



Integrating Science and Governance for Catchment Management

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RURAL ECONOMY
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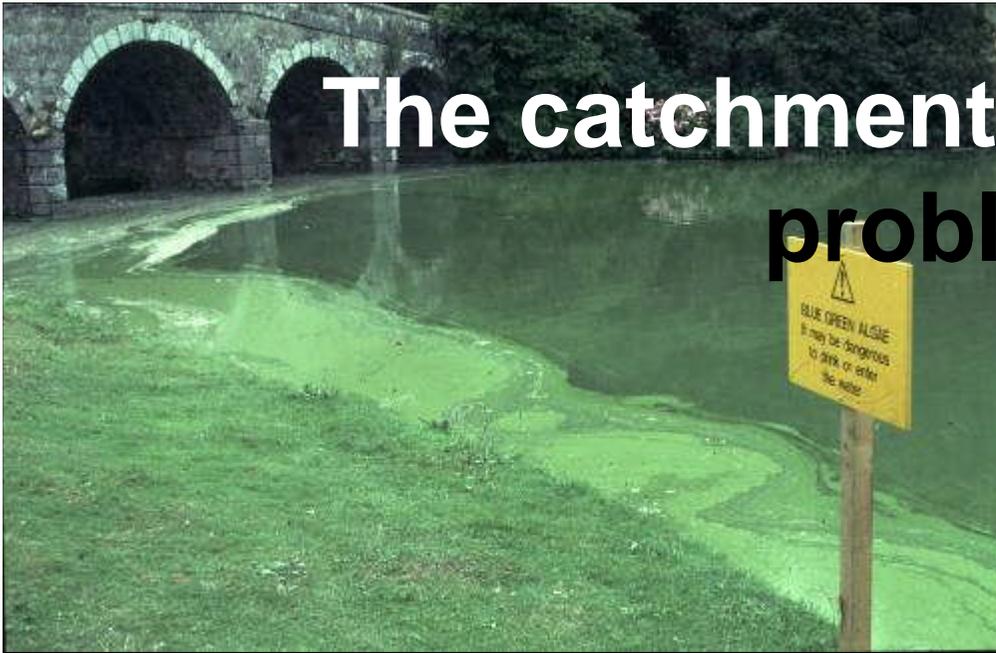
Catchment Science 2011

Dublin

16th September 2011



The catchment management problem:



How to protect and manage water resources in a catchment in which people can live, work and play?



A complex problem?

A 'wicked' problem?





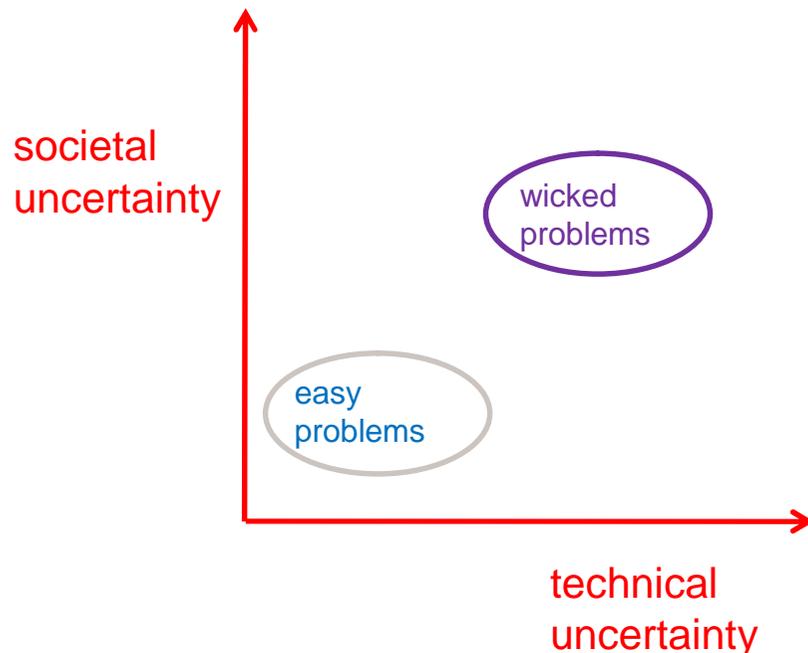
Catchment Management for Protection of Water Resources

Project Overview and Objectives



Objectives:

1. *Comparative analysis of international catchment management experience*
2. *Investigation of if and how lessons can transfer to UK*
3. *Two case studies: Upper Tamar, SW England and Upper Thurne, East Anglia*
4. *Development of guidelines*



Wicked problems:

- complex
- dynamic, uncertain
- diverse legitimate values and interests
- no definitive problem formulation
- many externalities
- multiple trade-offs
- intractable for a single organisation

(Rittel & Webber, 1973) (Ludwig, 2001)

