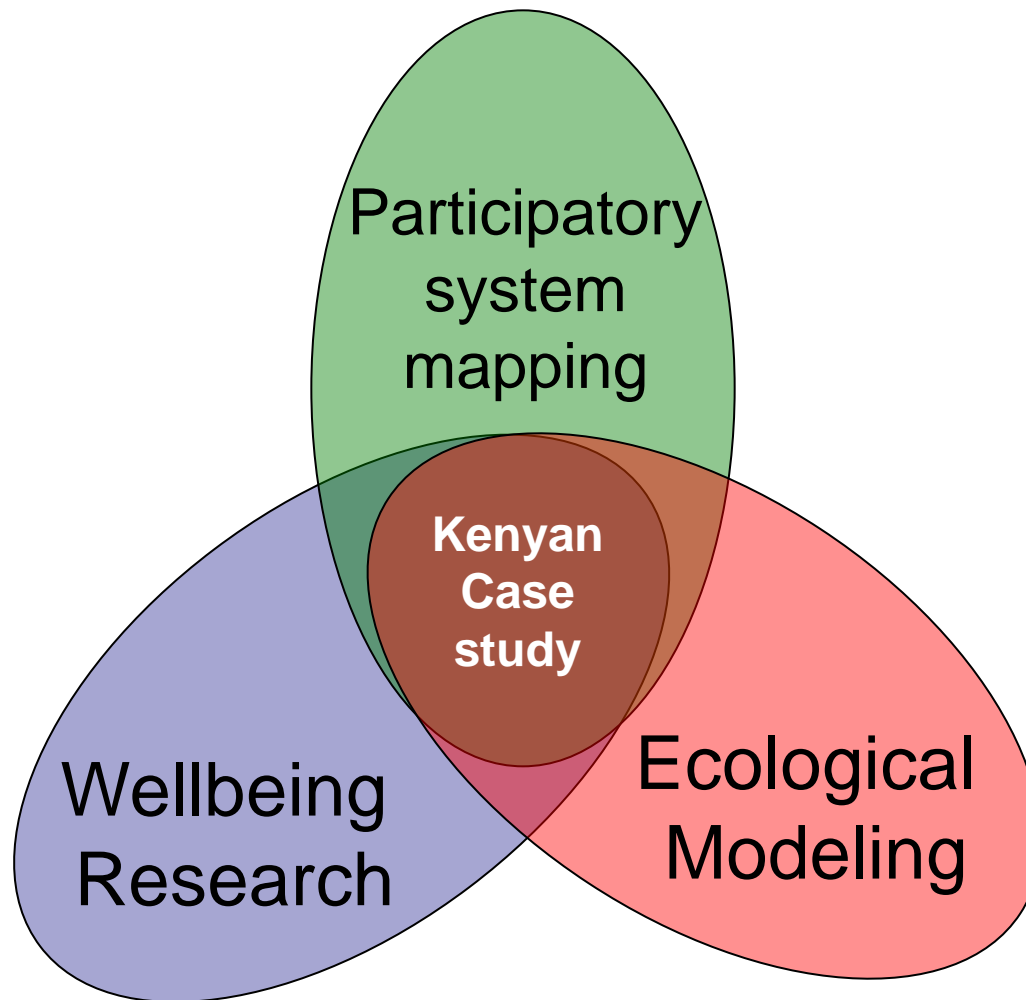
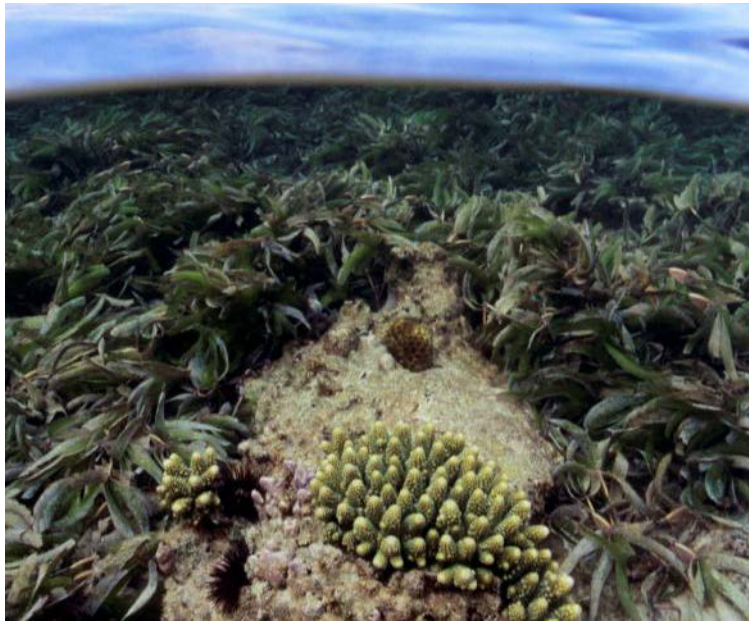
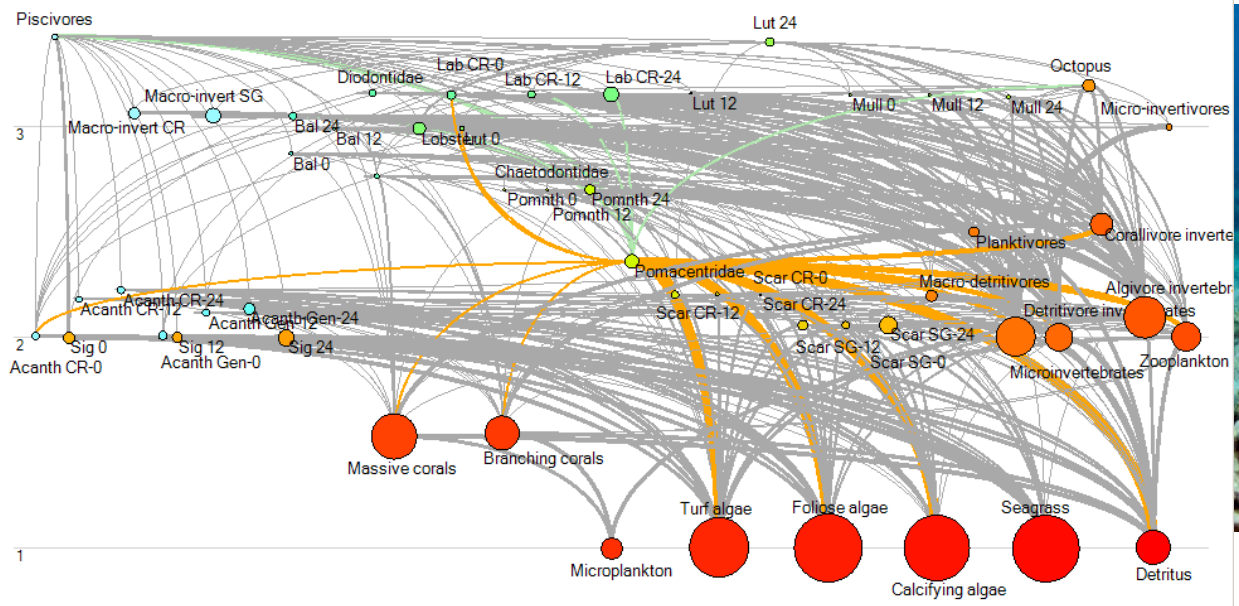


