

Catchment Management as a Community Led Process

Water Security in the Landscape
Coventry University, 7 & 8 November 2011

WATER21



Why Community Led ?

Coalition Government in their espousal of **Localism and Big Society** are very keen to **bring decision making and delivery to stakeholders**. One of the key points to emerge from Richard Benyon (Flood Minister) and the **Environment Agency** in their launch of the *Catchment Approach* at the March 2011 Defra Water Stakeholders Forum.

The need for **more effective delivery and engagement with a wider range of stakeholders** at a catchment scale has been highlighted by many organisations and is recognised fully by the Government and Defra in it's thinking. This is also happening at a time of **the severest financial and organisational constraints for a generation; we can't afford to waste people's time and money.**

Catchment Delivery Conference, 23rd November 2011, SOAS London

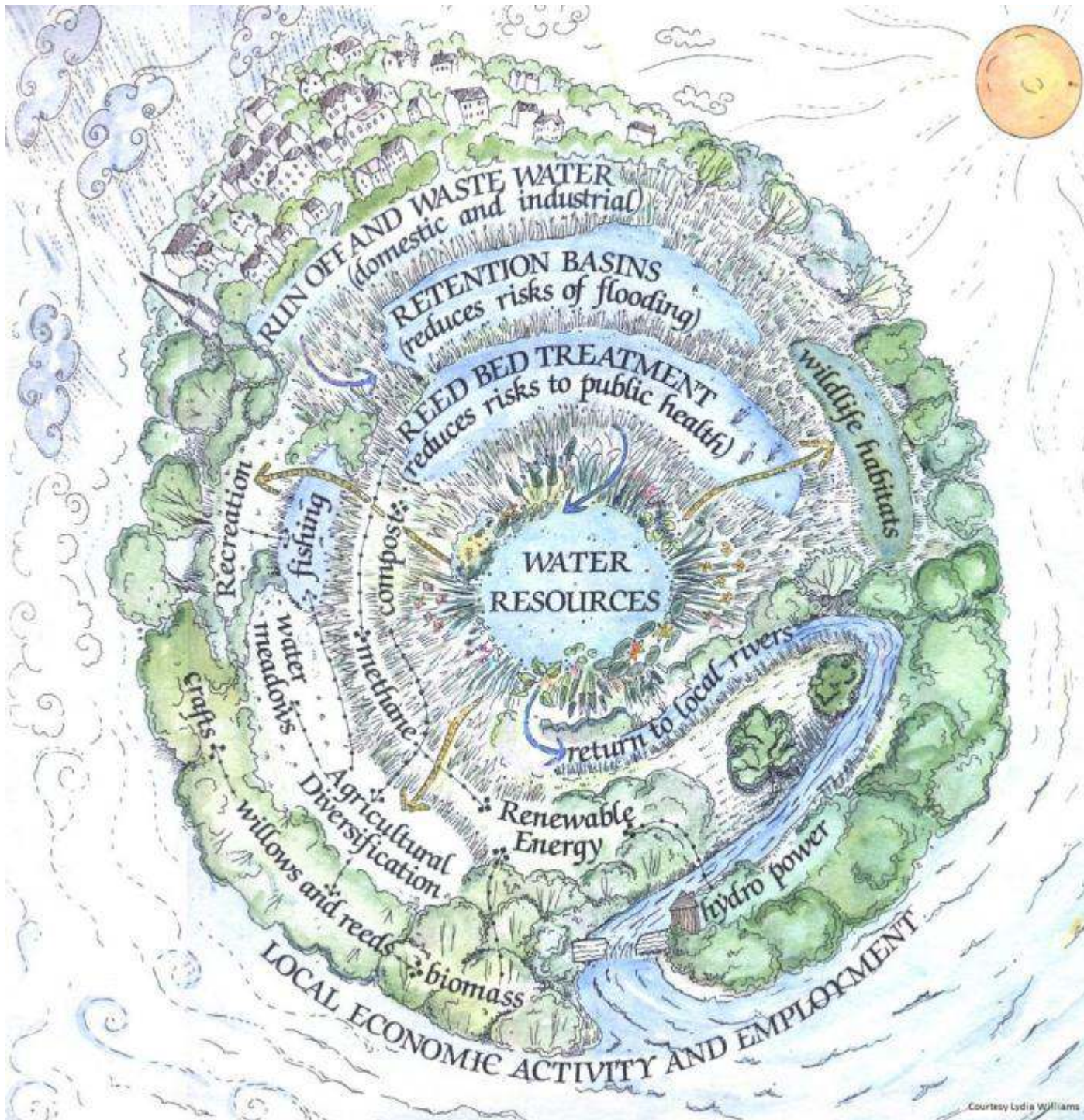
- **Agenda 21**
- **Water Framework Directive**
- **Localism Bill**
- **Flood and Water Management Act 2010**

Regulatory bodies face periods of significant change when new legislation demands a change in their culture

New legislation requiring a radical change in regulatory approaches or the adoption of new roles by regulators, do not always immediately result in the radical change in approaches anticipated. Instead such legislation is implemented incrementally with changes bolted on to existing practices.

In effect environmental regulators are being required to ensure that the social change ... occurs through the implementation and enforcement of environmental regulation. This means that existing institutions must take on a new role and tackle problems they are ill equipped to address ...

**Environmental regulation and institutional change for social change,
E. A. Kirk & A. D. Reeves, University of Dundee**



We need 'Safe & viable plans for Water' everywhere

Functioning landscapes that also benefit water resources, livelihoods & meet WFD

Food, energy, water, biodiversity, leisure etc

Stroud Urban Wetlands

**Lydia Williams,
Leeds Metropolitan Univ,
1993 (Water21)**

2 June 2011 Last updated at 00:06

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Nature 'is worth billions' to UK*

**By Richard Black**

Environment correspondent, BBC News

The UK's parks, lakes, forests and wildlife are worth billions of pounds to the economy, says a major report.

The health benefits of merely living close to a green space are worth up to £300 per person per year, it concludes.

The **National Ecosystem Assessment (NEA)** says that for decades, the emphasis has been on producing more food and other goods - but this has harmed other parts of nature that generate hidden wealth.

Ministers who commissioned the NEA will use it to re-shape planning policy.

"The natural world is vital to our existence, providing us with essentials such as food, water and clean air

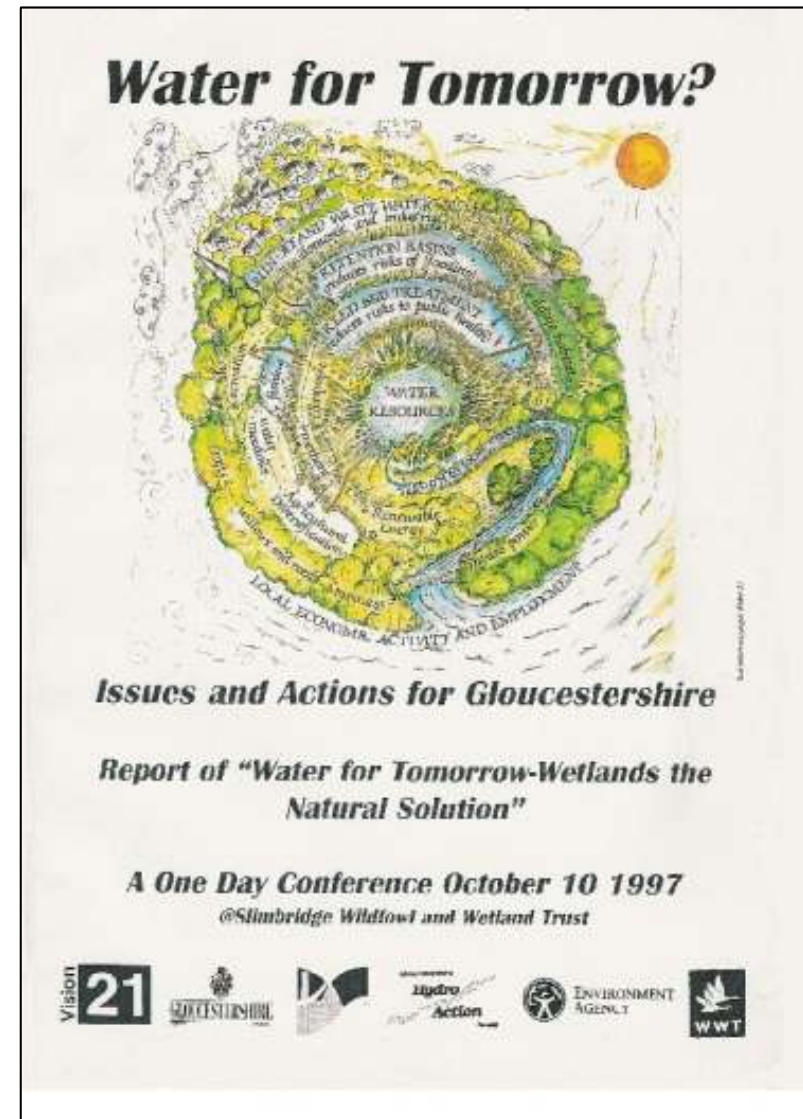


Urban parks and their attractions are worth up to £300 per person each year, the NEA concludes

*** And guess what ...
it already belongs to
someone ...**

What is Water21 ?

- Originating from 1997 'Water For Tomorrow' Community Conference
- Strictly 'Not for Profit'
- A 'Facilitating Framework for Water Sustainability'
- The Local Free Market
- Indigenous & traditional principles
- Community support (landowners/consumers)
- Agenda 21
- Apply Goodwill principle



Develop a Local (Catchment/Parish) Plan

TAKE RESPONSIBILITY

(For safe & economically viable water management.)

