Water: what is going on?

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There is a rising discontent with what is going on in the water sector. The latest focus is on storm overflows, and the allegations about discharges – over 400,000 of them in 2020[1] – and the lack of prosecutions. Point and diffuse pollution from agriculture continues to do its damage, from fertilisers, pesticides, poor soil management and slurry spreading. Abstraction threatens many rivers, and some unique chalk streams. Microplastics are becoming ubiquitous in rivers. Farmers blame the water companies; water companies blame the lack of funding and by implication the Water Services Regulation Authority (OFWAT). The fishers blame the Environment Agency (EA), and the EA blames the government for the lack of serious enough fines and penalties, and the "corporate culture" of the water companies. The EA also blames the government for cutting its funding.

Behind all the trouble and strife lies something much more profound: it is no longer acceptable to try to just hold the line on water pollution. In the twenty-first century people demand rivers clean enough to swim in and thriving biodiversity. In the nineteenth century and the first half of the twentieth century, people put up with rivers and the sea as convenient waste disposal systems. In the 1950s, this gradually became less acceptable, as did the filthy city air. Very gradually, a line was drawn, and in the 1970s clean-ups started, conveniently coinciding with the gradual deindustrialisation, and the closure of the coal industry and much water- and energy-intensive industry. We imported the nasty polluting stuff from China and elsewhere instead, and turned a blind eye to the destruction through gross pollution of China's three main rivers caused by producing all that stuff for export for our benefit.

[1] "The total number of spills in 2020 was 403,171, compared to 292,864 in 2019. This increase is due to the higher number of overflows being monitored." Department for Environment Food and Rural Affairs (DEFRA) (2021), "Event Duration Monitoring data published by the Environment Agency", press release, 1 April.

There have been some great examples of water clean-up. The River Mersey is no longer biologically dead, and the odd salmon goes up the Thames. Bathing beaches still have lots of sewerage and rubbish, but many are not as bad as they were. Much of this is due to the EU and its various Directives, including the Water Framework Directive (WFD) and the Bathing Water Directive.[2] These Directives made it hard to hide behind the older UK approach to pollution regulation – BATNEEC (Best Available Technology Not Entailing Excess Costs). There were now standards to be met, not case-by-case and lobby-by-lobby excuses. But much was still left to national interpretation, national monitoring and enforcement, and there is mounting evidence that this has not been quite what it could or (minus the lobbying) should have been.

Dumping sewage at sea has been stopped, and it is now simply no longer acceptable for raw sewage to go so frequently directly into the rivers, to abstract and destroy, and to decimate the insect life of the rivers. The prize of cleaner, safer and richer life in our rivers is now a priority. The past is an unacceptable and dirty place.
The question is: how can we move on from the approach of the twentieth century to one fit for the purposes of the coming decades? This paper sets out how to do this. But first we need to understand what is wrong with the way we manage and regulate our rivers and still waters.

Why has it gone wrong?
At the heart of our river problems lie three actors: the water companies, the farmers, and the flood defence. And behind them lie three public institutions: DEFRA, OFWAT and the EA.

Let's start with the water companies. Unlike in most European countries, these companies were gradually removed from local government control, most notably following the 1973 Act which created the unified Water Authorities. These combined the main water and sewerage functions together in a set of regional publicly owned and controlled organisations, and were funded by water charges and Treasury support on a

[2] Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy; and 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.

pay-as-you-go basis. Current customers and current taxpayers paid for investment as well as operating costs, and each generation passed to the next the assets.

As the economic crises of the 1970s unfolded, the Treasury's willingness to contribute weakened, and the prospect of a major EU-driven clean-up and the associated investment meant that any government in the 1980s would look for other ways of paying for this, and notably a greater shift from taxpayers and public borrowing to more private customer bills and private balance sheets.

