods and the aforementioned rise in sea levels could damage approximately 590,000 ha of rice area in the Mekong River Delta by inundation and saline intrusion.²³ This corresponds to about 13 percent of today's rice production in the region. (The World Bank 2010:p.16) Based on current information, a sea level rise of 30 cm could result in the loss of 193,000 ha rice area and in a decreasing rice production of about 2.6 million tons per year. (The World Bank 2010:p.40) In the case of one meter sea level rise the loss will be about 7.6 million tons of rice per year. (MONRE 2013)

²⁰ As I have indicated above, the amount of the personal income is decisive for the access to clean water, sanitations, secure accommodations, healthy food etc. and it is crucial to the extent of adaptation measures in terms of the individual property.

²¹ Vietnam is the world's second largest rice exporters. (Vietnam Trade Promotion Agency 2013)

²² In terms of the High emission scenario A2, not A1.

²³ This is a general statement which does not refer to any special scenario.

5.1.2. Fishery

The Mekong River is known as one of the most productive inland fisheries²⁴ in the world (WWF 2009:p.15) and for a very high number of fishing-related business. (The World Bank 2010:p.80) Especially the aquaculture is an important source of employment and rural income. About 2.8 million people derive their salary from this sector, which is able to generate export revenue of about 2.8 billion USD per year. (The World Bank 2010:p.19) For example, the Mekong River Delta is responsible for about 80 percent of the Vietnam's total shrimp production. (The World Bank 2010:p.52) Even so, eleven percent of all households in the Mekong River Delta were involved in fishing, in 2006. (The World Bank 2010:Table 32)

Climate Change or, to be more precise, the saltwater intrusion caused by storms, floods and the rising sea level will damage shrimps, catfish and other aquatic species with limited saline tolerance. (WWF 2009:p.17) Furthermore, the change in temperature and water chemistry²⁵ has an impact on fish migration routes, spawning and feeding grounds and on the fishing seasons. (ibid.) This could become a significant problem, for the livelihood of coastal fishing communities, which depend highly on their knowledge about the lifecycle of the species²⁶. (MRC 2010) As I have indicated in the footnote 9, the social impacts of climate change will be strengthened by infrastructure projects, which were planned without sufficient regard to their destructive effects on the nature. Especially, the construction of dams in the Mekong River Delta, which are financed to a certain extent by Clean Development Mechanism (CDM)-projects²⁷, has direct impacts to the biological, chemical and physical properties of rivers, riparian and the surrounding landscape. (International Rivers 2014) Besides the useful functions of dams for irrigation, energy production or water supply, in the first place, they fragment rivers. This fragmentation affects the migration of fish, disrupts the transport of sediments, cuts off floodplains from life-giving floods, and threatens many endangered species. (WWF 2014) These serious interferences in nature, in turn, strengthen the impacts of climate change and jeopardise the income of locals. China already built seven dams upstream, which also affect Vietnamese communities along portions of the Lower Mekong. (Zaffos 2014)

"But the impacts may soon get much worse as a new era of hydroelectric dam-building begins in the Lower Mekong Basin. Eleven major hydroelectric dams — mostly within Laos — and dozens of dams on tributary streams that feed into the Mekong have been proposed or are under construction."(ibid.)

5.1.3. Forestry

The forestry sector plays a minor role for the livelihood of people in the Mekong River Delta. In 2006, just 0.2 percent of households in the Mekong River Delta were dependent on a job in the forestry sector. (The World Bank 2010:Table 32) "It can, however, be an important informal safety net sector and provide income when other sectors like agriculture fail." (The World Bank 2010:p.79) Furthermore, the mangrove belts provide crucial natural protection against typhoons and erosion. (The World Bank 2010:p.72)

Especially, the above-mentioned expected sea level rise caused by climate change will affect the melaleuca forests and the mangrove forests. Both ecosystems are planted on salty land and depend on the deposition of sediment to support their growth and vitality. A sea level rise could result in a lowering of sediment and therefore be responsible for a huge damage of forest. For example, the one meter rise in sea level will affect 1,731 km² of man-

²⁴ A fishery may involve the capture of wild fish or raising fish through fish farming or aquaculture.

