The Protection and Conservation of Water Resources
This greatly revised second edition is dedicated to the former staff and students of Wye College University of London. Wye College was world-renowned, having worked for more than a century towards inter-disciplinary teaching, research and scholarship aimed at achieving better understanding of the rural environment worldwide. The Wye Campus was eventually closed in 2009 by Imperial College London. Wye College remains much lamented.
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Preface

Allegedly a London cabbie asked the philosopher Bertrand Russell: ‘Woz it all abaat then, Bertie’? The great thinker was stumped. Decades later, we too are invited to present ready solutions for the management of natural resources, but there is unlikely to be neither a Eureka, nor a ‘Crick and Watson moment’. No technical fix and no economic model so far seems, by itself, to offer hope and we are invited to contemplate this. For current water resource management options present only a tantalising à la carte menu to policy makers and environmental commentators.

In the preface to the original book, I recalled the drought year of 1976 that I experienced as a student. I had transferred from the Faculty of Social Science to that of Pure Science and I recall twice being quietly told ‘not to make too much of your prior affiliation with social science’. This well-intentioned advice was to prove outmoded in a career that, like many water professionals, found me with a foot in both camps – I had to make a return journey. More than ever, water is about politics and since the dry year of 1976 we have learned that hard subject barriers only hinder progress.

Then the brave new world of the 1990s in water governance started to feel creaky, and what is both interesting and galling for an author, no easy solution was presented. At privatisation of the water industry talks in England and Wales, neo-liberal values were in the ascendency, although critics talked of ‘a privatisation too far’. Following the re-organisation in the wake of the 1989 Water Act, regulation was seen as not only a means of looking after the water environment but, because water is a natural monopoly, regulatory arrangements represented customer interests in the absence of true market competition. It was fear of market failure that drove changes. The big question was: how could governance arrangements generate a kind of pseudo-market that bought ‘private sector efficiency’ to erstwhile publically owned enterprises and also allow functionality as an environmental steward?

There would be fears arising out of privatisation of what hitherto had largely been a public service. Would it increase water bills? Yes. Might certain privatised entities fail? Kind of; Enron who owned Wessex water collapsed in 1998, but the water company was sold to YTL Corporation. Safeguards exist for privatised utilities. The troubled Yorkshire Water once flirted with ‘going mutual’ and Welsh Water (Dwr Cymru) has been running on a ‘not-for-profit’ basis to some effect; owned by Glas Cymru; it is a private company limited by guarantee. Foreign domination? If euro-sceptics fear this, the Thatcher and Major administrations seemed to care little for non-UK ownership of such a key industry. Re-structuring after 1989 saw fears over sovereignty trumped by ownership
outside the UK in many instances. Matters European? We do not know the actuality if EU-derived regulation of the water environment following future changes in the UK's relationship with the EU. Investment? The industry was now free to invest through borrowing, but things like leakage and disputes over new reservoir construction continued and the real and complicated fears around groundwater quality and quantity have remained. Climate change? Scientific and political orthodoxy grew to a strong consensus – this process was not only real, but also largely human-induced and water resources were inevitably centre-stage. In the winter 2011/12 one borehole in the Wiltshire chalk apparently ran completely dry. Of course, one borehole does not a dry summer make, but then it rained and rained through the summer of 2012 and later there was serious flooding in early 2014. Have emergent governance arrangements made a difference? This is probably the hardest question. While we know a lot of technical information and are increasingly learning more about the human condition in environmental governance, limited achievements in reaching the Water Framework Directive goals by 2015 raised scarcely one cheer, so who has failed? Government? Regulators? Water undertakings? The great British public? Where is any modern National Water Strategy?

By the late 1990s a discourse that boiled down to 'water as a public service' versus management through privatisation and the profit motive seemed to morph into something far more intricate and subtle. While many problems could be solved technically given sufficient investment, there had to be limits to spending, and that large place referred to as 'the environment' required protection in order to provide environmental goods and services. And, for a political scientist, it contains groups of humans – the water industry itself, water consumers, flood victims, farmers, statutory regulators, conservation interests and so on – all graced with the name 'stakeholders'. These folk may well ask: Why cannot clever engineers make flooding a thing of the past? Is guaranteeing the consumer and endless, clean and cheap water supply a 'big ask', given all those scientists employed over decades? Why cannot farmers keep nitrates, phosphates, certain animal sources of pathogens and eroded soil out of natural waters? What should we do about transgressors of good practice and, given the strong legal basis for water governance, does compulsion actually work in the long-run? Why did not the huge investment opportunities created around 1990 greatly enhance regional and national water supply schemes? Actually, no new bulk transfer schemes have since emerged and it is natural to ask whether the 'national interest' can be served by private capital interests? Governments of various hues had the opportunity for investment before the 'credit crunch' of 2008. Finally, why has Scotland retained a water industry that is effective and operational within the public sector?