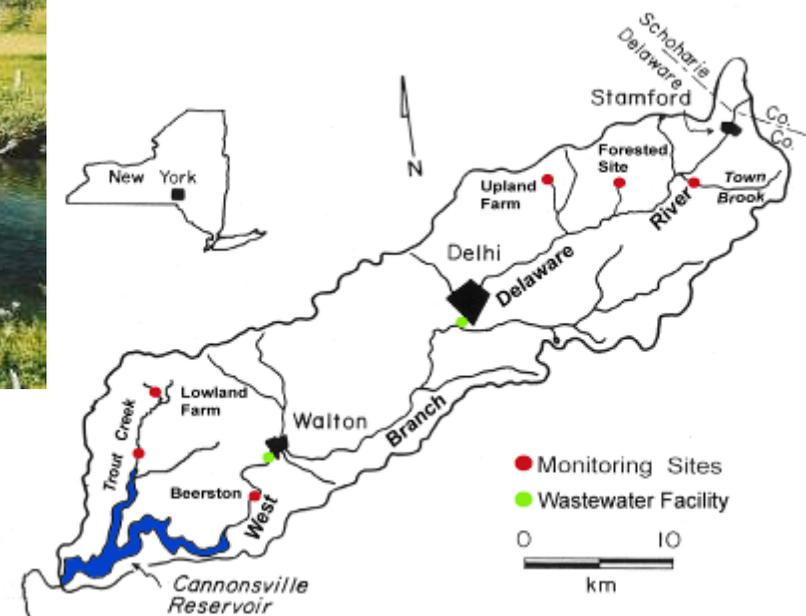
Catchment management challenges

- inter-related problems of water quality, over abstraction and flood risk
- pollutant sources are numerous, dispersed, with multiple & uncertain pathways & attenuation
- problems are multi-sectoral
- monitoring and regulation are relatively costly
- polluting activities produce food, rural jobs, tourist income etc.
- how to share costs?
- how to capture benefits & fund improvements?



