


GRESHAM COLLEGE

Greenness and UK Environmental Challenges

Carolyn Roberts

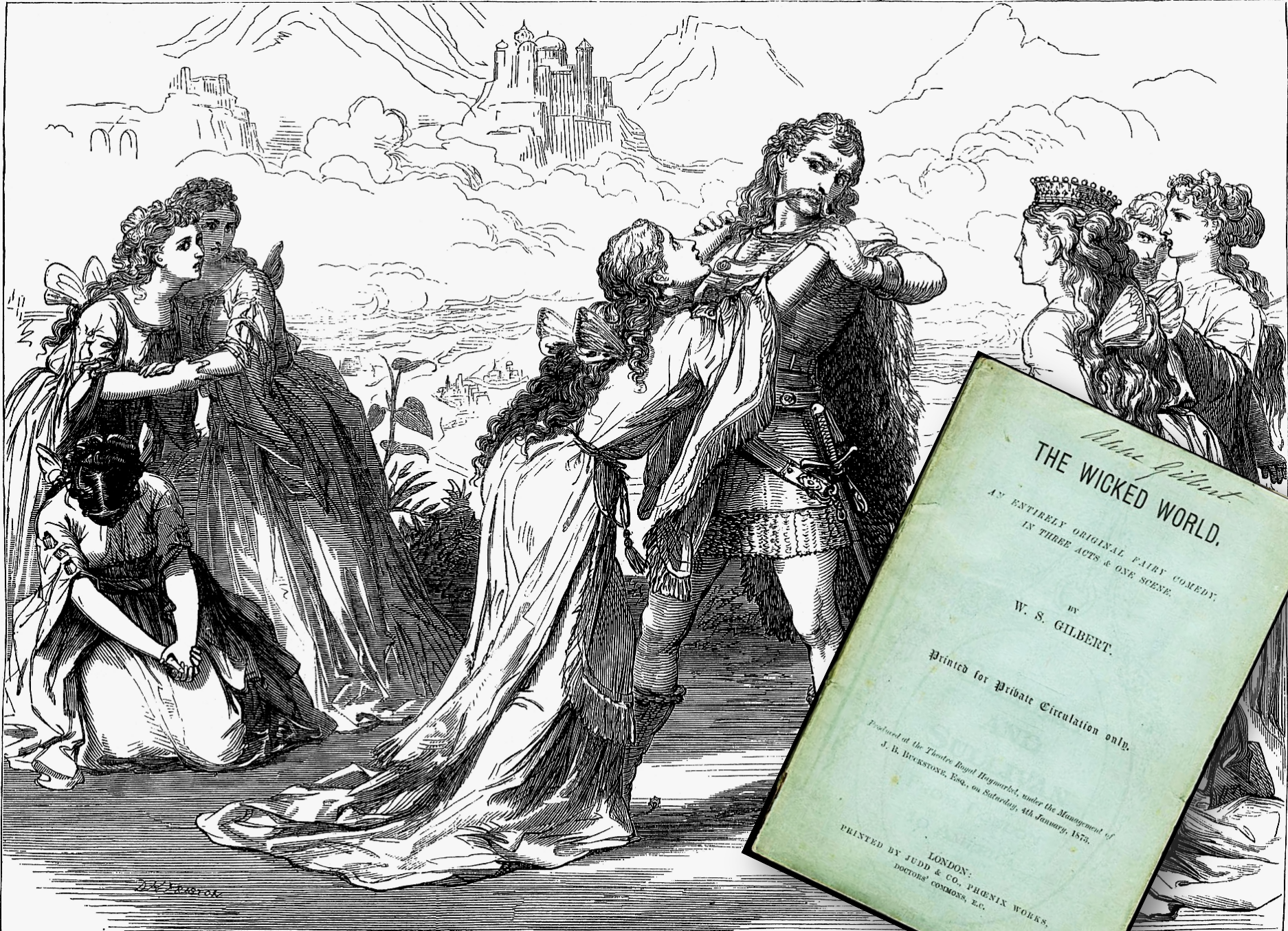
Frank Jackson Foundation Professor of Environment



The Knowledge Transfer Network

Visiting Researcher, University of Oxford





Miss Gilbert
THE WICKED WORLD,
 AN ENTIRELY ORIGINAL FAIRY COMEDY,
 IN THREE ACTS & ONE SCENE.
 BY
 W. S. GILBERT.
 Printed for Private Circulation only.
 Performed at the Theatre Royal Haymarket, under the Management of
 J. H. BUCKSTONE, Esq., on Saturday, 4th January, 1873.
 LONDON:
 PRINTED BY JUDD & CO., PHOENIX WORKS,
 DOCTORS' COMMONS, E.C.

SCENE FROM "THE WICKED WORLD," AT THE HAYMARKET THEATRE.

Uganda



Uganda



- Population c. 38 m
- Growth rate 3.1% /a
- 49% population under 15
- Mean fertility rate 6
- Life expectancy at birth 58.7 yrs
- Economically fragile
- GDP £276/hd
- Inflation 6-8%
- 161st in world ranking of economic indicators
- Low levels of literacy
- History of conflict
- High levels of mobile phone ownership



Boreholes and handpumps



'Drawers of Water', 1972



White, Bradley and White, 1972



Drawers of Water, 2004



Water-related Millennium Development Goals for Uganda

THEN

- 100% rural population to have access to safe and adequate water and sanitation (latrines) by 2015
- Access is defined as access to a 'safe source' within 1.5 km
- Reductions in water-related diseases such as diarrhoea