Recession or not, the main political parties became viewed as negligent in terms of environmental protection or promoting 'green living'. In general, there is a protracted disillusionment that strongly suggests unease with an entrenched neo-liberal ascendency. Might we enjoy a fairer world in terms of resource management and allocation? How is that to be achieved? But there are subtle changes and these would seem to relate to a change in politics towards single issues and a rise in public consultation or participation, however achieved. The left apparently abandoned ideas around 're-nationalisation' while centre-right, keen to reduce government borrowing and expenditure, once proposed expanding voluntary activity in the 'Big Society'.

If we next presume for the moment that we have sufficient technical information and 'present knowledge will do', then where are the changes in our thinking around water?
They are no longer only rooted only in natural science or engineering. There are economic considerations of course, but the impending revolution in water management relates more to the ‘why, for whom and how?’ than it does to presumptions about human need. Delegated public organisations were once created for, and charged with, the delivery of clean and continuous water supply. Is there a role for the ‘third’ or voluntary sector?

We may have seen strong elements of a ‘rolling back’ of the state, particularly in ownership of key industries, yet statutory regulatory bodies remain. The naked profit motive deemed the way forward at privatisation is criticised when dealing with natural resources. However, voluntary sector organisations are fairly described as ‘value-driven’ and ‘not-for profit’. They are also an outcome of well over a century of historic alignment of voluntary action with human welfare. It will be argued that groups who view themselves as beleaguered (smaller farmers are a good example) increasingly have a say, and their concerns are being better heard, at least in catchment management, through a range of diverse organisations.

Just when you thought it was over, concerns over water shortage turned once more to excess of many kinds. The proverbial sediment is still settling from the floods of December 2015 that continued into the new year. These devastated many settlements, hitting houses, businesses, roads and bridges across the north of England and in parts of Scotland. The government went into overdrive trying to justify its flood policy and expenditure.

Flooding is very serious, although one can be excused for seeing the funny side - at least where politicians are concerned. Prior to the flooding across northern Britain of winter 2015/6, January 2014 saw upwards of 200% average monthly rainfall (1981-2010) across much of central and southern England to say nothing of the coastal battering that hit the south west and elsewhere. Preceded by previous serious events hitting Cumbria, York, Kingston-upon Hull, places in the Midlands and elsewhere since 2000, it seems that serious destructive flooding is more than ever an issue in Britain.

Perhaps recalling initiation practices at public school the elected Conservative member for Bridgwater and West Somerset (a descendent of Queen Victoria), Ian Liddell-Grainger MP, stated that:

‘Chris Smith is a coward, a little git and I’ll flush his head down the loo’ (Mail Online, 6th February 2014).

Apparently this was on account of his handling of the flood situation on the Somerset Levels and Moors which, like flooding in 2015/6, truly horrified the country. It is reassuring that the noble Lord (Smith), then the Chairman of the statutory Environment Agency, made a more measured reply, genuinely agonising over the cost and prioritisation of flood defences.

Then as flood waters remained at unprecedented heights within living memory, the then Secretary for Communities and Local Government, Eric Pickles MP, unreservedly apologised for both government and Environment Agency (The Guardian ‘Environment’ 9th February 2014) causing one prominent academic in the field to claim he ‘would be more use as a sandbag’. Among the actual points for discussion included costs of defences in general, and specifically dredging (or the alleged lack of it) within certain main Somerset rivers. Then, we all knew it was going to be alright when another descendant of Queen Victoria (Prince Charles) was filmed taking a boat through the flooded Levels.
The question of farmers and the floods is very interesting and within it we can see a
dispute between agricultural systems. Clearly, small farming enterprises lost out badly
and it was comforting to see not only a public outpouring of sympathy, but real practical
help from the farming community across the country (Western Daily Press, 10th
February 2014). Activities on the Somerset Levels and Moors are famously located in the
livestock sector, and in recent decades farmers there are enrolled in agri-environmental
schemes that provide for environmental benefits as well as agricultural produce. However,
detractors from the agricultural sector were quick to blame their arable
counterparts farming up-catchment, especially those who indulge in farming fodder
maize (BBC News: Science and Environment 7th March 2014).

In June of 2014, when one could walk along the rivers of the realm admiring tide-
marks from earlier in that year, a piece of Radio 4 announced that the Environment,
Food and Rural Affairs Committee published its report into the winter floods of 2013-14.
Launching its Report on Winter Floods, the Chair of the Environment, Food and Rural
Affairs Committee, Anne McIntosh MP said:

“We have repeatedly called on the Government to increase revenue funding
so that necessary dredging and watercourse maintenance can be carried out to
minimise flood risk, yet funding for maintenance remains at a bare minimum.
Ministers must take action now to avoid a repeat of the devastation caused by the
winter floods.” (House of Commons Select Committee, 17th June 2014).