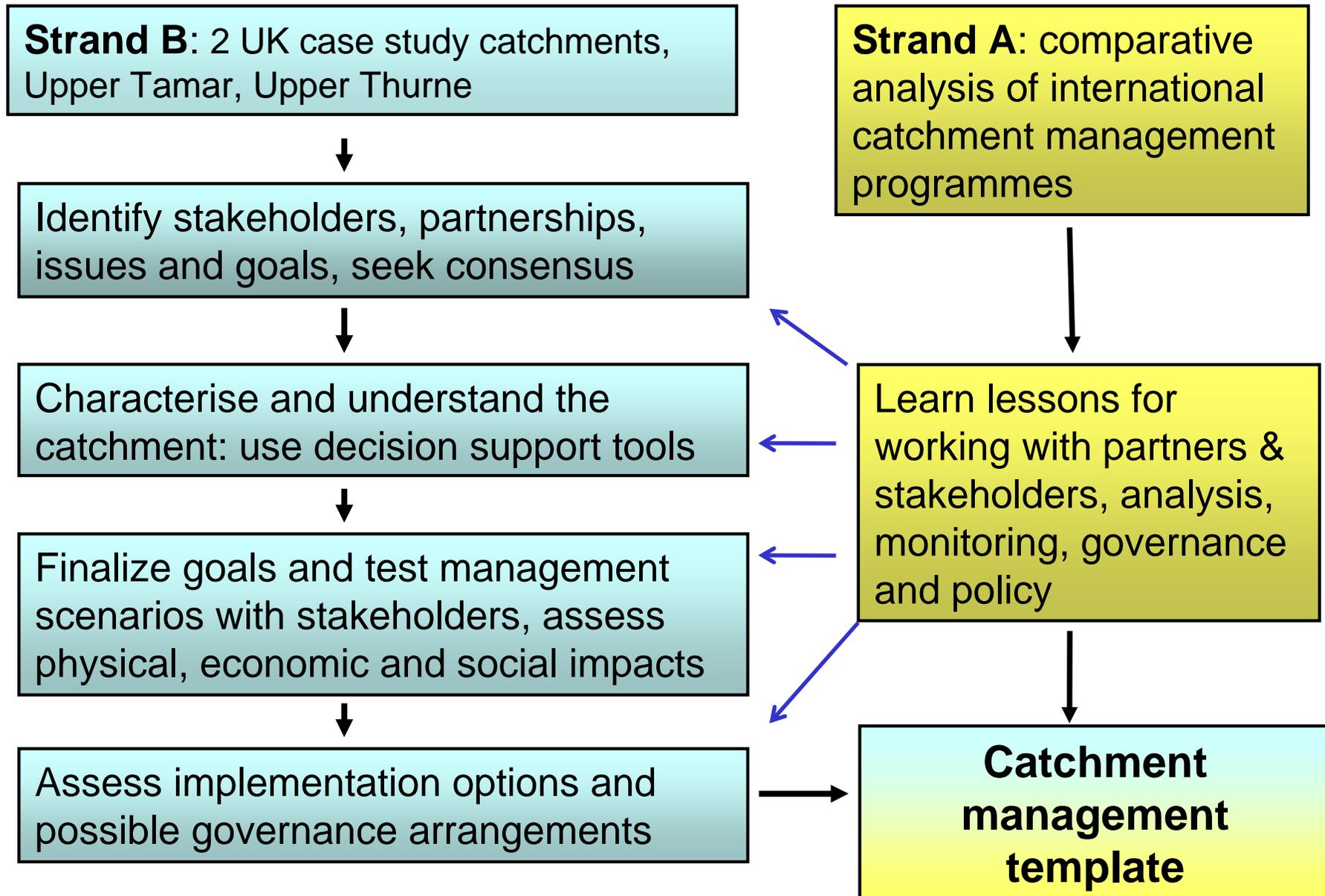
Catchment management concerns

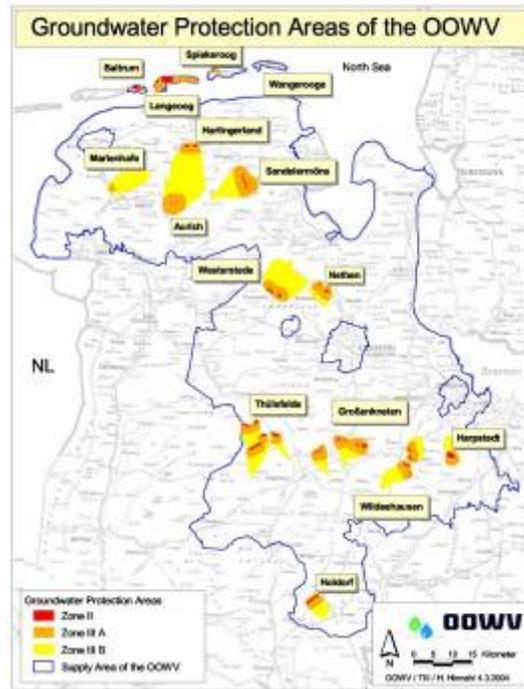
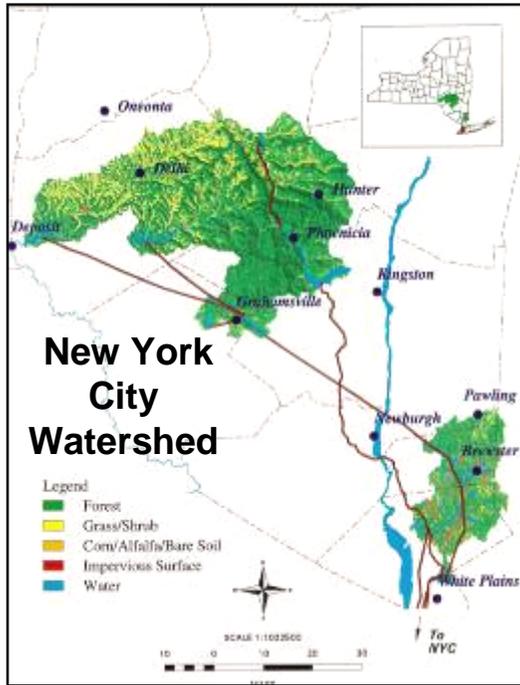
- household septic systems
- sewage treatment works
- soil loss in construction
- stream corridor management
- restoration of river morphology and wetlands
- road runoff and urban runoff
- water supply
- other waste management
- spatial planning and economic development
- education and awareness raising
- research, monitoring, modelling



A mix beyond the capacity of one organisation, needs collaboration and coordination

