

CATCHMENT MANAGEMENT, ABSTRACTION AND FLOODING: the case for a catchment system operator and coordinated competition

**Dieter Helm
New College, Oxford¹**

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1. Introduction

Since 2010 there have been a number of piecemeal reforms and developments across the water sector. These have included: the periodic review of the water and sewerage companies; the provision of further financing for the Environment Agency to address flood defences over a slightly longer period; a deal with insurance companies on flood risk; steps towards retail competition in water; and changes to the form and scope of agricultural subsidies for environmental improvements.

It is widely acknowledged that these are only evolutionary steps in developing a more efficient and environmentally sustainable water sector. Issues which remain outstanding include: abstraction management and upstream competition; a long-term solution for flood defences; and a better integration of agricultural practice with water quality and the ecology of rivers. Put simply, the natural capital embedded in catchments is as yet neither managed on a cost

¹ The arguments presented in this paper are personal, and should not be ascribed to the Natural Capital Committee, which the author chairs. Support and assistance from Wessex Water is gratefully acknowledged, but again the views expressed here are mine alone, as are all the errors.

effective basis nor a sustainable one². The current state of affairs therefore does not meet the objective of the 2011 White Paper: *The Natural Choice*³ – to be the first generation to leave the natural environment in a better state.

In the second half of 2015, there will be the opportunity to bring these issues together to create a long-term sustainable and overarching management of these natural capital assets. The Coalition government has promised to legislate on abstraction after the general election, whilst a number of interested parties are campaigning for a Nature Bill.

This paper is structured as follows: Section two summarises the challenges facing the water sector. Section three sets out the case for a catchment system operator approach to the management of river catchments. Section four develops this proposal, and the implications for: flood management; abstraction; and the water sector more generally. Section five considers how the sector could be funded and financed on a long-term sustainable basis. Section six concludes by summarising the main recommendations.

2. The challenges facing the wider water sector

The privatisation settlement in the water industry has not resulted in an efficient allocation of resources. On the contrary, a number of key issues were left unresolved and there have been a number of unintended consequences. This section sets out the main challenges.

No one in charge. The water sector in 2015 comprises a complex web of companies with different ownership structures, with multiple relationships with regulatory bodies covering pollution control, drinking water, abstractions, and farming practice, a number of different organisations engaged in flood defence, a diverse farming and forestry sector, and finally a number of environmental

² D.R. Helm, *Natural Capital: Valuing the Planet* (London: Yale University Press, 2015).

³ Department for Environment, Food and Rural affairs, *The Natural Choice: Securing the Value of Nature* (June 2011).

trusts, groups and organisations. Notwithstanding the role of the Environmental Agency, no one has overall responsibility for river catchments – there is no equivalent to the system operator in electricity. This is one reason why the outcomes are seriously sub-optimal.

Water companies focused on narrow functions. The primary focus for the water companies has been on the periodic reviews. These determine the returns to shareholders for private companies and the surplus for not-for-dividend structures like Welsh Water – in return for performing the specific functions set out in their licences. The cost of capital calculation by OFWAT dominates: a 1% change in the assumed cost of debt swamps most efficiency and other variables, and is the focus for the infrastructure and pension funds which now own either outright or through the equity and debt markets most of the industry. Where this is too tight or too generous, share prices and market values adjust sharply to capitalize the impacts. For example in 1999/2000 market values collapsed in some cases to as little as 60% of the regulated asset bases, whereas now the share prices show a very considerable premium.

The regulatory model has effectively made companies contractors – carrying out the functions defined in the licences for fixed priced contracts. The government has already added new functions, beefing up the sustainability and the resilience requirements. This is clear recognition that the boundaries of the water companies' functions are less than optimal, and that key considerations have been falling between the cracks.

Confusion about the form and role of competition. Whilst the companies (and their investors) are understandably focused primarily on their licence functions, and the periodic reviews, OFWAT is developing a path towards more competition and the gradual unbundling of the industry structure. The current staging post on this path is so-called “retail competition”. This is very much about the customer services rather than water as a commodity, and it is not yet concerned with domestic customer switching. In an industry where many supplies are not metered and most households pay on an old tax base, switching

would bring chaos rather than economic efficiency, as the cross-subsidies would be exposed. The fact too that the marginal cost of water is often zero raises the question of whether commodity competition would in any event have a role to play.

