

## **Assessment of the effectiveness of participatory developed adaptation strategies for HCMC**

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### RESPONSE TO REVIEWERS

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#### **General**

We would like to thank the reviewers for their constructive suggestions and comments. In general the three reviewers appreciate the methods and results of the paper. However, reviewers two and three indicate that the participatory approach needs further explanation. In addition, several other issues were raised, which need further clarification, such as who pays for adaptation and to describe what other sectors are potentially affected by the floods and measures.

Following suggestions by the reviewers, we have thoroughly revised the paper, and we believe the paper has significantly improved. Below follows a detailed response to the reviewers, in which the individual suggestions by the reviewers is in '*italics*', followed by our response. In the manuscript we have included the changes in 'sticky notes'.

#### **Response to reviewer P. Schmidt-Thomé**

*The manuscript presents a very interesting approach for the communication of natural hazard/climate change adaptation measures in urban areas.*

We appreciate the positive remark of the reviewer on our work.

#### **Response to reviewer #2**

The detailed reviewer comments include some very useful suggestions to revise the paper. The reviewer appreciates the "detailed description of cost-benefit analysis for possible flood management measures in a residential area". However, the reviewer also has some comments and suggestions, to which we will respond in detail below. The manuscript has been revised accordingly.

*1) The paper gives a very detailed description of cost-benefit analysis for possible flood management measures in a residential area, but suffers from a lack of description of the participatory approach.*

The reviewer has a clear point, and after rereading the paper, we now see that the title could imply that we do more on the participatory approach than actually is presented in the paper. To overcome this issue, we have revised the paper in the following way:

Since the paper focusses most on developing and applying a CBA method for assessing different adaptation options while assuming different future scenario's, we removed the term participatory from the title. We also added "flood" in the title, to make explicit what type of risk and adaptation types we are dealing with. The novelty of the paper lies in the CBA and scenario analysis. We have changed the title into:

**'Assessment of the effectiveness of flood adaptation strategies for HCMC'.**

In addition, even though the focus is not on the participatory approaches, we agree with the reviewer these methods need more explanation. We, therefore, have elaborated the description of the participatory approach, which it now includes more details on approach, techniques, and number and types of respondents. Sections 2.3.1. and 2.4 are revised accordingly.

*2) Clarify: Why is climate change and sea level rise mentioned but not the connection between climate change and potential increasing flood risk coming from rivers? Flooding from rivers can add to future problems of sea level rising due to cumulative effects- why was river discharge not included in your assumptions?*

The reviewer is correct climate change will probably affect both river discharge of the Saigon river and the sea level. However, data on how river discharge will change under climate change are not available to us. We have used the current situation for both river discharge and sea level to model depth and extent of floods using a Mike 11 model schematisation. For the future situation, we have used a different sea level scenario, including 30 cm of sea level rise in combination with current river discharge, and recalculated the depth and extent of floods. Not having discharge data for a changed climate is not a problem, as HCMC is located close to the sea, and the highest floods occur during storm events from the sea, which lead to wind driven storm surges (ADB, 2010; Tu and Nitivattananon, 2011). Hence, the change in sea level is expected to have a larger effect on flood extent and depth than the changes in discharge. To make it more clear, page 7, line 3 now reads:

"The inundation maps have a spatial resolution of 20×20m<sup>2</sup>, and are composed for five different return periods (1/10, 1/25, 1/50, 1/100, 1/1000) under the current sea level, and river discharge, and for five return periods including a sea level rise scenario of +30 cm (SLR+30) in the year 2050 and current river discharge (FIM, 2013)."

*3.1) Household survey: how was the survey executes? Face-to-face interviews or by telephone?*

The survey were face to face interviews at the homes of people.

Page 8, line 10 now includes:

“In total 659 households were interviewed face to face in their house using a structured questionnaire. The questionnaire covered the following topics: general information of households; past flood inundation; inundation damage; measures for inundation control; willingness-to-pay for flood protection; suggestions which actions the HCMC government, flood control program, and communities respectively should undertake to reduce flood risk; and, the potential damage caused by higher inundation levels.”

*3.2) Have you also asked about their needs (better flood information, support to measures etc.) to become more flood resilient?*

In this survey and paper we have addressed flood vulnerability of households in relation to the type of building people are living in, and we used survey data on measures the respondents think are effective to reduce flood risk. Besides, we have asked questions on: household characteristics (income, education ) and suggestions on additional measures to reduce flood risk (including flood information), willingness to pay of the households (for household measures and collective flood defences).

*3.3.) Risk perception is often in close relationship with income and education and other socio-economic factors. Did you look into these dependencies?*

Our data could probably be used to make an assessment on the relation between risk perception and socio-economic factors, although some indicators related to the motivation of people to invest in flood risk management measures are missing. It could be interesting to further study the qualitative effects, perceptions of (marginalised) stakeholders, relation to socio-economic status, but this needs to be explored in another paper. Risk perception is not the scope of this paper. We have done some work in Vietnam and Europe (Bubeck et al., 2012) and other interesting papers are for example the one by Pelling (1999).

