

**WORSHIPFUL COMPANY OF WATER CONSERVATORS
THINKPIECE SUBMITTED BY LIVERYMAN VIC COCKER
NOVEMBER 2024**

Ecosystem asset accounts for Rivers and Groundwater eco systems in England and Wales. Issues and questions.

Introduction

Joe Grice and Prof Paul Ekins of University College London are working on a project to compile natural capital accounts for the UK and sought our contribution on this subject .

Part 1 :Our contribution prepared by Vic Cocker in August 2024

The UCL team has identified 5 main water accounts which need to be completed to put a value on the natural water assets and articulate with the National Accounts. The intention is to measure the value of ecosystem services in line with the UN System of Environmental -Economic Accounts ,Ecosystem Services SEEA -ECS 2021 which is now formally endorsed by all of the UN members.

2 The workstreams are:

- 1.Extent of water available in flow and stock terms X region/catchment
- 2.Condition accounts
- 3.Extending supply and use physical tables to show from where water is supplied and which sectors use it. There is also a need to recognise ecosystem services that water supplies and which are valuable but currently unvalued.
- 4.Extended supply and use tables in monetary terms
- 5. A monetary valuation of the stock of these water services by capitalising flows
-

3 The purpose of this note is to try to anticipate issues which might arise in collecting this information or to identify additional data which might appear necessary to better inform analysis . Key questions have been highlighted in red.

Joe has acknowledged the usefulness of this contribution and kindly agreed that it can now (26 Oct ,2024)be shown on the Water Conservator's website for the information on members of the Company. The comments from UCL/ONS in reply will also be shown on the website.

UK Natural Capital Accounts at present

4 The UK Natural Capital Accounts for 2022 published by ONS ,as part of the National Accounts s, tate that they are not intended to be an estimate of the absolute value of nature but as a **developing picture of the value of any natural resource or process that supports human life, society and the economy.**

The ONS UK Natural capital accounts:2022 show that the **Natural Capital Services** which ONS are currently able to value are estimated to be worth **£1.8 trillion in asset value at 2021 prices**. The health benefits of all **tourism and recreation account for £623 billion** (15.58 billion pa) within the overall total.

The stock of UK **Provisioning Services** for natural capital is valued at **£443 billion** .This currently includes agricultural biomass, water abstraction, fossil fuels extraction, renewable generation, minerals, timber extraction, fish capture.

Water Abstraction

5 Water abstraction for public supply is valued at £134 billion asset value or £6.8 billion per annum (2022 National Accounts). (For water this represents a significant increase in the value of just £1 billion pa which the EA quoted in 2018.) The value of water abstracted for public water supply is the only purpose category for water provisioning services in the Natural Capital Accounts. It is presumably derived by taking actual rather than licensed public water supply abstraction volumes from non-tidal surface water (including impounding reservoirs) and groundwater and multiplying by a unit value . Data on abstraction volumes is published (Water Abstraction Statistics, England ;2000 to 2018. Updated January 2023 DEFRA) but with a significant time lag hence the importance of understanding the availability of more recent information from water companies own data sources . The last published DEFRA report says that “There had been a gradual decline in estimated abstractions between 2000 and 2011 but following a 13% increase in 2012 and a 5% reduction in 2013 there were increases in abstractions over the next 4 years of between 3% and 8%, In 2018 ,the most recent year for which data is currently available, the total for all abstractions (non tidal surface plus groundwater) was 10.4 billion cu metres. Groundwater accounted for 2.2 billion cu metres of this total while PWS was 5.5 billion cu metres and electricity 3.3 billion cu metres. Estimated abstractions analysed by source by purpose and by regional charge area are available for downloading.

6 The question of how the monetary unit value is derived is likely to be as important as the volume of abstraction .It could be based on the unit values shown in the EA charging scheme for abstraction. The problem is that these abstraction charges are designed to recover only administrative costs for the EA rather than reflecting marginal value to society. In fact the unit value of £6.8bn divided by 5.5 billion.cu.metres ie £1.23 per cu metre appears to represent roughly the average retail price of water minus the operating costs already included in national accounts .This may reflect an approximation to marginal utility although the retail price itself is determined as a regulatory outcome rather than one which is derived by competitive markets . **The source of the unit value needs to be explored.**

7 There are other complications arising first from the fact that there are very significant public health benefits from the availability of a continuous supply of fully treated and disinfected water supply to virtually the whole population . **Is this value contained within the amount shown above or should we apply additional value for this contribution to public health and how should it be determined ?**

Second, water resource plans co-ordinated by the EA for the next 25 years to 2050 are based on a significant reduction in per capita usage from around 145 to 110 l/p/d. Do we assume that there is no loss in customer value from the reduced consumption

? The customer will make a monetary saving from reducing the volume of consumption and if the marginal of utility is equal to price there should be no loss of value unless there is a detriment to public health .

