Climate change in perspective: global drivers of change in fisheries

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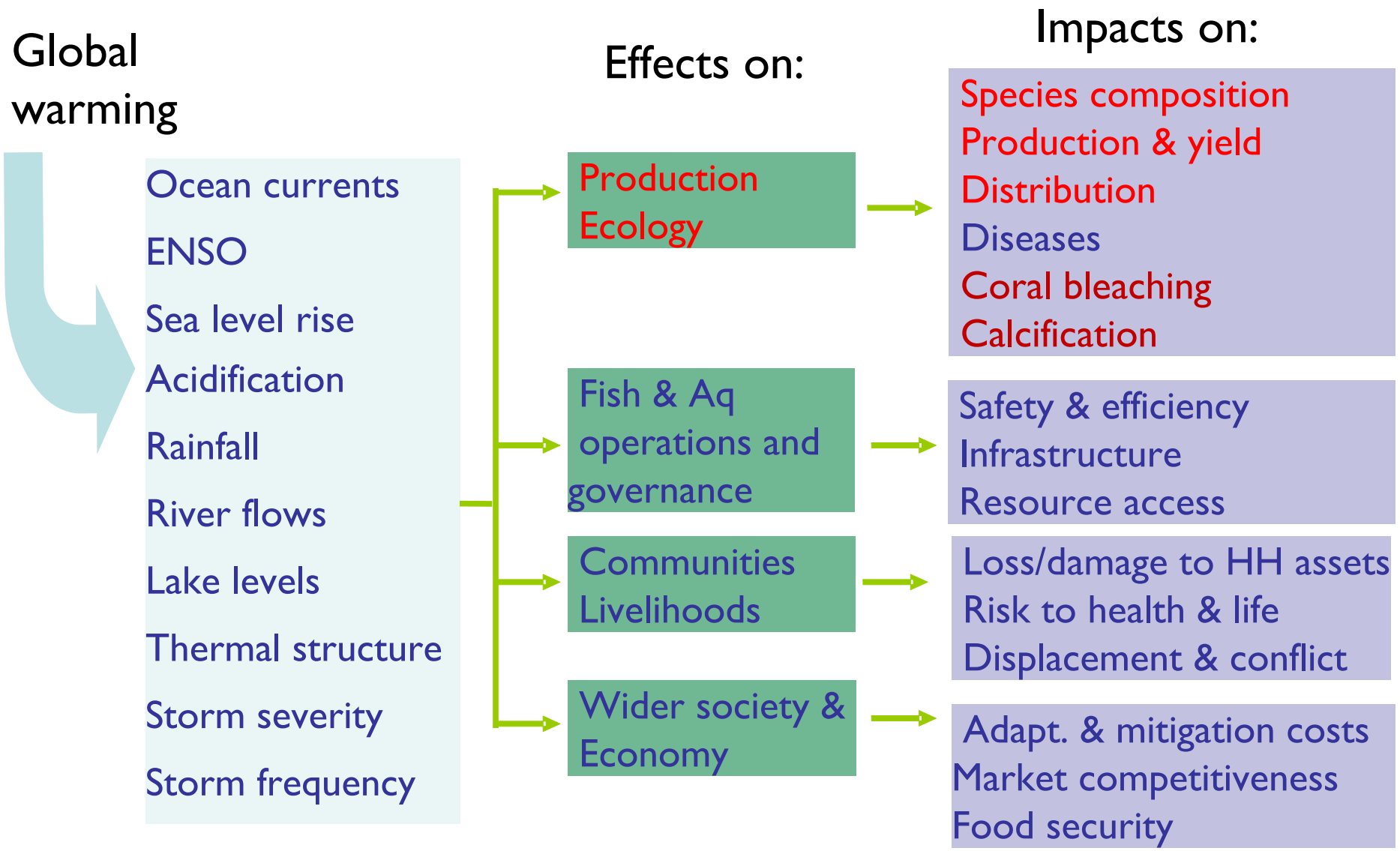
Outline

How will climate change impact fishery systems?

What else drives change in fisheries?

How can science guide policy and management at different scales?

