MANAGING WATER RESOURCES – INCORPORATING DROUGHT AND WATER SCARCITY – AS PART OF THE CATCHMENT BASED APPROACH

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About MaRIUS

Following the 2011–2012 UK drought experience, the MaRIUS project received funding from the Natural Environment Research Council (NERC) to explore how best to manage future droughts. Managing the Risks, Impacts and Uncertainties of drought and water Scarcity (MaRIUS) introduces a risk-based approach to drought and water scarcity in order to inform management decisions and prepare households.

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www.mariusdroughtproject.org
Effective management of water resources requires a systems-based approach that integrates all aspects of land and water management. This document sets out that the Catchment Based Approach policy framework has been a significant catalyst for progress, but that there is opportunity to go further. In addition to providing guidance for catchment partnerships on actions at a local scale, we suggest the following policy recommendations:

- A clear link between Catchment Partnerships and Catchment Plans and the developing Regional Water Resources Management Plans
- Integrated catchment actions to reduce drought risk and impact that are set out in Catchment Plans and referenced in Water Company and EA Drought Plans
- Testing of more innovative licence arrangements (such as catchment ‘bubble’ permitting for groups of abstractors) as part of abstraction reform.
- Further facilitation of the work of Catchment Partnerships through enhanced data access and sharing between key abstractors, water companies and the Environment Agency
- Support for Catchment Partnerships to promote water saving standards in catchments for business, public sector and domestic water users.
Introduction and purpose

England faces serious water resources challenges and the risk of future water shortage is high, especially in the drier south and east. In a speech at the Waterwise conference (2019) entitled Escaping the jaws of death: ensuring enough water in 2050, Sir James Bevan, CEO of the Environment Agency (EA) highlighted the very real threat to our future water supplies and in turn, the pressures that brings on our wider environment and wildlife. This threat, linked to population growth, climate change and the recognition that we are degrading our environment at an alarming rate, means that action is needed to improve the way we manage our water resources and increase our resilience against periods of water scarcity and drought.

The challenge is also made clear in a National Infrastructure Commission report Preparing for a drier future (2018) that sets out the need for action to ensure long term supply resilience within an already strained system. In response, the government has set out an Abstraction Plan (2017) to modernise the way in which abstraction licenses are managed, ensure that levels of abstraction are sustainable and explore new innovative ways of accessing, storing and sharing water. In addition, a new water resources national planning framework is being developed that will guide the development of new regional cross-sector water plans to build greater resilience. However, to move to a more sustainable future and deliver the aims of the governments 25-year Environment Plan, it is necessary to ensure that water resources are not managed in isolation.

A wider systems-based approach is required that integrates all aspects of water and land management within a framework of Natural Capital. Catchments are the natural building block from which to develop such an approach and much has been achieved through Defra’s Catchment Based Approach (CaBA) policy framework and the activities of the established catchment partnerships. However, we still have a long way to go.
The purpose of this document is to help support further integration of water resources management – incorporating scarcity and drought management – within the framework of CaBA, but more specifically to;

1. Set out the rationale for an increased focus on the management of water resources as part of an integrated approach to water management at the catchment scale within the ‘Catchment Based Approach (CaBA)’ policy framework.

2. Provide guidance and support to catchment partnerships and catchment actors to enable better integration and coordination of water resources management in local catchment planning and delivery.

3. Set out opportunities and policy recommendations for enabling the delivery of a more effective and resilient water management framework through CaBA as per Defra’s intention.
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1 Integrating water management as part of the Catchment Based Approach

1.1 Policy drivers for integrated water management at the catchment scale

Government policy in the UK – as set out by Defra, and regulatory agencies, such as the Environment Agency (EA) and Ofwat, the economic regulator of the water industry, is increasingly committed to the adoption of an integrated ‘catchment-based approach’ to managing the water environment.

This approach is emphasised throughout various policies for land and water management, including pollution control that are set out in the UK Governments’ 25 year Environment Plan. For instance, the UK government’s post-Brexit new ‘public goods for public money’ policy will entail working with farmers at the catchment level. Linked to this is flood management at the catchment scale. In that context the 25 year Environment Plan showcases ‘best practice’ examples, such as the Cumbria Catchment Pioneer which developed innovative governance and financing mechanisms, including a ‘visitors giving scheme’ in order to reduce flood risk. Catchments are also considered as important for larger scale woodland creation.

What is new is that now both the economic regulator and environmental agencies are moving towards the catchment as the key scale for governing water resources. Ofwat, for instance, wants water companies to capture and harness the value of natural capital, including water, at the catchment scale. Most importantly, Catchment Partnerships are envisaged to provide input into revising the government’s 25 year Environment Plan.
This emphasis will be reinforced if the Draft Environment (Principles and Governance) Bill 2018 – which was debated by Parliament during March 2019 – will be passed. The Bill will put the 25-year Environment Plan on a statutory footing, and require the Secretary of State heading Defra to report to Parliament on progress with its implementation. In addition, the UK government consulted in January 2019 on further proposals for improving the management of water resources, and these proposals also emphasise the catchment scale as key to reforming the current regime for abstracting water from the environment.

