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BALANCING WATER SUPPLY AND THE ENVIRONMENT

Water is vital for all living things. Rivers, lakes and wetlands support a variety of wildlife and habitats. However, the environmental need for water must be balanced against human water use. In most areas of England and Wales[1], the balance between users and the environment is sustainable but, in some locations, water-based ecosystems are under threat. European Directives aimed at protecting the water environment will have impacts on how human water needs are met. This POSTnote examines the potential risks and opportunities for the provision of public water supply as the Directives are implemented in England and Wales. It precedes the House of Lords Science and Technology Select Committee report on Water Management.

Background

Society uses water in many ways: in business, industry, households and farming. This water is abstracted (withdrawn) from rivers, groundwater, reservoirs and lakes. Public water supply (PWS) accounts for 45% of all abstraction in England and Wales ('non-consumptive' uses, such as power generation, account for ~44%)[2]. PWS is provided by 23 private water companies, responsible for meeting domestic and sanitation water uses. Half of all PWS is used in homes where an average person uses 150 litres a day[3] for washing, toilets and so on. Abstracting this water can have environmental impacts as river flows support fish migration and water levels sustain wetlands. To balance water needs:

- the Environment Agency (EA) regulates water abstraction;
- the Office of Water Services (Ofwat) regulates the economic activities of water companies and the prices they charge customers;
- the European Union (EU) has environmental directives that can affect water abstraction. (see Box 1);
- the Department for Environment, Food and Rural Affairs (Defra) has overall responsibility for water issues in England and Wales and sets national environmental targets that also affect abstraction.

Box 1. European directives and water abstraction

The Habitats Directive (1992)

The Habitats Directive aims to ensure biodiversity through the conservation, maintenance and restoration of natural habitats, flora and fauna at designated 'Natura 2000' sites. There are currently 414 of these sites across England and Wales[4]. Abstraction near these sites can continue only if it is shown that it does not adversely affect the site's ecological integrity. The UK has set implementation deadlines for the Directive to meet the EU goal of halting biodiversity loss by 2010. The Habitats Directive is being implemented with the EU Birds Directive and no distinction is made between them within this POSTnote.

The Water Framework Directive (WFD) (2000)

The WFD aims to achieve 'good status' for all groundwater, rivers, lakes, coastal and other water bodies in Europe. 'Good status' is based on the ecological, chemical and physical aspects of water bodies. They can fail to reach 'good status' when too much water is abstracted, thereby reducing water flows and impairing ecological quality. The WFD requires Member States to produce river basin management plans (RBMPs) for all river basin districts in the EU by 2009. These will set out measures that aim to achieve status objectives by 2015 and will be reviewed every 6 years to update and refine plans. The Habitats Directive is included within the framework of the WFD.

Managing public water supply

PWS is managed to ensure that the demands of water users are met in all but the driest of years, when some water use restrictions may be needed. Security of PWS is measured as the difference between water available for supply and water demand. Water supply should exceed

demand by a margin set to minimise the risk of water shortage. PWS areas where this security margin is low are shown in Figure 1a. Most of these are in the South East, where current levels of abstraction are already environmentally unsustainable (see Figure 1b). This means that no large amounts of water are available locally to increase PWS. Proposals for increasing water supply security and meeting projections of increased demand already include reservoirs, desalination plants and compulsory water metering in specific areas. Reductions in current supply levels to protect the environment could result in greater justification for these options. Reductions could also prompt more demand management or decreases in PWS leakage.

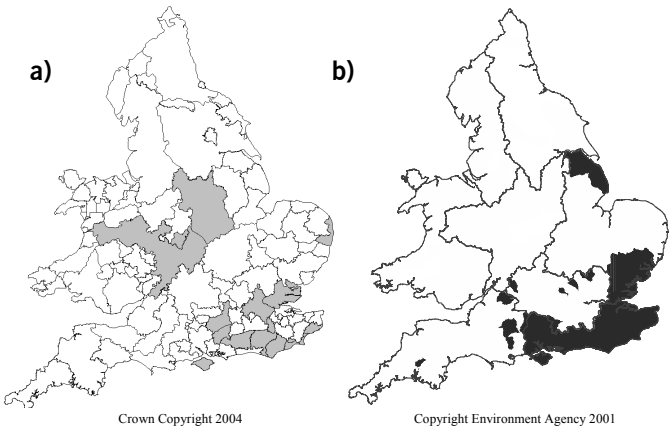

Figure 1. Areas of a) low water supply margin[3] and b) unsustainable surface water abstraction[2].

