A participatory tool for estimating future impacts on ecosystem services and livelihoods in Torres Strait

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Outline

- Context: Torres Strait

- Research objective

- Participatory workshop process

- Scoring of Ecosystems Goods and Services (EGS) and sensitivity of EGS

  – Cumulative potential impact scoring

- Strengths and limitations of the approach

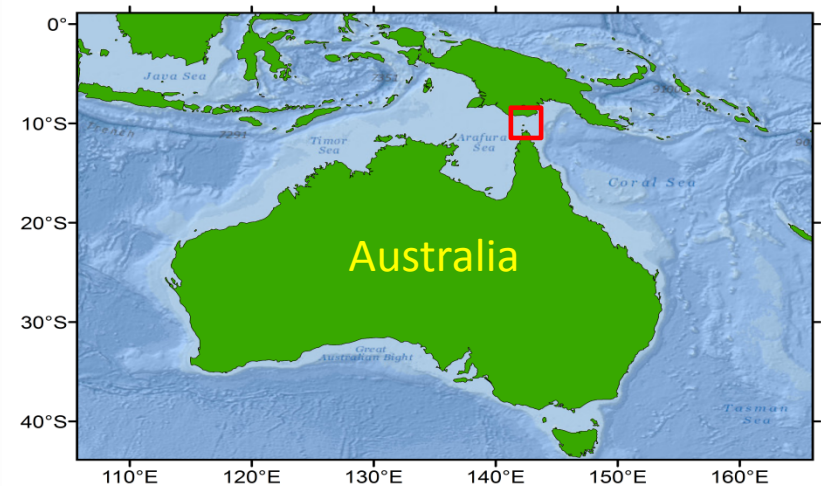- Adaptation planning, concluding statement

Torres Strait – Indigenous community with strong connection to land and sea
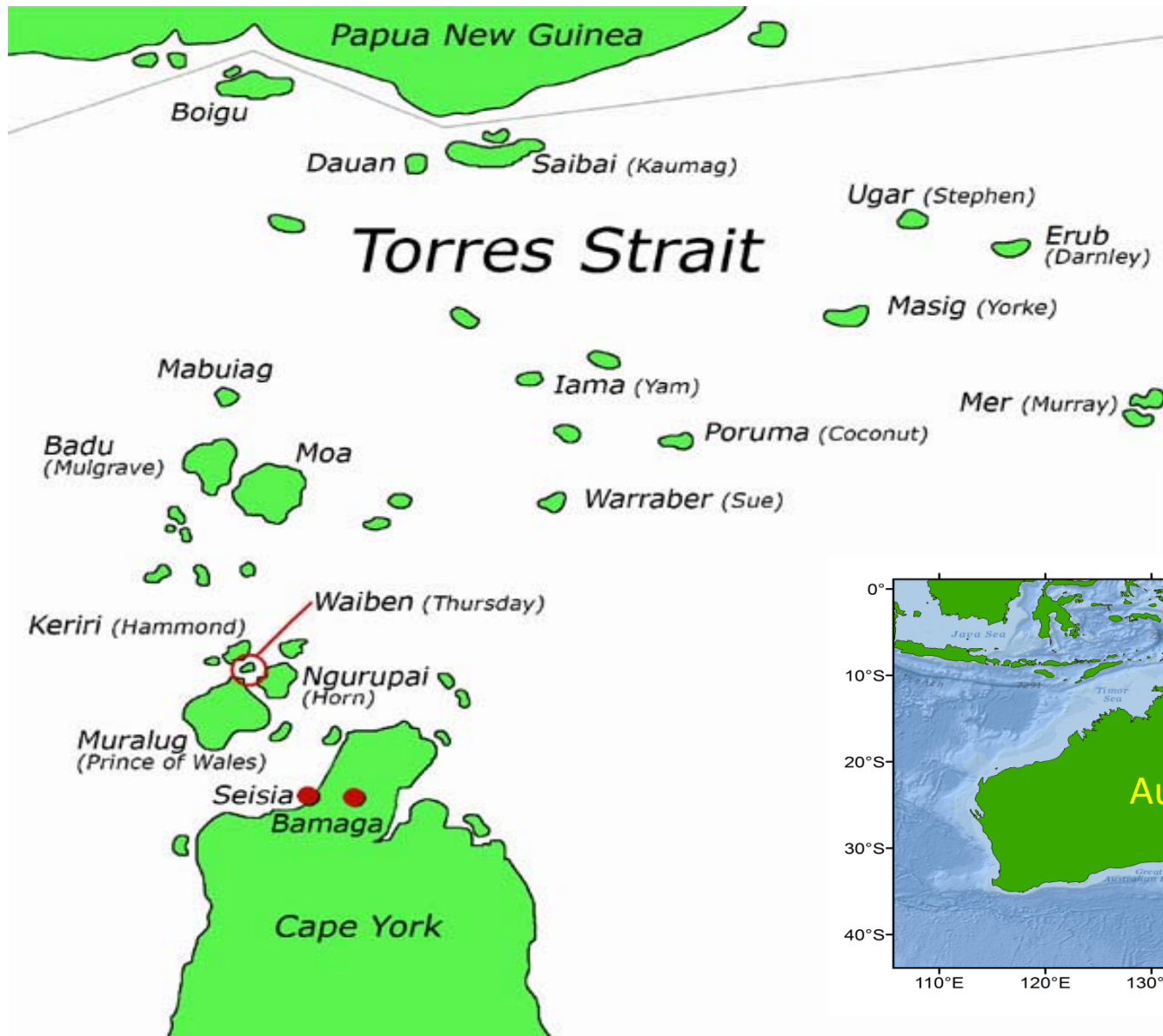
Key policy stakeholders: Torres Strait Regional Authority

