John Forrester*

- Part 1: Participatory design
  - what is participation
  - at what level
  - in what
- Part 2: What methods should I use?
  - e.g. Q-methodology;
  - social network mapping;
  - ABMs
- Part 3: Designing for Participation

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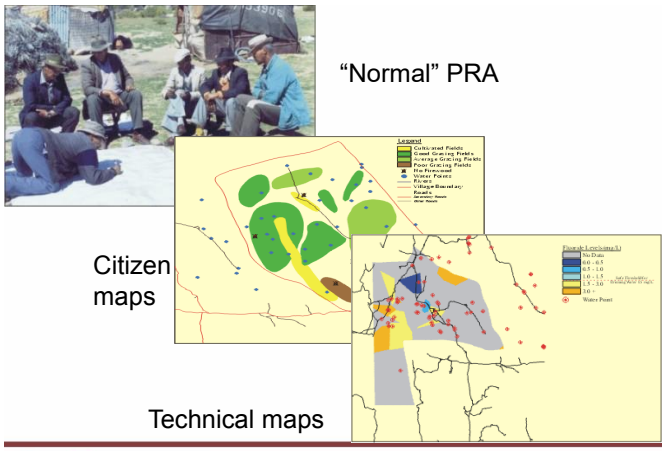
Theory of Change:

We're 'post-positivist' = "multiple methods are necessary to identify a valid belief because all methods are imperfect" Katie Moon & Deborah Blackman 2014 "A Guide to Understanding Social Science Research for Natural Scientists" in *Conservation Biology*

"positivists of sorts" F.G. Bailey, 1991, *The Prevalence of Deceit*

"partiality" / "practical adequacy" David Zeitlyn, 2009 "Understanding anthropological understanding" in *Anthropological Theory*

we believe that by informing our maps and models ***with what the Agents actually believe and do*** we are improving knowledge ...



"Normal" PRA

Citizen maps

Technical maps

Maps/photo: Steve Cinderby, (c.1997-99)

Russell Ackoff (1974) *Redefining the Future*, London & New York: Wiley

- "Every problem interacts with other problems and is therefore part of a set of interrelated problems, a system of problems…. I choose to call such a system a mess."
- ***Participative planning***
- ***Coordinated Planning***
- ***Integrated planning***
- ***Continuous planning***

The setting of the problem:

- *The problem is thus how to make Ackoff's "participative, coordinated, integrated, continuous" planning/governance 'do-able'*

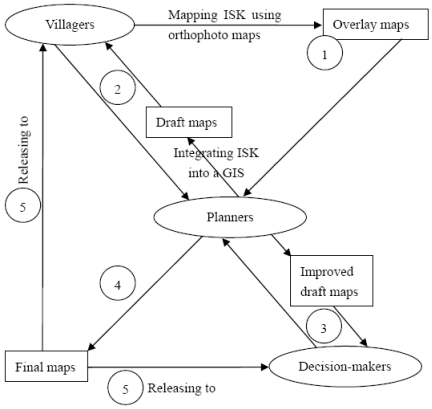
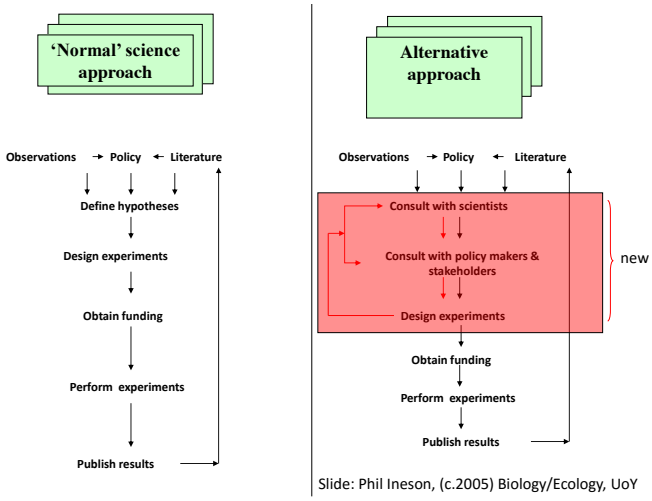
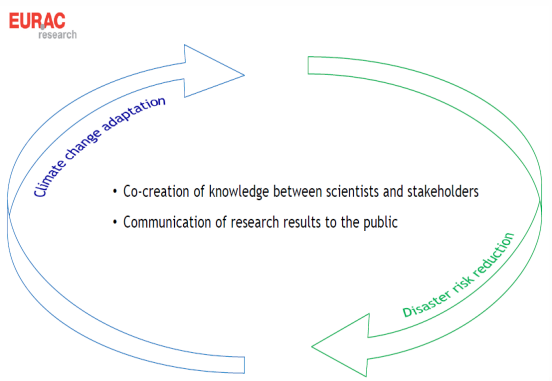


