Evaluating rural coping and adaptation measures in the context of water-related risks in the VMD

Presentation PhD thesis
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WISDOM PhD Scientific Seminar June 12th 2013

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Geographisches Institut der Universität Bonn

Supervisors: PD Dr. Jörn Birkmann and Prof. Dr. Klaus Greve
From Vulnerability Assessment to an Adaptation Evaluation

WISDOM I
Vulnerability Assessment

Vulnerability
- Exposure
- Susceptibility
- Capacity of response

WISDOM PhD Seminar 12th June 2013 – Maria Schwab
From Vulnerability Assessment to an Adaptation Evaluation

WISDOM I
Vulnerability Assessment

WISDOM II
Adaptation evaluation

Vulnerability
- Exposure
- Susceptibility
- Capacity of response

Coping / Adaptation
- Governmental
- Households
From Vulnerability Assessment to an Adaptation Evaluation

WISDOM
Water-Related Information System for the Sustainable Development of the Mekong Delta

WISDOM I
Vulnerability Assessment

WISDOM II
Adaptation evaluation

Vulnerability
- Exposure
- Susceptibility
- Capacity of response

Coping / Adaptation
- Governmental
- Households

Evaluation
Research area

Legend

- Research District
- Research Provinces TV
- Villages
- Cities in the VMD
- Mekong Delta Provinces
- Main Rivers

Interpretation

Research sites in the Vietnamese Mekong Delta for the PhD project of (name) (student) researcher within the WISDOM project.

Focus on: "village erosion and adaptive strategies in the context of flooding and salinization, in line with other VMD"

Data Sources

- LANDSAT 8 ETM+ data (2011/12/11) © USGS 2001
- Administrative boundaries and river network
- A National Institute for Agricultural Planning and Protection

Map created in February 2013

Author: (name) (PhD researcher/).
Research questions

- **RQ1:** How vulnerable are households in the context of water-related risks and how is this vulnerability interlinked with coping and adaptation processes on site?
- **RQ2:** How are decisions made and strategies evaluated?
- **RQ3:** Which coping and adaptation strategies are most promising for different stakeholders and timescales?
### Analytical components of the research framework

<table>
<thead>
<tr>
<th>Risk context</th>
<th>Hazard</th>
<th>Vulnerability</th>
<th>Perception hazard &amp; vulnerability</th>
<th>Goals &amp; preferences</th>
<th>Inputs</th>
<th>Process</th>
<th>Outputs</th>
<th>Outcomes &amp; Impacts</th>
<th>Impacts on vulnerability</th>
<th>CBA</th>
<th>Risk assessment</th>
<th>Present evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

#### Legend
- Analytical components concept framework
- Analytical sub-components
- Evaluation approaches
- Components included in eval. approach

#### Source:
author, evaluation classification mainly based on Silva-Villanueva (2011)
Methods

In-depth interviews

Households

Survey

Participatory group discussions

Literature/Report collection and review
Risk context
Elevation, salinity isohaline & protective infrastructure
Decision-making
### Risk perception - Government

<table>
<thead>
<tr>
<th>Level</th>
<th>Commune</th>
<th>Production system</th>
<th>Rank salinity risk</th>
<th>(most severe year)</th>
<th>Rank flood risk</th>
<th>(most severe year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commune (group discussions)</td>
<td>Ngoc Bien</td>
<td>Rice</td>
<td>1</td>
<td>(2010/2011)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Don Xuan</td>
<td>Rice</td>
<td>1</td>
<td>(2010/2011)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level</th>
<th>Institution</th>
<th>Rank salinity risk</th>
<th>(most severe year)</th>
<th>Rank flood risk</th>
<th>(most severe year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>District (interviews)</td>
<td>Farmer’s Association</td>
<td>1</td>
<td>(2010/2011)</td>
<td>4</td>
<td>(general)</td>
</tr>
<tr>
<td></td>
<td>DARD</td>
<td>1</td>
<td>(2010/2011)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Province (interviews)</td>
<td>DARD</td>
<td>1</td>
<td>(2010/2011)</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Source: Focus group discussions and interviews with authorities 2012, M. Schwab
What was the main reason for applying this strategy?