NOW

- Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation

FIGURE 24

Proportion of population using an improved drinking water source

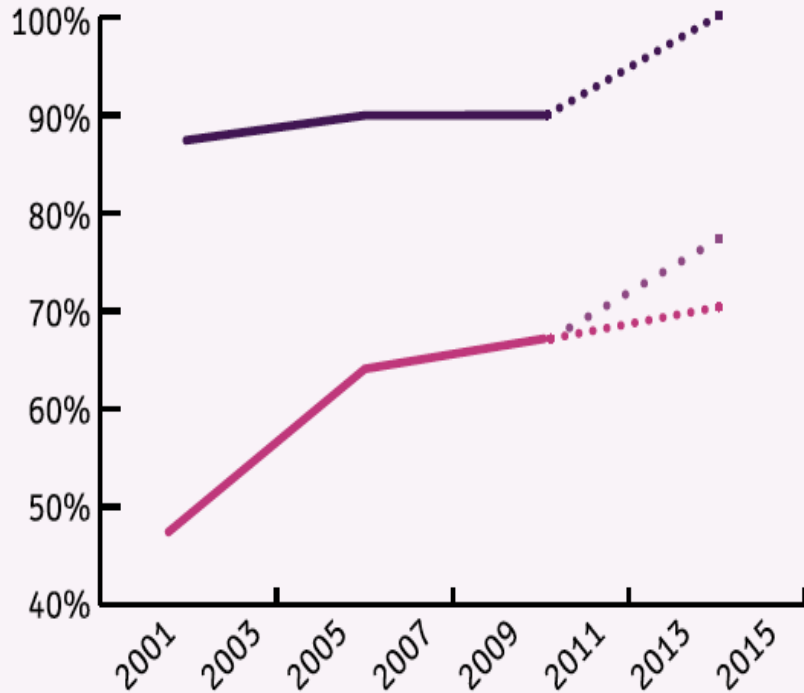
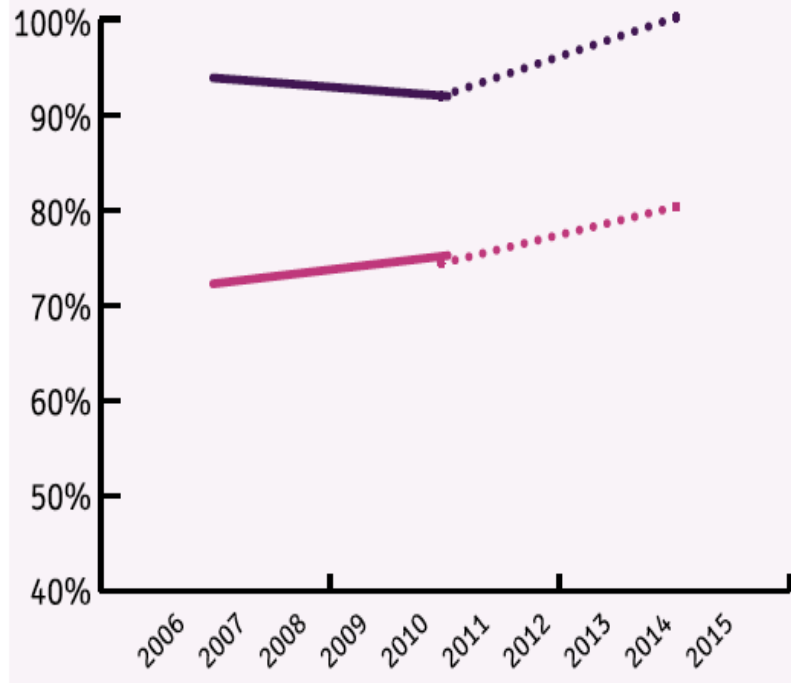


FIGURE 25

Proportion of population using an improved sanitation facility



— Urban — Rural

Sources: UDHS 2001/02, 2006, 2011. Note: Dotted lines of the same colour show the trajectories required to reach MDG target by 2015. The black dotted line in Figure 24 shows the trajectory required to reach the more-ambitious NDP objective (to increase access to safe water supply in rural areas to 77% by 2015).