8 Can we safely assume that reducing consumption produces a gain in net present value taking the net environmental gain of reduced abstraction plus the savings in pumping and treatment costs minus zero loss of customer use value minus the costs of smart metering and other measures to promote water efficiency? **In approximating this calculation in the natural capital accounts do we need a monetary value for the environmental gain from reduced abstraction?**

9 If the opportunity cost is to build more reservoirs how would this be reflected in the National Accounts compared to a per capita reduction approach? Marginal revenue from additional pws abstraction valued at retail price for water minus marginal op. costs plus value of additional supply security minus any additional environmental damage minus reservoir construction and running costs ?
In approximating this calculation do we need a monetary value for the environmental gain/loss arising from additional reservoir capacity.

10 From a global UN perspective some Governments may be keen to avoid exposure of the extent to which parts of their population are left unserved ,amounting to at least 700 million population worldwide without access to a safe water supply (UN stats suggest possibly 2 billion) .In the UK there is close to universal coverage ,no cut off for those who are unable to pay their water bill and access to social tariffs and to special support funds , which reflects the very high effectiveness of provisioning services . **To fully reflect living standards should there be a condition indicator for the continuity and coverage of the water supply service similar to the UN's SDG6.?** This indicator would be just as important as the indicator for the suitability of water sources for bathing or fishing and offer an incentive for governments to see their efforts to extend coverage reflected in their national accounts .

11In developing countries the marginal health utility of supplying water to those to whom it is currently inaccessible may well exceed the average revenue obtained from supplying the current served population and the marginal revenue gained from the very poor customers receiving first time supplies]es. In practice the service is often not provided especially in remote areas due to lack of public finance , lack of priority and inability of customers to pay. Charities such as WaterAid work with local communities to find very low cost local solutions (approx. £50 per head)such as drilled and protected boreholes but without the connection of individual properties to a continuous supply and without formal treatment and disinfection processes. In the UK developers may pay a contribution towards first time connection costs and to the installation of water re-use fittings (plus sustainable drainage measures) which are recovered from the house purchaser . OFWAT are now consulting as to whether Water Companies should offer financial incentives to developers to extend the sustainable agenda .**This investment in water sustainability has a monetary value per property which can be quantified.**

12 Abstractions for other purposes including electricity generation , agriculture and industry are apparently excluded from the Natural capital Accounts.**Is this**

because the payment for “other” abstracted water is regarded as being included in the National Accounts and further value would not be appropriate. Surely abstractions for electricity generation and agricultural irrigation should be part of ecosystem services in the Natural capital accounts and hence included.

Sewerage and sewage treatment

13 The value of sewerage and sewage treatment processes are not explicitly included in provisioning services presumably because their operational and capital expenditure are monetised and included in the national accounts . However there are huge unmeasured health benefits associated with the provision of safe and effective sewerage sanitation to 96% of the population .Should we be making an inclusion for the public health benefits of this service in the Natural Capital accounts ?

14 Further down the water recycling process the provisioning service of sewage treatment to restore used water to a level acceptable to the aquatic environment represents a significant element of monetary cost in the provision of water services. There is a need to properly reflect the condition of our rivers but in making policy choices view desired objectives alongside the money that is being spent and invested in capital schemes to maintain and improve their value. For the period from 2025 to 2030 OFWAT are proposing to approve £6 billion of capital investments on improvements at 1500 sewage treatment works in order to improve river quality including the reduction of phosphorous levels at 880 works. Is there any monetary value of environmental gain or public health gain to balance against this expenditure?

15 Companies will be fined heavily for failing to meet new performance targets for storm overflows or discharge consents . How do we account for such fines which can be significant.?