- Reaction to past events

Source: Household survey 2012 (n=313), M. Schwab
Perceived capacity of response and susceptibility

- Households showed little awareness and know-how when it comes to:
  - Susceptibility of crops
  - Quality of the embankment

- Little trust in the own know-how and capabilities
  - Both government and households see lack of formal education as a major barrier, especially for Khmer people
  - People often think that they don’t have the know-how to change the product

- Awareness and perception of only few adaptation options
  - Particularly in areas where households have little risk specific experience (salinity intrusion in rice producing areas)
Implementation and Impacts
Many coping strategies applied which were meant to provide compensatory financial resources. These reduced capacity of response in the long-run, though. E.g.:
- Selling productive assets
- Buying more food and inputs on credit / taking a loan

Several strategies changed susceptibility of households
- Seasonal migration increases number of income sources
- WS-rice production increases susceptibility to salinity intrusion substantially

Only few exposure reducing strategies applied
- Selling land
Impact on vulnerability – Governmental strategies

- Few coping options applied
  - Compensation payments
  - Early warning

- More adaptation with a focus on and preference for exposure reducing activities
  - Building a dike
  - Dredging the canals

- Little support to increase agency, awareness and the belief in the own capacities
  - Many training classes but salinity and flooding play merely a minor role
Subjective evaluation of government strategies

Scoring of most important governmental strategies according to selected criteria

*only hh who were affected by a policy measure evaluated the respective strategy.

Source: Household survey; M. Schwab 2012
<table>
<thead>
<tr>
<th>Research area</th>
<th>All communes</th>
<th>Kim Son commune</th>
<th>Don Xuan commune</th>
<th>Ngoc Bien commune</th>
<th>Tra Cu district</th>
<th>Tra Vinh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prod. type focus</td>
<td>(mean value)</td>
<td>Sugar cane</td>
<td>Aquaculture</td>
<td>Rice</td>
<td>Rice/ Sugarcane</td>
<td>Rice</td>
</tr>
<tr>
<td>Stakeholder group</td>
<td>Hh Gov.</td>
<td>Hh Gov.</td>
<td>Hh Gov.</td>
<td>Hh Gov.</td>
<td>DARD FA*</td>
<td>DARD*</td>
</tr>
<tr>
<td>Evaluation criteria</td>
<td>Scoring of relevant criteria for decision-making (total of 25 points)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact on Hh-Income/ productivity</td>
<td>8,3 6,2 9 8,8</td>
<td></td>
<td>11 4</td>
<td>5 7 7,5</td>
<td>6 2</td>
<td></td>
</tr>
<tr>
<td>Farmer Implement.</td>
<td>2,3 2,2 7 2,5</td>
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<td>0 3</td>
<td>0 1 1,3</td>
<td>8</td>
<td></td>
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<td>Food security</td>
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<td>0 0</td>
<td>0 0</td>
<td>0 2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>0 2,1</td>
<td>0 1,3</td>
<td>0 2</td>
<td>0 3</td>
<td>1,3 7</td>
<td></td>
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<tr>
<td>CC-proof</td>
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<td>0 1,3</td>
<td>0 0</td>
<td>0 0</td>
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<tr>
<td>Nr of beneficiaries</td>
<td>4,0 4,8 6 7,5</td>
<td>3 3 3 4</td>
<td>3,8</td>
<td>5 3</td>
<td></td>
<td></td>
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<tr>
<td>Costs</td>
<td>2,0 2,0</td>
<td>0 0</td>
<td>6 4</td>
<td>0 2</td>
<td>5 2</td>
<td>1</td>
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<tr>
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<td>1 0</td>
<td>0 0</td>
<td>3 0</td>
<td>0 0</td>
<td>1</td>
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<td>3 2</td>
<td>1,3 3</td>
<td></td>
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<td>Competence</td>
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<td>0 0,0</td>
<td>0 0</td>
<td>5 1</td>
<td>0</td>
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<tr>
<td>Implantation time</td>
<td>4,3 2,0</td>
<td>2 0</td>
<td>5 3</td>
<td>6 3</td>
<td>3,8 4</td>
<td></td>
</tr>
</tbody>
</table>