Remoteness: challenge being heard by government

Torres Strait - Community

Unique cultural practices, strong leaders, supporting future generations

Torres Strait – front line of climate change

Policy makers

Locals

Call to action

Torres Strait map

The Torres Strait is a strategically important region of the Australian coastline
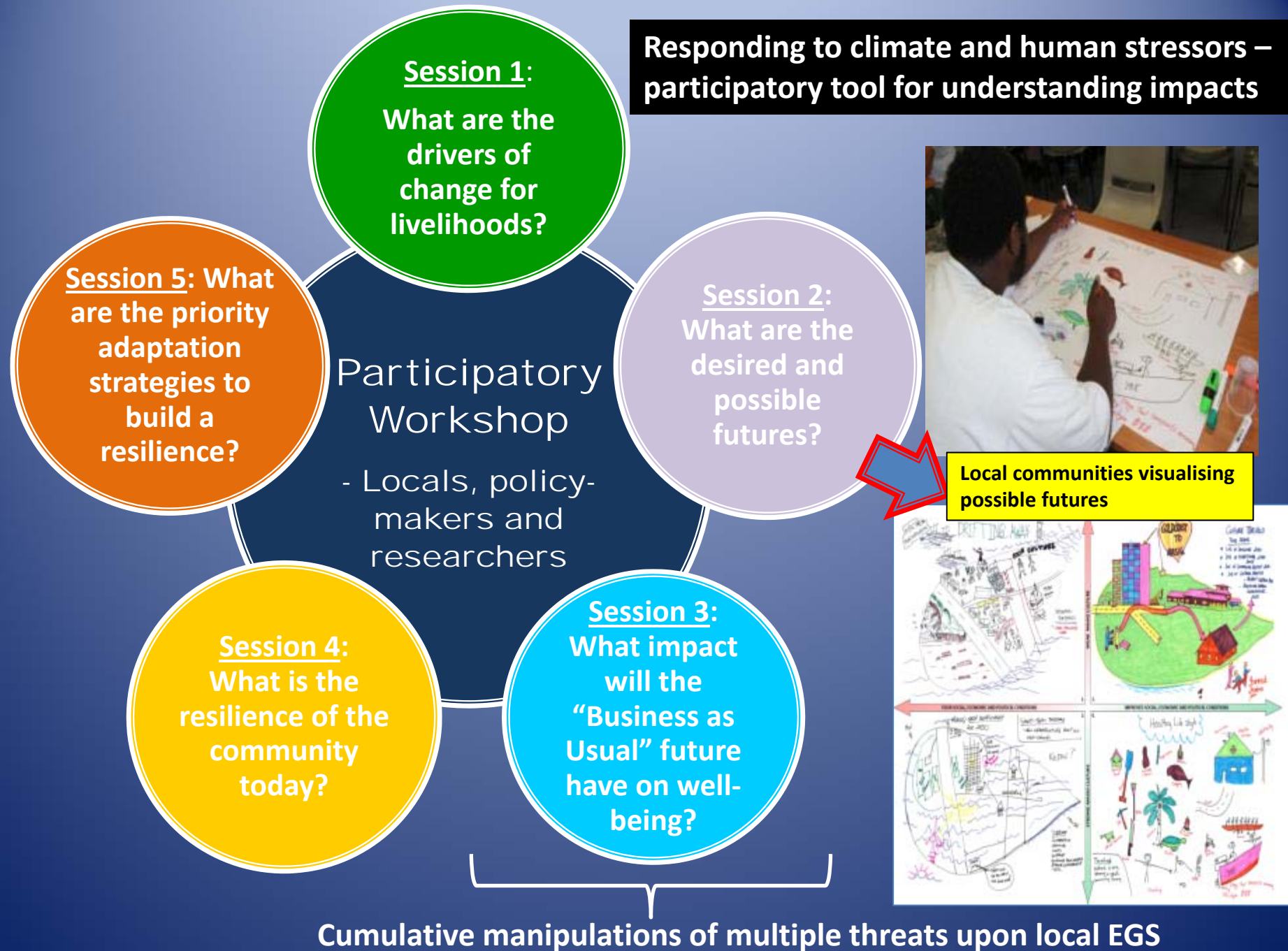
Research objective

"To provide the tools for effective planning and adaptation"
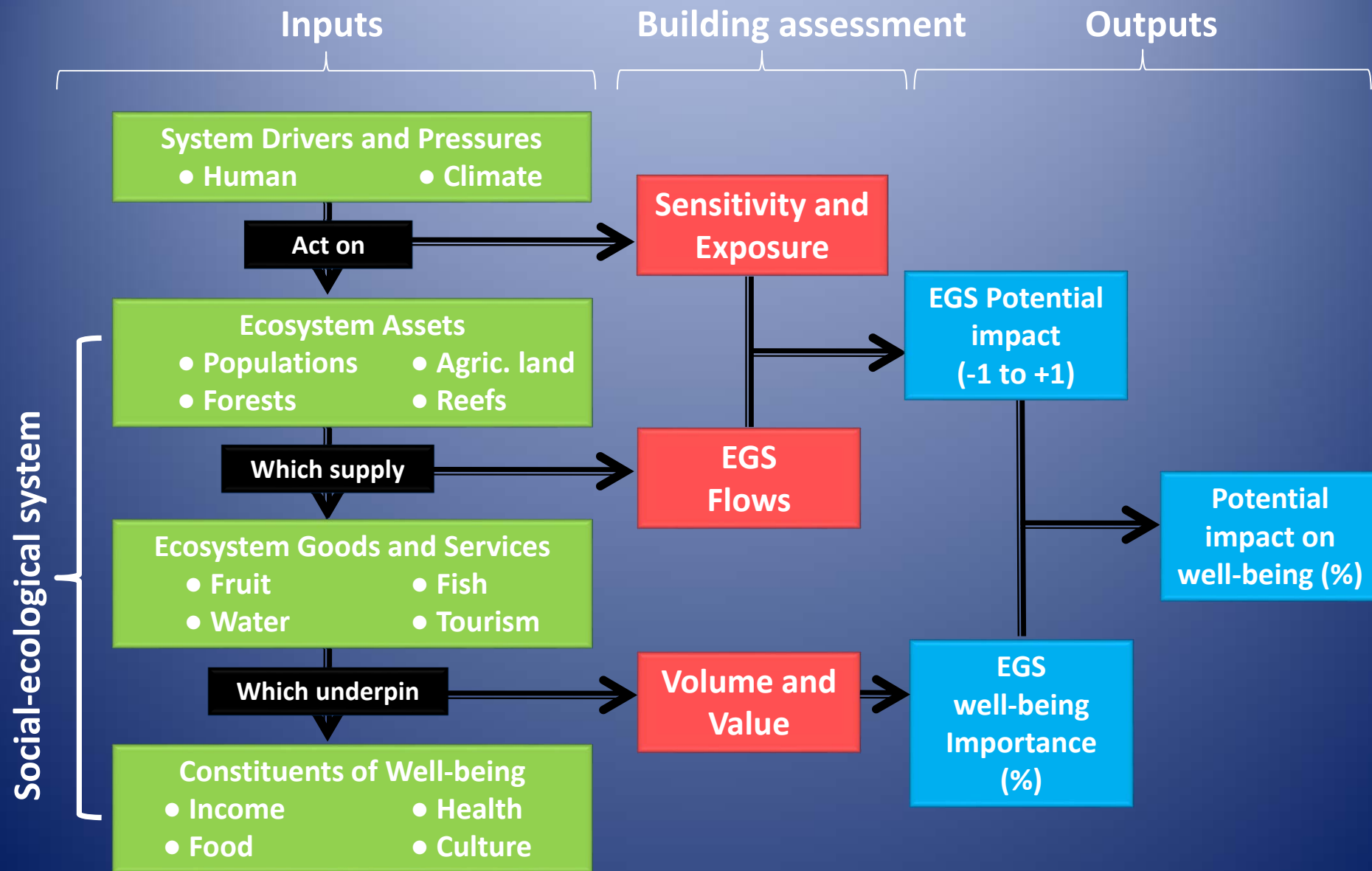
Focus/requirements:
- **Participatory tool for estimating future impacts on ecosystem services and livelihoods**
- **Developing a system (holistic) approach**
- **Social-ecological system**
- **Work closely with key stakeholders (TSRA)**