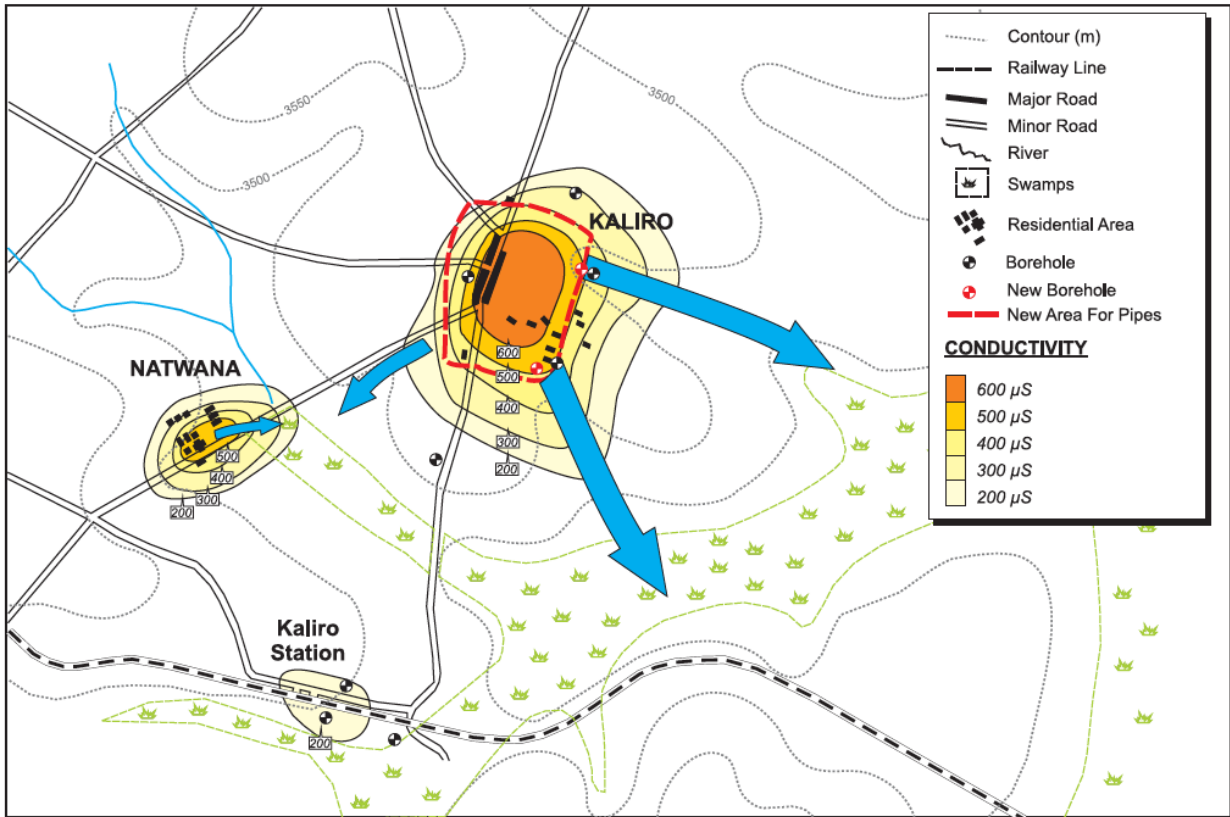


Groundwater contamination Kaliro

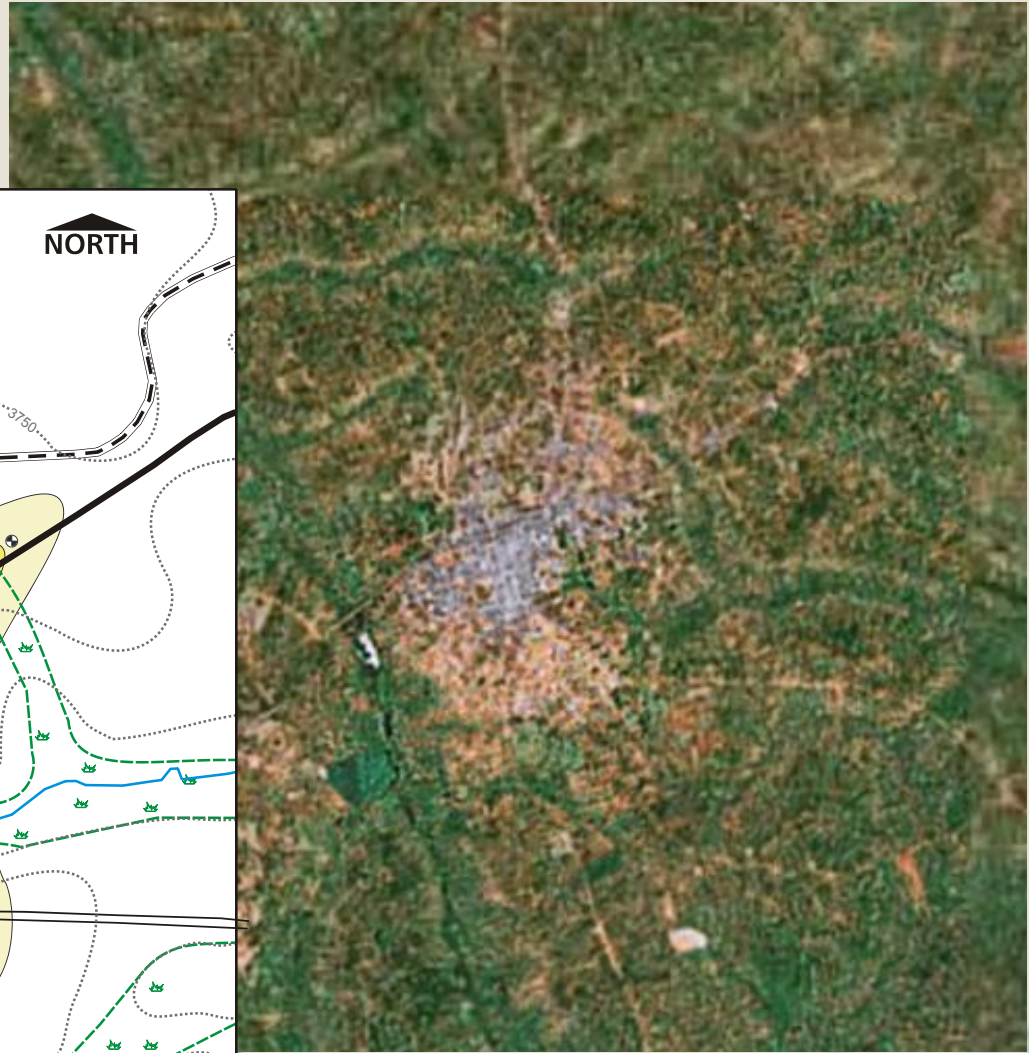
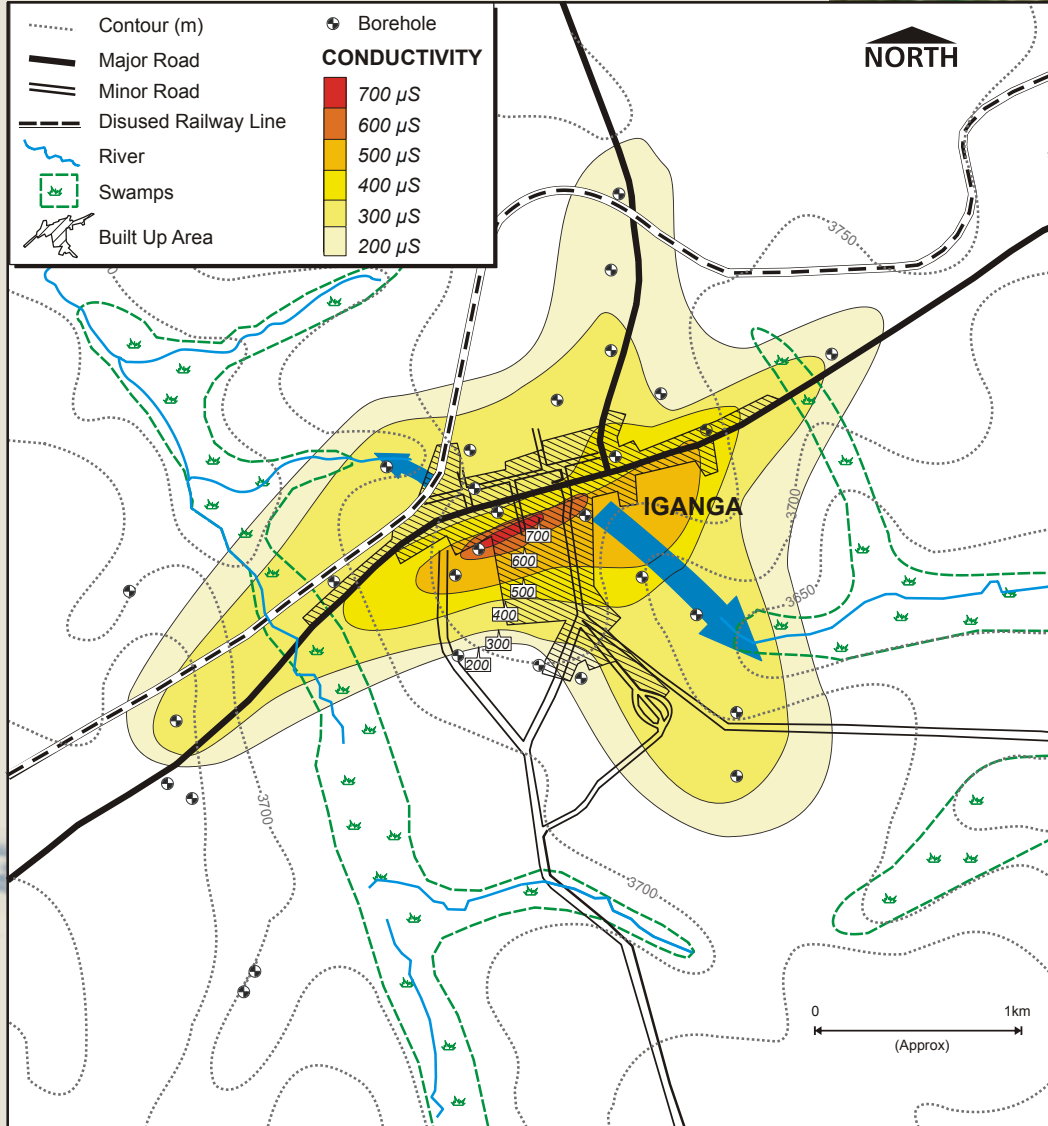


