



Vulnerability of the aquaculture sector to climate change in Vietnam

Badjeck Marie-Caroline¹, Kam Suan Pheng¹, Vo Thi Be Nam², Than Thi Hien³

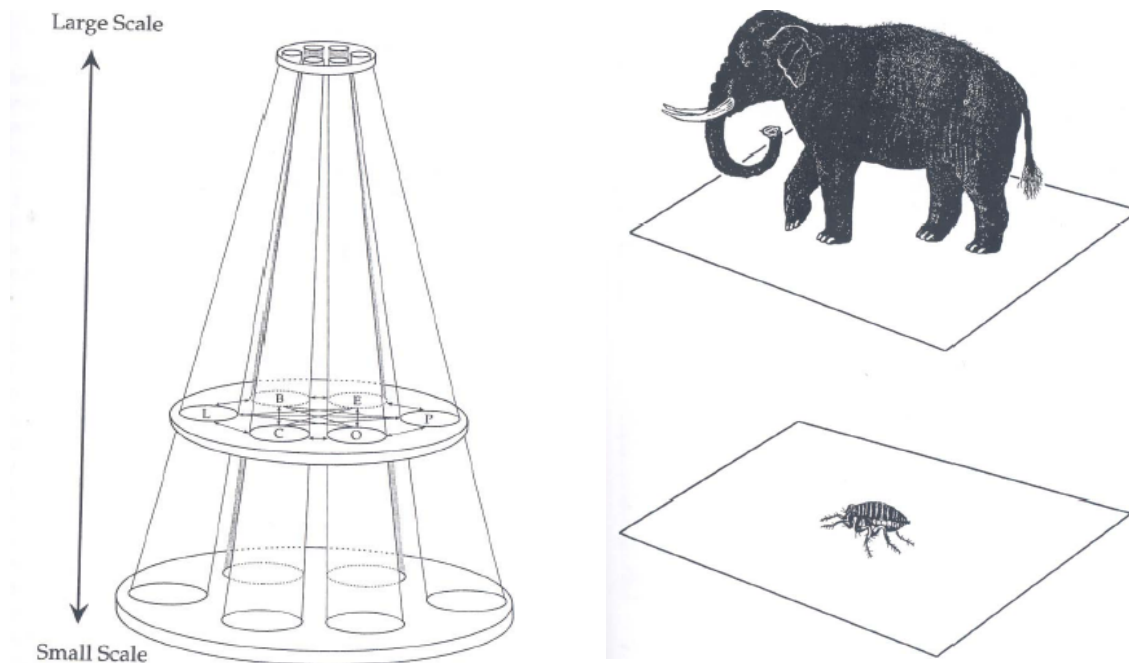
1 WorldFish Center, 2 Sub-National Institute for Agricultural Planning and Projection (Sub-NIAPP),

, 3 Centre for Marinelife Conservation and Community Development

International Climate Change Adaptation Conference
29 June – 1 July 2010 Brisbane

The Issue

- VA of the aquaculture sector:
 - Individuals?
 - The “farm” => production system?
 - Regions and provinces?
- Scale and unit of analysis matter!
- What do we mean by vulnerability in this context?



©Allen & Hoekstra 1992



WorldFish
CENTER

The Project

- Vietnam case study (World Bank EACC)
 - 2008, aquaculture production accounted for 6.6% of the national GDP
 - Multiple productions systems (species, intensive/ extensive)
 - Temperature, rainfall changes and SLR (MONRE, 2009)



Conceptual framework: country scale/province

EXPOSURE (E)

Sea level rise: % of province area flooded
Temperature rise: Avg temperature increase relative to 1980-99
Rainfall change: Annual rainfall change relative to 1980-99
Coastal extreme events: Aquaculture area damaged, due to storms & typhoons 1989-2008
Floods: Aquaculture area damaged by floods, 1989-2008

DEPENDENCY (D)

Direct livelihood: % hh engaged in aquaculture
Indirect employment: employees in fishery enterprises as % of total enterprise employees
Macro-economics: Fish output as % of country GDP; seafood export processing facilities
Food security: Per capita annual fish & shrimp consumption

ADAPTIVE CAPACITY (AC)

Poverty: % of population below poverty line; % of hh monthly food expenditure spent on fish & shrimp
Infrastructure: Telephone lines per 100 people; # of hospital beds per 1000 people
Education: Graduates of 2o education as % of total candidates
Disaster response to CC: # of disaster management programs; DRM investments in construction projects; DRM investments in non-construction projects
Social capital: share of fishery cooperatives as % of national total
Education: % of fishery employees with education