²⁵ Climate change, or better, carbon dioxide alters ocean chemistry leading to ocean acidification. Among others, climate change is a result of man made CO₂ emissions. Much of the carbon dioxide that enters the atmosphere dissolves into the ocean. As carbon dioxide in the ocean increases, ocean pH decreases or becomes more acidic. (Teach ocean science 2014)

²⁶ The fishing communities know exactly how to fish sustainably on which place in what season. But they do not have any skills to adjust swiftly to changes in climate conditions. Their knowledge is based on experience of the older generation. (MRC 2010)

²⁷ At the end of April 2009, about 70% of the CDM projects in Vietnam involve small-scale hydropower. (Nguyen 2010:p.18) The CDM allows industrialized countries to buy Certified Emission Reduction units and to invest in emission reductions where it is cheapest globally.

grove forests. This corresponds to a loss of about 70 percent of Vietnam's mangrove area. (ibid.) The southern provinces of Vietnam – Cà Mau, Kiên Giang, and Sóc Trăng – make up a large part of the Vietnamese mangrove forest stand.

Beyond the sea level rise, the increase of the average temperature will affect forest resources, as the likelihood of forest fires will be rising emphasized by droughts resulting in leaf shedding. At the same time the global warming and a higher concentration of carbon dioxide in the atmosphere will create beneficial preconditions for the process of photosynthesis of the mangrove forest trees and certainly also for new types of forest. (ibid.)

In addition to the already mentioned impacts of climate change to the production in the sector of agriculture, fishery and forestry it should be noted that year by year climate disasters damage transport infrastructure, which is required for the access to markets. For small farmers in particular, it can be difficult to compensate this.

5.1.4. Tourist industry

The previous pages don't consider the impact of climate change on the tourist industry, which is also an important source of income for poor people. In 2010, the Ministry of Culture, Sports and Tourism "approved a plan to develop tourism as a key economic sector in the Mekong Delta". (Thang long 2010) This plan should help to reduce hunger and poverty. "By 2020, the region expects to receive 3.9 million foreign tourists and 6.5 million local visitors. By 2015, there would be 37,150 hotel rooms and a total of 50,000 by 2020. The aim is to employ 154,700 people in the Mekong Delta tourism sector by 2015 and 236,600 by 2020." (ibid.)

It is obvious that a sea level rise of one meter, which converts 37.8 percent of the region into an inaccessible places, results in the loss of many jobs also in the tourist industry.

Beside the danger of unemployment of workers in the climate-dependent sectors, the situation of poor people, who spend a large share of their total income for food, is likely to deteriorating when food prices will rise caused by the decrease in production.

5.2. Ethnic Minorities

Ethnic Minorities in Vietnam combine the above-described characteristics of the most vulnerable groups affected by climate change. Many people of minorities are living in the rural area, working in climate-dependent sectors and are at risk of poverty.

The Mekong Delta has a relatively low percentage of minorities. Just 7.5 percent of the population belongs to an ethnic minority. (The World Bank 2010: Table 33) The Khmer Krom accounts for an overwhelming share of ethnic minorities in the region. (HRW 2009:p.21) This group is the most "economically and socially disadvantaged" (AusAID 2004:p.27)²⁸ of the three main ethnic minority groups, which are living in the Delta and makes up a largest of the poor in Sóc Trăng, Trà Vinh, Bạc Liêu and Kiên Giang. (Vuong, Duy Quoc 2011:p.13) Sóc Trăng and Trà Vinh are again the provinces with the highest poverty rates in the Mekong River Delta. (HRW 2009:p.21) One fundamental reason for the fact that the Khmer suffer the highest rates of poverty is their very restricted access to land. "The land reform policies of the 1980s and 1990s [...] often left out Khmer Krom who had already been displaced from their land. Other Khmer Krom have sold or mortgaged their land because of their poverty or indebtedness." (ibid.) Therefore they are highly dependent on wage labor as their main sources of income²⁹. (The World Bank 2010:p.81) Many Khmer Krom work as hired farm laborers on or do manual labor at low-income jobs. (AusAID 2004:p.27) It is common that Khmer Krom people, who are living in the Mekong River Delta, become migrant workers on fields in adjacent provinces or in factories in Ho Chi Minh City (HRW 2009:p.21), which is also a particularly vulnerable group affected by climate change (ibid.). This described limited access to jobs, which are not

²⁸ I could not find a more up-to-date source, which documents the same fact.