Image © 2006 TerraM
© 2006 Europa Techn

30'31.57" E elev 3557 ft S



Iganga










Wicked Problems Cycle

- 
- Rapid population growth leading to inadequate facilities
 - Policy that a new borehole/facility is required
 - Maximum population within 1.5 km sought
 - Boreholes installed in urban/suburban areas
 - Local groundwater is contaminated from pit latrines and other waste water
 - People abandon traditional sources and walk into town to collect water from boreholes
 - Perception that water quality is good, no perceived need or no fuel for boiling
 - Increased risk of water-borne diseases

'Wicked' Problems

- Are poorly formulated and complex
- With interconnected physical/scientific and human/sociological dimensions...
- Where what happens in one place and time affects what happens somewhere else, at a different time
- Involving many different stakeholders...
- Who don't agree about what is important...
- And who use the terminology in different ways...
- And who cannot agree if the problem has been solved

Based on Horst Rittel and Melvin Webber, 1973



'Super Wicked' Problems

- and
- Time is running out
- Those who cause the problem also seek to provide a solution
- The central authority needed to address the problem is weak or non-existent
- Policy responses make decisions that disregard the future and reflect short time horizons

Levin *et al*, 2012



Wicked Problems Second Cycle



- Typical water use is only c. 20 l/hd/day
- But water yields are relatively low per borehole
- Women and children queue
- Borehole area is poorly maintained and leakage, spillage or animal trampling occurs
- Stagnant water supports mosquitoes
- People are infected with malaria whilst queuing into the evening
- Privatised health care providers flourish
- Inhabitants perceive higher levels of healthcare in urban areas, promoting rural-urban migration



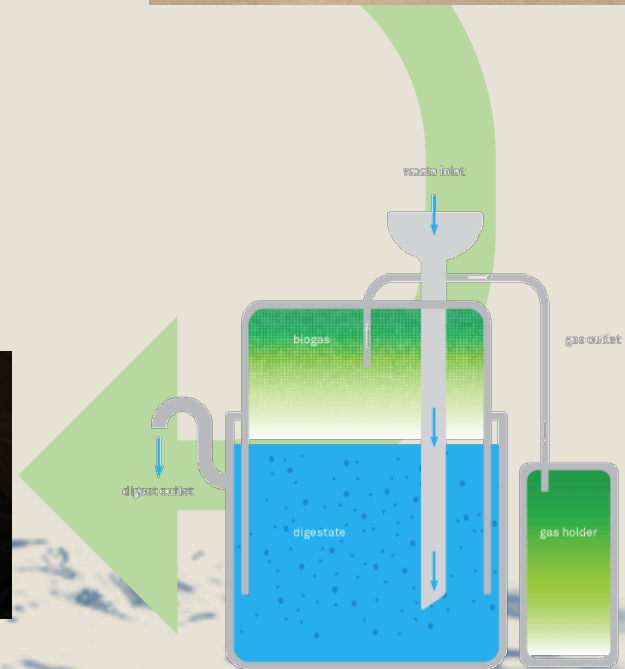


Technological solutions?

e.g. LooWatt

Award-winning mechanical sealing unit contains waste in biodegradable film, with an odour-inhibitor. Waste stored in a cartridge beneath the toilet, for periodic emptying.


Anaerobic digestion of the waste produces biogas fuel and fertiliser.





Sea energy wrong fossil pressures Clean
Demand Political level Flood Power little
Climate Population Affordability protection rise Business industry
Sustainable sea growth population
scarcity fle warming **Rising** Green **pollution** Carbon
Housing machinery social Non
Mitigation species native fuels new
Air infrastructure Urban Greenhouse
renewables emissions **water**
erosion Resilience continuity Adaptation
Pollution
change Infrastructure
communities coastal balance citizenship collaboration performance gases
placed Flooding **Energy** Pandemic supply risk Demand certainty
Global quality **Building** Economic levels Excess
Food policy





Gev Eduljee

Stuart Heyward
Higham

Lewis Jones

Ian Walker

Miranda Kavenagh

Peter Matthews

Sarah Beacock

Martin Baxter

Ian Patton

Jamie Agombar

Francesca Berriman

Katherine Pygott

Chris Hoggart

Matthew Pencharz

Sue Illman

William Pope

Judy Ling Wong

Thanks!

Owen Patterson, MP

'I leave the post with great misgivings about the power and irresponsibility of – to coin a phrase – **the Green Blob**.