# Participatory Modelling of Wellbeing Trade-offs in Coastal Kenya (P-Mowtick)





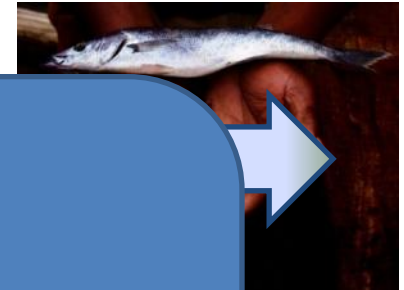
Ecological Modeling

# Tradeoffs in the fishery (Ecopath optimisations)

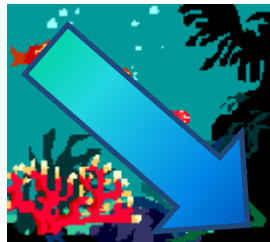
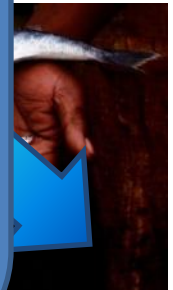
Economic  
Profits

Ecological  
status

Food  
production



But what are the wellbeing implications of these trade-offs?







Kenyan  
Case  
study

Wellbeing  
Research

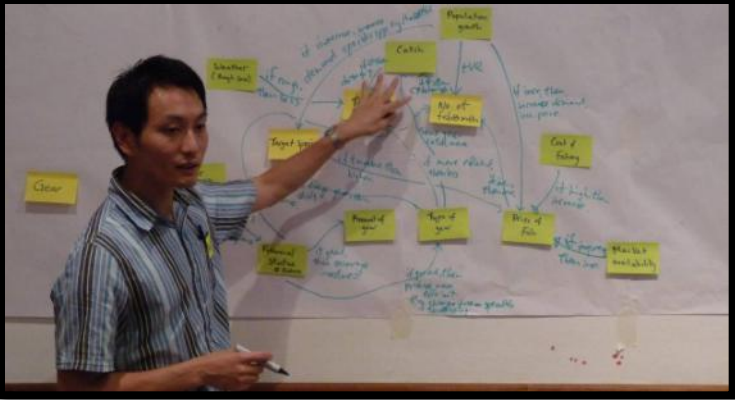


# Different stakeholders rely on different types of fish

- 'Mama karangas' rely on small fish (mostly caught by beach seine) to sell to local residents