CC impact-pathways on fisheries and aquaculture



Adapted from Badjeck *et al* 2010 *Marine Policy*

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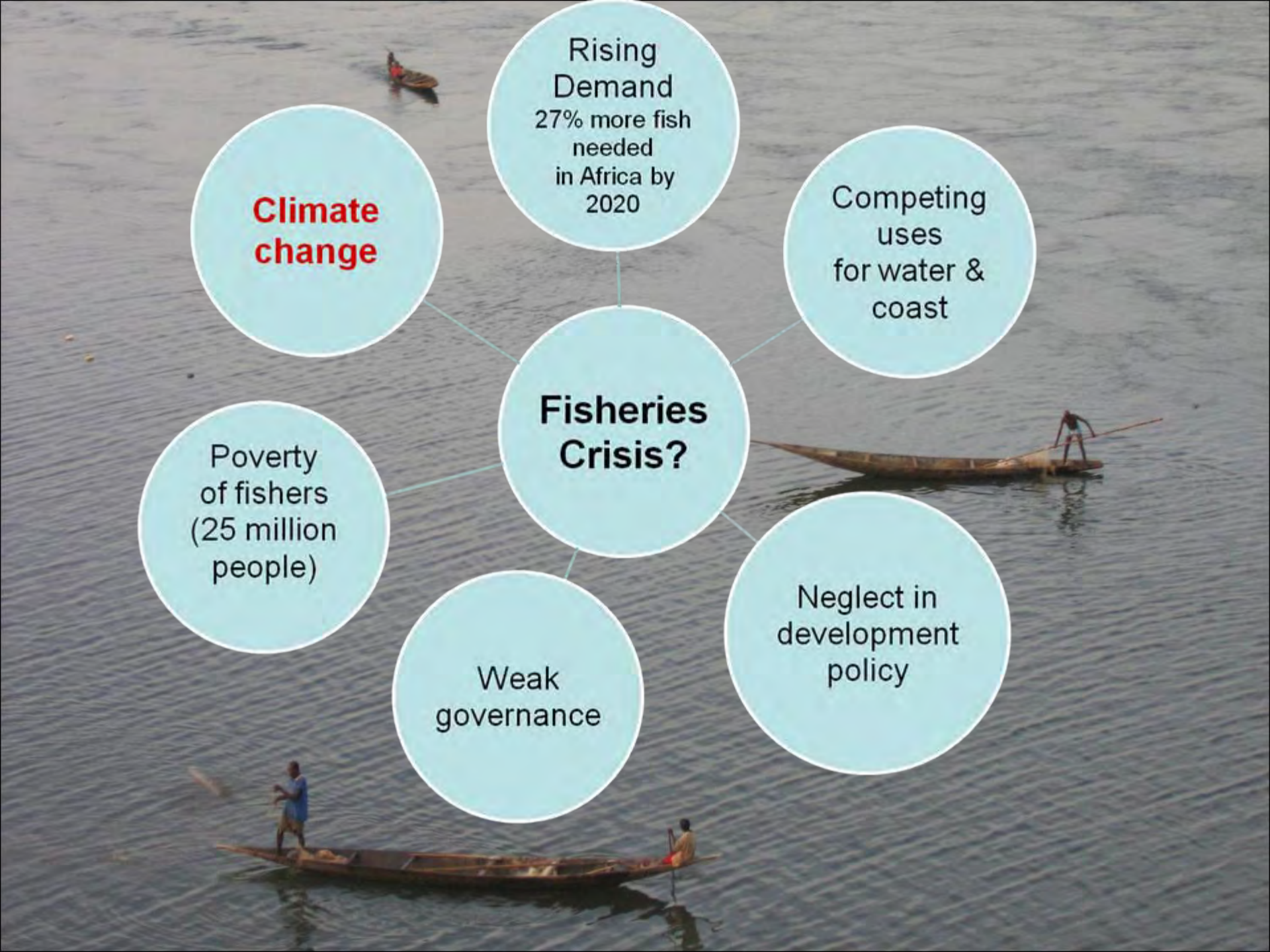

Rising Demand
27% more fish needed in Africa by 2020
Climate change
Competing uses for water & coast
Fisheries Crisis?
Poverty of fishers (25 million people)
Weak governance
Neglect in development policy

Some important drivers in fisheries

demographic and cultural change

economic globalization

growth of aquaculture

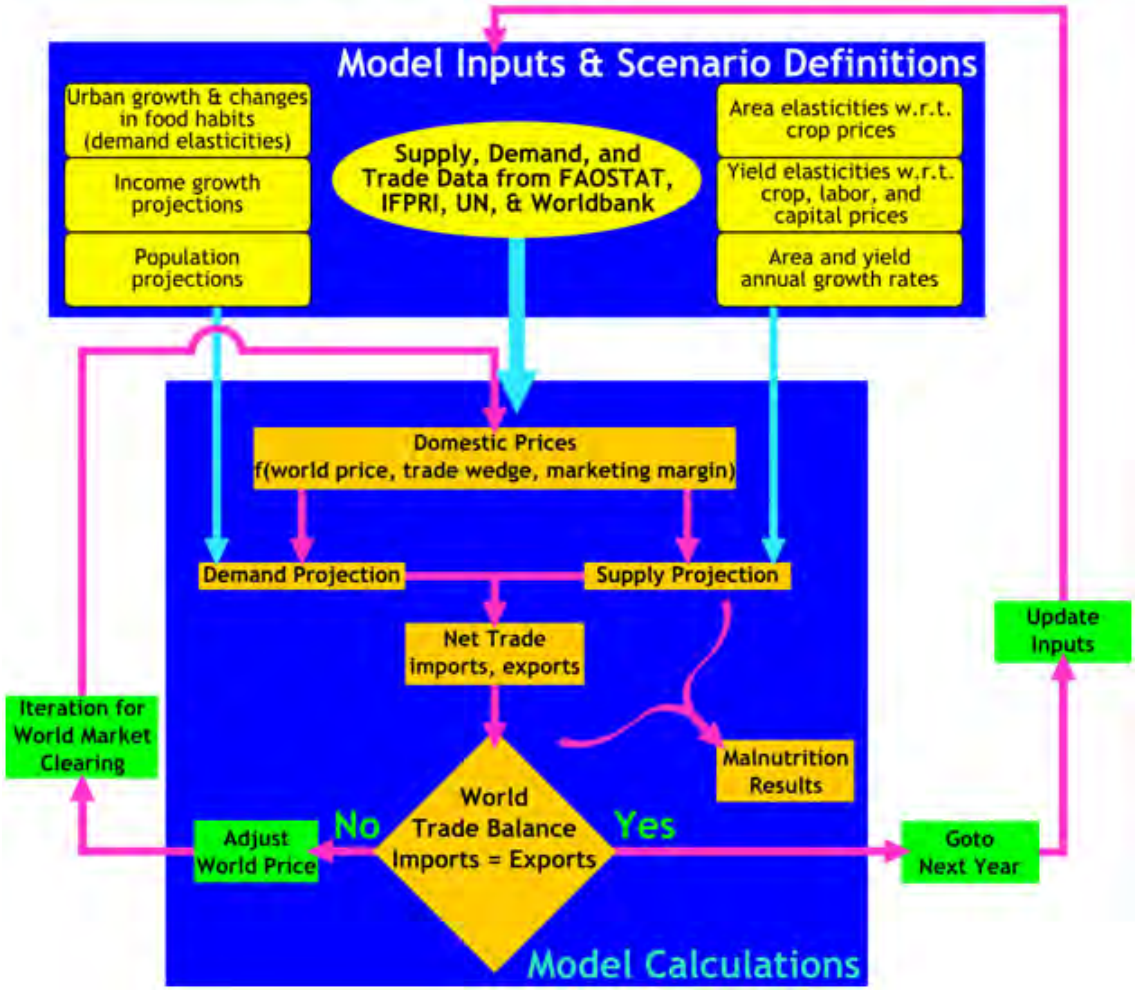
environmental concern

water scarcity

Complexities…

Proximate and ultimate drivers

International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT):