The Committee called for fully funded plans to address a backlog of dredging and
watercourse maintenance. It is also important to maintain the growing numbers of arti-
ficial flood defences. There should be better funding arrangements from an Environment
Agency and it should be flexible, including a degree of localism for:

‘the devolution of maintenance activity to internal drainage boards and to local
landowners, wherever possible. The Committee also urges the Government to
address the confusion over maintenance responsibilities through a widespread
education campaign.’

A group of MPs criticised the lack of investment in dredging (not only Mr. Liddell-
Grainger). This may have mitigated some of the flooding to a small degree, as would
more investment in physical flood defences, but economic cost is considered part of a
strategy. A balance should be sought. Such debate may not sound as exciting (or ridicu-
los) as politicians trading insults, but professional interest lies in a need to learn lessons
and optimise outcomes for all involved.

Sadly, people and property will always get wet. Lessons must be learned about rights
and wrongs, angry MPs, dredging or farming practice. Self-evidently, these are political
matters – the small ‘p’ being deliberate. There is a failure of faith in institutional action
and likewise in confidence in scientific and technical knowledge or practice. Importantly,
blame is generally sought with perpetrators identified. Taxes are paid to solve problems
while political arguments, however crude, are generally framed at first around either
excess or shortage of water. We may then ask if there are associated changes afoot set
within such a discourse? These will inevitably reflect present changes in intellectual
movements around ‘civil society’, perhaps a retreat from big government manifest in as 'statism', or indeed corporatism of big companies or institutions that are ‘top-down’ in nature, to be replaced by ‘localism’.

Localism, once the preserve of the historic British liberals is manifest across much of the political spectrum. To coin a phrase oft used by that most successful of water NGOs, the rivers trusts, ‘citizens are growing webbed feet’. In towns they are pulling the ubiquitous supermarket trollies out of rivers, in country they are organising to talk with all who ‘work, rest and play’ in rural catchments and in both instances farmers and water industry talk with young and old and often in a welcomed educational context. Yet the retreat from top-down must never be confused with an abdication of responsibilities by the state and its institutions. Most water professionals will agree there remains a need for good and effective regulation set within agreed boundaries, and this still costs public money!

The change has left any pure technological optimism behind. Terms like ‘governance’ replace old unpopular terms like ‘government’ and ‘regulation’. For the Euro-fan there has been the Water Framework Directive (WFD), that, whatever its implementation problems, remains a kite-mark for river basin management. We must strive to meet its goals, even if member states often ask what these may actually be. Basic philosophical questions are asked as outcomes drive expectations and in its wake we ponder ‘what is good ecological status?’ More accurately is asked ‘when was good ecological status?’. Meanwhile and never hitherto heard of in fortress Britain is the requirement in article 14 for ‘public participation’. After all, the spirit of such Water Acts as those passed in 1963, 1974, 1989 and so on was ‘we know what is good for you’. While the ugly overworked term ‘technocratic’ was bandied about.

In recent decades, the revolution in water governance is political rather than technical or scientific and no practitioner has been left behind. As I undertook the accustomed conference and workshop round in connection with the UK Research Council’s Rural Economy and Land Use Programme (‘RELU’ that was funded 2003-2014), staff of agencies were to be seen sporting badges sporting titles such as ‘Public Participation Officer’. They spoke of engagement and were keen to talk with academics and with those whose livelihood was affected by regulation. That is a result.

I often start talks to professionals and students with a flip cartoon involving a be-suited and bowler hatted figure declaring himself ‘from the English Rivers Agency (an invention)...and I am here to help you,’ this is a weak jest stolen from an old quip about the Inland Revenue (latterly HMRC). Association with farmers and others tells me that, at best, there is widespread scepticism around such approaches. The gap is exposed between WFD aspirations and actually doing something about such as diffuse pollution or flooding involving real farms and real communities. Yet efforts towards solving problems require not only investment in infrastructure or technical expertise but also ‘human capital’. That is, individuals who visit and engage with communities as well as proffer advice.

We have all learned a new language, and that became the terminology of public participation, the voluntary sector and (to an extent) economics. We are invited to contemplate stocks of human capital, public engagement, knowledge transfer and various kinds of ‘actors’ and ‘stakeholders’. Grown men and women, engineers, hydrologists and ecological scientists, twizzle the stem of wine glasses and mumble about ‘opinion formers’,
‘capacity building’ in diverse ‘stakeholder communities’. From a top-down view (whereby there had to be losers in the game of environmental gain for a presumed greater good) we may be witnessing (or at least seeking) a new *uber-demokratie*. Now everybody is using a curious corporatist language in an effort to better manage water resources. With new emerging ‘governance environments’ we are entreated to think about markets, hierarchies, networks and (above all) communities. Regarding membership of the EU, we may ask when might Article 50 be invoked, what will be the UK’s relationship with EU in future and what will be the impact on water? There will nonetheless remain a race to reconcile the central state and local concerns, and all sectors: private, public and voluntary, are involved. This volume is humbly offered as the log within a continuing journey, rather than set of prescriptive answers.