More specifically this commitment to managing water resources at the catchment scale has been further implemented through the catchment based approach policy framework in 2013, policy developments such as Defra’s Water Abstraction Plan (April 2019) specifying the development of a stronger catchment focus and a general shift in emphasis from targeting single objective delivery outcomes to more holistic solutions providing multiple benefits e.g. an increased focus on Natural Flood Management¹ and greater support and encouragement for water companies to invest in ‘upstream’ catchment interventions (pages 5, 8).

Integrated water management through a catchment based approach requires alignment of objectives between the different water ‘sectors’ (resources, flooding, quality) and the different actors with management responsibility and/or an active interest in water and land management, such as government agencies, water companies, food and farming businesses, environmental NGO’s and wider civil society.

In comparison to water quality and flooding, the integration of water resources management as part of CaBA is at a relatively early stage. This is at least in part due to the complexity and constraints of the regulatory processes underpinning water resources management. However, it is increasingly evident from water industry led initiatives such as Water Resources East (WRE), government policy direction (e.g. CaBA, Water Abstraction Plan, National Planning Framework) and examples of collective action projects within catchments that this approach is desirable and confers many benefits. A key reason being that synergies and potential conflicts in relation to various uses of water are more directly visible and mutually supported ‘win-win’ solutions likely to be developed at the catchment scale.

¹ Defra has also consulted on proposals to enhance flood risk management by increasing the number of Internal Drainage Boards (IDBs) and updating the way levies payable to IDBs are calculated, as well as options of raising funds for local flood risk management from residents. This further illustrates the importance of co-ordinating drought and flood risk management in order to avoid undue financial burdens on local residents, i.e. business rate and domestic council tax payers in catchments paying separately for both drought and flood risk reduction measures. Improving our management of water in the environment (pages 28, 30).
Such solutions increase the potential for greater resilience and cost efficiencies, and enable further integration of sewerage services and water resource planning.

A changing climate provides further reasons to focus on the catchment scale. Drought risk is pinpointed in particular areas and catchments in the UK – particularly those in central, southern and eastern parts of the UK. Drought risk became acute again in the UK during the summer of 2018. Focusing on catchments has the potential to develop more targeted measures to prevent drought impacts and for informed stakeholders to respond to drought incidents in a more collective, adaptive and effective way.

Integrating water resources management into a catchment based approach – what does it entail?

Measures for increasing water supplies and preventing water scarcity and drought as part of an integrated catchment approach can be described as:

- Measures are delivered by and benefit multiple beneficiaries of water.
- Measures are linked to promoting ground- and surface water quality, reducing flood risk and increasing natural capital.
- Measures are developed and supported at the catchment level but link back to regional strategies and national water policy measures.
- Measures are linked to national policies, such as in relation to food, energy, security and land use.

1.2 Integrating water resources management as part of the Catchment Based Approach (CaBA)

The Catchment Based Approach (CaBA) is not just a particular philosophy towards managing water in an integrated way at the catchment scale. CaBA more specifically is a Defra policy framework formalised in 2013 to deliver integrated catchment management across all 108 WFD management catchments in England (including cross-border catchments with Wales and Scotland).

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2 UK government draft statutory guidance to Ofwat: Defra, The government’s strategic priorities and objectives for Ofwat, September 2017, presented to Parliament pursuant to section 2A of the Water Industry Act 1991. In particular enhancing natural resilience is considered as more cost-effective than large-scale infrastructure solutions.

3 Northern Ireland Water imposed a temporary use ban on domestic water use at the end of June 2018, United Utilities announced that it planned to impose a temporary use ban from the 5th of August 2018. See also EA, Water Resources Prospects for 2018, March 2018.

4 As set out at the CaBA website and defined here by the authors of this report.
The policy document sets out that “the water environment is affected by activities on land and our actions in abstracting, using and returning water to rivers, the sea and ground matter, and catchments are the natural scale to deliver better coordinated and integrated action”.

1.2.1. Key elements of the CaBA institutional framework

CaBA is intended to facilitate flexible and local ‘bottom-up’ approaches that deliver policy ambition rather than impose prescribed actions and/or replace the need for regulatory interventions. There are however, a number of ‘institutional pillars’ that shape the delivery of CaBA. These include:

**Catchment Partnerships** – for every WFD management catchment there is an established catchment partnership to develop and coordinate the delivery of integrated catchment measures. Each catchment Partnership is ‘hosted’ or at least co-hosted by a charitable or not for profit organisation. Each partnership typically includes water companies, NGO’s, Local Authorities, Anglers, Food & Farming, Community groups and government agencies such as Natural England (NE) and the Environment Agency (EA). The EA have appointed catchment co-ordinators to provide an interface between the partnership and the various EA functions. Catchment hosts have been supported by a government grant to cover basic costs of hosting the partnerships. The availability and value (typically £15k) of this grant is decided annually by Defra and administered by the EA. Catchment Partnerships frequently match this grant with other sources of local funding so that they can employ a full-time catchment host. These partnerships are typically able to build networks with, and actively engage, a wider group of organisations into their partnerships. Match funding has been accessed from Water Companies; Local Authorities and Regional Flood and Coastal Committees (RFCC).