Delgado, C.L., Wada, N., Rosegrant, M.W., Meijer, S. and Ahmed, M. 2004. Fish to 2020 supply and demand in changing global markets. International Food Policy Research Institute, Washington, D. C.

Fastest growth

Highest

Most dependent

Table 4.6 Total per capita consumption of food fish, 1973–97 and 2020

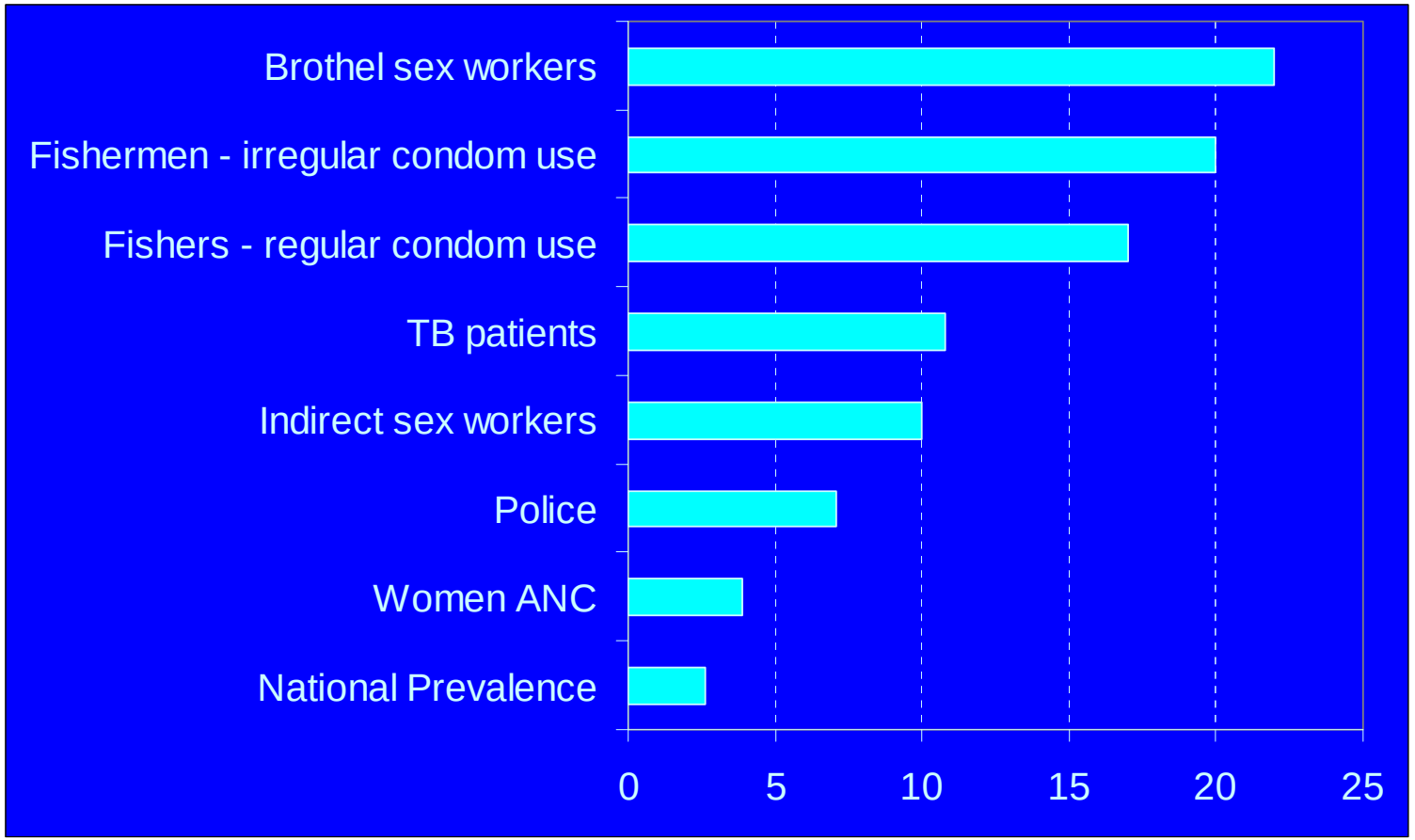
	Total consumption (kg/capita/year)				Annual Growth rate (percent)	
	Actual			Projected	Actual	Projected
Region	1973	1985	1997	2020	1985–97	1997–2020
China	5.5	8.1	26.5	35.9	10.4	1.3
Southeast Asia	17.6	19.8	23.0	25.8	1.3	0.5
India	3.1	3.6	4.7	5.8	2.3	0.9
Other South Asia	6.2	5.4	6.0	6.1	0.9	0.1
Latin America	7.0	9.0	7.8	8.6	–1.2	0.4
West Asia and North Africa	3.4	6.2	6.2	6.4	0.0	0.2
Sub-Saharan Africa	9.0	9.2	6.7	6.6	–2.6	0.0
United States	13.5	18.5	19.7	19.7	0.5	0.0
Japan	70.2	61.5	62.6	60.2	0.2	–0.2
European Union 15	18.2	20.3	23.6	23.7	1.3	0.0
Eastern Europe and former Soviet Union	20.3	22.7	10.6	11.6	–6.1	0.4
Other developed countries	11.2	13.4	14.7	14.0	0.8	–0.2
Developing world	7.3	9.0	14.0	16.2	3.8	0.6
Developing world excluding China	8.1	9.4	9.2	9.9	–0.1	0.3
Developed world	22.6	24.3	21.7	21.5	–1.0	0.0
World	11.6	12.8	15.7	17.1	1.7	0.4

Sources: Actual data were calculated by authors from FAO 2002c; projections for 2020 are from the baseline scenario of IFPRI's IMPACT model (July 2002).