Of all the industries privatised, the water case was the one where, relatively, the investment part was the greatest. Even BT with its System X exchanges was not proportionally on the same level. The reason for what was (and still is) amongst the more unpopular major privatisations was the need for a private sector borrowing capacity to replace that of the public sector borrowing requirement. The Conservative governments of the 1980s thought that the water sector needed to be off the public balance sheet and moved onto private ones.

It is because this was the main motivation that the original idea was to simply sell the Water Authorities as they were. This was the famous Ridley Plan. The trouble with this model was that, in public hands, the public Water Authorities regulated as well as ran the day job of providing water and sewerage services. They were both the gamekeepers and potentially could be the poachers too.

In response to the widespread public backlash, the Water Authorities were split up, and the National Rivers Authority (NRA) was set up to do flood defence and the environmental regulating bit. The NRA had an unhappy time of it: its responsibilities went beyond those carved out of the Water Authorities, and as a result it was part-regulator, part-prosecutor, part-adviser to the government, and part-producer. Its workforce started out at about 6,000, most of whom were engaged in "ditch-digging". All of this unhappy legacy from a botched design was inherited by the EA in 1996, when, to these multiple functions, a whole host of new ones were added.

The NRA immediately faced the implications of the new swathe of EU Directives, and these meant more costs and, in the new privatised world, higher customer bills. OFWAT, unlike the NRA and then the EA, had a much narrower remit. Its job was to protect customers and make sure the companies could finance their functions. As it turned out in the 1990s, it did neither very well. Whereas the NRA/EA was supposed to be in charge of the environmental requirements, and to advise the Secretary of State accordingly, OFWAT quickly muscled in, asserting that what mattered was "affordability". Politically this was of course always true: the architects of privatisation had never focused exclusively or even mainly on the investment, but rather on making sure that consumers (and therefore voters) were shielded from the consequences of the investments that were needed to catch up the backlog from the Water Authorities funding in the public sector. Cake-ism is not a new phenomenon when it comes to the great network utilities.

Politically, privatisation was a fudge, resting on the hope (much in vogue at the time) that the private companies would be so much more efficient and hence be able to absorb a lot of the investment costs. It was never credible, and after 30 years the consequences are all too apparent.

This investment could have been funded in the 1990s by using the ungeared private balance sheets to borrow rather than fund from current bills. This was the really big point about how privatisation was supposed to work: the old system of pay-as-you-go for capital and operating expenditure (CAPEX and OPEX) and capital maintenance was replaced by pay-when-delivered. The generational contract was broken and the fiction was advanced that the only thing that mattered in macroeconomic terms was public borrowing, whereas private borrowing did not count. There was no national balance sheet.

With this in mind, the water companies were even given an initial cash injection – the "green dowry" – of £1 billion. Although they were privatised at well below their current-cost accounting values (about 10% of them), there was ample scope for borrowing for the new investment requirements. It is an extraordinary failure of OFWAT that instead of using the balance sheets mainly for this intended purpose, the companies were

instead allowed to financially engineer them so that they borrowed, not for new investment, but to pay out special and higher dividends, and thereby gear up their balance sheets. They borrowed against their assets and associated revenues. In effect, they mortgaged them. They were further incentivised to do so (and still are) by OFWAT (and the Competition Commission (CC) and then the Competition and Markets Authority, CMA) setting the returns in terms of the weighted *average* cost of capital (WACC), thereby making debt excessively profitable, and equity not so. That is what averages do.[3]

It is not exaggerating to say that this is a scandal of financial engineering, aided by OFWAT in the name of "financial efficiency". From the first opportunity to force the companies to use the balance sheet – the South West Water interim determination in respect of the Bathing Directive in 1994[4] – through to the reaction of OFWAT and the CC/CMA to the great takeover boom from 1995 onwards across the utilities, the relevant authorities just let it happen. OFWAT, in particular, was more concerned with the loss of comparators for its efficiency econometrics than what was going on right under its nose. Some companies eventually ended up with over 80% gearing.