Rank: 6 2 1 3 5 3

Nr of participants: 61 31 13 10 33 11 15 10 1 2 2

* FA= Farmers’ Association; ** Irrigation Department of DARD Tra Vinh; *** In the discussion 100 points instead of 25 were distributed which is why 25 points represents 100/4 points

Source: Group discussions with commune authorities and households; M. Schwab 2012
Concluding remarks
Conclusion

- Long-term oriented planning and a system of continuous quantitative data collection on local level exists which also addresses the context of water-related risks but:
  - More transparency in terms of data sources and collection
  - More integrative and flexible scenarios / planning needed

- Risk perception is high but there is low trust in the own capabilities and little awareness of new adaptation options
  - Strengthen the capability of households to take situation-specific and more sustainable decisions
  - Integrate more risk-specific awareness raising and capacity building in training classes
  - Promote more risk-specific strategies
Stakeholder goals and the consequences of applied measures are often divergent leading to lower acceptance of measures and potential conflicts

- Evaluations should not only consider target group but also stakeholders on other spatial, social and temporal scales
- More stakeholder involvement and consideration of the opinions in public decision-making
- Interest in and awareness of stakeholder preferences can facilitate dialogue and mutual understanding

Evaluations of projects such as CBA or EIA exist but:

- Integration of less-regarded criteria and stakeholder specific evaluation can be beneficial in many cases
- Important to know the range of options (quality of one strategy has to be seen against the background of potential alternatives)


UNFCCC (2010): Synthesis report on efforts undertaken to monitor and evaluate the implementation of adaptation projects, policies and programmes and the costs and effectiveness of completed projects, policies and programmes, and views on lessons learned, good practices, gaps and needs. Nairobi work programme on impacts, vulnerability and adaptation to climate change. Nairobi, Kenya.


Thank you for your attention and feedback!

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Legend

- Analytical components
- Analytical sub-components
- Main influences between sub-components

Region/World
- Place
- Agent

Source: author, based on Turner et al. (2003); Grothmann & Patt (2005); Jacob & Mehiriz (2012); UNFCCC (2010)
Vulnerability framework

Source: own draft based on {Turner 2003 #890}
Objective capacity of response

Adaptation incentives/barriers

Social discourse on natural hazards, climate change and adaptation/coping options

Individual cognition

- Reliance on other agent’s actions
- Risk experience appraisal
- Cognitive biases & heuristics
- Goals & preferences
- Perception

Risk appraisal

- Perceived hazard exposure
- Perceived susceptibility

Adaptation/Coping appraisal

- Appreciated adaptation/coping options
- Perceived self-efficacy
- Response efficacy

Adaptation/Coping intention

Avoidant maladaptation

Source: author, based on Grothmann & Reusswig (2004); Grothmann & Patt (2005)
Process

Inputs
- Resources required for the implementation of activities

Process
- Main processes + activities to implement adaptation

Outputs
- Immediate products + services provided by activities

Outcomes
- Short-/medium-term effects generated by outputs

Impacts
- Long-term changes in social-ecological system

Staff
- Training
- # classes
- Motivation
- Well-being

Time
- Admin.
- # particip.
- Skills
- Environm.

...
Changing risk – Industrial zone plans for the year 2020

Functional areas of Đinh An economic zone planned for the year 2020 (total size: 15 403 ha)

Source: translated and complemented draft, data and cartography Tra Vinh Economic Zone Authority (2012)
Subjective evaluation of government strategies

Scoring of most important governmental strategies according to selected criteria

- Income effect
- Proportion of beneficiaries
- Long-term effect
- Implementation time
- Reliability
- Competence
- Participation

Source: Household survey (n=98); M. Schwab 2012
Subjective evaluation of household strategies

Figure 14: Most important disadvantages of selected strategy options

Source: Household survey (n=98); M. Schwab 2012
Perceived advantages and disadvantages of introducing a 3rd rice season

Example: Growing winter-spring rice

"The income returns are seasons".

