



Scotland's centre of expertise for waters

The Value of Scotland's Water Resources – Legal Analysis





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1.0 Introduction and Context – the Hydro Nation

In 2010, the Scottish Government launched its 'Hydro Nation' initiative.¹ Hydro Nation was conceived as a policy platform to bring together different aspects of the management of Scotland's water resources, in order to maximise the value of that resource base. The first consultation was very much focused on Scottish Water, the public water services supplier in Scotland,² and addressed, *inter alia*, how Scottish Water could maximise the use of its assets, in order to support various policy objectives. These might include, in the domestic arena, maximising renewable energy generation; but also, further afield, providing technical advice, and advice on regulation and governance models for water services.

The second consultation was a prospectus for draft legislation,³ resulting in a Water Resources Bill being introduced to Parliament in summer 2012.⁴ This Bill included a number of provisions directly relevant to Scottish Water and their activities within the Hydro Nation agenda, and wider measures on the Ministers' role in Hydro Nation, including clauses on 'developing the value' of Scotland's water resources. These proposals were enacted in the Water Resources (Scotland) Act 2013 (the 2013 Act).⁵

This report is the output of a project for the Scottish Government.⁶ It analyses the provisions around 'value' in the 2013 Act and related legislation, and assesses how these can be implemented, including a comparative study.

The objectives are:

1. To review and identify whether other legislatures across the world have also explicitly incorporated the notion of value

of water resources in legislation, and if so, to identify these and their specific consequences for the water industry.

2. To analyse the regulatory framework and legislation relevant to Scotland's water industry to:
 - a) identify opportunities within the existing regulatory and legal framework for developing the notion of value and ecosystem services,
 - b) reflect on the forms that development could take (e.g. Payments for Ecosystem Services, Benefit Sharing Mechanisms, local partnerships, etc.),
 - c) identify any legal barriers to development of the notion of value and ecosystem services and suggest any necessary legislative changes.

The Hydro Nation agenda is not exclusively focused on Scottish Water; it is intended and expected to engage with a wide variety of entities all active in water in Scotland, and to bring diverse benefits both to those entities and others. Thus there is recognition of Scottish research expertise across a variety of water-related disciplines, and of the importance of the domestic supply chain, especially in terms of innovation in the water services sector. However, Scottish Water is the public provider and is subject to provision in the 2013 Act around the 'value' of the water resource (section 3 below) and indirectly, the 'ecosystem services' that water provides (section 4 below). This report therefore focuses on Scottish Water, and how its activities can contribute to the policy goals of maximising value in this broad sense. The report also has a specifically legal focus, to complement wider socio-economic analyses of these types of mechanisms.

1 Scottish Government 2010 *Building a Hydro Nation* www.scotland.gov.uk/Publications/2010/12/14111932/0; Scottish Government 2012 *Scotland the Hydro Nation* www.scotland.gov.uk/Publications/2012/02/9536

2 Scottish Water is a public corporation, established in 2002. It is a vertically integrated water services supplier, managing bulk supply, treatment, retail distribution, and wastewater collection and treatment. It supplies around 97% of domestic drinking water, and around 93% of domestic sewerage. It also provides bulk services to licensed retailers who in turn provide competitive retail services for commercial users. Further detail on its structure and functions, and legal framework, is given in section 2 below.

3 Scottish Government 2012 *Scotland the Hydro Nation* www.scotland.gov.uk/Publications/2012/02/9536; Hendry S (2013) *Scotland the Hydro Nation* *Journal of Water Law* 22(1) 24-31

4 Water Resources (Scotland) Bill 2012 SP Bill No.15 and accompanying Parliamentary documents available at <http://www.scottish.parliament.uk/parliamentarybusiness/Bills/52620.aspx>

5 Water Resources (Scotland) Act 2013 asp.5

6 Funded by Scottish Government via the Centre for Research Excellence in Water, CREW; CRW 2014/4.

2.0 Regulatory and Policy Background

Scottish Water was established in 2002 as a public corporation under the Water Industry (Scotland) Act 2002.⁷ Its regulatory framework comprises especially, the Water (Scotland) Act 1980⁸ and the Sewerage (Scotland) Act 1968.⁹ In addition regulations transpose the EU Drinking Water Quality Directives,¹⁰ and Urban Waste Water Treatment Directive.¹¹ For drinking water quality, enabling powers and a control regime were inserted into the 1980 Act.¹² There are some relevant provisions in the Water Environment and Water Services (Scotland) Act 2003;¹³ the Water Services (Scotland) Act 2005¹⁴ completed the legal framework for SW's economic regulation and governance arrangements. This included establishing a new economic regulator with price-setting powers, the Water Industry Commission for Scotland.¹⁵

In addition, wider law on the management of water resources applies to Scottish Water as it does to all water users. Thus, as a vertically integrated supplier Scottish Water is a major abstractor of raw water, and discharger of treated wastewater, and as such is subject to the licensing requirements of the Water Environment (Controlled Activities) (Scotland) Regulations.¹⁶ Scottish Water is also stakeholder in the river basin management process established by the EU Water Framework Directive,¹⁷ and implemented under the Water Environment and Water Services (Scotland) Act 2003; it must be consulted on the draft plans¹⁸ and is a responsible authority.¹⁹

The 2013 Act created a duty on Ministers to 'develop the value of Scotland's water resources',²⁰ with related powers for Scottish Water;²¹ a new control regime for some large abstractions (in addition to the Controlled Activities Regulations);²² a clarification of Scottish Water's core functions;²³ and some new powers for raw water quality.²⁴ The last include powers to enter premises, and to enter into agreements with landowners,

relevant to catchment protection. A number of other provisions relevant to Scottish Water include managing substances in sewers, common repairs to septic tanks and a new scheme for water shortages.

2.1 Regulatory Approach

The 'Scottish model' of regulation and governance involves four regulators – the Water Industry Commission for Scotland, the principal economic regulator; the Scottish Environment Protection Agency (SEPA), the environmental regulator; the Drinking Water Quality Regulator;²⁵ and for consumer protection, Citizens' Advice Scotland.²⁶ The Scottish Government sets the policy context and objectives. There is a broad approach to economic regulation, i.e. it includes setting prices to achieve environmental and social objectives, as well as the capital and operational costs of meeting service standards.²⁷ The Water Industry Commission for Scotland has a general duty to promote the interests of persons whose premises are (or are likely to be) connected to the public system (water or sewerage or both).²⁸ It works with the other regulators to ensure that all Scottish Water's statutory requirements are met, and that Ministerial objectives are met, at the 'lowest reasonable overall cost'.²⁹ Specific actions, especially the capital programme, are agreed by all the regulators and Scottish Government under the 'Quality and Standards' process.

Ministers are essentially the owners of Scottish Water and ultimately of its assets, and are responsible for overall policy – they frame the debate (within the limits of EU law, and relevant reserved matters). Ministers issue two key pieces of documentation relating to price setting. The 'principles of charging' is a policy statement,³⁰ and this has now been

7 Water Industry (Scotland) Act 2002 asp.3. Previously, there had been three regional authorities established under the Local Government (Scotland) Act 1994 c.39; and before that, delivery by the regional councils.

8 Water (Scotland) Act 1980 c.45.

9 Sewerage (Scotland) Act 1968 c.47.

10 Drinking Water Quality Directive 1980/778/EEC, 1998/83/EC; implemented by the Public Water Supplies (Scotland) Regulations SSI 2014/364 (the DWQ Regulations) with the Water Quality (Scotland) Regulations SSI 2010/95, and for private supply, the Private Water Supply (Scotland) Regulations SSI 2006/209.

11 Urban Waste Water Treatment Directive 1991/271/EC; Urban Waste Water Treatment (Scotland) Regulations SI 1994/2842.

12 1980 Act Part VIA ss.76A-76L, inserted by Water Act 1989 c.15.

13 Water Environment and Water Services (Scotland) Act 2003 asp.3 (WEWS).

14 Water Services (Scotland) Act 2005 asp.3

15 The Commission replaced a single Commissioner established under the Water Industry Act 1999 c.9 Part II, who advised Government on prices.

16 Water Environment (Controlled Activities) (Scotland) Regulations (CAR) currently SSI 2011/209 as amended.

17 Water Framework Directive 2000/60/EC (WFD); especially, Art.14 on participation.

18 WEWS s.11.

19 WEWS s.2; Water Environment (Relevant Enactments and Designation of Responsible Authorities and Functions) (Scotland) Order 2011/368

20 2013 Act s.1.

21 2013 Act ss.23-25

22 2013 Act part 2.

23 2013 Act s.26

24 2013 Act Part 4.

25 Established under WISA, Part 2.

26 In a rapidly changing environment for consumer protection, which includes a role for the Public Services Ombudsman in managing complaints that Scottish Water cannot resolve.

27 On economic regulation, see eg Parker, D. (2002) *Economic Regulation A Review of Issues* Annals of Public and Cooperative Economics 73:4 2002; for a specifically legal analysis see Ogus, A. (1994) *Regulation: Legal Form and Economic Theory* Oxford: Clarendon Press, chapter 14.

28 2005 Act s.1(2), WISA s.1(2).

29 2005 Act s.21, WISA s.29G.

30 WISA s.29D inserted by 2005 Act, s.21(1).

published for 2015-21.³¹ The 'Ministerial objectives' are issued as Directions, and therefore binding on Scottish Water.³² Broadly, the objectives specify those activities and functions which SW must carry out and for which its charging schemes must be sufficient. The principles give guidance on how the components of the charging scheme are to be developed.

Of particular relevance to this project are objectives to identify longer term investments that will reduce future costs; support Government priorities for rural communities; support compliance with environmental legislation; work with SEPA in catchment management; work with Scottish Natural Heritage to improve protected sites; and work on climate change adaptation and mitigation; flood management; and security of supply.

