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BRIEFING

The logo for Natural Assets North, featuring a stylized green leaf and a blue wave, with a dark purple mountain peak in the background.

Natural

ASSETS NORTH

WATER IN THE NORTHERN POWERHOUSE

Jack Hunter

August 2019

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INTRODUCTION

Natural Assets North is an IPPR North project which investigates the natural potential of the north of England, including the quality of its landscape, water and coastlines. The natural capital of the North is immense, but its full potential is not yet being realised. This work is part of IPPR North's work on a Great North Plan.

This is the second in a series of Natural Assets North briefings. It considers the role that water plays in the Northern Powerhouse economy, the degree to which the region is resilient to the impact of climate change and other trends on the supply of water, and implications for policymakers at a local, pan-Northern and national level. It draws on conversations from a series of walk-and-talk events that took place across the North. At each event, issues of water supply and scarcity came up as important themes that policymakers need to grasp urgently.

Without a reliable and sustainable supply of clean water, and effective and efficient wastewater systems, activity in the Northern Powerhouse would quickly grind to a halt. To date, conversations about the future of the region and its economy have largely taken the North's water resources for granted.

WATER IN THE NORTHERN POWERHOUSE

Sometimes the stereotype rings true. Although the north of England may not get as much rain as some people might think, it is undoubtedly blessed with water in abundance. According to the latest figures from the Environment Agency (2018b), the North accounted for 41 per cent (over 6,500 million cubic metres) of all water abstracted across England.

Water is abstracted from surface waters (ie from rivers and lakes) and groundwaters (ie water held underground within rocks known as aquifers), however the North relies far more on surface waters than elsewhere in the country (BGS 2015). In the North, the water supply is managed by three main companies that provide drainage and sewerage services, as well as water supply to the cities, towns and villages of the region. Each company oversees multiple water resource zones (WRZs), which are large geographical areas across which water resources are planned and in which all customers have the same water supply risk (known as level of service).

- In **Yorkshire**, Yorkshire Water oversees two WRZs, of which the largest is the Grid Surface Water Zone, which covers over 99 per cent of its customer base, including Leeds City Region and Sheffield City Region. In addition, Yorkshire Water have an agreement with Severn Trent Water to abstract up to 21,550ML per year from the Derwent Valley reservoirs in Derbyshire. This water is used to supply part of South Yorkshire.
- In the **North East**, Northumbrian Water oversees two WRZs, of which the largest is the Kielder WRZ. The Kielder WRZ benefits from the Kielder Reservoir, located in Northumberland, which is the largest artificial lake in the UK (holding 200 billion litres of water). The reservoir, which was built in the 1960s in anticipation of a rise in demand for water from industry which never materialised, holds ample resource to serve the major North East urban conurbations of Newcastle-upon-Tyne, Gateshead Sunderland and Durham, as well as Tees Valley.

- In the **North West**, United Utilities currently oversees four WRZs, including a single large resource zone that stretches from Penrith to Crewe and includes the large urban areas of Greater Manchester and Liverpool City Region. The water company has plans to further expand the size of this large zone by merging it with West Cumbria WRZ, to create a huge single Water Resource Zone that will serve over 7 million people.

TABLE 1
Characteristics of Water Resource Zones (WRZs) in the north of England

Region	Name	Population	Water available for use, 2019/20. Megalitres per day (ML/d)
Yorkshire and the Humber	Grid Surface Water Zone	5.2 million people including Sheffield City Region, Leeds City region	1367 ML/d
	East Surface Water Zone	50,000 people in Whitby and part of North Yorkshire national park	14 ML/d
North East	Kielder WRZ	2.5 million people including Newcastle-upon-Tyne, Gateshead, Sunderland and Durham, as well as Tees Valley	773 ML/d
	Berwick & Fowberry WRZ	25,000 people, including Berwick-upon-Tweed	11 ML/d
North West	Strategic Resource Zone (incorporates West Cumbria WRZ)	7.0 million people, including Greater Manchester, Liverpool City region	1697 ML/d
	North Eden Resource Zone	14,000 people	6ML/d
	Carlisle Resource Zone	110,000, including Carlisle	27 ML/d

Source: Northumbria Water's draft Water Resource Management Plan 2019, Yorkshire Water's draft Water Resource Management Plan 2019, and United Utilities' draft Water Resource Management Plan 2019

Water is abstracted for a variety of purposes and plays various vital roles that underpin the health of the North's population, and that of the Northern Powerhouse economy.

First, the public water supply accounts for a significant proportion of all water abstracted in the north of England. This includes water use for washing, cleaning and cooking by households and businesses alike.

Second, the electricity supply industry is a significant consumer of water. Gas, biofuel and coal power stations use large amounts of water to produce and cool steam to generate electricity. Nuclear energy generation is also highly water intensive, however, in the North, as is normally the case elsewhere, nuclear power plants are located on the coast, in order to maximise use of tidal water sources. Carbon capture and storage technologies also significantly increase the amount of water used for energy generation (Byers et al 2015).

In addition, water is also vitally important for a wide range of industries, as well as agriculture, even though the proportion of total water used in each case is relatively small.

Finally, water also sustains and nourishes the North's natural environment, from its upland landscapes to its wetlands and estuaries. Ensuring a healthy and sustainable balance between the needs of human activity and the local environment is critical to maintaining the beauty of the North's natural landscapes for future generations. Thriving natural ecosystems also offer health and wellbeing benefits and help to reduce the risk of both fire in upland areas and flooding downstream.

FORECASTING WATER RESOURCES IN THE NORTH

In the coming decades, several trends will impact upon the availability of water in the north of England. Specifically, these include the following.

- **Climate change** has already had, and will continue to have, a significant effect on water supply in the North, as well as elsewhere in the country. We are now entering an age of environmental breakdown (Laybourn-Langton, Rankin and Baxter 2019). The projected effects are likely to include hotter and drier summers, cooler and wetter winters, as well as increasing exposure to extreme weather events (Environment Agency 2018a). The likelihood of drought is projected to increase, and overall average summer river flows may decrease across the UK, leading to reduced water availability and lower river water quality. Risk of flooding is likely to increase, particularly during winter (LWEC 2016)
- **Population growth** increases pressure on water supply. Although the effects of population growth are mitigated through reductions in per capita consumption (to the extent that overall demand is likely to fall over the coming decades), a growing population will entail higher demand for water through the public water supply and increased demand for energy generation.
- **Increasing water efficiency** is likely to reduce overall net demand. For example, all new domestic buildings must meet government regulations for water usage (HM Government 2010), and new designs of energy efficient appliances tend to use less water. In addition, increased public awareness around water issues is likely to affect behaviour change that should, over time, reduce the amount of water that is used in the household. The roll-out of water meters is also linked to reduced household usage (Fairness on Tap 2011), although the relationship is not straightforward (Staddon 2010a). In addition, the roll-out of water meters will be slower in the North because the region is not currently considered 'water stressed', meaning that meters can only be installed where customers opt in, or on new developments.
- **Increased demand for energy** may increase water consumption, depending on the degree to which future energy generation relies upon combustion (ie burning coal, natural gas, or biomass), rather than less water-intensive sources, including renewables. Methods for carbon capture and storage (which have been identified by the government as necessary element of the UK's strategy for reducing net carbon emissions (BEIS 2018)) are also highly water-intensive, as previously discussed.

The net effect of these trends is that pressures on the supply of water in the North are likely to increase over the coming decades and towards the end of this century, with implications for the future economic development potential in the North. We explore these trends in more detail below for each principal WRZ in the North, to make the case why issues associated with water resource management need to be an integral part of debates about the Northern Powerhouse.

The forecast for supply and demand for each area is set out in the respective water resource management plans (WRMP). Water companies in England are legally required to produce a WRMP every five years, and to set out how they intend to ensure a long-term balance between supply and demand for at least

the next 25 years. WRMPs for 2019 are currently available online as draft versions, pending approval from the secretary of state.

At a national level, steps are being taken to support and encourage more strategic and pan-regional planning of water resources.

The **National Infrastructure Commission** (NIC 2018) recommended that the government take steps to ensure a nationwide level of resilience to drought and flooding. This included recommendations for joint working between water companies in different areas.

At least partly in response to this, the **Environment Agency** is leading on the development of a national framework for water resources. This will set out an assessment of national and regional water needs, including:

- indicative needs for strategic solutions such as water transfers and new sources of supply nationally and regionally to improve resilience to drought
- strategic direction on leakage and water demand.

The **government** is also considering whether it will introduce a power to direct water companies to prepare joint plans “at a regional or possibly larger scale” (EFRAC 2019), and to require companies to take these into account through their individual WRMPs.

Each WRMP models the potential impact upon supply and demand under a number of different scenarios.

Across each strategic area in the North, the overall supply of water is expected to fall relative to demand. However, the relative size of reductions varies considerably between different regions.¹

In the North East, the large Kielder WRZ is at relatively low vulnerability to the effects of climate change over the coming years, as figure 1 shows. Although there is a forecast reduction in overall supply of just under 20 megalitres per day (ML/d) due to climate change by 2045, this accounts for just 2-3 per cent of the current available supply. For comparison, the total supply of water is currently 778 ML/d.²

During the same period, demand is expected to increase, driven primarily from an increase in the population. Demand from other sources, including industry, is expected to be relatively static. Including sufficient target headroom³ to allow for resilience to droughts and other periods of water shortage, overall demand in the WRZ is expected to increase from 662ML/d to 714 ML/d by 2045.

However, even under a ‘no action taken’ scenario, the large resource zone is still expected to be in surplus regardless of climate change effects. Nonetheless, Northumbria Water has developed a plan to reduce demand over the 25-year planning horizon, primarily through reduced leakage and activities to encourage greater water efficiency among domestic users. This plan, if successful, is expected to deliver an overall reduction in demand plus headroom of 51 ML/d, meaning that the area would remain in surplus.

1 For simplicity, we focus on the state of the principal water resource zones for each region. Full information for other, smaller zones can be found in the respective WRMP for each region.

2 All figures are taken from Northumbria Water’s draft Water Resource Management Plan 2019. See: <https://www.nwl.co.uk/your-home/environment/water-resources-management-plan-2019-consultation.aspx>

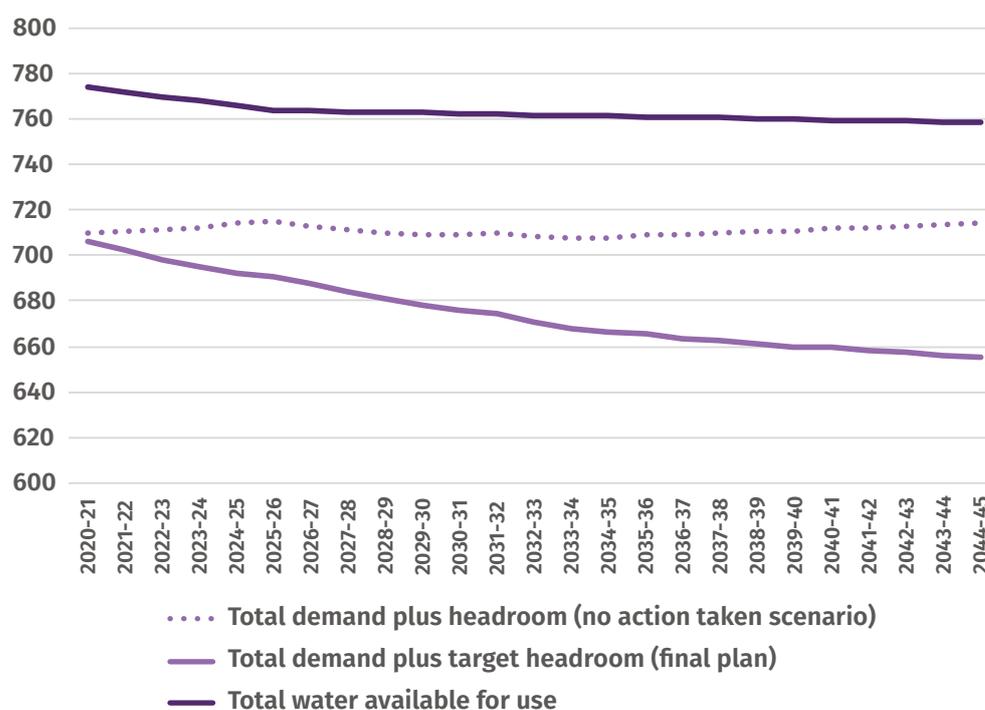
3 ‘Target headroom’ is defined as ‘the minimum buffer that a prudent water company should allow between supply (including raw water imports and excluding raw water exports) and demand to cater for specified uncertainties (except for those due to outages) in the overall supply-demand balance. Introducing this buffer into the overall supply-demand balance will help to ensure that the water company’s chosen level of service can be achieved’ (Defra).

In Yorkshire, water supply in the main WRZ is forecast to fall below demand in a scenario where no further action is taken, as figure 2 shows. This is attributed primarily to the effects of climate change. By 2045, a reduction of 98 ML/d (or 7 per cent of current supply) is anticipated under a median climate change scenario.⁴

Overall demand is expected to decline slightly over the planning horizon, owing to a planned reduction in leakage, behaviour change through increased metering and reduced demand from industry. In the long-term, population growth is expected to have an upward pressure on demand, however by 2045, the cumulative effect of these changes is a forecast reduction in demand of 6 ML/d.

Yorkshire Water forecasts that its main WRZ (called the Grid Surface Water Zone) will be in deficit relative to target headroom from 2035/36 onwards without intervention to mitigate this risk. Taken together, and in a scenario where no further action is taken, a deficit of 34 ML/d (just over 2.5 per cent of baseline) is forecast by 2045, assuming a median climate change scenario.

FIGURE 1
Forecast supply and demand to 2045 in Kielder SWZ (Northumbria), dry year average



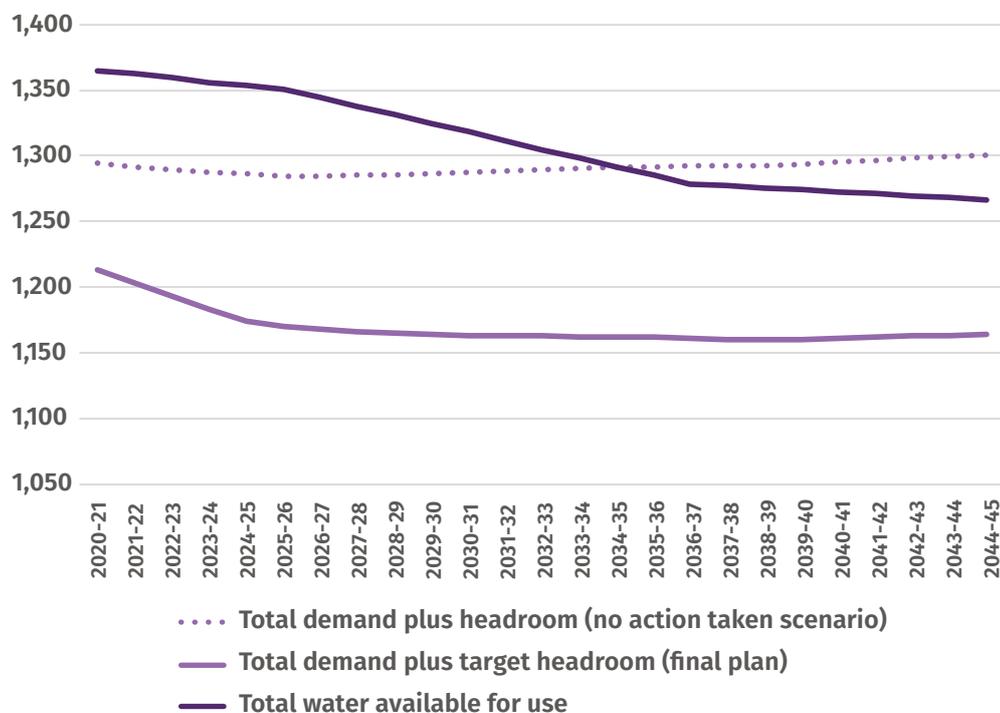
Source: Northumbria Water’s draft Water Resource Management Plan 2019

Yorkshire Water plan to respond to the risk of a possible deficit in supply through a range of measures, primarily through investment to reduce leakage. Yorkshire Water are targeting a 40 per cent reduction in leakage by 2025, enabling a total reduction in demand of 49 ML/d by 2045. In addition, the water company intends to create new supply through two boreholes, which would have a positive, albeit relatively small, impact upon total supply.

⁴ All figures are taken from Yorkshire Water’s draft Water Resource Management Plan 2019. See: <https://www.yorkshirewater.com/resources#ls4>

If successful, this will remove the risk of a deficit in supply by 2045 and increase water security for the Yorkshire region within the legal 25-year planning period.

FIGURE 2
Forecast supply and demand to 2045 in Grid SWZ (Yorkshire), dry year average



Source: Yorkshire Water’s draft Water Resource Management Plan 2019

In the North West, and according to United Utilities’ Water Resource Management Plan 2019, a reduction in supply is forecast in its large WRZ (called the Strategic Resource Zone) of 49 Ml/d, or 3 per cent of total deployable output by 2045, as shown in figure 3.⁵

Over the same period, and despite upward pressures because of population growth, overall demand is expected to decrease slightly (2 per cent of total demand), owing to lower per capita consumption over time. A very small deficit is forecast in a ‘no action taken’ scenario in the largest WRZ within the 25-year planning horizon.

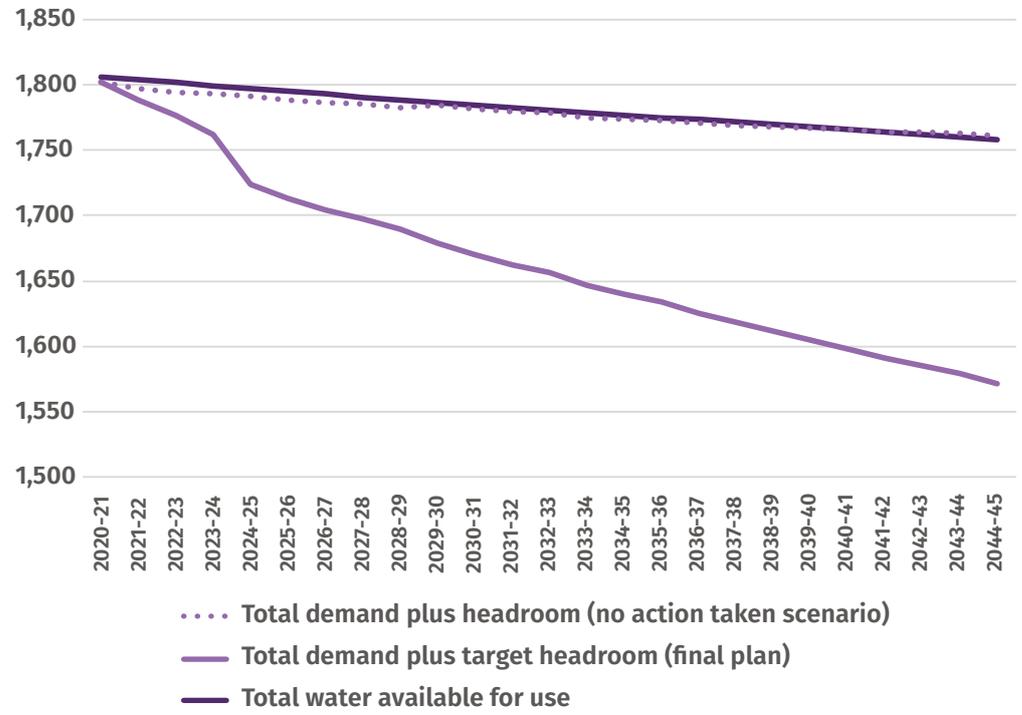
United Utilities have set out a plan to reduce demand, primarily through reductions in leakage (they have set a target of just over 40 per cent by 2044/45) as well as improved water efficiency through public engagement activities. These plans are forecast to decrease overall demand for water across the SRZ at a greater rate (15 per cent) than projected decreases in supply, providing a high degree of water resilience if successful.

Given this, the water company has included in its draft WRMP consideration of a future water trading scheme from the North West to other parts of the UK that have lower levels of water security.

⁵ All figures are taken from United Utilities’ draft Water Resource Management Plan 2019. See: <https://www.unitedutilities.com/corporate/about-us/our-future-plans/water-resources/developing-our-water-resources-management-plan/>

FIGURE 3

Forecast supply and demand to 2045 in United Utilities Strategic Resource Zone, dry year average



Source: United Utilities' draft Water Resource Management Plan 2019

ISSUES IN WATER SUPPLY ACROSS THE NORTH OVER THE COMING YEARS

The compound effects of climate change and economic and population growth are introducing significant pressures on the water supply of the north of England. Although much of the North – unlike parts of the south of England – is not considered water stressed, the region's water security cannot be taken for granted.

There are very limited opportunities to substantially increase the supply of water, for example by building new reservoirs, because of a lack of water availability, abstraction limitations, and the likely impact upon the natural environment.

Instead, to ensure the region remains water resilient, we will have to make better use of our existing water supply, by managing demand, reducing leakage and encouraging greater water efficiency. The water companies have a statutory responsibility to supply water and should be held accountable to ensure that they can deliver the improvements in service that they are promising. However, because of the nature and scale of the issue, and the possible consequences of water scarcity, this cannot solely be the responsibility of the water industry alone – instead all agencies have a role to play in helping to mitigate the risks and maximise the opportunities for the future.

There are five themes that, taken together, warrant a collective and pan-Northern approach to ensuring the continued resilience of the North's water supply and the health of its natural environment.

1. THERE IS CONSIDERABLE UNCERTAINTY IN FORECASTING FUTURE WATER RESOURCES

Modelling the future effects of climate change involves considerable uncertainty, where the choice of model has a greater impact on outcomes than the data inputted.⁶ As such, there is considerable variation in terms of the possible impact on water supply.

In particular, Yorkshire Water have identified a high vulnerability to the effects of climate change within the WRZ due to a high degree of uncertainty in the modelling scenarios. In a high climate change scenario, there is an additional reduction in water supply for the WRZ of 159 Ml/d. Under this scenario, by 2045, there would be a reduction in supply of 19 per cent relative to current levels, which would have a very significant impact upon the supply-demand balance.

If the effects of climate change are more severe than expected, then the pressures on water supply across the North will be much more significant.

2. THE WATER INDUSTRY HAS PROMISED TO REDUCE LEAKAGE – BUT EVERYONE MUST PLAY A ROLE IN MANAGING OVERALL DEMAND FOR WATER

Ensuring that there is a robust supply-demand balance across the North will require all those who can make a difference to play their part, including

6 See for example HR Wallingford (2015).

national and subnational government, water companies, the Environment Agency, the National Infrastructure Commission, key NGOs and customers (including business, industry and the general public). Ultimately, it will be through both individual and collective action that the long-term resilience of the North's water supplies will be secured.

This includes action to tackle water leakage. Without significant reductions in the current rates of leakage,⁷ the overall demand for water in the North will be greater and the overall resilience of each region – especially the North West and Yorkshire – will be less.

Each water company has laid out detailed and ambitious draft plans to reduce leakage and ensure the sustainability of their respective water systems over the statutory planning horizon. Many have identified investment innovation as a key mechanism to tackle leakage and maintain their networks more efficiently, including increased take-up of smart metering.

As the industry itself acknowledges, this will require an “unprecedented rate of improvement” (Water UK 2019). Although leakage is down by 38 per cent from its peak in 1994/95, rates of water leakage have remained more or less unchanged in the past decade (BBC News 2018), with variable performance from water companies in meeting their targets agreed with the regulator (Consumer Council for Water 2018). Historically, leakage targets have been agreed between the regulator and the water industry in relation to an estimate of the sustainable economic level of leakage (SELL). This is designed primarily to ensure value for money for the consumer, meaning that there has been little incentive for water companies to make efficiencies or innovations to deliver significant reductions in leakage.⁸

But this is changing. Reflecting an increasing concern from government, the regulator and the industry on ensuring future water resilience, water companies are being asked to set more challenging leakage reduction targets.

The water companies have indicated their willingness to meet this challenge. In April 2019, Water UK (the industry association for the sector) published a series of pledges which form part of a new Public Interest Commitment (ibid). These are intended to demonstrate their collective commitment to working in the public interest. They include a national goal to triple the rate of leakage reduction across the sector by 2030.

While action by water companies to reduce leakage is necessary, it is by no means sufficient to ensure the future water resilience of the North. Alongside this, there is an urgent need to radically shift public perceptions of water that reflect increased the risk of future scarcity, in order to reduce overall demand. For example, of the water lost through leakage, about one-quarter is lost through customers' supply pipes (EFRAC 2018). Awareness of the need to reduce water use remains low, with the result that there has been little discernible change in patterns of water use.⁹

The future resilience of the North's water supply depends upon significant investment and requires everyone to play their part. The water companies

7 According to Ofwat, leakage is treated water lost from the distribution system. It includes water lost from the companies' distribution networks and supply pipe losses from consumers' pipes. Leakage is affected by: operational strategies (for example pressure management), network characteristics (for example length of mains), asset condition (for example age), and customer base composition (for example rural or urban). See: <https://www.ofwat.gov.uk/households/supply-and-standards/leakage/>

8 For example, see: https://webarchive.nationalarchives.gov.uk/20150604024325/http://www.ofwat.gov.uk/sustainability/waterresources/leakage/rpt_com121012smcsell.pdf

9 For example, BEIS Energy and Climate Change Public Attitude Tracker found few changes in the proportion of respondents engaging in behaviours that waste water. See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/702640/Wave_25_Summary_Report.pdf

have set out plans to deliver an unprecedented rate of improvement in leakage reduction, in order to ensure that overall demand for water remains manageable. If they are unable to do so, future pressures on the balance of supply and demand of water in the north of England will become more acute.

But steps to reduce leakage can only go so far and need to be supported by concerted efforts by other partners, including consumers, to manage the overall demand for water resource more effectively across the North. This requires a step change in public attitudes towards water from across policymakers, manufacturers, retailers and the general public.

3. PUBLIC ATTITUDES TO WATER NEED TO CHANGE

In the face of a reduction in overall supply in the north of England, as a result of climate change, we will all need to use water much more carefully in future if the region is to maintain its overall water resilience.