Project scope and activities



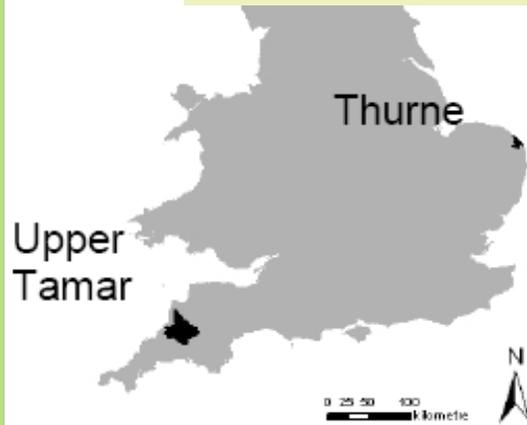
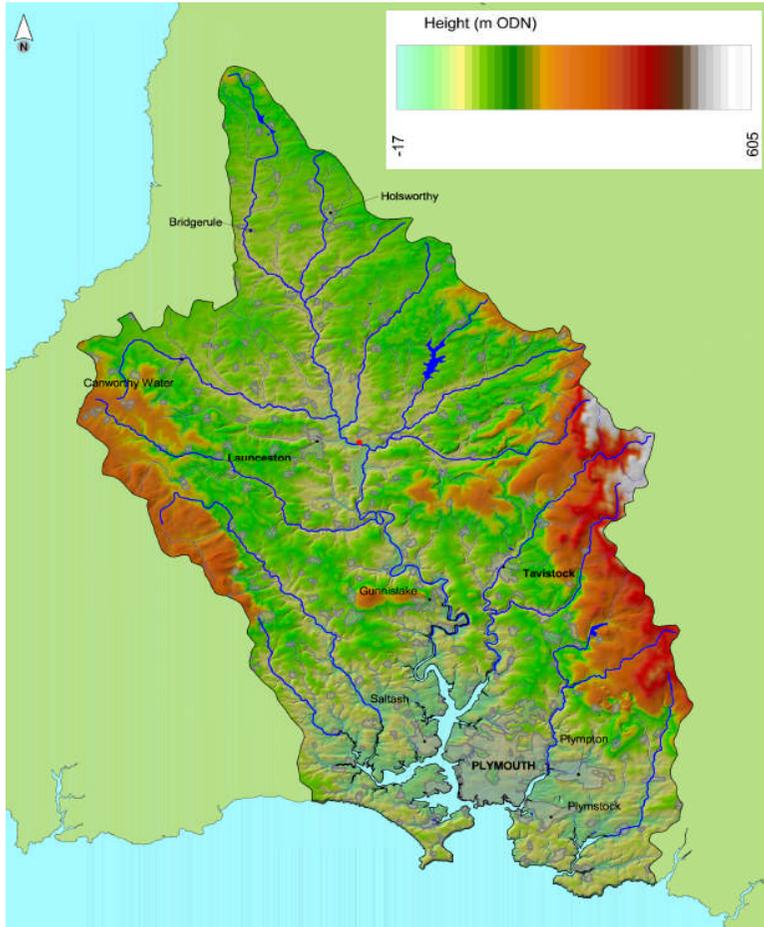
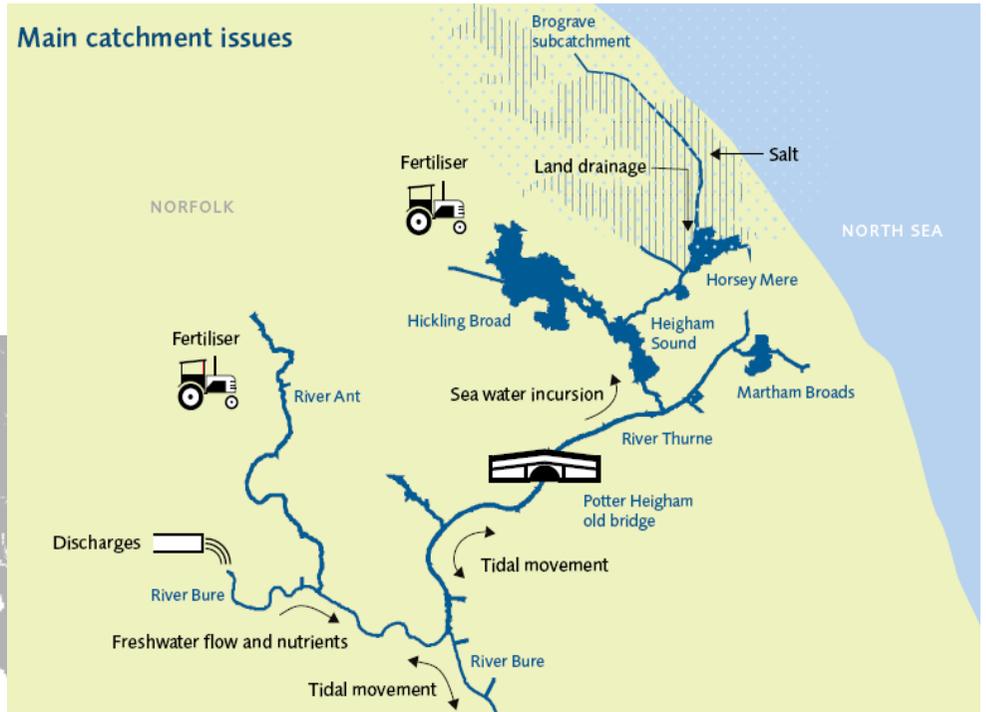


Hudson River Estuary

The estuary logo depicts an Atlantic sturgeon, the Hudson's largest fish



5 Implementation Groups

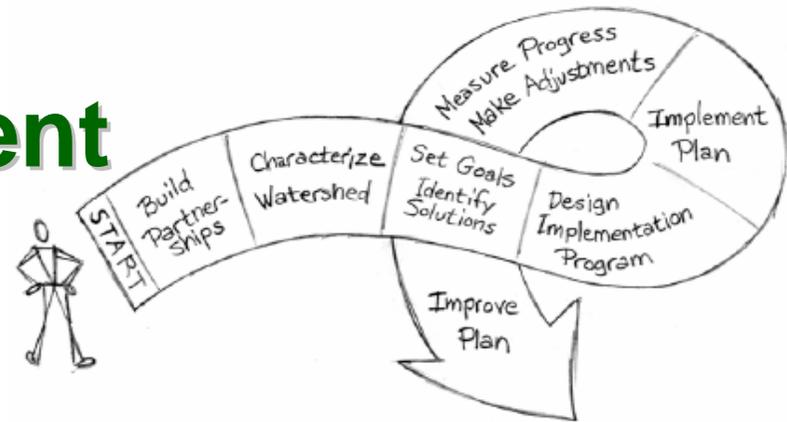


A 'wicked' diagnosis for catchment management recognises need for:

- **a broad societal response by civil society, local and national agencies and scientists**
- **decentralised collaborative management and multi-agency partnership working**
- **integration of science and governance (analytic-deliberative)**
- **the right combination of regulation, advice, land use measures, incentives and voluntary action**

Explicit recognition and understanding of this can inform policy, process and governance design.