Diagram: Xianjou Wang, (c.2006-07)



Slide: Phil Ineson, (c.2005) Biology/Ecology, UoY

An elegant depiction of a clumsy solution...



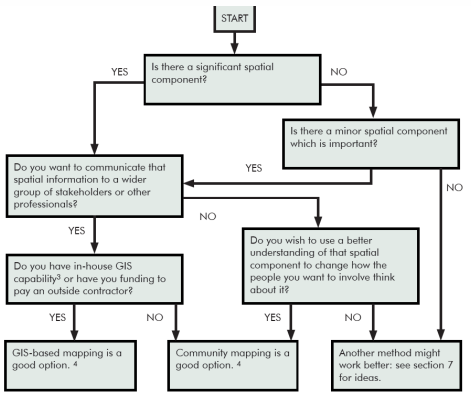
... Slide: Lydia Pedoth, (c.2014) EURAC

Discussion #1: some starter questions

- Who are your stakeholders?
- What is their "stake"?
- What knowledge do they have?
- How can it best be represented?
- How can it be used?
  - To what ends?
  - By Whom?

Part 2: When should I use mapping/GIS?

- And when should I not?
- And when should I use it alongside another method or methods?



From Forrester & Cinderby *A Guide to using Community Mapping and Participatory-GIS*, available from the Tweed Forum: http://www.tweedforum.org/research/Borderlands_Community_Mapping_Guide_.pdf

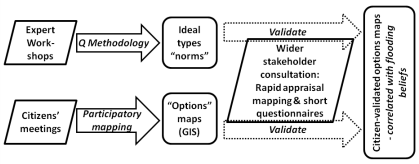
3 If you are uncertain whether or not you have the in-house capability, or whether or not available free-to-use packages (such as Google Earth) will meet your requirements, then you **should** use this guide.

4 If you came down the right-hand route where where the spatial component is minor but important then you should consider using another method alongside the mapping.

GIS+Q ideas about flood management + belief about flooding

Forrester et al, (2015) *App.Geog.* Vol. 56

GIS+Q approach & benefits



	Participatory Mapping	Q-Methodology	Q+GIS
Main Benefits	Clear policy-friendly output of ideas for spatially-validated options	Access to statistically-validated understandings of the range of beliefs amongst stakeholders	Is able to represent statistically and spatially the underlying support for different options
Main Disadvantage	Not easy to gather – and record – beliefs about different options	No particular idea of the level of support for different beliefs across different demographics	Time-consuming

benefits of using Q+GIS

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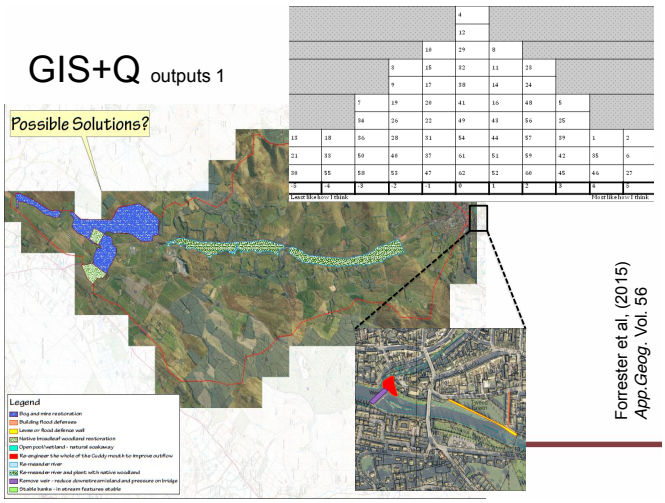
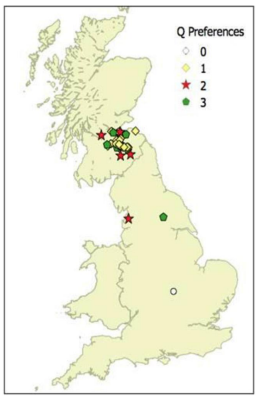
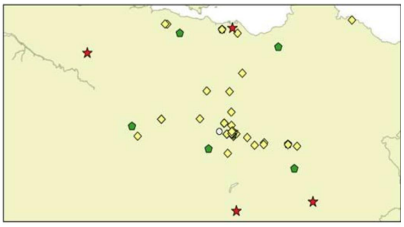
Forrester et al, (2015) *App.Geog.* Vol. 56