In order to do this, we need a substantial decrease in per capita consumption of water. Owing in part to improvements to the water efficiency of appliances such as dishwashers and washing machines, household water consumption has slowly decreased in recent years, with the current average water use per person being 141 litres per day, compared to 155 litres per day in 2004 (Consumer Council for Water 2018). But this is not enough. In Germany, consumption is a sixth lower (121 litres per day) (ibid).

This will require a step change in people's attitudes to water – particularly in areas like the North, where there is an assumption that water supplies are plentiful. Awareness of the future pressures on water supply remains low, with the result that there has been little discernible change in patterns of water use. For example, last year, a period of sustained warm weather led to substantially increased demand for water. In the North West alone, water consumption rose by 25 per cent (or around half a billion litres) to a record 2,250 million litres.

Supply-side measures to reduce per capita consumption will involve working with retailers and manufacturers to incentivise them to promote and sell water efficient products (including through regulation where appropriate).

In addition, there is a key role for policymakers to encourage more responsible use of water – for example, by requiring all developers to build to higher water efficiency standards, improving the water efficiency of anchor organisations, and supporting campaigns to encourage people to use water more responsibly. This will require some difficult decisions to be made and therefore requires political leadership to make happen.

4. MODELLING ACROSS A LONG TIMEFRAME SUGGESTS ADDITIONAL PRESSURES IN YORKSHIRE AND, TO SOME EXTENT, THE NORTH WEST

Water company plans are tested to the 2080s, however, in each area, the core supply-demand assessment of need is focused on the 25-year horizon.

However, analysis in different WRMPs suggest that the pressures on water supply are forecast to be more acute by 2085 owing to the compound impact of climate change.

In Yorkshire's main WRZ, a reduction of 224 Ml/d (or 16 per cent of baseline output) relative to the current baseline is anticipated under a median climate change scenario. Under a high climate change scenario, there is a forecast reduction of 477 Ml/d (34 per cent of baseline output). This would substantially increase pressures on the balance between supply and demand for water and necessitate sustained action across the region to reduce overall demand.

In the North West, the median forecast impact upon water supply in the large SRZ is a loss of 205 Ml/d (just under 10 per cent of current output). Under a high climate change scenario, the predicted loss could be more than double – the highest simulated impact is 469 Ml/d (over 20 per cent of current output).

Looking further into the future, the effects of climate change upon the North's water supply are likely to become more acute. Given that one of the main levers that have been identified to reduce demand, namely reducing leakage, entails diminishing returns on investment, the long-term water resilience of the region will increasingly necessitate action across all stakeholders in order to reduce overall demand for water.

5. THERE ARE OPPORTUNITIES FOR PARTS OF THE NORTH TO SUPPORT NATIONAL WATER RESILIENCE

Despite possible future pressures on supply, much of the North has a relatively high degree of water resilience when compared to other parts of the country, notably the South East.¹⁰ This could mean that these regions could act as a water donor to other parts of the country, in order to alleviate the risk of water shortages.

This has already been floated by United Utilities, and it is demonstrably of interest to the government, given that Ofwat has made funding available to several companies to look at the feasibility of such schemes.

Water trading schemes necessitate substantial investment to develop a national system to move water from the North West to the South East.¹¹ This would represent a significant economic opportunity, given the need for skilled employment and investment to make it a reality. To this end, it may be of interest to policymakers looking to support major infrastructure investment to support the Northern Powerhouse.

At the same time, however, it is also worth noting that others believe that the idea would be much more expensive than alternative measures, and would have a negative environmental impact, particularly from the carbon generated by pumping it across the country (Staddon 2010).

If proposals for a national water trading scheme were developed further, maintaining a healthy surplus will be essential. This will require a focus above and beyond ensuring a local surplus in supply and demand through increased efficiency and reduced demand, in order to better contribute to national water security. This includes agreement across the North to work towards a more water-efficient Northern Powerhouse.

¹⁰ See: <https://www.bbc.co.uk/news/science-environment-44215418>

¹¹ For further discussion see NIC (2018).

HOW TO ACHIEVE EFFECTIVE MANAGEMENT OF THE NORTH'S WATER RESOURCES

In recent years, we have taken our water supply for granted. Given the stereotype of the north of England as a wet and rainy region, it feels strange to talk about increasing pressures on our water systems. But the forecast effects of climate change, along with other trends, mean that we must start taking water sustainability seriously.

Policymakers across the whole region need to be aware of and take action against these pressures, in collaboration with those with statutory responsibilities for the water supply, to minimise and manage the future risks to the North's economy, its population and its natural environment.