By this I mean the mutually supportive network of environmental pressure groups, renewable energy companies and some public officials who keep each other well supplied with **lavish funds, scare stories and green tape**. This tangled triangle of **unelected busybodies** claims to have the interests of the planet and the countryside at heart, but it is increasingly clear that it is **focusing on the wrong issues** and **doing real harm** while **profiting** handsomely.

Local conservationists on the ground do wonderful work to protect and improve wild landscapes, as do farmers, rural businesses and ordinary people. They are a world away from the **highly paid globe-trotters** of the Green Blob who besieged me with their self-serving demands, many of which would have harmed the natural environment.'



Geoengineering Possibilities

Solar Radiation Management

Reflecting some of the sun's energy back into space by:

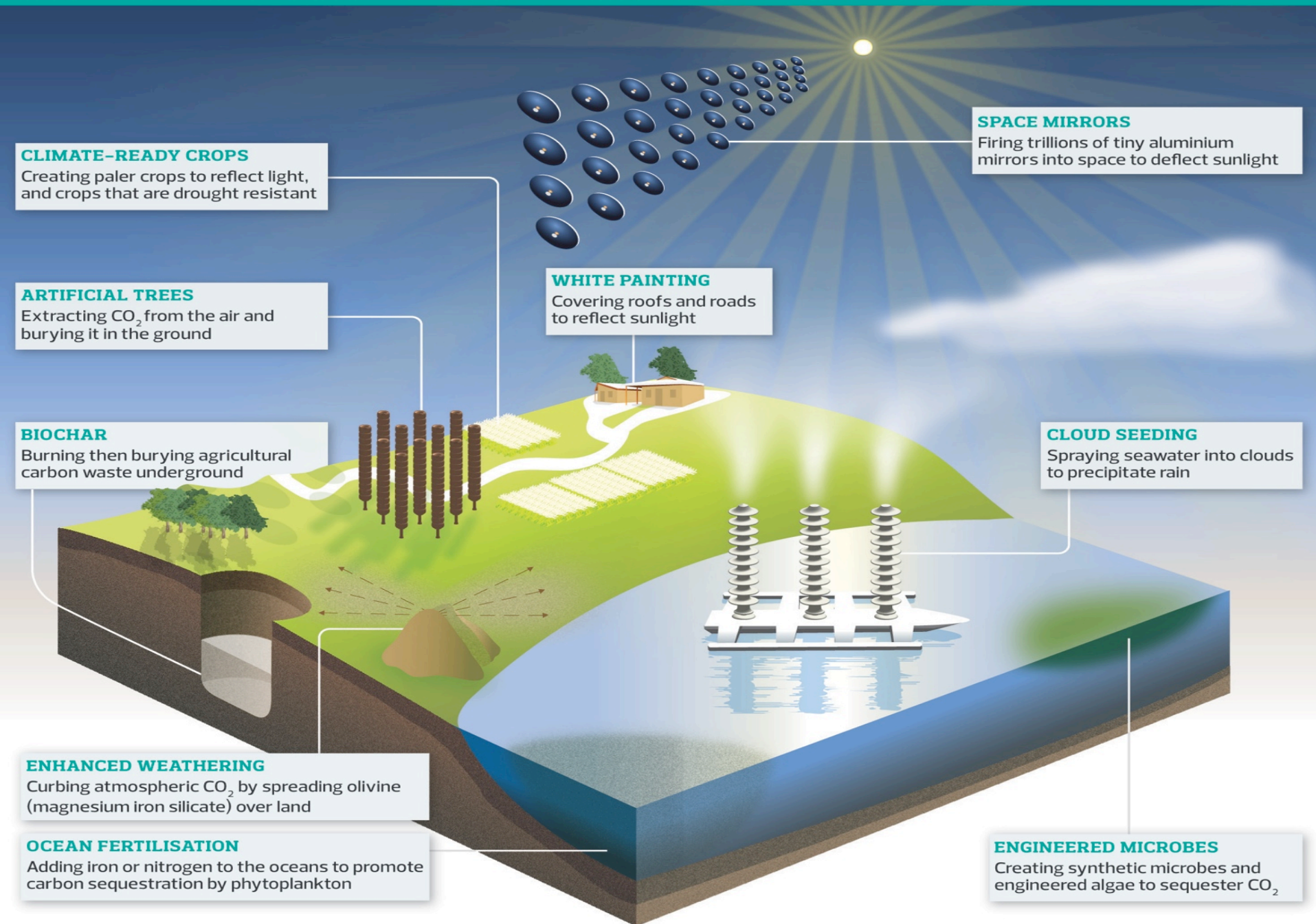
- Enhancing the albedo of the earth's surface or clouds
- Space reflectors to block some sunlight
- Stratospheric aerosol particles to scatter light