Involvement of the community

- (Landowners & Farmers, Local Flood/Water Action Groups, Sporting Organisations, Transition Town etc)

Develop Partnerships (Consumers – Landowners)

Parish Plans

Local Authority / Environment Agency

EA Catchment Flood Management Plan

Policy Unit 5 covers the reach of the River Frome

Catchment Objectives

- **Maintain or reduce flood risk** to provide an acceptable level of public safety (by reducing the risk to life, health and property from floodwater depth, flow velocity and rapid inundation);
- Minimise the economic damages from flooding to cities, towns, villages, isolated communities and commercial property in the catchment;
- Reduce the risk of diffuse pollution from surface water run-off and minimise the risk of foul water flooding.
- Protect designated and undesignated heritage sites and Scheduled Monuments adversely affected by flooding.

Policy

Policy option 4 – **take action to sustain the current level of flood risk into the future** (responding to the potential increases in risk from urban development, land use change and climate change).

“to sustain the current level of flood risk into the future”

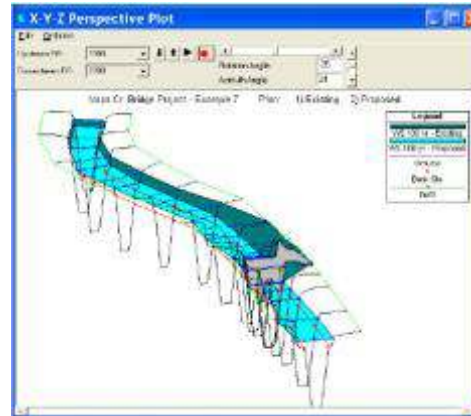


Slad, 2007
courtesy Zara Davis

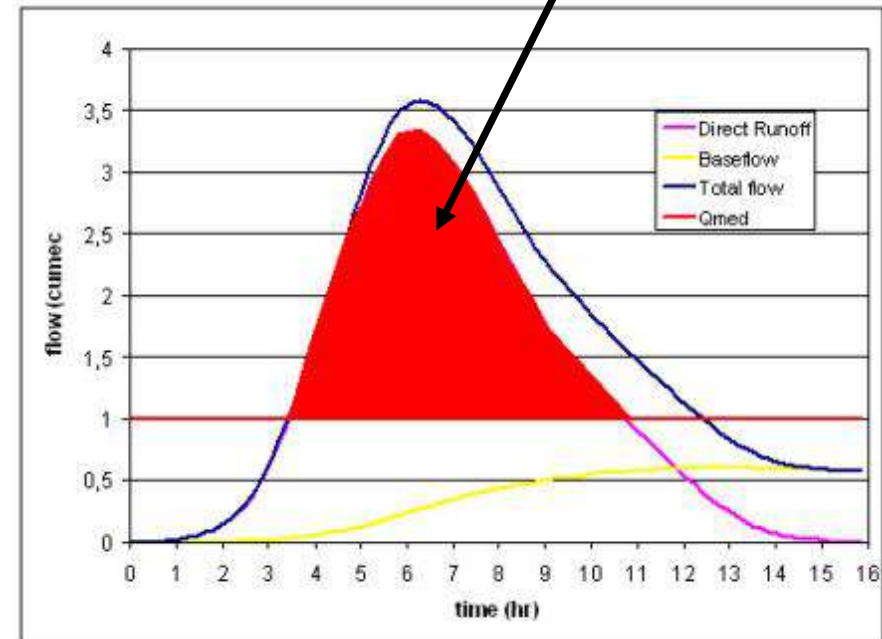
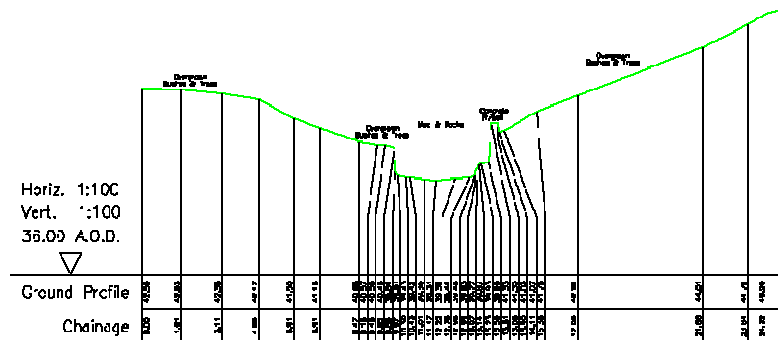
Defining critical flood risk ...



Ilaria Pretto, Trento University, Water21, 2008



180,000+ cubic metres of water to store in catchment for control of a 1 in 75 year flood event – in a 14.5 Km² catchment.





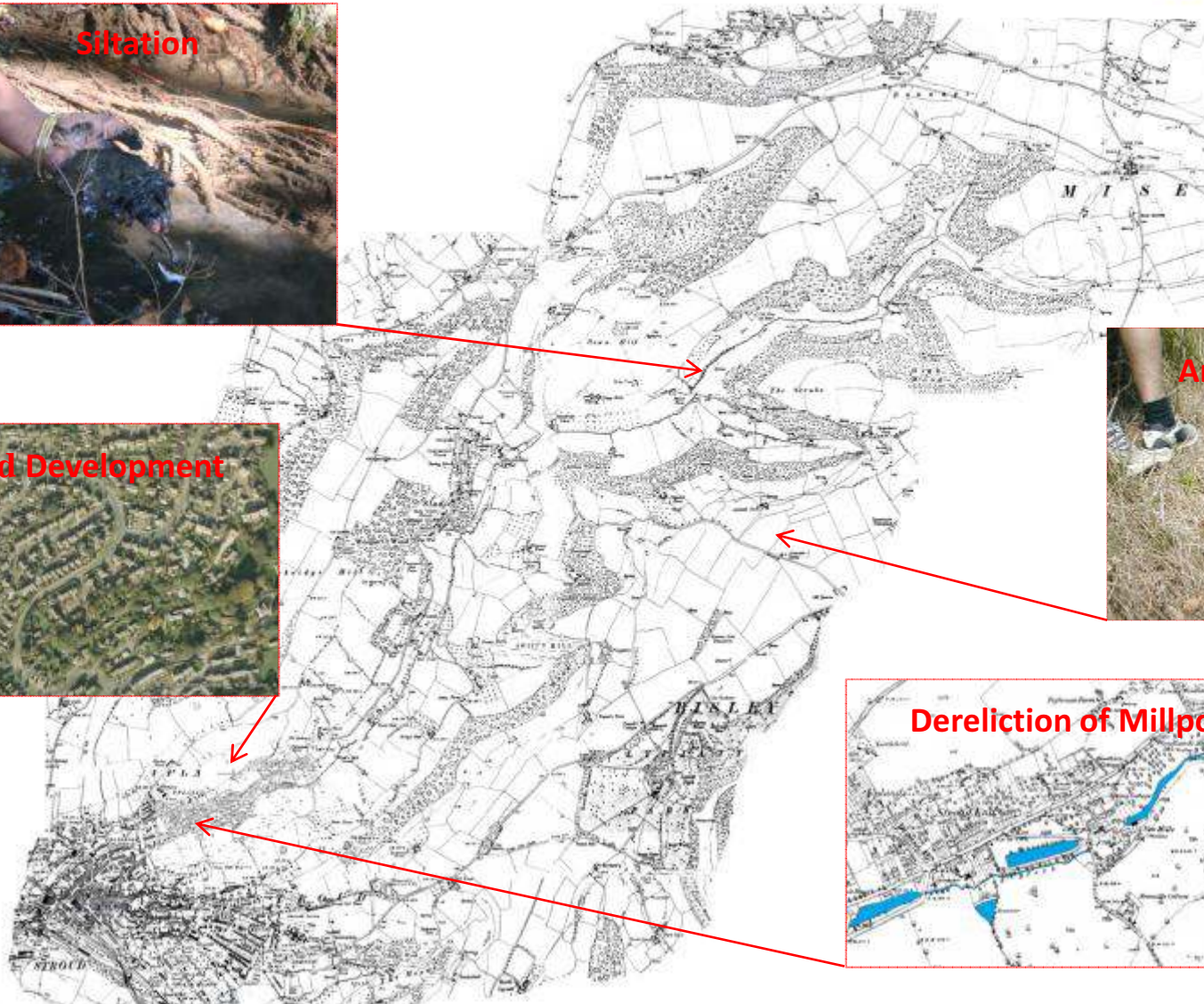
Identifying historic water management structures – an opportunity for 'town to meet country' – for mutual benefit.

Adam Broadhead, Sheffield University, Water21

Resolving risk by creating resources ...

- Flooding is largely caused by disrupted natural & traditional landscapes
- The 'community led' approach is an effective route to resolve critical flood risk
- Landowners open to partnerships within community (but dislike dealing with bureaucracies, DEFRA, LAs, etc)
- **Attenuation volumes for flood/drought control – are feasible on all UK watercourses**
- Could be largely self financing in longer term
- Huge potential renewable energy, biodiversity, food production, irrigation reservoirs, drinking water supply, leisure – by restoring landscapes
- **Goodwill is the key factor**

Slad Historic Land Use Changes – Key Catchment Flood Descriptors



Hydropower for flood control – Hazel Mill, Slad



3000 m³ of flood storage capacity can be created by restoring mill.