16 Worldwide over 2 to 4 billion people do not have access to sanitation services . Often this is because their provision is seen purely as a cost and there is no reflection in their National Accounts of the public health value of these services .Sometimes provision may be over ridden by environmental negatives . Again charities like Wateraid offer low cost solutions to communities with solutions like the VIP or composting latrines but in urban areas expensive sewerage solutions are often the only choice..

Direct provision of improved biodiversity

17 Many water companies in England and Wales are involved in schemes to restore protected aquatic environments such as chalk streams and wetlands . Sometimes this expenditure is indirect eg through a Rivers Trust project. Expenditure on all such projects needs to be recognised along with environmental benefits.

18 There are some examples of in river volume treatment such as the creation of the Tame lakes to allow solids settlement and recovery from non point pollution in large urban areas. Once established such schemes have direct operating costs such as

pumping and sludge disposal which need to be recognised even if operated by charitable bodies.

Recreation, health and access.

19 The water companies are among the largest landowners in the UK. Some own large areas of land incorporating their reservoir catchments for which public access and visitor centres are provided (excluding treatment works and operational structures). The scale of the estates is vast and may be run with the help of conservation bodies eg the RSPB at Lake Vrnwy. Access to the public offers huge public health benefits and paths are well maintained which is not always the case with normal public rights of way where many highway authorities have drastically reduced their annual cutting and path maintenance budgets. Tens of millions of visitors enjoy these facilities which are mostly not monetised apart from car parking. Is it appropriate to assume that the tourism and recreation benefits delivered by water based environments including bathing waters are included within the estimated total of £15.58 billion pa. for tourism and recreation or **should separate provision be made within water provisioning services for the benefits associated with company owned land around reservoirs etc.?** In 2018 the EA estimated that the value of time spent at water habitats was £303 million (The state of the environment .EA .2018) **Public access** is a key issue in valuing the benefits of environmental improvement.

Water Resources in more detail

20 Since the mid eighteenth century England's winter rainfall has increased and summer rainfall has decreased (EA).

England in 2024 has a balance of supply and demand for water taken as a whole although there are areas in parts of Sussex, Cambridgeshire, Suffolk and Norfolk where housing and new business have been affected by local supply constraints (EA Summary of England's draft regional and water resources management plans March 2024).

21 In 2022 England experienced the hottest summer on record and the driest since 1995. The heatwave generated high peak demand and some water companies had to resort to the use of tankers to top up their distribution networks or even distribute bottled water; this was a situation caused more by peak hour demands than a lack of seasonal water resources. However climate is changing, population is growing, the Government is aiming to encourage a higher rate of economic growth, increase the rate of housebuilding and achieve an improved environment.

The EA believes that current levels of abstraction are unsustainable in more than a quarter of groundwater bodies and groundwater accounts for about 30% of Public Water Supply. The EA is also concerned that abstraction levels are unsustainable in one fifth of surface waters.

22 Water resource projections for England the next 25 years (EA :A Summary of England's revised draft regional and water resources management Plans; updated March 2024) show that there is a projected gap between supply and demand of around 4,860 Ml/d by 2050. **By far the largest element of this gap is caused by the need to address "unsustainable pressure on abstraction "and achieve a sustainable "environmental destination" .The EA proposed reductions to**

public water supply abstraction amounts to 2,828 MI/d. or 60% of the gap by 2050 . Growing population needs are estimated to require up to 1,180 MI/d with business growth only 144MI/d. An extra 755MI/d is required to increase resilience to droughts to an extreme 1 in 500 year basis while water lost to climate change impacts by 2050 is estimated to be 642MI/d.

Regionally a total deficit of 2,511MI/d is projected for the South East ,1,032MI/d for the West and 769 ml/d for the East. .Even with significant improvements in water efficiency in homes and further reductions in leakage from water mains there is a need to increase physical supply capacity in England by well over 1000 ml/d . Current plans include 4 new desalination schemes, 7 new impounding reservoirs and 5 new water recycling schemes plus new iinterconnections at a cost of £6 billion (OFWAT PR24 announcement 16 July 2024).

23 What are the implications of this water resources picture for the design and production of accounts for River and Groundwater ecosystems?