The economics of water supply look much more like the economics of the Internet and less those of conventional commodity markets, and indeed even electricity supply with the emergence of a central buyer is going towards fixed price contracts and away from energy only commodity markets.

OFWAT would like to go further towards “wholesale competition”, and has been trying to split out the “wholesale” element, and in the process has toyed with weakening the commitment to the regulated asset base (RAB) in the future. It is also interested in further separation of water supply from waste water treatment.

The underlying competition model that OFWAT is pursuing is familiar across other utilities. Its guiding principle is to gradually open up more and more domains for competition, peeling back the core. The end point is to “normalize” the outputs and to mimic a “competitive market”.

Yet this model has not worked out as planned in the other infrastructure utilities to which it has been applied already with more vigour than in water, and there are lessons to be learnt. In railways and energy, early ambitions to allow the market through competition to determine the evolving structures and investments has proved less than convincing. In rail, competition between rival train services on existing lines has effectively been abandoned and in electricity a central buyer model has now been put in place determining investments through government-backed contracts. Rail customers cannot switch, and in energy switching has not delivered a competitive supply market.

In both rail and energy, public confidence has deteriorated significantly. In some customer surveys, energy companies are ranked below banks in public esteem,

and trust has broken down. In railways, renationalisation has occurred for the network company, and opinion polls suggest the majority of customers would prefer the whole industry to return to state hands. Attempts to apply the competition model to roads has not made much progress, and even in communications, the state has had to step in to ensure broadband access to what is a new utility service is more universally applied. In post services, universal service remains challenging alongside competition. Competition for the market, or what is effectively public procurement through a single buyer, is replacing commodity competition in many utilities.

Regulation and pollution control conflated with production activities in the NRA and its successor, the EA. Having narrowed the function of the water companies, many of the other functions which Water Authorities once carried out, have had to be provided by other organisations. Once the decision had been taken at privatisation to split the functions of the public sector Water Boards, and to carve out the National Rivers Authority, the practical effect was to create in the NRA a regionally organized flood work force and this in due course became the major function of the NRA, dominating its other regulatory and policy functions.

The initial idea was that the NRA, together with the relevant government department, would decide such matters as environmental quality and manage the rivers and catchments, and the water companies would carry out their roles, subject to economic regulation. The NRA would be “in charge”, and OFWAT would do the technical economics stuff. At privatisation the periodic reviews were to be at 10-year intervals, and so OFWAT would have a decade to get its act together for the first review. The hierarchy of control was clear, but it soon fell back through a combination of early management and leadership failures at the NRA and OFWAT’s determination to carve out a bigger role for itself.

In due course the NRA was merged into the Environment Agency, on the argument that pollution control should be “integrated”. Yet this is precisely what has not happened in the case of river catchments: water pollution control has

remained largely separate from the environmental regulation of land – with agriculture falling under MAFF and then DEFRA, and Natural England.

In terms of regulating water quality, the EA's role is set within the European Directives⁴, and in particular the Water Framework Directive and the Bathing Beaches Directive. These prescribe what a good quality river and a good beach should be like, and then the path to achieving this status. As with much European regulation, both directives have limited spatial content. Thus it forces attention to the most polluted rivers and beaches, whereas resources might be better spent on rivers and beaches which are on the thresholds of good quality. If a river is biologically close to dead, then it will require a proportionately much larger spend to get it to good quality, whereas a river at the threshold might cost less and have much greater ecological gains.

Long-term flood defences under short term Treasury financial control. The flood defence activities are very much a separate function in the current industry structures. Flood defences are managed by a combination of the EA, local drainage boards and landowners. This is a legacy of the privatisation arrangements and then the move towards integrated pollution control and the establishment of the EA noted above.