Responding to climate and human stressors – participatory tool for understanding impacts

Session 1:
What are the drivers of change for livelihoods?

Session 5: What are the priority adaptation strategies to build a resilience?

Participatory Workshop

- Locals, policy-makers and researchers

Session 2: What are the desired and possible futures?

Session 4: What is the resilience of the community today?

Session 3: What impact will the "Business as Usual" future have on well-being?

Local communities visualising possible futures

Cumulative manipulations of multiple threats upon local EGS

Cumulative manipulations of multiple threats upon local EGS

Inputs

Building assessment

Outputs

Social-ecological system

System Drivers and Pressures
- Human
- Climate

Act on

Sensitivity and Exposure

Ecosystem Assets
- Populations
- Agric. land
- Forests
- Reefs

Which supply

EGS Flows

EGS Potential impact (-1 to +1)

Ecosystem Goods and Services
- Fruit
- Fish
- Water
- Tourism

Which underpin

Volume and Value

Potential impact on well-being (%)

Constituents of Well-being
- Income
- Health
- Food
- Culture

EGS well-being Importance (%)

System Drivers and Pressures

- **"Business as usual" pressures**

Climate (Scenario A2, medium-high emissions)

- – **Temperature, SST**
- – **Rainfall**
- – **Sea level rise**
- – **Acidification**

Climate modelling for Torres Strait:
- **Kevin Parnell (JCU)**
- **Jack Katzfey (CSIRO)**
- **Suppiah Ramasamy (CSIRO)**
- **Wayne Rochester (CSIRO)**

Human (Population growth - current trajectory)

- – **Utilisation**
- – **Land use**
- – **Pollution**

Ecosystem goods and services

Agricultural

Banana
Betel nut
Cassava
Chickens
Coconut
Garden vegetables
Mangoes
Pawpaw
Pigs (domestic)
Rice
Sago
Sweet potato
Taro
Yams

Estuarine

Barramundi
Barramundi (aquaculture)
Crabs (blue)
Crabs (mud)
Crocodiles
Crocodiles (farmed)
Finfish coastal (trevally, mullet etc)
Mangrove timber

Forest

Birds
Non-timber building material (palms)
Pigs (wild)
Rusa deer
Rusa deer (farming)
Timber for building/boats/sale
Wallabies

Freshwater

Finfish (tilapia, snakehead)
Prawn (Macrobrachyia)
Saratoga
Water (fresh and rainwater)
Water (ground)

