Introduction

We are grateful for the opportunity to submit evidence to the Select Committee's inquiry into water management. Water UK represents all UK statutory water and wastewater service suppliers, at national and European level. We also look forward to making a presentation at the water management seminar to be held on 17 October, and to giving oral evidence before the Sub Committee later in the year.

1 Defining the Problem

1.1 What are the causes of the current problems of water supply, and how serious are they?

1.1.1 In the UK, public water supplies come from underground sources via boreholes or springs, direct from surface waters including rivers and lakes, or from rainfall collected in reservoirs fed by rainfall in the catchment. Used water is returned to the environment after treatment but usually into surface waters which do not always replenish drinking water sources. There is little direct water reuse in UK although indirect reuse is possible via surface waters.

1.1.2 All water companies have arrangements in place to collect, store and transfer water to cope with normal fluctuations in rainfall. In a drought these established arrangements may not be enough to ensure full supplies for an indefinite period ahead. A shortage of rainfall over a period will mean that water available for abstraction from rivers or the ground, or water in storage may be less than is desirable to ensure security of public water supply.

1.1.3 Southern England has experienced one of the driest winters and spring periods since 1904 – in some places only the winter of 1975/76 was drier. Hampshire, Sussex, Kent and the Thames Valley have had only about two-thirds of average rainfall since November 2004. It is worth noting that southern England has less rainfall per head of population than some north African countries.

1.1.4 Although public water supplies are not immediately at risk hosepipe bans have been necessary in some areas to safeguard supplies into the autumn and to avoid shortages next year if there is a continuing trend of low rainfall.

1.1.5 Over the country as a whole reservoir levels are 12% lower than at the same time last year at around 72% and most river flows were below long term average flows in August.

1.1.6 Groundwater levels are also falling and this is particularly so in the chalk aquifers which are so important to Southern England. Above average rainfall in August reduced demand but had little impact on resources. We really need to see rainfall figures 25% above average for the key rainfall period between October to March, in order to replenish our underground supplies.

1.1.7 Low river flows and groundwater levels across Southern England have also resulted in environmental problems and a balance must be struck with the need for abstraction for public water supply.

1.1.8 There is a statutory requirement under the Water Act 2003 for Water Companies to prepare and maintain a drought plan that details the actions it would take in the event of a drought to ensure the supply of wholesome water and to protect the environment. The drought plans use indicators such as low rainfall, low reservoir levels or high demand, which trigger actions such as more intense publicity for using water wisely, a focus on leak reduction in specific areas, bringing a new or dormant supply into use or in extreme circumstances applying restrictions on use. Currently restrictions on use have been imposed by four water companies in areas with specific problems, for example Weir Wood reservoir in Sussex, which serves 60,000 people and is fed entirely from rainwater is currently only one third full and there is no augmentation source. The reservoir provides flow to the River Medway and the water company has been granted the first drought order in the UK for 8 years to allow it to reduce this outflow.

1.1.9 Demand for water is also important. Obviously this increases in a dry summer through use in garden watering, swimming pools etc. There have also been demographic and social changes, modern lifestyles result in a greater demand for water. There has also been an increase in smaller size households that use proportionally more water, together with a general increase of population and economic activity in the South East of England.

1.1.10 Most water companies reported stable or reducing demand in August reflecting the localised nature of the drought. Whilst companies in the north generally have adequate reserves, a number of companies in the south and east are seeing continuing low rainfall conditions that require management under their drought plans with four companies placing restrictions (hosepipe or sprinkler bans) on water use.

1.1.11 Water companies have a statutory duty under the Water Resources Act 2003 to promote water efficiency and manage demand. They also have targets to reduce leakage from pipes. Leakage is discussed in detail in our response to questions 2c and 3.

1.2 What are the projections for future water supply?

1.2.1 Water company initiatives such as water efficiency campaigns and leakage reduction strategies are designed to reduce the increase resulting from social and demographic changes. Direct charging using meters can also have an impact on demand, though further research is required to confirm a long term reduction in demand.

1.2.2 The biggest concern to the water industry is the impact of climate change as predicted by UKCIP [*ref presentation to HoC EAC in 2004*]. Global warming due to increasing emissions of greenhouse gases is likely to result in statistically warmer drier springs, summers and autumns and mild wet winters. The impacts will be most noticeable in the South East where problems are already evident. This is also forecast to result in

rising soil moisture deficit which will mean that agriculture will require considerably more water and competition with the water industry for increasingly scarce resources.

1.2.3 Another concern is that increasing areas of impermeable surface resulting from urbanisation reduce the quantity of surface water which can infiltrate into the soil and replenish ground water. It is essential that modern communities are designed with sustainable urban drainage systems which allow infiltration rather than a rapid discharge to surface water systems.

1.3 Is sufficient research being devoted to predicting and handling future scenarios?

1.3.1 The water industry channels research funding through its research organisation UKWIR (UK Water Industry Research Ltd). UKWIR sponsors research both on its own and in collaboration with a range of other organisations including the Environment Agency and Defra. Recent and on-going research projects are listed below.

Current UKWIR water management research projects

- Peak Water Demand Forecasting Methodology
  Reservoir Catchment and Impoundment Management
- Assessment of Climate Change Scenarios for Water Planning at the Resource Zone Level
- Effective of Seasonal Variations and Climatic Extremes on Leakage
- Natural Rate Rise of Leakage
- Effect of Climate Change on River Flow and Groundwater Discharge
- Framework for Developing Water Reuse Criteria for Drinking Water Supplies

1.4 Is the response of Government, the EU, Regulators and the Industry adequate?

1.4.1 We welcome continued funding of UKCIP by Defra. Their scenarios are becoming increasingly more detailed and useful. The Environment Agency is looking at future climate change and water resource scenarios and sufficient funding must continue to be made available to enable them to do this. In particular, the flooding risk maps produced by the Agency will take account of climate change scenarios but are not yet available, apart from the south east of England risk map which was fast-tracked.

1.4.2 We do not believe that sufficient attention was given to impacts of climate change within the recent Periodic Review (PR04).

1.4.3 An EU directive on responding to climate change may be necessary to ensure that member states start planning and develop both adaptive and mitigating strategies in respect of protection of water resources.

1.4.4 The ODPM must ensure that new development takes into account water resources and this has been recognised in respect of sustainable communities.

1.4.5 No new reservoirs have been constructed in the UK since Kielder in the 1970s. We have to accept that new facilities will be essential to meet the demands of the 21st century and the planning regime must facilitate this. Water UK supports a twin track approach to meeting future demand, i.e. demand side management, leakage reduction plus resource development - but that approach must be concurrent not consecutive.

1.4.6 The water industry has set up 'Waterwise' to make a positive contribution to improving water efficiency.

2 Supply and Demand

2.1 What are the options for increasing water supply and what are the arguments for and against?

Option	For	Against
New reservoirs	• Reliable yield • Relatively low operating cost • Creation of new amenity, recreational facility	• High capital costs • Planning issues • Environmental concerns • Loss of land
Dam raising	• Low operating costs	• Dams not always suitable • Yield may not necessarily increase • Further land loss • Environmental concerns
Pumped storage	• Relatively low capital cost • Better use of existing storage • Low environmental impact • No loss of land	• High operating costs • Not all reservoirs are suitable
River intakes	• Little or no summer yield • Low capital costs	• Low capital cost • Poor water quality • May have environmental concerns
Licence changes	• Virtually no costs	• Environmental concerns
Boreholes	• Usually good quality water • Incremental developments possible • Low environmental impact • Relatively low capital costs • Relatively low operating costs	• Not all areas suitable geologically
Aquifer recharge	• Low environmental impact • Relatively low capital costs	• Not all geology suitable • Mixed results from trials • Can form part of water re-use
Conjunctive use	• Effective use of existing system • Low environmental impact	• Complexity of operation • Water transfer costs high
Bulk transfers	• Effective use of resources	• Adjacent areas may not have surplus

Water grid	• Evens out surplus/deficit areas • Low environmental impact	• High operating costs • High capital costs
Desalination	• Reliable and unlimited yield	• High operating costs • High capital costs • Debatable environmental value • High energy usage and associated GHG emissions
Re-use	• Lower grade sources, grey water etc. Can be used in particular circumstances	• Need to take account of potential public health risks

2.2 What are the likely future trends in water demand, and what can be done to manage demand more effectively, and to influence the behaviour of consumers and others?

2.2.1 Water companies have developed detailed demand forecasts using national methodologies agreed with the Environment Agency. The methods use micro-component approaches to assess each and every component of demand. Forecast accuracy has improved significantly as a result and all companies produce forecasts for at least a 25 year planning horizon. Demand forecasts vary across the country with some reductions in demand anticipated in the North of England whilst the South anticipates some growth.