1. About two thirds of the deficit is to be met by improved efficiency of water use including massive investment in smart metering of households, greater intensity of leakage monitoring and control and accelerated mains replacement. Government led labelling schemes for domestic appliances will have a cost too. Normal accounting processes should pick up this expenditure .It includes replacing around 8,000 km of water mains pipe and launching a £100 million water efficiency fund. As explained above it raises the question of valuing the net environmental gain from the project . **A further question is whether we wish to identify this investment in water efficiency to secure supplies under a policy heading?**
2. Reduced demand will mean reduced metered volumes and reduced metered income plus reduced abstraction volumes and income. This is a negative for our national accounts but is partly offset by reduced operating costs on the volume reduction.**Is there a balancing or offsetting item for the ecological services of recreation/amenity , fishing and biodiversity of more sustainable water resources and if so how is this to be measured?**
3. There will be significant investment in new physical water resources assets (OFWAT have approved £6 billion 2025-30) This should be covered by the Accounts. However It is worth noting many historical assets such as large impounding reservoirs have achieved a life well beyond their accounting lives and currently have no monetary value in the national accounts other than maintenance . Their replacement cost would be very high.It could be said that **these reservoirs and associated aqueducts are a significant part of our national wealth** However a newly built reservoir will be accounted under expenditure .
4. Volumes of untreated water stored will vary depending on season and drought conditions.Volumes of treated water stored within the distribution system by local storage reservoirs to even out diurnal flows will be much smaller (typically a few days average supply) but higher value. **If we were investing in new physical assets to meet the water resources shortfall would this provide a more favourable picture in the National accounts?**

Droughts

24 Droughts develop during periods of unusually low rainfall, particularly where there is a succession of dry winters. The East and South are more prone to droughts and rates of projected population growth are greater in these regions.

Planning is currently based on having adequate resources to maintain supplies without rota cuts during a theoretical 1 in 200 drought design year but with restrictions to domestic sprinklers, car washes and other commercial discretionary demands. Companies have been asked to extend the resilience to 1 in 500 years partly to protect the environment from damage during severe drought.

The consequences of drought for society, the environment and the economy can be severe. (For details of impact see EA The state of the environment 2018).

Is there an ecosystem monetary value for the greater resilience which is planned?

Flooding and sewer overflows

25 Localised heavy rainfall has increased in frequency and intensity due to climate change since the 1990's causing local surface water flooding. Surface water sewer overflows are triggered more frequently, combined sewers (100,00km) discharge a mixture of rainwater and diluted sewage to watercourses more frequently. Surface water flood damage to property is becoming more common although problems of sewers backing up into properties are relatively small but expensive to remedy.

Unpredictable localised flooding of households and commercial premises in specific areas has led to significant insurance claims and concerns about sustainability of communities in some vulnerable areas. The EA produces updated flood risk maps for postcode areas which project the annual likelihood of flooding. The EA has also intervened to invest in upstream ecological resources to hold back flooding but on a scale limited by financial parameters including risk and potential damage. For the 5 years from 2025 to 2030 OFWAT is proposing expenditure by water companies of £10 billion to reduce spills from storm overflows by 44% (in addition to £2.2 billion already committed.) This involves work on 2,500 storm overflows and £1.4 billion on catchment and nature based solutions. **There seems to be a need to reflect this huge scale of investment in our Natural Capital Accounts as an identifiable item. With climate change this is going to be an increasingly significant issue for all countries.**

Condition

26 The UN has produced an Introduction to Ecosystem Accounting.

The conceptual structure recognises ecosystem assets for their extent and condition and abiotic assets such as minerals and energy resources are identified separately. Forests for instance are identified by coverage, soil density and their ability to filter water before reaching rivers and streams hence reducing water treatment costs.

South African River Ecosystem Accounts.

27 One of the examples shown in the document is South Africa's River Accounts.

The key finding for the river accounts was that "the ecological condition of South Africa's rivers declined by 10% from 1999 to 2011". An interesting presentation Ecosystem Accounts for Rivers on 19 June 2018 made to a Forum of experts in SEEA EEA based on a pilot SA exercise is available on the web. It suggests a multi

factor conceptual framework for assessing the ecological condition of rivers using 4 indicators including flow, water quality, instream habitat and riparian habitat assessed for each river reach. For accounting purposes there are just 4 summary categories; Natural or near natural; moderately modified; heavily modified; and unacceptably modified. Moderately modified includes loss and change of natural habitat and biota but the basic ecosystem functions predominantly unchanged. Heavily modified includes a loss of habitat and biota and basic ecosystem functions has occurred while Unacceptably modified includes extensive or almost complete loss of habitat and biota. It notes that “not all rivers need to be natural; hard working rivers are often heavily modified and can be sustainably used in that condition”. River lengths are then categorised accordingly and separately for flow, water quality, riparian habitat and instream habitat. Showing a complex picture of improvement in the most modified rivers and deterioration in the natural rivers between 1999 and 2011. **It may be worth finding whether this work in South Africa has now been updated .**