Sustaining the environment

To meet the Habitats Directive requirements at Natura 2000 sites, the EA estimates water abstraction must be reduced by ~250 million litres a day (Ml/day)[5]. Of this, 234 Ml/day (the water use of ~1.5 million people or 6.5% of PWS leakage) would come from PWS, with the rest coming from other abstractors such as industry or agriculture. These preliminary estimates are being refined through additional investigations. The largest reductions will be required in East Anglia and the North West.

For the WFD, there are currently no clear estimates of the extent to which abstraction will need to be reduced to achieve 'good status'. Estimation is difficult because there is not yet a definition of what criteria must be met to achieve 'good status'. However, initial work shows that some water bodies in England and Wales are 'probably at risk' or 'at risk' of not meeting the 'good status' criteria in 2015 due to abstraction[6]. These include:

- 629 rivers (10.7% of the total);
- 9 lakes (2.1% of the total or 8.6% of lakes assessed);
- 19 transitional waters, such as estuaries (14%); and
- 93 groundwater bodies (26.1%).

Setting environmental requirements

The extent to which PWS will need to be reduced to meet the requirements of the two Directives will depend on environmental water need and how that need is met.

Defining environmental water need

Protecting the water environment requires an understanding of how much water is needed to sustain ecosystems. Generic methods of relating water availability to ecology can be used for a range of ecosystems, but detailed and lengthy field investigations may be required to determine abstraction impacts at specific sites. However, ecosystems are complex and subject to a variety of pressures. Therefore, even with site-specific studies, there can be much uncertainty in the measurement and prediction of abstraction impacts on the environment.

In the past, uncertainty over the impact of abstraction on the environment has been a barrier to altering abstractions. In places this has caused almost irreversible ecosystem damage. The Habitats Directive changed this approach by switching the burden of scientific proof from the need to show 'impact' to the need to show 'no significant impact'. So, uncertainties in assessing impact are a reason to reduce abstraction at Natura 2000 sites. This precautionary approach to environmental protection is welcomed by environmental groups. However, the EA and water companies are concerned about reducing abstraction in areas where the risk of ecosystem damage is low and water is required for PWS.

In assessing Habitats Directive sites, water companies are concerned that research time and money will only be allocated to some high priority sites, with less reliable generic methods of assessment being used in other areas. The concern is that this will result in a larger PWS impact than is necessary for ecosystem protection. English Nature states that the generic methods of assessment being applied are robust and supports their use where site-specific studies cannot be undertaken. However, they would like to see more money devoted to research to improve methods and reduce uncertainty.

Meeting environmental water need

Under the Habitats Directive, the UK must meet environmental needs at Natura 2000 sites but can decide which water management measures are best suited to this purpose. Measures can include reductions in abstraction, changes in water flow management, changes in water quality and so on. The only justification for not meeting protection requirements is an imperative reason of overriding public interest. For sites hosting a priority habitat or species, the only public interest considerations are human health or public safety.

Under the WFD, the UK should aim to meet 'good status'. However, if this is not technically feasible, would incur disproportionate cost or would significantly impact other aspects of sustainability, alternative objectives can be set, including extensions to deadlines and/or the lowering of standards. Alternative objectives must be justified and actions must be taken to meet them and prevent environmental deteroriation. This flexibility in objective setting is not possible for Natura 2000 sites.

When management options are weighed to assess cost-effectiveness or disproportionate cost, economic analysis is required to support decision-making. The development of economic analysis tools is widely seen as an area

where research is required. Defra is leading a collaborative research programme to address this issue.

Managing PWS impacts

To achieve environmentally sustainable abstraction levels, PWS abstractions will have to be reduced in some areas. In applying these reductions the EA is duty-bound to ensure that PWS is not destabilised. However, there is no definition of what constitutes a 'stable supply' or of an acceptable environmental cost for its maintenance. Although the abstraction reductions being discussed represent only 1.5% of PWS across England and Wales, there is potential for conflict at local sites (see Box 2).