Adam Broadhead,
Cranfield University, Water21

Hydropower - for flood control

Pumped storage energy estimates			
Slad Valley Flood Protection			
Pumped storage height =	h =		100 m
Acceleration due to gravity =	g =		9.81 m/s ²
Density of water =	rho =		1000 kg / m ³
Number of water impoundments =	N =		20
Average volume per impoundment =	v =		10000 m ³
Round trip efficiency =			0.75
Energy stored =	E =	rho * g * h * N * v =	1.47E+11 joules
		=	40875 kWh
		=	40.88 MWh





Arun Cappi, Loughborough University, Water21, 2011

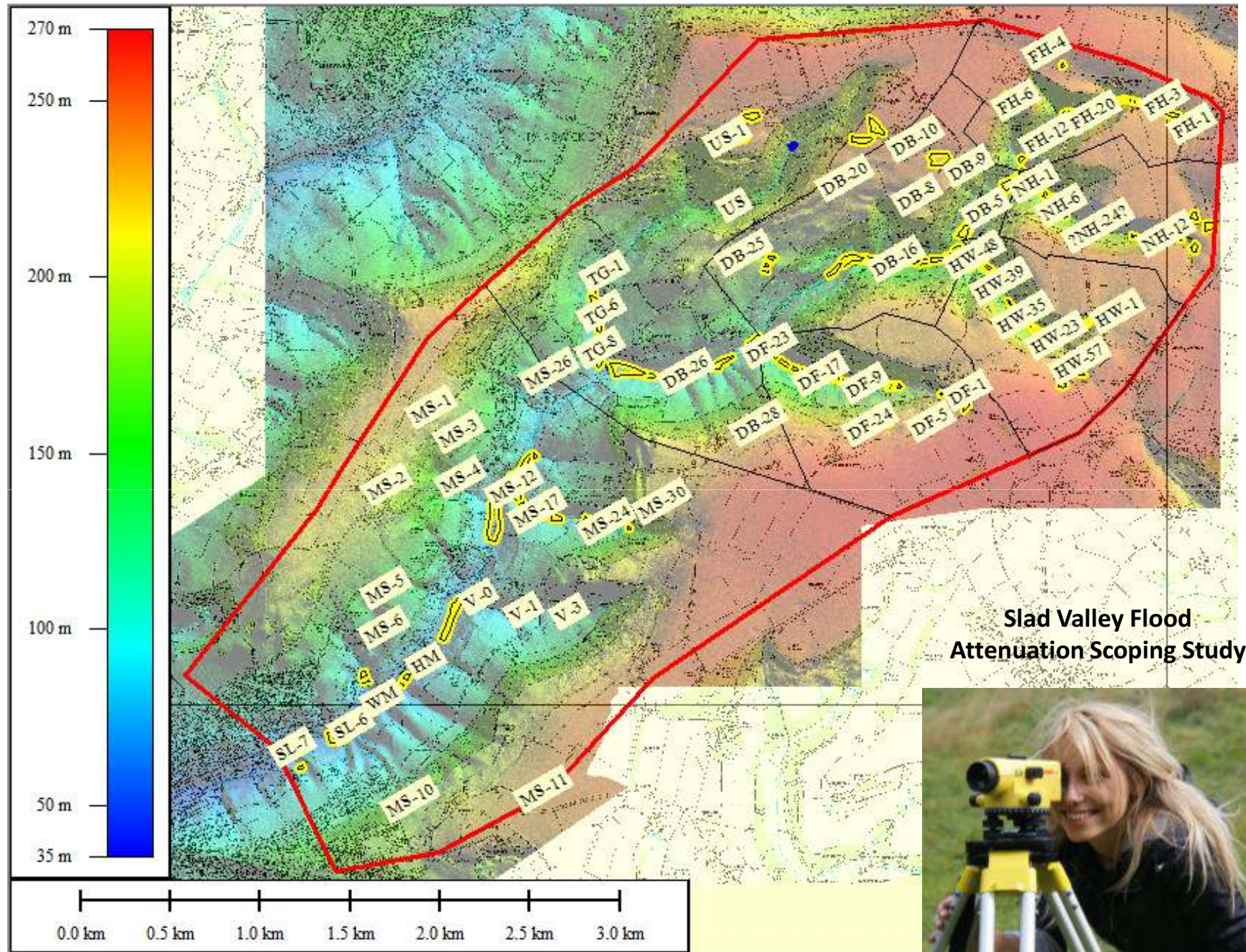
Gabriella Kovacs, Budapest University, Water21, 2011



Surveying for flood attenuations



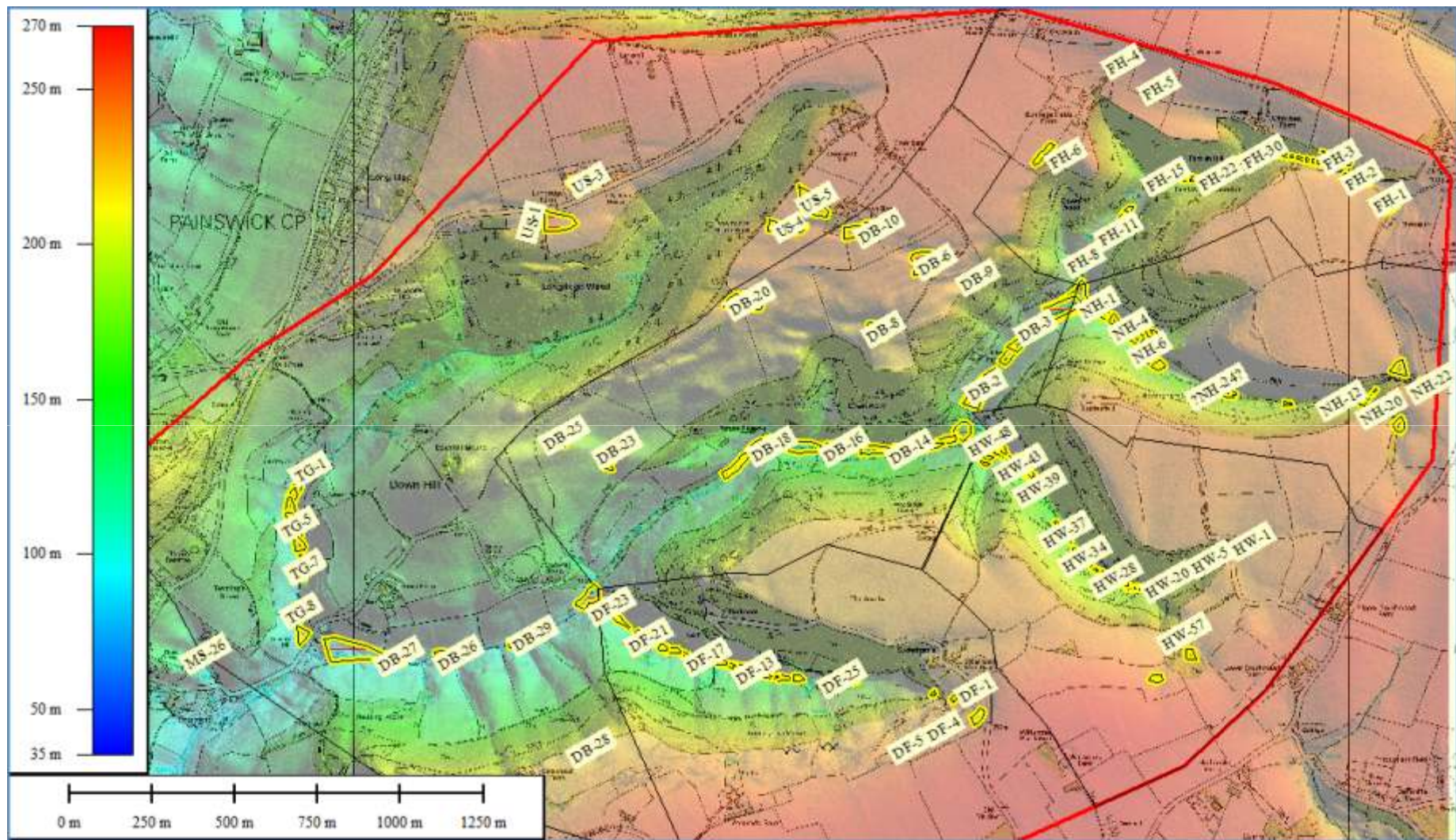
Planning 'Leaky Weirs' in steep flood gullies