Worse still, a cursory bit of arithmetic and an inspection of the accounts show that, after 30 years, profits roughly equal dividends, and hence there has been little net re-investment of retained earnings. The gearing has lately come down a bit, but at no time has OFWAT seriously considered what the pro-forma state of the companies would have been if gearing had been increased to fund and finance only new CAPEX that was not paid by current customer bills. This is what should have happened, and it is what has not. Next time you hear about a storm sewerage overflow that exceeds what should reasonably be expected, look to this calculation and ask whether that investment could have been made from retained earnings.

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[3] See Helm, D. (2009), "Infrastructure investment, the cost of capital, and regulation: an assessment", *Oxford Review of Economic Policy*, 25:3, pp. 307–326.

[4] Monopolies and Mergers Commission (1995), "South West Water Services Ltd: A Report on the Determination of Adjustment Factors and Infrastructure Charges for South West Water Services Ltd", 1st January, HMSO.
Commission of the European Communities (1994), "Commission Proposal for a Council Directive Concerning the Quality of Bathing Water", Communication from the Commission to the European Parliament and the Council, COM (94) 36 Final.

The counterargument is that the companies needed to have the possibility of making excess returns to incentivise them to be efficient – more efficient than they would have been in the state sector – and in particular they should be incentivised to be financially efficient and beat the cost of debt. The trouble with this argument is that there is not much evidence, and no convincing evidence, that after 30 years in the private sector, the companies are any more efficient than all the other water companies in the public sector in the EU, or indeed better than Scottish Water. For the kinds of returns to have resulted in a net gain, the water companies of England and Wales should be leagues ahead of their state and municipal comparators in Europe. At the last election in 2019, threatened with renationalisation by Labour, the companies paid consultants and think-tanks in an effort to try to prove their superiority. The resulting studies were mostly of very poor quality and could not come up with any convincing empirical evidence.[5]

The sad reality of 30 years of privatisation has been high gearing, high profits and dividends, and investment well below what could have been achieved. Unsurprisingly companies did what the companies were incentivised to: they stripped out the balance sheets, inflated the salaries of monopoly utilities to levels comparable with those of the major FTSE100 companies in competitive and global markets, and maximised dividends. None of this is their fault, though it is fashionable to argue that they should have been more environmentally and socially responsible and moved beyond profit-maximising. The purpose of private water companies has indeed been to profit-maximise. It would be odd to expect the infrastructure and private equity funds to have decided to forgo an open goal. The fault lies squarely with the privatisation structures and OFWAT, and it is quite remarkable that soon after the latest price review in 2019 (PR19), some of the companies are trading at a premium of over 30–40% over their regulatory asset bases (RABs), and Bristol Water has changed hands at a premium of around 50% to its RAB.

To be fair to OFWAT, it is a creature of statute and it inherited the RPI-X periodic review framework and the company licences at privatisation. Periodic reviews were designed

[5] These studies are cited in Helm, D. (2020), "Thirty years after water privatization—is the English model the envy of the world?", *Oxford Review of Economic Policy,* 36:1, Spring, pp. 69–85.

on the basis of a very simple idea: if the companies could be put in the same position as if they were in a competitive market, they would be price-takers, and then maximise profits by minimising costs. It was deceptively simple, for two reasons. The first relates to the information and the control of the information upon which the prices are set; and the second is that fixing prices indexed to inflation for five or ten years at a time is not how competitive markets work.

It turned out that the information that the RPI-X *ex ante* price caps required for setting was not very different from that required for *ex post* rate of return regulation. The capital base (what became known as the RAB), the cost of capital and the CAPEX, OPEX and capital maintenance all have to be estimated to make a guess at what might happen in the subsequent period. The difference between the two forms of regulation is that *ex ante* regulation meant that the companies could keep any outperformance in the period, only to be rebased at the next periodic review, whereas, in pure rate of return regulation, the outperformance is clawed back (and the underperformance compensated for). And if these estimates are generous, the companies get to keep the upside too.