The UK

28 The EA is responsible for monitoring and regulating River Quality but there are devolved responsibilities in Scotland, Northern Ireland and Wales. In its report dated “State on the environment : long term trends in river quality in England updated 17 May 2024” the EA presented the results of an analysis of long term trend data for ammonia, BOD, and nutrients. It relies on 130 fixed site located on the principal rivers of England with sampling points mostly sited at the lower end of those rivers just above the tidal limit. The report says “ammonia concentrations have reduced to about 15% of average concentrations in 1990; BOD concentrations have reduced to 55 to 60% of average concentrations in 1990; orthophosphate concentrations have reduced to 15%-20% of average concentrations in 1990 ; nitrate -nitrogen concentrations show no clear trend; the richness of invertebrate communities increased from 1991 to 2005 overall and to 2010 in urban rivers but with no increase after that.”

“ By 2020 the reductions in sewage treatment loadings to rivers since 1995 were 49% for BOD, 79% for ammonia and 66% for P.”

29 The Rivers Trust in its “State of our Rivers “ report says that in the most recent WFD (Water Framework directive) report **only 15% of rivers in England had achieved “good “ ecological status or better compared to 19% in the 2015 assessment.** However they say that in 2015 60% of river stretches achieved good Macroinvertebrate Ecological Quality. They argue that the large scale surveys used by the EA do not adequately cover the local picture and spot local trends. Their overall comment is “As industrial activity declined post industrial revolution macroinvertebrate data across Europe has indicated that river health has been improving between the 1970’s up to the 2010’s . At that point the **rate of improvement slowed to a standstill** and the data tells us that our rivers still have plenty more room for improvement.”

“An equal number of river stretches across England have shown improvement as the number that have shown decline , which gives the appearance of an overall standstill”.

The UN

30 The UN itself is struggling with the fact that “assessments done for Europe cannot be made on a global scale” UNEP Pathway to the World Water Quality Assessment. They say “around the world (only)about 40% of the total population is connected to a sewage system with wastewater treatment plants removing 26% of the emissions from connected households..The remaining nitrogen and phosphorous in the untreated wastewater plus effluents after treatment contribute 15 to 17 per cent to total nutrient flows.

31The UN say that “increasing economic development leads to an increasing use of a wide range of chemicals.Toxic stress from chemicals can arise when some of the more than 350,000 chemicals registered for use accumulate in rivers and lakes damaging aquatic life. Typically these chemicals are used in agriculture for food production or in pharmaceutical products to keep us in good health.”

The UN also say that “anthropogenic sources “ ie people related ,contribute more than 70 percent to river nutrient loading. Most of the increase in river loading has been in Asia. Harmful algae blooms are now spreading in many river basins. Curbing global nutrient cycles requires paradigm shifts in food and waste systems.”

In Europe the effects of chemicals is having chronic effects. Such effects , caused by a mixture of chemicals on aquatic species is to be expected at 42 to 85 percent of studied sites.

32 The UN concludes that the World’s growing populations and the need to keep people fed and healthy are having a major impact on the health of the planet’s ecosystem through nutrient pollution and toxic stress by chemicals. It clearly wishes all countries to progress in terms of flow measurement and regular monitoring but suggests that there will be level 1 and level 2 reporting for some time. Its indicator 6.3.2 is the proportion of bodies of water with **good** ambient water quality and it published a report **Progress on Ambient water quality in 2021** and data for 2023 is available in summary map form on the SDG6 Water Quality Hub sdg632hub.org . The **UK , Belgium, Denmark and Netherlands** have reported a **low** quality summary score for rivers, lakes and groundwater for 2023. **France** reports **very high** quality . **Germany and Poland are high too with Italy and Portugal moderate.** This represents a very significant change for the UK which had previously reported in 2020 a score well ahead of France as had the Netherlands. **Russia and China** are claiming a very high score too. It looks as though there has been some recalibration of earlier scores for some countries.