Enjoy!

Salisbury, January 2017

*Hadrian F. Cook*
Preface to the First Edition

In many respects, Tuscany and Kent are very different. I smiled when an Italian student likened the landscapes of the two places, yet one Saturday during August 1995 I had to agree with him. Driving through Kent I observed that the harvest was well under way with golden fields of wheat being attacked by combine harvesters. Large bales of straw were left, like many cotton reels, among the uniform stubble, and in the intervening fields the grass was brown. By the end of the month leaves on trees were wilting and so were the understory plants in the broadleaved woods.

Almost 20 years earlier, 1976 was abnormally dry and will always remain in my mind. I graduated that year and recall the distraction of the exceptionally hot weather in Sheffield during finals, followed by a holiday in Wales, unusual for the fact that it did not rain. This was enough to turn a young geologist towards water resource issues in later life; but 1976 was not to prove unique.

Back to the 1990s, and in the late summer of 1995 a radio programme expressed concern for the East Anglian sugar beet crop, but the media preferred to concentrate on unease about the water industry’s management of resources. Yorkshire Water was the first of a number of water companies who applied to the Department of the Environment for drought orders: reservoirs were reported to be at only one-third capacity. These were the first requests for ‘orders since privatisation in 1989. In mid-August, the Meteorological Office was able to make statements that this was the driest summer since 1727, and the hottest since records began. One estimate put the summer at a 1:200 year ‘drought event’.

Events naturally threw water supply issues into focus, and water companies in particular were criticised for not investing sufficiently in leakage control.

September proved to be above average for rainfall in areas of England (sadly the Lake District was not in this category) and there were floods in eastern Scotland. By late September, with rain lashing down outside, Yorkshire Water were defending their persistence in seeking drought orders. Meanwhile South West Water was criticised for water losses from their reservoirs. The ‘re-wet’ was not to last: around the country reservoirs were not replenishing at a fast enough rate and conservation was deemed necessary ‘well into autumn’. By April 1996 there was serious concern for groundwater reserves in Kent, a situation which persisted into the following year.

Whatever the cause of the shortages (and with rising demand, much can be attributed to inflated public expectation of the resource), there are problems to be addressed. Increasing bulk supply would not seem viable in most of the drier areas of Britain. Matters of water quality, of ecological conservation, a switch to demand management, economic issues of investment and pricing, political and ethical concerns about
ownership and regulation, social justice, and use of water are all critical issues. 'Commodification' has led to a move from public service to tradable commodity and caused a massive break with the past. Water is viewed as a consumer item, and there are increasingly stringent regulations upon quality. There are signs of hope, however, when somewhere in excess of 97% of supplies meet stringent European Union standards.

The privatisation of water and sewerage utilities in England and Wales proved the most controversial privatisation of all. Attacked in the media for increased charges to the consumer, private water companies countered such criticism by talking about the high level of investment since 1989. Across the 10 privatised water and sewerage service companies, chief executives received salary packages totalling almost £1.7 million in 1994/95, while typically 25% of treated supply was lost through a leaky distribution system. Here is the stuff of controversy. Water companies are increasingly the target of takeovers, hostile or otherwise, and of mergers, real or threatened. With the water industry tradable, there are many potential problems.

Changes in environmental regulation since 1989 have proved uncontroversial, and indeed may already be a success story. Since 1 April 1996 there was a new Environment Agency for England and Wales and a Scottish Environment Protection Agency. Water shortage, water quality and environmental conservation continue to provide a real test for these – and indeed other – regulators to represent local, public and national interests.

Water managers have long stoically maintained that periods of low rainfall were a part of the natural order and not a portent of change. Then a meeting of the Intergovernmental Panel on Climate Change in Madrid during November 1995 made an announcement to the effect that changes in climate were occurring, and these could most likely be attributed to anthropogenic activity, specifically the emission of 'greenhouse gases'. In the water world, changes in ownership and operational problems have overshadowed wide-ranging changes in regulatory institutions and water- and land-use policy. This book aims to rectify this oversight and place such new developments centre-stage, where they belong.
Acknowledgements

It is hard to recall all the individuals who have supported and inspired me, enabling the production of this volume that is humbly offered in an effort to capture the zeitguist in environmental management. Inclusion in the list below does not imply agreement with any opinions proffered. A fair list would include the staff and students of the former Wye College, University of London, colleagues, students and library service of Kingston University, the Harnham Water Meadows Trust, Salisbury, participants in the RELU programme, especially those encountered at conferences whose lapel badges have not all been retained in memory, and my immediate family: Clare, Greg, Ellie and Alasdair.