How would OFWAT know what the efficient costs and efficient cost of capital were going to be in the future? How could it predict these variables? The regulatory game was born, as a whole host of economic consultants, accountants and lawyers were hired by the companies to argue their cases, and set loose on the comparatively poorly resourced OFWAT. In this unequal battle, OFWAT proved weak. Not surprisingly, it got it very badly wrong, time and again. What is surprising is that it was not so much the efficiency per se that drove the excess profits; rather it was partly changes to the CAPEX, with companies arguing for more *ex ante* and doing less *ex post*, and overwhelmingly the gains from financial engineering and the fact that, in every regulatory period for the past 30 years, the interest rate turned out to be lower than predicted by OFWAT. The interval between the predicted and the actual interest rate, plus the gains from financial engineering because of the WACC averaging effect between debt and equity described above, explains the bulk of the profits.

In order to advance OFWAT's priority of affordability, the companies' approach to every periodic review is to work out what would be the investment in the next period that enabled them to outperform and still add up to say RPI-0, or whatever they thought OFWAT was targeting. The approach was not based upon what investment *might actually be needed* for the longer term – what mattered was the next five years, and the prices OFWAT wanted to set.

You might think that the NRA and the EA would have forcefully stood up to this, publicly insisted on the necessary environmental outcomes, and left it to the government to sort out if this proved to violate the OFWAT affordability criterion (which was not a statutory one for OFWAT anyway, but something the first Director General added and emphasised). This did not happen, and the fact that it did not is a major reason for taking a good hard look at the EA's future role (alongside a host of other reasons).

The EA has (rightly) had a great deal of latitude in how it interprets the WFD and its statutory duties. You might think that the EA has developed a sophisticated digital monitoring system so that it can immediately identify point source pollution, assess the risks of diffuse pollution and then pinpoint the culprits. But this is far from what actually happens. Extraordinarily, the water companies report much of their own performance and compliance, and the EA has generally relied upon this information. As revealed in the recent Southern Water case, this is not always reliable. You might, too, have thought that the EA accurately records storm overflows from sewers, compares them with the licence requirements, and then investigates and prosecutes – and checks that they are all properly licensed. But this is not how all the 400,000 plus cases came to light in 2020.

You might also assume that the EA was on top of slurry spills, other pollution and water abstractions by farms. But the probability that any farmer might be formally prosecuted for breaches is very low. The EA prefers to give advice in the event of a breach of

licences. In its latest report on the water companies, it records that it made only three prosecutions in 2020.[6]

The EA explains its performance in part by criticising the lack of funding. This is both understandable and also remarkable, given that it has not greatly upgraded its surveillance or fully utilised all the opportunities for more efficiency. In principle, new digital technologies should *reduce* the EA's costs.

There are two reasons why farmers get away with breaches: the probability of detection and prosecution is very low; and the fines are also low. Suppose, however, that there was a high detection and prosecution level, and that the various farm accreditation bodies expelled members who were found guilty of pollution. Perhaps even the National Farmers Union (NFU) and Country Land and Business Association (CLA) could do the expelling? This would raise the costs of pollution to the polluter and the compliance would thereby rise.

When the periodic reviews are being determined, the original idea was that there would be a hierarchy of decision-making. The Secretary of State (and the government) would determine the high-level outcomes (and in particular this meant compliance with the WFD and other Directives for the last 40 years). The NRA and then the EA would determine what needed to be done in each water company area (largely defined by catchments). OFWAT would then ensure that these outcomes were delivered at least cost, setting the price cap for the next period.

In practice, OFWAT quickly got the upper hand. Worse, the EA ended up focusing on inputs rather than outputs, and the companies had an incentive to find hard physical capital solutions (concrete) rather than seek out natural capital options and find common interest outcomes that took account of the wider catchment costs and benefits. The way the capital base was determined (and the RABs) formed part of the attraction

[6] Environment Agency (2021), "Water and sewerage companies in England: environmental performance report for 2020", section 12.1, 13th July.

of the concrete route to investors. The EA in its turn focused more on concrete for flood defences.