In recent years the regulatory and governance 'model' in Scotland is considered to have been operating very successfully, with significant efficiency gains and a positive relationship between Scottish Water and its regulators. Scottish Water International is involved in consultancy work abroad where this model, or approach, might be of interest to others, especially where countries are moving from municipal provision but wish to retain the service in the public sector.³³ The Water Industry Commission, and academics and researchers, have also been active in promoting the Scottish approach to regulation and governance.³⁴ This is an important part of the Hydro Nation agenda, serving to raise awareness of what Scotland can offer and what has been achieved, thus bringing intangible 'value' as well as funding via Scottish Water International and through other research and consultancy activities.

2.2 Scottish Water's Core Functions

Scottish Water's 'core functions' (defined below) are financed by charges set under a formal regulatory process. Prices are currently reviewed every six years, and in the most recent strategic review, for the period 2015-2021, there has been a move to a less rigid regulatory settlement, with an investment review after three years and setting the whole in the context of a 25 year 'strategic projection'.³⁵ Long-term planning is desirable in the sector, especially in the light of climate change and other pressures; in addition this was also seen as a way of 'smoothing' the effects of the regulatory settlement. Scottish Water's only income streams for its core functions are charges and Government borrowing; customers of the core functions should not bear either the risk or the reward of any additional non-core activities. Any functions beyond the core must be self-funding, and this must be transparent. Scottish Water's governance framework, including four ring-fenced subsidiaries – Scottish

Water Business Stream as a licenced provider, Scottish Water Solutions for joint ventures for domestic construction projects, Scottish Water International for international consultancy and Scottish Water Horizons for commercial activities at home. It is the latter two that are most likely to be involved in activities to realise commercial value, especially of the assets.

The 2013 Act redefined core functions in order to clarify the same.³⁶

(2) In this Act, the references to core functions in relation to Scottish Water are to its functions under or by virtue of—

(a) the 1968 Act and the 1980 Act,

(b) any other enactment (including this Act) so far as relating to the provision of water or sewerage services in Scotland. "

The 1968 Act provides that 'function includes power and duty'.³⁷ The principal duty (s.1) is to provide public sewers, and treatment works, to 'effectually drain' sewage, surface water and trade effluent; and to enable connections to this system, where that can be done at 'reasonable cost'. There are duties of maintenance, and a series of powers, eg relating to construction, and the making of relevant agreements. All of these would be core functions. The 1980 Act also provides that 'functions include powers and duties'.³⁸ The principal duty (s.6) is to provide a supply of wholesome water for domestic purposes, where this can be done at reasonable cost. Again there are a series of subsidiary duties, and enabling powers, to achieve this supply; and all of these would be core functions. Thus the core functions are spread through the two principal Acts and include the provision of services and all the supporting activities. Other Acts may also create core functions (section 4.1 below).

Non-core activities are enabled under Scottish Water's general powers.³⁹

(1) Scottish Water may engage in any activity (whether in Scotland or elsewhere) which it considers is not inconsistent with the economic, efficient and effective exercise of its core functions.

There is no simple definition that will specify core functions and distinguish them from other activities. Commercial activities at home or abroad would not be core functions and would need to be separately funded. In addition, as SW does not serve all households in Scotland, any wider public benefit will be wider than benefit to 'the customers'. Where that benefit is more than marginal, that raises questions of who should fund that improvement.

31 Scottish Government 2014 *General Statement of Policy – Principles of Charging for Water Services 2015-21* available at <http://www.watercommission.co.uk/UserFiles/Documents/2015-21%20PoC%20Statement.pdf>

32 Scottish Government 2014 *The Scottish Water (Objectives: 2015 to 2021) Directions 2014* <http://www.scotland.gov.uk/Resource/0045/00459867.pdf>; WISA s.56A inserted by 2005 Act s.22.

33 Most water services provision is in the public sector globally and is likely to remain so.

34 For example, at the recent IWRA National Congress in Edinburgh, where numerous papers and panels reflected on Scottish Water's governance. Scotland has also been actively involved in the OECD's Water Governance Initiative and in the European Water Regulators' Group and the International Water Regulators' Forum.

35 See on the review process, WICS 2013 *Strategic Review of Charging 2015-21: Innovation and Choice* and WICS 2014 *Strategic Review of Charges 2105-21 Draft Determination* available at http://www.watercommission.co.uk/view_Price%20Setting_2015-21.aspx; and Scottish Water (2014) *Strategic Projection* <http://www.scottishwater.co.uk/about-us/publications/strategic-projections>;

36 2013 Act s.26.

37 1968 Act s.59, interpretation.

38 1980 Act s.109, interpretation

39 Water Industry (Scotland) Act 2002 asp.3 s.25.

3.0 The Water Resources (Scotland) Act 2013 and the Concept of 'Value'

The concept of 'value' is central to the 2013 Act and the Hydro Nation agenda, and Part 1 of the Act imposes a duty on Ministers, to 'develop the value' of Scotland's water resources. Given its importance it may be worth quoting s.1 in full:

Duty of the Scottish Ministers

(1) *The Scottish Ministers must—*

(a) *take such reasonable steps as they consider appropriate for the purpose of ensuring the development of the value of Scotland's water resources,*

(b) *do so in ways designed to promote the sustainable use of the resources.*

(2) *In fulfilling the duty under subsection (1), the Scottish Ministers are to act so far as is consistent with the proper exercise of their—*

(a) *functions under the 2003 Act and the 2009 Act,*

(b) *other functions (whether or not relating to water resources or environmental matters).*

(3) *In subsection (1), the reference to the value of water resources—*

(a) *means the value of the resources on any basis (including their monetary or nonmonetary worth),*

(b) *extends to the economic, social, environmental or other benefit deriving from the use of the resources (or any activities in relation to them).*

(4) *In this section—*

"the 2009 Act" means the Climate Change (Scotland) Act 2009,

"water resources" means wetland, inland water and transitional water as defined by section 3 of the 2003 Act.

There is then a power of direction to require certain public bodies to participate, including Scottish Water.⁴⁰ Ministers must provide Parliament with an annual report for each of the first 3 years in which the provision is in effect. Part 1 came into effect on 12 June 2013,⁴¹ and the first report has been published.⁴²

Part 1 led to much debate at Committee stage. Especially, concerns were raised about the meaning of 'value', and also, whether and how 'development' was appropriate. The original clauses had referred to '*the economic and other benefit*' of using the resource.⁴³ The amendment referring specifically to '*social, environmental or other benefits*' was inserted to meet some of these concerns.⁴⁴ Especially, there were concerns that any 'development' of the resource would not recognise the

intrinsic value of water in its undeveloped natural state; that 'value', especially read with 'development', would be seen to involve and indeed prioritise economic analysis and monetary exchange; and that taking an 'ecosystems services approach',⁴⁵ or an 'ecosystems approach'⁴⁶ (and enshrining that in law) might be an alternative way to proceed. All of these positions are relevant to the policy context and implementation. (For the terms 'ecosystem approach', 'ecosystem services' and related terminology, see section 4 below.)

To aid the Parliament in its further deliberations, the Centre of Expertise for Waters and the James Hutton Institute produced a report summarising current academic thinking and evidence on the value of water resources, and how this might be developed in a Scottish context.⁴⁷ This included discussion of the multiple values that can be allocated to water, and how these can be assessed, as well as the ecosystem services that water provides.

3.1 Duties on Scottish Water regarding 'Value'

The definition of 'core functions' in s.26 (above) was intended to make it easier to identify the sorts of (non-core) activities by which SW or its subsidiaries could help to 'develop the value' of the resource. Again, it may be worth setting these provisions out in full:

S.23 Value of water resources

In section 25 (Scottish Water's general powers) of the 2002 Act, after subsection (1) there is inserted—

"(1A) Subsection (1) extends to allowing Scottish Water to engage in any activity that it considers will assist in the development of the value of Scotland's water resources (as construed in accordance with section 1 of the Water Resources (Scotland) Act 2013)."

This provision is the key enabling power that will permit non-core activities under the Hydro Nation agenda.

S.24 Development of assets

After section 50 of the 2002 Act there is inserted—

"50A Development of assets

(1) So far as it considers is not inconsistent with the economic, efficient and effective exercise of its functions, Scottish Water must take reasonable steps to develop the commercial value of its assets and expertise.

⁴⁰ 2013 Act ss.2-3; the list may be modified by regulation. No Directions have been made.

⁴¹ Water Resources (Scotland) Act 2013 (Commencement No. 1) Order 2013/163

⁴² Scottish Government (2014) Scotland The Hydro Nation - First Annual Report - Towards A Water Economy <file:///H:/My%20Documents/documents%20scotland/HydroNation%20AnnReport%202014.pdf>

⁴³ Water Resources (Scotland) Bill as introduced, clause 1(3).

⁴⁴ For the evidence led at the Committee stage, and the Committee's Stage 1 Report, along with all other supporting documents, see <http://www.scottish.parliament.uk/parliamentarybusiness/Bills/52620.aspx>

⁴⁵ Marc Stutter, JHI; Scottish Parliament Official Report Infrastructure and Capital Investment Committee, 24 October col.1002.

⁴⁶ Marc Stutter, Sarah Hendry; Ian Cowan; Scottish Parliament Official Report Infrastructure and Capital Investment Committee, 24 October col.1002.

⁴⁷ Martin-Ortega, J. et al (2013) *The Value of Scotland's Water Resources* CREW www.crew.ac.uk

(2) In complying with subsection (1), Scottish Water must have regard to any guidance for the time being issued by the Scottish Ministers.

(3) In this section, "assets" means property, rights and other assets (whether tangible or intangible)."

[Note: s.50 provides: *Scottish Water must, in exercising its functions, seek to ensure that its resources are used economically, efficiently and effectively.*]

S.25 Supporting renewable energy

After section 51 of the 2002 Act there is inserted—

"51A Supporting renewable energy

(1) So far as it considers is not inconsistent with the economic, efficient and effective exercise of its functions, Scottish Water must take reasonable steps to promote the use of its assets for the generation of renewable energy.

(2) In complying with subsection (1), Scottish Water must

have regard to any guidance for the time being issued by the Scottish Ministers.

(3) In this section, "assets" means property, rights and other assets (whether tangible or intangible)."