Box 2. Habitats Directive and the River Itchen

The River Itchen is one of the finest chalk streams in the world. It flows from the Hampshire Downs to Southampton Water. The river is a Natura 2000 site because it supports high quality habitats and species including salmon, bullhead and the internationally threatened southern damselfly. The Hampshire and Isle of Wight Wildlife Trust consider the area to be significantly degraded. The principal threat to the habitats is a decrease in water flow velocity and an increase in siltation[7]: salmon and bullhead favour fast-flowing clear shallow water and damselfly require small stream-side channels. The River Itchen is also significant source of PWS providing >200 Ml/day to PWS customers in Hampshire. PWS leakage in this area is within economic levels set by Ofwat and alternative sources for abstraction are limited.

The river is seen by some as a flagship site for Habitats Directive implementation. Approximately £2 million is being spent investigating abstraction impacts and appraising management options. The EA has estimated that PWS abstraction may need to be reduced by ~15.6 Ml/day[8], (the supply for ~100,000 people, excluding leakage). Water companies think this estimate is conservative.

Supply-demand planning

If EU directives reduce PWS abstraction, water companies must consider this in their supply-demand planning. To ensure security of PWS, losses in water supply must be replaced by new supplies or reductions in water demand. PWS planning covers a 25-year period to ensure that there is time to implement supply or demand management options before the system fails to meet demand levels. Plans are assessed by the EA and Ofwat every 5 years to review the security of supply and to set prices for PWS customers. Prices are set to fund supply and demand management options approved by Ofwat. In the 2004 review of plans, the EA was critical of the focus on increasing supply, instead of reducing demand[9].

The 2004 review of water company plans did not consider the potential loss of supply due to the Directives because of uncertainty over their impact. This is despite the fact that companies such as Portsmouth Water and Southern Water see the potential impact of the Habitats Directive on PWS supply levels as being more significant and certain than those related to climate change. The degree to which the next review of water company plans (2007–2009) will be able to consider the two Directives is currently unknown. As the Habitats Directive deadline is 2010 and WFD RBMPs will not be finalised until 2009, some uncertainty will be present in the next review. Although the timing of the PWS planning cycle has not been ideal for implementation of the Directives, Defra considers that appropriate mechanisms are in place to manage change between reviews. In 2006, Ofwat will publish a consultation paper on the length of future price reviews to determine an appropriate length for the price review in 2009 and beyond. One consideration will be the 6-year cycle of WFD RBMPs.

Deadlines and timeframes

Compared with the timeframe for PWS planning, deadlines for the implementation of the two Directives are relatively immediate. The ability of water companies to adapt will depend on their water supply-demand balance and how flexibly they can manage that balance across their supply areas. Companies with a good security of supply and an interlinked supply network are in a better position to respond to the requirements of the Directives than water companies whose security of supply is already in deficit.

For the Habitats Directive, environmental groups such as the World Wildlife Fund (WWF) and the Royal Society for the Protection of Birds (RSPB) accept that not all potentially damaging abstraction can stop by 2010. However, they want to see secure plans for PWS change in place and progressing by the 2010 deadline. For the WFD, UK stakeholders are debating which types of objectives should be set for 2015 and what should be addressed over more than one cycle of river basin planning. Ofwat and the water industry see a significant change to the supply-demand balance between 2009 and 2015 (beyond that already planned) as problematic. The European Commission insists that the aim to achieve good status for all water bodies by 2015 'must be taken seriously'.

Funding abstraction licence revocation

Where abstraction licences are reduced or revoked to meet Habitats Directive requirements, compensation usually has to be paid to the licence holder[10]. The EA has estimated that on average £1.5 million will be payable for each Ml/day revoked, resulting in an estimated £352 million payable for alterations to PWS abstractions under the Habitats Directive[5]. Water companies are concerned about how compensation will be calculated and the interaction between supply-demand management options funded by customers through the planning process and those funded through the compensation programme.

In line with government advice, the EA is initially proposing to collect £85 million through the abstraction charging system to fund licence revocations at Natura 2000 sites where a real and current environmental risk can be identified. The RSPB states that securing funds for licence revocations only at these sites conflicts with the Habitats Directive requirement for intervention where risk cannot be disproven. They see this as grounds for European legal proceedings against the UK, unless a strategy for bridging the gap is proposed.