GIS+Q outputs 1



Forrester et al, (2015) *App.Geog.* Vol. 56





Option 1	We need to look for alternatives to traditional heavily engineered flood defences – they aren't sustainable economically or environmentally. We should make use of a landscape's natural ability to store water. The attitudes of farmers and other land managers are a key part of flood management. Improving land drainage upstream can lead to greater flood risk downstream, so some lands might have to be sacrificed for flood protection.
Option 2	Floods are really frightening and leave emotional scars; recovering from them can take years. I don't really think about flood defences (they might never be enough), we need to focus on people, helping them prepare for floods.
Option 3	Floods are such a big problem for individuals and communities – they leave emotional scars – that we need to defend people and properties with major engineering works. No land should have to be sacrificed to prevent flooding elsewhere but we can make use of a catchment's natural capacity to store water.

GIS+Q outputs 2

Forrester et al, (2015)
App.Geog. Vol. 56

Using Q-methodology to identify attitudes or viewpoints about management coastal models; geographic perspectives; and the role of scientific knowledge.

Bärbel G. Bischof, 2010. "Negotiating uncertainty: Framing attitudes, prioritizing issues, and finding consensus in the coral reef environment management 'crisis'"
***Ocean & Coastal Management* 53: 597-614**

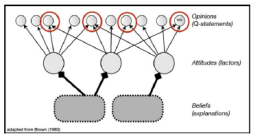
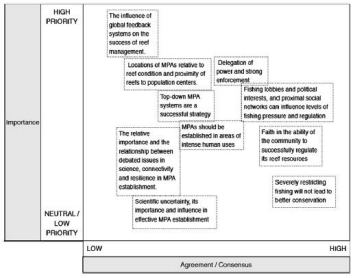


Fig. 1. Opinions are prioritized by the respondents and results are obtained throug factor analysis. These result in main factors, which are clusters of individuals who hav ranked the statements in a similar fashion and which together imply beliefs or cor attitudes. Red circles indicate common opinions can be rooted in differing attitude and beliefs; how and which opinions are preferenced therefore can define the inherer attitudes and beliefs.



Some reflection – Q + GIS

- "The first step in addressing complex problems is to appreciate the mess" (Donaldson, Ward, & Bradley, 2010 "Mess among disciplines: interdisciplinarity in environmental research." *Environment and Planning A*, Vol. 42(7): 1521-36).
- A central 'success' is reconciling (rather than simply juxtaposing) what people say with the underlying feelings and values that guide action and behaviour (Forrester et al 2015)
- Our combinations of methods and emphasis on reflexive (re)engagement forced values and perceptions not normally confronted in highly structured discussions into the discussions (Forrester et al 2015 after Eden , Donaldson & Walker , 2005 "Structuring Subjectivities? Using Q methodology in human geography". *Area*, 37(4), 413-22.