**Catchment Management Plans** – Catchment partnerships are encouraged and supported to produce catchment management plans that underpin and guide the delivery of integrated catchment measures. Although these plans and the actions identified within them have no statutory role, they are increasingly important as a gateway to accessing funding from government and other sources. In addition to identifying local actions some also include strategic, long-term actions for water resource management, such as the building up of an evidence base for CaBA actions, including the facilitation of university research (pages 42, 64), and the inclusion of citizen science, as well as the development of communication strategies and catchment business plans. Several Catchment Partnerships maintain websites, some of which have links to ‘live’ Catchment Plans5. This may be coupled with a presence on social media such as Facebook. Increasingly popular is the use of online GIS Storymaps to provide a portal to catchment data and a descriptive narrative of the catchment, issues and actions being delivered by the catchment partners. Examples of some Storymaps from different parts of the country can be found on the River’s Trust website.

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5 The Arun and West Streams Catchment; the Teme Catchment Partnership’s Plan.
**CaBA National Support Group (NSG)** – The NSG provides support to the catchment partnerships and delivers a programme of work aimed at building capacity and expertise nationwide. The NSG provides both practical support (mainly via a technical support team described below) and strategic engagement with key sectors such as business, water industry, local authorities and statutory organisations to facilitate effective local delivery. The NSG comprises representatives from all the national bodies of the partnership hosting organisations as well as other key national NGO groups, Water Industry and the Defra family.

NSG working groups (WG’s) – The NSG supports several thematic working groups to support the implementation of CaBA. These can include task and finish groups or those with a longer strategic purpose. Current working groups include; Catchment Data Users Group (CDUG), Urban WG, Agriculture WG, Biodiversity WG, Evaluation and Benefits WG, WFD 3rd cycle planning WG, and importantly from a water resources perspective, a recently established Abstraction (Water Resources) WG to further the integration of water resource management into the work of local catchment partnerships and help support the delivery of the Defra/EA Abstraction Plan. Details of the working groups can be found on the [Catchment Based Approach website](#).

**NSG CaBA Technical Support (TS)** – provides a wide range of services to catchment partnerships. These include;

- CaBA website – a dedicated site providing a help desk and CaBA community forum as well as a wealth of best practice case studies and e-learning resources.
- Mentoring – focused training and support to build expertise within catchment partnerships across a range of areas including the use of data and evidence, development of business and catchment plans, monitoring and evaluation and delivery. This is delivered on a one to one basis; via annual CaBA conferences and thematic webinars.
- Training – specific training events and workshops on topics such as GIS, Health & Safety and catchment planning.

1.2.2. **CaBA delivery – benefits and evaluation**

All catchment partnerships are required to complete an annual return setting out their engagement and delivery activities as well as the details of partnership expenditure. The most recent benefits report is available on the CaBA website. The report highlights the fact that all partnerships are directly engaged with water companies and have collectively delivered more than 450 projects with many providing direct or indirect water resources/drought resilience benefits, worked with more than 6000 farm businesses, that partnerships are generating an average of £6.50 for every £1 directly invested by Government and have

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6 Catchment Based Approach – National Support Group; WRAP – Businesses commit to Courtauld Commitment 2025 Water Ambition to cut environmental cost of food & drink
leveraged a further combined total of £23m from other government sources. In addition, the report highlights the wider societal outreach and benefits of CaBA such as the direct engagement with approx. 30,000 primary stakeholders, the involvement of more than 14,000 volunteers in project activities, the delivery of work and training in deprived communities and the provision of green/blue spaces to enhance community health and well-being. More recently, and supported by an established water stewardship service, several CaBA partnerships have also made great progress engaging with businesses in the delivery of collective action projects in water stressed catchments to meet their water commitments as part of the Courtauld 2025 commitment to undertake collective action in key sourcing catchments at risk of water scarcity.
2 CaBA guidance for integrating water resources – including the prevention & management of water scarcity and drought

2.1 Current framework for water resources planning

The following section is intended to provide some background context for how water resources planning currently occurs in England and Wales. For more detailed information please refer to the websites of the key regulators, the Environment Agency, Natural Resources Wales and Ofwat.

2.1.1 Water Company planning

The law requires water companies to plan for the provision of enough water of sufficient quality, with these planning processes overseen by regulatory agencies. Water companies develop strategic long-term Water Resources Management Plans (WRMP) every 5 years that set out how they seek to achieve a positive supply-demand balance over the proceeding 25-year period. These WRMPs also contain statements about finance required for the water company ensuring that there is sufficient supply in relation to demand for water. Statute (S. 37 A (8) (a) WIA 1991) requires the water company to consult the EA/Natural Resources Wales (NRW) before preparing its WRMP.

