

Sustainability Science



阪神高速道路コンクリート橋脚の被害

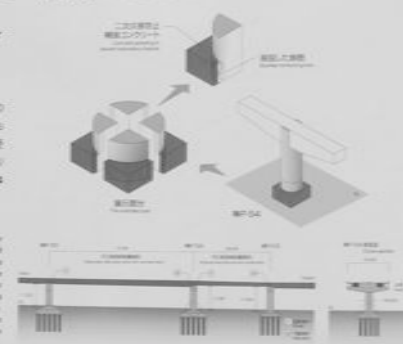
〔RC橋脚基部付近での曲げせん断破壊〕
Damage in "Hanshin expressway" concrete bridge pier
 (Flexural shear failure around the base of concrete pier)

展示物の概要

3号神戸線の神戸～5号橋脚は、西宮市北成町の立地をきまぐら比較的長スパンの単線鋼橋脚を支持する1本のRC単柱（円形）です。地震動により柱基部付近において主筋が全面にわたって変形し、乗鉄部がはらばらしい曲げせん断破壊を受けた。復旧は、柱基部より破壊部後、鋼筋深さより倍を大きくしたRC柱で作り替えています。展示は、二次災害防止のため、コンクリートで巻立て増強した部分94分割したものです。（橋脚の除去は、展示していないようブロックで模造しました。）

Outline of exhibit

This pier on Kobe Route 3 (Route 3) is a T-shaped concrete pier with circular cross section. The pier supports steel box girders one of which has a span of 33 meters long at water intersection. Because of flexural shear damages that occurred around the bottom of the column, the main reinforcements were buckled on the entire circumference and their top too became loose. In flexural shear damage, the contribution of the structure against its load point at that time to the bending moment. Then the shear force exceeded the shear strength of the structure. This type of damage often occurs on the columns designed by code relationed (before 1980), since the code specifies fewer hoop ties than the latest one. For restoration, the entire pier was cut off and stacked and removed from the base, and a new concrete rectangular pier with larger cross section and shear height was built on the original foundation. The removed box girders with most severely cracked are shown here.



兵庫県東部地震と橋梁構造物の被害

平成7年1月17日の阪神地区に発生した都市圏下型の大規模地震は震度4.6-4.9の地震動による被害が、21の県域で甚大な被害をもたらした。兵庫県道路は、3号神戸線7.02kmの区間17箇所、11箇所で深刻な被害を受けた。各橋脚の75%以上で損傷するなどの被害を受けた。本展示は、復旧工事が完了した区間のうち1箇所を展示するにあたり、今後の防災対策の検討の一助となることを、兵庫県建設委員会が協力して設置するものです。

The 1995 Hyogo-ken Nanto Earthquake and Damages inflicted on Bridge Structures. An unprecedented earthquake, officially named 1995 Hyogo-ken Nanto Earthquake for the area it and associated with 6.9 Mw on January 17, 1995, it caused substantial and infrastructure damage within the wide area. Highway infrastructures, almost one through the area also suffered from extensive damage such as the further collapse of 820m spans of cable structure and two girder viaducts in Akae Nishi Route 2, and the great collapse of bridge piers. This exhibit on the one writing is up to the restoration of bridge infrastructure. It will help the research to find a way to improve the repair procedures and bridge structure infrastructures for research and education to future groups of the researchers.

What is sustainability science?

- Emerging field of research, dealing with:
 - The interactions between natural and social systems, and
 - How those interactions affect the challenge of sustainability
 - The challenge is to meet the needs of present and future generations, while substantially reducing poverty and conserving the planet's life support systems