*4) Is the area a purely residential area without any economic activity?*

The area is predominantly residential, intermingled with small shops (often as part of the residential houses), large shops, and offices. The main land uses in the case study area are shown in Figure 3. Interviews have been carried out for these major land uses, which are used to determine the vulnerability to floods of these land uses. We have revised the paper as follows on page 6, line 21:

“The main land use is residential buildings, intermingled with small shops (often as part of the residential houses), large shops, and offices (see Fig. 3).”

*5.1) Explain the method of Charettes - what is different to a common stakeholder workshop? Explain which NGO were invited and why. How have you ensured that all possible interests were included?*

In the design of the VCAPS project, the Vietnamese and Dutch experts jointly made a stakeholder analysis, to identify which organisations and people needed to be involved. In order to develop a culture sensitive participatory process, as advocated by Hostovsky and McLaren (2005), it is important to know the local culture. In contrary to western countries, the role of NGOs in Vietnam is different (Kerkvliet, 2002), and the number of NGOs in HCMC remains low (Duc and Minh, 2008). According to the Vietnamese government, the peoples Committee knows the interests of the people living in the area, and thus automatically represents them. This is based on the Grassroots Democracy Decree of 1998 (Duong, 2004), which has been updated in 2003 and 2007. This decree strengthens the rights of the population to participate in local government affairs through the Peoples Committee. The views of people on the local level do not directly reach the central government but are summarized and reported up through the "chain of command", in this case the Peoples Committee. Hence, several vulnerable groups were not directly represented at the workshops. Also, the vulnerability of hospitals, schools, etc. to flooding is included in the analysis, they are grouped under the land use public building (Table 1), and have their own stage damage curve.

The core group of workshop (Charette) participants was closely selected with Peoples Committee representatives, and consisted of civil servants working at different city departments, as well as departments from the central Government, both relevant for flood risk management in the central part of HCMC. For some meetings NGOs were invited, to include their vision and knowledge. The NGOs that attended to the meetings were WWF, Environment and Development Action, and the Vietnam River Network. These were interested in the topic of the project. From the private sector Saigon Water Corporation, Saigon Premier Container Terminal, and Hiep Phuoc Industrial Park JSC were participating during some meetings.

*5.2) How did you e.g. included the interests of the unregistered immigrants you mentioned in chapter 2.1? They might be a very vulnerable and hard to reach group. How did you include other vulnerable groups and sensitive infrastructure like kindergardens, schools, prisons, homes for the elderly? How where the so called strategies developed? Completely bottom up by the participants?*

The unregistered immigrants are not living in the study area, but more at the outskirts of the city, and hence they are were part of this specific study. This group should of course be involved when the general plan for the whole city is further elaborated in detail, before it is implemented. This can be direct involvement, or indirect involvement (see above).

The adaptation strategies are developed using bottom up- (surveys and design workshops), and top down information (e.g. existing plans for the area). The experts from Vietnam and the Netherlands drafted the strategies on the basis of

the workshops, including information from other comparable studies. These were then presented/tested in the workshops, and where necessary adjusted. This information has been added on page 10, line 8, and now reads:

” These strategies were drafted by the experts using inputs of the stakeholders during the interactive design workshops and the results of the household survey. The draft strategies have been presented to the stakeholders in a subsequent workshop, and where necessary they have been adjusted accordingly.”

*6) Explain why there was no measure for forecasting and early warning systems recommended.*

The floods in HCMC occur most often in cases of intense precipitation at the tidal peak at high tide (ADB, 2010; Tu and Nitivattananon, 2011), and the water levels rise at low pace. The inhabitants of flooded areas know the timing of high tide, and are aware of the upcoming flood way in advance. Storm events also lead to high tides, and a storm forecast and warning system is in place by public media and warning systems maintained by the Peoples Committee at Ward level. Hence it is not included as an additional separate measure in the analysis.

*7) Explain why you focussed on economic aspects if all structural measures might have an impact (positive or adverse) on the environment. Why didn't you include possible contradictions between flood risk reduction and good ecological status of the ecosystem?*

The reviewer is correct that adaptation measures also have effects on risks, or costs and benefits, other than flood risks (e.g. Brouwer and van Ek, 2004). However, in this paper, we aim to make a cost benefit analysis for only reducing flood risk. Impacts on the environment could be included, but it would mean another study, since the valuation of environmental values is quite complex (Brouwer and van Ek, 2004).