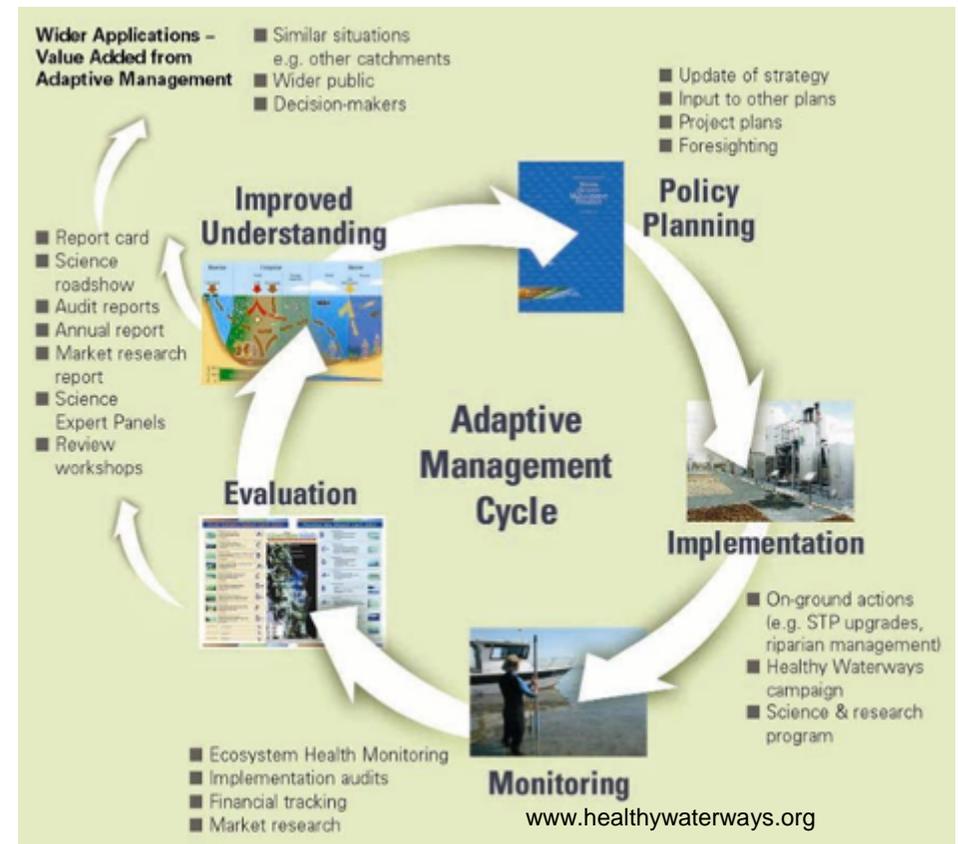
Components of a catchment management 'template'