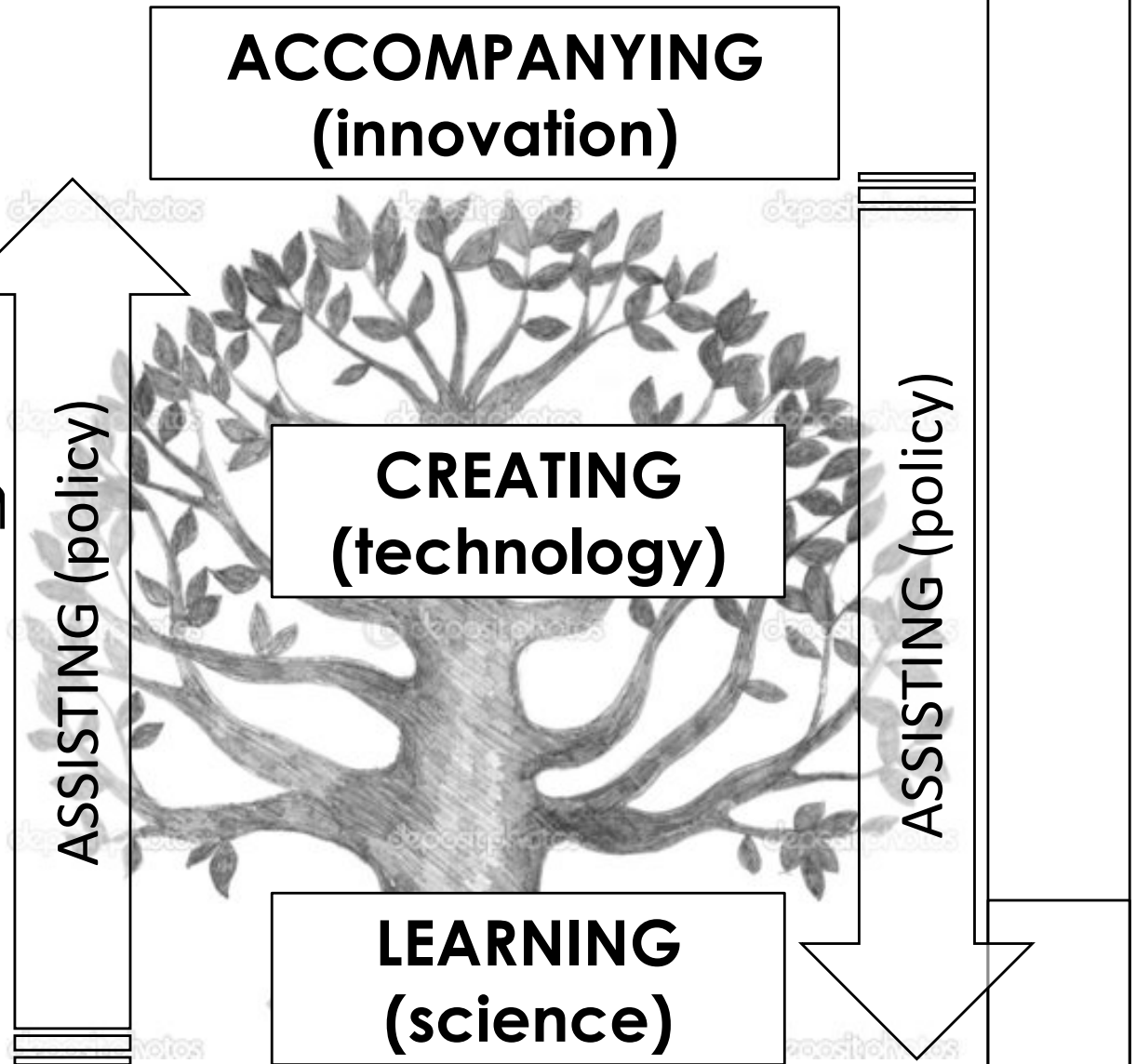
A science that responds to need

- State and industry used to define the science agenda
- Today, science needs to be defined by human needs
- Science must give attention to basic needs and move towards achieving impact at the bottom
- Essential for people to learn how to manage their environment and resources
- Young professionals can learn from communities and remain committed to integrate local knowledge to economic development

Value Premise

Sustainability

science rooted
in being human
and authentic in
service to
human
development &
environmental
interaction



Role of science UNESCO

Science

Technology

Innovation

Policy

PARTNERS

**Generational
change and
local
opportunity**

**Consumption &
expectations
without leaving
out people &
environment**

**Knowledge for
social
transformation
and
fundamental
shift in global
economy**

Sustainability science interface

UNESCO \ Principles	Roles	Science (learning)	Technology (creating)	Innovation (accompany -ing)	(Policy) (assisting)
ESSC Partners					
Generational change Local opportunity	Youth, landscape & livelihood	Hydrological cycle, biodiversity, soil nutrients & cropping	Water systems rainforestation, agroforestry	Focus & management	Village officials, awareness & policies
Consumption/ expectations without leaving out people & environment	Profession -als in human security & envt'l sustainability	Learn what is development from below	Engage with culture & strength of people	Always space for friends not merely sector	
Knowledge for social transformation Shift economy	Insti-tutional cooper-ation in DRR	Reverse agenda of social segregation	Find adaptation options & methods	"Negotiations" for a better deal	PES

What is needed?