Marine

Dugong
Finfish pelagic (queenfish)
Mackerel
Pearlshell (aquaculture)
Pearlshell (goldlip)
Prawn (banana, tiger)
Rock lobster
Sponge (aquaculture)
Sponge (wild)
Tourism (fishing)
Turtles (flatback)
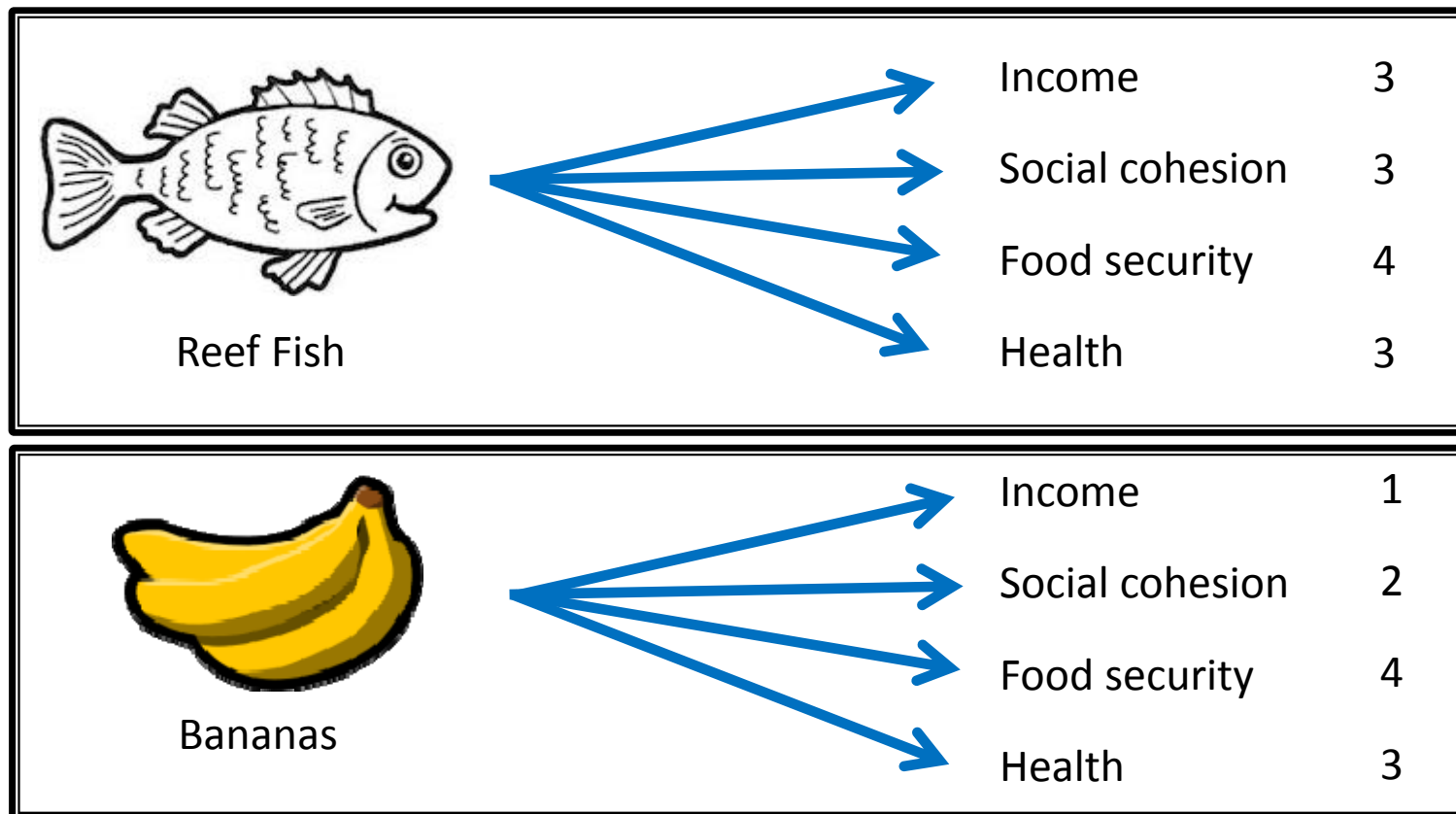Turtles (green)
Turtles (hawksbill)

Reef

Beche-de-mer
Clams (Tridacnid)
Coral lime
Other molluscs (and from mangrove)
Reeffish
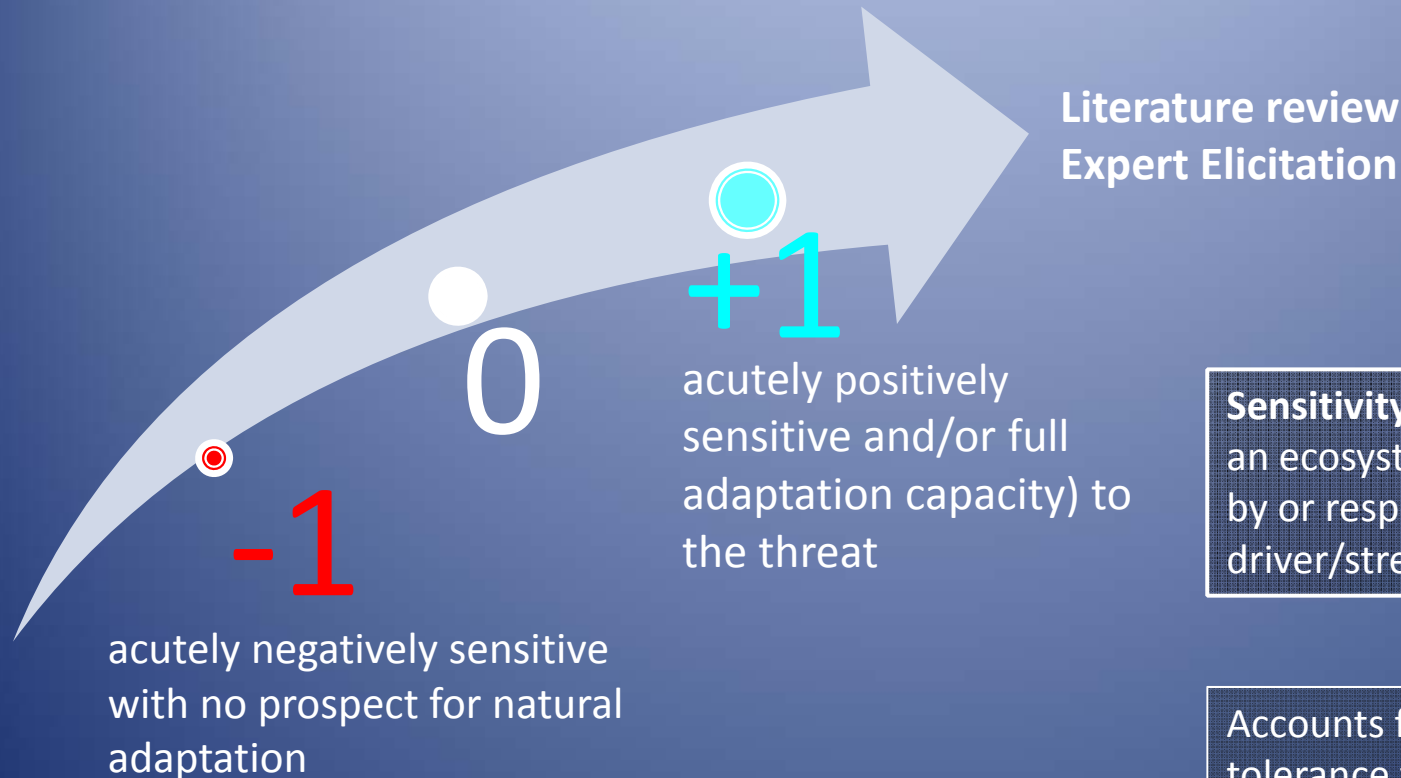Sharks and rays
Tourism (reef)
Trochus

55 EGS in total

EGS Values to Well-being

Value of each EGS to the four Constituents of Well-being (CoWBe) scored from (0 – 5)

Reef Fish	Income	3
	Social cohesion	3
	Food security	4
	Health	3

Bananas	Income	1
	Social cohesion	2
	Food security	4
	Health	3

Sensitivity of EGS to stressors

Sensitivity scored on a scale from:

Literature review
Expert Elicitation

+1

acutely positively
sensitive and/or full
adaptation capacity) to
the threat

0

-1

acutely negatively sensitive
with no prospect for natural
adaptation

Sensitivity: Degree to which
an ecosystem asset is affected
by or responsive to a
driver/stressor.