Slad Valley Flood Attenuation Scoping Study

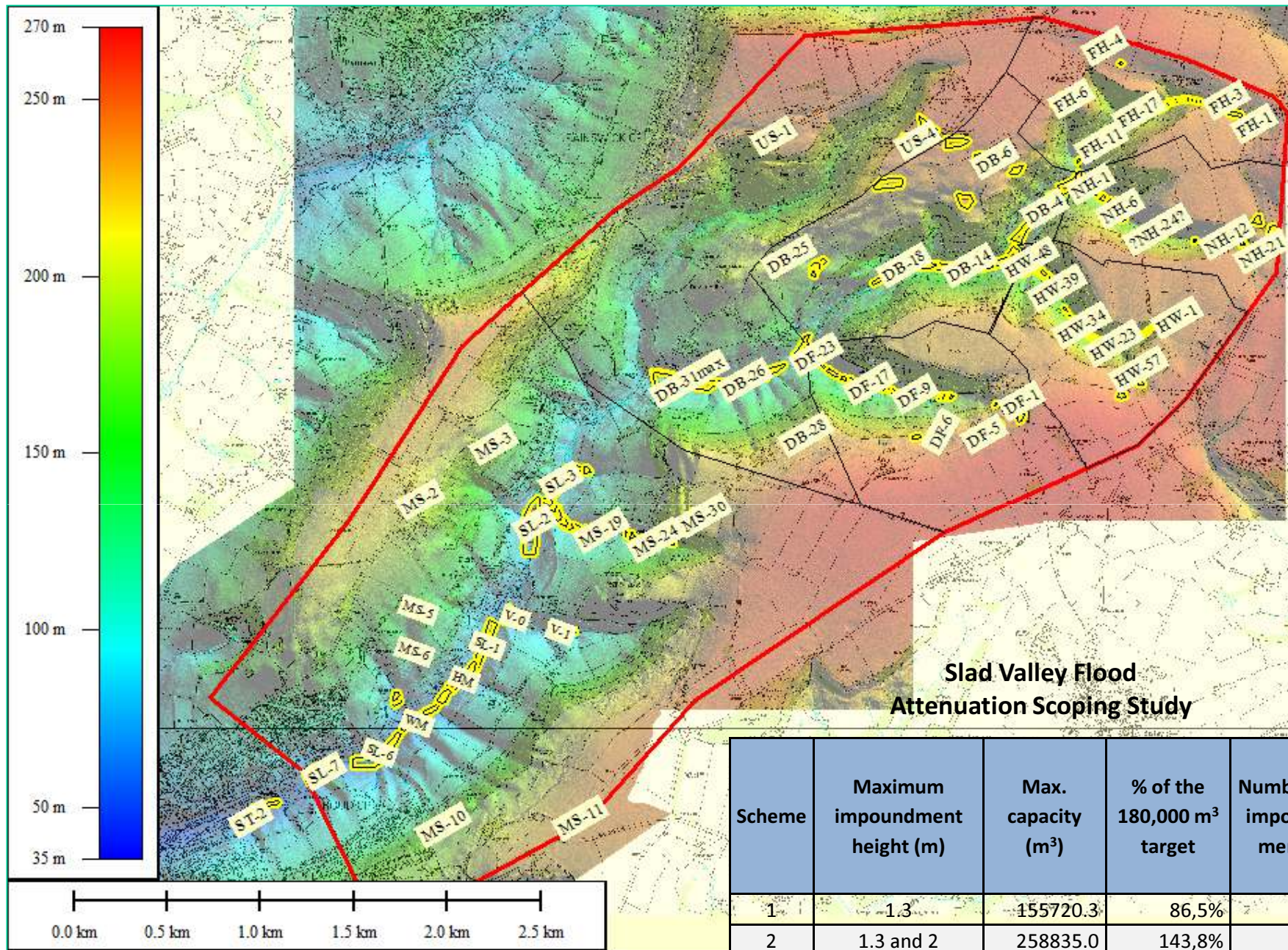


Anett Szabo, Budapest University, Water21, 2011



Upper Slad and Dillay Brook attenuations

Slad Valley Flood Attenuation Scoping Study



Scheme	Maximum impoundment height (m)	Max. capacity (m ³)	% of the 180,000 m ³ target	Number of impoundments
1	1.3	155720.3	86,5%	236
2	1.3 and 2	258835.0	143,8%	222
3	2	219118.2	121,7%	72

... societies collapse when their investments in social complexity reach a point of diminishing marginal returns.

While invasions, crop failures, disease or environmental degradation may be the apparent causes of societal collapse, the ultimate cause is an economic one, inherent in the structure of society rather than in external shocks which may batter them: diminishing returns on investments in social complexity

Joseph A. Tainter. *'The Collapse of Complex Societies'*, 1988

Top Down

vs

Bottom Up

Centralised control

Vested interests

Bureaucratic

Large scale

Corrupting

Resources loss

Homogenous

Community led

Local interests

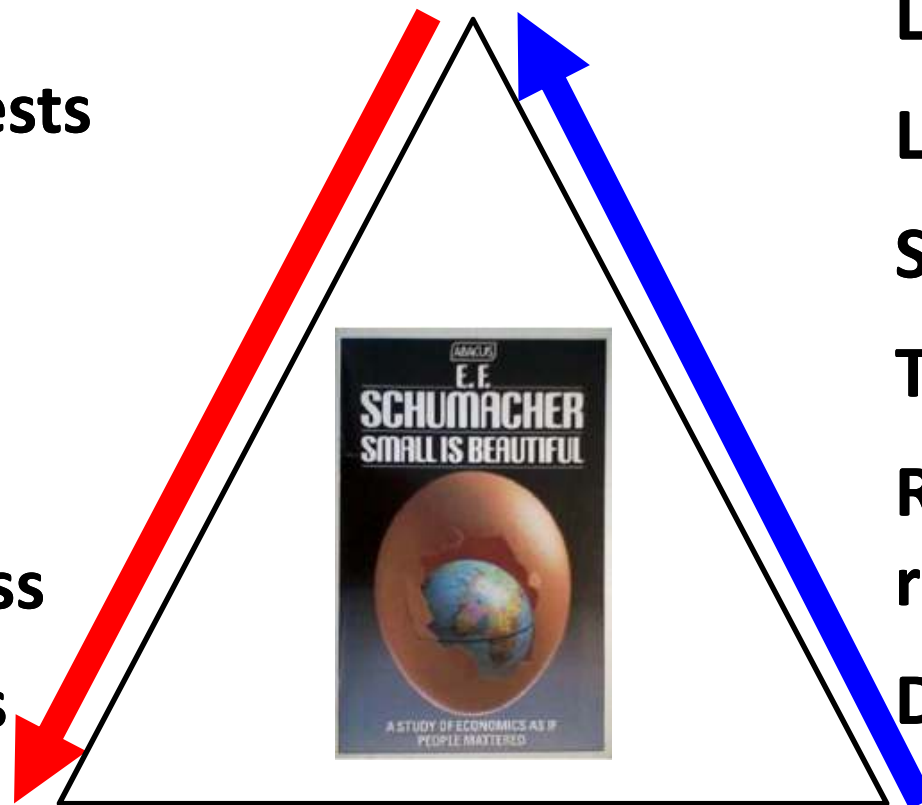
Lower cost

Small scale

Transparency

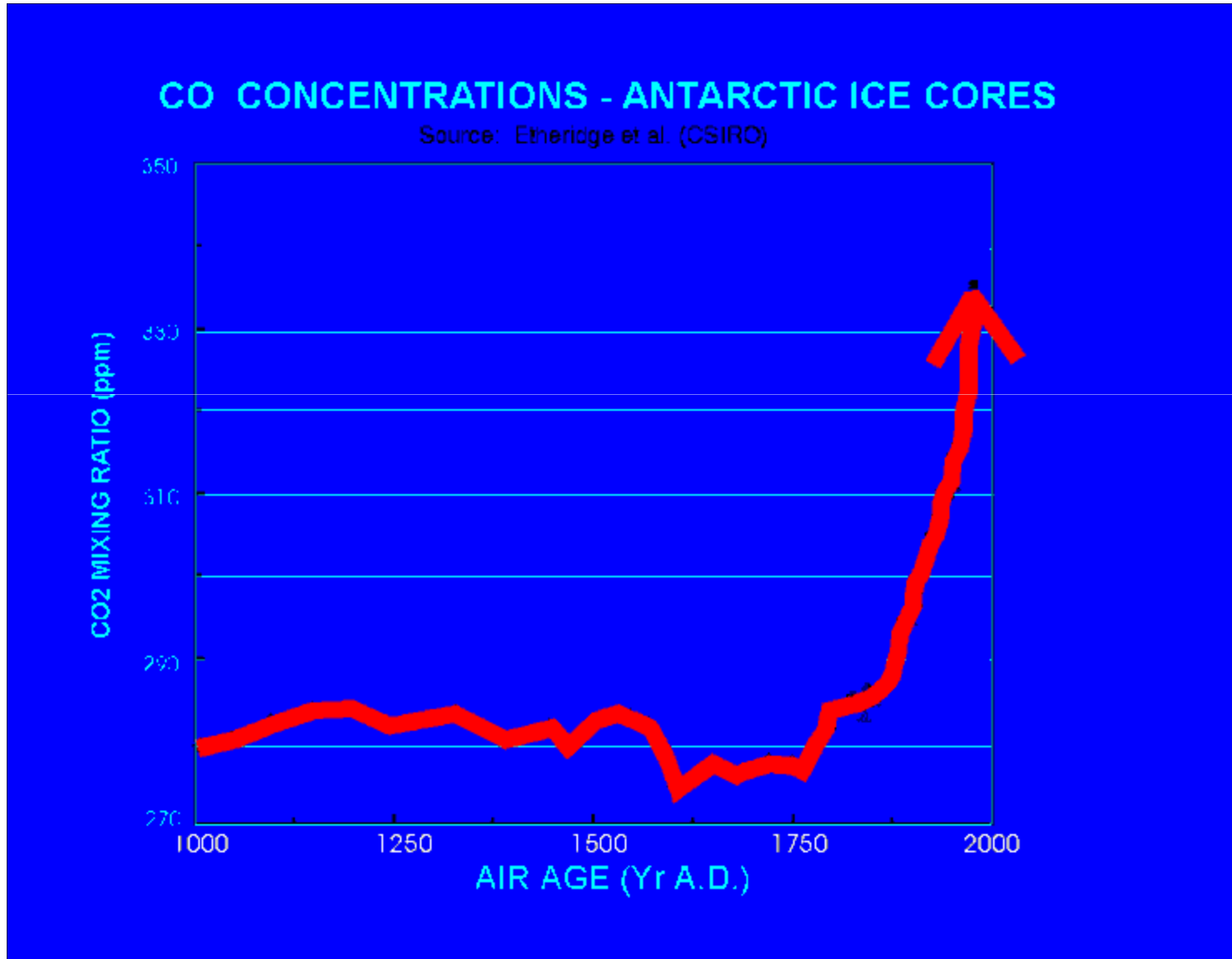
Realisation of resources

Diverse



E. F. Schumacher - *Small Is Beautiful*

It seems we started going wrong around 1750 – the peak time of European exploration & increasing exploitation of other global cultures - did we miss something here ?



**... you must first demonstrate that you
have learned to understand
the accumulated evolutionary wisdom
in natural <and social> systems.**

Bill Becker - *Avoiding the Frankenplanet*

"systemic environmental restoration?"