A **science** that:

- **Translates** immediately to livelihood options and innovation
- **Provides knowledge** not only for social transformation – also self transformation
- **Facilitates access to** basic education and SDGs
- **Improves** not only GDPs and income – more on quality of life and human development

Premise for sustainability research

- A science that addresses needs of practitioners
- Directed to a particular problem
- Help the sustainability concept become more operational
- Looking for answers to bigger questions by asking smaller and region specific questions
- Science should inform management
 - Realities are complex – winners and losers

In terms of method

- Addresses needs and problems
- Multi- and trans-disciplinary
- Always in search of solutions
- Has an appreciation of time, history and systems
- Element of participatory approaches
 - Using participation to deepen scientific understanding
 - Brings in the voices from the margins
- Science that struggles to be meaningful

Community Concerns & Values, Systems Chart

1 Socio-environmental issues

Extensive land/water degradation
 Maize production (GMO)
 Loss of food security
 Opportunity for youth – migration
 Land rights
 Use of timber products

1a Value mapping

What has value / meaning for us?
 This is my home / meaning - explore

2 Conceptual mapping: resources and relations

Relationships Positive / Negative Push & Pull
 How people feel they can move in the relationships?
 Community, Land, Government, Trade...

3 Community mapping

Weighing stocks & flows in demographics, social behaviour, agriculture & forestry

+ Values

- Systems
 Decisions
 Participation

4 Commitment to drive



Intention

5

Plausible futures (Community vision)