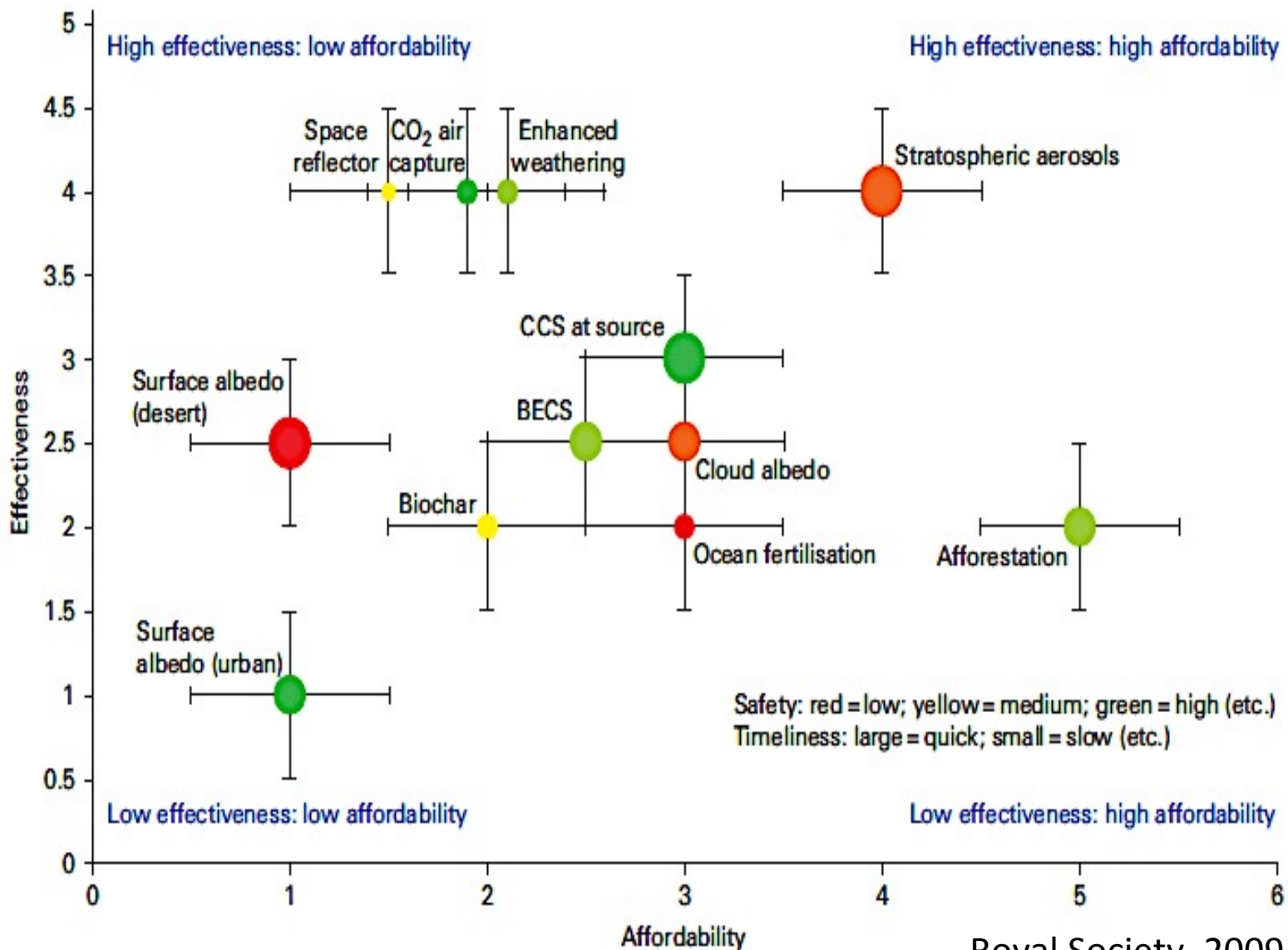
Direct Carbon Dioxide Removal

- Global scale afforestation
- Charring biomass and burying it
- Bioenergy with carbon capture and sequestration
- Ambient air capture using machines
- Ocean fertilisation with nutrients such as iron
- Enhanced weathering of minerals such as olivine
- Ocean alkalinity increases using limestone powders and similar, to increase carbon dioxide solubility



HOW GEO-ENGINEERING HOPES TO COMBAT CLIMATE CHANGE New Scientist, 2009






Royal Society, 2009



Approximately 4000
houses and 500
businesses flooded in
July 2007, in
Gloucestershire alone



Flooding included
non-floodplain areas



‘In terms of scale, complexity and duration, this is simply the largest peacetime emergency we’ve seen’
Chief Constable, Tim Brain

- Several deaths
- Thousands of properties flooded, on floodplains and in settlements of all sizes in Gloucestershire, Warwickshire and Worcestershire, and surrounding counties
- Inundation, contamination, life-threatening disruption to core services for over 400,000 people
- Subsidence, stress, illness and other contingent losses
- £3 Billion (estimated) insured damage, and some permanent economic losses to business and industry
- Incipient ‘civil disorder’



Single critical points of failure emerged, such as water treatment plants, electricity stations and motorways

c. 350,000 people lacked piped water supply for up to 21 days

c. 10,000 people trapped on flooded M5 motorway for up to 18 hours

Severn Trent Water



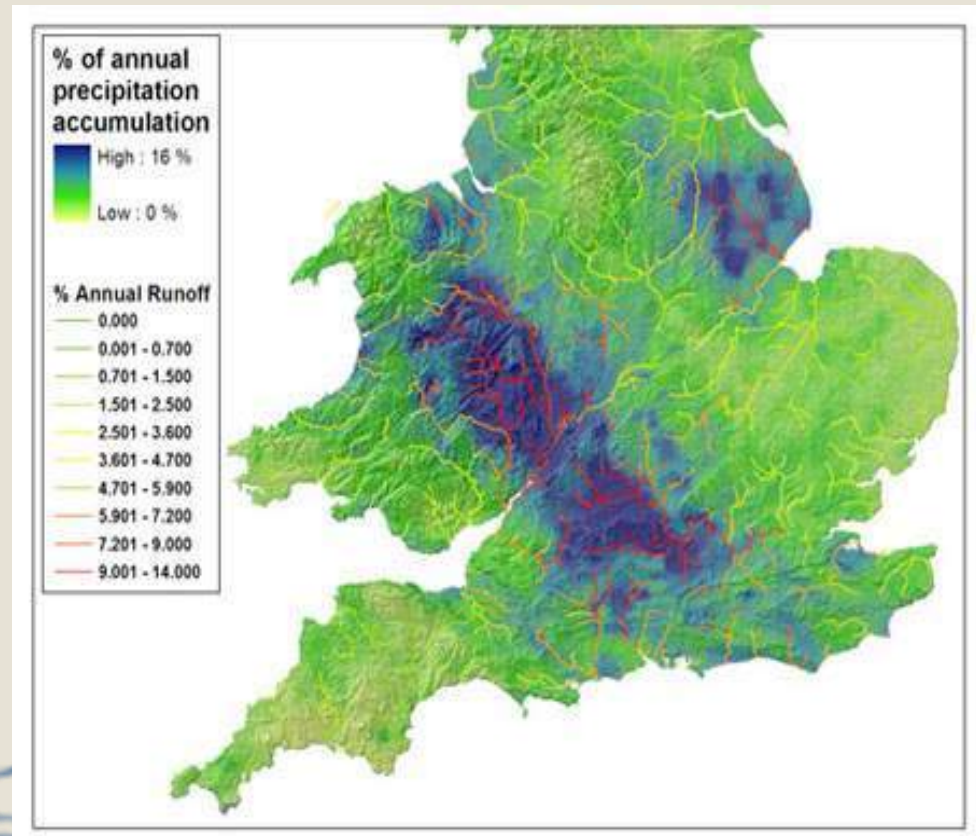
Gloucestershire 2007

The Impact of the July Floods
on the
Water Infrastructure and Customer Service

Final Report

A 1 in 200+ year event?