The emerging global culture & economy should now look to all cultures, particularly long term evolved ancestral and traditional engagement with the environment, in order to understand and provide a firm basis for the future

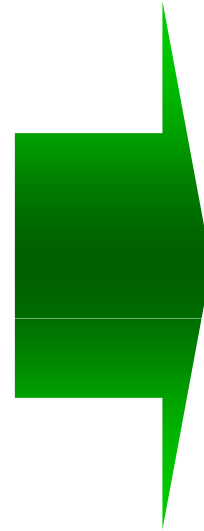
Hinepare of Ngāti Kahungunu,
Maori, Aotearoa New Zealand

Mauri Environmental Regulation

Framework of effects and well-being assessment using four dimensions of sustainability (Daly, Aotearoa NZ legislation)

- **Social**
- **Economic**
- **Environmental**
- **Cultural**

Well-being criterion



- **Community**
 - **Whanau**
 - **Ecosystem**
 - **Hapū**

Mauri dimension

Four key aspects of our well-being

When considered holistically get different results

Dr Te Kipa Kepa Brian Morgan CPEng, Int.P.E.
Ngāti Pikiao, Te Arawa, Kahungunu, Kai Tahu, Waitaha
THE UNIVERSITY OF AUCKLAND, School of Engineering

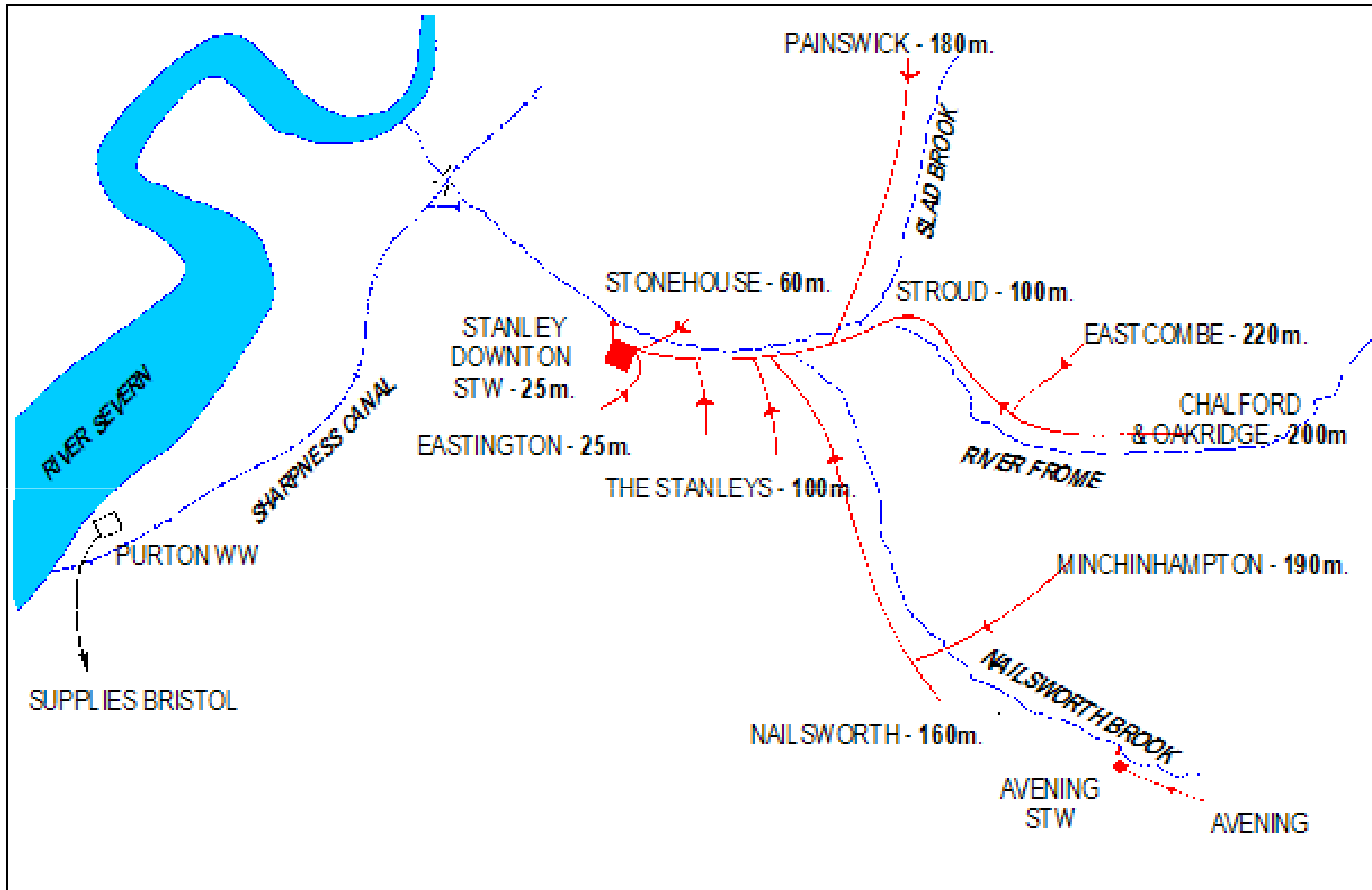
Social complexity reaching a point of diminishing marginal returns ...



‘Sustainable’ Urban Drainage – that is no such thing; a simple pond with some freeboard flood storage would have provided more cost effective flood protection here, for 200 homes on 10 acres.



Climate change – or simply an undersized sewer resulting from years of housing development and inadequate investment in infrastructure ?



High topographic head differential, over 200 m, makes this landscape an impossible challenge for centralised sewerage

Parliamentary Question

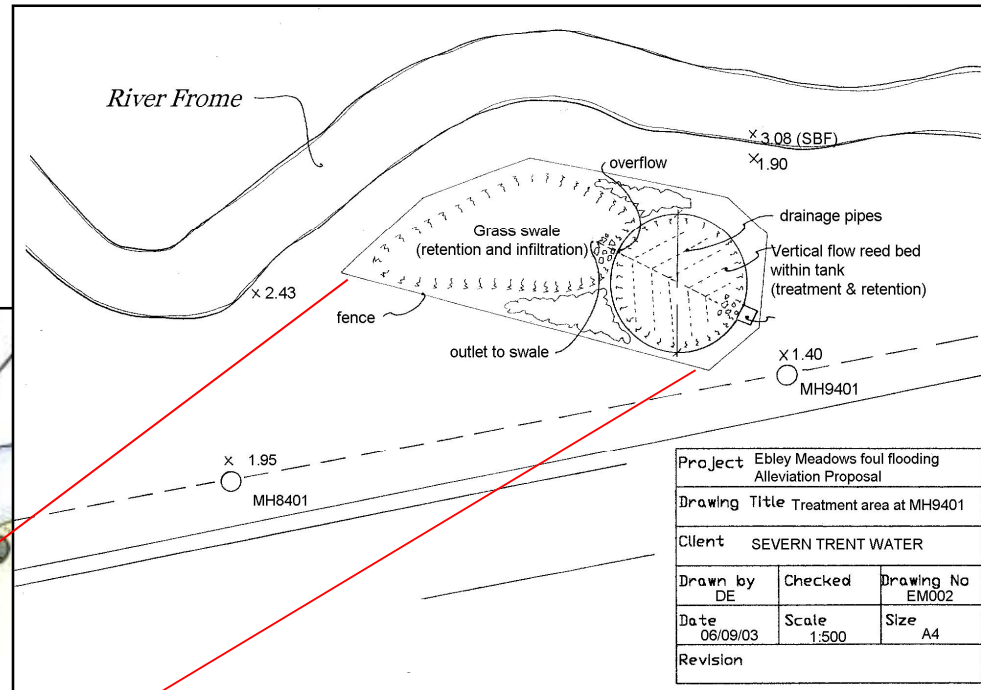
Mr. Drew: To ask the Secretary of State for Environment, Food and Rural Affairs what steps her Department is taking to define **microbial public health standards for (a) water courses and (b) discharges into them.** [2678]

Mr. Morley: The Surface Water Abstraction Directive specifies microbiological standards for waters that are abstracted for potable water supply. The quality of the abstracted water determines the level of treatment of raw water required for potable consumption.

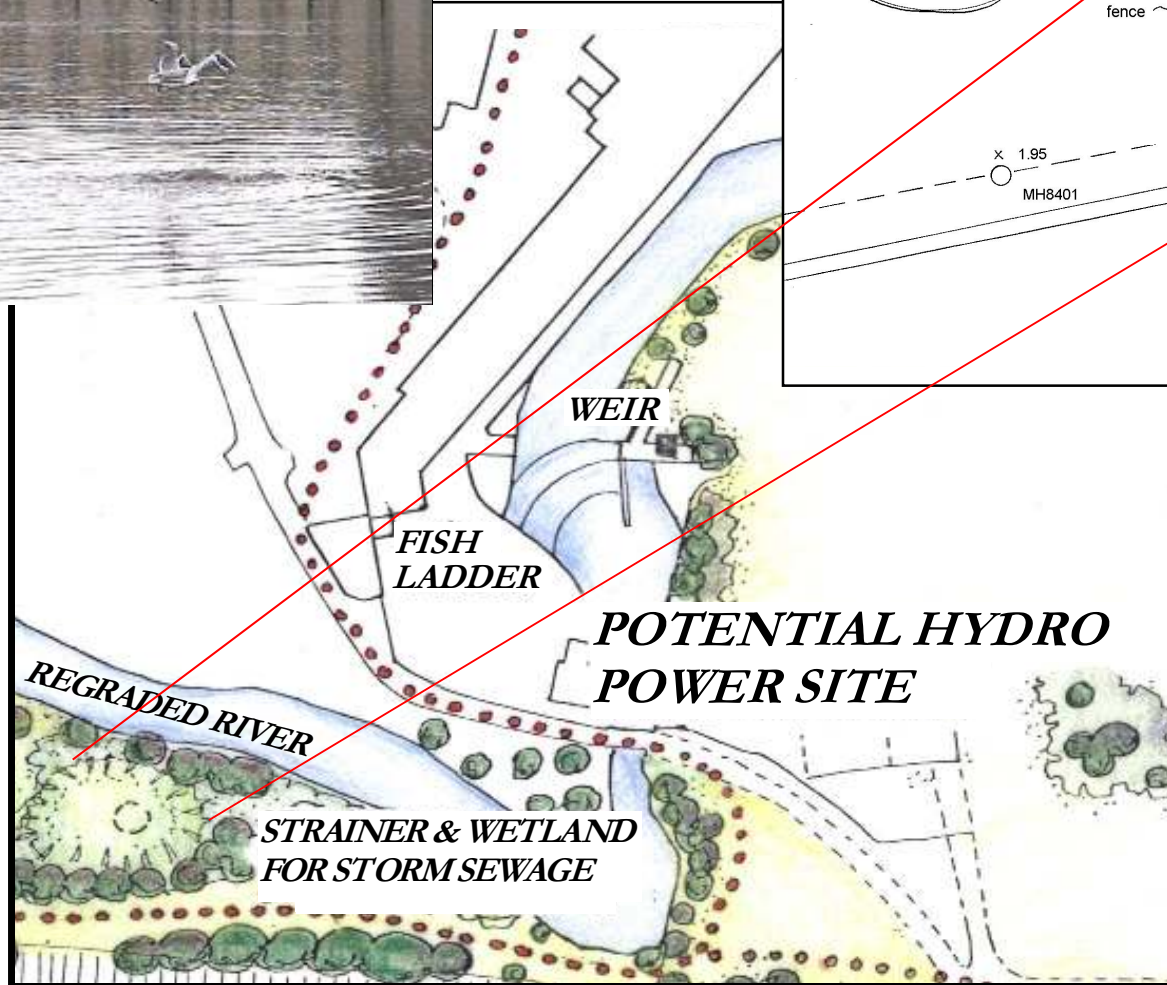
The **Bathing Waters Directive** specifies mandatory and guideline standards for identified bathing waters. In the UK most are **tidal waters not watercourses**. The few inland bathing waters are all lakes or ponds. The Bathing Waters Directive is currently under review.