Current proposals for funding abstraction licence revocations for Habitats Directive sites and other environmental programmes do not discuss the funding of any changes that might be required for the WFD. This is partly because of uncertainty over the WFD objectives and how they will be met. It is also because abstraction licences increasingly have expiry dates. No compensation is required if licences are not renewed upon expiry. After 2012, compensation will no longer be payable for licences without expiry dates where the abstraction may be causing environmental damage. Anglian Water has questioned how supply-demand planning is to be managed when licences expire without compensation.

Who pays?

The Government has decided that the costs of abstraction licence revocations should be paid for through increased charges to water abstractors. The abstraction charging system is managed by the EA. Abstractors pay for their water annually. Generating the £85 million needed for compensation could increase the cost of water abstraction by up to 10% per year for 4 years[5]. Raising the full £352 million by 2010 would multiply costs. Potential increases to water charges have implications for all water users, including industrial and agricultural abstractors (paying 10% of abstraction charges) and PWS customers (paying 87% of abstraction charges). The WWF and the RSPB argue that any spending would be offset by socio-economic gains related to environmental improvement. English Nature adds that money spent on environmental protection now will avoid costly site remediation later. Although many groups would like to see the true cost of water more adequately reflected in pricing (at present water abstraction charges are <4% of a customer's water and sewerage bill), the Consumer Council for Water is concerned about how increases are applied to those least able to afford them.

Opportunities for promoting sustainability

The WFD marks a new era in EU environmental policy making that considers the environment in the context of 'sustainable development'. Most groups see this as a great opportunity for improving water management. Key areas for improving 'sustainability' include the integration of land and water management; the promotion of sustainable water use; and the setting of water management decision-making within a larger socio-economic context. All of these issues have implications for the balance between PWS and the environment.

The integration of land and water management should facilitate the consideration of land-based approaches to water management problems. For example, the improvement of rainwater infiltration across land surfaces could raise low river flows, decrease flooding and enhance water quality. This would reduce the environmental impacts of abstraction and could allow more water for PWS. The promotion of 'sustainable water use' could increase water efficiency and reduce water demand. This could decrease PWS abstraction requirements and therefore reduce the need for new reservoirs or desalination. Setting water management decision-making within a wider socio-economic context is accomplished through analysis of cost-effectiveness and disproportionate cost in WFD implementation. This should ensure abstraction reductions aimed at improving the water environment do not result in excessive social or environmental impacts in other sectors (such as increased energy use for water pumping) or unacceptable costs to water users.

Organisations such as WaterUK, the WWF and the RSPB prefer sustainable approaches to immediate reliance on stricter abstraction controls. The WWF suggests this will require a greater focus on participation and partnership in WFD implementation. Partnership working is seen to be essential because water managers do not have all the tools necessary to implement land management or sustainable water use options.

Overview

- EU environmental directives will require reductions in PWS abstractions to protect valuable ecosystems.
- There is uncertainty around how much water will be required for environmental protection and the associated PWS impact.
- Implementation of the Directives requires proper planning to ensure that security of PWS is maintained.
- Implementation of the Habitats Directive is problematic as costs of changing current abstraction regimes are high and, in places, the environmental benefits are uncertain.
- The WFD is seen as a great opportunity for increasing sustainable water management.
- Partnership working and economic analysis of costs and benefits are seen as essential for WFD success.

Endnotes

1 Scotland and Northern Ireland have different water management systems. These systems are not the focus of the House of Lords report and, regrettably, are not within the scope of this POSTnote.
2 Environment Agency (2001) *Water resources for the future: a water resources strategy for England and Wales.*
3 Ofwat (2005) *Security of Supply, Leakage and the Efficient Use of Water 2004–05 Report*.
4 http://www.jncc.gov.uk/
5 Environment Agency (2005) *Review of the water abstraction charges scheme. Second consultation document*.
6 http://www.environment-agency.gov.uk/commondata/acrobat/rbc_res_leaflet_v1.1_1009289.pdf
7 JNCC (2002) River Itchen Nature 2000 Data Form Version 2.1.
8 Environment Agency (2003) *Draft supplementary guidance note 3 – water resources components of the environment programme*.
9 Environment Agency (2004) *Maintaining Water Supply*.
10 Water Resources Act 1991.

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