2.2.2 Leakage from water company supply systems has been reduced significantly over the last 10 years. Companies are now operating at or very close to the economic level of leakage. As leakage levels reduce, the remaining leaks become more difficult to detect or control,

2.2.3 All newly-built houses in England and Wales have been metered since 1989, and all water companies offer a free meter option for household customers who wish to switch to metering. As a result household meter penetration has increased substantially over the last decade and will continue to increase. In parts of South and East England, faster meter penetration on the basis of change of occupier metering programmes will contribute to the supply-demand balance. The industry is currently engaged in research to verify the assumptions for the impact of metering.

2.2.4 Water companies have carried out a significant amount of customer education and promotion of water efficiency (a statutory requirement), and issued large numbers of customers with free water saving devices (e.g. cistern devices to reduce toilet flush volumes, and water butts and hosepipe "trigger guns" to reduce water use in the garden). Many companies have also undertaken household audit programmes by which individual homes are visited, water saving devices are fitted (e.g. cistern device, low-flow tap inserts), dripping taps are repaired and water saving advice is provided

2.3 What contribution can science, engineering and technology make towards reducing water use or waste by households, businesses and the public sector?

2.3.1 Currently installed water meters only measure cumulative volume of water and so only permit tariffs based on total volume of consumption. They do not enable tariffs to be used that vary the charge according to the time of use (e.g. seasonal peak flow, or time of day of consumption). There is therefore a need for low-cost "smarter" meters which would enable more complex tariffs to be applied and help control peak consumption at critical times.

2.3.2 There are limited water efficiency options currently available that cost effectively save significant quantities of water. There is an urgent need for more research to find cost-efficient demand-side solutions that can make significant contributions to the supply-demand balance.

2.3.3 Water UK has established Waterwise, a new organisation jointly funded by all water companies. Acting independently, its aim is to support further demand-side actions to balance supply and demand, and promote the benefits of water efficiency to customers.

2.3.4 In addition, advances in engineering and technology have enabled water companies to reduce waste of water in three ways

- Development of new pipe materials
- Implementation of pressure management
- Improvements in leak detection technology

In section 3 we discuss infrastructure and the prevalence of cast iron water mains. Over the last two decades the industry and its supply chain has moved to plastics for its primary pipe material, using variants of uPVC and polyethylene (PE) and electrofusion welded joints. These pipes, whilst not 'leak proof' exhibit much lower leakage rates than historic materials.

2.3.5 Development in instrumentation, control and automation and more recently wireless communication has allowed greater use of valves and remote sensors to manage pressures proactively within distribution networks, rather than allowing wide diurnal variations dependent solely on demand. Benefits of this are reductions in stress cycles and surge in pipelines leading to fewer bursts and reduced losses through smaller leaks from joints or corrosion holes.

2.3.6 Improvements in leak detection technology, again using microprocessors and wireless communications have led to new ways of identifying leakage and determining individual leak locations. Examples are leak noise correlators and acoustic loggers. These have improved the effectiveness of leak detection teams by around 35% over recent years.

3 Infrastructure

3.1 What is the current water supply and drainage infrastructure? Is there sufficient investment in its improvement?

3.1.1 The privatisation of the water industry in 1990 is now widely recognised as a success story and has lead to £50bn of investment in the 15 years since then. A substantial amount of investment has rightly been directed towards improving water quality and other environmental improvements. This is partly due to public and political pressure, both in the UK and in Europe, and the generally recognised need to clean up rivers and bathing waters from organic and industrial pollution. Sewage effluent was the Government's first target, partly as a result of the adoption and implementation of the Urban Waste Water Treatment Directive from 1991 onwards.

3.1.2 The water industry is a capital intensive industry relying on its network of underground assets and above ground structures to deliver water supply and waste water services. The total cost of replacing all these assets today in England and Wales would be in excess of £200bn. Three quarters of this investment is below ground and out of sight. Other essential infrastructure includes the sophisticated IT, telemetry and communication systems that control and monitor operation of treatment works, reservoir levels and pressures within the water supply networks.

3.1.3 Breaking this down into individual components, there are 325,000 km of water mains and 302,000 km of sewers. The replacement value of the underground water networks is about £43bn and the sewerage network around £115bn. There are also around 2,500 water treatment works and 9,000 wastewater treatment works. In addition there are numerous service reservoirs (enclosed structures storing potable water) water towers and pumping stations and sewage pumping stations. The value of above ground water assets and wastewater assets is about £25bn each.