It would still be unfair if I did not include a few of my immediate associates who have helped in so many ways including reviewing my work and supplying information. They are: Dr David Benson, the late Dr Dylan Bright, Dr Laurence Couldrick, Dr Roger Cutting, Dr Stuart Downward, Dr Jon Hillman, Prof Kevin Hiscock, Mr Alex Inman, Prof Andy Jordan, Prof Keith Porter, Mrs Mary-Jane Porter, Mr Arlin Rickard, Prof Laurie Smith, Dr Kathy Stearne, Mr Jacob Tomkins OBE (who read and commented on the entire draft) and Dr Martinus Vink.
Introduction

A spectre is haunting Europe – the spectre is Integrated Water Resource Management (IWRM). In environmental management terms, the powers of old Europe are at last collaborating. The problem is, as far as politics are concerned, this important issue lags behind democratic enablement and action over climate change. More specifically, diffuse pollution remains a largely unsolved issue and serious flooding seems to re-visit Britain with a vengeance. Water resource managers would be excused for crying ‘me too’, after the proponents of climate change have had their say.

We have actually been victims of poor river basin management for longer than we have worried about climate change, for this only hiked up the environmental agenda during the 1980s and 1990s. For achievements based in river basin management date back to the hydraulic civilisations in Mesopotamia, Egypt, Sri Lanka, the Indus valley, China and various locations in the Americas. In Europe, spectacular water management is historically associated with the Romans (draining the Pontine Marshes and complex water supply arrangements involving aqueducts) or with Moorish Spain. Furthermore, it is interesting to observe medieval irrigation and drainage associated with monastic houses.

Whole books have been written about water in Britain, including London’s water supply. Tales of the Great Stink from sewage in the Thames (which closed Parliament in 1858) and the daring-dos of Georgian, Victorian and later water engineers such as Joseph Bazalgette, C.H. Priestly or the John Rennies (father and son) who worked in so many areas of engineering, came to stress personalities. Also of continuing interest are magnificent water treatment works and reservoir construction in the British uplands. Those in the Elan valley and Lake Vernwy remain controversial in a devolving Wales. The whole of nineteenth century activity was underpinned by legislation, largely aimed at industrial pollution in the north of England, industrial areas of Scotland, and likewise in Wales. In the south, aside from a few industrial problems relating to light industry – was the problem was sewage. The Rivers Prevention of Pollution act 1876 and the vision and foresight of engineers had vision and foresight for not only practical matters, such as inter-basin transfers, but also administrative issues. For example, Frederick Topliss (1879) foresaw a need for Regional Water Authorities (realised 1974–1989) and his conjectural boundaries bare a recognisable likeness to those of the water utility companies today.

Catchment institutions really start with the mid-Victorian Lee and Thames Conservancies (Cook, 1999) but such organisations reflected more the concerns of elites for they were really concerned with salmonid fisheries, rather than with public health.
Yet Victorian Britain was also a place of considerable advances, both legally and technically. We are reminded of extensive sewage improvements in London sewers by Bazalgette (1858-1865) and imaginative water supply improvements in other British cities as well as pioneering legislation to protect rivers (Hassan, 1998). London's Metropolitan Water Boards, on the other hand, pioneered public water supply yet was an early exemplar of over-abstraction, of springs in Hertfordshire beyond the boundaries of London. John Sheail (1982) reports this change, noting the genesis of urban-rural conflict. In modern parlance, not only is there the expansion of that city's 'ecological footprint' beyond the metropolitan area, but there was, in the 1890s, serious signs of poor stakeholder engagement leaving resentment. Environmental history as a sub-discipline carries with it useful lessons for the ‘sustainable development’ debate.

In our own generation, we are indebted to the various editions of Malcolm Newson's book, *Land Water and Development* for raising many issues bridging technical and human problems. On the other side of the pond, New York City had commenced damming valleys for water supply reservoirs in the Catskills in the 1900s, a process that was to continue for some 60 years. This left a legacy of 'bitterness and resentment towards New York City', for it took at economically difficult times, fertile valley-bottom land from agriculture (Keith Porter, 2004, *pers comm*). Curiously, persuading the good folk of upstate New York to protect their catchment for water export to NYC became a major milestone not so much in the undoubted achievements of engineers, but also in community engagement. With associated economic support, it must be added.