	Scores reported in 2020				Scores in 2023
	Lakes.	Rivers.	Groundwater	Avg .	Avg.
Denmark	38.	54.	75	53	0-20
Very Low					
France.	100.	92.	39	79	81-100
Very high					
Netherlands	99	100	62	96	21-40
Low					
Norway.	100	100	-	100	81-100
Very high					

Russia.	83.	100	-	96	81-100.
Very high					
South Africa	43.	52	74	52	61-80
High					
Switzerland	36	100.	-	61	61-80.
High					
UK +NI	100.	96	58	90	21-40.
Low					
USA		33		33.	41-60.
Moderate					
Canada		82			81-100
Very High					
India					0-20
Very low					
China					81-
100 Very high					

33 Although the UN stats offer a useful approach it is not standardised .The UN guidelines say "it is recommended that each country should determine and define good ambient water quality and set their own targets against which they can be assessed"(UNEP Step by step monitoring methodology for indicator 6.3.2.). **Targets as to what constitutes good ambient quality vary as well as the number of parameters which apply.**

The EU

34 The objective of the EU's Water Framework Directive (WFD) to reach good status and prevent deterioration. Good status means good chemical and good ecological status. In 2022 the EC added an additional 24 individual substances and changed the environmental quality standard for 16 substances making 14 more stringent.It further indicated that it was developing a methodology for the measurement and monitoring of micro plastics and antimicrobial resistance genes with a view to listing them as a pollutant in future. The EC commission expressed **concerned about incomparable data due to implementation deficits** and **proposed that member countries introduce a mechanism for automated data reporting to allow faster and more direct access to raw water quality data at member state level.** In an executive summary of the impact assessment report (Commission staff working document) it stated that there would be significant cost implications but that benefits for society would considerably outweigh the costs. Although indeterminate there is clearly pressure within the Commission to continually tighten standards.

35 In 2021 the European Environment Agency reported on The Ecological status of surface water s in Europe (pub. 18 Nov 2021) . At that time about 60% of surface water in the EU still had less than good ecological status. They identified Flanders, Northern Germany, the Netherlands as areas where more than 90% of surface water is less than good. Czechia, Southern England, N.France, Southern Germany, Hungary and Poland had 70 -90 % of surface waters less than good. So England is not alone in its problems which will have been made worse by the addition of new chemical parameters.

36 The Water Conservators have suggested that for England and Wales there should be a system for setting long term quality objectives for individual catchments which would reflect all aspects of demands upon the river and desired and attainable environmental and ecological standards. Some local catchment based planning is already taking place but it will take many years before full coverage is achieved.

37 From a national Accounts viewpoint it would help to explore the data behind the river quality reported to the UN. Is it provided by DEFRA or the EA and is there any regional or catchment breakdown? Both the DEFRA, the EA and Natural England need to confirm that they are content for this to reflect the condition of our rivers versus criteria used by other reporting nations. If not we should ask what criteria we should use to be on a level playing field of comparison.

38 Despite the massive investment commitment by the UK the inclusion in standards of factors outside those which can be controlled by agricultural practices and biological sewage treatment may mean that there is a disconnect between inputs and measurable outcomes which will not be helpful in the context of International comparisons. Measurement issues are clearly going to remain for many years but automated systems coupled with AI may provide solutions provided that sensible allowance is made for statistical variance in natural and biological processes.

Part 2: Response by the UCL team

39 The paper makes numerous important and pertinent points which will certainly help us drive forward the UCL/ Economic Statistics Centre of Excellence project in which we are engaged. Below are comments and reactions to points made in the paper.

40 Current ONS natural capital estimates. The paper correctly refers the current stock and annual flow valuations for total natural capital assets and for water abstraction for public supply currently shown in the ONS accounts. It is important to note, however, that these are at exchange value ie the current market price or what might be inferred to be the current market price. This valuation convention is the one recommended by the UN because of its great advantage of ensuring consistency with the existing national accounts, which also have this valuation convention.

41 The figures do not represent an estimate of total value of UK natural assets; indeed £1.8 trillion would be only around 9 months of GDP. The total value would need to include the consumer surplus and would be many times the value at marginal prices shown in the accounts – perhaps in the limit infinitely so. Total value figures are relevant for some purposes, for example, cost benefit appraisals relating to particular projects and policies. But they would differ from the figures shown in natural capital accounts.

