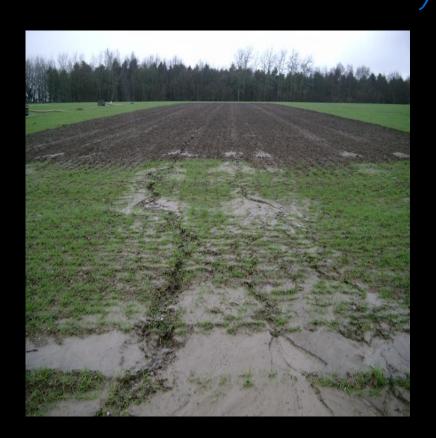
Sustainable Water Management Pressures, Drivers and Options

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Integrated solutions to diffuse environmental problems

PRESSURES



Water Resource Issues in the UK

- Impact of climate change on freshwater systems
- Economic and social costs of meeting improved water quality standards
- Water conflict/ regulatory systems/ asset location and management
- Risk management

BIGGER DRIVERS

- Economic incentives e.g. subsidies vs ecosystem impacts
- Public goods: environmental concerns vs consumer aspirations
- Globalisation e.g.
 resources as capital
 assets; resource use
 efficiencies/ international
 performance comparisons

WATER ISSUES AND POTENTIAL RISKS

- WFD: moving 2,073 designated water bodies in North of England to "good ecological status"
- Social aspects of improving water quality: agricultural policy effects on diffuse pollution & eutrophication of rivers and lakes
- Climate change effects on floods and droughts
- Economic implications of water use & savings
- Water and health



Westmorland Gazette

12 August 2005

"LORDLY 'BID' FOR POWER AT LOWTHER"

"The most important thing in the world over the next 40 years isn't oil - it's fresh water and people will be paying vast amounts of money for it." declared Lord Bragg.

"We have all this weather we endure, we should say this water belongs to us and we should sell it."

"Ken Livingston has already said London is going to come north for its water, we have been warned!"

'STRUCTURAL' DRIVERS

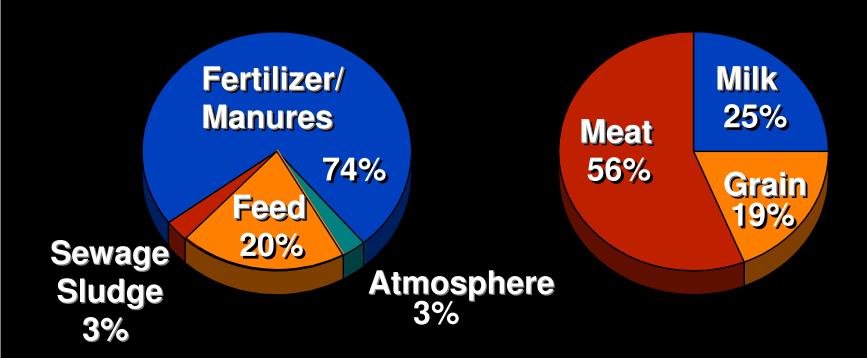


Natural Environment Programme

Developing the evidence base **Trends** What the costs of these How pressures pressures/trends are and Future trends that may could develop in the benefits of mitigating have an impact on the the future them. natural environment How our valuation of the well the policy natural environment framework can may change in the adapt to trends future Pressures Valuing the Characterising the How we can define, Natural Environment How well the Policy Framework How we understand and policy framework measure the What policy tools we can use to communicate pressures. What policies affect the natural can adapt to better account for the value of effects of What the pressures are environment, who owns them, how pressures policies the natural environment - to that we need to deal with they interact and what their ommunicate with policymakers drivers are (e.g. targets) and stakeholders. How these limits relate to targets. Whether Én∨ironmental pressures may What the cause economic and Limits environmental social criteria for limits to be What environmental limits environmental breached. are - which definitions of limits are limits are consistent with our vision In∨entory What data we have about the natural environment and how it helps us assess change over

time and the source of these changes.
Where there are opportunities for new approaches and the integration of monitoring techniques

Phosphorus Fluxes in UK Agriculture

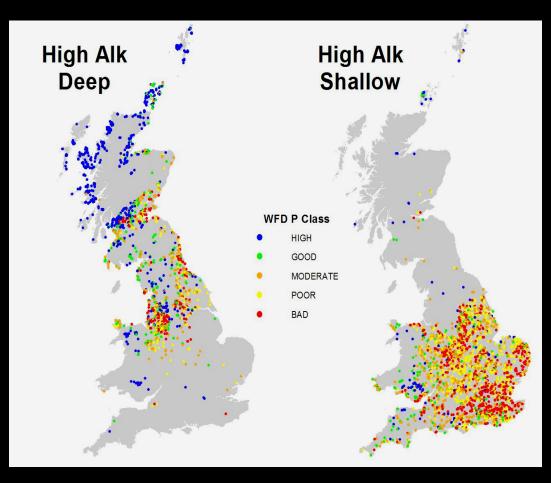


P surplus: 177 000 tonnes (c. 10 kg ha⁻¹ a⁻¹)

WFD UKTAG Jan 2006

River Typology (based on alkalinity, altitude)		Mean annual SRP (ųg l ⁻¹)	
		High	Good
1n	Lowland, acid	30	50
2n	Upland, acid	20	40
3n+4n	alkaline	50	120

Risk Assessment for High Alkalinity Lakes



High Alkalinity – Shallow

- England 91% at risk
- Wales 61% at risk
- Scotland 29% at risk

High Alkalinity – Deep

- England 72% at risk
- Wales 34% at risk
- Scotland 23% at risk



WATER MANAGEMENT OPTIONS FOR THE FUTURE



OPTIONS

Three themes:

- Water Supply and Savings
- Water Treatment and Clean-up Technologies
- Water as a Hazard (floods, droughts, health)

Two time scales:

- Decade (Water Framework Directive)
- Long Term (Climate Change)

Outcome: towards Risk-based Management within an Ecological Assessment Framework

Systems, functions, services and values

BIOPHYSICAL STRUCTURE or PROCESS (e.g. woodland habitat or net primary productivity)

Limit pressures via policy action?

Σ PRESSURES

FUNCTION
(e.g. slow
passage of
water, or
biomass)

SERVICE (e.g. flood protection, or harvestable products) Minimum levels of service (service limits)

VALUE
(e.g. willingness to pay for woodland protection; more woodland; harvestable products)

Abstraction – Treatment - Wetland Sustainability - Saltwater Intrusion

ISSUES AND VALUES

- Water charges; water metering
- Conflicting goals e.g. SE housing
- Technology vs frugality
- Politics and votes; short-termism
- Legislation groundwater contamination: diffuse pollution
- Risk-based decision making





- More diverse rural economies (CAP reform, agri-environment schemes)
- Reductions in UK N emissions
- More widespread application of UWWTD (not >10,000 per
- More widespread adoption of BMPs in agriculture
- Encouragement of sanitation without water in rural areas
- Sustainable (energy efficient) water treatment
- Water consumption patterns across sectors; water pricing
- Harness landscapes...Wetlands/DOC/NO3 attenuation in shallow groundwater systems?