The way the EA tried to operationalise its approach to the water companies was to come up with a system called "WINEP" (the Water Industry National Environment Programme). This system takes the Directives and turns them into outputs, which the companies are supposed to meet. In turn, the companies work out what they need to do to meet them, resulting in a highly complex web of items for which spends are proposed.

At first glance, an output-based system looks sensible. But any set of outputs depends upon what is being targeted. By focusing on the Directives and especially the WFD, the die is cast. This is what companies are supposed to report on, and success equals meeting these targets and standards. The trouble is that this is not the same as the "close to natural states" for rivers that the 25 Year Environment Plan[7] rightly emphasises, focused on the full suite of natural capitals. The gap between the two can be measured in terms of the sad state of the rivers today, and the public outrage. The EA estimates that the target for getting 75% of the rivers into this near-natural state would take around 200 years to achieve on the current rate of progress.

The net result – a very unsatisfactory outcome

The net result has been both costly and unsatisfactory. It has been the opposite of an integrated catchment approach. The way the periodic reviews have been conducted has been compounded by the way the Common Agricultural Policy (CAP) subsidies have worked, and the approach to flood defence. On top of this, housing and other developments have paid insufficient regard to the flooding and pressures on water resources, and indeed on their contribution to the exacerbation of storm overflows. Waste policy – or rather its absence – has allowed wet wipes to clog up the sewers and the proliferation of plastic and other pollution.

[7] HM Government (2018), "A Green Future: Our 25 Year Plan to Improve the Environment".

This is a siloed approach: each dimension of the catchment is considered largely in isolation. Farmers are subsidised in ways that often result in pollution, houses are built in the wrong places, water bills are inflated by the focus on concrete. Flood defence is focused on those properties at most risk of flooding – a policy that does nothing to discourage building in the locations at most flood risk – and flood insurance cross-subsidises these houses that are either in the wrong place or are affected by an increase in flood risk from surrounding developments. Plastics escape proper pollution charges and wet wipe producers do not pay to deal with these once they have been used.

Though the EA claims to do catchment planning and management, and indeed is supposed to do this, there is no *effective integrated* planning and no mechanisms for ensuring that the optimal catchment investments are made, which take into account all the users of the catchment and all its various natural capital dimensions.

The immediate response to public outrage has been to do some ad hoc interventions to allow additional CAPEX to make a small number of small stretches of rivers fit for swimming and then to bring forward investments.[8] This is an example of the periodic review process breaking down, and the critical bit is that all of these are to be paid for after the next periodic review, maintaining the cake-ism fiction – more environmental clean-up now, but no increase in current bills. The first set of projects is designed to help the recovery process and create jobs post the pandemic. This is a far cry from a coherent water catchment investment framework. The second is to be "seen to do something" in the face of public pressure. In the latter case the obvious question is: why are these advances in investment the right thing to do now, but were not the right thing to do at the periodic review just completed? Newspaper headlines, together with the *Panorama* and other film coverage, is the most likely explanation.[9]

The way to think about this

The starting point for putting together a coherent and sustainable water policy and associated framework is to recognise that the EA–OFWAT periodic review approach of

[8] OFWAT (2021), "Green economic recovery: Overview of draft decisions", 17th May.
[9] "The River Pollution Scandal", *Panorama*, 27th April.

the last 30 years has broken down, and that simply adding sticking plasters (like the ad hoc adjustments above) is not going to work. The approach is broken, and it cannot be patched up. It is simply not sustainable, and therefore will not be sustained.

If it was ever true that the investment required in the water industry could be met *in this framework* without large increases in customer bills, it clearly is not anymore. Maintaining this political fiction is one of the reasons why the assets are in the state they are. It has been made all the more unrealistic because the companies were privatised at about 10% of their current-cost values. Hence as they are replaced with modern equivalent assets, there were bound to be price increases. This is another inconvenient truth about water privatisation which successive governments and regulators have managed to keep below the public's radar.