The EA, as a public sector body, is subject to Treasury control and Treasury budgeting. Its capital spending is determined within the framework of the Comprehensive Spending Reviews, and hence is inevitably short term. As with any public body, it has to make its case or “bid” to the Treasury for its capital and current spending, and it has attempted to provide a long term analytical

⁴ The European Parliament and the Council of the European Union, “Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 Establishing a Framework for Community Action in the Field of Water Policy”, *Official Journal of the European Union* L 327 (22 December 2000), p. 1–73; The European Parliament and the Council of the European Union, “Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 Concerning the Management of Bathing Water Quality and Repealing Directive 76/160/EEC”, *Official Journal of the European Union* L 64 (4 March 2006), p. 37–51.

framework for the analysis of capital projects⁵. Longer term “settlements” are granted from time to time, but always subject to the overarching Treasury constraints.

Treasury control means that the EA is cash rather than balance sheet based. Indeed it has no meaningful balance sheet at all, and hence there is no assessment of assets and liabilities. As with many such bodies its asset register, such as exists, is primitive. It cannot borrow to invest as a private company would.

Paying for flood defence has therefore been a struggle, and the EA has tried to find additional funding, through partnerships and eliciting other contributions. This risks being a zero-sum game – the Treasury has the option of reducing its funding as and when other sources arise.

In part because it lacks adequate control over the diffuse land management, the EA has little control over the causes of flooding, and hence it is very much about managing the consequences rather than mitigation. Housing developments on the flood plains, road and other transport hard surfaces, and agricultural practices have all contributed to a rising flood risk. The normal market response would be through the price of insurance: high-risk locations would attract very expensive insurance. The price mechanisms however do not work for flooding: the government engineers cross subsidies to high-risk houses from the bulk of households. The latest version of the subsidy regime is Flood Re, given legal force in the Water Act 2013.

Agriculture is another world. Neither the water industry nor the EA (or indeed OFWAT) has much control over land use and in particular agricultural practice, despite the fact that agriculture is highly subsidized. It contributes only about 0.7% to the economy, and receives over £3 billion in subsidy. The CAP is designed in Brussels, and the particular application of environmental schemes

⁵ Environment Agency, *Flood and Coastal Erosion Risk Management: Long-Term Investment Scenarios (LTIS) 2014* (Bristol: Environment Agency, 2014).

like entry and high level stewardship is the task of DEFRA, with the subsidies administered by the Rural Payments Agency.

Natural capital assets under multiply uncoordinated ownership. Rivers are quintessential wildlife corridors and core examples of natural capital infrastructure. The management of environmental assets in catchments is dispersed amongst multiple bodies. Land use planning lies with national and local government, and has resulted in housing and other developments often in inappropriate locations. Natural England designates SSSIs and manages some nature reserves. The Wildlife Trusts, the National Trust and the RSPB manage nature reserves too. There is little or no overarching catchment environmental planning, and hence the system environmental properties of these wildlife corridors is often lost in the cracks. They also receive little or no reward for the flood management services they frequently provide.

3. The systems approach versus the competitive model – the case for a systems operator.

The complex web of companies, organisations and agencies covering the water sector has evolved over time. Each bit – water and sewerage, flood defences, and land management - has developed separately.

There are two different stylised approaches to the problems identified above – coordination through markets and prices as a result of competitive markets; and coordination through planning. A third option - pursued here - is for a combination of the two models – a system operator, and competition to deliver the coordinated functions and services.

(i) The competition model

The stylised competition model is deliberately designed to increase the fragmentation of the sector. Competition requires many competitors. It aims to gradually peel back the layers to drive more competition into the core. From a

competition perspective there are several lines of attack on the current structures, and in the spirit of the competition model each is additive, and can be pursued separately, always with the prize in sight of an unbundled commodity-based competitive market.

This model has a considerable pedigree and as noted above it motivated much of the great privatisation and liberalisation policies of the 1980s and 1990s. The rationale is one in which regulation would provide a temporary holding role whilst competition was driven into the core of the newly privatized companies. Even that regulation – the RPI-X framework – was modelled on price takers in competitive markets.

The model is a rich one, and it is a paradigm in that it readily tells the policy makers and regulators what to do in each circumstance they find themselves. They should go for more competition. In water, capital market competition was argued to have a strong role to play as competing sets of owners drove efficiencies into managements, reducing the need for regulation⁶.