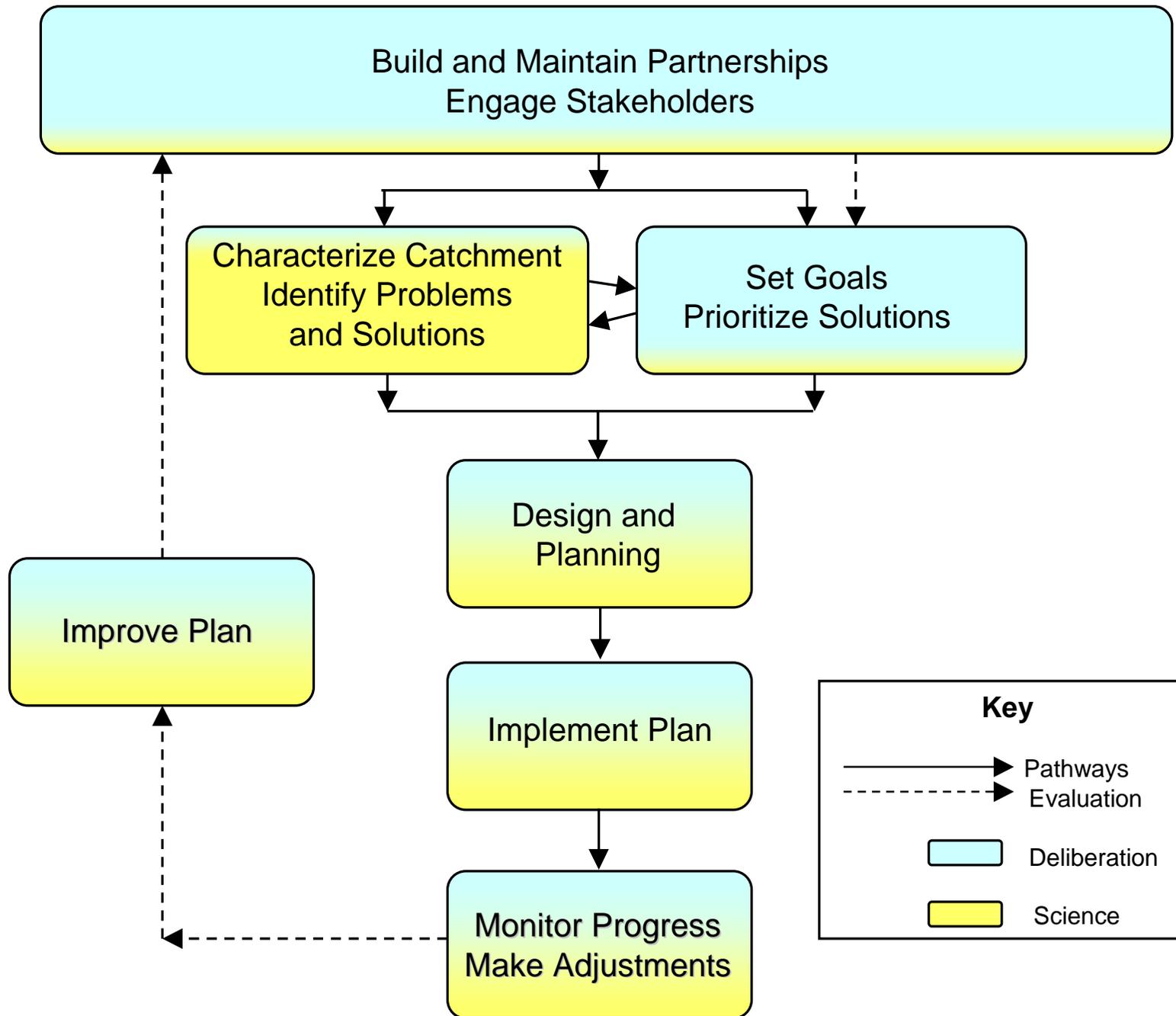


Source: US EPA Handbook 2005

An Adaptive Management Cycle

- the complexity, dynamics and trade-offs of catchment management require an adaptive management approach
- and a 'twin-track' of deliberative partner and stakeholder engagement supported by targeted scientific research (analytic-deliberative)





Components of a catchment management 'template'

Governance

- **Partnerships**
 - cross-sectoral and multi-level collaboration and coordination based on recognised responsibilities and duties
- **Stakeholder engagement**
 - inclusive deliberation to integrate environmental and public health criteria with local economic and social objectives, and wider policy goals
 - enhance implementation with local knowledge, acceptance and ownership
- **Locally led**
 - decision-making at the level appropriate to responsibilities for land and water management, with provision for inter-locality cooperation and coordination
- **Transparency and accountability** (apply principles of good governance)
- **Funded** – core (public) and from diverse sources

Components of a catchment management 'template'

Capacity

- **Locally accepted technical providers**
 - trusted experts and intermediaries to analyse, advise and mediate
- **Comprehensive condition and threat assessments and planning**
 - ideally one integrated strategic plan to guide action plans, in accordance with higher level regulation and policy directives
- **Knowledge exchange**
 - synthesis and communication of information to decision makers, partners and stakeholders through skilled intermediaries and communication and decision-support tools
- **Monitoring of performance and outcomes**
 - inherent to adaptive management, and to sustaining partner and stakeholder engagement, and funding
 - evaluation criteria to include environmental quality and sustainability, cost effectiveness, and an accepted distribution of benefits and costs

To conclude, critical factors for catchment management:

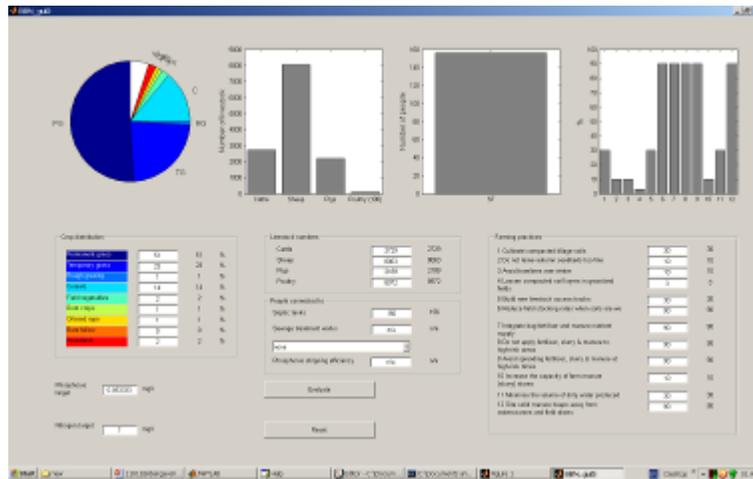
- Engage all the agencies that have relevant duties and responsibilities, building on local conditions and strengths
- Establish arrangements to manage across administrative and sectoral boundaries, with non-regulatory facilitation and coordination at catchment level
- Recognise that leading individuals or ‘network champions’ will be significant (find political, scientific and managerial leadership at catchment and regional scale)
- Don’t undervalue the activities and time taken to build trust between individuals and organisations
- Focus on inclusivity, dialogue and collaborative linkages to work across silos, developing consensus through committees and advisory groups which draw in different actors
- Give these arrangements legitimacy and ‘standing’
- Adequate representation of local government is essential to ensure accountability of decision making to local electorates