This means that PR24, the next periodic review, cannot be framed under the RPI (or CPI)-0 umbrella. It is not going to be possible for the companies to come up with business plans within this price envelope and address the serious environmental challenges – in particular the ambitions within the 25 Year Environment Plan. Something has to give.

There are broadly four corner solutions:

(i) The environmental enhancements are dropped back to the level compatible with CPI-0.

(ii) The customer prices go to whatever level is necessary to meet the environmental objectives in the 25 Year Environment Plan.

(iii) The taxpayer steps in.

(iv) Other revenue streams are identified.

In practice there are many packages which marry up some parts of these options, and within each there are measures that could be taken to soften some of them. Some of these are discussed below. But before the options are refined, there is one stark and

hopeful part of the jigsaw that needs to be addressed, and which could radically reduce the total cost without compromising on the environmental objectives.

The way to think about this opportunity to be much more efficient and to reduce the costs is to take any major catchment and add up all the environmental expenditures in each of the silos. With this total from flood defence, water and farming spending in mind, ask a simple question: *is it possible to get less for the amount spent*? Put the other way around, if this siloed approach currently neglects the system characteristics of a catchment, then it is possible to get more environmental benefits for the level of current spending by taking an integrated approach. *We could have a better water environment without increasing water bills so much*. Digitalisation should add further to the efficiency gains.

Instead of doing things in silos, try the following thought experiment. Again, take the whole catchment. Assess its natural capital by running a detailed baseline survey of each layer of natural capital. Identify the key problems within the catchment. Translate these requirements into a set of possible enhancements. Re-run the baseline pairwise against each enhancement, and with each work out the aggregate natural capital benefits (and any damage caused by the specific enhancements). Now re-run the baselines with the package of enhancements. Constrain by a budget the amount of spending allocated for the full catchment, net of revenues. Finally check against the counterfactual to take account of what would have happened to the baselines in the absence of the enhancements.

This multiple natural capital catchment approach to catchment simulations leads to multiple benefits. Some enhancements sequester carbon. Other enhancements improve the soils and increase the sustainability of farming. There will be all sorts of public goods that emerge, benefiting recreation, fishing, swimming, boating and other sources of physical and mental health, whilst at the same time improving river quality, reducing flood risk and increasing biodiversity.
Some of these extra natural capital benefits may attract new revenues to the catchment, such as the carbon offsets. They may contribute to economic growth by boosting the hospitality and leisure industries.

The key economic principle here is that catchments (and the rivers in them) are *systems*. They are not sets of discrete assets and investment projects amenable to conventional cost–benefit analysis (CBA). Everything affects everything else. The current approach by the EA and OFWAT and the agricultural side of DEFRA largely ignores this system dimension. As a result, it is bound to be costly and inefficient – the only question is the degree of inefficiency.

The new Environmental Land Management Scheme (ELMS) introduced by the Agricultural Act 2020 to replace the CAP could claim to help by adding in public goods. But it is not very focused, or at least not for its Tier 1, the Sustainable Farming Incentive. This is based upon consultant-led, farm-by-farm agreements. It starts bottom-up, and takes no overarching view of the context or, in this case, the catchment. There is some scope in Tiers 2 and 3 of ELMS, but there is no explicit catchment requirement. As George Eustice, Environment Secretary, put it in an interview with *Country Life*: "I want each farm to have a trusted agronomist or wildlife advisor, who will walk the farm and create a bespoke agreement. Farmers will have their mobile numbers, rather than get stuck on a helpline, and there will be more tolerance and less emphasis on measuring every hedge."[10] No other recipient of large state subsidies would be given such opportunities to capture the money. Will the consultant have much idea about the catchment, the baselines, and the direct and diffuse pollution? Will they be able to digitally map each farm? The ELMS approach is analogue in a rapidly evolving digital context.[11]