²⁹ "Over 80 percent of the incomes of poor Khmer households surveyed in a 2006 report came from wage labor." (The World Bank 2010:p.81)

climate-dependent and better paid, is, among others, a result of a restricted access to education. Often Khmer Krom students lack the money to pay school fees, struggle with the language and the long distances between the school and their homes. (ibid.) Furthermore, the lack of a higher education level can lead to problems in the context of the recovery after climate events, as a low education level creates other obstacles in terms of the access to information and sources of support. (The World Bank 2010:p.85) Beside the restricted access to land, climate-independent work and education, the group of Khmer Krom is suffering, such as other ethnic minorities, from a limited access to credit and financial services. (The World Bank 2010:p.80) Especially after climate disasters, bank loans are necessary to go ahead.

5.3. Women and Children

Whether one considers farmers, ethnic minorities, migrant workers or other social groups, which are at risk of poverty, within these groups, women and children are the most vulnerable people affected by climate change. Due to their gender-defined roles in the Vietnamese society, women are likely to carry the heaviest burdens.

In Vietnam, where violence towards girls and women is pervasive (UNWOMEN 2013), it is likely that cases of domestic violence are rising after climate disasters. There are studies, which noticed a corresponding increase, however, I could not find any research about the situation of girls and women in Vietnam after climate disasters. One of the more recent studies, published in 2012, found that violence against women increased following Australia's most lethal bushfire in 2009, which killed more than 170 people and injured 414. (Homeland Security News Wire 2012)

Beside their remunerated work, women contribute by far the greater part of housework. "Women carry a wide range of caring responsibilities in the household, for children, spouses and other relatives, but also for neighbours, elderly and sick people in their communities." (United Nations Vietnam 2011:p.7) Often they are in charge for collecting wood and water. In this context, a change of climate could mean that women have longer distance to find drinking water or suitable wood. (ibid.) According to the statistics of the Ministry of Planning and Investment (MPI), 64.2 percent of unpaid family worker were females, in 2012. (Ministry of Planning and Investment 2013:Table 2.10) Furthermore, the number of women, who are working in household-scale small enterprises is greater than the number of men. In general, these kinds of jobs are informal, they are often worst hit and least able to recover after climate disasters. (The World Bank 2010:p.82)

Among the rural poor, a major part of females is represented by older women who are especially widows since the American War. (United Nations Vietnam 2011:p.3) The income of many women, especially in the Mekong River Delta, is dependent on climate-dependent work. The "Report on labour force survey 2012" assumes that 44 percent of women in Vietnam work as skilled agricultural, forestry and fishery workers. (Ministry of Planning and Investment 2013:Table 2.5) However, the World Bank-document "Economics of Adaptation to Climate Change" and a policy brief about gender equality in climate change adaptation, published by Oxfam and the United Nation, refer to data from 2008, which show a feminization of agriculture. "Data from the 2008 Viet Nam Household Living Standards Survey (VHLSS) suggests that agriculture accounts for 64 percent of working women in rural areas compared to 53 percent of working men. Overall, a trend of feminization of agriculture is visible." (United Nations Vietnam 2011:p.4)

Furthermore, the policy brief is speaking about a high wage gap between men and women. It cites the 2009 Labour Force Survey and points out that in general, women's salaries are about 75 percent of men's. (ibid.) A further economic inconvenience is the restricted access to land. Just 20 percent of land in Vietnam belongs to females. (United Nations Vietnam 2011:p.7) The fact that women are less likely to have their name on land tenure titles increase their uncertainty in the case of divorce or widowhood and dispute over land rights. (The World Bank 2010:p.82) This means, in turn, that the women's access to credit is very limited. Summarising the above, it can be

said that, the restricted access to credit, land, climate-independent work and the low wage, compare to Vietnamese men, create difficulties for women to recover after climate disasters or declining harvests.³⁰

Often, the only way out is migration. Male migration often worsens the situation for women and children left behind. Female migrants often earn less and stay alone without social connections and with little protection. (The World Bank 2010:p.82) There is a great danger that families and thus a crucial social element of Vietnamese society break up. The most affected victims are the children, who often start to work at a young age to improve the income of their parents after climate disasters. (Le 2008:p.32) In addition, in many cases children drop out of school as they have to work, the schools or the ways to school are damaged by storms, floods etc. or because they can't pay school fees. (ibid.) This results in a vicious circle of poverty increased by migration and a lack of education perpetuating each other.