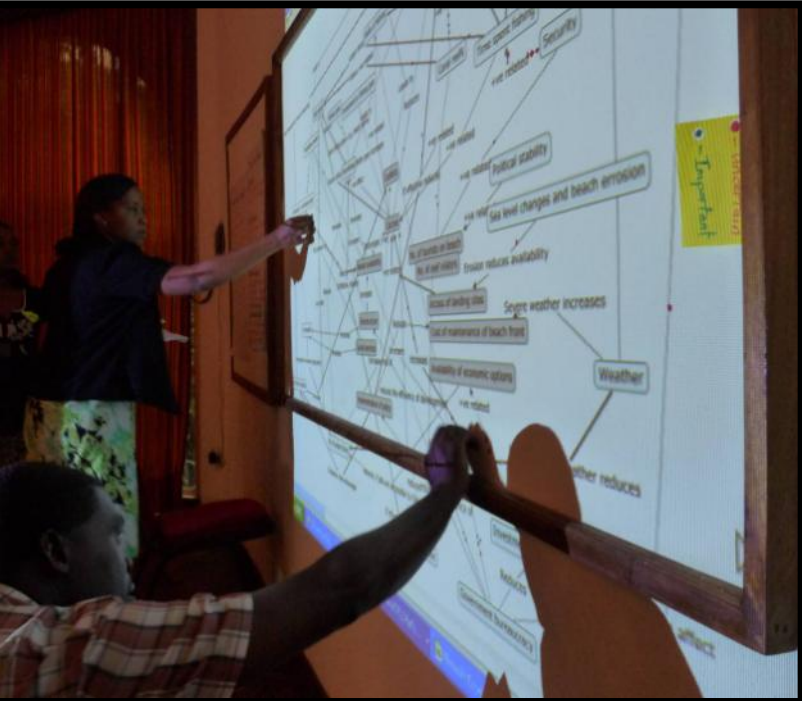




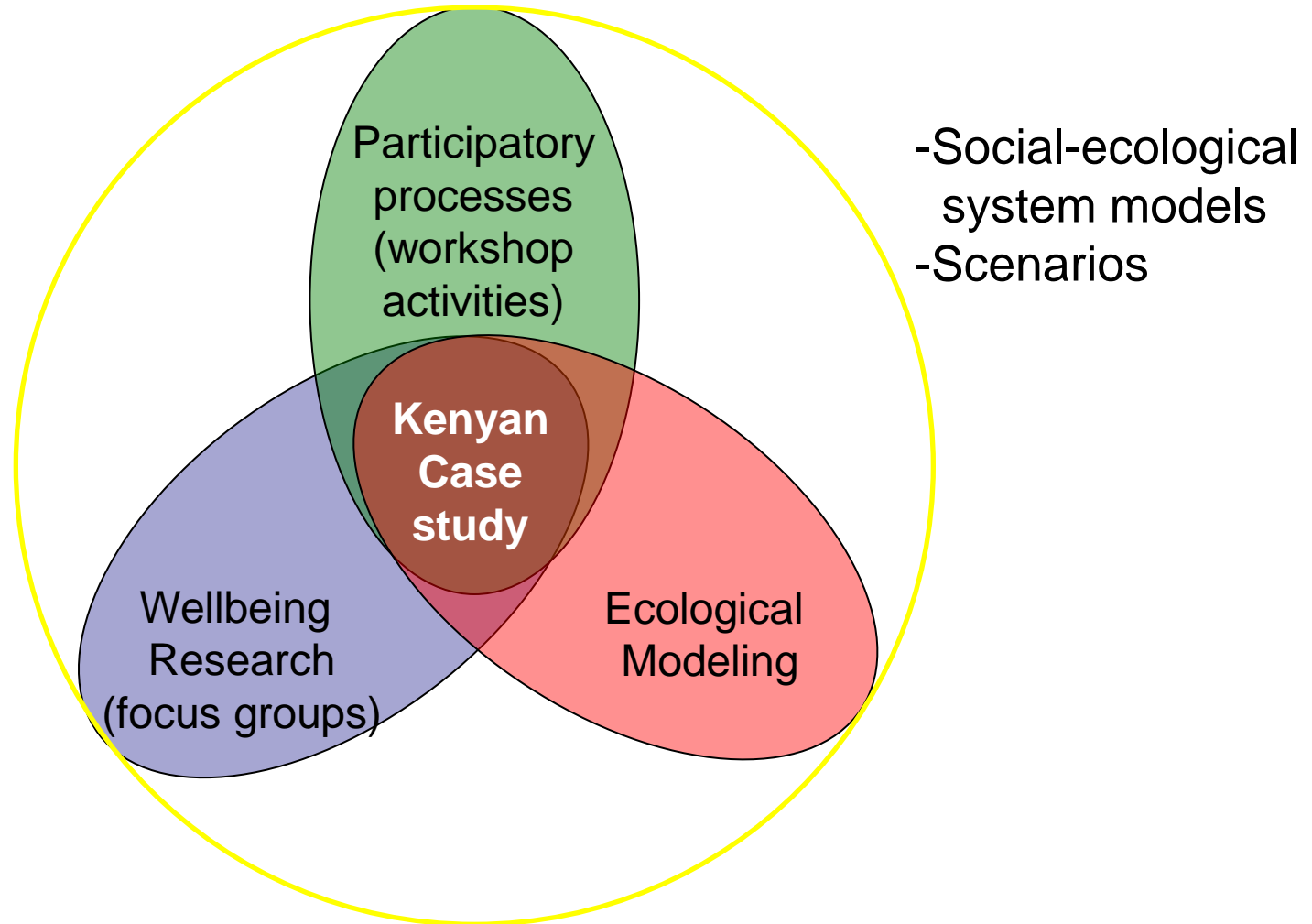


Participatory  
system  
mapping

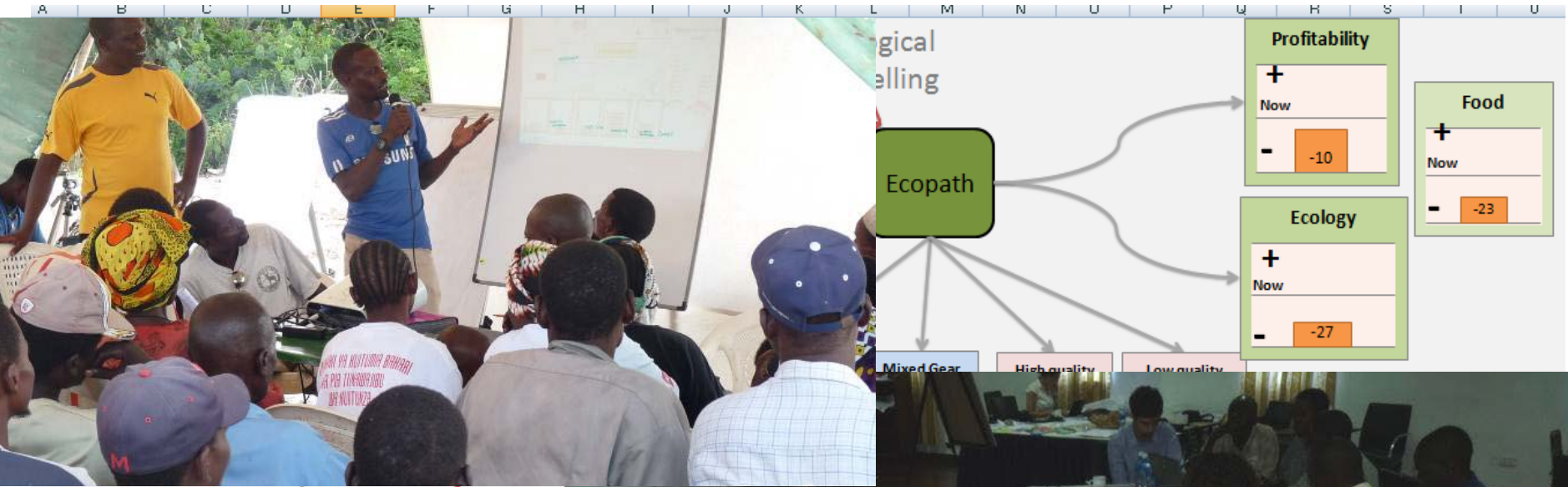
Kenyan  
Case  
study



# Participatory Modelling of Wellbeing Tradeoffs in Coastal Kenya



# System 'toy model'



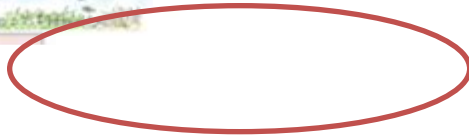
50







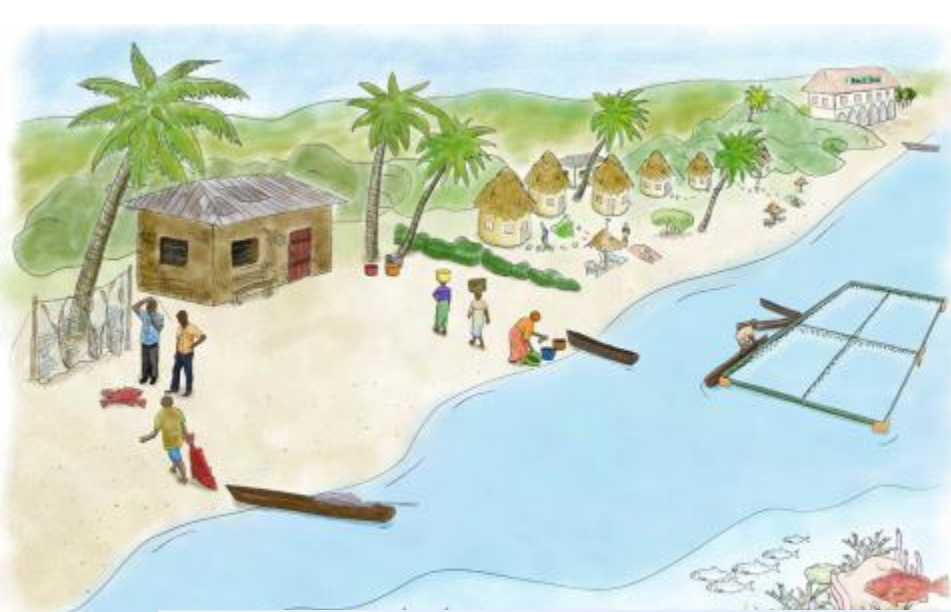
Illegal gear  
More employment



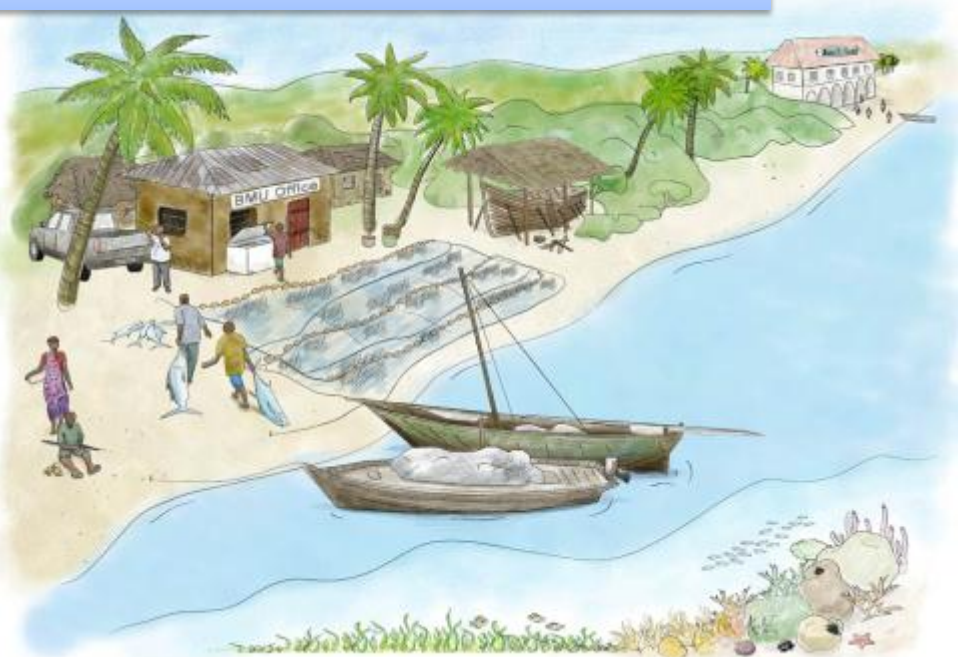
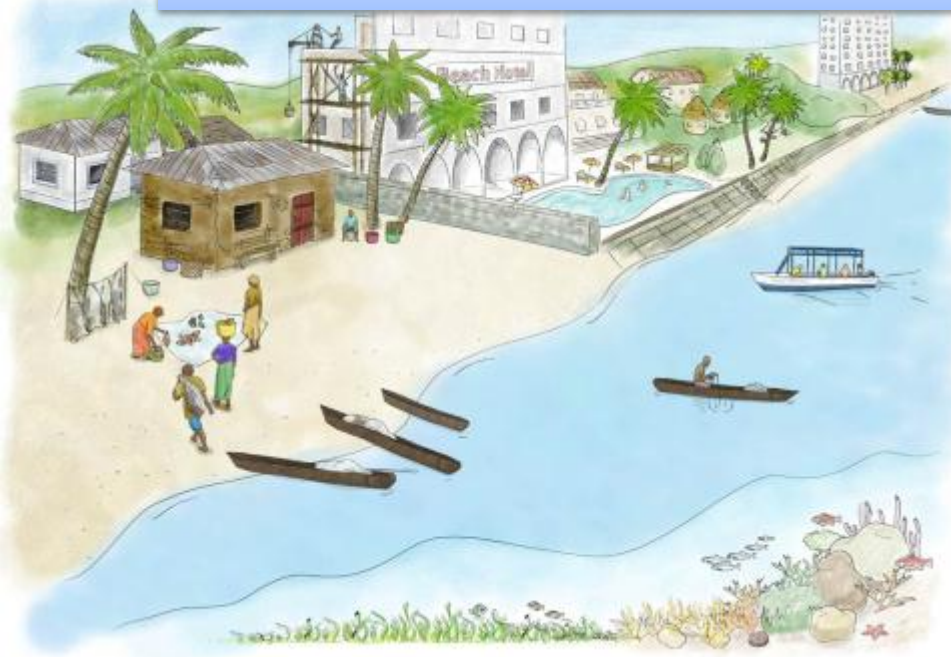
Lower effort



... the poorest stakeholder  
(women traders) rely on high  
volumes of cheap fish...



Scenarios: Storylines of future trajectories



# Conclusions

- Trade-offs and hard choices exist
- Need to directly study wellbeing of different types of people
  - Identify most vulnerable to change
  - Identify groups likely to block change
- Models help communicate trade offs that exist
- Scenarios allow thinking beyond the model
  - consideration of how to ‘transform’ the system



# Participatory Modelling of Wellbeing Tradeoffs in Coastal Kenya

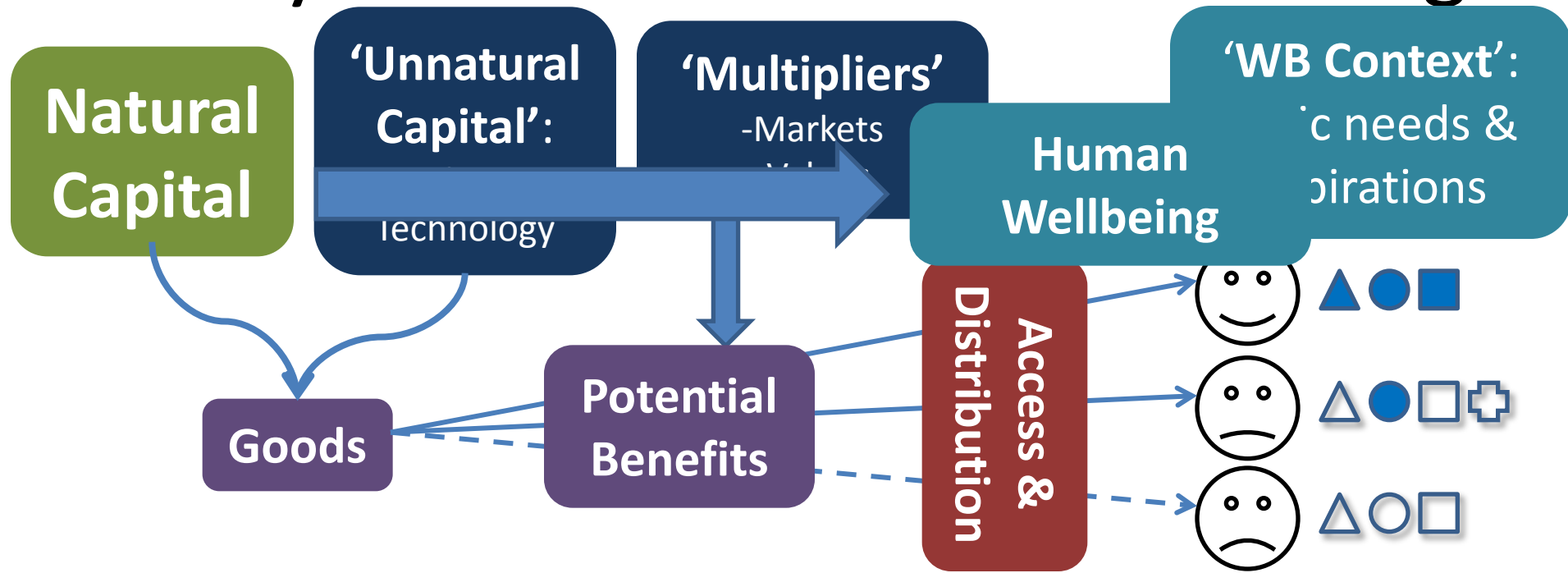
## Tradeoffs, optimising and thinking outside the triangle

Tim Daw, Sara Coulthard, William Cheung, Kate Brown,  
Tim McClanahan, Diego Galafassi, Caroline Abunge,  
Johnstone Omukoto Omuhaya, Garry Peterson, Carlos  
Ruiz, Amini Tengeza, Lydia Munyi





# Ecosystem Services and Well-being

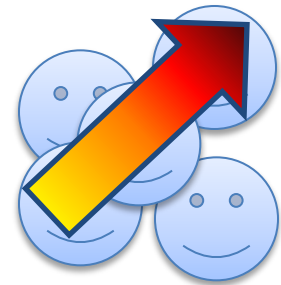
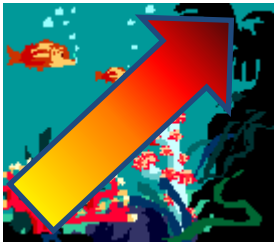


- Millennium Assessment definition is about WB
- Relationship is poorly understood and contingent on many factors
- Aggregated analysis can't say much about WB



# Trade-offs in Ecosystem Services (& Fisheries)

- Common focus on win-win
  - Alignment between conservation, and wellbeing



- Trade-offs often not considered
- Wins & losses for particular groups may be hidden

# Ecological modelling

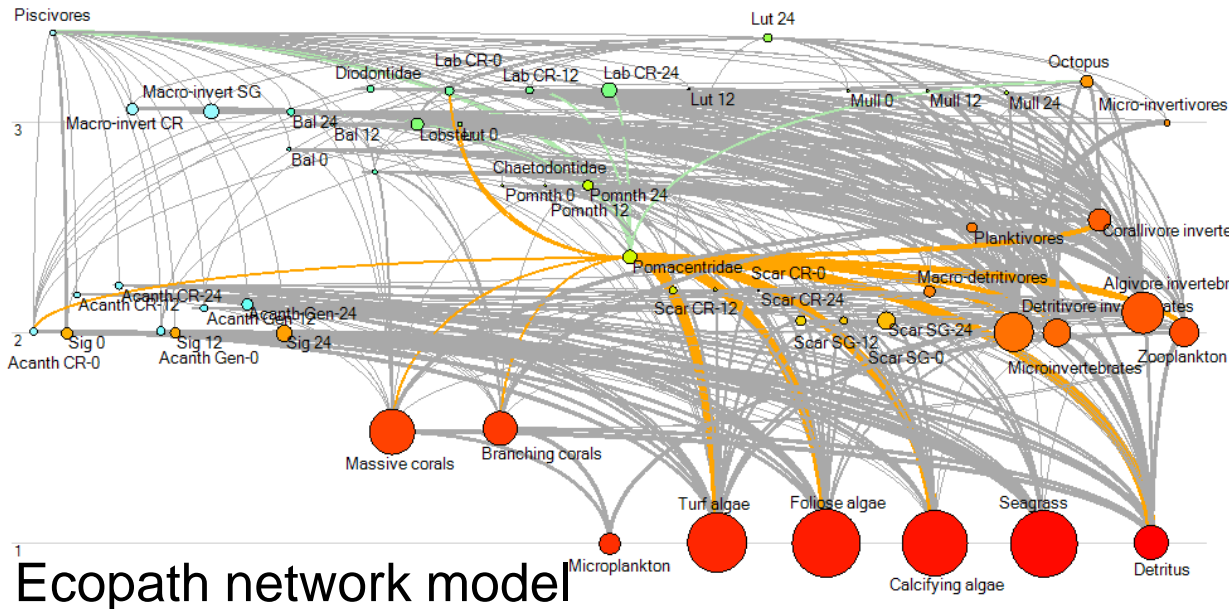
Ecological  
Modeling

## Two biophysical models of the reef/fishery

- Ecopath with Ecosim
- Stella model of reef dynamics

## Specific Questions


- Ecosystem service delivery
  - Fish
  - Environmental quality
- Effects of fishing by different gears



Ecopath with Ecosim



# Wellbeing research



Wellbeing  
research

- **Focus on fisheries stakeholders**
  - Multi-gear users (hand line, spear gun, nets, traps),
  - Beach seine fishermen
  - Beach seine captains
  - Women fishmongers
  - Male fish traders
- **What is wellbeing for these people?**
- **How easy is it to be well?**
- **How do ES (provisioning, fisheries) contribute to WB?**



# Wellbeing research

## Key changes that affect accessibility of wellbeing

Reduced fishing ground (creation of park).

Beach development (private and public) and lost beach space

Increased number of fishers- + competition

Bad government policies which are not creating jobs,

Environmental changes (coral reef change, more sea urchins and less sea grass)



## General accessibility for that group of people

1= easy

2= somewhat easy

3 - difficult

4= impossible

## Things that are important for living well

Money

Good job

'A developmental mind' (knowledge, education)

Savings

Property

Donor/ start capital

Decision-making capacity

Planning

Good fishing gears

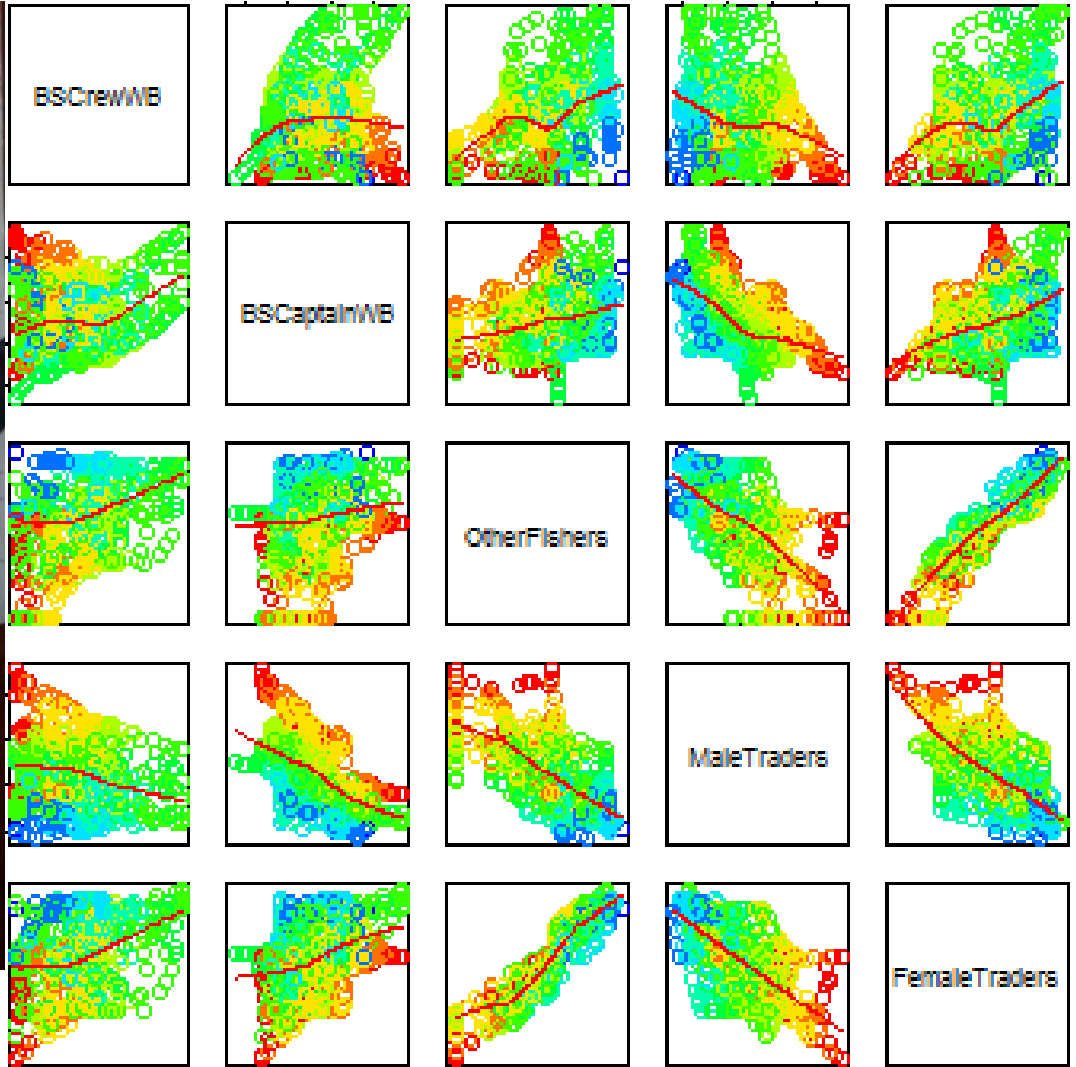
Health

Good neighbours



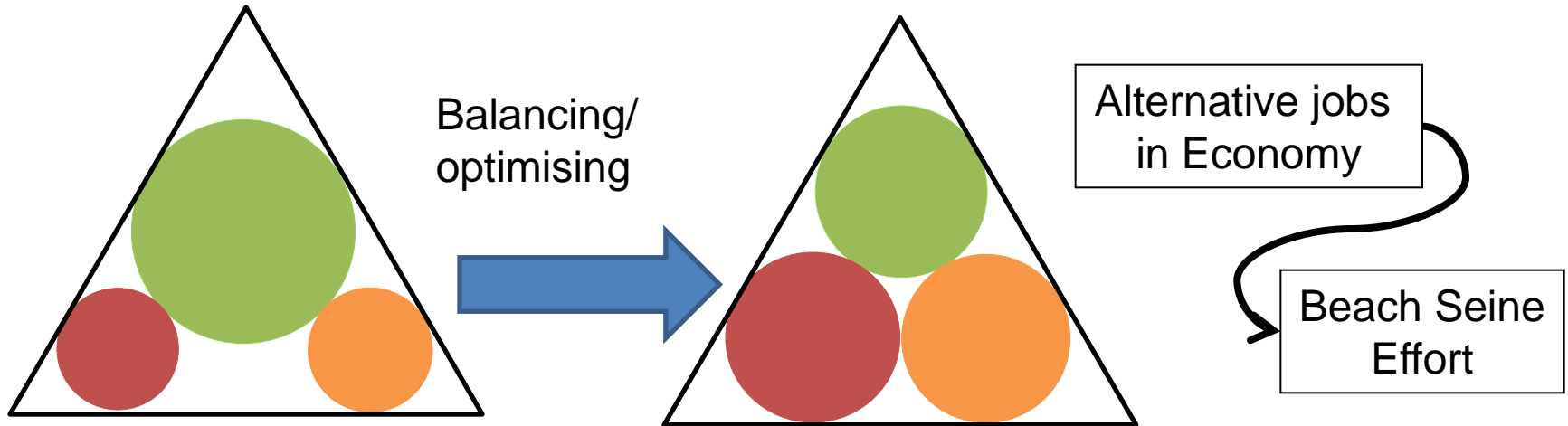
# Trade-offs as described by 'Toy Model'

	MAXIMIZE \$	MAXIMIZE #	MAXIMIZE \$	MAXIMIZE \$	MAXIMIZE \$	MAXIMIZE \$	MAXIMIZE \$
	BScrew	BScaptain	Mixed fish	Female fish	Male fish	Ecology	Food
Population	52	100	12	180	12	75	75
Governance	0	0	49	0	49	20	60
Economy	51	100	78	5	78	33	33
Tourism	39	0	41	2	40	73	73
BScrew	9	-21	-25	-21	-25	-25	-25
BScaptain	10	40	1	-21	1	-45	-05
Other	-50	-1	23	-50	-23	-50	00
Female fish	2	19	-	35	-31	-16	20
Male fish	-25	0	22	-19	22	-46	10
Ecology	25	14	16	14	16	38	38
PROFIT	17	10	3	10	3	9	05
FOOD	-29	-23	-30	-23	-30	-54	-54





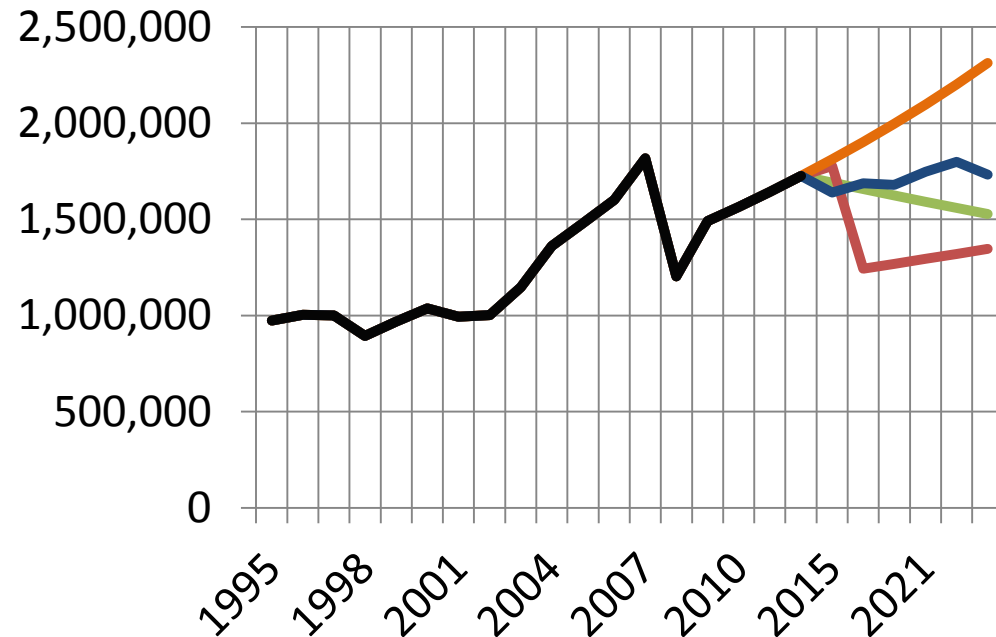
# What the model can explore



- What about changing the system?
- What about human agency, responses and feedback in the system?
- What about other stakeholders, other variables?

Drivers			Effects				
	Politics	Economy	One offs	Gears	Demand	Immigration	Tourism
A	Top down Less emphasis ind. Rights Strong env. Lobby and regulation	Low	Global slowdown Low climate change aquaculture	No BS	Low	Low	Ltd investment
B	Strong ind. Rights Populist policies High participation/decentr.	Low growth	Drought Land tenure given healthcare + education pressure on services Eutrophication?	BS	High	High	Less
C	Pro business govt. Low tax Inequality	Booming Foreign investment	Infrastructure Conflict risk Pollution? Beach erosion	Mix	High	High	Expansion
D	Accountable	Growth	Fisheries infrastructure Bleaching	Ring nets, migrants, locals?	Low fish price	low?	

## Mombasa visitors



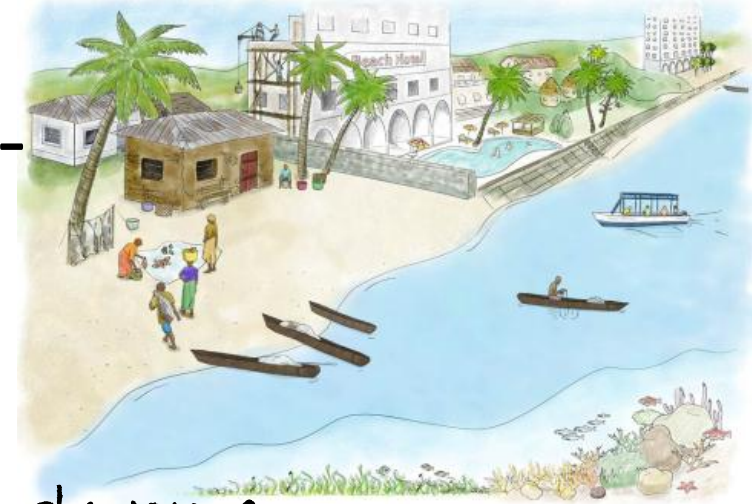
## Outcomes

	Ecology	Catch	Fisherman	Fish Types
A	High	Low catch, high CPUE	Low	High and quality
B	Low	High	High	Low quality
C	Med	Med catch, high CPUE	Med	Med quality
D	?	High and variable	Low-reef, high off-shore	high quality, large