42 Valuation. We agree about the importance of valuation to allow monetised values to be shown in the accounts. This is likely to be one of the central strands of work that the project undertakes. As the paper discusses, there are at least three groups of issues here:

- a) The current ONS accounts include only provisioning services. But even here the basis for valuation, using EA charges for abstraction, is shaky to say the least. As the paper says: “The problem is that these abstraction charges are designed to recover only administrative costs for the EA rather than reflecting marginal value to society.” This puts the point in a nutshell.
- b) The accounts currently relate only to abstractions for the public water supply. Certainly, abstractions for other purposes, as well as the provisioning benefits of sewage and sewerage treatment, should be included, on the basis that they carry benefits to society. We will explore with ONS the reasons for the omissions. If it is that ONS does not have data, we would want to find ways to access such data. At the same time, as the paper recognises, we would need to be conscious of what is currently included in the national accounts, to avoid double-counting.
- c) There is nothing in the ONS accounts relating to so-called regulating and cultural/recreational services water provides: health, physical and mental, access and recreation and so on. With climate change, the likelihood is that such services will increase further in value. This is a major omission. Water provides a wide range of such services, which are clearly of value but which the accounts currently ignore. We see repairing these omissions as a major part of the project.

43 On the last set of issues, the approach we are taking is based on prioritisation. There are a wide range of regulating and cultural services water provides and we will not be able to find ways of accounting for all of them at once. We are therefore working to catalogue most or all of the ways water provides services but then to produce a prioritised list for attention based on their importance and the feasibility of measuring them. We would appreciate expert assistance with this prioritisation.

There is a particular issue about recreation. As the paper notes, the ONS accounts do include an item for recreational benefits in total. We will explore with ONS whether this includes recreational benefits from water or not, and if it does, whether the methodology would be appropriate for water. At first sight, a tailored methodology used to estimate such benefits in the specific context of water would seem preferable to a generalised one with procrustean dangers.

44Condition. We share the paper’s view that this is a crucial area to consider. The quality of water is important both for provisioning and regulating/ cultural services. It is an indispensable dimension of value but also of importance for public policy and debate in its own right. In our project, we intend to address this in the context of compiling the Condition Account.

45 As the paper points out, the SEEA includes detailed guidance for the construction of such an account. However, ONS does not currently publish one. The main reason for this appears to be lack of data. What data ONS currently holds is set out in the article: Habitat extent and condition, natural capital, UK: 2022

<https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/habitatextentandconditionnaturalcapitaluk/2022>

46 There is a section devoted to Freshwater, Wetlands and Floodplains but, in all charity, the data set can only be described as a ragbag. The data is often partial, well out of date and with no comparability between the UK countries. Construction of a Condition Account along SEEA lines will therefore require additional timely data. Our hope is that progress towards this end can be helped by information held by the water companies themselves and/or by other government departments and agencies which ONS has not to date utilised.

47 Sustainability and resilience. The paper makes salient points relating to these issues. It points out that these have value of themselves. This is undoubtedly the case, though, the current international guidance in the SNA and the SEEA does not cover this. For this reason, we may cover these issues in later stages of the project rather than in the first round.

48 The way forward may be through an insurance approach. I value and therefore am prepared to pay for an insurance policy notwithstanding that I might not, and probably hope not, to need to receive payments from it. In a non-market context, yesterday I was fortunate enough not to break my leg or develop appendicitis or indeed to trouble the NHS in any way. Nevertheless, I benefitted from the assurance that had I needed medical treatment, I would have had the NHS available. In just the same way, there is value in knowing that if I turn on the tap, clean water will flow, even if actually I use no water in a particular period.

49 The SEEA, as currently drafted, does not cover the valuation of sustainability and resilience per se. But it will no doubt evolve over time. The advantage of the insurance approach is that there are well defined national accounting methodologies for dealing with insurance, so it should be possible to build on these.

50 The international context. Finally, the paper draws attention to the international context and the work going on outside the UK. Our own project will concentrate on compiling UK accounts. But we are attempting to keep abreast of initiatives and work elsewhere, such as those the paper references, not least to learn from valuation methodologies which are being used by other researchers and to consider their potential application to UK work.