Notes: Actual data are three-year averages centered on 1973, 1985, and 1997, respectively.

Complexities...global drivers, local variability

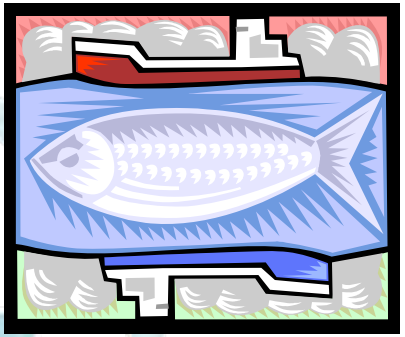
HIV Prevalence (%) in Sihanoukville, Cambodia, 2000

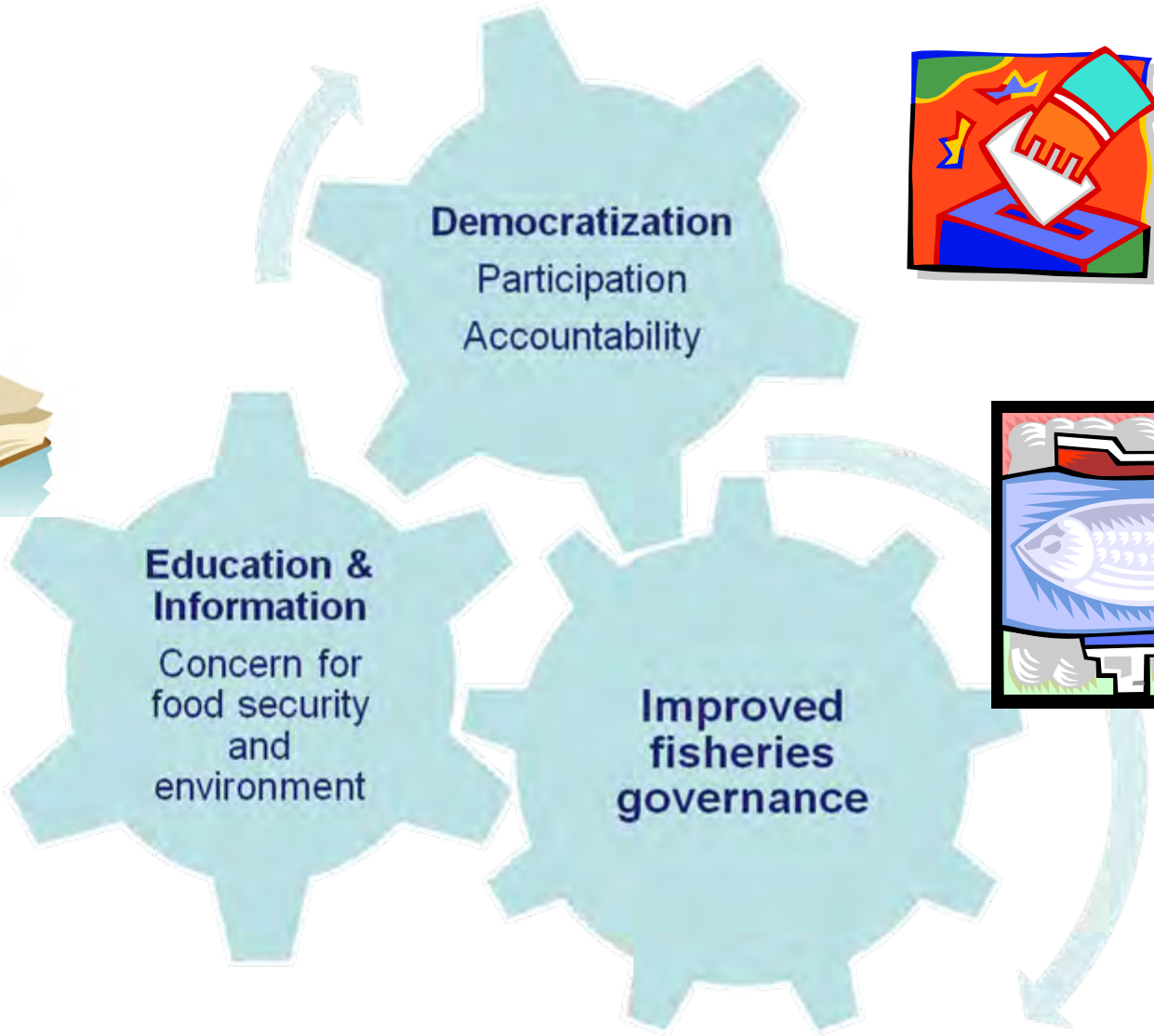


Data sources: Kim et al., 2000; Semang et al., 2000; UCSF AIDS Research Group, USA & UNAIDS epidemiology fact sheets

Complexities…

Drivers interact - and can be positive





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indicator-based approaches modeling scenarios

Vulnerability to climate change: Global assessment (Allison et al, 2009)

Vulnerability

'the degree to which a system is susceptible to climate change, and is unable to cope with the negative effects of climate change' (IPCC, 2007)

Which countries are most vulnerable to the potential impacts of climate change on fisheries?