[Note: s.25 provides that *Scottish Water must, in exercising its functions, act in the way best calculated to contribute to the achievement of sustainable development.*]

These provisions were discussed at stage 3 of the Bill.⁴⁸ They give some indication of activities that will not be core functions; i.e. commercial exploitation of assets, or renewables generation; but as long as there is clarity as to who bears the risk and the reward, non-core activities are also ways by which SW can assist with 'developing the value'. However it is still necessary to further explore the multiple definitions of 'value' (economic, social and environmental), including how the non-monetary aspects can be safeguarded.⁴⁹ One way to do this is through the paradigm of 'ecosystem services', as reflected in the objectives of this project.

⁴⁸ Scottish Parliament Session 4 Official Report 27 February col.17061-17112.

⁴⁹ Martin-Ortega, J. et al (2013) *The Value of Scotland's Water Resources* CREW www.crew.ac.uk

4.0 Ecosystem Services: Terminology and Approaches

Academics and practitioners in different disciplines increasingly analyse human use of the environment in terms of the ecosystem services that the environment provides; many ecosystem services are provided by water. A series of attempts have been made to classify ecosystem services, including the Millennium Ecosystem Assessment,⁵⁰ and to assess their economic value, including The Economics of Ecosystems and Biodiversity project.⁵¹ More recently the UK National Ecosystem Assessment has placed this more firmly within a UK and Scottish context, and developed scenarios and policy responses around the concepts of ecosystem services and valuation, using both the Millennium Ecosystem Assessment classifications and The Economics of Ecosystems and Biodiversity methodologies.⁵² This approach is essentially anthropocentric, and often involves an economic analysis, to aid decision-making.⁵³ Nonetheless, it also recognises non-monetary values such as the cultural or spiritual values of water.

Services freshwaters provide to society:

Provisioning services: are the products obtained from ecosystems. For example: drinking water, commercial fishing, water for irrigation to produce food or hydropower, etc.

Regulating services: are the benefits related to the role that freshwater have in nature. For example: climate regulation, flood regulation, water purification, supporting wildlife, etc.

Cultural services: are non-material benefits that people obtain from ecosystems. For example: recreation, aesthetics values, symbolic and religious values.

Martin-Ortega, J. et al (2013)
The Value of Scotland's Water Resources.

The Millennium Ecosystem Assessment identified four classes of services - provisioning, regulatory, cultural and supporting services. Since then, a growing consensus has emerged that 'supporting' services (such as photosynthesis, or the water cycle) should not be included for the purposes of valuation, since they are not are not services pursued by humans directly but are

means of securing other services and are therefore reflected in the other three (provisioning, regulating and cultural).⁵⁴

A related concept is biodiversity, or the abundance and diversity of species and habitats – biodiversity can also be classed as a supporting service. The international community has acted to develop legal frameworks for managing biodiversity, especially through the Convention on Biological Diversity, agreed at the United Nations Conference on Environment and Development in Rio in 1992.⁵⁵ Subsequently, this Convention developed the 'Ecosystems Approach',⁵⁶ a set of 12 management principles to protect ecosystems and their functions. These principles include conserving ecosystem structure and functioning, and managing ecosystems within the limit of their functioning. Whilst 'ecosystem functioning' is a scientific concept, and the Ecosystems Approach perhaps best summed up as a set of management principles founded on that science, the term 'ecosystem services' is used across disciplines, not always consistently.⁵⁷ Martin-Ortega *et al* have recently reviewed the literature and suggest that the 'Ecosystem Approach' should be restricted to the Convention and related legal instruments, and specifically be taken to refer to the 12 Principles.⁵⁸ They also suggest using the term 'ecosystem services-based approaches' to encapsulate the wide variety of mechanisms used to address the relationship between humans and the services they take from the environment. They note a number of difficulties with these approaches, including the gaps between theory, use by policymakers, and incorporation into actual resource management practice; and the risk of disillusion when the new approaches do not lead to hoped-for results.

4.1 Scottish Water and Ecosystem Services

There are a number of ways in which Scottish Water's core functions can contribute to the maintenance, protection or enhancement of ecosystem services and therefore, to maximise the value(s) of Scotland's water resources. These might also entail additional benefits, either in going beyond the core functions, or benefiting persons beyond their customers. This in turn raises questions for the funding of those activities.

a) **Upstream Catchment Protection:** protection of drinking water sources above a certain size is mandatory under the Water Framework Directive,⁵⁹ to reduce the need for subsequent

50 Millennium Ecosystem Assessment (2003, 2005) available at <http://www.millenniumassessment.org/en/index.html>

51 The Economics of Ecosystems and Biodiversity see <http://www.teebweb.org/>

52 UK National Ecosystem Assessment Technical Report (UNEP-WCMC Cambridge 2011) and related documents see <http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx>

53 An important early contribution was Costanza, R. *et al*, (1998) *The Value of the World's Ecosystem Services and Natural Capital* Ecological Economics 25(1) 3-15; for a recent literature review, Martin-Ortega, J. *et al* (2013) *The Value of Scotland's Water Resources* CREW www.crew.ac.uk

54 Fu, B-J. *et al* (2011) *Double counting in ecosystem services valuation: causes and countermeasures*. Ecological Research 26, 1-14; Hein, L. *et al* (2006) *Spatial scales, stakeholders and the valuation of ecosystem services*. Ecological Economics 57, 209-228; Ojea, E., Martin-Ortega, J. and Chiabai, A. (2012) *Defining and classifying ecosystem services for economic valuation: the case of forest water services* Environmental Science & Policy 19 (2012): 1-15

55 Convention on Biological Diversity 1992 (CBD) (UN) 31 ILM (1992) 818.

56 CBD COP5 Decision V/6.

57 The concept also needs to be explained to wider audiences. For a useful discussion, see Ecosystems News Issue 9 Winter/Spring 2015, produced by the Ecosystems Knowledge Network <http://ecosystemsknowledge.net/>

58 Martin-Ortega, J. *et al* 'What Defines Ecosystem Services-Based Approaches?' in Martin-Ortega, J. *et al* (2014) *Water Ecosystem Services A Global Perspective* CUP / IHP Series

treatment, and also part of water safety planning under World Health Organisation guidance.⁶⁰ Reductions in rural diffuse pollution from agriculture and other land management activities may have other benefits, for example for biodiversity, as well as potentially reducing treatment needed for drinking water. Scottish Water has a Sustainable Land Management scheme for funding improvements in land use beyond regulatory compliance,⁶¹ and the Scottish Government is considering options for extending this scheme.⁶² Current work in this area is core business and paid for by Scottish Water's customers but some of the benefits may extend to the wider public. Support for rural communities is specified in the 2014 Ministerial Objectives and the Scottish Government is currently examining ways to improve such support.

b) **Flood Management:** Scottish Water has duties under Sewerage (Scotland) Act to maintain and repair the sewerage network,⁶³ and to map sewers and drains.⁶⁴ In addition they are responsible authorities under The Flood Risk Management (Scotland) Act 2009 and subject to the general duty to exercise their functions 'with a view to reducing overall flood risk'.⁶⁵ The 2009 Act applies to flooding caused by overloading of the system caused by heavy rain or other 'hydraulic factors', though not where the flood is caused by a blockage.⁶⁶ The 2009 Act also requires Scottish Water to assess the risk of flood from the sewerage network in vulnerable areas.⁶⁷ Sewer flooding, and flood management generally, are both specified in the 2014 Objectives. Scottish Water also has functions in relation to surface water flooding, including managing some road drains⁶⁸ and adopting certain Sustainable Urban Drainage Systems.⁶⁹ Particular issues arise in relation to Combined Sewer Overflows which may discharge a mixture of surface water and sewage during floods.⁷⁰ Both sewers and sustainable drainage systems are built to withstand a 1:30 year flood and this raises a wider issue of the capacity of the sewerage network to deal with climate change. Scottish Water has been delivering the Metropolitan Glasgow Sustainable Drainage Partnership as an integrated option to improve the incidence of sewer flooding in Glasgow.⁷¹ In addition there are responsibilities around managing reservoirs.⁷² Managing flood risk is core business, but again may have benefits for a wider public. Although sewer flooding from Scottish Water's networks or assets would seem likely to only affect those close enough to the system to also be

customers, that would not necessarily be the case for flooding from reservoirs, for example; and there are always wider benefits (public health, safeguarding property) not directly connected to Scottish Water's services, from managing any flooding.

c) **Environmental Protection and Improvement:** Many of Scottish Water's core functions enable a contribution to environmental protection. It is a bulk abstractor of raw water, and discharger of treated effluent. SEPA regulates these and SEPA is part of the Quality and Standards process which agrees Scottish Water's work programme, within which Scottish Water will be responsible for some of the programme of measures under the Water Framework Directive. The Quality and Standards process includes determining any 'disproportionate cost' relating to these measures and their timing.

The Government has recently consulted on new powers enabling SEPA to require Scottish Water and other public authorities to engage in river restoration, especially managing historic structures not subject to authorisation. Such restoration will contribute to the Water Framework Directive objectives.⁷³ These regulations also propose partnerships between the public authorities and private owners of infrastructure, including some financial incentives for the latter, where the assets are not subject to commercial use. Environmental improvements can always be seen to provide additional benefits to the wider public and future generations, as well as customers in the shorter term.

d) **Wastewater Management:** Core duties to manage wastewater are part of these environmental activities, and also relevant to flood management, but in addition, there are specific opportunities around management of wastewater, relevant to the Hydro Nation agenda and the management of climate change. These include generating energy and other products from sewage sludge;⁷⁴ and to closing loops on water and nutrient cycles. Whilst management of sludge produced by the public sewerage system is core business, any move to extend technologies, for example to co-digest food waste, would be a commercial activity carried out by Scottish Water Horizons.⁷⁵

There are also a number of small rural wastewater systems in the public domain where Scottish Water's Innovation unit is focused on achieving integrated solutions. However problems

59 WFD Art.7.

60 WFD Art.7; WHO (2004) *Guidelines for Drinking Water Quality 3rd Edition* available at http://www.who.int/water_sanitation_health/dwq/gdwq3/en/responsibility/sustainable-land-management and section 5.4.1 below on the governing regulations, and other mechanisms to address diffuse pollution.