Water companies in the North, who are legally responsible for the public water supply, have set out how they will manage possible pressures on water in the North. Principally, these involve ambitious plans to reduce leakage, and to reduce demand and improve efficiency through customer education.

If successful, these plans will be sufficient to mitigate against an increased risk of a deficit in water supply and demand over the next 25 years.

However, in order to reduce the increased risks to water supply and the natural environment in a potential high climate change scenario, and to build resilience for the forecast increased scarcity towards the end of the 21st century and beyond, the North needs to go further to manage the overall demand for water across the region.

This would involve action across different constituencies including the following.

- **Households** – Under any future scenario, we will all need to use much less water than we do currently. This will require a shift in public attitudes to water use, towards much greater water efficiency in daily behaviour and consumption patterns by both householders and businesses. This was identified by the government in its **25-year plan**, published earlier this year. As described, water companies already dedicate resource into their own information campaigns, however given the importance of reducing per capita consumption to the future water security of the North, there is a need for other stakeholders, including political leaders, to reflect and amplify public messaging campaigns regarding good water usage.
- **Planning and development** – Although recent legislation sets out expectations regarding water usage in new developments, much more must be done to mitigate the impact of new development upon water demand, and measures to better improve water flow and flood management. In addition, to help even out the flow of wastewater, and to avoid very high 'peaks' associated with high levels of rain, we need more effective sustainable drainage systems in urban areas, in order to reduce rapid run-off overloading the sewer system. We also need much more widespread use of greywater systems that would reduce demand by allowing for wastewater from houses and offices to be re-used (for example, for watering plants or flushing toilets).

At present, water companies are not statutory consultees on individual planning applications, and they are not legally required to be part of strategic planning processes. This needs to change. Developers and strategic policymakers (such as Transport for the North, local enterprises partnerships and combined authorities) must engage fully with those with statutory responsibility for the supply of water in order to ensure decisions around the North's future incorporate issues associated with maximise the opportunities to manage water effectively in the future and to mitigate the increasing pressures on our resources.

In addition, we also need better flood management 'upstream', in rural and upland areas. This necessitates engaging with a wide range of stakeholders, including landowners, in order to target and coordinate action to maximise the flood management capacity of the natural environment (Longlands and Hunter 2018).

- **Energy generation** – Reducing overall demand for water from energy generation will involve a strategic shift away from thermal generation towards sources of energy that are less dependent upon water such as renewables. Where they are needed, thermal energy generation and carbon capture and storage facilities should be located near the coast to allow for the use of seawater.

If decisions about how to meet the North's future energy needs do not include consideration of the fact that thermal generation depends on a reliable source of cooling water being available, then economic costs are likely to be higher than modelled.

CONSIDERATIONS FOR POLICYMAKERS

To date, strategic discussions about the future of the Northern Powerhouse have failed to engage properly with the potential impact on water systems, and with the increasingly urgent need to manage demand for water in future. This will potentially lead to poor decision-making, given that the risk of failure, namely, increased pressure on water supplies would pose a substantial risk to the success of these plans, and would undermine the potential benefit to the Northern economy of water trading schemes.

Water is essential to the North. It underpins a healthy population, a successful economy and a thriving natural environment. Given this, the serious and increasing pressures on both supply and demand that are forecast for the coming century mean that policymakers must act now. This is an opportunity for the North to lead the national debate on how best to safeguard our water resource into the future.

To begin with, we need the following.

1. **A recognition across all strategic stakeholders in the North**, including Transport for the North, combined authorities and the metro mayors, members of the NP11 group of LEPs and other political and business leaders that:
 - sustainable water systems play a foundational role in the health of the region's population, of the Northern Powerhouse economy, and the natural environment
 - the responsibility of ensuring the continued health of the North's water assets is not simply owned by the water sector (including regulators) but is a shared issue which requires shared approaches to management and investment
 - the challenge of water resource management should be acknowledged in any future refresh of the Northern Independent Economic Review which is currently being developed by Transport for the North. It should also

be part of discussions about the future energy needs of the North, given close synergies between water supply and energy production.

- 2. A strong pan-regional voice for the sector**, in order to ‘hold its own’ in discussions with key Northern partners. This could build upon the embryonic Water Resources North group, which comprises representation from across water companies in the north of England as well as key regulators such as Ofwat.

NEXT STEPS FOR NATURAL ASSETS NORTH

Recommendations for how to develop a more joined up and system-wide approach to the North’s natural assets, as a foundation of a thriving Northern Powerhouse economy, will be set out in detail in IPPR North’s overarching report on the North’s natural assets, to be published in 2019.

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