Vulnerability analysis framework

(derived from IPCC 2001)

EXPOSURE

Nature and degree to which countries are *exposed* to predicted climate change

SENSITIVITY

Degree to which economies & people are likely to be affected by fishery-related changes

POTENTIAL IMPACTS

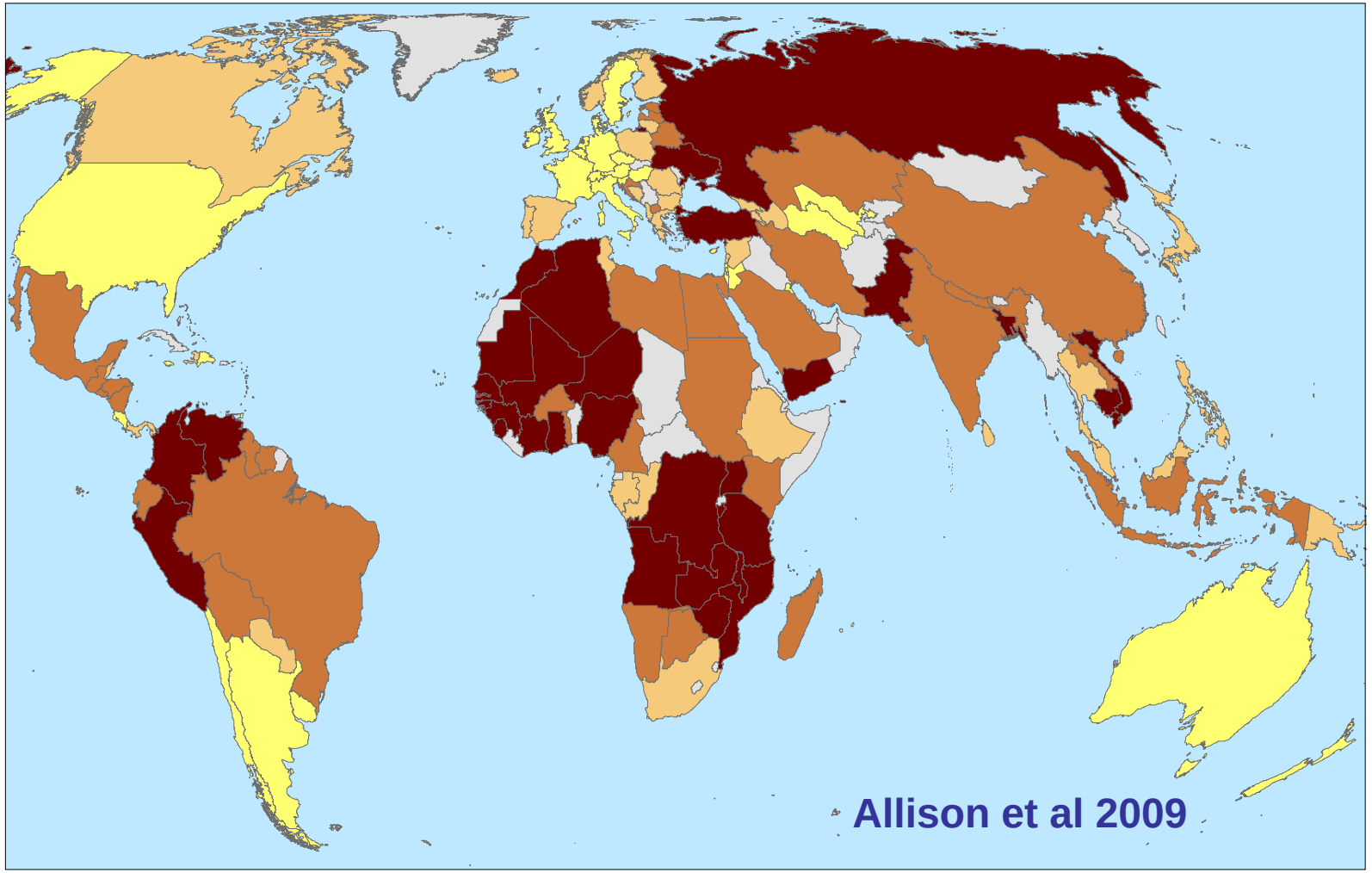
All impacts that may occur without taking into account planned adaptation

ADAPTIVE CAPACITY

Abilities and resources to cope with climate-related changes

VULNERABILITY

Relative vulnerability of national econonomies to potential impact of CC on their fisheries



2/3 of most vulnerable are Least Developed Countries

Diagnosing Vulnerability: country level

- Vietnam case study (World Bank, QUEST_fish)

- At the national scale the unit of analysis is the province:
  - Which provinces are more vulnerable to the potential impacts of climate change on their aquaculture sector?
  - What do we mean by vulnerability in this context?