61 See <http://www.scottishwater.co.uk/about-us/corporate->

62 CRW 2014/17 on *Methods to Assess the Role of Catchment Management in Helping to Improve and Protect Drinking Water Quality in a Cost-Effective Way*.

63 Sewerage (Scotland) Act 1968 s.2.

64 Sewerage (Scotland) Act 1968 s.11.

65 Flood Risk Management (Scotland) Act 2009 asp.6 s.1. Scottish Water is designated as a responsible authority under s.5.

66 Flood Risk Management (Scotland) Act 2009 s.3

67 Flood Risk Management (Scotland) Act 2009 s.16.

68 Sewerage (Scotland) Act 1968 s.7.

69 Water Environment and Water Services (Scotland) Act 2003 s.33 and Sch.3.

70 See Scottish Water's evidence to the Scottish Parliament's Rural Affairs and Environment Committee Inquiry into Floods and Flood Management, Second Report 2008 Session 3

71 See <http://www.scottishwater.co.uk/investment-and-communities/your-community/glasgow-investment/environmental-improvements/metropolitan-glasgow-strategic-drainage-programme>

72 Reservoirs Act 1975 c.23; being progressively replaced by Reservoirs (Scotland) Act 2011 asp.9.

73 Scottish Government (2015) *Delivering Scotland's River Basin Management Plans: Improving the physical condition of Scotland's water environment: A Consultation* available at <http://www.gov.scot/Publications/2015/02/1275>

74 Gaines, M *Sewage Recycling System Makes UK Debut in Scotland* Water and Wastewater Treatment 6/12/2014 <http://wwtonline.edie.net/news/sewage-recycling-system-makes-uk-debut-at-scottish-water#.VSTq5dzF-B0>

75 See <http://www.scottishwater.co.uk/business/horizons/horizons-environment/horizons-environment>

also arise from private schemes for which Scottish Water is not responsible. Scottish Water might seem ideally placed to offer technical advice and support, without adopting the system. That would be non-core business and could be provided on a commercial basis by Scottish Water Horizons, but analysis of any wider ecosystem benefits might affect the extent to which Government might wish to contribute to such improvements. As evidence emerges about impacts of emerging pollutants⁷⁶ it is likely that Scottish Water's expertise will be increasingly important for wastewater systems at any scale.

e) **Climate Change:** Scottish Water like all public authorities has duties under the Climate Change (Scotland) Act 2009,⁷⁷ to 'act in the way best calculated to contribute to' both targets under the Act, and delivery of any Government programmes, and reports on this annually in its Sustainability Report.⁷⁸ In some ways the benefit of this to the wider community is most extensive, as climate change is managed globally. Scottish Water generates renewable energy in various ways for use in its own processes, which would be core business.⁷⁹ However generation for supply to the grid would be non-core business and operate on a commercial basis; there was a clear intention that Scottish Water would do this during the passage of the Water Resources (Scotland) Act 2013. Concerns were raised by some witnesses that due to their (public) assets, Scottish Water might have an unfair advantage over private sector competitors in this area.⁸⁰ In their evidence, both Scottish Water staff and the Chief Executive of the Water Industry Commission considered that these concerns were not well-founded.⁸¹ In its Stage 1 Report, the Committee welcomed these assurances whilst recommending continued dialogue.⁸²

f) **Biodiversity:** Scottish Water has a general duty to 'further the conservation of biodiversity', as do all public authorities in Scotland,⁸³ and must report on this annually.⁸⁴ As with their climate change duties, this is included in their annual Sustainability Report. Biodiversity duties could be described as ancillary to Scottish Water's core functions, in the sense that they do not entail specific additional obligations but refer to the manner of carrying out other core functions. Nonetheless biodiversity law is often the framework for protection of ecosystem services internationally and the duty could provide an opportunity to justify further activity, including the funding of some additional benefits.

Some of these contributions, for example biodiversity, will benefit 'the public', beyond those who are customers of Scottish Water, including those in Scotland with private supply, future generations, and in some cases communities further afield (for example carbon management). All of these functions are mandated by public law instruments, which provides an opportunity to address any concerns about the benefits applying more widely than the customer base. Biodiversity and climate change especially could usefully form part of Scottish Water's ongoing dialogue with customers (and regulators) over spending priorities.

g) **Innovation:** All of these activities give rise to technologies and expertise which Scottish Water International could 'market' to other countries, in furtherance of the Hydro Nation agenda, and this would be contributing to developing the value of the resource and use of its assets. Innovations within the core business will assist in providing a better service to customers at home, and may also be useful and relevant to those with a private supply, but in need of technical support; but can then (along with the regulatory and governance model itself) be part of the export agenda.

4.2 Payments for Ecosystem Services

To build ecosystem services into decision-making processes entails an economic analysis; schemes for payments for ecosystem services (PES schemes) are an economic tool for environmental management. They are market-based mechanisms and fall within ecosystem services-based approaches. However the concept is cross-disciplinary and also studied by lawyers;⁸⁵ like most macro-economic policy areas, implementation will be through a legal framework. One recent definition of PES schemes is 'voluntary transactions between service users and service providers that are conditional on agreed rules of natural resource management for generating offsite services'.⁸⁶

A recent report looking at PES schemes globally, specific to water, suggests that these are rapidly expanding.⁸⁷ Forest Trends 'Ecosystem Marketplace' tracked 406 active or pilot programmes in 29 countries, in 2013.⁸⁸ Funders included governments, businesses, and donors, with a total of USD9.6 billion spent on water issues in 2013. Investment has been

76 The recent revisions to the Priority Substances Directive, 2008/105/EC, 2013/39/EU, have introduced a 'watch list' including some pharmaceuticals, and the Water Resources (Scotland) Act 2013 s.34 gave Scottish Water new powers to control priority substances via trade effluent consents.

77 Climate Change (Scotland) Act 2009 s.44.

78 Scottish Water (2014) *Sustainability Report 2014* <http://www.scottishwater.co.uk/assets/about%20us/images/corporate%20responsibility/sustainabilityreport2014.pdf>. The Government is intending to formalise reporting requirements under Part 3 of the Act.

79 See <http://www.scottishwater.co.uk/investment-and-communities/investment-programme/energy>

80 Scottish and Southern Energy, and the Scottish Environmental Services Association, raised this issue regarding both generation and the management of biodegradable wastes; see Scottish Parliament Official Report Infrastructure and Capital Investment Committee 3 October 2012 col.951 ff; and for written evidence, see Infrastructure and Capital Investment Committee 11th Report, 2012 (Session 4) Stage 1 Report on the Water Resources (Scotland) Bill. <http://www.scottish.parliament.uk/parliamentarybusiness/Bills/52620.aspx>

81 Scottish Parliament Official Report Infrastructure and Capital Investment Committee 3s October 2012 col.1031-2, col.140-141.

82 Infrastructure and Capital Investment Committee 11th Report, 2012 (Session 4) Stage 1 Report on the Water Resources

83 Nature Conservation (Scotland) Act 2004 asp.6 s1, and see section 7.1 below (Scotland) Bill paras.132-133.

84 Wildlife and Natural Environment (Scotland) Act 2011 s.

85 See, for an early discussion of the role of law, Ruhl, J.B., Kraft, S. and Lant, C. (2007) *The Law and Policy of Ecosystem Services* Island Press Washington DC; in a transboundary context, bringing together law and science, Rieu-Clarke, A and Spray, C (2013) *Ecosystem Services And International Water Law: Towards A More Effective Determination And Implementation Of Equity?* (16)2 PER/PELJ 12/212 <http://www.nwu.ac.za/sites/www.nwu.ac.za/files/files/p-per/issuuepages/2013volume16no2/2013%2816%292RIEU-CLARKE%20ea.pdf>;

86 Wunder, S. (2015) *Revisiting the concept of payments for environmental services*. Ecological Economics DOI: [10.1016/j.ecolecon.2014.08.016](https://doi.org/10.1016/j.ecolecon.2014.08.016)

87 Bennett, G. and Carroll, N. (2014) *Gaining Depth: State of Watershed Investment 2014* A Report by Forest Trends' Ecosystem Marketplace (Forest Trends) <http://www.forest-trends.org/documents/files/SOWI2014.pdf>

88 Bennett, G. and Carroll, N. (2014) *Gaining Depth: State of Watershed Investment 2014*

growing at about 8% per year and has supported the protection or rehabilitation of 365 million hectares of land. Due to the importance of forests as providers of ecosystem services, and the relationship between forests and water, it is unsurprising that forest law provides many examples of PES schemes.

The National Forestry Finance Fund of Costa Rica – Fondo Nacional de Financiamiento Forestal (FONAFIFO)

In 1996, responding to rapid loss of forest cover, Costa Rica established a framework for payment of forest ecosystem services with the enactment of the Forestry Law 7575, recognizing four environmental services: carbon fixation, hydrological services, biodiversity protection, and scenic beauty. The Forestry Law also established FONAFIFO as a public, decentralized and autonomous forestry-financing agency with the objective of attracting financing for the benefit of small and medium sized forest producers.

FONAFIFO pays for three activities:

- conservation (USD 320/ha for 5 years),
- reforestation (maintained for 15 years, USD 980/ha paid in instalments over the first 5 years);
- sustainable forest management (5 year sustainable logging plans, USD 1.3/tree paid in instalments over 3 years)

By 2012, the scheme had increased to nearly 13,000 signed contracts covering over 800,000 hectares. It is financed by 3.5% of the revenues accruing from a fossil fuel tax; a national water tariff on water use; loans from organizations like the World Bank and the GEF; and voluntary contracts with private hydroelectric producers.