Accounts for factors such as
tolerance thresholds (some
marine species have acute
thresholds e.g. corals and other
species have a broader threshold
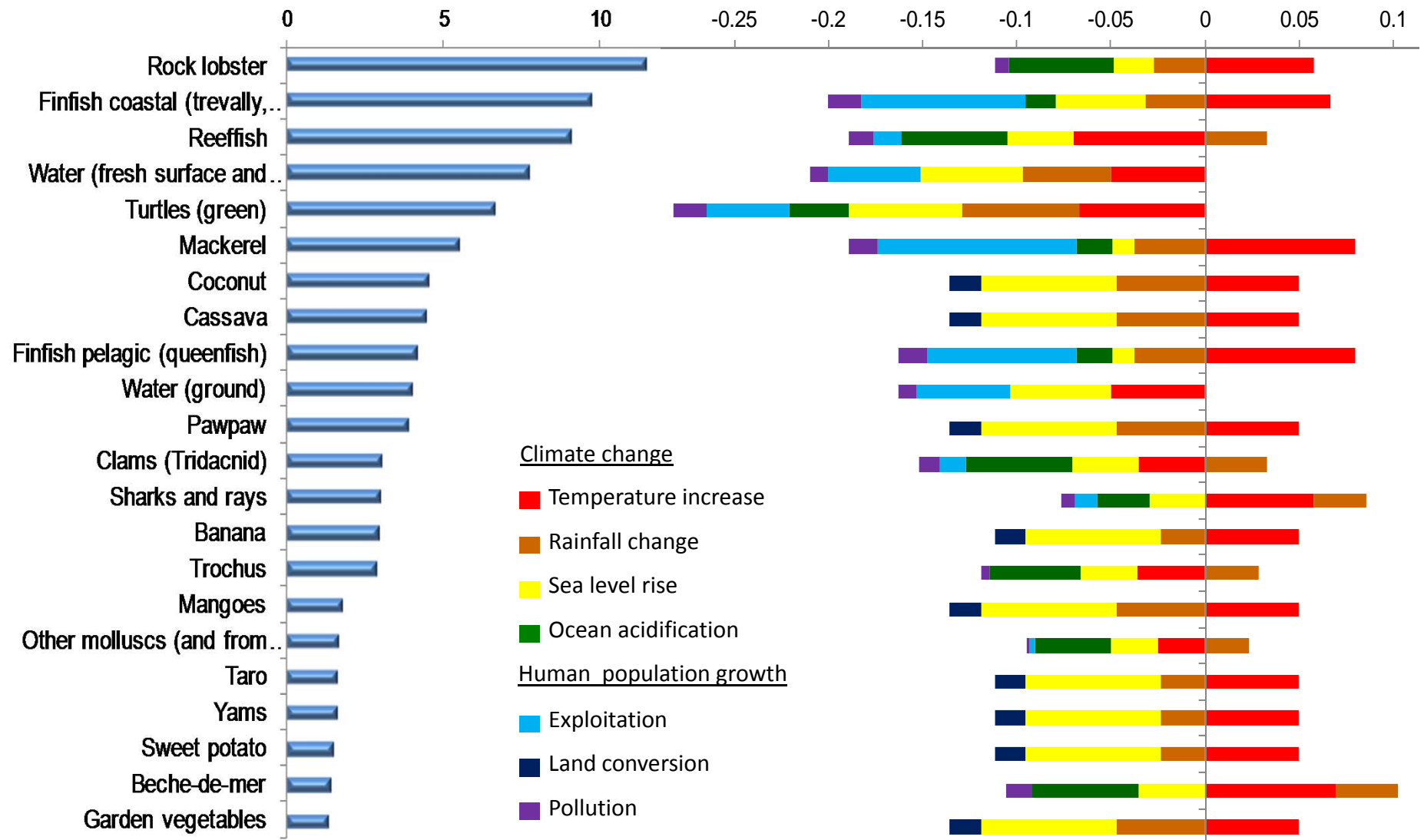e.g. crocodiles).

Matrix representation of components

Driver/Stressor	EGS				
	EGS Potential Impact				
	Cumulative potential impact				
	EGS Wellbeing Importance (%)				
	Potential well-being impact (%)				Overall well-being impact (%)