Critical factors:

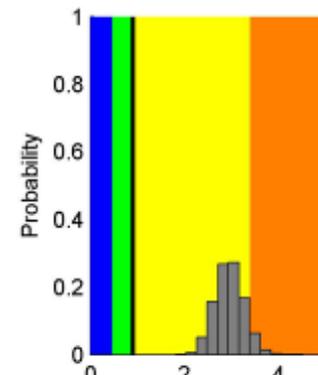
- Develop integrated catchment/regional plans, with goals that are shared locally, plus the strategies and action plans to deliver the targets of higher level policy frameworks and national programmes
- Develop tools for catchment characterisation, simulation and communication; drawing in partners and stakeholders and changing their perceptions and behaviour can only be achieved through robust scientific research and modelling
- Integrate scientific evidence into policy, planning and management processes to identify 'win wins' and low cost gains
- Develop the capacity for local analytical and advisory services
- An independent expert-based scientific advisory group drawn from local and national research organisations and key partners that can review and validate approaches, tools and plans is essential
- Present scientific data using techniques designed to engage non-scientific audiences e.g. an annual catchment report card

Extended Export Coefficient Model T. Krueger

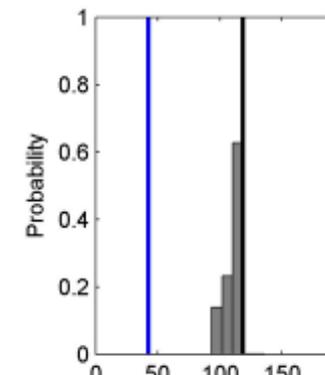
From conceptual modelling to live and interactive scenario development with stakeholders



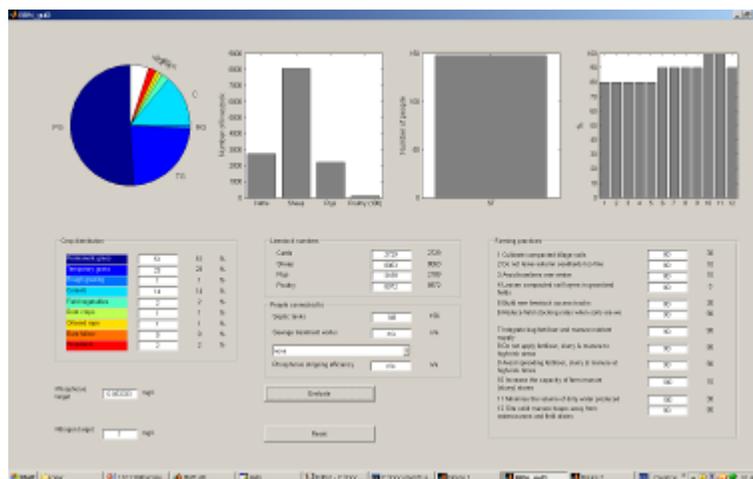
Baseline



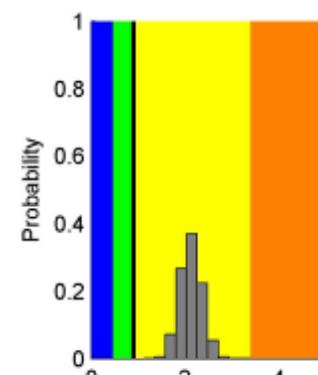
Phosphorus export (t per year)



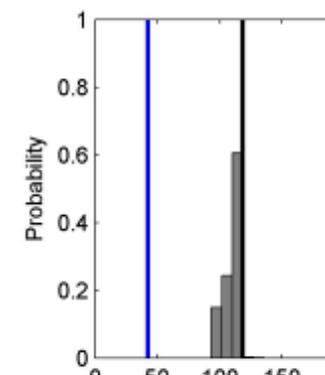
Nitrogen export (t per year)



Scenario



Phosphorus export (t per year)



Nitrogen export (t per year)