(IIED, 2012. *Payments for environmental services in Costa Rica: from Rio to Rio and beyond*. Briefing, International Institute for Environment and Development. Prepared by Ina Porras, Miriam Miranda, David Barton and Adriana Chacon-Cascante;

SANCHEZ-AZODEIFA, Arturo et al. *Costa Rica's Payment for Environmental Services Program: Intention, Implementation, and Impact*. Conservation Biology, 21 (5) (2007);

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Different countries are establishing PES schemes in different ways. Martin-Ortega *et al* examined 310 transactions in 40 different schemes across Latin America, all specific to water, and found that the reporting and analysis of these schemes in practice did not always match the theory, and that both data and terminology were problematic.⁸⁹ Characteristics of these schemes were the use of intermediaries, the role of NGOs, and that payments were rarely based on economic analysis. Usually schemes pay for inputs (changes in land management practice) rather than outputs (the ecosystem service gains themselves) and monitoring of schemes in terms of the benefits they delivered was often unknown.

Latin America provides many examples of interest (and see also 5.6.3 below), but so do other jurisdictions. Australia also has made extensive use of PES schemes, public, private and voluntary, at Federal and State level. In England and Wales, one example of a publicly funded scheme would be DEFRA's Environmental Stewardship scheme.⁹⁰ This paid farmers and land managers in return for more environmentally-sensitive farming, but is now closed to new entrants.⁹¹

In the UK, the Department of Environment, Food and Rural Affairs (DEFRA) funded 11 pilot PES schemes of different types from 2011-13 and has since published a review.⁹² This includes discussion of how to design PES schemes, including risk assessment and guidance on levels of payment; and is likely to be useful in a Scottish context. As in the review of Latin American schemes, DEFRA identified likely timescales of around 5 years, and also noted that payments are more likely to be for inputs than outputs. Schemes may be 'bundled', where a single buyer pays for multiple services from one site; 'layered' (or 'stacked'), where different buyers acquire different services; but in some circumstances there will be 'piggybacking' (or freeloading), where additional benefits are secured, or secured for other beneficiaries, without specific funding. Globally, Forest Trends have estimated that around a third of PES schemes will use bundling or stacking.⁹³

DEFRA reviewed 17 schemes, including several catchment protection schemes. Three of these were operated by English water companies and two relate to drinking water protection elsewhere, including the Catskills scheme in New York State⁹⁴ and also Vittel's scheme in France.⁹⁵ The latter protects water for the bottled water market, and in that regard we can also note Highland Spring's site in Perthshire, where mechanisms have included buying land and not renewing leases, in order to minimize human and agricultural impacts on land.⁹⁶ In theory purchase of land would be an option for Scottish Water but is unlikely to be financially or politically acceptable (see section 5.4.1 below).

89 Martin-Ortega, J *et al* (2013a), *Payments for Water Ecosystem Services in Latin America: A literature review and conceptual model*. Ecosystem Services <http://dx.doi.org/10.1016/j.ecoser.2013.09.008>

90 Natural England (2009). *Agri-environment schemes in England 2009: A review of results and effectiveness* <http://publications.naturalengland.org.uk/publication/46002>

91 See <https://www.gov.uk/environmental-stewardship>

92 DEFRA (2013) *Payments for Ecosystem Services A Best-Practice Guide* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/200920/pb13932-pes-bestpractice-20130522.pdf

93 Bennett, G., Carroll, N., and Hamilton, K. (2013) *Charting New Waters: State of Watershed Payments 2012* Forest Trends http://www.forest-trends.org/documents/files/doc_3308.pdf

94 See also Appleton A, (2002) *How New York City Used an Ecosystem Services Strategy Carried out Through an Urban-Rural Partnership to Preserve the Pristine Quality of Its Drinking Water and Save Billions of Dollars* http://ecosystemmarketplace.com/documents/cms_documents/NYC_H2O_Ecosystem_Services.pdf

95 Perrot-Maître, D. (2006). *The Vittel payments for ecosystem services: a "perfect" PES case?* International Institute for Environment and Development, <http://pubs.iied.org/pdfs/G00388.pdf>

96 Highland Spring, Presentation to researchers from the Centre for Water Law, Policy and Science and from the EU 'GENESIS' project, Groundwater and Dependent Ecosystems: EU FP7 Contract Number 226536, September 2013.

4.2.1 Catchment Protection by English Water Companies

New York City Catskills Water Management Scheme

In the 1980's, New York City water supply was at risk of failing drinking water quality standards and had a choice whether to build a new water treatment plant, or try a catchment-based approach. The source is a 2,000 square mile watershed in parts of 8 upstate counties, with supply primarily from surface water; the City owned less than 8% of the watershed. The system capacity was 550 billion gallons, serving 9 million people and delivering around 1.2 billion gallons per day to the City. The City decided to invest in watershed protection programmes at source, rather than treat at end of pipe.

The 'End of pipe solution' was costed at \$6-8 billion capital cost of filtration plant, with \$350 million annual operating costs.

The 'Watershed protection' costs were some \$1.5bn over 10 years with around \$100m / annum being invested in the upper catchment.

They achieved their targets via New York City Watershed Memorandum of Agreement (MOA) which included Land Management Agreements, a Watershed Agricultural Program and Forest Programs. The MOA established an innovative partnership between diverse governmental and non-governmental parties that protects the New York City drinking water supply and preserves the economic vitality of the upstate Watershed communities.

Appleton A, (2002) How New York City Used an Ecosystem Services Strategy Carried out Through an Urban-Rural Partnership to Preserve the Pristine Quality of Its Drinking Water and Save Billions of Dollars.

In England, a number of water companies have been undertaking catchment work, for biodiversity as well as drinking water protection. As private companies, the English companies are not affected by state aid rules. However their prices are still regulated; the regulatory framework is broadly similar to that in Scotland and they are also vertically integrated, so they provide a useful comparator for this aspect of managing value.⁹⁷

They are able to use catchment management as a way of delivering against any of their outcomes, but companies are free to base their actions on whatever they see as being the most cost effective way of delivering the outcomes required. Only four companies (Severn Trent, Thames, Sutton and East Surrey, and South West) were committed to catchment related outcome performance in their PR14 Final Determination, but others will also use catchment methods.

The 2015 Business Plan proposals contain some 300 catchment schemes; the total catchment spend will be much greater, but it is still only estimated as around 1% total expenditure. Choice of catchment schemes may be driven by customer preferences, reputation, risk or other drivers (as opposed to treatment cost-benefit); costs and benefits, if analysed at all, are usually hidden or generalised, so they are not transparent.

In a detailed review of the activities of three companies, Indepen identified £100 billion total expenditure in English catchments in next 15 years, of which £30 billion will be on Water Framework Directive measures and maintaining standards for water and wastewater treatment. They estimated that anywhere between £300m - £1billion costs could be avoided by the water sector through adopting a wider catchment approach, in addition to which, there would be additional benefits to biodiversity, flood risk reduction and carbon management. Catchment-based approaches could reduce water treatment costs by 10-20% due to reduced suspended solids content, improved colour, and lower pesticide levels.⁹⁸

South West Water surveyed their customers and found a willingness to pay a small additional amount for ecosystem services. This is a mechanism which Scottish Water could usefully explore with customers and regulators.

⁹⁷ The principal legislation is the Water Industry Act 1991 c.56 as amended; the regulator is now the Water Services Regulation Authority, but it is widely referred to by its prior acronym, OFWAT. The material in this section is taken from work under CRW 2014/17 on *Methods to Assess the Role of Catchment Management in Helping to Improve and Protect Drinking Water Quality in a Cost-Effective Way*.

⁹⁸ Indepen (2014) *Discussion paper on the potential for catchment services in England* http://www.indepen.uk.com/docs/catchment-services-report_july2014.pdf

⁹⁹ See <https://www.cbd.int/information/parties.shtml>

5.0 Legal Mechanisms for Managing Ecosystem Services

The DEFRA review notes that PES schemes are only one policy option in a suite including regulation, provision by public authorities, voluntary action and various other 'market' or financial mechanisms. In addition there could be a role for subsidy and for environmental taxation. Almost all of these, including the 'market' mechanisms, are likely to involve a legal framework, whether they are mandatory legal requirements or operate by agreement, but this section will consider first, public law mechanisms. These may be international, regional, national or local, and often operate via biodiversity law. It will then consider options and constraints in private law, and then legal mechanisms specifically for market-based measures.

5.1 Biodiversity Law

The UN Convention on Biological Diversity has wide international acceptance, with 195 state parties;⁹⁹ it has driven reforms of domestic law and policy. The Conference of the Parties of the 1971 Ramsar Convention, protecting wetlands and migratory birds, refined its definition of the 'wise use of wetlands' following the introduction of the CBD's Ecosystem Approach and reflecting inputs of the Millennium Ecosystem Assessment: "*Wise use of wetlands is the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development.*"¹⁰⁰

At EU level, international commitments are recognised under the Biodiversity Strategy¹⁰¹ as well as the Habitats and Birds Directives.¹⁰² The Strategy provides explicitly for maintenance and enhancement of 'ecosystem services' and though it does not specify an Ecosystems Approach, it specifically implements the EU's international commitments under the Convention on Biological Diversity, including restoration of 15% of degraded ecosystems by 2020.

There is a complex mesh of national law and policy at both UK and Scottish level.¹⁰³ These rules *inter alia* protect species and habitats, and include at national level, Sites of Special Scientific Interest, as well as national parks and other designated sites. Ramsar wetland sites are designated, and under European law, there are Special Protected Areas (for habitats) and Special Areas of Conservation (for birds). Generally an international designation is the most powerful, but for EU member states, EU sites may be better protected. Although the Habitats Directive introduced certain exceptions to modify the impact of the Birds

Directive, the European Court of Justice has generally been restrictive in terms of allowing these development exceptions.¹⁰⁴ Usually, a site designated at international or European level will also have a national designation.

Enforcement nationally is often limited and in the past may have depended on purely consultative processes; but in recent years there has been extension of enforcement powers of public authorities, usually to prevent certain uses, backed by the criminal law as well as the civil courts.