EGS Impact (2030) - Masig
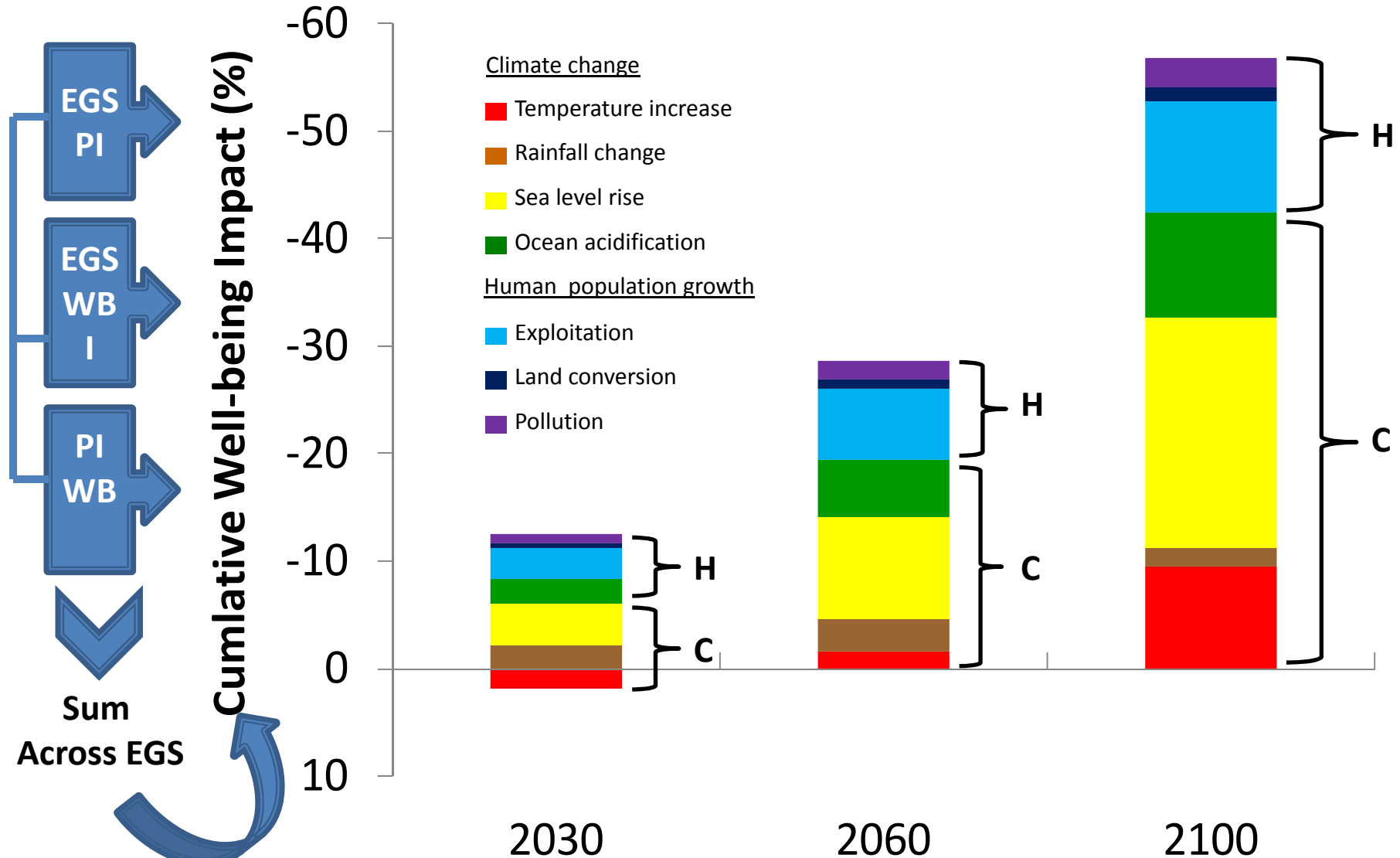
Limitations of approach

Subjective process
- Scoring of sensitivity
- Inevitable compromises with the breadth of factors

Uncertainty
- Future projections
- System dynamics

Openly discussed through verbal acknowledgement

Strengths of approach

Transparent
- EGS valuing defined by participants in workshop
- Well-being impact calculated in real-time at workshop

Relevant
- Outputs designed for helping formulate strategies
- "System approach" based on all natural resources used by communities

Replicable
- Methods and assumptions well documented
- Complexity low enough for rapid assessment

Credible
- Scrutiny-potential from peer community of stakeholders
- Outputs that is clear and understood by participants

Co-learning framework

Involvement of locals and policy makers
- **Workshops with locals and TSRA**

Viewpoints elicited through expert knowledge
- **Delphi approach**

Valuation of local ecosystem goods and services
- **Four constituents of well-being (CoWBe)**
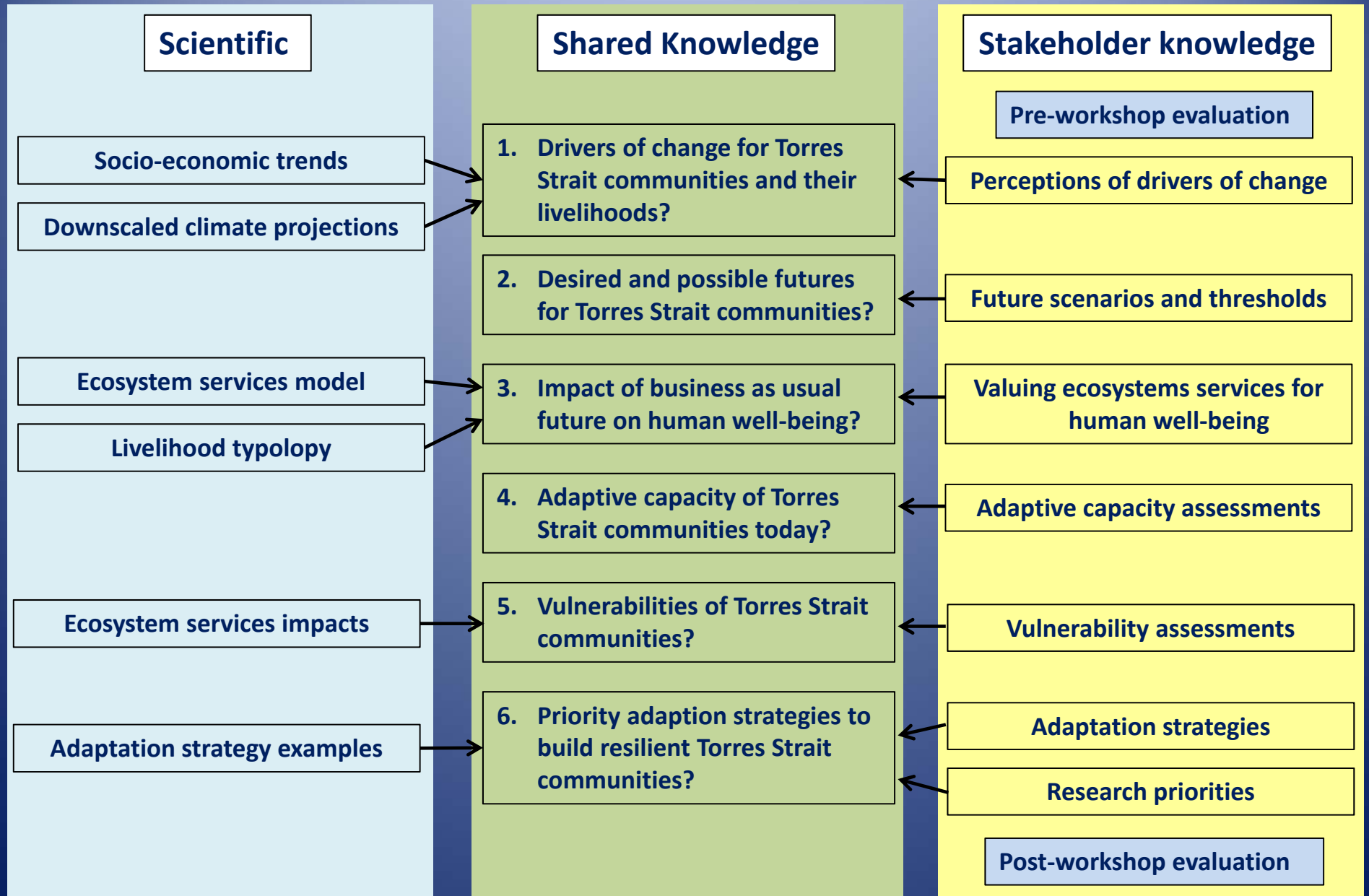