7 Water companies are appointed under a licence granted by the Secretary of State or Ofwat to provide water supply and sewerage services. Defra has consulted on proposals to extend Ofwat’s powers to modify these licences. Licence modifications could relate eg. to water companies being required to provide more information to Ofwat.

8 NRW has to be consulted if the plan affects water resources in Wales.
Water companies are also legally required to write every 5 years an operational Drought Plan that sets out what measures they will take in order to comply with their legal duty to ensure public water supply also during drought – typically determined with reference to the particular water company’s worst historic drought experience, relying on data going back to the 1920s and 1900s. The EA or in Wales NRW have to be consulted (S. 39 B (7) WIA 1991) before water companies prepare their Drought Plans.

These planning processes are embedded in the business planning of water companies, with companies submitting every 5 years a Business Plan on their planned investments to Ofwat (the government’s financial regulator), who must approve the plan. The legal powers for Ofwat to scrutinise water companies’ Business Plans, allocate it a central and very influential role in relation to the management of water resources in the UK. While not primarily concerned with environmental issues, Ofwat can influence water company’s investment in different options for both making water resources available and increasing the natural resilience of catchments to periods of low flow and drought.

This process also includes close scrutiny of company plans by the EA and Natural England (NE) who, as the environmental regulators, must be satisfied that the investments deliver against specified environmental drivers (e.g. EU Water Framework Directive (WFD), EU Habitats Directive etc.) which may include reductions in certain abstractions. The majority of this investment is wrapped up in the Water Industry National Environment Programme (WINEP), with water companies given a strategic steer on the environment, and resilience requirements.

The other regulator involved in water resource management is the Drinking Water Inspectorate (DWI). Its role is to oversee that water companies have sufficient investment in place in order to comply with European Union and national standards for the quality of drinking water provided to customers.

The review of water company Business Plans and the proposed investments (cost to customers) is often referred to as the Price Review (PR), followed by the year during which the review took place. The subsequent 5-year period of investment by the water companies is known as the Asset Management Period (AMP) and typically designated to highlight which AMP it is e.g. AMP7 referring to the 7th 5-year period of investment since privatisation.

In order to harness water resources more efficiently and to enable more transfers and exchanges between water rich and water scarce areas, Defra promotes regional water resources planning that seeks to bring together various water companies in a region, environmental regulators and local economic development agencies. It is expected that the Environment Agency will develop some guidance for regional water resources planning groups, and that this will include an enhanced role for water companies to ensure through their WRMPs and their implementation that environmental objectives (pages 11, 12) of water resource management are achieved.
One of the purposes of this new regional planning is to provide for earlier and greater integration of regional economic development, also as promoted through Local Enterprise Partnerships, with water resources planning. Proposals for new industrial developments should take water availability into account and water companies will be able to plan their abstractions also with reference to other abstractions. This should enable joint water supply options that consider all abstractors in a region, and more specifically in a catchment.

Moreover, also in order to develop a more systems-based and integrated approach for managing water resources, water companies have now begun to draft Drainage and Wastewater Management Plans. This is currently not required by statute, but will help to get a clearer picture of how water availability in a catchment is also influenced by the building and maintenance of water drainage infrastructure e.g. by local authorities, developers and water companies themselves. The government is currently proposing to impose a statutory duty upon water companies to develop and publish every 5 years statutory Drainage and Waste Water Management Plans.

2.1.2 Additional state planning by Defra / EA / NRW

Abstraction

The EA/NRW decide applications for licences to abstract water from the natural environment, as well as variations and revocations of such licences. Their power to decide permit applications from e.g. industrial operators to discharge into rivers and other surface or groundwater bodies, also influences how much water of what quality is available for abstraction.

Since 2001 the EA has developed Catchment Abstraction Management Strategies (CAMS) which pinpoint water deficits and surpluses in particular catchments and thus inform decisions when the EA/NRW decide applications for and renewals of abstraction licences. The EA is currently in the process of updating these CAMS. Most importantly, there is a possibility for innovative approaches to water resource management to be developed through CaBA, e.g. in the abstraction plan Priority Catchments to inform the contents of CAMS. Priority Catchments are designated by the EA in order to inform abstraction reform. Updates of the CAMS will also include an indication of how the EA will approach CaBA, so engagement of catchment partnerships with the CAMS updating process presents an opportunity to further link to statutory licencing processes.

Drought Planning

The EA and NRW also write voluntary Drought Plans for their 14 areas – i.e. at a larger scale than catchments. These plans set out when the EA/NRW considers drought conditions to occur, what actions it is likely to take, also in order to protect the natural environment. These Drought Plans set out the thresholds of reduction in water availability in the environment which inform the EA’s evaluation of whether drought conditions exist and what operational actions, such as monitoring during and after drought, the regulatory agencies will take, and what drought orders they may apply for.
Drought Plans also set out communication strategies with citizens and stakeholders during drought in order to minimise water shortages.