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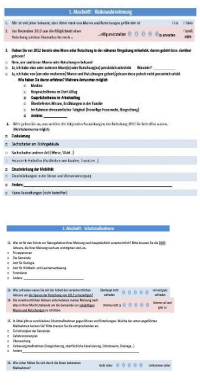
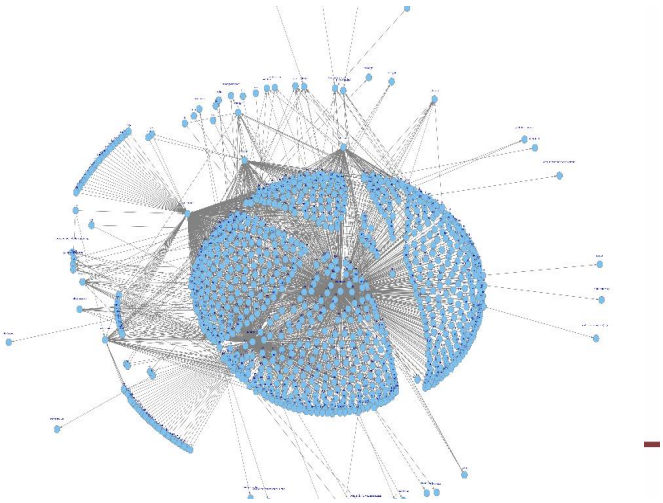
Data collection through survey & Social Network Mapping – emBRACE project (#1: survey)



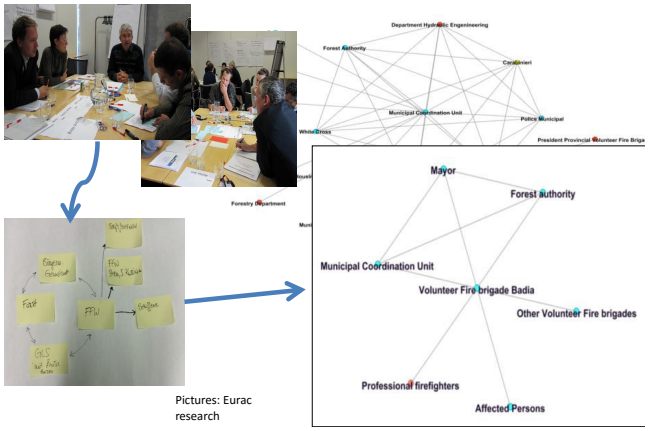
- 2325 questionnaires/ 3 languages/ all adults of Badia/April 2014
  - Response rate: 43% ∴ fairly representative picture of the whole population

Two questions:

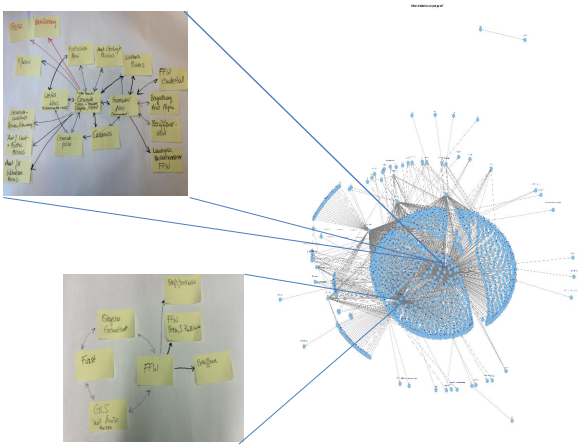
- To whom do you go for help and support in case of a natural hazard event?
- To which institution do you go for help and support in case of a natural hazard event?



emBRACE method #2 – expert workshops and individual 1-2-1 interviews



Pictures: Eurac research



is freely available from http://www.embrace-eu.org/

Some Reflections – multi-level SNM

- SNM helps understand notions of complexity, dynamism, adaptation, and coupling (one cannot understand the network-of-interest without understanding the broader context within which this network operates).
- participatory approaches to network analysis based on a combination of narratives, interviews and surveys can help us produce “real world” network maps; qualify the ties and constantly re-work them, and define the time scale in which the processes of interest unfold.
- Finally, we can offer network maps and visualisations, particularly when co-created by the users themselves, as a way to understand mechanisms through which the indicators of environmental governance can be portrayed.

Agent-based Modelling

- with potential for spatial mapping...