Since the creations of all-embracing Regional Water Authorities in 1974 there have been three ‘revolutions’ in British water management, although not all reached all of the UK. The first was largely economic, that was the privatisation of the utility side (water supply and sewage) and its separation from regulatory bodies. By 1990, apart from ten privatised RWAs, there were a number of (already) private water supply companies in England and Wales and their number shrank to 16 with mergers and acquisitions. Scotland had a re-organisation into water boards, but the overall ownership remained public, as did those in Northern Ireland. For England and Wales, Ofwat represented consumer interests and enacted economic regulation in the absence of true market competition (water is a natural monopoly), the Drinking Water Inspectorate represented human health interests and the National Rivers Authority (incorporated in the Environment Agency in 1996) became the environmental regulator. The path was apparently set for cleaning up Britain's rivers and protecting groundwater resources.

The second ‘revolution’ at about the same time was scientific and engineering in nature. Attitudinal shifts within water management, through RWAs, privatised utilities or regulators, moved dramatically towards conservation. ‘Soft engineering’ and landscape values (for which we can partly thank Jeremy Purseglove’s influential, if somewhat polemical book (1988 and 2015 editions) were all part of a means of managing water and landscape with conservation in mind. Things were moving beyond mere fish conservation towards a re-engineering that resurrected a presumed pre-industrial world. For all its philosophical problems, the drive towards conservation and re-creation of Britain’s historic landscape was set for a generation, maybe more.

The third revolution was largely political, although inevitable social change (including attitudinal shifts) and economic changes (involving funding for voluntary sector initiatives and new means of agricultural incentivisation) will produce a main theme of this book. This is the most nebulous of all three and it may take us into a firmly political
direction, yet it displays a more uncertain outcome that either of the other two. This is the governance revolution. On the one hand, it incorporates ‘top-down’ regulation from the European Union and ‘bottom-up’ factors at the catchment and community level.

These changes have to live with technocratic institutional arrangements from the past, with statism, with regulated private undertaking and with conservation imperatives such as angling, flood alleviation, carbon sequestration, habitat enhancement, soil conservation, historic landscapes and more. It is of great significance that ‘the public’ engage with some more than others (flooding and water quality being two examples) although complaints about water charges may also be heard.

This clumsy grafting of top and bottom is egregiously political, yet it does not really refer to any of the UK’s political institutions at levels below national government. This is partly historic; there is virtually no residual legislation relating even water as a public health issue for county, borough, unitary, district or parish councils. Yet we look to these to represent our interests. Like health, but not education, there is really no linkage with local government. Parish councils, on the other hand, may suffer from problems of engagement and seek a role, yet their commonest activity is in related areas of environmental management such as re-cycling. Certain organisations have sought to remedy the situation; Hampshire County Council had proposed a system of water advocates in the former Hampshire Water Partnership. Otherwise, there is not much more to report if local authorities are to participate in the revolution.

Critics have been keen to point out the perceived shortcomings of Big Society. This is especially significant where there is a feared overlap of public provision with consequent losses of jobs and prospects for public employees. That aside, the role of the voluntary (or third) sector in UK has a long and distinguished history, being supported by governments of both left and rights since at least 1945 (Cook and Inman, 2012) because it can do certain things well, but substitution of public services is perhaps not one of them. As far as managing water resources, the sector was all but absent unless one counts angling bodies and those concerned with conserving water-based features such as canals and mills. It is from here that a voluntary sector initiative was not to replace, but to innovate. The Rivers Trust grew from what were basically angling pressure groups, but took on something of the campaigning zeal of earlier conservation bodies, including wildlife trusts, CPRE and the National Trust.

Such has been the success of rivers trusts since 2000 that both public agencies and private concerns are keen to engage with them. One example to be illustrated in this book will be the Westcountry Rivers Trust who, once it secured adequate funding has been working not only to improve the river environment for the Tamar catchment and beyond, but it becomes mediator in Payment for Ecosystem Services by South West Water to the farming community and plays significant roles in education and even ‘bioregional planning’. It now has the resources to operate as what might be termed a ‘competent authority’ and carries with it considerable gravitas.

The gravitas that comes from trust in turn belongs to an organisation that, as an NGO, is ‘value driven’ and beyond meeting its own running costs is clearly ‘not-for-profit’. In a world imbued with neo-liberal values, the voluntary sector is here promoted, yet the use of NGOs in pollution control is a sign of market failure, because classical economics tells us that pollution is one environmental outcome of a failure in environmental management.
In order to tackle the market failure implicit in the generation of diffuse water pollution, the profit motive is eschewed and an intermediary ‘honest broker’ is engaged. This need not be a public body, for while ‘regulation may remain necessary’, regulatory bodies are ‘official’ and may be less trusted than, say, NGOs while private concerns are profit motivated. Environmental politics becomes complicated.

The voluntary sector is valued by neo-liberal ideologues because it is free from state control and because, as they see it, it reduces state involvement in some responsibilities that require public expenditure. Funds have to be directed (or re-directed) as there is market failure – demonstrated by pollution and loss of habitat. The solution lies – we are told – in market mechanisms, for example, incentivisation is sometimes offered to farmers, this is a market mechanism. Otherwise we are left with motives that are not-for-profit, value driven, supported by individuals who are not themselves market-driven. Statism remains in the regulatory framework. Ownership, for the present, remains in private hands.