Iterative decision-making
- **Revising ideas/policies as we continue to learn which outcomes are more likely**

Engagement to allow for scrutinising
- **Peer-scrutiny**

Knowledge Integration

Scientific

- Socio-economic trends
- Downscaled climate projections
- Ecosystem services model
- Livelihood typolopy
- Ecosystem services impacts
- Adaptation strategy examples

Shared Knowledge

1. Drivers of change for Torres Strait communities and their livelihoods?
2. Desired and possible futures for Torres Strait communities?
3. Impact of business as usual future on human well-being?
4. Adaptive capacity of Torres Strait communities today?
5. Vulnerabilities of Torres Strait communities?
6. Priority adaption strategies to build resilient Torres Strait communities?

Stakeholder knowledge

- Pre-workshop evaluation
- Perceptions of drivers of change
- Future scenarios and thresholds
- Valuing ecosystems services for human well-being
- Adaptive capacity assessments
- Vulnerability assessments
- Adaptation strategies
- Research priorities
- Post-workshop evaluation

'No regrets' adaptation strategies

'No regrets' strategies bring benefits under any future conditions of change

Regional workshop

Marine resource conservation

Promote tourism and sponge aquaculture

Climate-change proof terrestrial EGS against sea level rise

Masig community workshop

Cultural renewal strategy

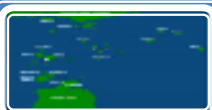**Build community financial management capacity, including eco-tourism**