3.1.4 Since 2000 the industry through Water UK and UKWIR, together with Ofwat, the Drinking Water Inspectorate and the Environment Agency have developed the "Common Framework for Capital maintenance" This approach was used extensively by companies to develop their asset management plans for their recent PR04 submissions. Despite continuing environmental requirements, companies will be devoting more investment to capital maintenance over the current year AMP period.

3.1.5 A high proportion of both underground networks are over 100 years old and, in London ⅓ of water mains are over 150 years old. Though no longer used as a material, most water mains are cast iron which inevitably corrodes over time or fractures with increasing stress (from ground movement or traffic loading). To manage leakage companies have to control pressure, to limit the stress on pipe walls and find and fix leaks where they occur. In the past with limited funding, companies have struggled but managed to achieve the Ofwat agreed targets for Economic Level of Leakage (ELL) by finding and repairing leaks combined with limited mains replacement programmes. Companies successfully reduced leakage by 1800million litres per day (Ml/d) or 36% from 1995 to 2001 – sufficient to supply over 12 million household customers.

3.1.6 In recent years it has become increasingly difficult for some companies to achieve the ELL and leakage has increased by 200Ml/d since 2001 (Source: Ofwat). Companies now therefore have to embark on proactive mains replacement programmes to control leakage levels. One example is Thames Water's programme to replace over 1200km of water mains in London over the next 5 years. Ofwat expects this and similar mains replacement schemes and ongoing maintenance works by all companies will reduce leakage by a further 315 Ml/d over the next 5 years

3.1.7 In the Final Determinations Ofwat allowed companies additional funding for tackling the distressing problem of sewer flooding. Companies will be investing almost £970m over the next 5 years to resolve over 9,000 internal flooding problems and 6,000 external problems

3.1.8 Whilst planned maintenance is greater within AMP4 the length of water mains due for replacement is only about 1.4% each year and for sewers 0.4%. It is questionable whether such investment levels, though greater than historic levels, are achieving a sustainable replacement rate.

3.1.9 Whilst science and technology has helped develop innovative solutions to deliver drinking water quality, environmental and bathing water quality improvements, there is a downside. These solutions rely on more advanced equipment and process control systems that have much shorter asset lives than more traditional engineering solutions. Equipment installed since the 1990s is in many cases now reaching the end of its useful life. So the maintenance requirement is increasing with the provision of new equipment.

3.1.10 In short, we do not believe there has been sufficient investment. However there are political, economic and social realities to be balanced. It is to be hoped that the effect of the Water Framework Directive, if implemented properly, will diminish the need for new areas of environmental activity and begin to tackle problems of diffuse pollution both agricultural and urban, giving full weight to the 'polluter pays principle'. This may in turn release water companies to devote more resources and investment to improving infrastructure including wholesale asset renewal programmes where justified from sustainability criteria.

4 Context

4.1 The Water Act 2003 amended previous legislation in order to promote sustainability and water conservation. Is the legislative and regulatory framework, at National and European levels, adequate?

4.1.1 The 2003 Water Act placed a duty of care upon water companies and Defra in respect of ensuring the efficient use of water. The Environment Agency retains the duty to ensure the proper distribution and use of water resources. Imposing the duty to conserve upon privatised water companies reinforces their requirement to take all practical measures to minimise the need for abstraction of water from the environment. In this sense the duty is properly placed on water companies. However, this responsibility should have been additionally placed on other abstractors, for example power and agricultural sectors.

4.1.2 The water regulator has recently taken on the new duty to promote sustainability. It is too early to test the extent to which this has been embraced. An issue that may need to be addressed is the approach to be taken where the most economically viable solution is not the sustainable solution. This will test Ofwat's adherence to the new duty.

4.2 How does water figure in the development of both policy in areas such as housing, land use planning and industry?

4.2.1 Recent evidence suggests that in some instances the provision of public water supplies has not been given a high enough priority in the development of Government policy in relation to housing developments

4.2.2 Water companies are not statutory consultees in the planning process, and so, for example, water use in new development does not seem to be fully considered as part of planning approvals. This should be addressed.

4.3 What can the UK learn from the experience of other countries?

4.3.1 The UK water industry leads the world in much of what it does. At the same time, the UK can learn from the experience of other countries with regard to managing demand through metering and tariff systems. In places like Singapore and Holland customers receive bills showing consumption profiles in charge bands, with advice as to how bills could be reduced by changing water use, habits, patterns etc. We should seek to learn from such experiences, as we inevitably move towards a society that will have to value water more highly, and pay for it on a more rational basis.

Water UK
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