Perhaps ideological diatribes are not required for something as important as water. This book will review the panoply of scientific, technical, political, economic and social means of addressing the problems for water in Britain. Sadly, there can never be such a thing as pure objectivity, for normative approaches inevitably play well in most areas of conservation and management. And complexity: we may talk about ‘wicked problems.’ This intriguing definition is about matching technical uncertainty with corresponding societal uncertainty so that, to the faint-hearted, the problem looks intractable. Water resource issues have sometimes failed to be responsive to technical fixes, so that one is forced to look elsewhere. Diffuse pollution is regarded as a ‘societal problem’ because (for example) it arises from interactions of common property, open access resources (of water) with a widely distributed and essential human activity (such as producing food or manufacturing) – to say nothing of the treatment and disposal of wastewater. There remains the awful prospect that only limited strides have been made in solving problems of Britain’s water environment and that we still need to address massive problems rooted in both societal and technical uncertainty.

To summaries this book, Chapter 1 deals with sustainability and water policy, outlining the issues presently at issue and also scope out the challenges. It poses the question: what is integrated water management? Chapter 2 reviews water availability in Britain: is there going to be enough? Chapter 3 explores the dynamic between institutions and legislative framework, its history and includes changes in abstraction licensing and asks if that really is enough in the age of stakeholder engagement? Chapter 4 introduces the catchment approach, Chapters 5 and 6 explore issues for sustaining bulk supply, noting the imperatives of climate change. It poses the question, are we doing enough in context? Chapter 7 explores the contemporary background to water quality issues, describing problems. Chapter 8 describes case studies of catchment problems, both urban and rural including the tools available. Chapter 9 describes solutions in land use change including technical fixes. Are these sustainable, if so how? Chapter 10 is concerned with emerging new governance arrangements and Chapter 11 leaps out of Europe looking as some successful examples around the world, asking how might positive lessons be learned, especially from nearby Europe, North America and Australasia.
1

Water, Policy and Procedure

There is a certain relief in change, even though it be from bad to worse; as I have found in traveling in a stagecoach, that it often a comfort to shift one's position and be bruised in a new place.

Tales of a Traveller, Washington Irving (1824)

1.1 Pressing Needs for Conservation and Protection?

Among the nations, the three constituent countries of Great Britain (England, Wales and Scotland) were early to industrialise and have been that way for around two and a half centuries. While this observation sets the scene for an account of the water resources of Britain, the last 30 or more years have seen dramatic changes away from the heavy industrial sector. Yet problems persist, particularly where ‘technical fixes’ have not provided solutions. Once it was assumed that regulatory measures, and especially ‘end of pipe’ pollution problems are solved (in theory) through consenting and licencing, yet diffuse pollution of waters persists from a range of contaminants and from a range of industrial and other activities. These result largely from the ways by which we conduct our economy and new solutions are sought. Not only is Britain definitively to manage its water resources on a catchment (or river basin) basis, but new political imperatives are emerging that require water management in part to become an extension of ‘civil society;’ this eclipses older ideas about ‘technocratic management.’

This chapter outlines the present issues for sustainability and sustainable development in water resources, and it also scopes out the challenges. This is a tall order, for there is no agreed definition of sustainability or for any prescription of sustainable development. Such received wisdom on the subject is, however, helpful to a point for there is general agreement that three spheres of ‘social’ ‘economic’ and ‘environmental’ sustainability are involved. Figure 1.1 shows a common variant of the famous Venn diagram used in many accounts. Other commentators choose to re-name or expand this into other spheres, including the cultural and political. Certainly the latter is of great interest here, for changes in water governance are driven by political agenda and the political dimension can be seen as the driver for the others. While implicit in the social, to delve into the murky depths of cultural activities is also implied.
Actually the Brundtland Report ‘Our common Future’ of 1987 (World Bank, n.d.) sought to define the notion of sustainable development, to use the oft-quoted definition:

‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs.’

This is a good stage-setter, but it gives an objective without ways and means. No doubt feeling a bit cynical, in some ways it has become that ‘it is simply a new manifestation of an old, tired discourse.’ Variously accused of being too western, too anthropocentric, even hiding the fact that the economic framework itself cannot hope to accommodate environmental considerations, perhaps a critique of the neo-liberal worldview that the answer lies within small adjustments to the market system, especially where the underlying presumption of economic growth remains. Is it, on account of being such a broad concept that it is open to wrong action, be that through good or poor motives? It can be therefore more catchphrase than a revolution in our thinking. We are sent back to thinking about equity, environmental justice and how the means of production are organised (Hove, 2004).