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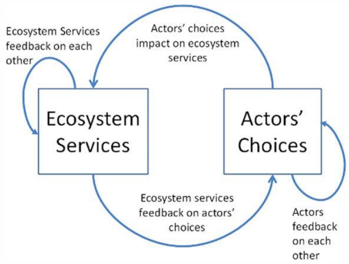
***Whole decision Network Analysis for Coastal Ecosystems* (WD-NACE)**
2010 – 2012

- A UK Department for International Development (DFID); Natural Environment Research Council (NERC); and Economic & Social Research Council (ESRC)) project to provide a framework (a conceptual model) for understanding the drivers of the drivers of the relationship between ecosystem services change and poverty alleviation
- Used a top-down 'systems modelling' approach and a 'bottom-up' ABM approach to understand the same issues. Did not try to seamlessly join the models but rather used both as heuristic devices



… we are not seeking to *replicate* the full complexity of the socio-economic/environmental interactions of even our focus […] region. We are not trying to build a conventional simulation model. **We are trying to develop a conceptual *representation* and *reflection* of complex socio-environmental systems which encapsulates both stakeholder and scientific perceptions of how the critical elements of the complex inter-relationships behave**. The issues are not 'simply' uncertainty about causes, effects and outcomes […] but also different perceptions and beliefs about the structure and the behaviour of the systems themselves…

(David Harvey, Newcastle – [successful] RELU project proposal with Forrester: emphasis added)

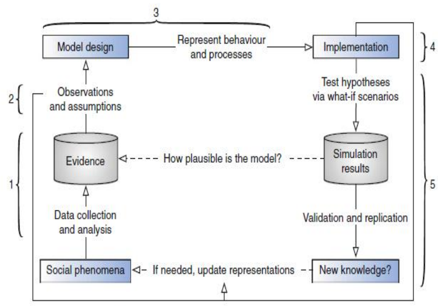


Fig. 1 Evidence-driven development methodology

source: **Pablo Lucas**, 2011. Usefulness of simulating social phenomena: evidence , in *AI & Soc.* DOI 10.1007/s00146-010-0315-1

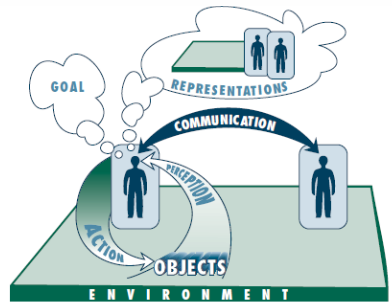
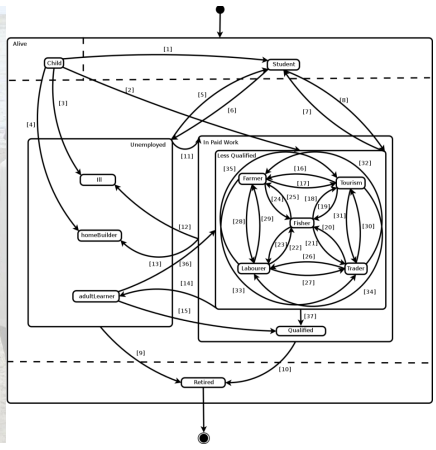


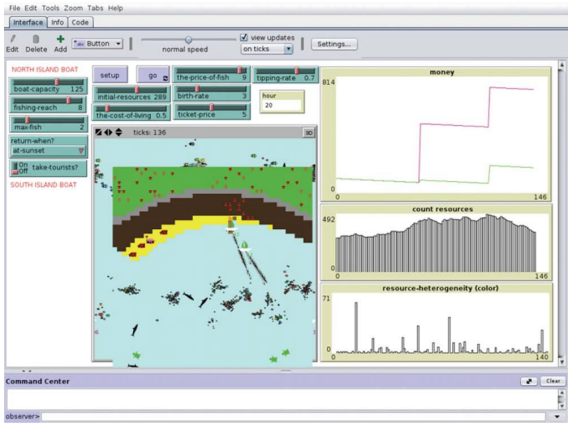
Fig. 1: Architecture of a multi-agent system (based on Ferber, 1995)

Source: **Michel ÉTIENNE**, 2006. Companion modelling: a tool for dialogue and concertation in biosphere reserves. M. Bouamrane (ed.) *Biodiversity and stakeholders: concertation itineraries*. Biosphere Reserves – Technical Notes 1. UNESCO, Paris: pp44ff

Artisanal fisheries systems – Kenya coast

Rice paddy systems – Bangladesh coast





https://www.youtube.com/watch?v=KvX5G6edDQE
&
https://www.youtube.com/watch?v=xyb4mCJUFLY