Water company statutory Drought Plans are currently understood to be operational plans. Given an increased risk of drought and water scarcity in the context of a changing climate there is scope to render Drought Plans more strategic also by integrating them more closely with water company Business Plans, their Water Resource Management Plans, as well as voluntary EA area drought plans, and internal EA drought plans. This also matters in light of the fact that the EA will seek to ensure that water companies implement their statutory water company Drought Plans during a drought.

For further information about drought planning see Cook et al. (2017) Drought Planning in England: A Primer.

2.1.3 Challenges of the current planning framework and CaBA opportunities

The planning processes seek to be strategic and preventative, but there are limits to this, due to various uncertainties and features of the current framework.

Firstly, from a water company planning perspective, there are uncertainties concerning the impact of population growth and associated housing development as well as economic growth, in particular in already water stressed areas, on domestic and industrial demand. This further illustrates the challenges posed by limited integration of land use planning with water resource regulatory frameworks. These challenges for water company planning are compounded by the uncertainties of forecasting the effects of a changing climate on water availability. There is also uncertainty about future regulatory action on water availability, such as future reductions on water that can be abstracted under existing licences under the National Environment Program 5. There is also uncertainty and risk around short-term impacts on water supply due to degradation of water quality and/or the occurrence of droughts.

With regard to abstraction planning, a key challenge is that many licences were granted a long time ago with little or no regard to environmental protection. This has resulted in catchments that are already over-abstracted – even before the impacts of growth and climate change are considered. The EA has undertaken retrospective action to address this issue as part of the Restoring Sustainable Action (RSA) programme and by revising the conditions of time limited licences as part of the renewal process.

9 Water companies are currently statutory consultees only in relation to planning applications for fracking, i.e. extraction of oil and natural gas from shale (Reg. 18 (1), Schedule 4 Town and Country Planning (Development Management) Procedure (England) Order 2015/595).

10 Time limits for licences range from ca. 6–18 years.
The recent publication of the Defra Water Abstraction Plan and the development of a CaBA Abstraction Working Group aim to provide an increased focus on developing more long-term sustainable solutions at catchment scales. Furthermore, Defra is consulting on proposals for the EA to have additional powers to revoke or amend existing licenses without compensation.

Another challenge is that the AMP planning and investment cycle is specific to the water company and water resources solutions are largely tied up in the AMP cycle of investment. There are concerns that assessment methodologies employed by the regulators result in single-outcome, engineering based solutions that underestimate the value and opportunity for natural capital based solutions that increase resilience (e.g. managing soil health to increase water infiltration and groundwater recharge) and the solutions that could be delivered in partnership with other catchment actors (including the potential provision of funding). This is further complicated by the different geographies at which water supply companies operate, the base units at which water company water resource planning takes place ‘water resource zones’ (WRZ), the different sources of water available to water companies, including infrastructure to store and transfer water between WRZ’s, and the mismatch between these geographies and those used for drought planning and response by EA/NRW and Defra.

All of the above factors are likely to result in an underestimate of drought risk and impact both from the perspective of the water company and its customers, but also for the other key dependants on water such as the environment, agriculture and industry.

In the light of this there are undoubtedly opportunities for CaBA to develop a more shared understanding of the water resource challenges within catchments and develop more integrated solutions as part of the planning processes for both WRMP’s and area Drought Plans.

2.1.4 Current regulatory tools for managing drought

The legal framework provides for a number of regulatory tools that can be used during drought to ensure water availability, sometimes also in combination with each other. A more detailed description of the framework for drought management can be found here: [EA Drought Response: Our Framework for England](#). A brief summary of such tools includes;

11 Which is linked to the CaBA National Support Group that supports local catchment partnerships.
Temporary Water Use Bans (TUBs)\textsuperscript{12}

Can be implemented by water companies themselves, but only for the range of specific purposes prescribed in Regulations\textsuperscript{13}. TUBs seek to limit water consumption during drought by domestic householders for e.g. watering lawns, washing private cars, and filling swimming pools. A Code of Practice which water companies tend to follow, recommends that in order to limit the economic impact of droughts TUBs will be imposed on domestic householders first, before restrictions on commercial operators are put in place.

Drought Orders and Permits

These are two key tools for in-drought management. Drought orders can be applied for by water companies and the EA/NRW and have to be authorised by the Secretary of State heading Defra. Drought permits are applied for by water companies and have to be authorised by the EA/NRW\textsuperscript{14}. Drought orders\textsuperscript{15} can restrict water abstractions by water companies or industrial abstractors, in order to maintain public water supply. They can also be used to increase water company abstraction to maintain public supply.