Applied to water, the competition model has the following elements:

- (i) The division of retail from wholesale and the unbundling of the price caps (already largely achieved)
- (ii) Splitting out water from waste water treatment (planned by Ofwat)
- (iii) Opening up non-domestic customers to switching and hence competitive supply (a distant aim)
- (iv) Market testing through competitive tendering (partly in place)
- (v) Inset agreements to peel off bits of the local networks (now largely abandoned)
- (vi) Connections competition (partly in place)
- (vii) Reducing the scope of the RAB to a core network (Ofwat plan)

⁶ Stephen Littlechild, “Economic Regulation of Privatised Water Authorities and Some Further Reflections” Oxford Review of Economic Policy 4, no. 2 (1988): 40-68.

- (viii) Reducing the commitment to the RAB, treating it as a legacy (Ofwat plan)
- (ix) Encouraging bulk water transfers to create competitive pressure on incumbent monopolists (requires abstractions market)
- (x) Opening up upstream water supplies to competitive supply, developing a market in abstraction rights (for legislation)

This model denies that the industry has system properties, and has at its heart of the notion that the private decisions of a large number of buyers and sellers will produce an optimal outcome. It denies that the catchments are system public goods and hence that there is a system coordination role. Its advocates have always been sceptical of the assumption of natural monopoly⁷.

(ii) The systems planning model

An alternative stylised model is to start with the system itself, and regard the functions in this systems context. A river catchment comprises a core set of natural capital assets, which function as an integrated system. The ecosystems interact: rivers form natural corridors for plants and animals to move along, and the functions of rivers to provide sources of drinking water supplies and to act as waste disposal systems depend upon the underlying biological processes. Failure to maintain these natural capital assets has resulted in disease and disaster around the world. The Thames and the Rhine were once heavily polluted. The Ganges and all the main Chinese rivers are modern examples of the consequences of system neglect.

River catchments provide water to agriculture, support the soil structures and flooding is by its very nature a river catchment system event. The natural capital assets provide a host of other services too: transport, leisure and recreation and nature for human enjoyment.

⁷ In the tradition of Schumpeter and Baumol, the existence of profits can be viewed as a necessary condition to suck in competitors.

Natural capital comes in systems not marginal units. It cannot be broken down into neat discrete entities and traded on a marginal basis in the way that commodities typically are. The market cannot be left to its own devices to coordinate a natural system. It is not that natural monopoly is a temporary feature, to be unbundled and ultimately competed away. It is that the coordination of the system is a permanent feature – to effectively deliver and protect the public good.

The main characteristics of a systems approach are as follows:

- (i) The economics of the system are non-marginal. The evaluation of projects and Policy changes has to have regard to the impacts on the system as a whole, and not only the marginal costs and benefits of specific developments.
- (ii) The spillover effects between any project and the rest of the system are very important.
- (iii) In a system everything depends upon everything else.
- (iv) The environmental standards are non-marginal, and require overarching targets based on ecosystems for the river catchment as a whole.
- (v) There is a core role for system planning and the coordination of functions.

These systems considerations arise in all the main utility infrastructures. They are a central defining characteristic of infrastructure.

In particular:

- In rail, Network Rail coordinates the system, develops a system plan with the DfT, and manages the coordination of demand and supply, and the system investments.

- In electricity, National Grid has a specific system operator function, and it coordinates dispatch, and runs the capacity auctions to ensure that sufficient investment is forthcoming.
- In communications, Openreach has some systems functions, though the multiple networks are largely independent, and the absence of a communications system operator explains in part why mobile and broadband coverage is incomplete.
- In post, the Royal Mail has an explicit USO obligation, requiring it to operate a system sufficient to meet it.

(iii) Coordinated competition – a system operator model

At the theoretical level, the debate between the competition model and the planning approach was played out since the 1930s. Socialist planning was pitted against an Austrian economic approach, and the protagonists included Lange and Hayek respectively.

These polar cases are not however the only ways of understanding how markets work, and the relationship between the state and the market. An alternative is to regard the state and the market as mutually reinforcing. Markets work *within* rules and frameworks. *Laissez faire* tends to monopoly and the erosion of competitive forces. The coordinated competition model combines the role of the state in setting the frameworks for the provision of the core infrastructures (and public goods more generally) together with the maximising of competition for the delivery of these key functions.