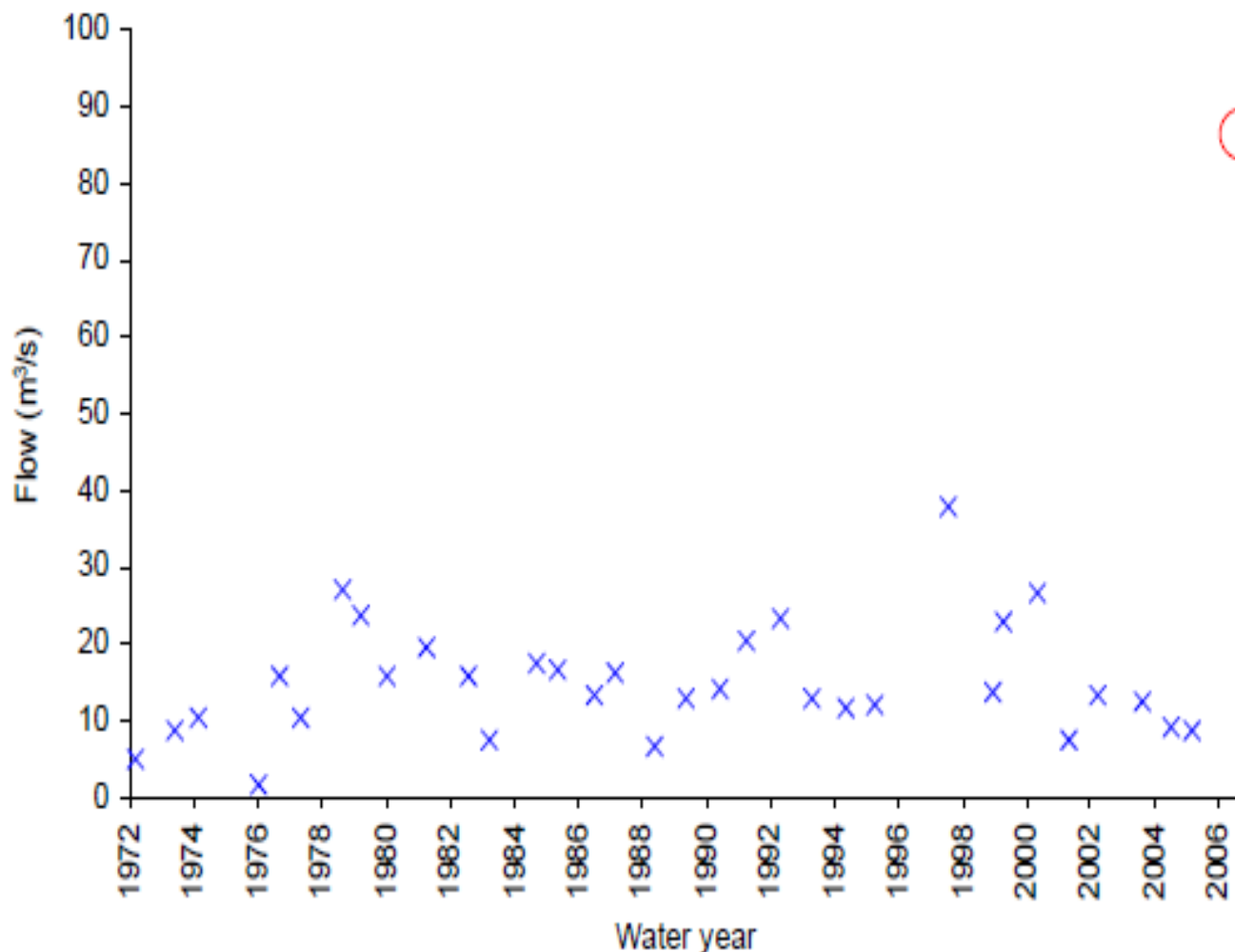
- 1st June to 31st August: 200-250% long term average rainfall across most of the County
- July 2007: 400-450% long term average rainfall
- 20th July: 78mm in 12 hours, peaking at 16-32mm/hr. 2 months rainfall in 24 hours at Pershore



4.22 Isbourne at Hinton

July

Annual maximum time series plot (flow)



Return Period
>1000 years

Peak stage
4.93m

Peak flow (m³/s)
124 (NFFS)
86 (ReFH and
extrapolated EA rating)
170 (hydraulic model)

Confidence in flow
Very low (rating
exceeded by >1m
and ReFH estimates
uncertain)