The low levels of political participation of women make it very difficult for females to change their situation. They are less likely to engage in community activities to increase adaptive capacity. There are studies which estimate that the female participation in local politics is less than 20 percent of official positions at local People's Councils. (The World Bank 2010:p.82) In the National Assembly the representation of women decreased from 27.3 percent in 2002-2007 to 24.4 percent for the 2011- 2016 session. (United Nations Vietnam 2011:p.4)

6. Conclusion and outlook

The present paper has pointed out that in terms of the World Markets scenario the most vulnerable group in Vietnam, affected by climate change, is the poor. It is expected that more and more the amount of aid, delivered by the state, will decrease while adaptation will increasingly depend on a market for climate change adaptation or rather on the ability to buy adaptation measures. Therefore, the poor won't have enough money to protect themselves and their property in a sustainable manner. This means, in turn, that climate change is threatening the poor – especially farmers, fishers, ethnic minorities and migrant workers in the Mekong River Delta – to become even poorer. Within these social groups, women, children and people with disabilities are particularly vulnerable. Furthermore, workers in climate-dependent sectors, who are not considered as poor, are at risk of poverty. Today already, the continuous economic growth of Vietnam does not benefit everyone to the same degree. (Charaby/Poma Poma 2012:p.190) "There still exists a quite big difference in the income of rural and urban households, as well as between the richest and poorest households due to the structure of household income." (Nguyen, Thanh Binh 2011:p.14) The impact of climate change could accentuate this trend and provoke an increasing share of conflicts.

If people and especially their livelihood are affected by climate change and their opportunities to adapt are not sufficient, they tend to leave their homes to find work in other regions. Later this century, Ho Chi Minh City, which has big industrial zones, may face a wave of immigration of about 5 million people coming from the Mekong River Delta, in the next decades. (The World Bank 2010:p.83) But in general, this way out does not improve the situation of people. In the past, many migrants have not been registered in the national household registration system. Therefore, they will not be entitled to receive any social services. (ibid.) Today, one can find particular districts in Ho Chi Minh City, with greater proportion of migrant workers such as Tân Bình or Bình Thạnh, facing increasing social problems. (The World Bank 2010:p.84) The growing gap between rich and poor and an expected huge wave of migration point to a possible large conflict potential in terms of the social impact of climate change. Hungry people without any opportunities to live could try to find new places to stay with no regards to property rights or

³⁰ The Government of Vietnam recognizes this problem and implemented appropriate measures. For example, the Vietnam Bank for Agriculture and Development and the Vietnam Women's Union built together the US\$298 million Second Vietnam Rural Finance Program, which supports women, among others, in the shape of micro-credits. (The World Bank 2010 b).

public order, because they have nothing to lose. Therefore, the social impact of climate change could be a threat to the political stability, at least in the southern part of Vietnam.

According to the World markets scenario, there will be “a convergence among regions and increased cultural and social interactions, as well as strong regional interactions between governments.” (MONRE 2009:p.7) Even if the present situation in foreign politics makes it difficult to imagine a close co-operation between the governments of Vietnam, Laos, Cambodia and Thailand in terms of adaptation to climate change in the Mekong River Delta, such collaboration could be a very important step to reduce the social impact of climate change. Furthermore, the World markets scenario includes a high growth rate of tourism and an increasing population of about 1.8 to 2.4 billion in 2080. (IPCC 2007) It seems at least possible that the share of the tourism sector and the rice production³¹ in terms of the total value of the gross domestic product of Vietnam would increase. In despite of a market driven society, this again could have the effect that the Vietnamese government put an enormous amount of effort into the adaptation to climate change in the Mekong River Delta. One publicly discussed solution to the problem of rising seas in the delta is the construction of a system of dykes to hold back the sea. Among others, Eren Zink rejects this idea as a more or less continuous wall, that separates the Mekong Delta from the sea, would fundamentally undermine the hydrological cycles that sustain rice production as well as the mangrove forests and the aquaculture production. (Zink 2013:p.180) Adaptation measures alone cannot answer the growing problem of rising sea level and climate-related harvest shortfalls. Rather, it should be a mix of mitigation- and adaptation-measures, plus a dialogue about alternative growth concepts and the disadvantages of a market-driven society. In an environmentally friendly scenario, which contributes more efforts to the well-being of Vietnamese citizens, the extent of social impacts of climate change should be lower than in the World Markets scenario. Unfortunately, regardless of the kind of world we are making in the coming decades, the impacts of climate change on people in the delta will be devastating.

³¹ From a national economic point of view the tracking of a persistent comparative advantage in terms of an Vietnamese export-oriented rice production would make sense.

Bibliography

Adve, Nagraj (2013): Global Warming in the Indian Context – An Introductory Overview, New Delhi.

AusAID (2004): Mekong Delta Poverty Analysis. Final Report, http://aid.dfat.gov.au/Publications/Documents/mekong_poverty_report_04.pdf (accessed 20 February 2014).