In the water case, this third model would combine a system operator with increasing competition to provide the functions and services. In this way, it would approximate what has evolved in respect to the coordination and investment in the electricity system rather than the stylised commodity competitive model. There would be both system planning and competition to provide the system services. The former is a public function, the latter can be largely private and market-driven.

A system operator (SO) function for the water sector would include a number of analogous functions that the SO in electricity currently exercises, and these are functions that are permanent, rather than temporary ones to be chiselled away.

These might include:

- (i) Day-to-day control and allocation of water abstraction
- (ii) Day-to-day control and regulation of discharges from sewerage treatment works
- (iii) Day-to-day flood management
- (iv) Day-to-day oversight of environmental schemes in agriculture
- (v) Planning flood defence
- (vi) Planning sewerage treatment and abstraction investments and long term management
- (vii) Planning the development of CAP environmental subsidy requirements and other land management dimensions
- (viii) Providing an overarching natural capital framework for catchments

Note that none of these system operator functions requires any production activities. On the contrary the SO is very different from the EA in its current form. In electricity the SO does not generate electricity, and the SO implicit in Network Rail does not run trains. In this water SO, the provision of the services such as the building and maintenance of flood defence assets is for the competitive market to deliver, on the basis of contracting by the SO, as are water treatment works, sewerage works and all the things water companies currently do.

4. A new framework

(i) The CSO

The coordinated competition model requires a *catchment system operator* (CSO) for each catchment. The CSO should have a clear and defined mandate and a CSO

license to set out its role. It would have the duty to have regard to the legislative framework – the EU directives, the various water and related acts – and to consult and perhaps act upon statutory guidance provided by the relevant Secretaries of State.

It would be required to develop, consult and implement a catchment plan (CP), and set out a long-term framework (say 25 years). The CP would be directly linked into the national infrastructure plan (NIP), and the 25-year national natural capital plan proposed by the Natural Capital Committee⁸. It would have a relationship with the various infrastructure institutions. CPs would incorporate current river catchment management plans on a much more integrated and long-term basis.

The CSO would carry out the day-to-day coordination functions, analogous to those performed by National Grid in electricity. As per the list set out above, it would in particular manage and monitor abstractions and discharges within the catchment, it would manage and monitor flood protection and management, and it would have a direct role in the determination, management and monitoring of the agricultural subsidies and supports within the catchment insofar as they impact on the river systems.

The CSO would have no productive activities and it would not have regulatory and prosecution powers in respect of pollution. These should be the functions of an environmental protection agency (EPA). Such an EPA would be the responsibility of the successor to the EA, once the CSO functions have been taken away, and the EA had been divested of its production work force. Regulation and prosecution would be separated from production and catchment coordination and management.

⁸ Natural Capital Committee, *The State of Natural Capital: Protecting and Improving Natural Capital for Prosperity and Wellbeing*, Third report to the Economic Affairs Committee (2015), <https://www.naturalcapitalcommittee.org/state-of-natural-capital-reports.html>.

The delivery of the CP and the functions of abstracting, water treatment, sewerage, flood defence investment and management and land management would be for competing companies and organisations specialising in these functions. These would include water companies, farmers, asset management companies, facilities services businesses, conservation bodies and a host of new entrants. There would be competition for the market in each and every one of these services.

The new CSO model with the CP would have consequences for the delivery of the core elements in the catchments, to which we now turn.

(ii) Abstraction

Abstraction is location-specific. Water abstracted upstream is very different in its impacts from that abstracted downstream. Although water is a somewhat homogenous product, it is heterogeneous by location. Therefore it follows that any crude competitive commodity approach to abstraction rights and water trading is likely to be seriously economically inefficient. In terms of the system properties discussed above, the spillover effects are typically massive.

It is no surprise that despite studies by various government departments going back over two decades, no credible and efficient competitive abstraction rights model has been developed.

Yet we are not stuck with the *status quo*: it is chronically bad from both an economic and an environmental perspective. The serious error was the granting of abstraction rights in the 1963 Act, which weakened control and allowed the wasteful practices notably in agricultural irrigation and has caused serious damage to river flows.

In the CSO model, abstract planning and management lies with the CSO. It manages the river catchment as a whole and optimises the water abstracted. The costs of abstraction vary by location, and by setting prices to reflect these

variations, the private sector can then take the commodity, use it and then where appropriate sell it back to the CSO. One approach would be to set up a “water bank”, and manage this bank to optimise the system.