The EA/NRW will usually only support water company applications for drought orders if the water company has taken additional demand management measures before applying for a drought order. Water companies and the EA have to show that drought orders and permits do not cause unnecessary harm to the environment, and this may entail monitoring for adverse effects of drought orders/permits. In cases of extreme drought, Emergency Drought Orders, can be issued which can restrict both domestic and commercial users of water. They are also known as Level 4 restrictions and can involve measures, such as rota cuts, supply of water through bowsers, standpipes and bottled water.

Temporary restrictions for spray irrigators

Farmers who abstract water from the natural environment for spray irrigation can be subject during drought to temporary restrictions on such abstractions (S 57 Water Resources Act 1991). In the case of an exceptional shortage of rain or other emergency the EA or NRW can temporarily limit the amount of water that can be abstracted under the licence. In practice, these powers are seldom used by the EA and NRW.

\textsuperscript{12} TUBs include restrictions on water use that used to be called hosepipe bans.

\textsuperscript{13} Water Use (Temporary Bans) Order 2010/2231.

\textsuperscript{14} A recent example of this is Southern Water being granted a drought permit by the EA to replenish Bewl Reservoir (EA, Press Release).

\textsuperscript{15} They are also known as Level 3 restrictions.
Environmental restrictions on abstractions

Abstraction licences are usually issued with conditions that may include so-called ‘hands-off’ flow conditions. This means that the EA/NRW can request during periods of low flow, such as during summer or drought periods, that abstractors limit the amount of water they can abstract. These ‘hands-off’ flow conditions are often set with reference to the Environmental Flow Indicator (EFI). The EFI is set by the EA/NRW during the resource assessment process carried out for the Catchment Abstraction Management Strategies. The EFI is expressed as a percentage of deviation from the natural river flow, as represented by a flow duration curve. It is set with reference to water quality objectives required by the EU Water Framework Directive, such as to achieve good ecological status of rivers (Article 4, (1), (a) (ii)). It therefore contributes to maintaining species, habitats and river ecology more generally.

2.1.5 Limits of current drought management tools and CaBA opportunities

The contribution to water savings of the tools listed above can be limited. Also because some of them are dependent on legal authorisation before they can be implemented. Citizens and abstractors can raise objections to drought orders and drought permits which can further delay or prevent their implementation. The use of these regulatory tools can thus also be dependent on gaining acceptance by abstractors and citizens for their implementation.

This can be particularly challenging in chalk catchments. Water use reductions may be necessary here due to low flows in rivers even though there may have been rainfall. Decreased rainfall in the previous winter may have been enough in a chalk catchment for aquifers not having refilled yet, thus requiring water conservation measures which may entail a reduction in river flows. Water companies can also limit through drought orders water consumption by commercial water users, e.g. for washing cars, cleaning windows, and watering sports grounds, through non-essential use bans.

The use of these tools during drought depends not just on environmental considerations. Water companies plan for their use in their Drought Plans also with reference to the ‘level of service’ that they agree with their customers and undertake to provide for them. This means that commercial considerations in negotiating that ‘level of service’ also play a role in how in-drought regulatory tools will be used. This further increases the variety of planned use of these regulatory tools. For instance, while some water companies have planned to use TUBs 1 in 10 years to deal with drought risk, others suggest they would use TUBs once in 100 years. Similarly, some water companies plan to use Emergency Drought Orders once in 50 years, while others state they will never use them.

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17 The specific commercial water uses that can be restricted are defined in the Drought Direction 2011.
This, however, implicitly ranks claims to water, for instance by ranking domestic water use higher in some areas than others, which may run counter to the idea of collective responsibility for water use. Indications by water companies in their Drought Plans on the water savings they expect from TUBs suggest that these are limited, in the region of 3-10% cuts in domestic water use during drought\textsuperscript{18} though the precise range of water savings achieved is contested.

2.3 Opportunities for CaBA partnerships to incorporate water resources management objectives

2.3.1 Use of Data & Evidence for understanding the water resources challenges in your catchment

Data and evidence is critical to the planning and delivery of integrated catchment measures. The current CaBA GIS Data Package (V5) is a set of over 150 data layers, provided to CaBA Catchment Hosts under a license negotiated centrally with the data providers. Version 5 is the latest release and contains many data layers to help partnerships understand water resources in their catchment and to help them plan and deliver appropriate measures. The data package is accompanied by a Data User Guide which explains how each data layer can be used. Additional data sets may also be available locally from the EA, water companies and research institutes.

CaBA data package and Water Resources

Every CaBA partnership has access to data to help identify the water resource status of each sub-catchment within the wider catchment. This enables the partnership to understand if the Environment Agency believes that there are enough water resources in the catchment to supply water users and the environment, based on the Catchment Abstraction Management Strategy (CAMS) assessment. The CAMS process, which considers abstractions AND discharges and integrates surface water and groundwater provides partnerships with the underpinning understanding they need to play a constructive role in water resource management. If there are insufficient water resources available the data identifies which parts of the catchment are over-abstracted and the location and size of each abstraction as well as the sector who is responsible for the abstraction (agriculture, water company or industry).