How to do the catchment approach

The way to create a catchment approach is to designate someone to be in charge, instead of lots and lots of "stakeholders". This should be a *catchment system regulator*, tasked with designing a *catchment plan*. I have elsewhere set out in detail how this would work.[12]

[10] *CountryLife* (2021), "A minister for all seasons", p. 54, 3rd March.
[11] For an analysis of the Agriculture Act, see Helm, D. (2022), "Agriculture after BREXIT", forthcoming in *Oxford Review of Economic Policy*.
[12] See Helm, D. (2019), "The Systems Regulation Model", February, and other papers covering the topic of catchment on my website: www.dieterhelm.co.uk.

The catchment regulator's job is to find the least-cost ways of maximising the benefits, against the baseline. The priority is to hold the line and prevent deterioration. This is capital maintenance: to stop the system assets deteriorating, so at least the next generation gets catchment assets at least as good as they are now. Then comes the options of improvements to meet the aims of the 25 Year Environment Plan.

The catchment regulator has a budget to auction, comprising the monies that will be paid by customer bills, the ELMS and other land subsidies, any subsidies for carbon sequestration over and above carbon offsets, and the flood management spending. With the catchment plan, the system regulator auctions the outputs against its combined budget. It asks how outputs might be achieved. For example, some party might propose to reduce the flood risk by building a flood defence, like the canal around Oxford.[13] Someone else might instead propose a land management programme capable of holding flood water on the land instead.

The water companies post their business plans on the catchment system regulator's website – in effect their bids setting out how they plan to meet the capital maintenance and enhancements of the natural capitals in the catchment plan. This step is what they have to do anyway in the periodic reviews. Anyone can bid in alternatives and lower costs against the costs and options in the water companies' plans.

It is easy to see why the main incumbent parties might not like this approach, and will almost certainly lobby hard against it by employing consultants to write reports in criticism of the framework and by engaging in media and political briefings and lobbying. The farmers might feel threatened by the catchment plan, and argue that their current practices and their rights to extract water (and implicit rights to pollute) might be questioned. They will resist their obligations as polluters to pay for the pollution they cause. They may prefer ELMS to replicate more closely the CAP Pillar 1 payments through the "farmer-led" farm agreements. The EA might not like its costs and practices being challenged in flood management, and especially might not like its activities being

[13] Environment Agency (2021), "Oxford Flood Scheme", policy paper, 17th May, Oxford Flood Scheme - GOV.UK (www.gov.uk).

opened up to competitive tendering.[14] The water companies might not like others being able to challenge and compete for parts, or even all, of their business plans. The producers of wet wipes and other plastics might not like paying for the consequences of the disposal of all those wet wipes through sewers by being made to meet producer responsibility. Finally, OFWAT might not like the implication that it should be abolished and replaced by the catchment system regulator.

My proposals upset all the main parties, in a system that to date has underpinned and rewarded most of them, and it explains why there is so much inertia. But then if the integrated catchment approach is not taken, the current sad state of these river catchments is likely to be perpetuated, punctuated by ad hoc interventions, such as the recent spending announcements to improve a very small number of rivers. Refusing to tackle the unsustainable practices does not make them sustainable, and what is unsustainable will eventually not be sustained.

What will happen?

There is a unique constellation of developments which could foment radical changes, and in particular a move towards catchment system regulation. Part of these are technological. Digitalisation has changed the game. We now can know what is going on in very close detail. It is one of the reasons why the public has found out what is going on and is horrified by what they have discovered. We are increasingly going to be able to know what is happening in each stretch of river, at each sewerage outflow and on each few square metres of farmland. Pictures get taken, concerned people network and share information, digital mapping leaves less place for polluters to hide, the torch is getting brighter, and the truth will be out.