This approach would require the current system of abstraction to be reformed – a task which successive governments have both recognized is necessary and repeatedly ducked. The problem has been the legal one of having to pay compensation to the current owners. A possible approach is to put the value of existing abstraction rights into a “residual abstraction asset base”, securitise the buyout costs by issuing abstraction rights bonds, and then pay interest net of the purchases of water the previous owners would pay for the water to the CSO under the new regime. If the net value of the abstraction rights is equal to the total catchment abstraction (roughly) then the costs of the residual of abstraction right bonds should be close to zero.

(iii) Flood defence

The CSO would assume the system planning and management of flood defences, but not do any of the work directly. It would contract this out to competing private firms. As these functions are currently carried out by a mix of the EA, farmers, local drainage and local government, there would need to be an initial corralling of powers, functions and duties into the CSO.

The EA would lose a significant proportion of its existing labour force. It would then be able to focus on delivering the objectives of the 1990 White Paper: *This Common Inheritance*⁹, and in particular focus on integration pollution control, regulating, monitoring and enforcing across water, land, and air.

The CSO would develop the longer-term flood management plans currently the responsibility of the EA. It would do this in a catchment-wide sense - by bringing

⁹ Department of the Environment, “This Common Inheritance: UK Annual Report 1997: Reporting on the UK's Sustainable Strategy of 1994 (including the Environmental Strategy of 1990)”, *Command Paper Series 3556*, (Stationery Office, 1997).

flood defence within the framework of agricultural subsidy and land management. It would have particular regard to the management of the upper catchments, and their ability to absorb and hold water.

Current examples of good practice include the management of the Exmoor mires within the Exe and Barle catchments, and the upstream moorland management by United Utilities. Examples of poor catchment management and the costly consequences - include the Somerset Levels. All three would make interesting case studies to compare current with the proposed catchment arrangements.

(iv) Regulation and the water and sewerage companies.

Many of the functions of the CSO were once the task of the Water Boards, and some carried over to the privatised companies, even after the splitting off of the NRA. The CSO model clearly delineates the role of the companies: they deliver what the CSO plans and manages. They would face competition for the services the CSO requires, as do electricity generators in the National Grid SO model. The role of OFWAT would be to ensure that that the resulting markets are competitive and to protect customers in the residual monopoly roles.

The creation of the CSO would be an evolutionary one and consistent with much of the forward strategy advanced by OFWAT. There would be little need to amend very much of the current water company licences, other than to add the duty to have regard to the CSO, and the shearing off of some of the new and additional functions that have been gradually grafted onto the companies in the absence of a proper CSO. Resilience for example would become a CSO function, and a number of dimensions of sustainability would be for the CSO too. The public interest would be separated from the private, in contrast to the strategy of successive governments in adding more and more public duties and obligations onto private companies.

In time, the CSO model might facilitate the gradual redefinition of the boundaries of the water companies. Some would specialise and fragment; others might take

on wider ambitions and enter the new flood defence and land management markets. What would change would be the boundaries of the water companies which would become much more porous. As companies with key competitive advantages in the management of water and waste water, in managing water treatment works, and sewerage works, it is to be expected that they would be companies with much to offer in taking over a number of flood management services – both in carrying out projects and in facilities management services. They may also have an interest in land management.

In practice, there are a number of functions within catchments that are probably best done by integrated companies for the medium term. Once the water is abstracted, the rest is not a CSO function, until it is returned to the rivers. It is abstraction and discharge that the CSO plans, including the development of new sources of supply, taking account of (and influencing) new demands.

The CSO model does not disturb the water company RABs, and it does not impact on the issue of so-called retail competition within the current changing framework. The CSO would have an interest in the development of metering and water demand management, and these would be implicitly (or explicitly) part of the CPs, since the shape and nature of demand impacts on abstraction and discharges.

Water companies would however face a number of new competitors. At one level, trusts and not-for-profit organisations might compete to offer flood management options to the CSO. An upstream nature reserve, a national park or a re-pasteurisation project might alleviate the need for hard capital works downstream, and landowners could bid with projects too. The CAP subsidies could be made partially competitive – in terms of which land management schemes on which farms offer the best environmental and flood protection. Facilities management companies and infrastructure companies might compete head on, as well as in cooperation with water companies.