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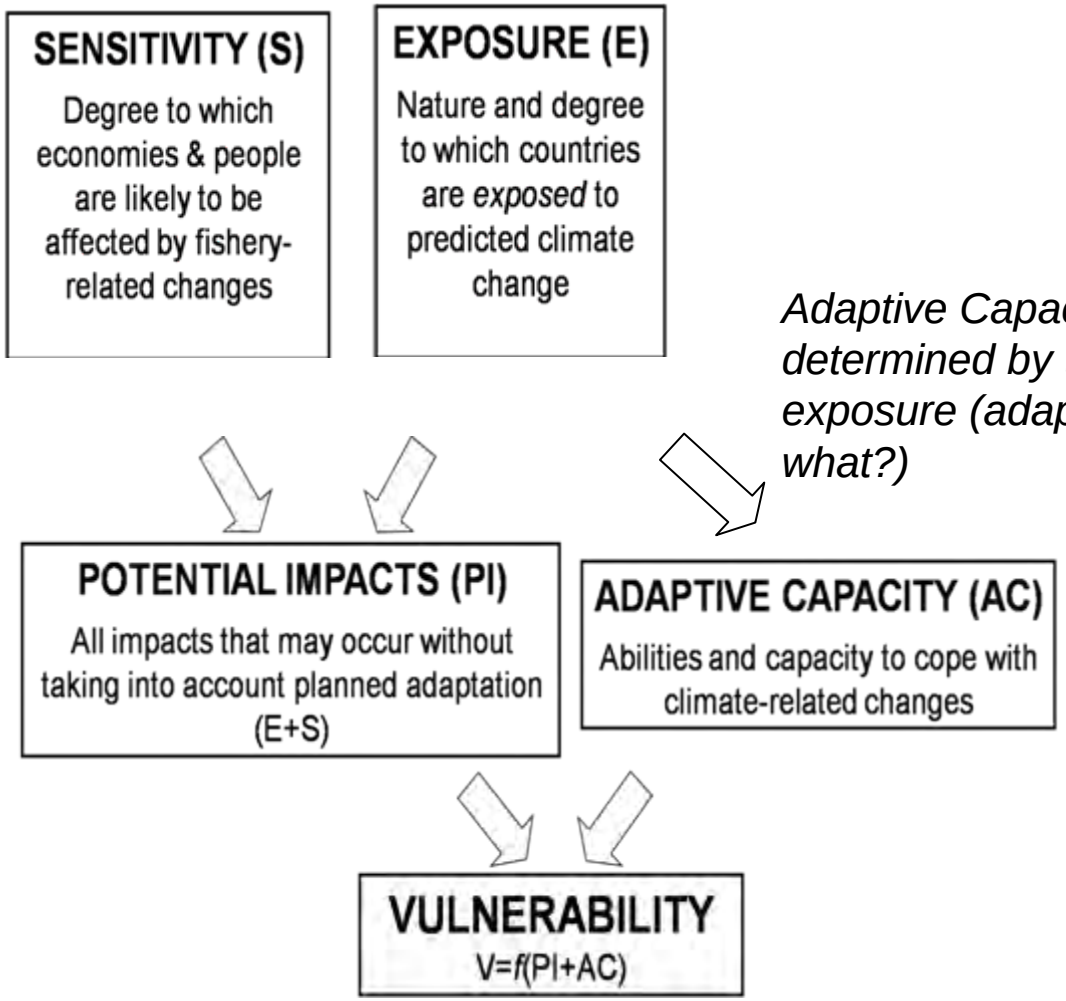
Conceptual framework adapted to Vietnam aquaculture context

Sensitivity conceptualized as dependency of a province on the aquaculture sector



Adaptive Capacity is determined by the type of exposure (adapting to what?)

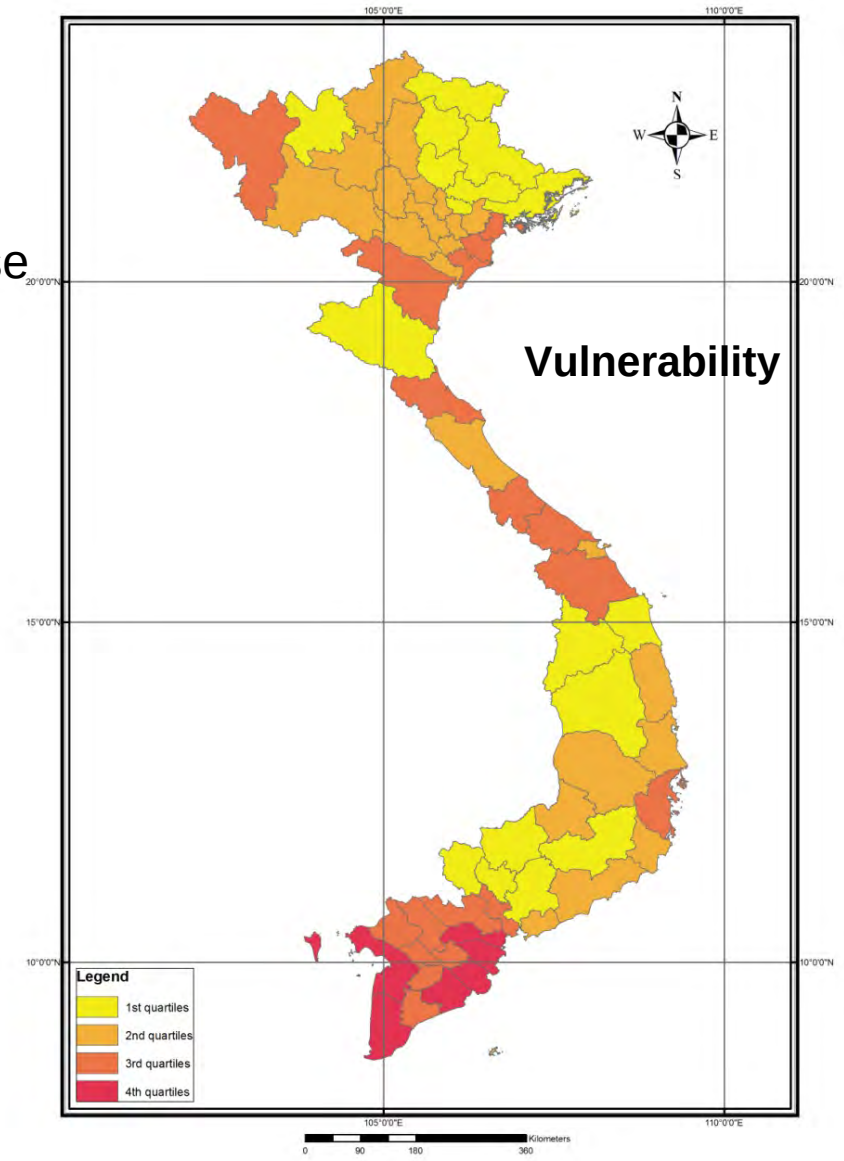
Adapted from Allison et al. 2009, QUEST_Fish project conceptual framework