This book is about water in Britain, and it brings in a few comparisons from North America’ from ‘continental’ Europe and from elsewhere. This constrains it to mature, developed economies. Furthermore, a volume that goes into the details of development theory is not its purpose. Mercifully, in water resource science and policy, there are boundaries that may be defined socially and politically (as stakeholder groups), as well as in a geological and topographic sense (Cook et al., 2012). Even more helpful, if traditional aspects of standard setting and notions of ‘carrying capacity’ are included, presuming the

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Figure 1.1 Spheres of ‘sustainability’ Rodriguez et al 2002.
calculations of these variables reflect real water quality and ecosystem issues, some of this work is done for us. For the World Conservation Union has described the idea of carrying capacity as ‘improving the quality of human life while living within the carrying capacity of supporting ecosystems’ (Gardiner, 1994).

Yet the real revolution in water management has been in the socio-economic-political sphere. Progress in water resource management as affects Britain seemed to falter from about 1990 onwards, and one manifestation was the UK research councils’ Rural Economy and Land Use Programme (RELU) between 2004 and 2013 (RELU, 2015). Its objective was to take a long, sidewise look at UK land use issues by all interested parties, so that teams of social and natural scientists, policy makers and engineers, practitioners, theorists and all shades in between were involved. One illustration is the persistent issue of **diffuse pollution**, that is pollution (in this case of waters) that is not about attributing blame to an individual site or enterprise, but to the way we do things. Classic examples are nutrient pollution and pesticides from farming systems, loading of sediment to river systems from various land uses, phosphates and pathogens from sewage treatment and various hydrocarbons, salt and even heavy metal contamination in runoff from roads. In some way, we are all responsible and to go to the individual farmer or industrial concern is patently not only alienating, but it is difficult and expensive to enforce and would seem to contradict notions of ‘natural justice’.

Mainland Great Britain is a small and overcrowded island and it has been stated that England, Wales and Scotland were early to industrialise. However, since around 1980 there has been a serious move away from the heavy industrial sector. Setting aside the momentous social changes of this, the often bitter legacy of neo-liberal ‘Thatcherism’; that changed communities often for the worse and made unemployment endemic in the economy, Britain was to suffer in the long-term for transition towards a service based economy. Industry continued, but in a muted form and with new products replacing some steel, coal products, ships and so on. Car production did continue, but it is under foreign ownership and operating under different constraints.

In parallel with industrialisation, an intensive agriculture has developed which largely concentrated in lowland areas. Official statistics for 2011 for the entire UK suggest that around 76% is in agricultural production (Defra, n.d.), this includes roads, yards, derelict land and associated buildings. Of the remainder, some 10% (and rising) is under forest and woodland and 14% under ‘other’, mainly urban and industrial, but also semi-natural vegetation and recreational land use. Rivers, lakes, streams and canals cover some 2,580 km² and there is an unquantifiable volume of water beneath our feet as groundwater.

At the planetary level, the ‘hydrosphere’ is the arena in which hydrological processes occur and it is intimately related to geological, geochemical and biological planetary systems. As the above statistics suggest, for the land-based part of the hydrological cycle, to regard the hydrological cycle as wholly a ‘natural’ process belonging to some Arcadian, ‘deep green’ paradise world with little human intervention is of no use. Britain is certainly no exception.

With a population (2011 census) of around 61.3 million (53.0 million in England, 3.1 million in Wales and 5.2 million in Scotland), England and Wales had a population density of 371 persons per km² with several well-known large centres of population making it unevenly distributed and the figure is far lower for Scotland at 67 persons
per km² with most living in just two large cities. Overall, England and Wales combined is among the most densely populated countries in the world. Pressures on water, as on other resources such as land and energy, are therefore considerable and potentially problematic.

Estimated water abstraction volume from non-tidal surface water and groundwater in England and Wales between 2000 and 2014 is shown in Figure 1.2 and fell steadily from an estimated 15 billion cubic metres in 2000 to 11.4 billion cubic metres in 2011, after which it increased again.

Overall categories continue to fall except spray irrigation, included in ‘other’ in Figure 1.2 (Defra, 2013a; 2016a).

The changes in abstraction levels between years include factors attributed to:

- Weather conditions, for example drier years could result in an increase in abstraction for agriculture and spray irrigation.
- Changes in the level of activity in different sectors.
- Improvements being made in the efficiency of water usage.
- Changes to abstraction licences.

The main reason for the overall decrease in abstraction between 2013 and 2014 is the fall in the level of abstractions used for electricity generation. Levels of abstraction for electricity generation fell by 16% from 6.4 billion cubic metres in 2013 to 5.3 million cubic metres in 2014. The abstractions for public water supply decreased slightly between 2013 and 2014 by 2% to 5.8 billion cubic metres in 2014.