Additional understanding about water resources can be gained by comparing the water resource status at average flows with that at low summer flows. Any difference between the two assessments indicates the importance of discharges. Catchments with significant discharges (for example from sewage treatment works) tend to be more resource stressed at average flows than low flows. There is also data available highlighting all of the groundwater abstractions (Source Protection Zones). This allows the partnerships to identify the areas of land that can influence the groundwater resources available for each abstraction.

\textsuperscript{18} See e.g. Anglia Water Drought Plan 2014.
The **EA Reasons for Failure database** will also provide evidence on which waterbodies are vulnerable to low base flows during periods of low rainfall and drought. **Targeting the delivery of interventions here (particularly when there is appropriate soil hydrology) can help alleviate the pressure and increase resilience.**

Crop type has a significant impact on evapotranspiration, which can be more than 80% of the water balance in most water stressed catchments. Data on land use and specific crop type is increasingly available and can be used to highlight drought prone catchments which have water hungry land cover.

**A basic understanding of the above data sets will enable CaBA partnerships to consider water resources alongside water quality, flood risk and bio-diversity as they develop and deliver their catchment plan.**

**Additional Data in the latest CaBA data package**

The **Working with Natural Processes: Potential Opportunities maps** identify locations in every catchment where natural flood management options could be built. These measures are aimed at reducing peak flood flow. However, they also store water and critically promote increased drainage to groundwater. The WWNP maps, along with the CaBA data package above, can be used to identify opportunities to both increase groundwater resources and reduce flood risk.

However, groundwater resources are vulnerable to pollution at locations where the soil is thin, or the water table is close to the ground surface. The new **groundwater vulnerability maps** identify locations where pollution on the land surface can rapidly enter the groundwater system and cause long-term harm to water resources. **Partnerships can use these maps to reduce the risk of accidently polluting an aquifer through their catchment management work.**

The Coal Authority has also provided data that could help partnerships in catchments which have coal measures. The spatial data highlights areas which may require dewatering to prevent/reduce polluted discharges from abandoned mines. If these areas coincide with known areas of low flow a new dewatering abstraction could have potential benefits not only for river water quality but also for low flow alleviation.

**Additional data available from local partners** – Environment Agency Catchment Coordinators and the local water company are able to provide local information on specific low flow issues within their catchment and any mitigation planned to improve low flows. This is a spatial more targeted version of the CAMS assessment and will allow CaBA partnerships to refine their targeting of measures to maximise their impact on water resources. An example of this would be to focus river restoration in areas of known low flow to maximise the resilience of the ecology to low flows, this would complement and enhance any planned reduction in abstraction.
For additional data sets see also the ‘data and science’ available from the NERC MaRIUS project Data and Science and also from the wider NERC UK Drought and Water Scarcity Programme.

Other sources of data and information

- Hydrological Summaries
- Hydrological Outlooks
- EA Water Situation Reports for England
- Water Situation Reports for Wales
- CaBA resources

Priority data not currently available to catchment partnerships

The Environment Agency has data on recent actual abstractions, but only publishes data on licensed abstraction volumes. The MaRIUS project team have been given access to the recent actual abstraction data. The team have processed this data but are not yet allowed by the EA to publish it or share it with partnerships. Although this information is sensitive it should be possible to release it in a way so that partnerships can understand the difference between licensed and actual abstractions so that the delivery of resilience measures and the facilitation of license trading can be targeted to deliver the greatest benefits for the catchment.

2.3.2 Engagement with Water Resource, Abstraction and Drought Plans

In many cases additional data and evidence will be available in existing Water Resource Management Plans and Drought Plans produced by the water companies and the EA. It is recommended that CaBA partnerships familiarise themselves with these plans and contribute to any updates either formally through consultations or directly through partners. The catchment focus highlighted in the Abstraction Plan 2017 provides further opportunities for CaBA partnership engagement. Initially this will be through a series of identified priority catchments, with the aim of upscaling best practice across all catchments.

2.3.3 Implementing actions to both increase the resilience of water resources and improve the management of water scarcity and drought

There are a number of areas in which CaBA partnerships could deliver effective practical actions. Notwithstanding the need to coordinate actions with the EA, water companies and other actions identified within water resource and drought plans, such activity could include;
Community engagement and communication

Catchment partnerships and their constituent partners have significant outreach capabilities and are well placed to provide an effective route for increasing community awareness of water resources pressures in their catchments, encouraging the adoption of water efficiency in homes and businesses and communicating the correct drought messages effectively to both the general public and specific interest sectors. Good examples of these could be the development of GIS story maps and community engagement projects such as the Water matters project delivered in partnership between Action for the River Kennet and Thames Water.

Catchment interventions

Direct actions have the potential to provide significant water resources (as well as wider) catchment benefits. Such actions could include river restoration projects to increase environmental resilience to low flows in particularly vulnerable parts of the catchment; working with natural processes to slow the flow and increasing storage in strategic areas; working with farmers, land managers and supply chain businesses, to improve soil health, manage water efficiently and reduce water loss.