5. Funding the water sector

Most attempts to reform flood defence and abstractions have floundered on the money question. The argument is that there are no significant private revenue streams to pay for flooding, and the abstraction rights are too expensive to buy out. The result has been paralysis – and considerable net economic losses.

The trick in thinking about the money is to recognise the size of the prize and to recognise that monies are already provided. Put simply, the total economic activities currently delivered could be rendered at a lower cost, yet this level of activity is seriously sub-optimal, under-utilising natural capital and resulting in lower economic growth, as benefits are not reaped. How then to increase the value of the benefits, reduce the costs, and finance the catchments and water sector?

The size of the prize of better catchment planning has not been empirically estimated and is beyond the scope of this paper. In part it rests on first defining an alternative (optimal) model to compare with the inefficiencies of the current model – as has been sketched in this paper. It is not hard to think that this prize is significant.

There are current revenue streams. These comprise:

- Customers' bills to water companies
- Taxpayer's contributions to the EA to pay for flood defence
- Partnership and other payments to the EA for flood defence
- CAP subsidies
- Cross-subsidies in flood insurance
- Voluntary contributions to trusts and environmental bodies
- Developer contributions

In total, these together finance the current outputs.

There are two strategies taking finance and funding forward. The first is to reallocate the existing monies to the new structure set out above – between the CSO, the water companies, the environmental trusts and the farmers. This would lead to a major improvement, as the above structure is implemented. The EA water and flood management monies would go to the CSO, and the CSO could take charge of the subsidies and better allocate them.

There is therefore no obstacle to implementing the structure. But this would be a very poor outcome compared with what could be achieved. Much better would be to relate funding and finance to those who benefit from the services. There are several ways of doing this:

- There could be a CSO system charge to all the beneficiaries in the catchment – *a catchment system charge*. This is what happens in electricity (a use of system charge). It happens too in part in water. All the customers of the Thames catchment are going to pay for what is in effect an implicit CSO charge for the Thames Tideway. It is not a charge confined to Londoners. All customers benefit from a cleaner river downstream, since rivers are corridors upstream and downstream. (Salmon might actually make it past the cleaner water downstream to spawn in tributaries like the Windrush and Leach rivers for example.)
- The CSO charge could be *integrated into the water and sewerage bills* (as in electricity) or there could be an additional CSO charge, added to Council Tax bills (as, for example, police and school services are).
- There could be an explicit payment for services from the Treasury (as for the EA) on a longer-term basis, buying the CSO services on behalf of the people in the catchment. It would however require a solution to the endemic problem of short-term finance.
- There could be a household CSO flood charge on the basis of the additional insurance premiums as risks rise. Payment of the charge would be a *quid pro quo* for the subsidy: the CSO reduces the risk, and the insurance companies could be the intermediaries. (Note that this is very different from Flood Re, since the latter provides little or no incentive for

the house owners to locate in lower risk locations and indeed moral hazard undermines the incentives for the traditional prevention measures households in flood risk areas can take.)

To these conventional sources of funding and finance, there are others. These include:

- *Green levies and charges for pollution.* Currently polluters do not pay for much of the damage they do to river catchments. The run-off from fertilisers, pesticides and herbicides is an obvious example, but so too are discharges from land and sewage works. It is economically efficient to charge for these pollution externalities and they would generate revenues.
- Damage to natural capital should be compensated for. Building on flood plains raises the flood risks to others, and increases the need for flood protection. The destruction of pastures and other riverside damage increases flood risk. These *compensation payments* should leave the aggregate natural capital intact, and applied to each river catchment, this would generate the funds necessary to mitigate the impacts of developments, where these pass a broader economic and environmental test. A natural capital fund¹⁰, would be one possible mechanism for channelling such compensation and pollution charge revenues. It could be administered independently or by the CSO.

Within this framework of a CSO charge, the natural and physical assets could be incorporated into a *catchment balance sheet*. The assets in this balance sheet would have to be maintained, and there would be a *capital maintenance charge*. It is an open question as to who would “own” this balance sheet. Network Rail owns the rail network assets, but not the trains. National Grid owns the transmission assets but not the power stations. The overall CSO charge would be for operations and for capital maintenance.