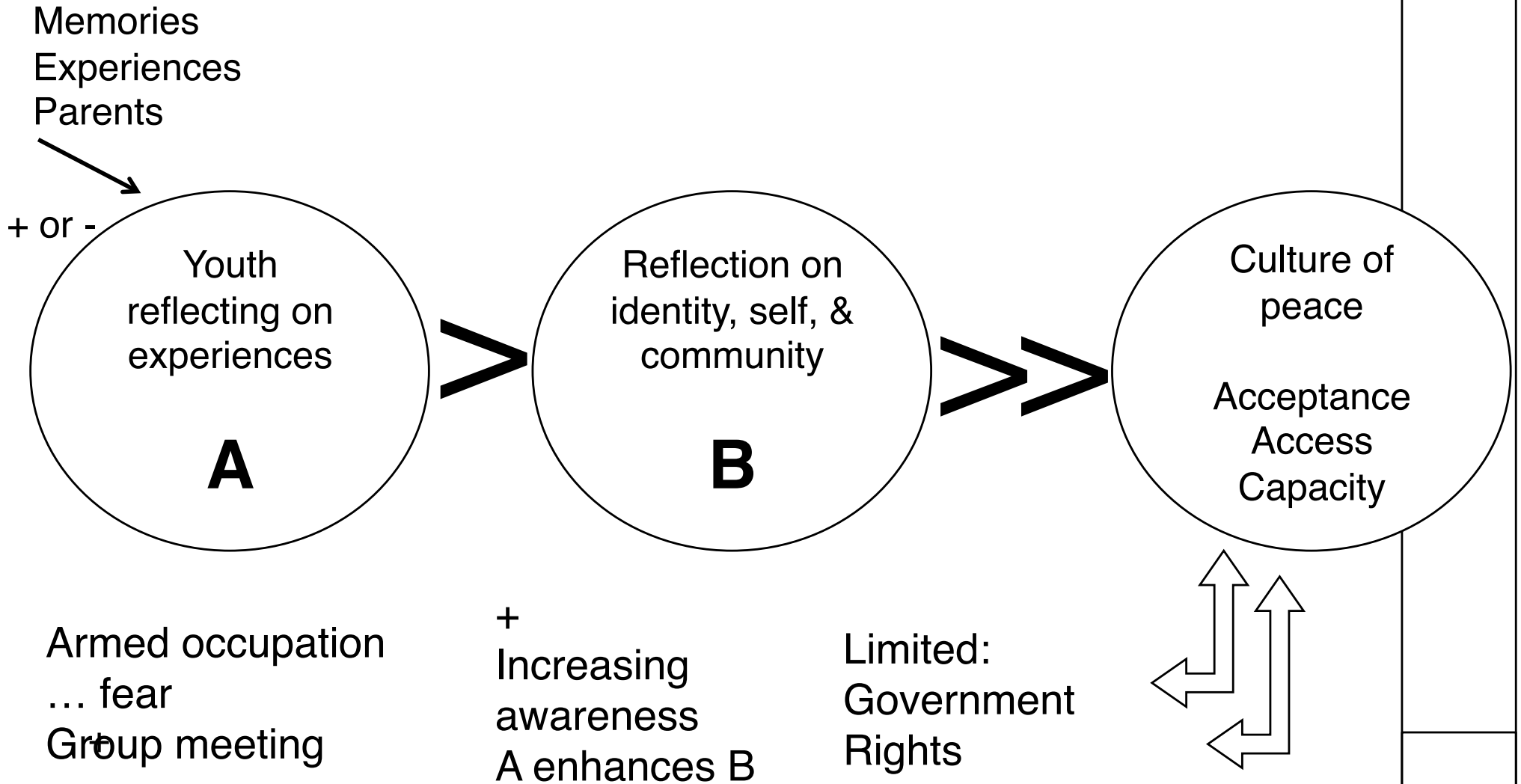
After actions, review and monitor

- ✓ Youth potential
- ✓ Political agenda
- ✓ Country systems

Layer of human experience

Conscious on what to do (having heard people)

Community Systems Mapping



Preliminary conceptualisation

Demographics

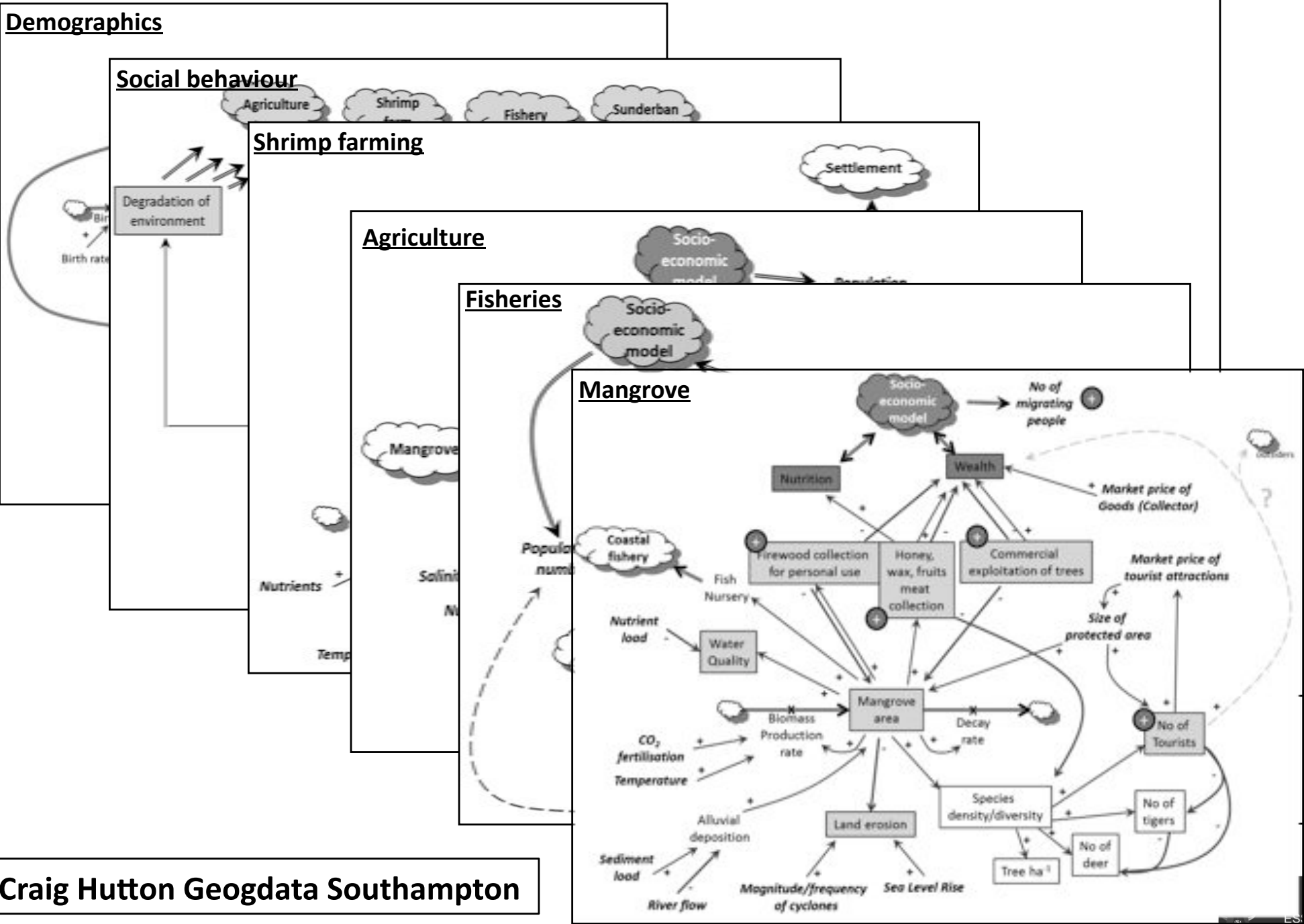
Social behaviour

Shrimp farming

Agriculture

Fisheries

Mangrove



Craig Hutton Geogdata Southampton

Modeling of possible futures

- Governance fails to speak in illiberal contexts and public protest is not possible
- Scientific research can unclog political stalemates
- Science can reach government erroneous interpretations and offer alternative ways and build capacity
- Scientific solution and diplomatic strategy mediate solutions of rhetorical buzz-words and ultimatums