POT rank
1

Years of data
35

Word cloud from Executive Summary of Pitt Review



'The Pitt Review', 2008

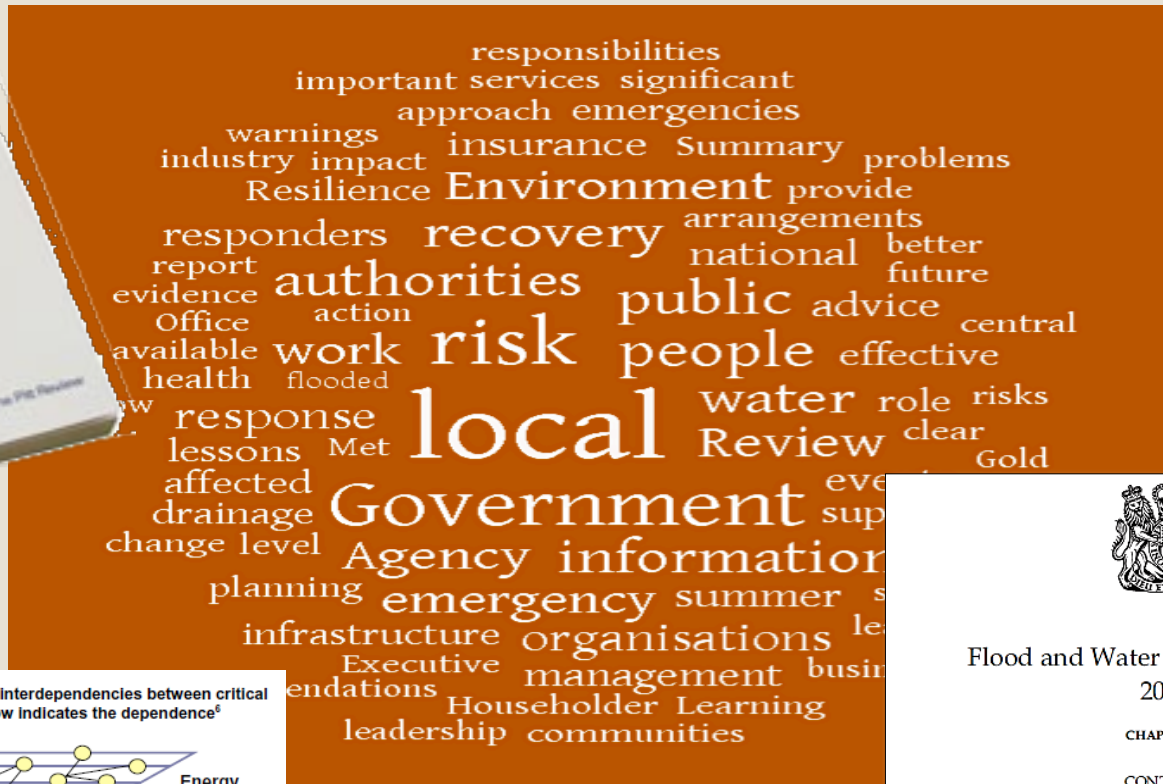
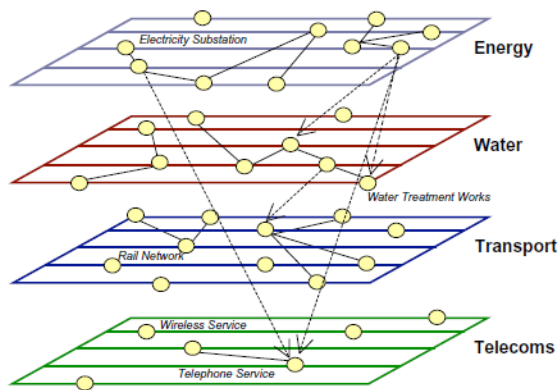


Figure 13 – A schematic outline of some of the interdependencies between critical infrastructure sectors. The direction of the arrow indicates the dependence⁹



Flood and Water Management Act 2010

CHAPTER 29

CONTENTS

PART 1

FLOOD AND COASTAL EROSION RISK MANAGEMENT

1. Key concepts and definitions

- 1 "Flood" and "coastal erosion"
- 2 "Risk"
- 3 "Risk management"
- 4 "Flood risk management function"
- 5 "Coastal erosion risk management function"
- 6 Other definitions

2. Strategies, co-operation and funding

- 7 National flood and coastal erosion risk management strategy: England
- 8 National flood and coastal erosion risk management strategy: Wales
- 9 Local flood risk management strategies: England
- 10 Local flood risk management strategies: Wales
- 11 Effect of national and local strategies: England
- 12 Effect of national and local strategies: Wales
- 13 Co-operation and arrangements
- 14 Power to request information
- 15 Civil sanctions
- 16 Funding
- 17 Levies

3. Supplemental powers and duties

- 18 Environment Agency: reports

Urban runoff effects in Longlevens, Gloucester



Horsbere Brook
Catchment Area

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cypress gardens, longlevens, gloucester

© 2007 Infoterra Ltd & Bluesky

© 2007 Tele-Atlas

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Pointer 51°52'56.99" N 2°12'23.28" W elev 17 m Streaming ||||| 100%

Eye alt 307 m

Conclusions

- Scrutiny Inquiry was effective social learning and can be seen as part of 'adaptive management'
- Stakeholder representation was excellent
- Councillors were challenged by the scientific concept of an event too extreme to be controlled, and by issues around spatial and temporal interdependency
- Wider national planning policy implementation issues for landscape development (e.g. floodplain occupancy) and SuDS could not be addressed adequately.
- Much testimony was emotionally charged
- 'Wicked' nature of problem proved challenging for the Inquiry mechanism. Education programme is required for full engagement




Project FOSTER

**To improve the
flood science
understandings of
decision makers
and professional
'actors'**

**Evaluate a mix of
science
communication
methods for
engaging Local
Authorities**

**Explore good
practice in flood
science
communication**

Learning for the next flood

- 
- Project FOSTER is researching exchanges of understanding between flood scientists, and Local Authority Officers and elected Members
 - Three English local authorities and the Environment Agency, with inputs from research scientists
 - Experimentation with different styles of engagement for learning – ‘expert’ -led, ‘participant’ -led/role play, Virtual World-based (using social media: Second Life™)
 - Detailed evaluation using interviews, pre- and post-questionnaires, event observation
 - Identification of good practice in dialogue about wicked problems between professional people

Evaluation of participants' responses, using semi-quantitative and 'grounded theory' approaches

- 100 pre-workshop questionnaires (24% Councillors)
- 83 post-workshop questionnaires (20% Councillors)
- 36 individual pre-workshop interviews
- 29 individual post-workshop interviews
- Five partner focus groups; three partner interviews
- Three facilitator interviews
- Observations of workshop sessions

Virtual Workshops in SecondLife™



I don't play computer games so it was a novel experience for me...
(Officer)

What really worked once I'd mastered the technology was that **I could operate remotely and yet interact with [the facilitator] and others**
(Councillor)

I think the amount of time you need to learn just how to get into and use *Second Life* before you get into any attempt at using it for the right content, I think that's a significant issue *(Officer)*

Strangely enough, **I found it a d**m sight easier than I thought it was going to be!** When I walked in on that first morning, I saw the laptops and I thought 'Oh my God, no' ... *(Resilience group Member)*



THE WORKS

McDonald's

McFlurry
99p
Drinks
Entrances

Arnstein, Sherry R. 'A Ladder of Citizen Participation', 1969