Improve turtle and dugong management to control over-harvesting

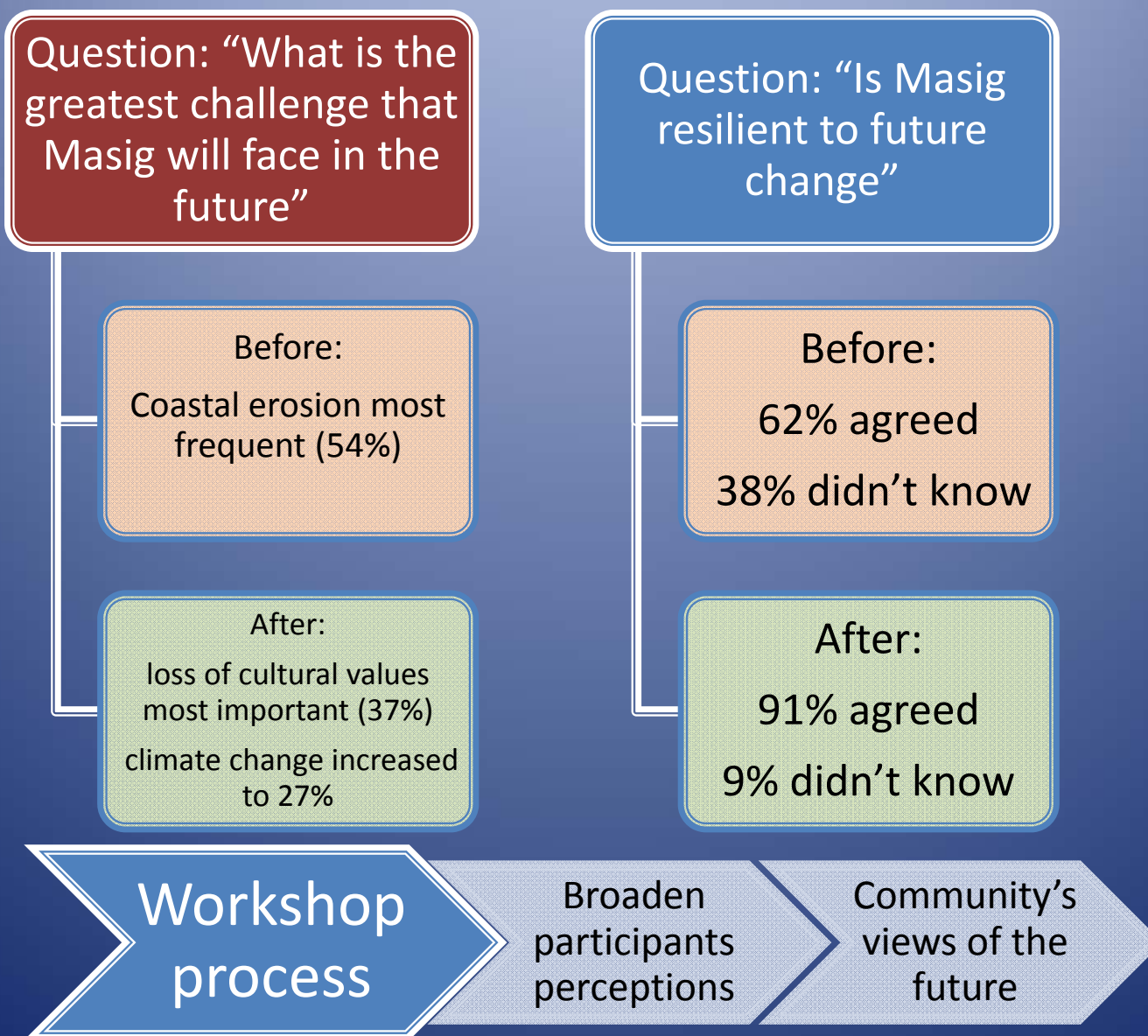**Improve garden food production, including hydroponics**
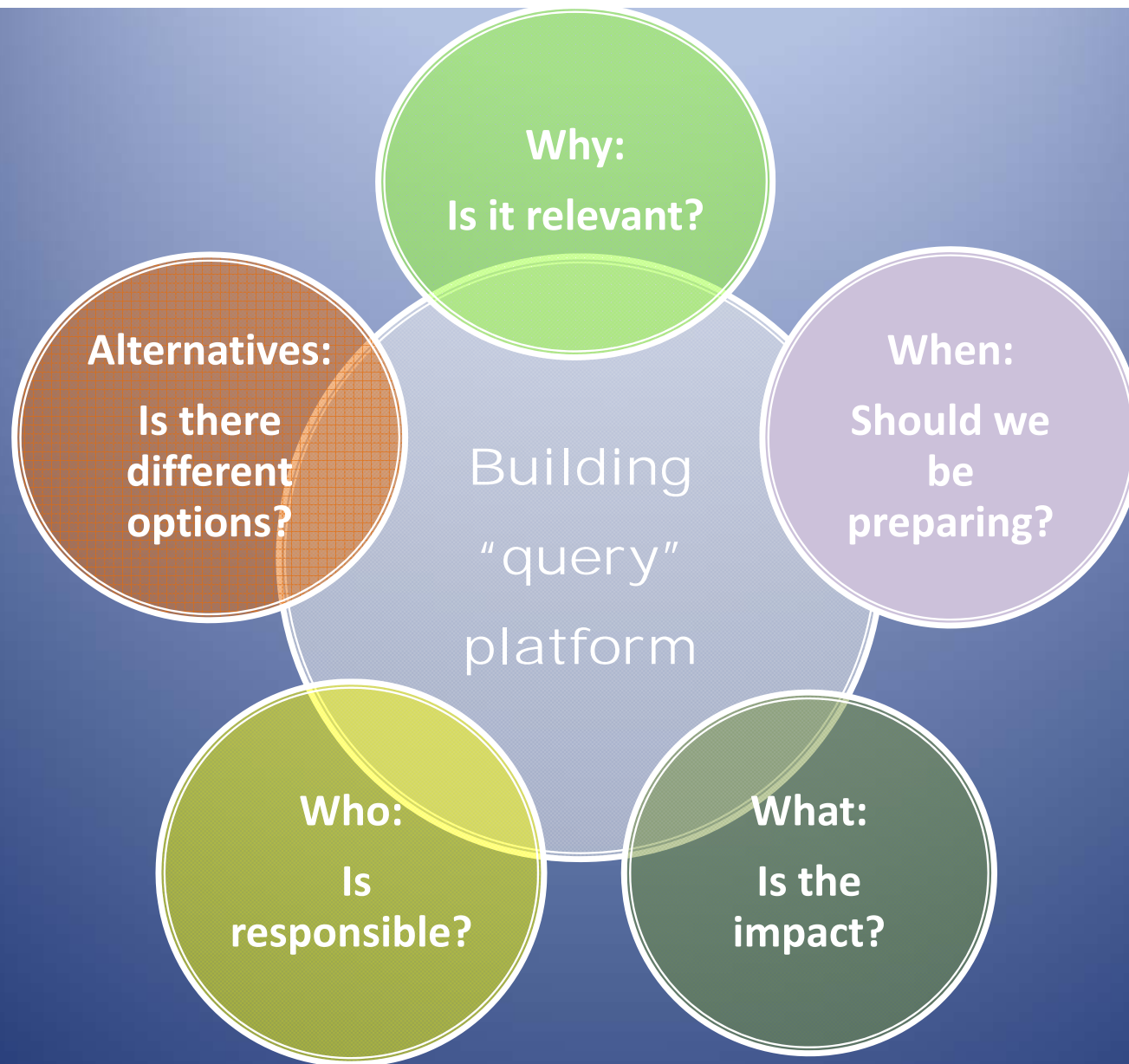
Meetings to improve community communication

More coordination among central islands, which face same issue

Capacity for communities and stakeholders to avoid mal-adaptive strategies

Support the development of TSRA community planning

Workshop Evaluation – Masig Community

Question: "What is the greatest challenge that Masig will face in the future"

Before:

Coastal erosion most frequent (54%)

After:

loss of cultural values most important (37%)

climate change increased to 27%

Question: "Is Masig resilient to future change"

Before:

62% agreed

38% didn't know

After:

91% agreed

9% didn't know

Workshop process → Broaden participants perceptions → Community's views of the future

Why:
Is it relevant?

When:
Should we be preparing?

Alternatives:
Is there different options?

Building "query" platform

Who:
Is responsible?

What:
Is the impact?

Bringing together of stakeholders should not be <u>undervalued</u> and is empowering for locals to allow their voice to be heard by policy makers

Conclusion – Community benefits

- **Empowering locals through accommodating local community social and cultural values**
- **Set the platform for effective adaptation planning**
  - Interactions between locals, policy makers, and researchers
  - Uptake: Relevant information that locals find useful to sustaining their livelihoods
  - Create/trial innovative ways to increase adaptative capacity

- **Build deeper linkages and conversations – guide the way forward**

Thanks- ESSO

Acknowledgments – thanks to workshop participants