The Agriculture Bill – debated by Parliament during April 2019 – provides further powers to enhance the resilience of water resources by integrating land and water management. Section 1 of this Bill provides a new power for the Secretary of State heading Defra to provide financial assistance e.g. to farmers for managing land or water in England in a way that protects or improves the environment, as well as financial assistance for mitigating or adapting to climate change.

Monitoring – with increasing programs of citizen and 3rd sector led data collection, recording and reporting the way the catchment and its ecology enters, responds and recovers from periods of water scarcity and drought could provide valuable evidence to underpin future planning and delivery.

CaBA partnerships are increasingly using the national curriculum to engage with communities through the use of spatial data within their own catchment. The National Curriculum mandates the teaching of GIS, however, the vast majority of secondary school geography teachers are poorly equipped to deliver this part of the curriculum.

A number of partnerships have developed tailored online GIS resources which support teachers to deliver the curriculum and embed a deeper understanding of how their own catchment works. This is a highly effective way of building wider understanding within the community. In key stage 5 the key requirement is the collection of spatial data. Partnerships could work with A-level students to collect water resource significant data as part of their final year project, this would support the teachers as well as the partnership.
CaBA provides the institutional framework for delivering an integrated approach to water and land management. There is enormous potential to increase the delivery of targeted water resources benefits as part of this approach, including the prevention and management of drought and water scarcity. Significant progress is already being made with this regard including bottom-up and industry led initiatives. However, to achieve maximum benefits it is important that policy developments continue to support the integration of water resources as part of CaBA. Recommendations for policy and guidance for partnerships to achieve this include:

**Policy recommendations**

1. **A clear link between Catchment Partnerships and Catchment Plans, and the developing Regional Water Resources Management Plans** by linking objectives to catchments, incorporating the delivery of integrated solutions within catchment plans and empowering catchment partnerships to develop innovative solutions to water resources challenges. This could include increasing public awareness, increasing environmental resilience, developing innovative water saving and storage schemes and trialling new licence arrangements such as greater local flexibility and/or group licences. Initially, a model similar to that used in flood risk management could be used with regional groups co-ordinating, approving and reviewing the delivery of schemes – providing legitimacy and focus for partnership delivery.

2. **Develop integrated catchment actions to reduce drought risk and impact that are set out in Catchment Plans and referenced in Water Company and EA Drought Plans.**
3. Testing of more innovative licence arrangements (such as catchment ‘bubble’ permitting for groups of abstractors) as part of abstraction reform.

4. Further facilitation of the work of Catchment Partnerships through enhanced data access and sharing between key abstractors, water companies and the Environment Agency. Ensure that catchment partnerships have access to all relevant data and evidence concerning water resources management. Access to recent actual abstraction volumes is a critical dataset to support catchment partnership activity and the collection and provision of near real time data will be important to facilitate innovative and transparent licensing arrangements.

**Catchment Partnership recommendations**

1. **Use the available Data & Evidence to build an understanding of the water resources in your catchment** – Using the CaBA data and evidence package you should be able to make a good start in developing a basic understanding of the water resources within your catchment. Further engagement with, and support from water resources professionals from water companies and the Environment Agency should help your partnership develop a shared understanding of the water resources challenges and develop targeted actions as part of an integrated approach.

2. **Incorporate a water resources theme within your catchment plan** to demonstrate how current projects are delivering water resources outcomes, and potentially provide a catalyst for the development of targeted projects to improve the sustainability of local and regional water resources.

3. **Make the most of opportunities to engage with water resources management initiatives** such as water company and EA drought planning, water company water resources and waste water management plans, emerging regional water resources strategies and abstraction reform pilots.

4. **Raise awareness of local water resources challenges (and solutions) through partnership activities.** This could include working with schools to connect children to their local water environment, capitalising on the GIS requirement in the National Curriculum to enhance pupils understanding of the water resources in their catchment; facilitating local water saving initiatives for key domestic and business water users in a catchment, organising relevant workshops and public events to inform and showcase activity.

5. **Consider whether current monitoring activities could be adapted to provide additional information on the impacts of water scarcity and drought and to inform future management strategies.** Consider promoting local water saving and water stewardship standards for domestic and business water users in a catchment. This could include promoting best practice such as the adoption of the Alliance for Water Stewardship (AWS) standard which has clear synergies with CaBA.

This report and further material relating to water resources management are available on the [catchment based approach website](#).
Managing water resources – incorporating drought and water scarcity – as part of the catchment based approach

Bettina Lange, Barry Bendall and Philip Williams, Centre for Socio-Legal Studies, University of Oxford and MaRIUS (Oxford) project.

Managing the Risks, Impacts and Uncertainties of drought and water Scarcity (MaRIUS) introduces a risk-based approach to drought and water scarcity in order to inform management decisions and prepare households.

www.mariusdroughtproject.org