Sites of Special Scientific Interest

On Sites of Special Scientific Interest, landowners need consent to carry out certain notified activities. If such consent is refused, the public authority (Scottish Natural Heritage) may offer to enter a Land Management Agreement, and this may include payment to the applicant; but if the applicant declines such an agreement, Scottish Natural Heritage may also ask the Ministers to serve a Land Management Order. Scottish Natural Heritage can serve Restoration Notices, and Ministers can also serve Nature Conservation Orders, for classes of activities and not restricted to SSSIs. These powers may involve criminal sanction for certain breaches, or be enforced in the civil courts. There is a register of procedures relating to SSSIs.

Nature Conservation (Scotland) Act 2004 Part 2; Wildlife and Natural Environment (Scotland) Act 2011.

5.2 Land Use and Planning

Biodiversity law will interact with other strategic legal meta-regimes such as land use planning and environmental law as well as water law; the boundaries between these regimes are not fixed and will vary across time and between legal systems and jurisdictions. In the UK jurisdictions, agriculture and other rural land uses do not fall within the scope of land use planning, but some activities may do so and broader planning and land use policies are relevant. Scotland's National Planning Framework recognises explicitly that our quality of life depends on the ecosystem services provided by (rural) Scotland.¹⁰⁵

100 Convention on Wetlands of International Importance (UN) (Ramsar) 1971 11 ILM (1972) 96; COP9 Res.IX.1 Anx A Para.22.

101 European Commission (2011) *Our Life Insurance, our Natural Capital: an EU Biodiversity Strategy to 2020* COM(2011) 244 final.

102 Habitats Directive 1992/43/EEC; Birds Directive, now 2009/147/EC.

103 See Reid, CT (2009) *Nature Conservation Law* W Green / Sweet & Maxwell; Scottish Government (2004) *Scotland's Biodiversity: It's In Your Hands* <http://www.gov.scot/Resource/Doc/25954/0014583.pdf> and Scottish Government (2013) *2020 Challenge for Scotland's Biodiversity* <http://www.gov.scot/Resource/0042/00425276.pdf> - together, designated as Scotland's Biodiversity Strategy. Wildlife and Countryside Act 1981 c.69 as amended; Conservation (Natural Habitats, etc) Regulations 1994/2716 as (much) amended; Nature Conservation (Scotland) Act 2004 asp.6; Wildlife and Natural Environment (Scotland) Act 2011 asp.6.

104 See, eg, the early case law on the Birds Directive, *Santona Marshes, Commission v Spain* Case C-355/90; *Leybucht Dykes, Commission v Germany* Case C-57/89; and recognising the changes in the Habitats Directive, *LappelBank, R v Secretary of State for the Environment, ex parte RSBP* Case C-44/95 1997 QB 206; more recently *Nomarchiaki Aftodioikisi Aitoloskarnanias Case C 43/10, considering whether large-scale diversions for irrigation and public supply could amount to 'overriding public interest' under the Habitats Directive.*

105 Scottish Government (2014) *Ambition, Opportunity, Place: Scotland's Third National Planning Framework* <http://www.gov.scot/Resource/0045/00453683.pdf> paar.4.19. There is also interest in services relevant to the urban environment; one of the DEFRA pilots was

The Scottish Land Use Strategy was developed under the Climate Change (Scotland) Act 2009¹⁰⁶ and establishes as one of its principles that *'use decisions should be informed by an understanding of the functioning of the ecosystems which they affect in order to maintain the benefits of the ecosystem services which they provide.'* One of the 'first steps' in the implementation of the Strategy was to recommend an 'ecosystems approach'.¹⁰⁷ The pilot projects under the Land Use Strategy have involved assessment of ecosystem services.

5.3 Environmental and Water Law

General environmental law, and especially water law, provide further mechanisms to manage ecosystems. The UN Watercourses Convention provides that *'Watercourse States shall, individually and, where appropriate, jointly, protect and preserve the ecosystems of international watercourses'*.¹⁰⁸ The UN/ECE Helsinki Convention, also open to signatories globally, requires parties to *'ensure conservation and, where necessary, restoration of ecosystems'*;¹⁰⁹ and notes the use of the *'ecosystem approach'* as part of sustainable water management.¹¹⁰ Regional conventions may also make similar general provision. Whether or not linked to such international initiatives, water (and environmental) laws in many countries are increasingly referring to ecosystems, and indeed ecosystem (or environmental) services as factors in managing water use.

Bhutan's Water Act

In 2011, Bhutan enacted its new Water Act, with the aim of ensuring that *'water resources are protected, conserved and/or managed in an economically efficient, socially equitable and environmentally sustainable manner'*. The value of water is therefore established within the principles of sustainable development, and sustainable use is prominent throughout, with specific reference to inter-generational equity. The Act sets criteria for permitting water use, including the impact of new uses on existing formal and customary users, and environmental uses.

The National Environment Protection Act of 2007 established the principle that extraction or use of natural resources should be paid for, and allows the National Environment Commission to facilitate valuation of natural resources, with reference to user equity, conservation and sustainable use. The Water Act refers to payment for 'watershed services' and 'environmental services', and foresees development of a regime for payment for environmental services, but as yet there is no secondary legislation.

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In an EU context, the Water Framework Directive does not specifically mention 'ecosystem services' or an Ecosystem Approach, but its first purpose is to *'prevent further deterioration and protect and enhance the status of aquatic ecosystems'*.¹¹¹ The Water Framework Directive is an instrument for Integrated Water Resource Management (IWRM), which is a policy initiative in many countries¹¹² and increasingly being recognised as a core element of national water laws.¹¹³ In addition, the Directive sets an objective of 'good ecological status' for all waterbodies, through programmes of measures developed in river basin management plans; ecological status is defined to include the structure and functioning of ecosystems. It would seem therefore to promote taking an ecosystem-services based approach.¹¹⁴ The Water Framework Directive also recognises the multiple values of water, stating that *'Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such'*.¹¹⁵ Further, it utilises economic tools; there should be full cost recovery (including environmental and resource costs) of water services, and 'disproportionate cost' may be a reason to defer or derogate from the overall objective of reaching good status.¹¹⁶ Thus better identification of the value of ecosystem services from water may assist in determining if costs are disproportionate.

Environmental and water laws operate at national level, and the Water Environment and Water Services (Scotland) Act, with the Controlled Activities Regulations, operationalise the Directive in Scotland. The programmes of measures under the river basin management plans are a key tool for managing the flow of services from the aquatic environment and Scottish Water is an important stakeholder, and has significant responsibilities for delivering the programme of measures.

These accepted public law frameworks may provide opportunities to protect and enhance ecosystem services, but they rely firstly, on capacity (human, technical, financial) of relevant public bodies, and secondly, on political will. They will generally use a combination of penalties and (perhaps) financial incentives. These must be politically acceptable in order to be enforceable, and will also need to be compatible with protection for private interests in land.

5.4 Enforcement

5.4.1 Powers of Compulsion

In a system such as in Scotland, which recognises and protects private rights to land, mechanisms to restrict the rights of landowners are nonetheless well-established. These would include the public law regimes above, as well as established rules on nuisance in private law. Powers of compulsion are easy to enact, but not always easy to enforce – especially in a rural context and especially where resources are limited. For example, the Diffuse Pollution Regulations introduced by Scottish Government have led to extensive enforcement action

106 Scottish Government (2011) *Getting the best from our land: A land use strategy for Scotland* <http://www.gov.scot/Resource/Doc/345946/0115155.pdf>

107 Scottish Government (2011a) *Applying an ecosystems approach to land use: Information Note* <http://www.gov.scot/Resource/Doc/345453/0114927.pdf>

108 Convention on the Law of the Non-Navigational Uses of International Watercourses (UN) (Watercourses Convention) 36 ILM (1997) 700 Art.20.

109 Watercourses Convention Art.2.

110 Watercourses Convention Art.3.

111 WFD Art.1.

by SEPA officers in fourteen 'priority catchments',¹¹⁷ including farm visits to 'walk the catchment' as well as meetings and other communications. Even in the catchments furthest ahead, where SEPA officers have made a second visit, compliance is still variable but concentrated regulatory effort is paying off. In the Ugie, the best performing catchment, compliance with the rules is at 82% and still rising.¹¹⁸

The most obvious and far-reaching power of compulsion would involve compulsory purchase of land, which although available to public authorities in Scotland, is restricted legally and by financial and practical constraints. More generally, powers of compulsion may be politically unacceptable amongst the communities subject to the powers, and may lead to legal challenge, especially on the basis that property rights are being unreasonably or disproportionately affected by new rules (section 5.5.1 below). Further, they are usually only appropriate to create negative obligations or restrictions, rather than positive requirements.

5.4.2 Incentivising Behavioural Change

An alternative to compulsion is to incentivise change, usually by financial mechanisms. This can operate at different levels and may be integrated with compulsory requirements, for example the schemes for direct payments under Pillar 1 of the EU Common Agricultural Policy, require compliance before payments can be made.¹¹⁹ By contrast, payments under Pillar 2 for agri-improvement schemes are made under the Scottish Rural Development Programme for activities beyond compliance.¹²⁰ At a smaller scale, Scottish Water's Sustainable Land Management scheme incentivises measures to address diffuse pollution above and beyond the requirements of the regulations. Whilst compulsion may lead to resistance and challenge from affected landowners, incentive schemes may lead to dissatisfaction amongst the wider community, who perceive public funds being diverted to private landowners for activities designed to protect the resource base on which ecosystem services of public utility depend. State aid rules are relevant here; the Commission must approve relevant schemes including the Scottish Rural Development Programme and the Sustainable Land Management scheme.

5.5 Private Law and Property Rights

In many countries, a formal written constitution establishes the nature of property and ownership, and allocates rights to the

state and to citizens in variable ways. In civilian jurisdictions, there can usually be only one 'owner' of property, which might be a private individual, or the state. In common law jurisdictions, the concept of trust may enable concurrent 'ownership' rights. Traditionally in Scotland, the feudal system created multiple property rights in land.¹²¹ Further, leases and licences create rights in land which co-exist with that of the owner. In order to create structures that affect the use of land by private landholders, especially over periods of time, these multiple interests must all be recognised.