Way of working

- Demand-driven for change
- Analysis and dialogue
- Scenario-building
- Supports cultural knowledge as incorporator of responsible science
- Builds policy by demand



Science and values

- We are learning that we need to translate what is of value for others
- Within this, we acknowledge the value of science and how important this is
- But we also recognize the multiplicity of other values that define and direct the research we do and that are also important in the validation and use of that research

New approach needed

- We are recognizing that the solutions and adaptations will require an evolution in the science, in policy and in how we live; “evolutionary policy making”
- Cannot be sure yet what will work: need systems that can evolve rapidly
- The system must remain deeply human and appreciative of the human condition
- See the value and importance in terms of:
 - Defining sustainability
 - Sharpening methodologies
 - Communicating the discernment
- The challenge is to give concepts new meanings that bring us to a new level of appreciation

Learnings

- Participation is a basic principle in our way of proceeding
- Community participation is crucial so that the relationship with science is deepened and diversified
- Local wisdom is valuable to the process—but this needs to be verified and validated
 - Ensure that the process of verification should not override local values
- In the past, the understanding of science was very solid, very difficult to approach, very unique and basically housed in a university, the pinnacle of civilization
- Today, we meet the challenge of translating science to the local community
- The concept of “do no harm” in science, research, program interventions

3 emerging themes

1. Risk, vulnerability, sustainability
2. Global boundaries and local implementation
3. Youth and capacity building

Risk, vulnerability, sustainability

- In the last three to five years is the emergence of a science of vulnerability in its diversity, of sustainability, of risk, in ways that it are immediately usable and applicable by others
- Tend to put vulnerability and sustainability into science and the communication of that into global boundaries and local implementation
- Andreas reminded us of the importance of the critical communication of this beyond political boundaries
 - the fullness of human aspirations to understand what the meaning of life on the planet is

Risk and Sustainability

Focus on methods and where it is exploring how capacities and critical values are incorporated in the research, including questions on land tenure and use

Solutions for a more sustainable world

Youth and capacity

*Youth as the present future; philosophy psychology and the development of capacity
Need to understand what they value and what their vision is*

Global science of planetary boundaries

Bringing local to the global in a transformative way, communication and information

Youth and values

- We are challenged to bring this to the youth today in a new way, in ways that they feel it is a lifeline to reality, by which they can vision and envision the world in which they can share
- There is much we still have to do in relation to youth and what youth need to learn to value in this world and the capacities they need to have the relationship they need to have with science and society
- Knowledge and language
- How we think and how we change involves language, concepts, and the values that are within those
 - Need to acknowledge that we are not value-free
- Many of us are enriched and challenged by relating our work to a youth vision and how they relate to the world.

Community and capacities

- Community is a disunity! What are the processes and systems that unity?
Development often divides a geographic unit
- Community also has to learn certain realities:
 - Community does not necessarily have an idea of its boundaries though having allocation
 - National government boundaries used to be very loose; province boundaries were not clearly demarcated: now it becomes critical to draw lines on the map to get the budget allocations

Boundaries

- In so many ways we're challenged to deal with boundaries that are sustainable - watershed boundaries
- A great deal of science and geographic information is helping us manage this.
- Surprising how many communities can use GPS and information systems and we can see how science will move very rapidly
- We take this concept of sustainability science and learn new boundaries, but also new inclusions

Knowledge Networks

- We are challenged to go from here to sharpen our own participation in this and also our own communication
- One of the things we were talking about here were knowledge networks for scientific research
- Now a very different dynamic than before
 - Impact of social networks
 - Many other ways of moving information, but also getting participation

Towards Solutions

- Am I able to bring these themes (risks, boundaries, youth) together to look towards solutions?
- The solutions themselves are evolving, but are we moving us closer to the transformations that are required?
- How do we discern the research we've got to do, the reality of today, of people and where we live, and how we want to relate to others and where they live?

Thoughts for the day

Stones of our time



Everything has gone and disappeared.

Think in peace about the eternal being which exists behind those that have gone and disappeared.

Hayato Takemiya