Excluding environmental values for the analysis of District 4 probably does not have a large effect, though. The environmental values are relatively low in this district, compared to other parts of HCMC, for instance, on the Can Gio mangrove system, located downstream of the city. If an analysis of different adaptation options is carried out for the whole city, it would be advisable to indeed include the non-monetary effects of the measures on the environmental values of the wetlands in the South West. Especially because measures taken on the scale of the city will affect the environment.

However, the reviewer is right, we should point out the CBA is limited to only one type of risk, and we have revised the paper by providing suggestions for further

study (discussion section 4.3 “policy implications”, page 24, line 25). This section now reads:

“For further study, especially when it pertains the whole city, including the wetlands, it is recommended to include valuation assessment of other costs and benefits, such as impacts on environmental and societal values. This can be done using different techniques (Brouwer and van Ek, 2004) or by using a multi criteria analysis, which allows to include non-monetary units in the evaluation.”

*8) What is the "solidarity territory" of the costs? Is it in your assumptions the flood risk area?*

As HCMC is the main economic centre of Vietnam the costs for reducing flood risk are shared over the local, and national government, and a large part of the investments are financed from ODA (WATSAN, 2012). Projects that have been implemented have been financed from these different governmental levels. We have added this information in the discussion on page 24 line 5. This section now reads:

“Future research should also look into the division of costs related to the different strategies, and who should pay. It will be a division between the individual households, the city, the national government, and private enterprises. Official Development Assistance (ODA) could also contribute to the investments, comparable to the JICA drainage master plan (FIM, 2013).”

*9) Concerning wet proofing: who should finance it? Private, public or a mixture of both? Poverty or lack of knowledge enhances vulnerability.*

This is an interesting question, which goes beyond the focus of this study. We have included this topic in the discussion on page 24 line 19. This section now reads:

“For this type of measure it should be taken into account that if the investment costs are paid for by the private household, the poor will remain more vulnerable than households which have the means to invest. If wet proofing becomes a part of the adaptation strategy of HCMC, this (side)effect should be included.”

*10) The description is very restricted to one risk factor, the private economic risk of households and Interaction with other risks is open e.g. social questions, cultural heritage, ecological factors.*

The reviewer is correct, and we have revised the paper by an upfront statement we only focus on flood risk. Indeed there are many other issues, such as in-direct economic damage due to business interruption (Jonkman et al., 2008; Hallegatte and Przulski, 2010) or environmental and societal effects (Brouwer and van Ek, 2004), related to flood hazard and flood risk. However, the focus of our paper is on the cost and benefits of flood risk due to direct damages to buildings. The section on the goals and objectives now reads, page 5, line 7:

“In this assessment we only include direct impacts of floods on urban land uses. Indirect effects, and societal and environmental effects are not included.”

### **Response to reviewer #3**

*1) The manuscript presents an interesting approach of an important topic. It illustrates a really broad survey on adaptation strategies; the number of interviews conducted in the case study area is impressive.*

We appreciate the kind remarks of the reviewer.

*2) However, I do share the opinion of referee #2 regarding several aspects of the methodology. Since the title of the paper is explicitly underlining the participatory approach the text is given astonishing little information on how the interviews are conducted, how the stakeholder are analyzed and identified, how the workshops were done et cetera, in brief on the participatory methods which have been used and why the study was designed like that. The title is also not clear because there is no information on what kind of adaptation strategies the paper s dealing with.*

In re-reading the paper, we agree with the reviewer that the title implies that we do more on the participatory approach than actually is presented in the paper. To overcome this issue, we have removed the term ‘participatory’ from the title, added “flood” in the title, to make explicit what type of risk and adaptation we are dealing with. We have changed the title into:

### **‘Assessment of the effectiveness of flood adaptation strategies for HCMC’.**

In addition, even though the focus is not on the participatory approaches, we agree with the reviewer these methods needs more explanation. We, therefore, have elaborated the description of the participatory approach, which it now includes

details on approach, techniques, and number and types of respondents. Sections 2.3.1 and 2.4 are revised accordingly (see also response to Reviewer 2)

*3) The date of the land use map seems a bit old (from 2005)(see chapter 2.3, page 391,l. 17), but since the Master plan of 2025 is used as the basis for the study it is probably the best available data to be used.*

Indeed the land use map is a bit old, but it was the newest that was made available to us by the Government.

*4) The authors state that there was no measuring of learning outcome of the participatory process. However, it would be interesting if other kinds of evaluations have been conducted.*

Another evaluation would be if the topic of climate change adaptation and flooding continues to be on the agenda in HCMC. We have added a line on learning effects. See page 23, line 2. This line now reads:

“The topic of climate change has gained importance in HCMC. At the end of the VCAPS project the bureau on climate change has been established in HCMC. People from different departments jointly work in this bureau to further develop and implement adaptation measures. Several of these people were involved in the VCAPS project, amongst which the vice managing director of the bureau. This indicates that the topic of climate change has been adopted by the policy makers and civil servants in HCMC.”

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