# Policy Responses to the Scenarios, considering trade-

## • Economic growth Scenario

- Action: Enforce regulations
- Losers: Beach seine fishers and women fishmongers
- Facilitate alternative livelihoods
- Women fishmongers are marginalised and hard to integrate into alternatives
- Response: legislation to promote access to fish for women fishmongers, or fish prices
- Resultant trade-off: Fishermen and women fishmongers



# Many thanks

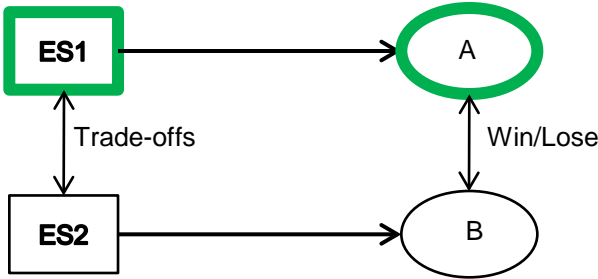
- Ecosystem Services and Poverty Alleviation (ESPA programme)
- Wildlife Conservation Society
- KMFRI, Kenyan Fisheries Department, Kenya Wildlife Services
- All workshop and focus group participants



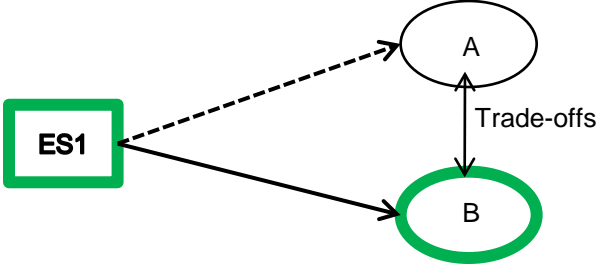


# Tradeoffs in Ecosystem Services

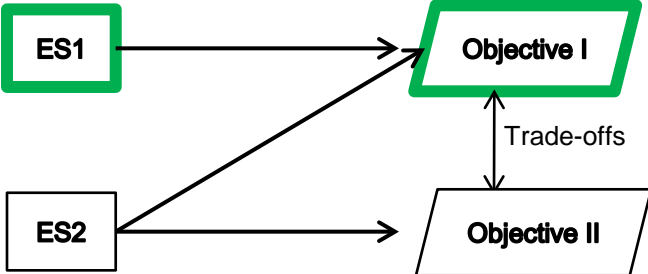
Between different ES...



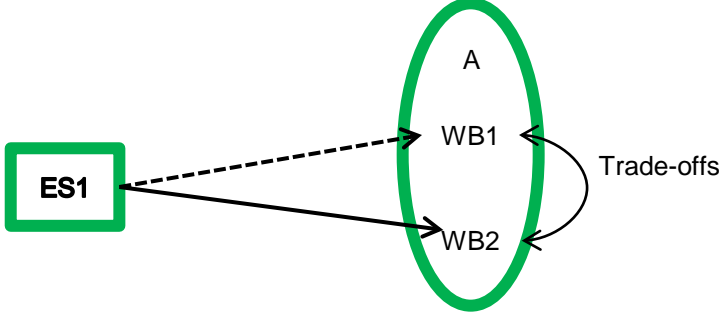
different stakeholders...



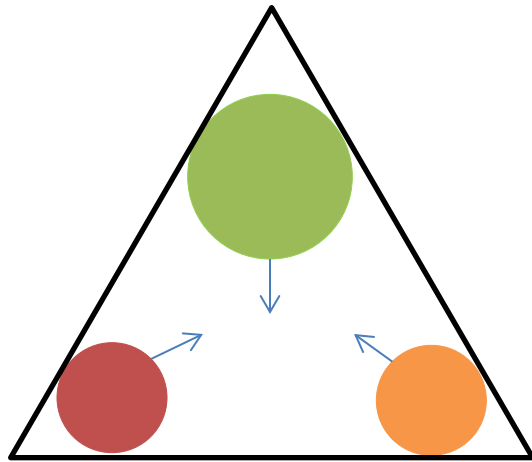
aggregate objectives...



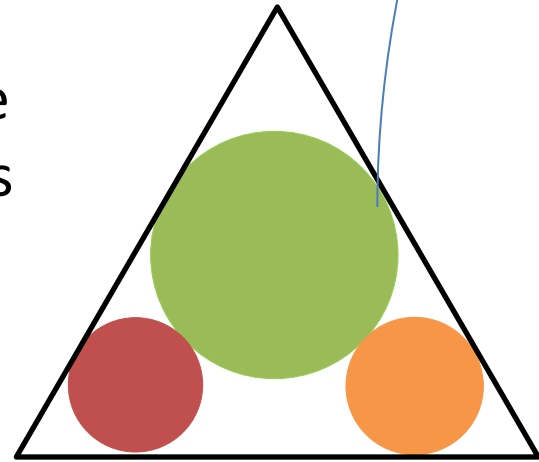
different aspects of WB...



# Trade offs within the system o

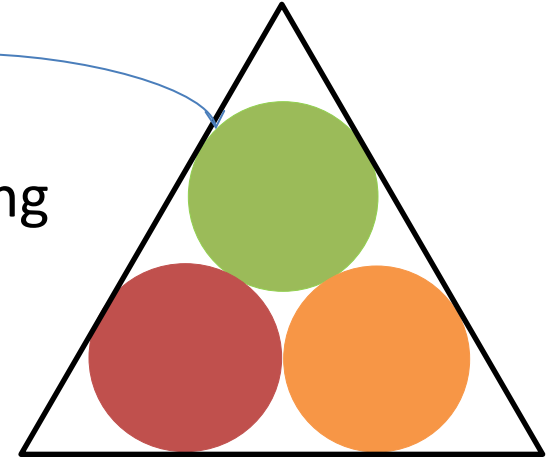


Sub optimal  
Wins still possible  
without tradeoffs



Pareto optimal system

Balancing



Pareto optimal  
Tradeoffs