Black: Generic; Red: CC related; Blue: aquaculture sector

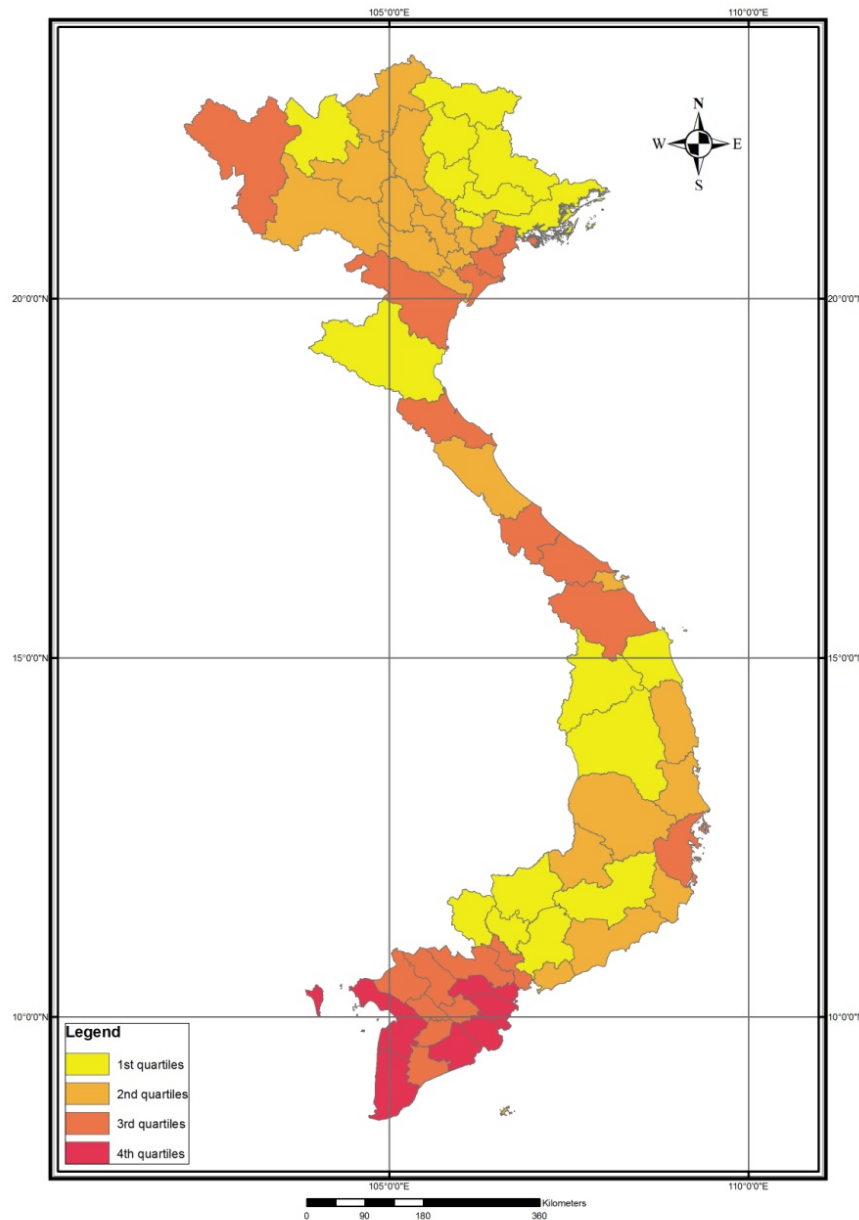
POTENTIAL IMPACTS (PI)

- impacts that will occur without adaptation
 $PI = f(E, D)$

VULNERABILITY

-the nature & extent of losses incurred by the aquaculture sector due to CC
 $V = f(PI, AC)$