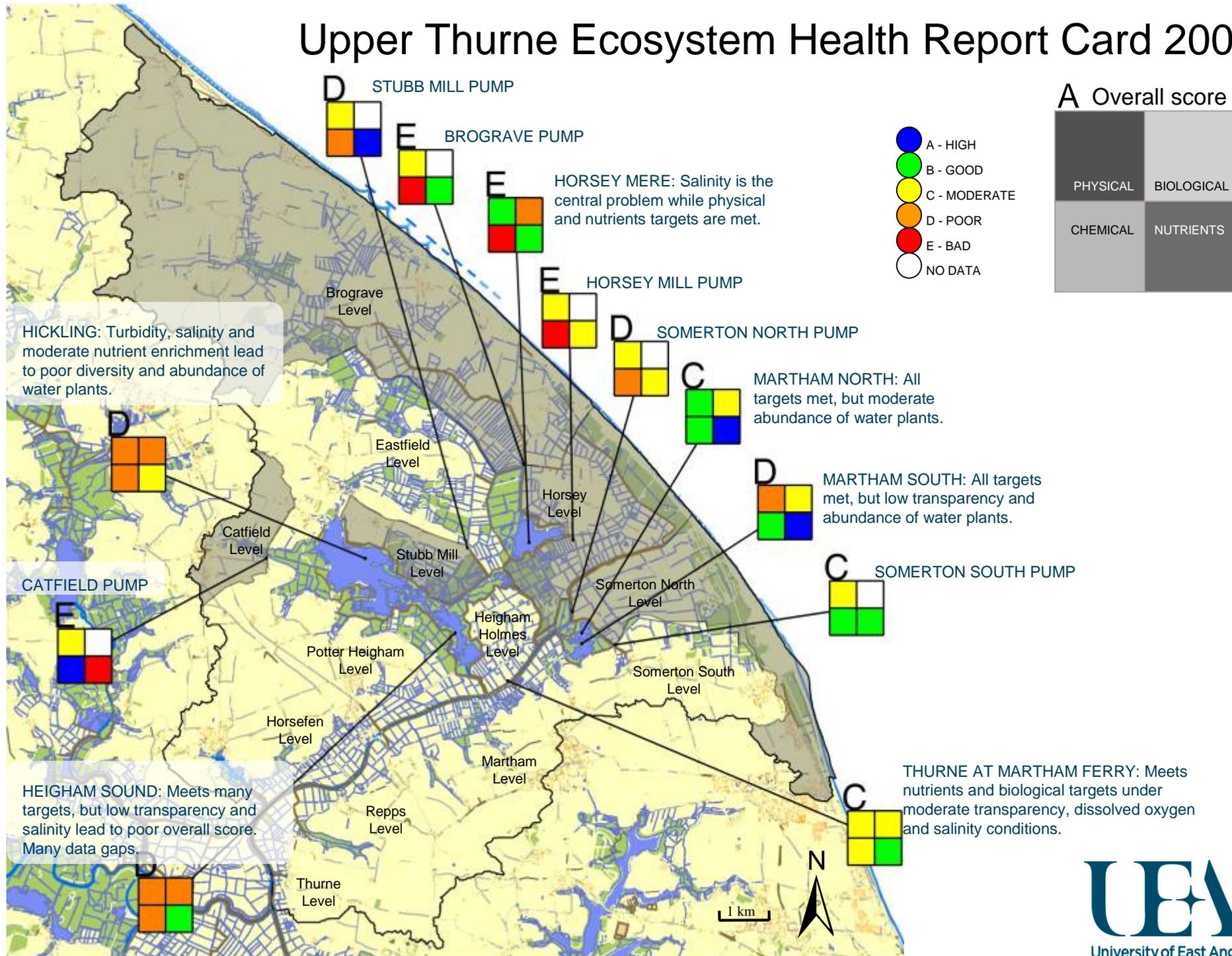


Social learning and co-production of models



- ✦ a platform for stakeholders to **collaboratively frame the scale and severity of the problem**, and develop a collective understanding
- ✦ modelling of options including BMP depended on local knowledge
- ✦ stakeholders can model potential solutions in **real time**, stimulating highly **dynamic** and **engaged** discussion
- ✦ an appreciation of **trade-offs** and **costs** developed
- ✦ model became a vehicle for stakeholders to **incorporate their knowledge within the problem solving process**, stimulating ownership and trust in the outcomes, and helping to ground truth and validate

Upper Thurne Ecosystem Health Report Card 2007





Project Principals and Partners



Principal investigator: Laurence Smith, SOAS (l.smith@soas.ac.uk)

Co-investigators: Kevin Hiscock, UEA and Keith Porter, Cornell Law School

Other institutions:

- University of East Anglia; University of Kent
- The Westcountry Rivers Trust
- Broads Authority and the Upper Thurne Working Group
- The Association of Rivers Trusts
- Cornell University; New York State Department of Environmental Conservation; Delaware County Action Plan; the Upper Susquehanna Coalition; and the Hudson River Estuary Programme
- The South East Queensland Healthy Waterways Partnership
- City of Aalborg, Denmark
- Drinking Water Company Drenthe and Drenthe Province, Netherlands
- OOWV Water Supplier, Lower Saxony, Germany

Research Team:

Christina Aue; Alastair Bailey; David Benson; Patricia Bishop; Dylan Bright; Marco Civitareale; Hadrian Cook; Jonathan Hillman; Alex Inman; Andrew Jordan; Andrea Kelly; Tobias Krueger; Mike Lovegreen; Jennifer Morley; Mary Jane Porter; Gitte Ramhøj; Diane Tarte; Nico van der Moot.



Catchment Management Resources

REPORTING RESEARCH AND PROVIDING RESOURCES FOR WATER
MANAGEMENT AND PROTECTION

For more information: