Catchment Management as a Community Led Process

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

WATER21

RIO+20 the future we want

Why Community Led ?

- **The government is very keen to bring decision making and delivery to stakeholders through its Localism and Big Society initiatives**
  (a key point made by the Floods Minister Richard Benyon at the launch of the *Catchment Approach*—Defra Water Stakeholders Forum, March 2011)

- **The current economic climate means that financial constraints are at their most severe for a generation**
  (money must be invested to provide the greatest benefits from limited budgets)

Catchment Delivery Conference, 23rd November 2011, SOAS London

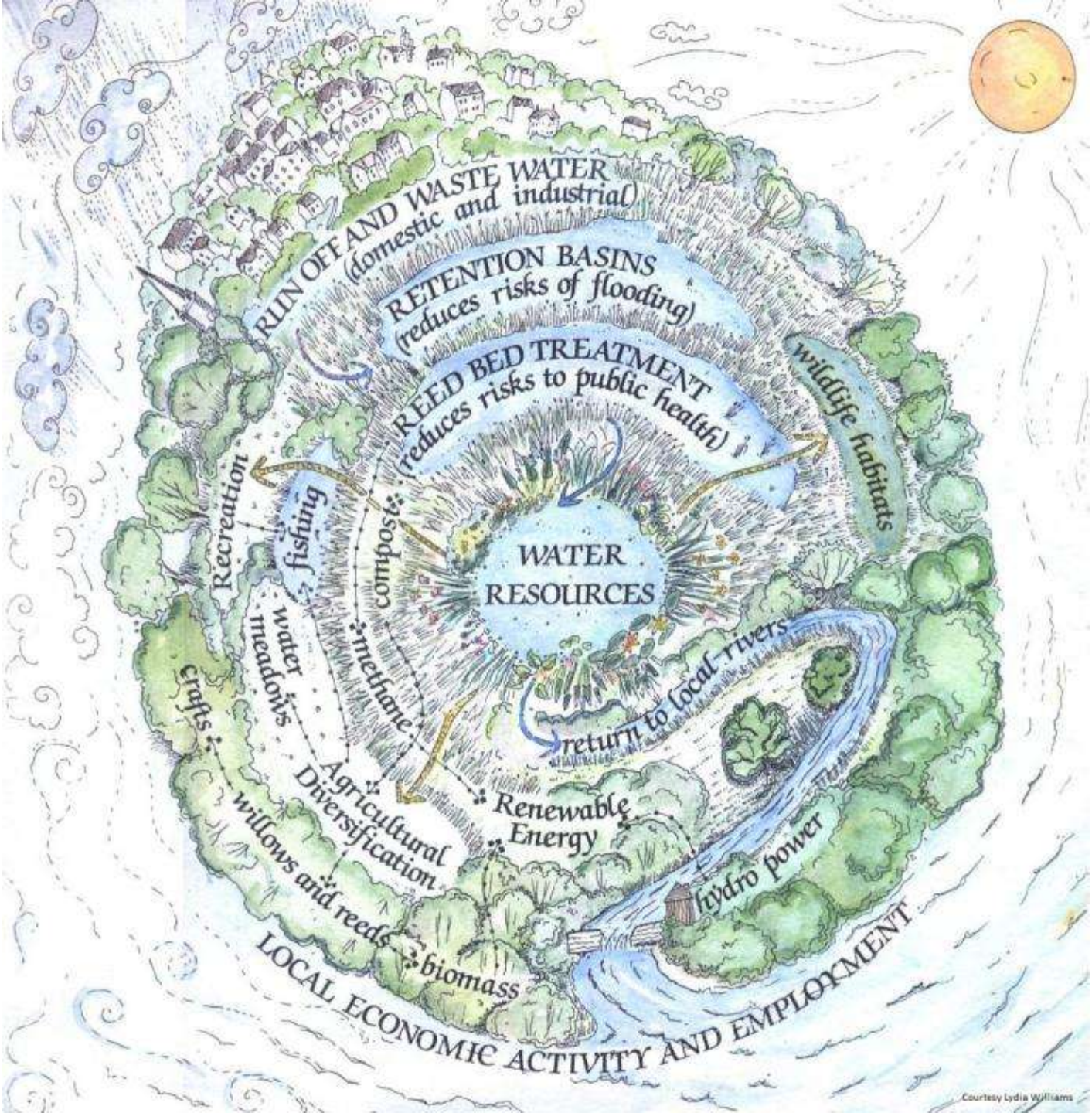
- **Localism Bill**
- **Water Framework Directive**
- **Flood and Water Management Act 2010**

New legislation demands significant change in the culture of regulation and enforcement

"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

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.

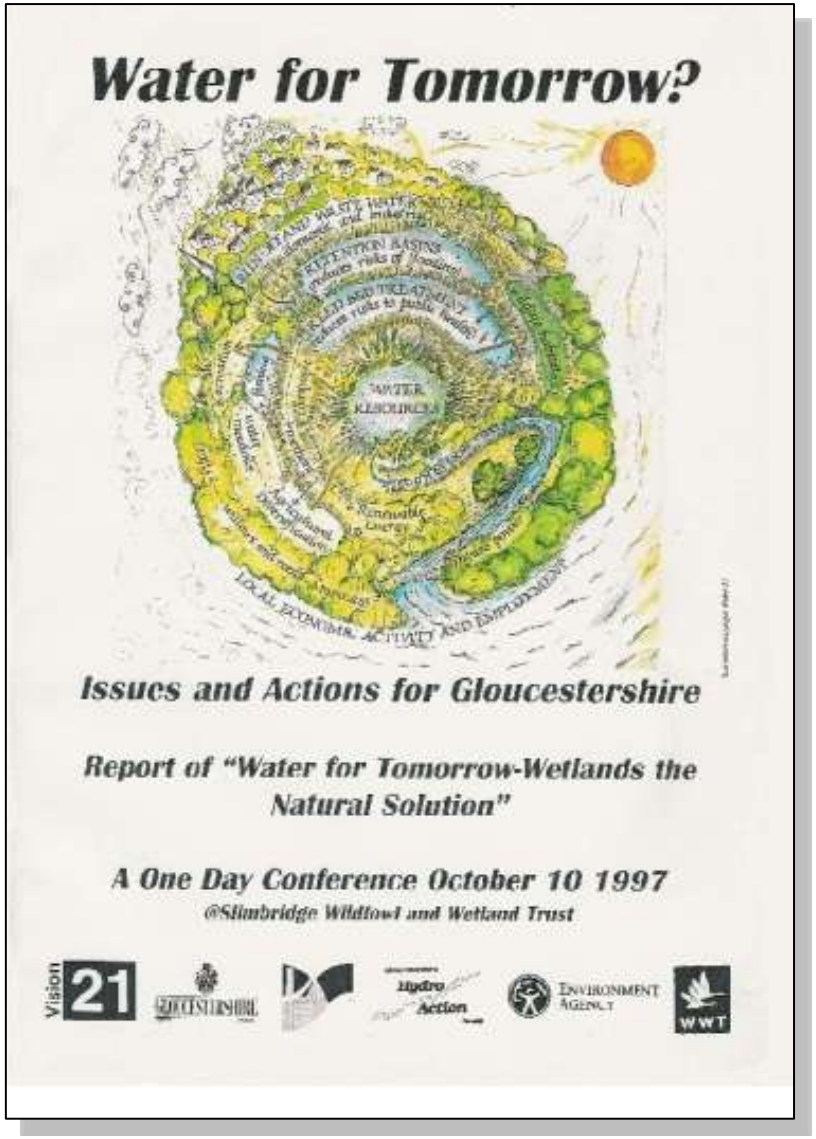
"The natural world is vital to our existence, providing us with essentials such as food, water and clean air

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

*** private sector stakeholders alone**

What is Water21 ?

- Originated from the 1997 'Water For Tomorrow' Community Conference
- Strictly 'Not for Profit'
- A 'Facilitating Framework for Water Sustainability'
- Local Free Market approach
- Harnesses local knowledge and time-proven principles
- Community Supported (landowners/consumers)
- Assisted by Agenda 21
- Practising Goodwill Principles



Develop a Local (Catchment/Parish) Plan

TAKING RESPONSIBILITY

for safe and economically viable water management

- **Involving the community**

  Landowners & Farmers, Local Flood/Water Action Groups, Sporting Organisations, Resident's Associations, etc.

- **Developing partnerships**

  Consumers & Landowners

- **Parish Plans**

- **Local Authority / Environment Agency**

Current 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 economic damage 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

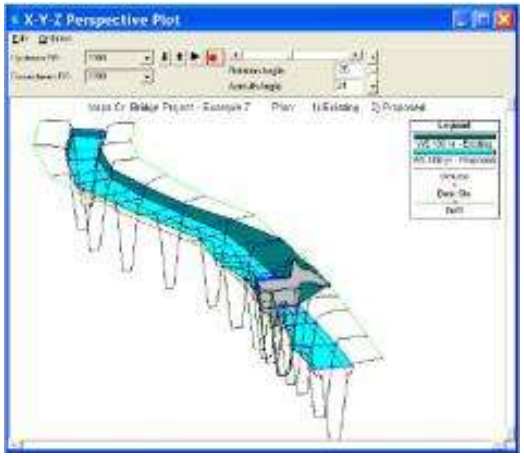
Policy

- 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)

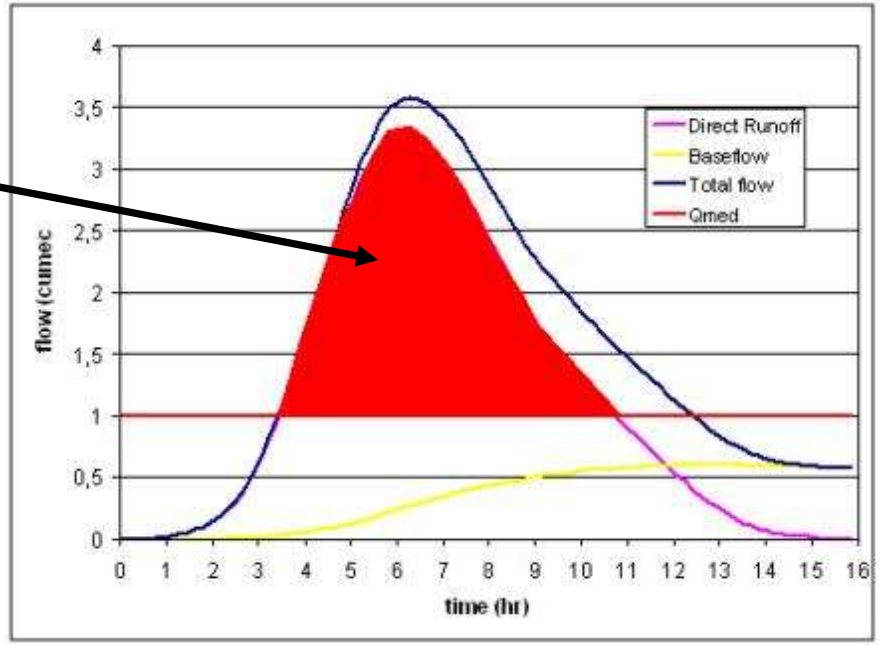
"to sustain the current level of flood risk into the future"

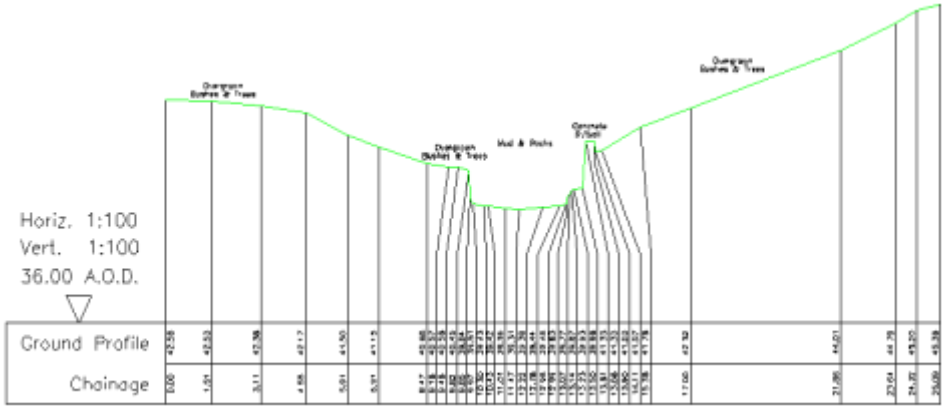
Slad Road, 2007
(courtesy Zara Davis)

Defining critical flood risk



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.





Ilaria Pretto, Trento University, Water21, 2008

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

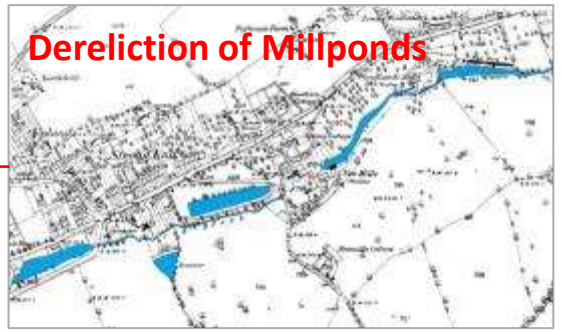
Adam Broadhead, Sheffield University, Water21

Resolving risk by creating resources

- Flooding is largely caused by disrupted natural landscapes and neglected historical solutions
- The community-led approach is an effective route to resolve critical flood risk
- Landowners have a preference for partnerships within their community (rather than with bureaucracies)
- Attenuation volumes for flood/drought control – are feasible **on all UK watercourses**
- Can be self-financing in the longer term
- Huge potential for **renewable energy**, biodiversity, **food production**, irrigation reservoirs, **drinking water**, and leisure – by restoring landscapes
- **Goodwill is the key factor**

Slad, Historic Land-Use Changes – Key Catchment Flood Identifiers

Environment Agency



WATER21

Hydropower for flood control – Hazel Mill, Slad

3000m^3 of flood storage capacity can be created by restoring mill.

Adam Broadhead,
Cranfield University, Water21

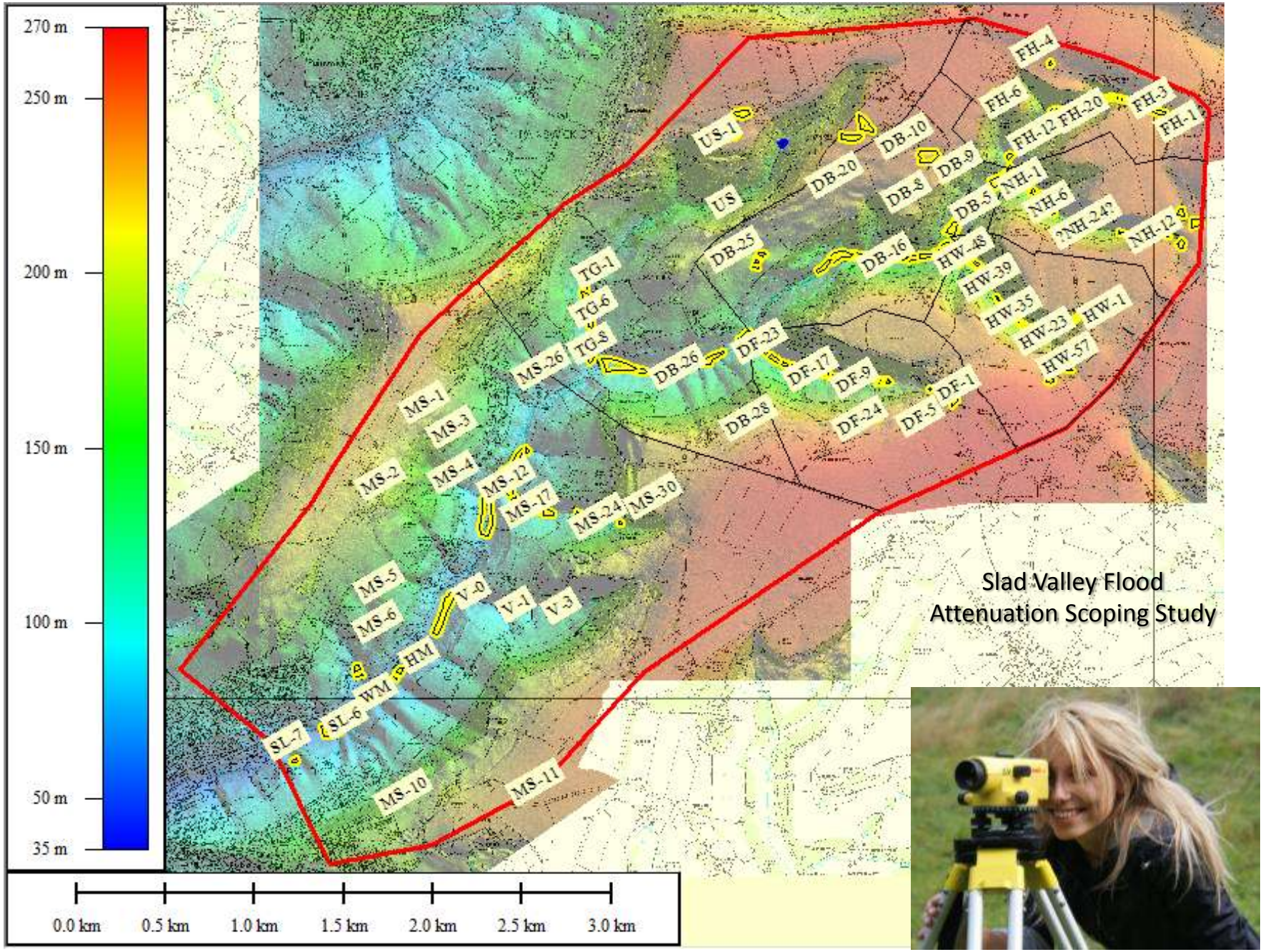
Hydropower - for flood control

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

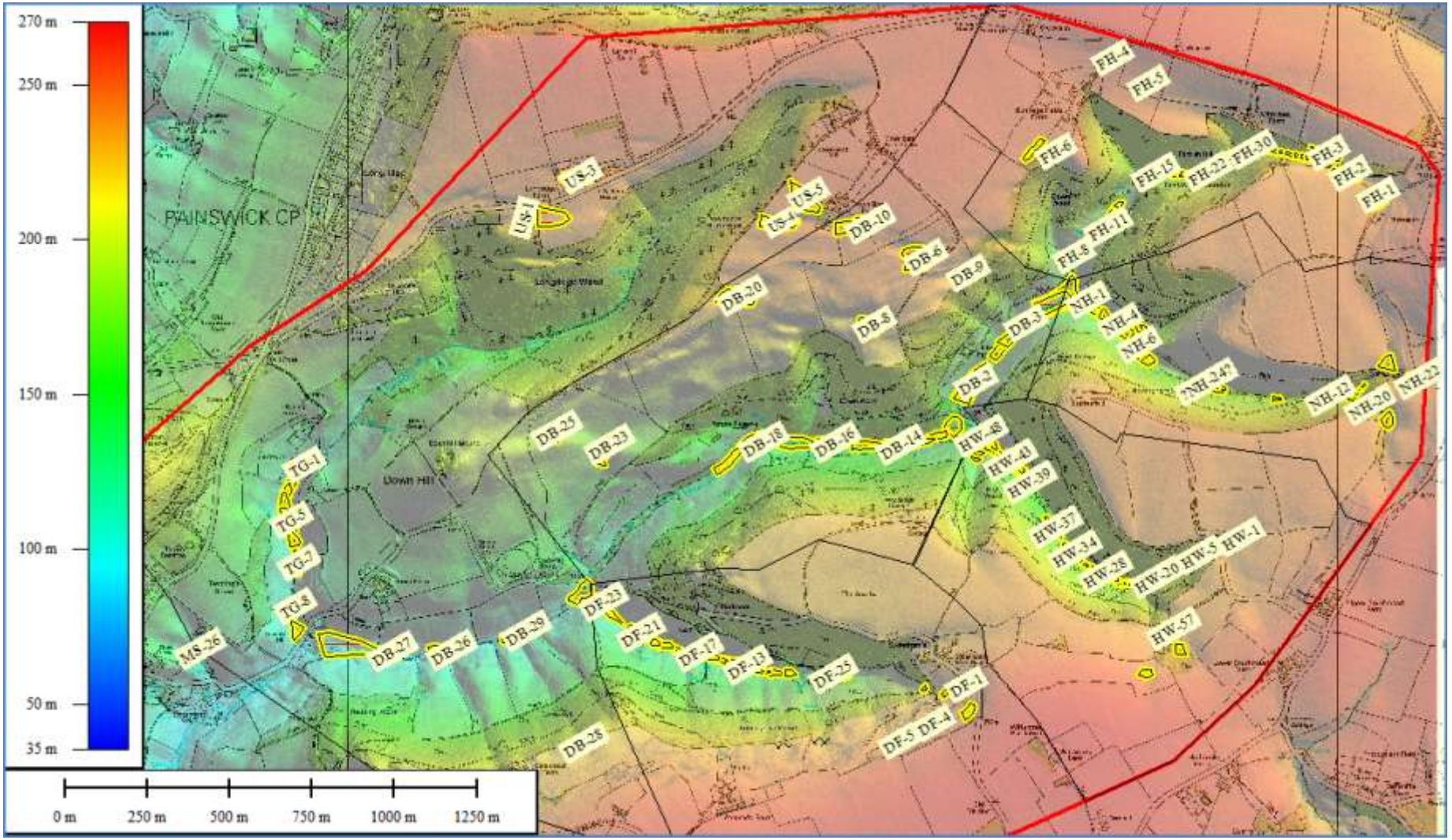
Arun Cappi, Loughborough University, Water21, 2011 - Gabriella Kovacs, Budapest University, Water21, 2011

Surveying for flood attenuations

Planning ‘Leaky Weirs’ in steep flood gullies

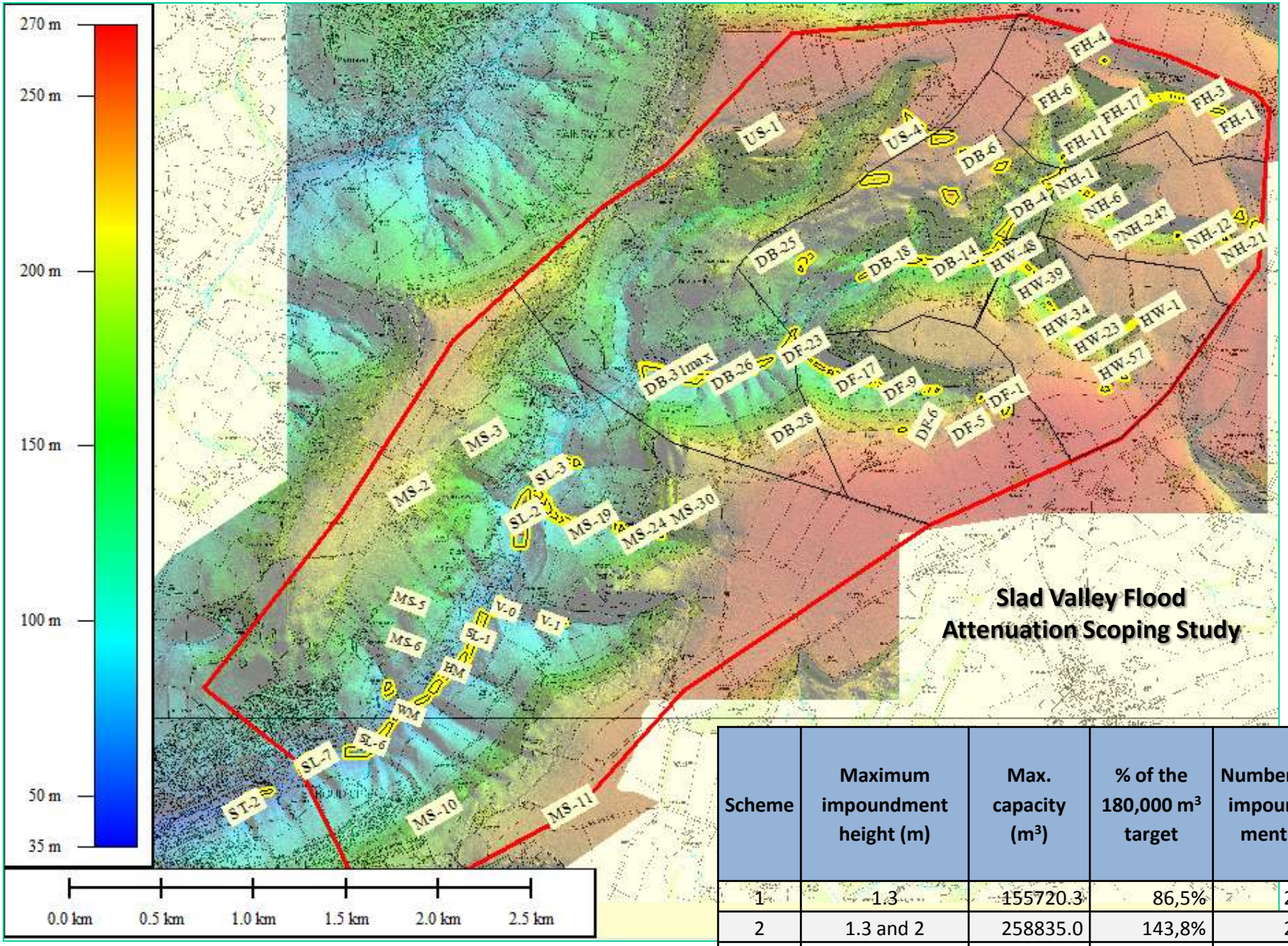


Anett Szabo, Budapest University, Water21, 2011



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

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 for guaging effects on well-being using four aspects of sustainability (Daly, Aotearoa NZ legislation)

Four key aspects of our well-being translated holistically

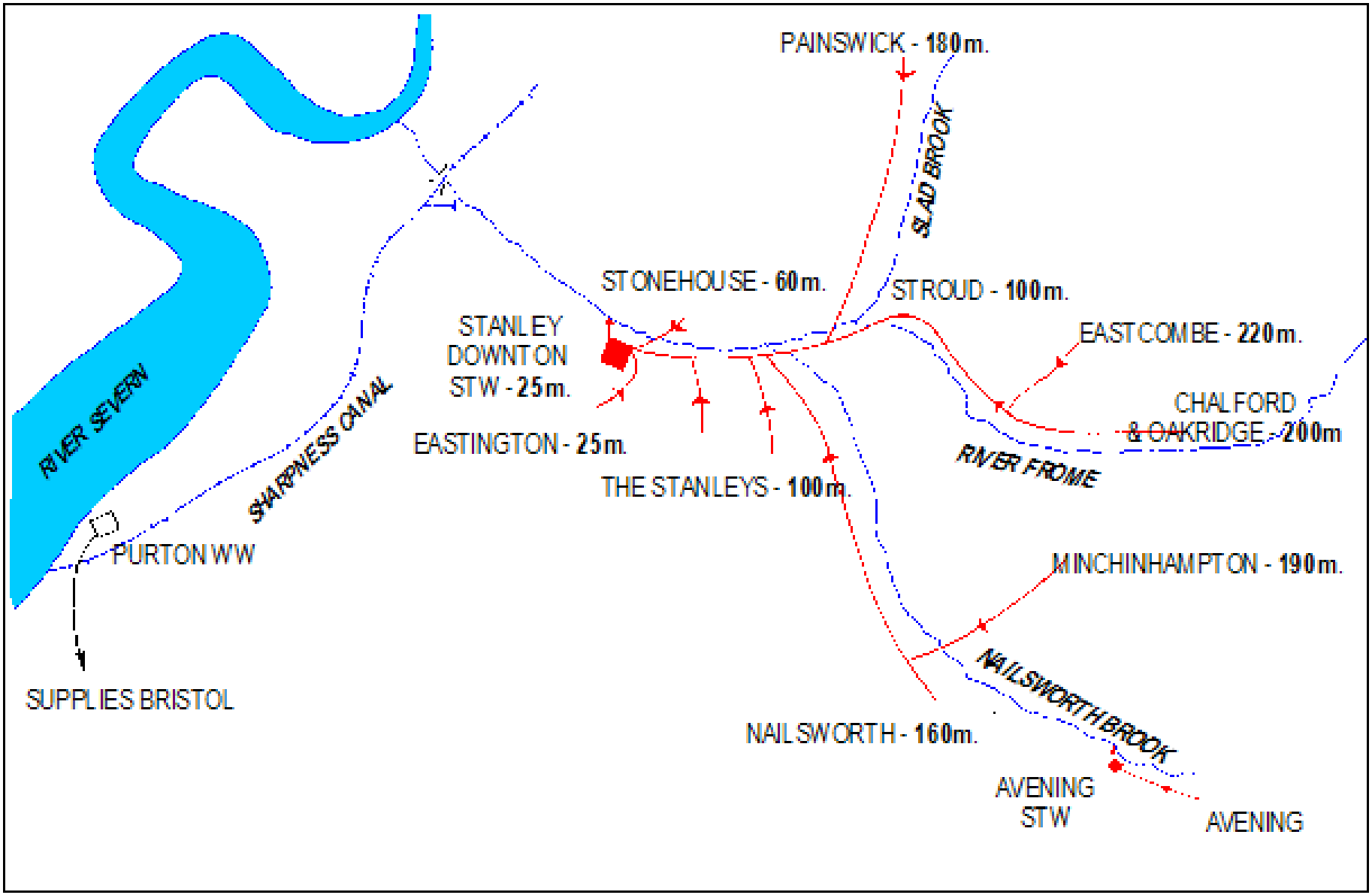
Well-being criterion	Mauri dimension
• Social	• Community
• Economic	• Whanau
• Environmental	• Ecosystem
• Cultural	• Hapū

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

Infrastructural investment reaching point of diminishing returns

Sustainable Urban Drainage? **Landscaped ponds with extra flood storage capacity can provide a more cost effective & productive alternative to hard-built flood protection**

An undersized sewer resulting from years of housing development and inadequate investment in appropriate infrastructure



200 meters head of pressure makes Stroud's landscape an impossible challenge for centralised sewerage

Parliamentary Question

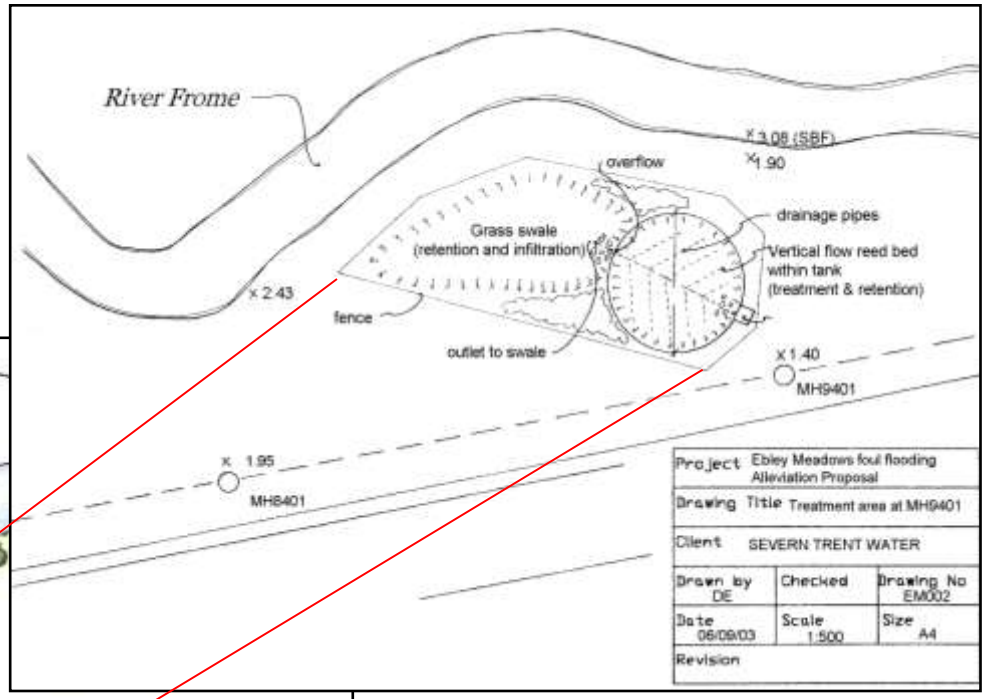
Mr. Drew: To ask the Secretary of State for Environment, Food and Rural Affairs what steps her Department is taking to define microbial public health standards for (a) water courses and (b) discharges into them. [2678]

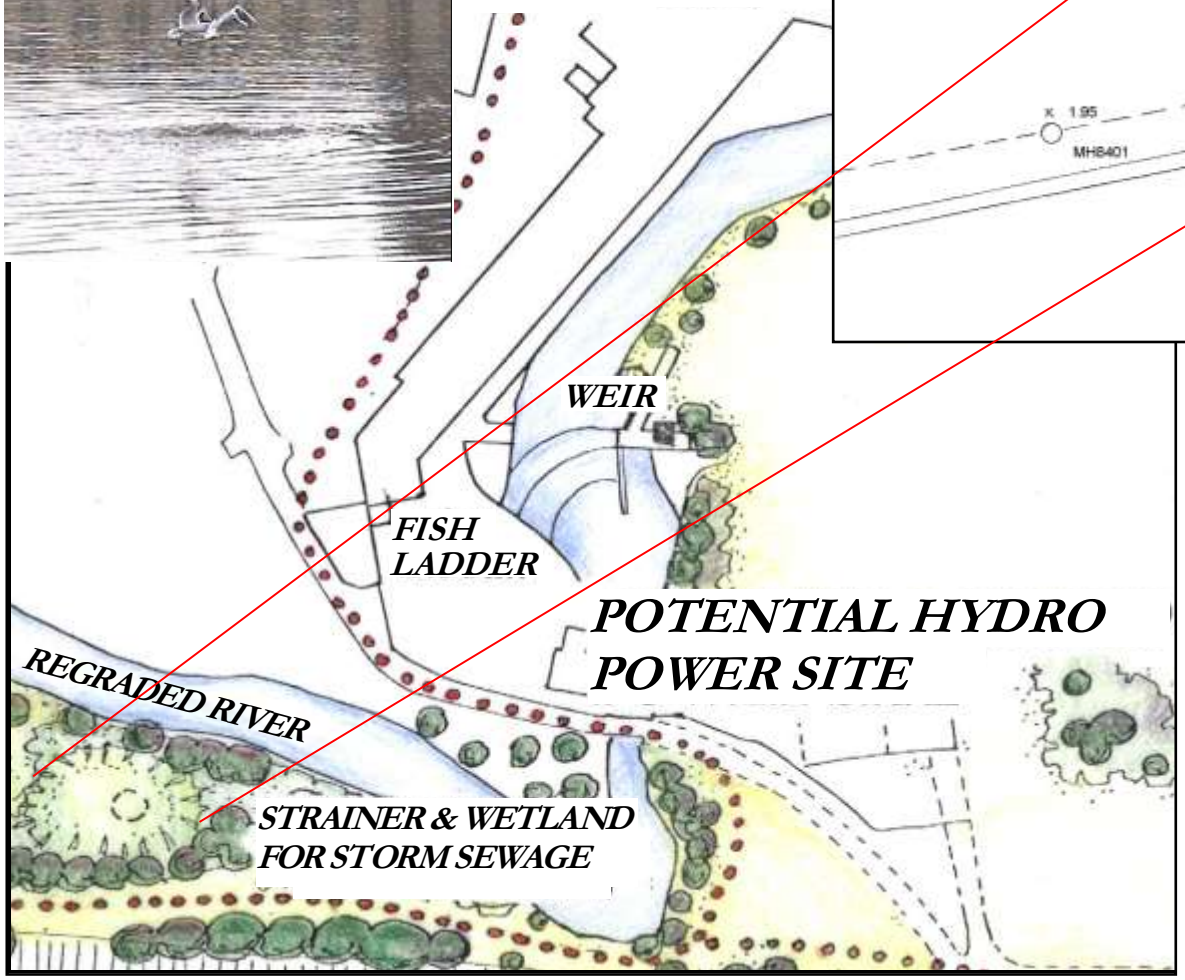
Mr. Morley: The Surface Water Abstraction Directive specifies microbiological standards for waters that are abstracted for potable water supply. The quality of the abstracted water determines the level of treatment of raw water required for potable consumption.

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

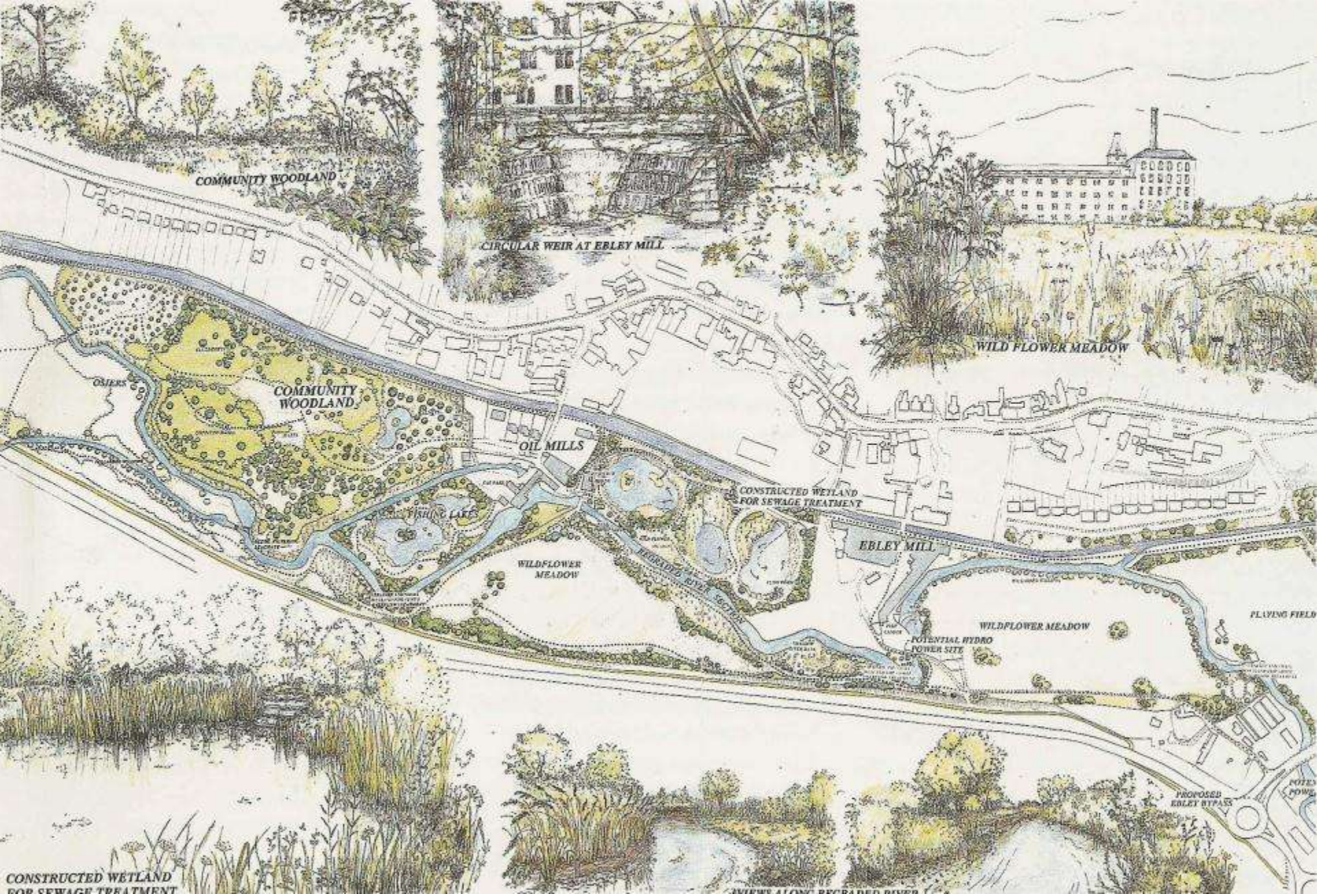




Naturalistic solutions to sewer incapacity are cheap & straight-forward

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 Tristan Cork

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.

Revlon girl Waris Dirie, whose English home is in Minchinhampton, announced plans to transform 250 acres of wetlands so that they can be used to treat the whole district's sewage, instead of taking water from the rivers.

Standing in the dried-up bed of the River Frome, just five miles from Stroud, Waris said: "These rivers are more like those in my home in Africa.

"This is an unnatural situation and after the wettest winter for years can only be blamed on the water companies pumping too much from their boreholes.

"This is the real reason that the National Rivers Authority ...

The report is the work of her ... head, expert Julian Jones.

... LIKE THOSE IN AFRICA: Waris Dirie lets the dust from the Frome's dried up bed run through her fingers.

think. about beautiful pine furniture built by our craftsmen think about what you would like we do

The Cotswold Collection

Where pine comes naturally

Babdown Airfield, Beverstone, Nr. TETBURY on the A4135 between Tetbury and Dursley

Open 7 days a week

171 North Street, Bedminster, BRISTOL

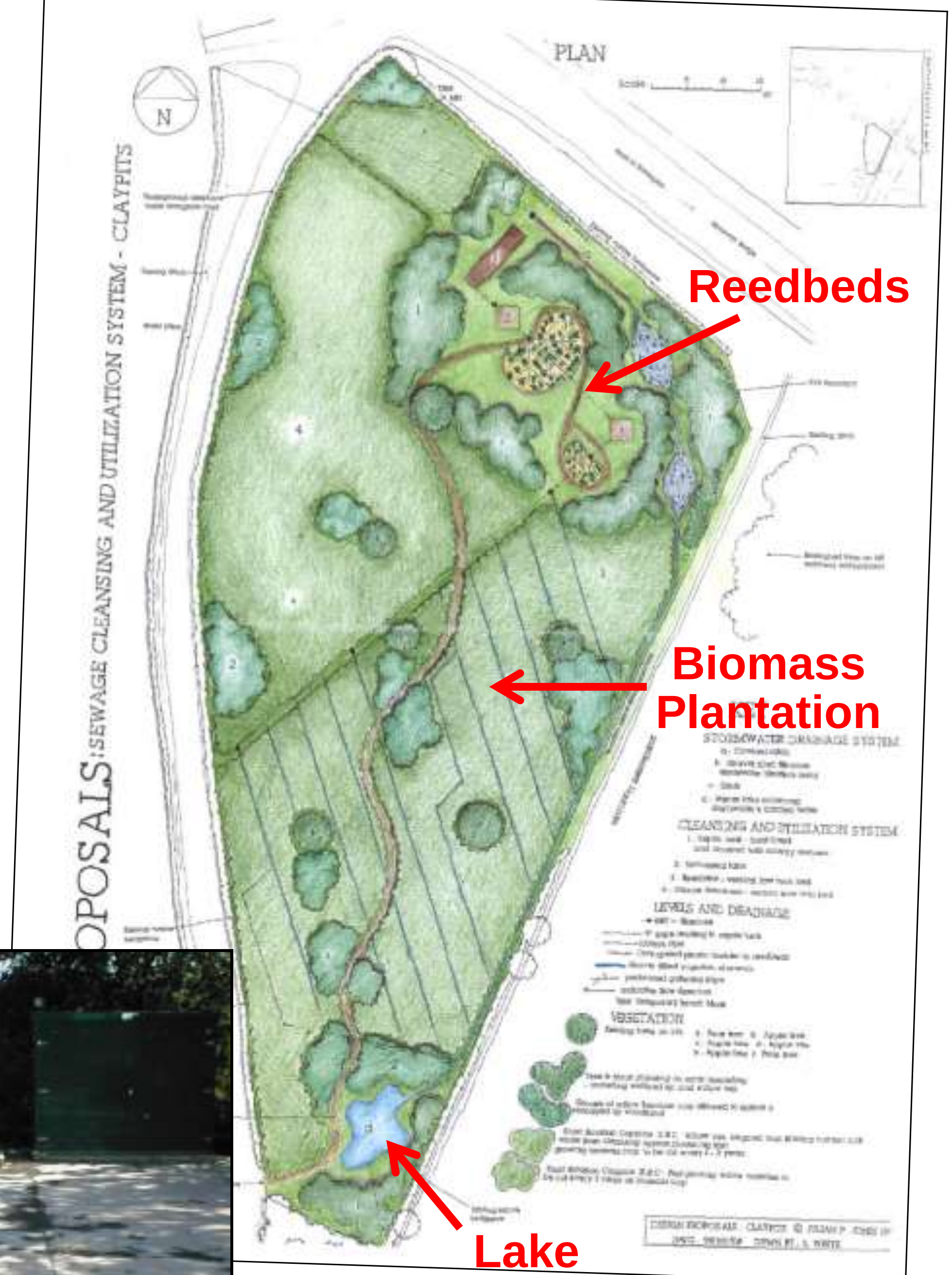
Open Mon-Sat 9.30-5.30

25 Pittville Street, CHELTENHAM

Open Mon-Sat 9.30-5.30

Also at WESTON SUPER-MARE

...ERIES – GLOUCESTERSHIRE'S MOST READ NEWSPAPER (Source: JICREG 1994)

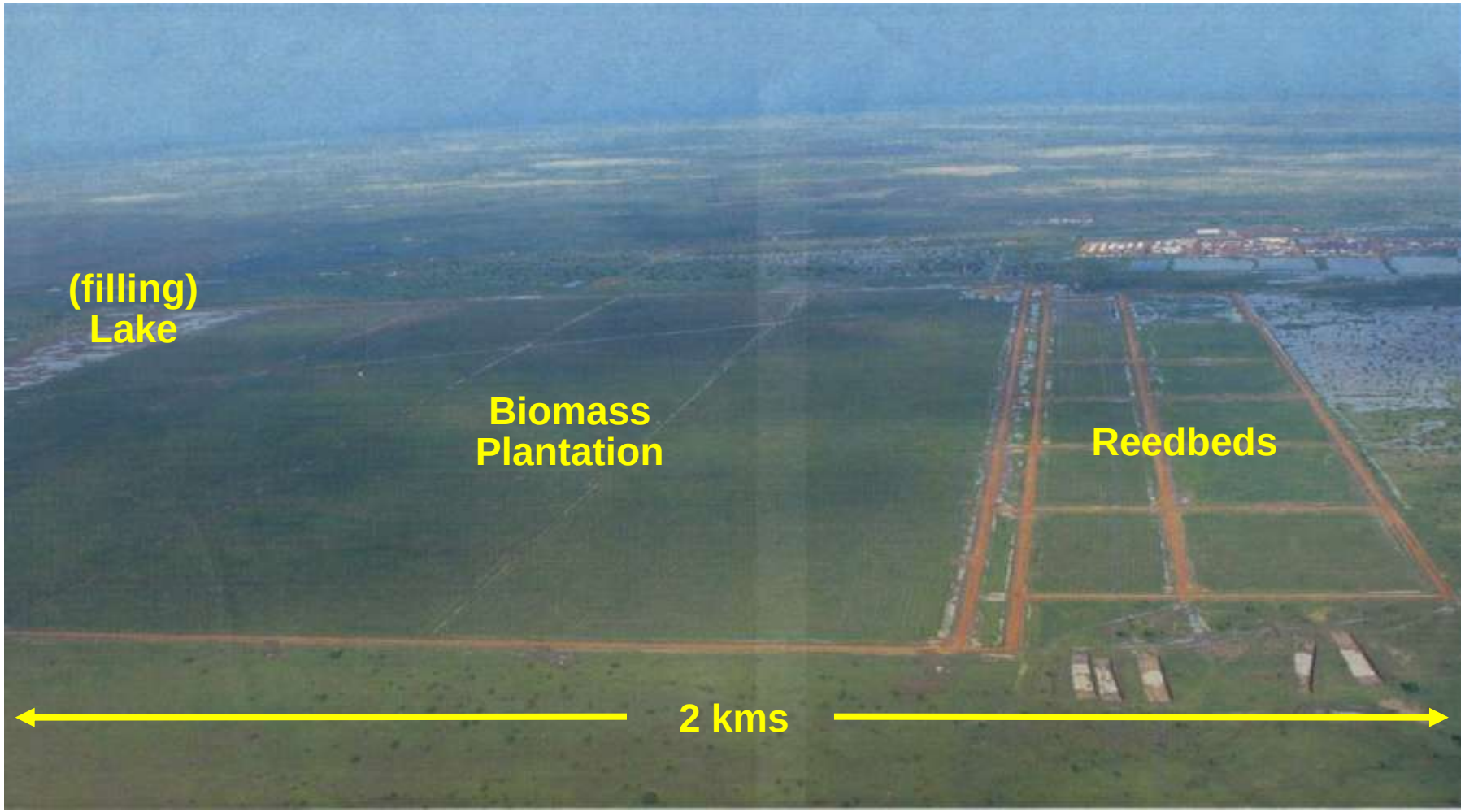


Above: *Claypits village near Stroud. 60 acres of additional plantation can provide 100% of the village's potential domestic energy needs for a total cost of £25,000.*

Right: *pumping station and conventional sewer connection, by comparison, costs an estimated £500,000, which wastes energy and fails to realise the full value of sewage as a sustainable resource – all adding up to negative environmental & climatic impacts.*

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, the local population were able to commence fishing

Courtesy Oceans-ESU

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

Courtesy Oceans-ESU

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










Courtesy Oceans-ESU

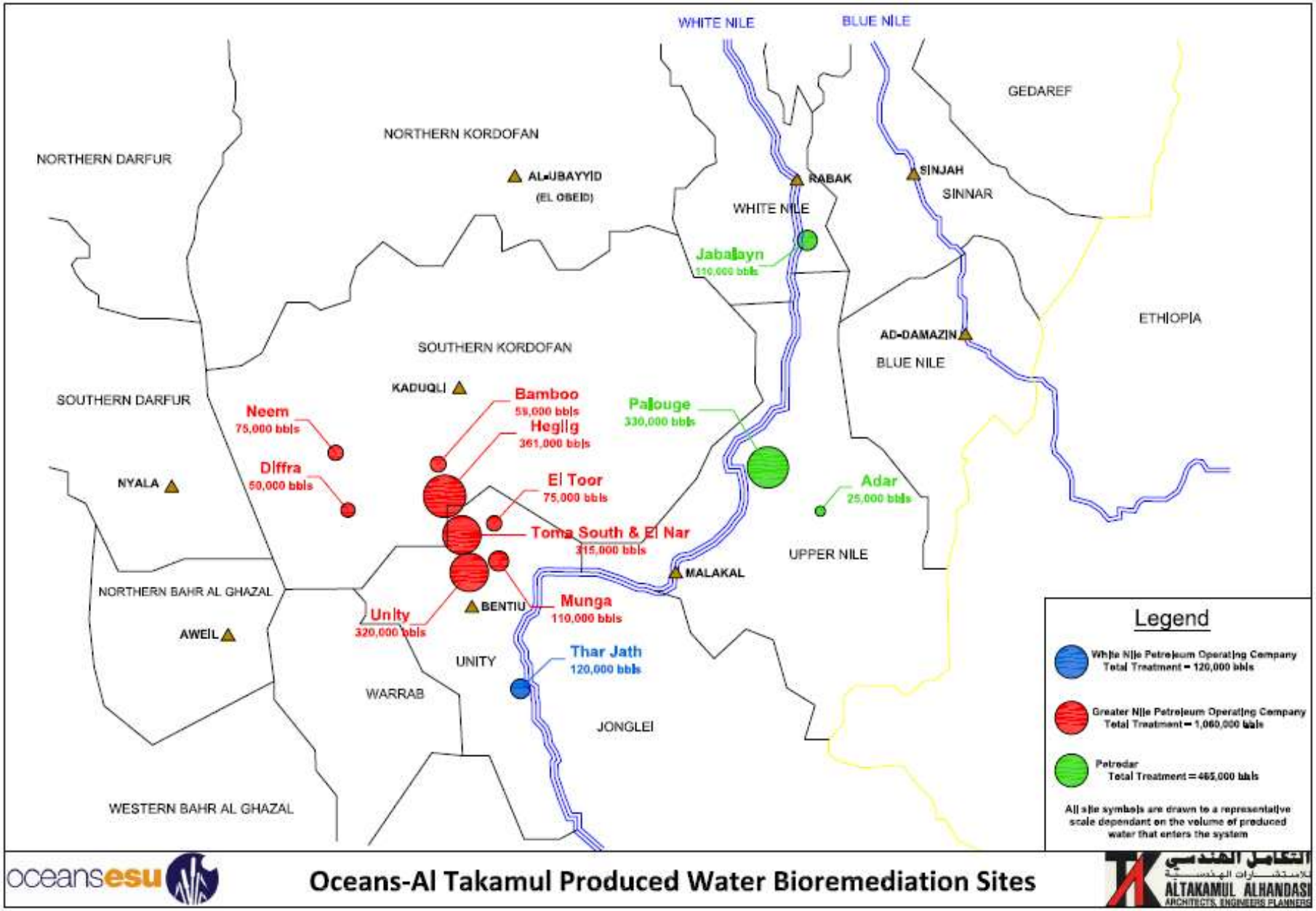
PRODUCED WATER FORECAST

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

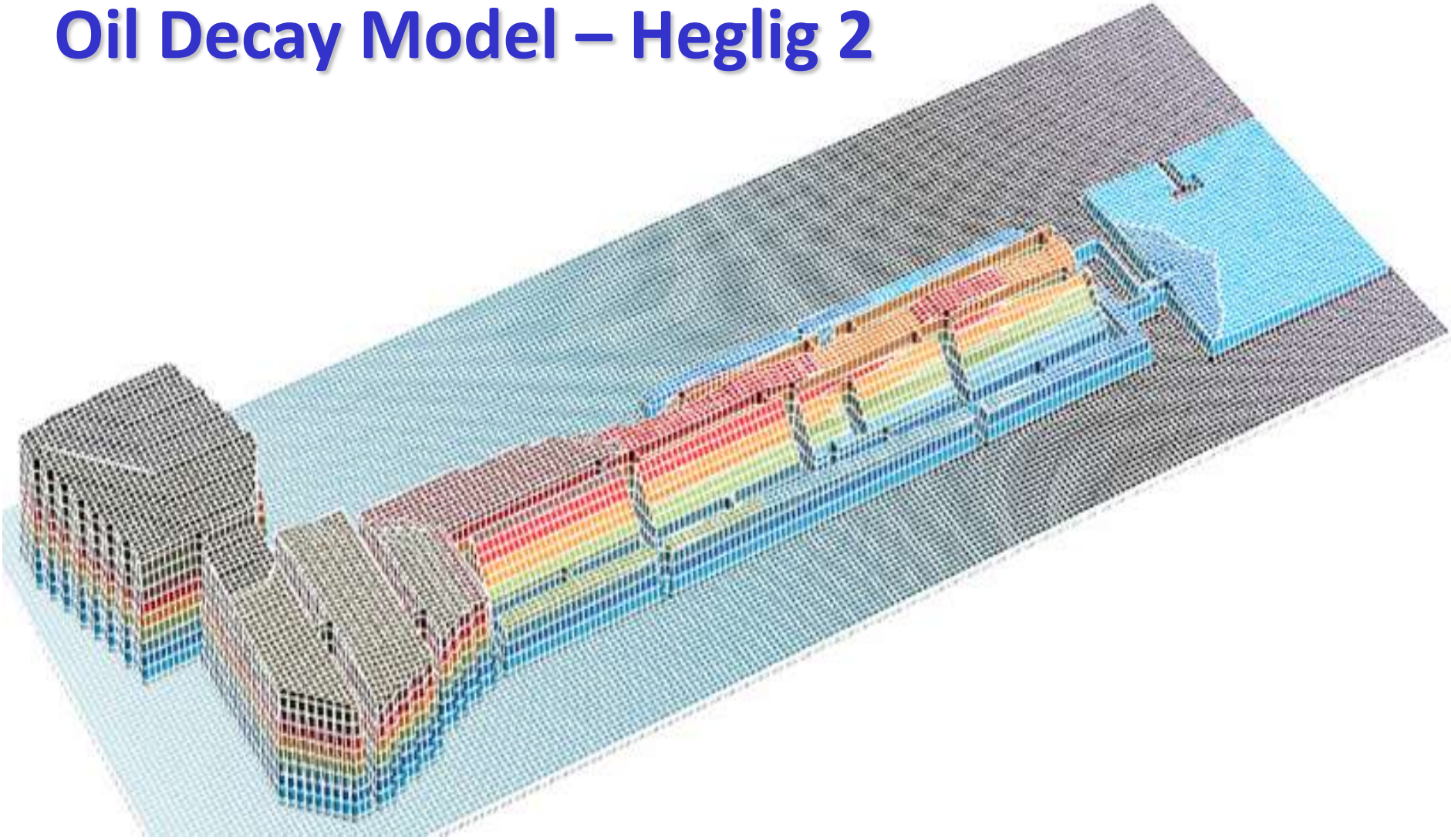


oceansesu

Oceans-Al Takamul Produced Water Bioremediation Sites

التكامل الهندسي للاستشارات الهندسية
ALTAKAMUL ALHANDASI
ARCHITECTS, ENGINEERS PLANNERS

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
Date planted	01/03/2008	01/03/2008	01/03/2008	01/03/2008	01/03/2008	01/03/2008
today	14/02/2008	14/02/2008	14/02/2008	14/02/2008	14/02/2008	14/02/2008
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	...	...

days360(

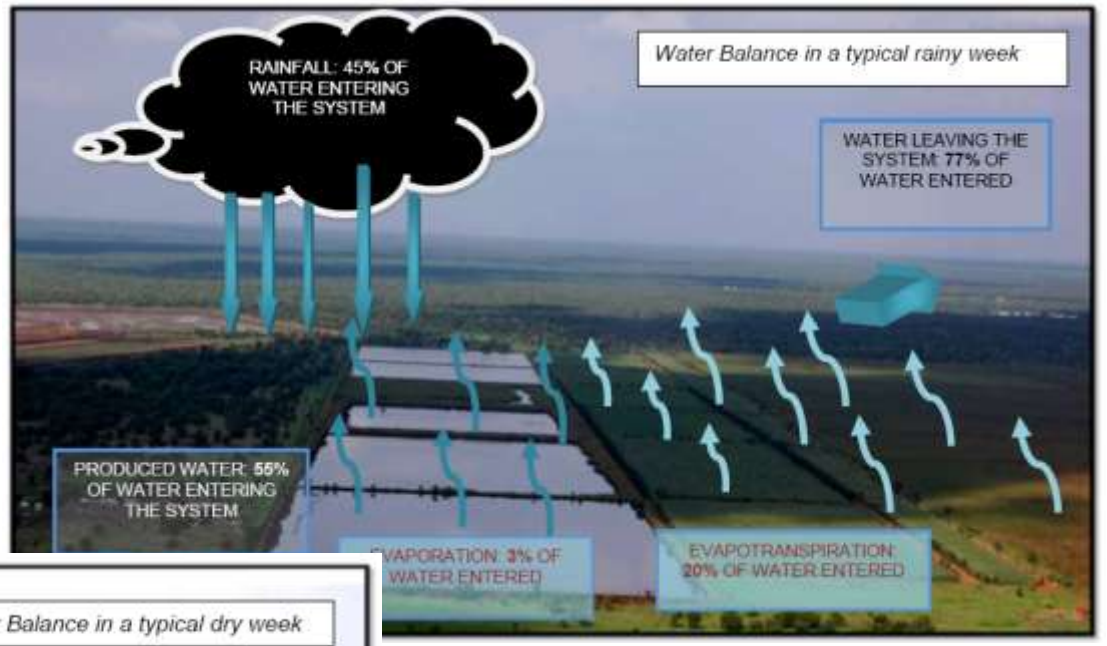
AREA AVAILABLE (ha)
217.3

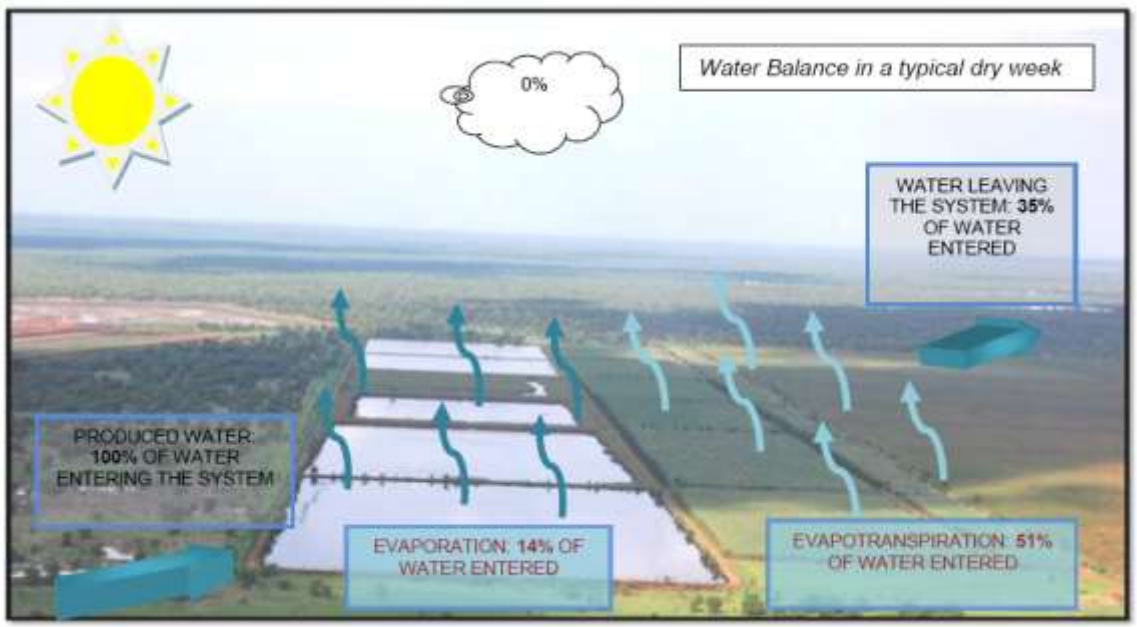
TOTAL $	10,542,621.2

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 Purity and Plenty

1. Work with a holistic overview
2. Understand the self-organising principle of natural systems
3. Use the currency of goodwill

(Further design methodology may be requested from Water21)

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