Developments in environmental law suggest that a 'stewardship' approach might be one way forward, whereby landowners are increasingly expected to take responsibility for the services that their holding provides, for public benefit and future generations.¹²² Stewardship might also offer an 'umbrella' concept, embracing activities, rights and responsibilities of landowners, authorities and the public. A more radical reassessment of the (competing) interests of private landowners and the needs of the environment comes through the Wild Law or Earth Justice movements, where the planet is seen as having rights that can be enforced on its behalf.¹²³ These analyses would recognise the locus of communities in various ways, including communities of place but also communities of interest, of relevance to (for example) iconic sites of national significance.

These different analyses all offer ways of moving forward, but also present the possibility of challenge, in relation to both land and water rights.

Constitutional Rights for Nature

Recently, the Ecuadorian Constitution was amended to provide rights for nature:

Art 1: Nature or Pachamama, where life is reproduced and exists, has the right to exist, persist, maintain and regenerate its vital cycles, structure, functions and its processes in evolution. Every person, people, community or nationality, will be able to demand the recognitions of rights for nature before the public organisms. The application and interpretation of these rights will follow the related principles established in the Constitution.

Constitution of Ecuador (2008) Title II Chapter 7 'Rights of Nature'

- 112 Since 2002, signatories to the Johannesburg Declaration have been committed to water planning: UN (2002) *Report of the World Summit on Sustainable Development Incorporating the Johannesburg Declaration and Plan of Implementation* (Johannesburg) A/Conf.199/20 Para. 26; and for progress globally in law and policy reforms, UN-Water (2012) *Status Report on The Application of Integrated Approaches to Water Resources Management* available at http://www.unwater.org/downloads/UNW_status_report_Rio2012.pdf
- 113 Salman, S. and Bradlow, D. 2006 *Regulatory Frameworks for Water Resources Management* World Bank Washington DC, section 3.2; Hendry, S. (2015) *Frameworks for Water Law Reform* CUP / IHP Series chapter 2.
- 114 Blackstock, K., Martin-Ortega, J., Spray, C. (2014) 'Implementation of the European Water Framework Directive: What does taking an ecosystem services-based approach add?' in Martin-Ortega, J. et al (2014) *Water Ecosystem Services A Global Perspective* CUP / IHP Series
- 115 WFD Preamble Art.1
- 116 WFD Art.4
- 117 Water Environment (Diffuse Pollution) (Scotland) Regulations SSI 2008/54, now incorporated into CAR 2011 Sch.3. See also DPMAG (undated) *Rural Diffuse Pollution Plan for Scotland* available with other documentation at http://sepa.org.uk/water/river_basin_planning/diffuse_pollution_mag.aspx
- 118 Personal communication, Darrell Crothers, SEPA. These figures are at October 2014 and are likely to be improving as enforcement continues.
- 119 COUNCIL REGULATION (EC) No 73/2009 establishing common rules for direct support schemes for farmers under the common agricultural policy and establishing certain support schemes for farmers.
- 120 Scottish Rural Development Programme see <http://www.gov.scot/Topics/farmingrural/SRDP>
- 121 See eg Reid, K. and Zimmerman, R. (Eds.) (2000) *A History of Private Law in Scotland* Vol.I OUP Oxford.
- 122 See, for a recent review, Barritt, E. *Conceptualising Stewardship in Environmental Law* (2014) 26 JEL 1. These 'management' approaches are only one way of utilising 'stewardship' in relation to property and the environment.
- 123 See, eg <http://www.wildlawuk.org/>; Burdon, P (Ed) (2011) *Exploring Wild Law: The Philosophy of Earth Jurisprudence* Wakefield Press

5.5.1 Property and Ownership in Water

In many jurisdictions, constitutions establish public ownership of water.¹²⁴ This reflects customary and historic approaches to water as a public good or subject to common interest, and reflects its cultural and spiritual (non-monetary), as well as its social, values. Private rights are often restricted to use. In Roman law, running water was *res communes*, and not susceptible to private ownership, and permanent rivers were *res publica*;¹²⁵ as a mixed jurisdiction, these principles were reflected in the development of the riparian doctrine in Scotland.¹²⁶ Legislation may specify in some detail the relative rights of the public and private domains,¹²⁷ or may provide that water is in public trust, or some similar formulation.¹²⁸ In the US, where property rights in water, as in land, may be deeply entrenched, the public trust doctrine has allowed public authorities to protect public benefit in water;¹²⁹ and to protect biodiversity.¹³⁰ Hence, despite description of water rights in historical case law as “*more than a right of use... as nearly amounts to property*”,¹³¹ in Scotland, as in most countries, water rights are different from private rights in land.

There is no constitutional provision for public ownership of water in Scotland or the UK. The historic common law applied the riparian doctrine, and this has been extensively overlaid with statutory restrictions, but riparianism was not abolished or replaced. When the Water Environment and Water Services Act 2003 went through Parliament there was no discussion of ownership as such, and perhaps this was sensible, to avoid controversy. Scottish Water therefore does not own Scotland's water. It certainly holds extensive water rights, but their nature is no different to any other water rights holder. The Government does not ‘own’ Scotland's water either. As a mixed jurisdiction, in Scotland a ‘public trust’ or similar doctrine would be quite consistent, and it has been argued recently that rights in water should be revisited, to reflect current understandings of water rights in the public interest,¹³² but the Government does not currently intend to proceed with this.

5.5.2 Human Rights and Challenges to Compulsory Powers

In the US, where private property is heavily entrenched in the constitution, the opportunities for the state to interfere is more

limited, and this is one reason why US states are likely to use conservation easements to provide for ecosystem services.¹³³ In the UK, the incorporation of the European Convention on Human Rights into domestic law has sharpened the focus on what sorts of encroachments may be acceptable.¹³⁴ The jurisprudence of the European Court of Human Rights has given a wide meaning to ‘property’, including licences to extract natural resources,¹³⁵ but has not prevented states from infringing property rights if the measures are proportionate and for a public purpose.¹³⁶ When the Controlled Activities Regulations were first enacted, there were fears this would lead to human rights challenges from those with prior rights to abstract, especially from groundwater, but this did not occur.¹³⁷ Hence, although neither the Government nor Scottish Water ‘owns’ the resource, there is general acceptance of the right to control uses in the public interest, including for the management of ecosystem services and the delivery of multiple values.

In practice, both land and water rights are constrained by widely accepted legal obligations imposed by public law (planning, environment, nature conservation), but the different ownership regimes might still be relevant to the type and degree of control that the state or public authorities can exercise. Whilst landowners will be better-placed to challenge restrictions on their use of land, where property rights are more definite, they will also be able to challenge restrictions on their water rights which are disproportionate (especially, regarding public purpose and also the timing of reforms). Further, broader concepts of multiple interests in water risk challenge from the wider public. The Wild Law and Earth Justice movements are concerned with the rights of the environment as such, as distinct from either the competing rights of private interests, or the role of the state. However, both ‘wild law’ and stewardship could provide conceptual frames to enable and justify better protection of ecosystem services in the public interest.

5.6 Legal Mechanisms for Market-Based Approaches

As noted, PES schemes are one form of market mechanism. The term is sometimes used to include all market-based instruments, but is more often restricted only to those involving a buyer

124 See, eg, Constitution of Spain, 1978, Art.132.

125 Lee, R.W. (1956) *The Elements of Roman Law* Sweet & Maxwell Edinburgh

126 See, for a historical analysis, Ferguson J 1907 *The Law of Water and Water Rights in Scotland* W Green & Son (the only monograph on Scottish water law), or Whitty N *Water Law Regimes* in Reid K and Zimmerman R, Eds, 2000 *A History of Private Law in Scotland* Vol.I OUP Oxford.

127 See, eg, French Civil Code Art.538.

128 See, eg, the South African National Water Act 1998 No.36 s.3.

129 As famously discussed by Joseph Sax – Sax, J. (1970) *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention* Michigan Law Review 68 (3): 471–566.

130 See, famously, *National Audobon Society v Superior Court of Alpine Country SC California* [S.F. No. 24368 Supreme Court of California. February 17, 1983.]

131 *Ferguson v Shirreff* (1844) 6D 1363.

132 Elliot, A. et al (2014) *The Land of Scotland and the Common Good: Report of the Land Reform Review Group* <http://www.gov.scot/Resource/0045/00451087.pdf> section 30.

133 For a comparative discussion of the human rights (and rights-based) issues around managing ecosystem services, see Reid, C. and Nsoh, W. (2014) Whose Ecosystem is it anyway? Private and Public Rights Journal of Human Rights and the Environment 5(2) 112-135.

134 European Convention for the Protection of Human Rights and Fundamental Freedoms (1950) 213 UNTS 221; Human Rights Act 1998 c.42.

135 See eg *Fredin v Sweden* (1991) 13 EHRR 784; *Catscratch Ltd No.2 v Glasgow City Licensing Board* 2002 SLT 503

136 European Convention on Human Rights Art.1 Protocol 1; and see eg *United Kingdom Association of Fish Producer Organisations v Secretary of State for Environment, Food and Rural Affairs* [2013] EWHC 1959 (Admin) [113]. These arguments essentially address property rights, rather than the ‘human right to water’, which is concerned with access to basic services.

137 This line of argument is about property rights, and is not linked to the ‘human right to water’, at least in the UK and in the context of large scale public provision of services. The linkage could exist if an individual or community losing a ‘water right’ was dependent on it for drinking water supply.

138 See DEFRA (2013) *Payments for Ecosystem Services A Best-Practice Guide*; and for a typology, Pirard, R., and Lapeyre, R. (2014) *Classifying market-based instruments for ecosystem services: A guide to the literature* *Journal of Ecosystem Services* 9 (2014): 106-114.

and seller of services.¹³⁸ Purely regulatory mechanisms would not be market mechanisms, as there would be no voluntary aspect, and it is important to ensure that no form of payment is made for environmental compliance. Yet there can be linkages between regulation and incentives. Ruhl *et al* found, in a US context, that payment schemes work best within regulated activities, and suggested 'nested' planning mechanisms, including for water management, to develop the data necessary to include these services in decision-making¹³⁹ – effectively, using an IWRM-type approach. In England, the most recent guidance on river basin planning under the Water Framework Directive specifically provides that PES schemes are a 'delivery mechanism' that can be used as a to achieve the programmes of measures.¹⁴⁰ This section will focus on these 'market' measures and the legal mechanisms to realise them.