Result 1: Vulnerability



Provinces most vulnerable to climate-induced changes in the aquaculture sector

Preliminary results World Bank study please do not cite



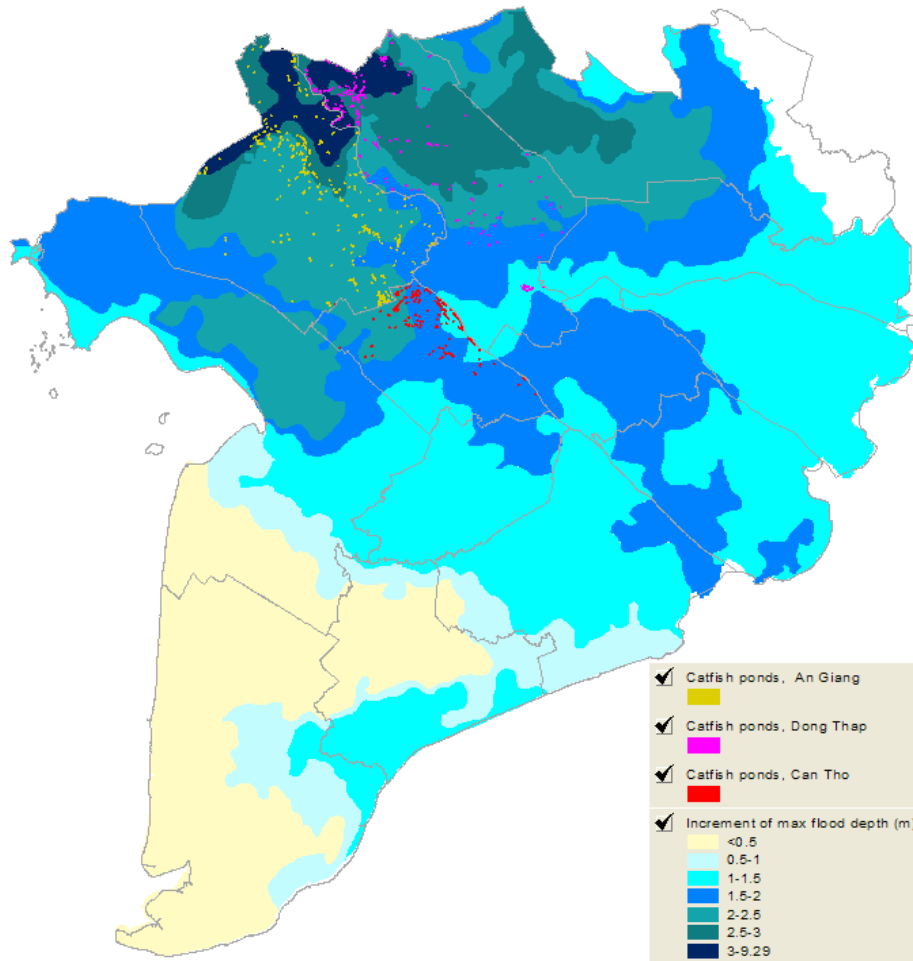
WorldFish
CENTER

Conceptual framework: region/production syst.

- At the Mekong River Delta scale the unit of analysis is a production system:
 - ✓ 2 systems: shrimp and catfish farming
 - ✓ How are they vulnerable to climate change? What do we mean by vulnerability in this context?
- Exposure: nature and degrees to which production systems are exposed to climate change
- Sensitivity: degree to which a production system is affected, either adversely or beneficially, by climate-related stimuli. Effect may be:
 - ✓ direct (e.g., change in physiology in response to change in T_o)
 - ✓ indirect (e.g., damages caused by an increase in the frequency of extreme events)
- Adaptive capacity: ability of a production system to adjust to climate change

Result 2: Potential Impacts in the MRD

Areas subjected to increments of maximum flooding depths during the rainy season (for 50-cm SLR scenario), superimposed with catfish pond areas in An Giang, Dong Thap & Can Tho provinces