Vulnerability of aquaculture in Vietnam

Dominated by coastal shrimp ponds
And catfish (Pangassius) in Mekong Delta

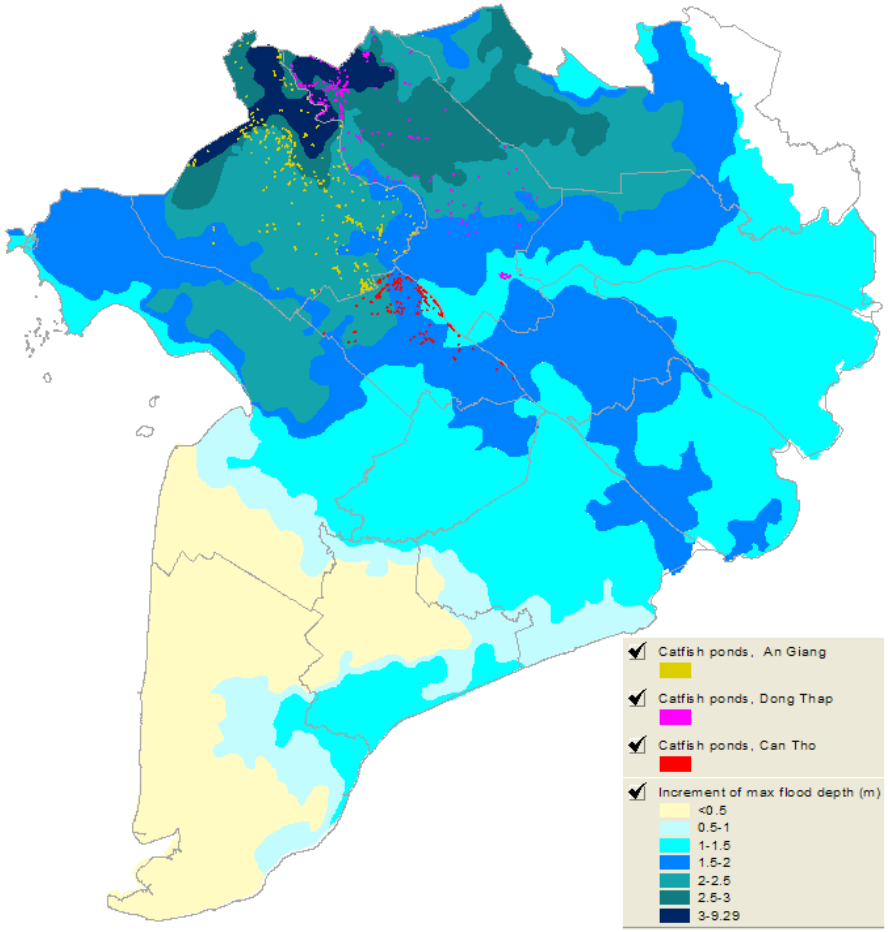
-Storms, sea level rise, temperature increase

Province Name	Region	Vulnerability Index
Sóc Trăng	Mekong River Delta	100.0
Cà Mau	Mekong River Delta	91.7
Kiên Giang	Mekong River Delta	87.3
Bến Tre	Mekong River Delta	77.9
Trà Vinh	Mekong River Delta	77.7
Tiền Giang	Mekong River Delta	76.7
Thái Bình	Red River Delta	69.7
Hà Tĩnh	North Central area & Central coastal area	61.6
Cần Thơ	Mekong River Delta	61.2
Bạc Liêu	Mekong River Delta	60.2



Potential Impacts in the Mekong River Delta

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 %

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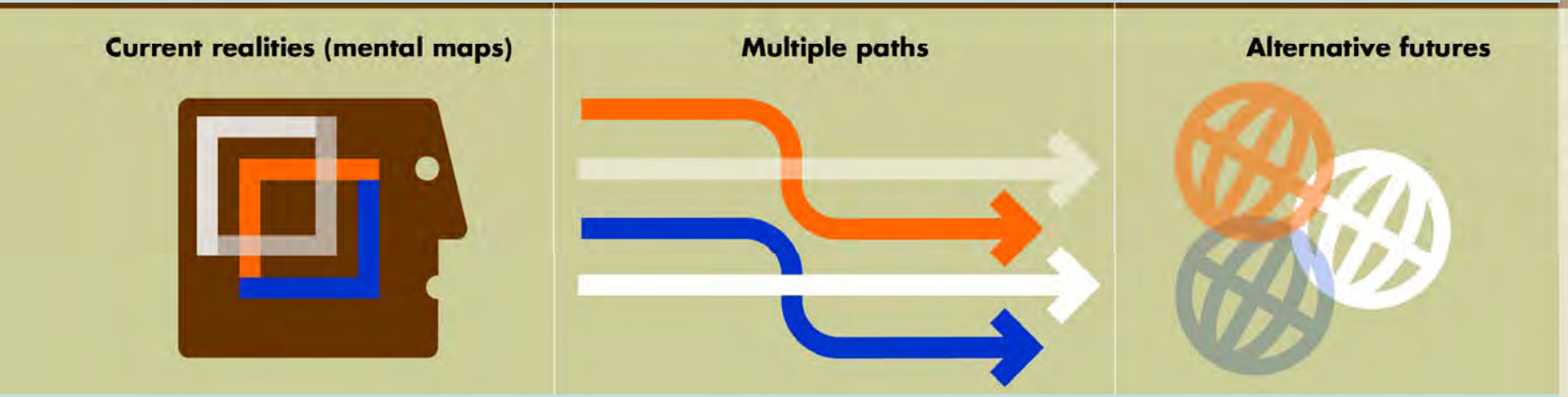
Scenarios to explore alternative futures (Quest_Fish, U.K. NERC)