There are no microbial water quality standards that are generally applicable to all water courses or discharges. The microbiological quality of inland watercourses is highly variable, due to land runoff from livestock agriculture and from urban drainage after rainfall, as well as from continuous discharges of treated effluent from sewage works.

13 June 2005, House of Commons, Hansard



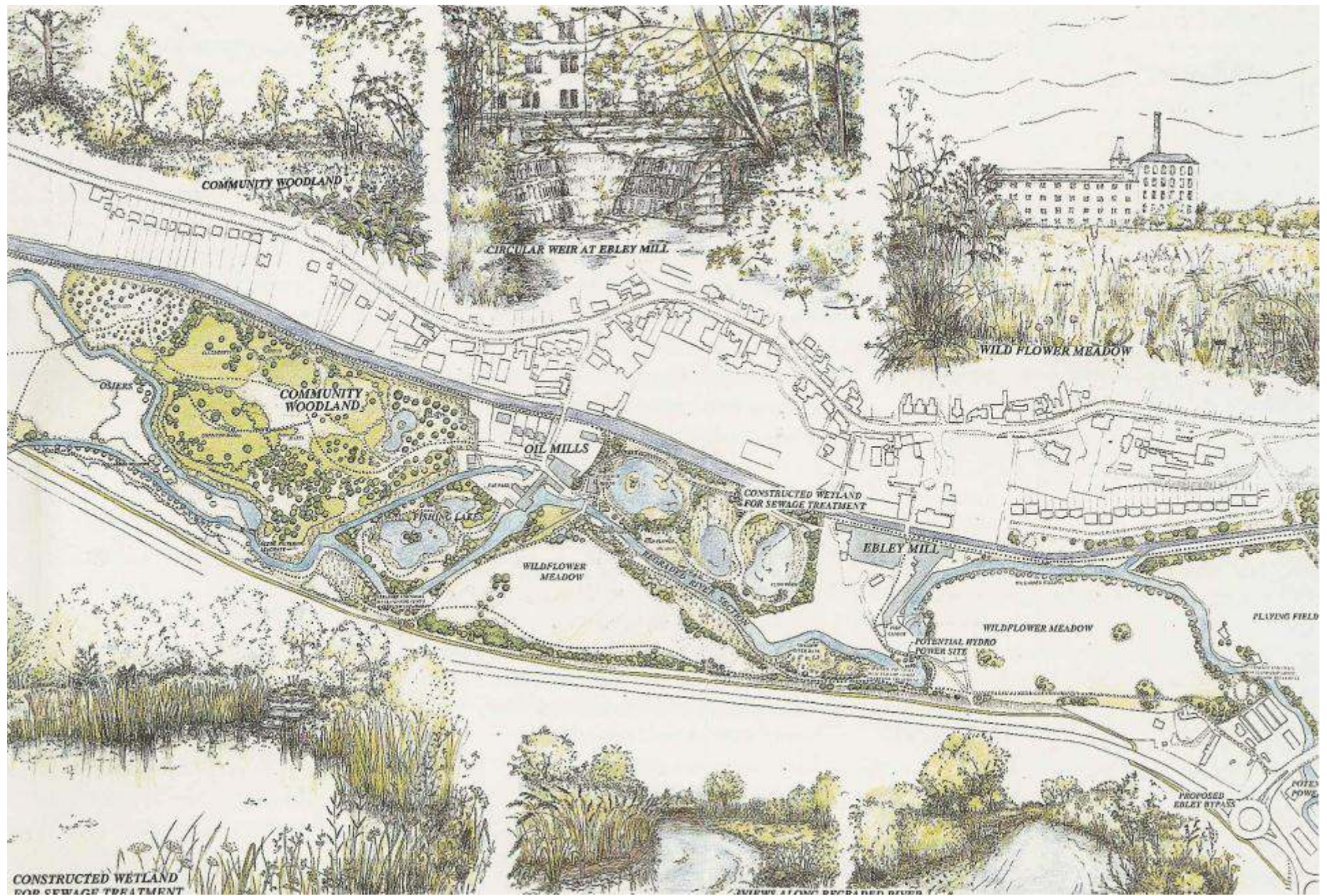
Project Ebley Meadows foul flooding Alleviation Proposal		
Drawing Title Treatment area at MH9401		
Client SEVERN TRENT WATER		
Drawn by DE	Checked	Drawing No EM002
Date 06/09/03	Scale 1:500	Size A4
Revision		



**... naturalistic solutions
to sewer incapacity are
cheap &
straightforward**

**Stroud Urban Wetlands
& Severn Trent Water**

**Lydia Williams,
Leeds Metropolitan Univ,
1993 & 2003 (Water21)**



Stroud Urban Wetlands , Lydia Williams, Leeds Metropolitan University, 1993 (Water21)

Water good idea!

Story by
Tristian Clark

Fashion model unveils plans to keep our rivers flowing

A SOMALIAN fashion model unveiled plans this week to set up a company to treat Stroud's sewage.



London girl Marie Doro, who has moved to the Cotswolds, unveiled plans to transform 200 acres of wasteland so that they can be used to treat the village's sewage, instead of taking water from the river.

Marie said: "I have always been into the outdoors and I want to do something to help the environment. I have always been into the outdoors and I want to do something to help the environment. I have always been into the outdoors and I want to do something to help the environment."

think... about pine furniture

Made by our craftsmen who you would like we do

Reddown Airfield, Broomfield, HERTS

On the A4111 between Tring and Hemel Hempstead

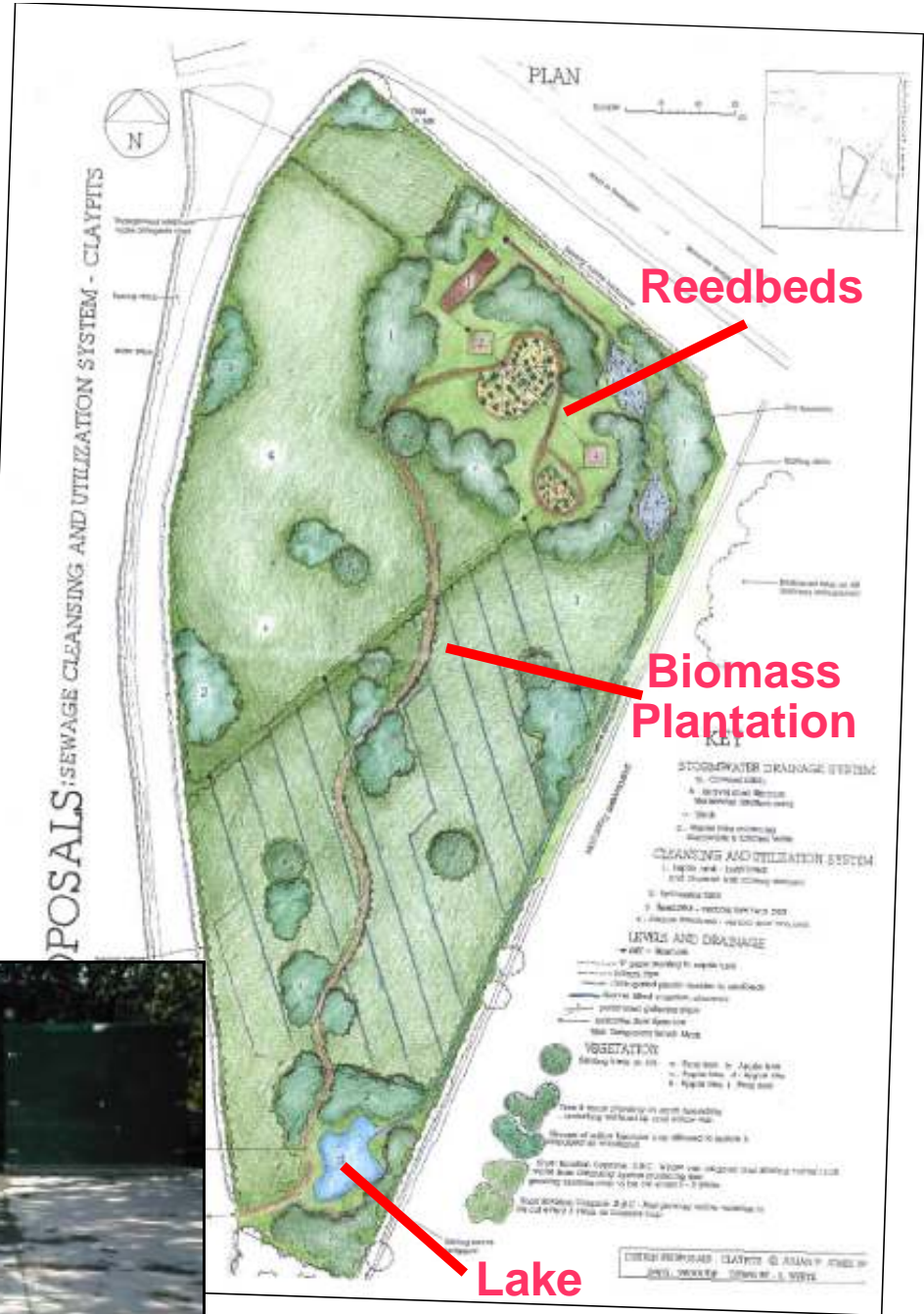
1011 North Street, Hemel Hempstead, HERTS