The second is BREXIT and the follow-through it mandates, the Agricultural Act and the Environment Bill. BREXIT and the Agricultural Act mean the government cannot hide behind the European Commission and the CAP. It has now "taken back control" and hence it has taken back responsibility. ELMS, seriously flawed though it is, does formally advance the principle of public goods for public monies, and the polluter-pays principle

[14] The Chair of the EA wrote a letter justifying its approach in May 2021. See Environment Agency (2021), "Environment Agency launches new flooding Action Plan", press release, 12th May.

is gaining ground. If it is British taxpayers who are paying for the bulk of the 0.6% of UK GDP that the agriculture sector produces, it is inevitably going to mean that the British taxpayers (and the Treasury) are going to want to shape the sector's future.

A similar logic applies to environmental policy. Even before BREXIT, the 25 Year Environment Plan was gaining traction. It has bold ambitions, and it also mandates a process of development, implementation and monitoring. Again the torch is getting shone more brightly on what is and is not being achieved.

A first step is going to be the new statutory water targets, due in 2022. These should and probably will be a radical break from the WINEP approach. The 25 Year Environment Plan promotes close to natural rivers, not WFD-style silo targets. These cannot be achieved without a much more comprehensive catchment approach, integrating farming and flood defence within the frame of a strong preference for natural capital enhancements.

To these is added the 2019 amendment to the Climate Change Act, and the net zero 2050 target. As the Commission on Climate Change (CCC) has rightly recognised, not least in its 2021 progress report,[15] net zero cannot be achieved without a serious and comprehensive revision of the approach to land management and farming. The Adaptation Committee of the CCC has further pointed to the implications of climate change, which will inevitably change the way land is used and managed, and the need to create more resilience. Carbon farming, carbon storage and additional carbon sequestration in catchments are necessary parts.

Technology plus the three new and major legislations change the game: for the first time in over 40 years, there is a UK set of agricultural and environmental policies (with variations for each of the developed regions). Digitalisation radically changes the efficiency and transparency of each of these. Net zero necessitates a transformation in land use.

[15] Commission on Climate Change (2021), "2021 Progress Report to Parliament", 24th June.

To these hard system changes, there are the softer bits of public perception, priorities and the political consequences. Covid-19 has highlighted the importance of physical and mental health, to which rivers, river banks and catchments contribute greatly. This has been reflected in the major increase in visits and enjoyment during the lockdowns. A large number of people have had new experiences, and they have in some cases come face to face with sewerage and wet wipes in the water and on the river banks.

Covid-19 has also hit some sections of the population hard financially. It is naive of environmentalists simply to assume all of the above will translate into a willingness to pay personally for the necessary step change in the water sector, just as this assumption is naive when it comes to climate change. The appeal of cake-ism is very much alive: the public want the investment in water and climate mitigation and sequestration, but they want someone else to pay for it.

This brings us back to the four stylised options above. The costs will not go away just because people do not want to pay them. If the investment does not take place, the rivers will deteriorate further. This can only be confronted by a combination of finding substantial extra savings by integrating the agricultural, flood defence and water budgets; and finding efficient integrated system opportunities. This should significantly reduce the gap between CPI-0 and the environmental spending requirements. Revisiting the cost allocations between the different customer classes, introducing a basic social water tariff and redistributing costs to the better off is going to have to happen anyway, not least because customers cannot be cut off if they do not pay.

Finally the sheer inefficiency of the five-year period reviews, the way the cost of capital is calculated and the proliferation of financial engineering can and should be brought to an end. Indeed, it will have to be. If and when interest rates start to rise, the abnormality of the last 30 years of ever-lower costs of capital will inevitably come to an end. The cushion will be taken away. It is hard to imagine that, faced with the sort of increases in bills that a sustained rise in interest rates will bring, the water companies and their investors will be able to get away with some of the sorts of behaviour of the last 30 years. The practical question will be how this will unravel – whether share prices fall sharply, credit ratings are pushed up as a result of the high gearing that is the outcome

of the financial engineering, and current owners take a bath, or whether the consequences of a more hostile context for investors encourage a return to the European model, and more local or national public involvement and ownership. A rational investor would either take cover or push hard for the catchment system regulatory model.