Tends to remove discussion of uncertainties



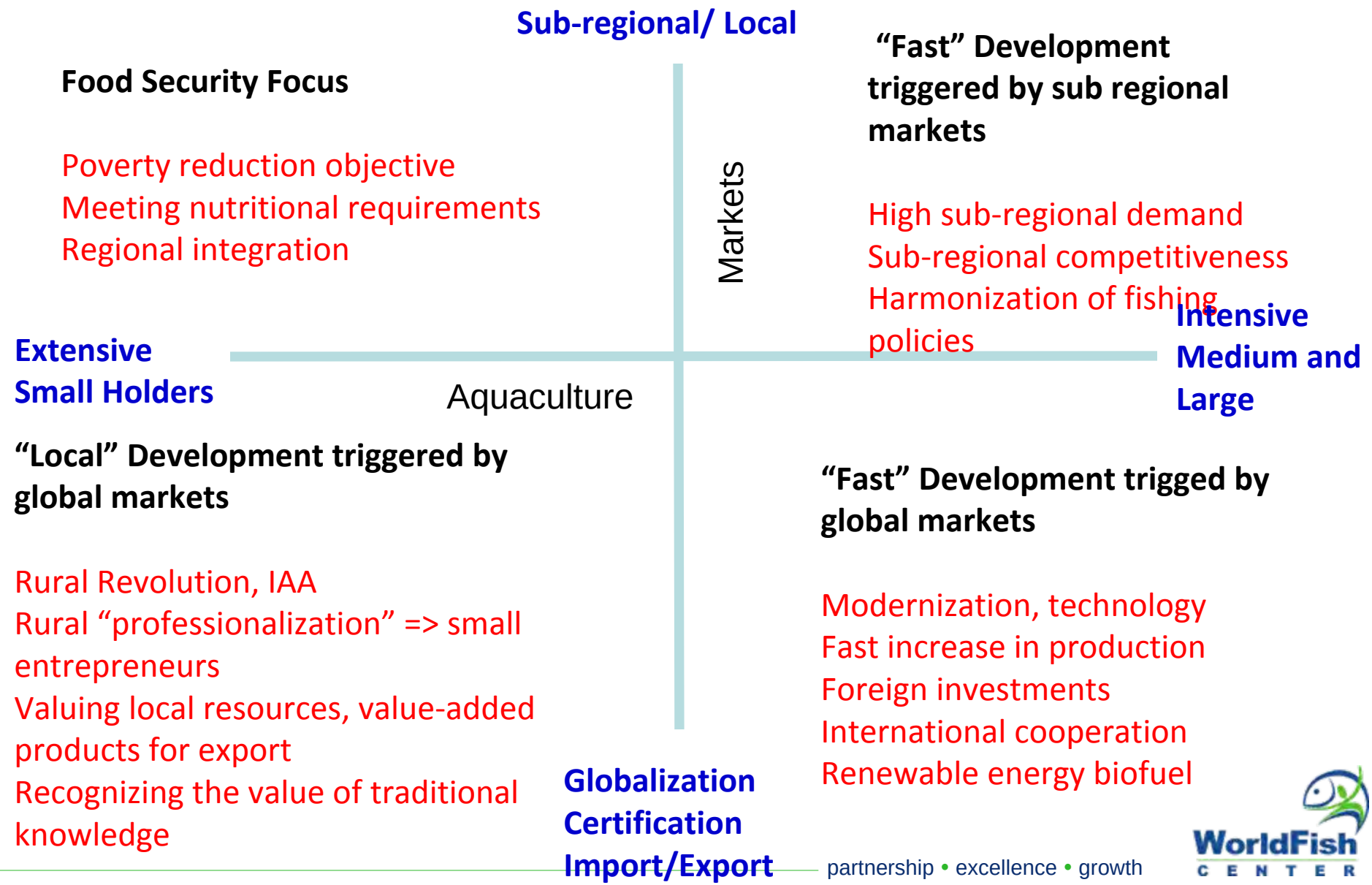
Critical Uncertainties addressed

Adapted from Shell 2050 vision

Scenarios West Africa

- Senegal, Ghana and Mauritania (ZMT/GTZ/IDRC)
- In total 27 experts surveyed to identify major drivers of change
- Scenario building workshop 13th to 16th of April 2010
- Debates about possible futures of fisheries and discussed critical issues and uncertainties faced by the sector
- Identification of strategies that could address uncertainties related to drivers including climate change

Scenarios West Africa



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Scenarios West Africa: youth and arts

• Youth from Kayar (Senegal) fishing community involved in identifying drivers of change through visual arts (with NGO Mundis Maris)

•Important to involve marginal group such as youth in discussions about vulnerability to climate change and future of the sector

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Synthesis

- Climate change is not a distraction from strengthening fisheries governance
- Most adaptive responses to climate change have ‘no regrets’ for both environment and development
- The ICES/PICES/FAO group has a large and impressive toolkit with which to advise decision-makers on responses to climate change

Thank you

Marie Caroline-Badjeck

Kam Suan Pheng

Quest_Fish team

Partners in West Africa and Vietnam

UK NERC, World Bank, GTZ FAO/PacFA