1011 North Street, Hemel Hempstead, HERTS

1011 North Street, Hemel Hempstead, HERTS

HERMES - GLOUCESTERSHIRE'S MOST READ NEWSPAPER (Source: JICREG 1984)

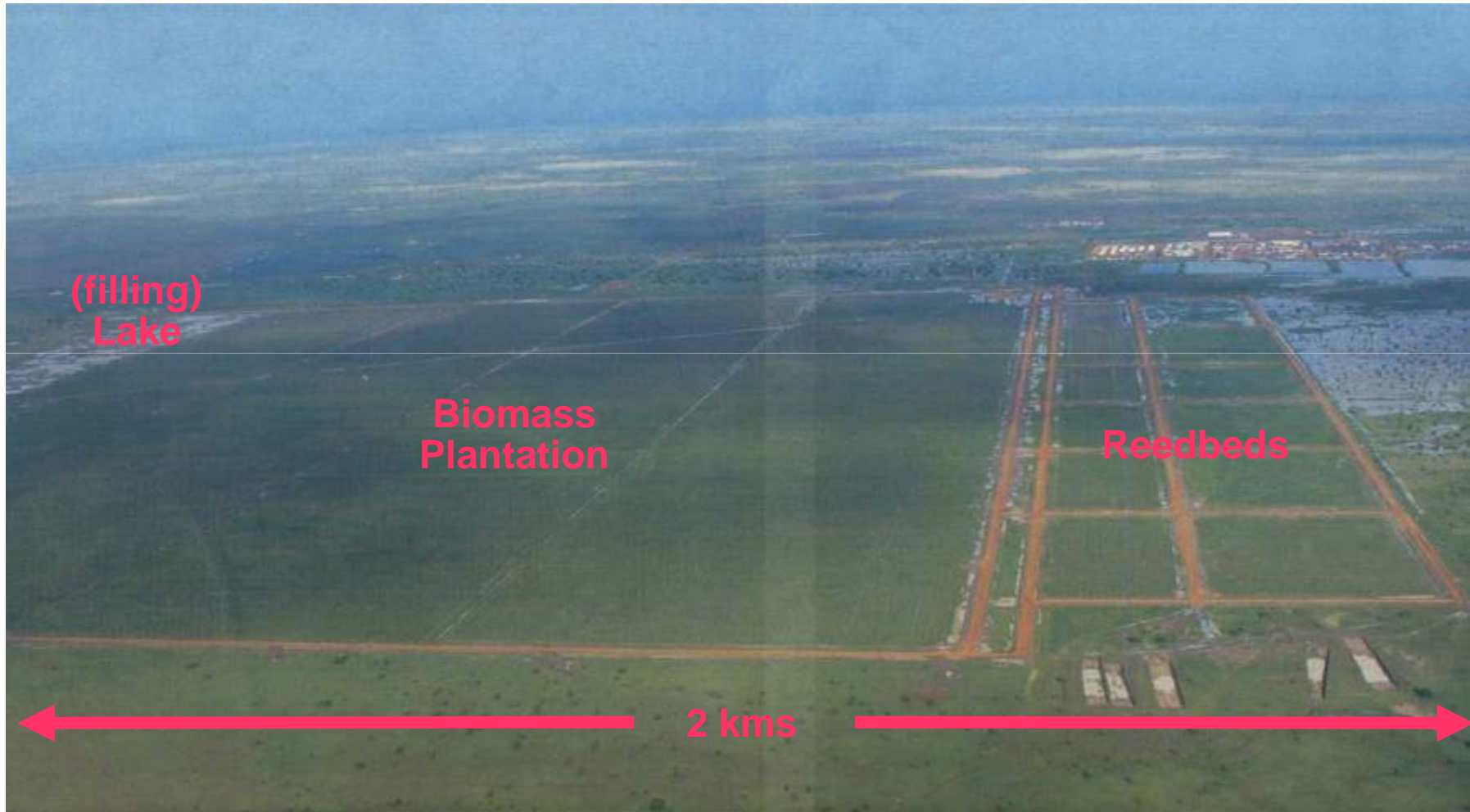
The biomass alternative. Study for Claypits village near Stroud that with additional plantations of 60 acres could have provided 100% of the village's potential (unprocessed) domestic energy needs for an installed cost of £25,000. Below left, the pumping station and conventional sewer connection that was actually built here for an estimated £500,000. This wastes energy, fails to realise full resource value of the sewage and has numerous negative climatic implications - some serious.



Lindsay White, Leeds Metropolitan Univ, 1995 (Water21)

Applying the Claypits Approach to a War Zone

Heglig 1



courtesy Oceans-ESU



A civil war had been fought over oil ...



Courtesy OCEANS-ESU



Oil wastewater at 50,000+ BOD



Courtesy OCEANS-ESU



50,000 m³/day recovered water Heglig 1



courtesy Oceans-ESU



**Within 2 years of filling Heglig 1 lake,
local population were able to commence fishing**



courtesy Oceans-ESU





Oil waste system is just the start of a complete approach to wider environment – here medicinal and other plants are prepared, to create an ongoing economic framework lasting long after oil ceases flowing.

courtesy Oceans-ESU

Restoring biodiversity within and around oil systems – all for 90% less cost than 'conventional'



courtesy Oceans-ESU



PRODUCED WATER FORECAST

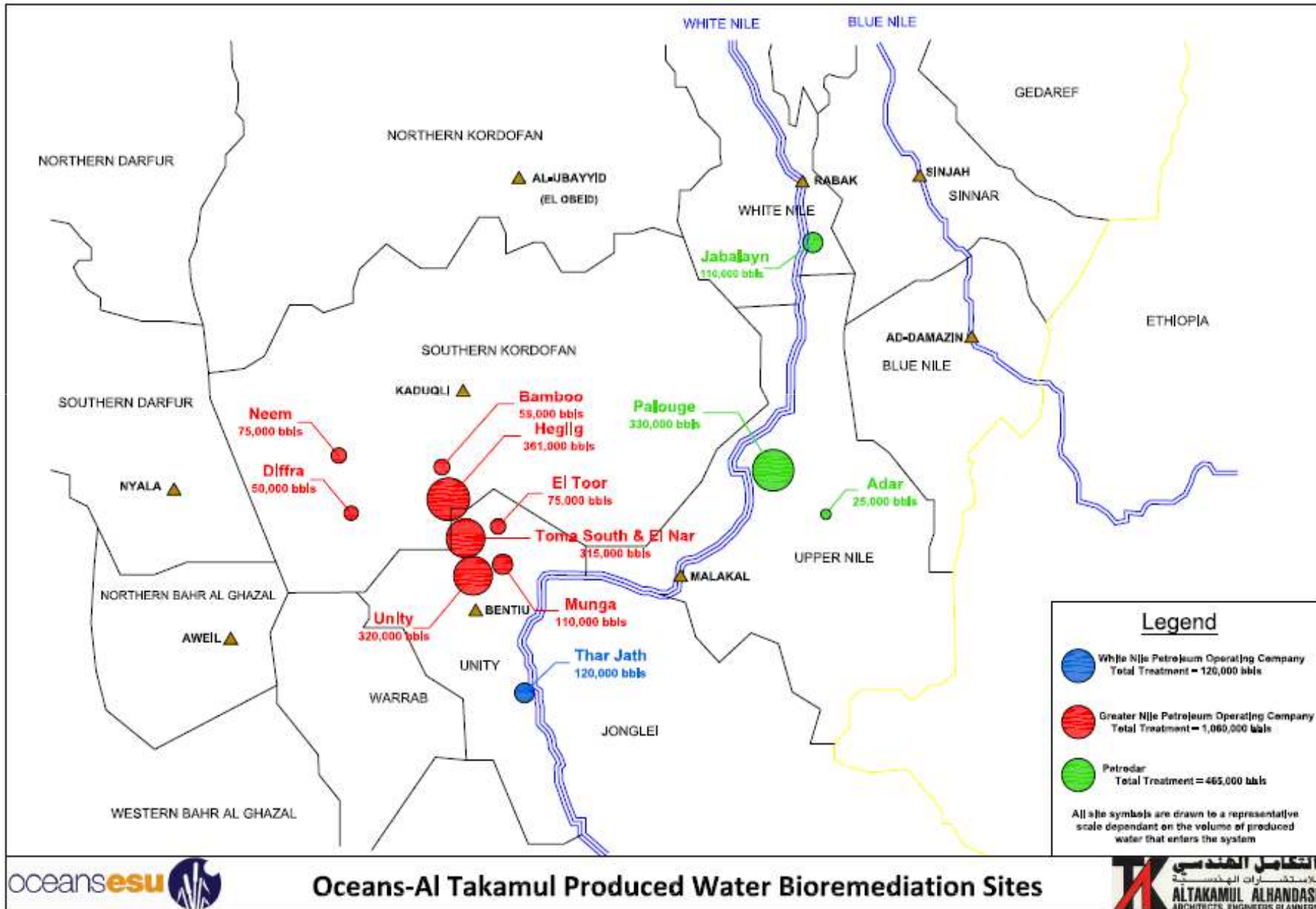
S.NO	FIELD	CURRENT WATER RATE, KBWPD	PEAK WATER RATE, KBWPD	PEAK WATER BY YEAR
1	Heglig	288	361	2010
2	Unity	141	320	2011
3	Toma South	135	205	2014
4	El Nar / El Harr	82	110	2014
5	El Toor	46	50	2015
6	Bamboo	38	58	2015
7	Munga	85	88	2012
8	Diffra	25	50	2012
9	Neem	16	75	2010
	Total	856	1210	