Pros and Cons of ABMs:

1. Description not prediction
2. Trade off between simplification and complexification
3. Many possible uses
4. Opportunity for participation
5. Links well to other structured approaches
6. Data intensive

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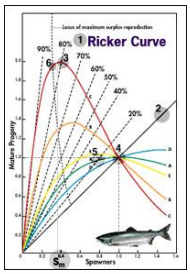
Next steps – coupling social with ecological



http://www.science.ca/images/scientists/s8-ricker.jpg

Next steps – elaborate the social
e.g. power scenarios

e.g. use mixed methods to understand different viewpoints

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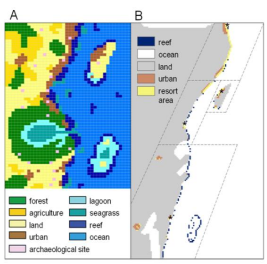
Linking two dynamic models (SimReef and Coral Reef Scenario Evaluation Tool (CORSET)) and creating feedbacks between them using a spatially synchronized base map:

Jessica Melbourne-Thomas, C. R. Johnson, P. Perez, J. Eustache, E. A. Fulton, and D. Cleland. 2011. "Coupling biophysical and socioeconomic models for coral reef systems in Quintana Roo, Mexican Caribbean". *Ecology and Society* 16(3): article 23.

Synchronizing the Models

Modified versions of SimReef and CORSET were synchronized by means of a common base map (spatial synchronization) and synchronized time steps (temporal synchronization). The revised base map for the coupled model is spatially realistic and the location of reef cells is properly georeferenced (Fig. 2B). This map comprises a 2 km x 2 km grid



Also of potential interest:

Making the argument for Structured Stakeholder engagement in coastal LUP (w.r.t. Climate change):

Lloyd, Michael, Debora Peel, Robert Duck, 2013. "Towards a social-ecological resilience framework for coastal planning" *Land Use Policy* 30: 925-933

***

Some (both spatial and mathematical) modelling of coastal ecosystems (from the USA):

Timothy O'Higgins, S. Ferraro, D. Dantin, S. Jordan & M. Chintala, 2010 "Habitat Scale Mapping of Fisheries Ecosystem Service Value in Estuaries" *Ecology & Society* 15(4) article 7.

* * *

Some Agent-based modelling of psychosocial factors related to coastal ecosystems (in Bangladesh):

Nilufar Matin and Richard Taylor, 2015. "Emergence of human resilience in coastal ecosystems under environmental change" *Ecology & Society 20*(2) article 43.

Part 3: Designing a participatory project to include GIS...

<table>
<tr><td colspan="4">WP1: Integrated framework development
• 1.1: model integration building on WP2, 3, 4, and 5
• 1.2: model interface (linked to WP6)</td><td rowspan="3"></td></tr>
<tr><td>WP2: ecosystem data collection. What is happening in:
• 2.1: Mangroves
• 2.2: Reefs & seagrasses
• 2.3: paddy</td><td>WP3: ecosystem service/NR data. What is happening to:
• 3.1: fish stocks
• 3.2: other resources</td><td>WP4: social benefit data collection. What valuation(s) can be put on:
• 4.1: fish
• 4.2: other benefits</td><td>WP5: social system data collection:
• 5.1: access to resources
• 5.2: power issues
• 5.3 social capital</td></tr>
<tr><td colspan="4">WP6: Simulation modelling of human/natural resource use interactions
• 6.1: improving stakeholder interface models to include better data from WPs 2 & 3
• 6.2: continuing to develop the ABMs to include social (including economic) data
• 6.3: Development and exploration of scenarios (with WP1 and WP7)</td></tr>
<tr><td colspan="4">WP8: project management, engagement with people: stakeholder workshops and interaction
• 8.1: stakeholder interactions
• 8.2: project management</td><td>WP 7: GIS and spatial analysis:
• 7.1: GIS & remotely sensed data provision
• 7.2: GIS as an integrative tool to present ICFM data</td></tr>
<tr><td colspan="5">WP9: Impact and dissemination
• inception and EoP workshops and briefing materials</td></tr>
</table>