¹⁰ As proposed by the NCC SONC 3 report (2015) and Helm, *Natural Capital* (2015).

New capital expenditure – on hard infrastructure and on natural assets like water meadows, mires and so on – would create new assets, and these can be financed through borrowing. As long as the net benefits are positive, these liabilities will be less than the assets on the balance sheet. Again these assets might be vested in the CSO, or they might be vested in a number of companies and organisations, including trusts and other bodies.

This sort of capital structure is very familiar in the water industry. The RAB plays a central role here: it provides comfort to investors that their investments will not be expropriated by opportunistic regulators, given that there is a classic time inconsistency risk to the investors. The better the guarantee, the lower the cost of debt, and the CSO model proposed here would be more cost effective if the implicit guarantee to honour the RAB was made more (rather than less as OFWAT propose) explicit.

6. Conclusion and recommendations: A comprehensive reform package for the next Water Bill

The current state of river catchments is not sustainable. Current abstractions are seriously inefficient and have in a number of catchments serious economic and environmental consequences. Flood defence is short-term and inefficiently planned and managed. The catchment natural capital is often in decline. Integrated pollution control is muddled up with production activities in the EA.

These problems will not be solved by the application of a stylised competition model, and direct planning within the public sector is unlikely to deliver efficient outcomes. The former has been gradually developed since privatisation and the latter was tried with the Water Boards. Neither alone can solve the problems, though both competition and planning have important roles to play. Coordinated competition combines the benefits of both.

Numerous attempts have been made to tackle each of the dimensions of river catchment in isolation and on a piecemeal basis. They have not worked, and indeed efforts have been concentrated on the “easy bits” (like so-called retail competition) whilst failing to tackle the difficult bits (like abstractions and flood defences). What is required is an approach that treats the catchments as systems rather than the sum of a set of discrete and separate activities and markets.

The key proposal in this paper is for a CSO for each main catchment, responsible for a Catchment Plan, and with no production activities. Its job is to plan and coordinate, using the maximal competitive bidding and tendering from the myriad of companies, not-for-profit organisations and trusts. The closest analogy is the SO in the electricity industry, currently within National Grid.

The impact of a CSO would be great: it would bring together catchment planning and management, integrating flood defence, agricultural subsidy policy, abstraction and discharges.

The CSO would take over a number of functions from the EA, but most of the EA’s flood defence workforce would go to the new providers, including not only water companies, but also facility management businesses, and not-for-profit organisations. The market for delivering capital and operating services would be dramatically opened up.

The EA could then go back to what it was designed to do: integrated pollution control through pollution regulation, pollution monitoring and pollution prosecution. It could become a serious Environmental Protection Agency.

Funding could start by simply replicating what already exists. But a better more efficient approach would be to introduce a CSO charge. This could be raised by a separate and identifiable item to water bills (as are all sorts of levies in the electricity bills), the Council Tax bills (as are police and education), or as a separate water catchment services utility bill.

The revenue stream would cover CSO operations and management and a capital maintenance charge. The capital investments could be debt financed on a balance sheet. This might form a CSO RAB, but there are clearly other options.

The prize would be considerable, including:

- A reform of abstraction rights, financed through a “residual abstraction asset base” fund, net of new abstraction charges (broadly revenue neutral)
- Rivers no longer blighted by large scale drying because of inefficient abstractions
- Agricultural subsidies directed to maximizing the natural capital benefits within the catchment
- Integrated flood defence solutions rather than hard concrete solutions
- Incentives for appropriate spatial development and flood risk management strategies
- Efficiency gains from much greater competition
- Better enforcement of pollution control and a much more effective Environmental Protection Agency without production activities.

Not to reform in these evolutionary ways risks more flood damage, higher costs now, and potentially very high costs in the future if abstraction is not properly managed and flooding is not put on a sustainable basis.

Now is the time to think about the sector as a whole, and to recognise that the sharp institutional and company boundaries created at privatisation in 1990 left unaddressed the many interfaces within catchments. These reforms should be done well ahead of the next water periodic review process, and form the basis of a new and comprehensive water act.