Now at 12 sites ... in Sudan

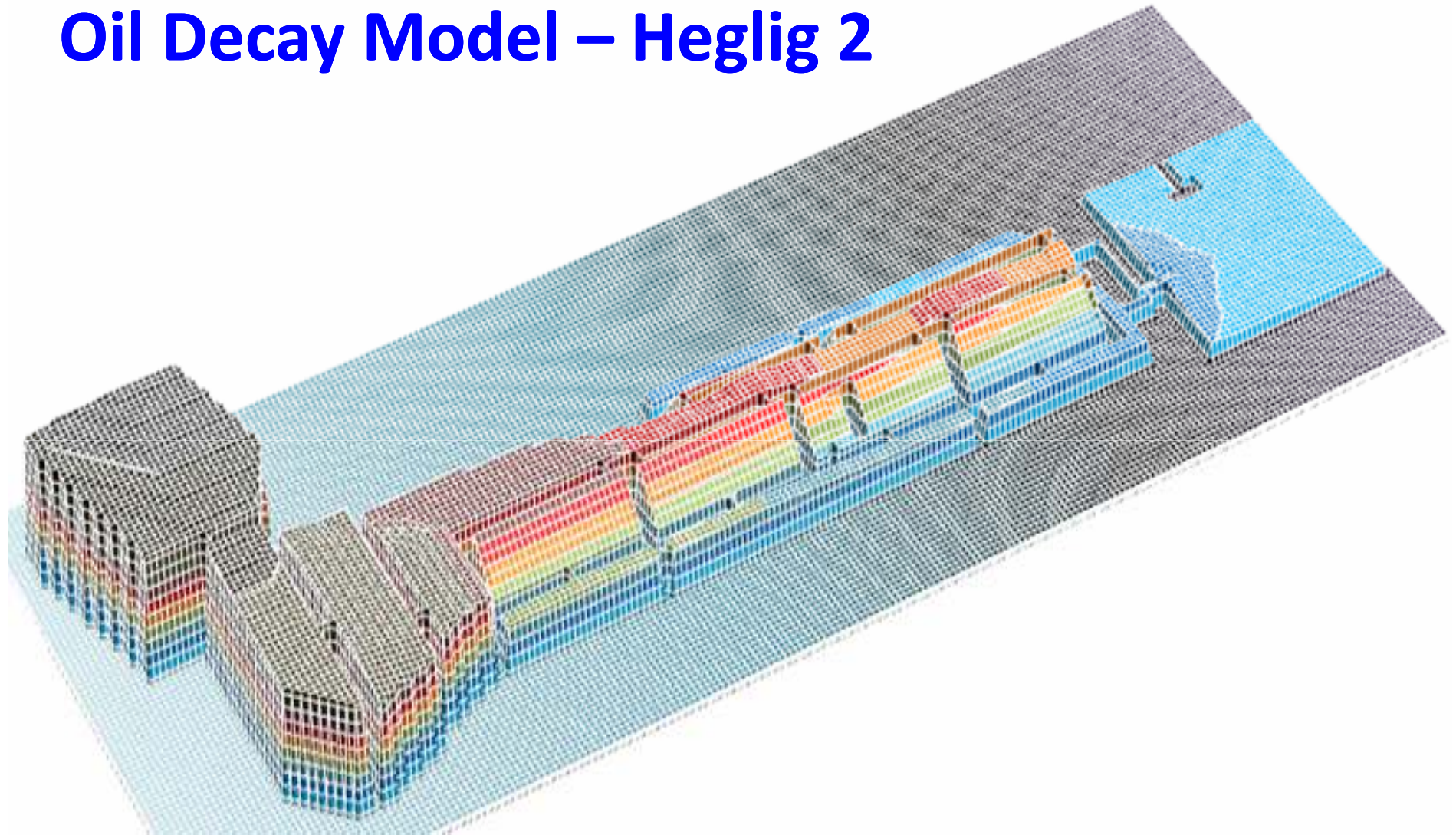
courtesy Oceans-ESU



Sudan Bioremediation Sites



Oil Decay Model – Heglig 2



courtesy Oceans-ESU



MODEL SET FOR - PALOUGE

UP TO DATE GENERAL INFO

CHANGE DATE WHEN SIMULATING MODEL		01 April 2008
area	unit	value
Farming area	m2	10560000
	hect	1056
V produced water	m3/day	48677.0
	L/day	48677000.0
V Rain water	l/ha/day	9000.0
TOTAL water available	L/m2/day	5.51
	L/hect/day	55095.6
	L/day	58181000.0
Eto		6.08

CROP SELECTION HELP

month of planting	4
Ideal Crop	Wheat, Sorghum, Potatoe, Cotton seeds

CROP INFO

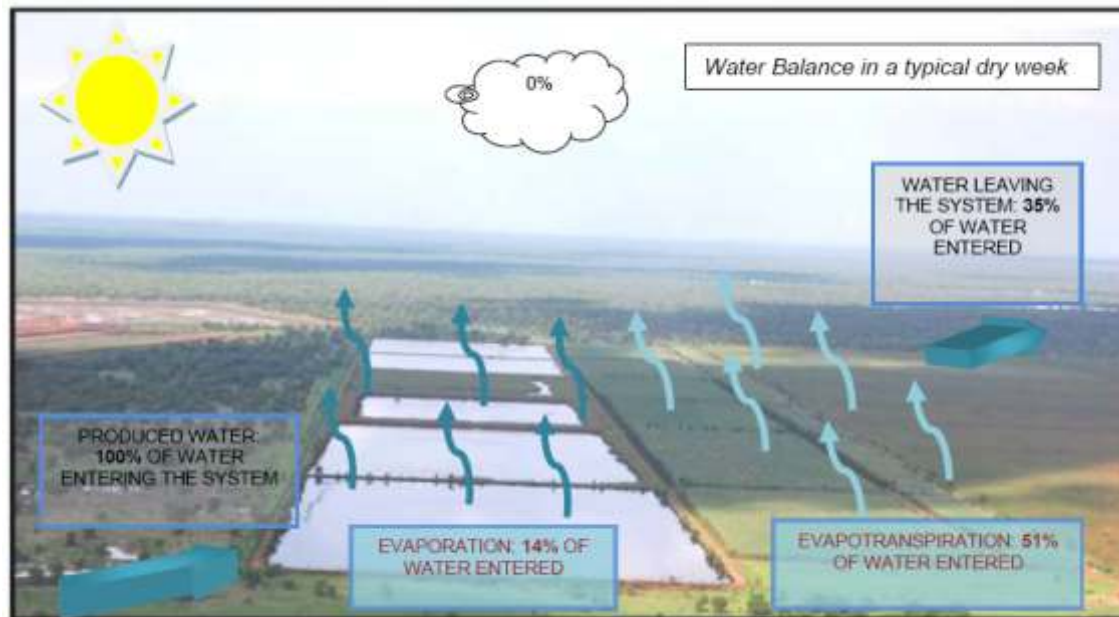
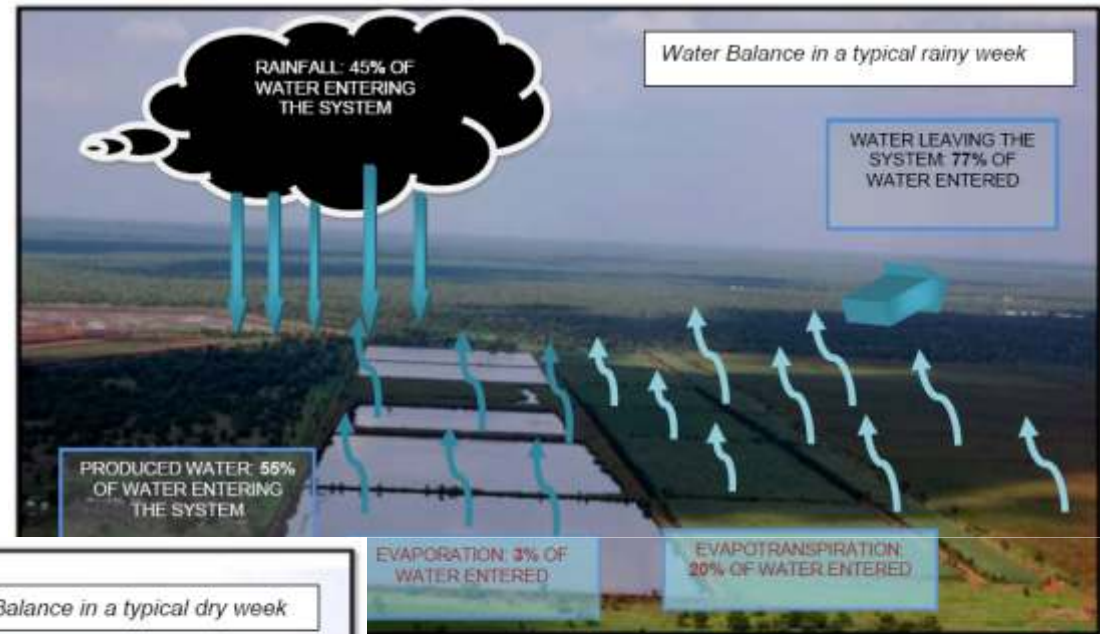
crop	Wheat a	Sorghum	Potatoes	Seed Cotton	x	x		AREA AVAILABLE (ha)
Date planted	01/03/2008	01/03/2008	01/03/2008	01/03/2008	01/03/2008	01/03/2008		217.3
today	14/02/2008	14/02/2008	14/02/2008	14/02/2008	14/02/2008	14/02/2008	days360(
growth period -days	1	1	1	1				
area (ha)	300	300	133.7032173	105				
stage	ini	ini	ini	ini	..?..	..?..		
time left	135	135	130	185	0	0		
Production (kg)	5630100.0	1945200.0	8905302.8	648270.0		
\$	2139438	719724	7035189	648270		
TOTAL \$							10,542,621.2	

Transforming food availability ...



Hydrological Monitoring

Weather station data gives information on climatic influences of bioremediation systems



Climate data is then used to develop mathematical models of each system ...



Planning for Plenty & Purity

- **Work with an ‘holistic overview’**
- **Understand the ‘self-organising’ principle of natural systems**
- **Use the currency of Goodwill**

(Request further design methodology from Water21)

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www.water21.org.uk