Charaby, Nadja/Poma Poma, Sara (2012): 25 Jahre Erneuerungspolitik (Doi Moi) in Vietnam. Kontinuität und Herausforderungen. In: Neumann, Marlène / Schied, Michael (eds): Asien. Geschichte, Konflikte, Transformationen. Studien zur Geschichte und Gegenwart Asiens. Band 2. Berlin: trafo.

Delta Alliance: Mekong Delta, <http://www.delta-alliance.org/deltas/mekong-delta> (accessed 20 February 2014).

Dan Tri (2014): TPHCM liên tục nâng mức chuan nghèo, <http://dantri.com.vn/xa-hoi/tphcm-lien-tuc-nang-muc-chuan-ngheo-829897.htm> (accessed 20 February 2014).

Intergovernmental Panel on Climate Change [IPCC] (2000): IPCC Special report – Emissions scenario. Summary for Policymakers, <https://www.ipcc.ch/pdf/special-reports/spm/sres-en.pdf> (accessed 20 February 2014).

Intergovernmental Panel on Climate Change [IPCC] (2007): IPCC Fourth Assessment Report: Climate Change 2007. 6.3.1 Environmental and socio-economic trends, http://www.ipcc.ch/publications_and_data/ar4/wg2/en/ch6s6-3-1.html (accessed 20 February 2014).

International Rivers (2014): Environmental Impacts of Dams, <http://www.internationalrivers.org/environmental-impacts-of-dams> (accessed 27. February 2014).

Garschagen, Matthias / Diez, Javier Revilla / Dang, Nhan Kieu / Kraas, Frauke (2012): Chapter 4: Socio-Economic Development in the Mekong Delta: Between the Prospects for Progress and the Realms of Reality. In: Renaud, Fabrice G./ Kuenzer, Claudia (eds) (2012): The Mekong Delta System. Interdisciplinary Analyses of a River Delta. Springer Environmental Science and Engineering.

General statistics of Vietnam (2010): Area, population and population density in 2012 by province, http://www.gso.gov.vn/default_en.aspx?tabid=467&idmid=3&ItemID=14459 (accessed 20 February 2014).

General statistics of Vietnam (2010 b): Average urban population by province Area, http://www.gso.gov.vn/default_en.aspx?tabid=467&idmid=3&ItemID=14454 (accessed 20 February 2014).

General statistics of Vietnam (2013): Tình hình kinh tế - xã hội Thành phố Hồ Chí Minh năm 2013, <http://www.gso.gov.vn/default.aspx?tabid=383&idmid=2&ItemID=14772> (accessed 20 February 2014).

Hall, Jim W. / Sayers, Paul B. / Walkden, Mike J. A. / Panzer, Mike (2006): Impacts of climate change on coastal flood risk in England and Wales: 2030–2100. downloaded from rsta.royalsocietypublishing.org on 12 December 2013.

Homeland Security News Wire (2012): Study shows violence against women increases following disasters, <http://www.homelandsecuritynewswire.com/srdisasters20120314-study-shows-violence-against-women-increases-following-disasters> (accessed 27 February 2014).

Human Rights Watch [HRW] (2009): On the Margins Rights Abuses of Ethnic Khmer in Vietnam's Mekong Delta.

Latif, Mojib (2013): Klimaforscher Mojib Latif: "Der Klimawandel geht weiter", <http://www.spiegel.de/wissenschaft/natur/klimaforscher-mojib-latif-zur-erderwaermung-klimawandel-geht-weiter-a-920582.html> (accessed 20 February 2014).

Le, Sang Thanh (2008): Climate Change Adaptation in the Mekong River Delta: Issues, Measures, and Challenges. powerpoint within the framework of the Second WISDOM Ph.D Scientific Seminar 17-19 September 2008. Can Tho University.

Mekong River Commission [MRC] (2014): The Mekong Basin, <http://www.mrcmekong.org/the-mekong-basin> (accessed 20 February 2014).

Ministry of Natural Resources and Environment [MONRE] (2009): Climate change, sea level rise scenarios for Vietnam, Hanoi.

Ministry of Natural Resources and Environment [MONRE] (2013): Impacts of climate change on agriculture, <http://www.monre.gov.vn/v35/default.aspx?tabid=675&CatelD=59&ID=128275&Code=M7L128275> (accessed 20 February 2014).

Ministry of Planning and Investment – General statistics Office (2013): Report on Labour Force Survey.