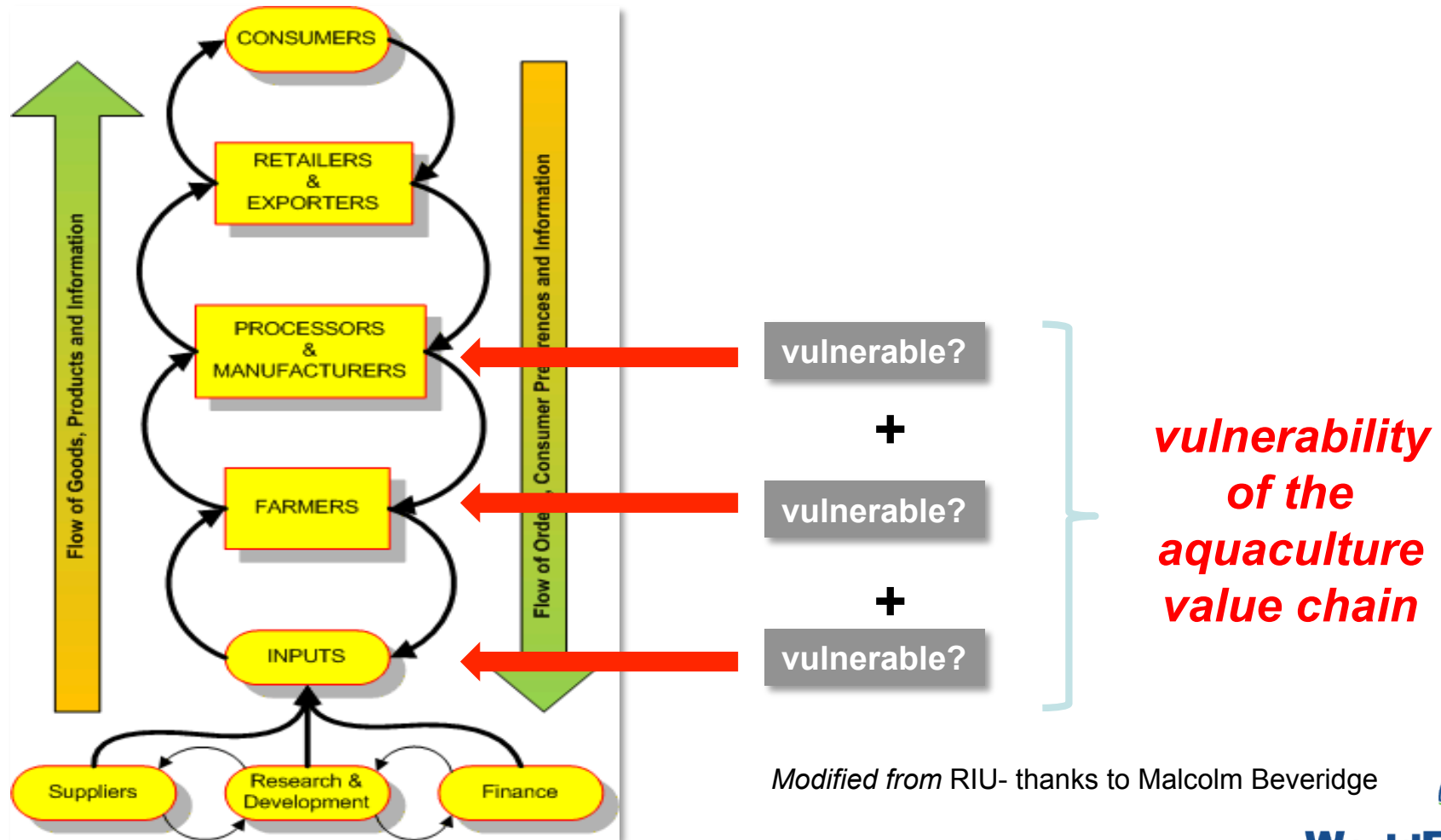
Increment of max flood depth (m)	Affected catfish pond area, ha (%)					
	An Giang		Dong Thap		Can Tho	
<0.5						
0.5-1						
1-1.5			178	13%	273	26%
1.5-2	163	8%	89	6%	509	48%
2-2.5	1,236	62%	211	15%	286	27%
2.5-3	394	20%	497	36%		
> 3	210	10%	402	29%		
Total	2,003	100%	1,376	100%	1,068	100%

Preliminary results World Bank study please do not cite



Follow up work....

Climate change impacts depend on vulnerability of different components of the aquaculture value chain and those engaged with them



Modified from RIU- thanks to Malcolm Beveridge



WorldFish
CENTER

Some thoughts...

- What do we mean by “the sector” and “the industry”?
- What scale? What metrics?
- Vulnerability is a moving target => “future vulnerability” => scenarios? Strategic planning?
- Link vulnerability analysis and cost of adaptation => who is vulnerable, nature of vulnerability, and ability “to pay” from the producers to the consumer => power and equity
- Need to develop consistent methodologies
- Need for cross-sectoral approaches => in the Mekong River Delta aquaculture is intertwined with agriculture (rice/fish farming)



Acknowledgements

- World Bank EACC
- QUEST_fish project (NERC/UK)
- Full Report: Kam S.P, Badjeck M-C, Teh L., Teh L., Bé Năm V.T, Hiền T.T, Huệ N.T, Phillips M., Pomeroy R. , Sinh L.X (2010). Economics of adaptation to climate change in Vietnam's aquaculture sector: A case study. Report to the World Bank
- **m.badjeck@cgiar.org**