"The output prices were high so that we chose to produce another season of rice".

Variable costs:
- SA: 1.564.806 VND/cong
- AW: 1.561.736 VND/cong
- WS: 1.225.567 VND/cong
(after only 2 months in most cases!)

"It affects the environment because the land cannot rest".

"The costs are high but the increased income from a third rice season would compensate for that".

"There is no effect on the environment".

"The income can increase because the returns are higher than in the other seasons".

"The work is harder [than for the other seasons] because of the pumping".

Average variable costs:
- SA: 1.564.806 VND/cong
- AW: 1.561.736 VND/cong
- WS: 1.225.567 VND/cong

% of all relevant respondents who mentioned these criteria as relevant (n=98)

Source: Household survey 2012, M. Schwab
### Scoring of evaluation criteria

#### Evaluation criteria for household strategies

#### Scoring of relevant criteria for decision-making (total of 25 points)

<table>
<thead>
<tr>
<th></th>
<th>Households</th>
<th>Average</th>
<th>Xoai Rum hamlet</th>
<th>Bau Sau hamlet</th>
<th>Sa Van A hamlet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sugar cane</td>
<td>Aquaculture</td>
<td>Rice</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td>10</td>
<td>8</td>
<td>11</td>
<td>12</td>
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<tr>
<td>Costs</td>
<td></td>
<td>7</td>
<td>10</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Environment</td>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
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<tr>
<td>Food security</td>
<td></td>
<td>0</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Implementation time</td>
<td></td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Autonomy/Implementability</td>
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<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Flexibility</td>
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<td>2</td>
<td>6</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Long-term impact</td>
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<tr>
<td>Climate Change proof</td>
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<tr>
<td>Risk</td>
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<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Total of ascribed points</td>
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<td>25</td>
<td>25</td>
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<tr>
<td>Number of participants</td>
<td></td>
<td>61</td>
<td>13</td>
<td>31</td>
<td>15</td>
</tr>
</tbody>
</table>

**Figure 2:** Identification and scoring of relevant evaluation criteria in household decision-making  
Source: Group discussions and authority interviews; M. Schwab 2012
### Seasonal calendar for rice production (2011)

<table>
<thead>
<tr>
<th>Production steps</th>
<th>Winter-spring season</th>
<th>Summer-Autumn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice prod. (BGA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparing land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planting/sowing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvest</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Salinity (BGA)

<table>
<thead>
<tr>
<th>Period of Salinity</th>
<th>Salinity destroyed rice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

#### Explanation:
The figure describes the timing of the production steps and the occurrence and duration of salinity intrusion for ten households in Ba Giam A (BGA) hamlet (Don Xuan commune). Every field marks one week of the year 2011. The black frames illustrate the period between the earliest beginning and latest ending of a step/phase. The shaded fields show the period between the average beginning and ending of a step/phase.

Source: Production centred interviews, M. Schwab 2012
Contribution margin calculations

Costs, Turnover and Contribution margin in 2011

Source: Key informant household interviews 2012, M. Schwab
Institutions, Interconnectivities and the differential distribution of costs and benefits

Climate Change

Vulnerability

Socio- Economic Changes

Tieu Can
Exposure:
Suscept.:
Cap. of resp.:

Salinity Vulnerability
Tra Cu
Exposure:
Suscept.:
Capacity of resp.:

Institutionalisation of the operation 2012/2013

Sluice gate operated by informal stakeholders (unclear institutional regulation) 2010/2011
## Stakeholder preferences and priorities

<table>
<thead>
<tr>
<th>Pairwise comparison</th>
<th>Agricultural training class</th>
<th>Vocational training classes</th>
<th>Loan for production</th>
<th>Upgrade the dyke</th>
<th>Operation of sluice gate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural training class</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocational training classes</td>
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<td></td>
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<tr>
<td>Loan for production</td>
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<tr>
<td>Upgrade the dyke</td>
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</tr>
<tr>
<td>Operation of sluice gate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Household survey 2012, M. Schwab