Nguyen, Nhan T. / Duong, Minh Ha / Greiner, Sandra / Mehling, Michael (2010): The Clean Development Mechanism in Vietnam: potential and limitations, <http://minh.haduong.com/files/Nguyen.ea-20100118-CDMPotentialVN.pdf> (accessed 28 February 2014).

New Geography (2012): The Evolving Urban Form: Ho Chi Minh City (Saigon), <http://www.newgeography.com/content/002738-the-evolving-urban-form-ho-chi-minh-city-saigon> (accessed 20 February 2014).

Nguyen, Thanh Binh (2011): Household income in present day Vietnam, <http://www.ipedr.com/vol17/4-CHHSS%202011-H00020.pdf> (accessed 27 February).

Teach ocean science (2014): What is climate change?, http://www.teachoceanscience.net/teaching_resources/education_modules/coral_reefs_and_climate_change/how_does_climate_change_affect_coral_reefs/ (accessed 26 February 2014).

Thang long (2010): Delta to heat up tourism industry, <http://en.hanoi.vietnamplus.vn/Home/Delta-to-heat-up-tourism-industry/20108/1225.vnplus> (accessed 20 February 2014).

The World Bank (2010): Economic of Adaptation to Climate Change. Vietnam, <http://www.slideshare.net/wiriana/eacc-vietnam> (accessed 20 February 2014).

The World Bank (2010 b): Vietnam: A Rural Finance Program Targets Women's Poverty & Social Issues. <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIAPACIFICEXT/VIETNAMEXTN/0,,contentMDK:22513679~menuPK:387587~pagePK:141137~piPK:141127~theSitePK:387565,00.html> (accessed 20 February 2014).

The World Bank (2014): Exports of goods and services (% of GDP), <http://data.worldbank.org/indicator/NE.EXP.GNFS.ZS> (accessed 20 February 2014).

United Nations Vietnam (2011): Policy Brief. Gender equality in climate change adaptation and risk reduction in Viet Nam.

United Nations Entity for Gender Equality and the Empowerment of Women [UNWOMEN] (2013): Estimating the cost of domestic violence against women in Viet Nam, <http://www.unwomen.org/en/digital-library/publications/2013/2/estimating-the-cost-of-domestic-violence-against-women-in-viet-nam> (accessed 27 February 2014).

Vietnam Trade Promotion Agency (2013): Vietnam's rice export for the first 6 months of 2013, http://www.vietrade.gov.vn/en/index.php?option=com_content&id=2027:vietnams-rice-export-for-the-first-6-months-of-2013&Itemid=232 (accessed 26 February 2014).

Vuong, Duy Quoc (2011): Are households' poverty levels in Mekong Delta of Vietnam affected by access to credit?. Munich Personal RePEc Archive Paper No. 35412, downloaded from <http://mpra.ub.uni-muenchen.de/35412/> on 11 January 2014.

Ward, Karen (2012): The World in 2050. From the Top 30 to the Top 100. HSBC Global Research.

World Wide Fund for Nature [WWF] (2009): The Greater Mekong And Climate Change: Biodiversity, Ecosystem Services and Development at Risk, <http://www.slideshare.net/wwf/climate-change-impacts-in-the-greater-mekong-region> (accessed 20 February 2014).

World Wide Fund for Nature [WWF] (2014): The problems with dams, http://wwf.panda.org/what_we_do/footprint/water/dams_initiative/problems/ (accessed 27 February 2014).

Zaffos, Joshua (2014): Life on Mekong Faces Threats As Major Dams Begin to Rise. In: Environment 360. Opinion, Analysis, Reporting & Debate, http://e360.yale.edu/feature/life_on_mekong_faces_threats_as_major_dams_begin_to_rise/2741/ (accessed 27 February 2014).

Zink, Eren (2013): Hot science, high water. Assembling Nature, Society and Environmental Policy in Contemporary Vietnam. Copenhagen: NIAS Press.

Videos

Mekong River Commission [MRC] (2010): Mekong Delta fish, farms and families; <http://www.youtube.com/watch?v=l-vh-keADl0> (accessed 20 February 2014).

Mekong River Commission [MRC] (2011): When the Mekong Rises, <http://www.youtube.com/watch?v=9czcem9sFww> (accessed 20 February 2014).

New Atlantis Full Documentaries (2013): Mekong, the river of nine dragons (full documentary), <http://www.youtube.com/watch?v=3Yu8nst95ug> (accessed 20 February 2014).

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