In a recent research project on '*The Privatisation of Biodiversity?*', Reid investigated legal mechanisms for ecosystem services-based approaches, focusing on voluntary measures with some 'market' dimension, which nonetheless may operate within a regulatory framework. He identified three options: biodiversity offsetting, conservation covenants or burdens, and PES schemes as such.¹⁴¹

5.6.1 Biodiversity Offsetting

Biodiversity offsetting is where, e.g., a compensatory area of habitat is required to be provided to obtain development consent. Under the Habitats Directive, if development is permitted on a protected site on grounds of overriding public interest, the state has a duty to take 'compensatory measures'.¹⁴² Offsetting is also a recognised mechanism under the EU Environmental Liability Directive,¹⁴³ where operators may need to take 'compensatory' or 'complementary' remediation, including provision of sites with comparable conservation value where restoration cannot be quickly achieved. Reid identifies a series of problems with offsetting especially in a UK context, where there are few expanses of appropriate wilderness sites. This may be less true in Scotland, where the population density is much less than the UK as a whole, but that does not address other practical difficulties, including the need to move species from a threatened location, ensure that the new site is a comparable habitat, and ensure the long-term dedication of the offset site to that purpose. In England DEFRA consulted on offsetting schemes in 2013, to facilitate development, but so far this policy option has not progressed.¹⁴⁴ Other countries are also adopting this approach; for example in Australia, the state of Queensland has currently legislated to rationalise several existing schemes.¹⁴⁵

5.6.2 Conservation Burdens

This approach primarily uses private law mechanisms to affect the activities of landholders, and presents various difficulties

compared to public law. 'Conservation easements' are widely used in the US states, where as Reid notes the system of land ownership is different and the law (though varying across states) generally provides less opportunity for state intervention in private property. In England the Law Commission has recently reported on these types of provisions,¹⁴⁶ but in Scotland we already have statutory 'conservation burdens' under the Feudal Abolition (Scotland) Act and the Title Conditions (Scotland) Act.¹⁴⁷ The latter defines these as being:

'... for the purpose of preserving, or protecting, for the benefit of the public—
(a) the architectural or historical characteristics of any land; or
(b) any other special characteristics of any land (including, without prejudice to the generality of this paragraph, a special characteristic derived from the flora, fauna or general appearance of the land).'

These can be created and enforced against private landowners by the Ministers, or a designated conservation body. There seems no reason why they should not apply to special characteristics of land covered by water. Reid identified several problems including the limited nature of such schemes, and the necessity to ensure that they are acceptable to landowners and the risk that they are subsequently extinguished; and noted the role of the Lands Tribunal as a partial remedy.¹⁴⁸ It is possible that Scottish Water could be designated as a conservation body, perhaps with Ministerial approval, or more likely, that Ministers could create these burdens.

5.6.3 Payments for Ecosystem Services Schemes

Reid defines these narrowly, to distinguish the two options above and refer only to schemes for paying landowners to carry out, or refrain from carrying out, activities that would improve, or detract from, the services provided by the land in question. DEFRA also uses PES schemes in this narrower sense,¹⁴⁹ and suggests the term be used to indicate 'beneficiary pays' mechanisms, where the beneficiaries of the service pay the landowners or 'stewards' (recognising the increased use and usefulness of this concept); whereas offsetting schemes are more properly defined as 'polluter pays' schemes. Although this specification is useful it seems unlikely to replace the generic 'PES'.

Reid distinguishes two broad possibilities, tax and levy schemes based on generic presumptions, and payments for actual (or at least individually estimated) services. The former could include some sort of development levy when a new proposed development is likely to harm services, the use of hypothecated taxation, or other environmental taxes designed to change behaviour. An addition to water charges for catchment protection or indeed other ecosystem services via Scottish Water could be categorised in that way. The latter, which he

139 Ruhl, J.B., Kraft, S. and Lant, C. (2007) *The Law and Policy of Ecosystem Services* Island Press Washington DC;

140 DEFRA (2014) *River Basin Planning Guidance*

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/339471/river-basin-guidance-final.pdf Chapter 14.

141 Reid CT (2011) *The Privatisation of Biodiversity? Possible New Approaches to Nature Conservation Law in the UK* Journal of Environmental Law 23:2 203-231.

142 Habitats Directive 1992/43/EEC Art.4(4).

143 Directive 2004/35/EC, implemented by Environmental Liability (Scotland) Regulations SSI 209/266.

144 DEFRA (2013a) *Biodiversity Offsetting in England* (Green Paper)

https://consult.defra.gov.uk/biodiversity/biodiversity_offsetting/supporting_documents/20130903Biodiversity%20offsetting%20green%20paper.pdf

145 Environmental Offsets (Qld) Act 2014 No.33, and see <http://www.qld.gov.au/environment/pollution/management/offsets/>

146 Law Commission (2014) *Conservation Covenants* No.349.

147 Feudal Abolition (Scotland) Act 2000 asp.5 ss.26-32, Title Conditions (Scotland) Act 2003 asp.3 ss.38-42.

148 Reid (2013) *Conservation Covenants* The Conveyancer and Property Lawyer [2013] 77 8-17.

149 DEFRA (2013) *Payments for Ecosystem Services A Best-Practice Guide*.

describes as *'the most complex and difficult undertaking'*, involves identifying specific services, and specific beneficiaries of those services, and establishing payments accordingly. He then suggests that this would need to operate at community level, and most likely through an intermediary, which might be a local authority, another public body or another body. He concludes that there are certain advantages to using public law schemes, rather than private law mechanisms, in terms of accountability and transparency.

Whilst it is of course possible that such agreements can be made between private parties, these would be enforceable (only) as contracts. There is limited scope in Scotland for such agreements between private parties to be binding on successors, either as servitudes or real burdens. Given the common duration of PES schemes of around five years, a simple contract could be sustained for that duration, although a change in ownership would certainly be problematic. Reid also notes tax implications if uses of property are constrained, affecting its value; and issues for trustees or directors, who may have duties to maximise returns to beneficiaries or shareholders. These implications would also be relevant to the use of conservation burdens.

He has also suggested that what is needed is *'a change in approach, which might then necessitate assorted consequential changes. For example, to encourage people to enter conservation burdens, land subject to these could be exempt from inheritance tax or land and buildings transaction tax, or ecosystem services could be included in valuation for compulsory purchase, etc. It's a question of thinking through what are the consequences if we do start to take ecosystem services seriously as part of what land is producing and how this need to be reflected in the law.'*¹⁵⁰

The first part of this suggestion is not difficult to achieve, though it might be controversial. The second part however assumes a body of valuation science that is further advanced, and less disputed, than is currently the case. Our understanding of commercial value is significantly greater than our understanding of the holistic value of the resource. Until this is progressed, it is difficult to reconcile these two notions of value.

5.6.4 Categorisation of PES Schemes

Jackson is currently undertaking a review of legal mechanisms for PES, with particular reference to water, and has identified three broad ways in which these can be introduced.¹⁵¹ She categorises these as:

- 'National' PES schemes;
- 'Regulating' PES schemes;
- Enabling legal frameworks.

In the first category, there is a national (or state) scheme run by the Government; the legal framework establishes the schemes, who can participate, how they are managed, and designates a centralised fund from which payments are allocated. Examples include Costa Rica,¹⁵² Mexico,¹⁵³ Ecuador,¹⁵⁴ and Brazil's Amazonas State.¹⁵⁵ In each of these schemes landowners or occupiers apply to participate in the programme and a designated government agency selects participants according to prescribed criteria. Payments are made for land management activities such as retention of natural forests, ecosystem restoration, or sustainable agricultural practices. Contract terms range from 5 to 20 years and remuneration values are standardised. In each case hydrological services, carbon storage and biodiversity protection are considered alongside sustainable development and poverty reduction goals.

In the second category, schemes may be operated and funded by various parties but the legislation establishes regulatory oversight of the schemes, including a national registry. Examples include Peru,¹⁵⁶ which establishes national jurisdiction to regulate all PES, and Colombia,¹⁵⁷ which provides national regulatory oversight for municipal watershed protection schemes. This type of legal mechanism authorises and promotes voluntary, decentralized development of PES, while setting regulatory limits that ensure coordination and consistency with national water strategies and provide legal certainty for the parties involved. In both Peru and Colombia, water services are specified in the schemes (case studies, below).

In the third category, there is no specific law regulating PES but rather, the legal and policy framework creates an enabling environment that facilitates the development of PES. Jackson suggests that both the US and the UK would fall into this category. In Europe the Water Framework Directive is a driver for PES as a potentially cost-effective compliance mechanism,¹⁵⁸ and this is recognised in the UK.¹⁵⁹ PES uptake might also grow under the EU Green Infrastructure Strategy, although this would depend on that strategy being taken forward at EU and national level.¹⁶⁰ In the United States, PES has seen uptake in those states where regulations are flexible enough to allow water utilities to allocate funds to source water protection rather than strictly for built infrastructure, and progress is also being made on economic and financial analysis of costs and

150 Reid, C.T. Pers. Comm.

151 Jackson S, PhD Candidate, University of Dundee, personal communication.

152 Costa Rica's national payment for ecosystem services scheme was created in 1996 under Forestry Law 7575.

153 Mexico established the Programme for Hydrological Environmental Services in 2003 via amendments to the national forestry law and article 223 of the Ley Federal de Derechos. It is now encompassed under the umbrella programme *ProArbol*.

154 Ecuador's Socio Bosque scheme was created by Ministry of Environment Decree 169 of 2008, and expanded by Decree 131 of 2013, creating a unified national incentives program for sustainable use of natural resources.

155 The *Amazonas Bolsa Floresta* Program was established in under Law 3.135 of 2007, State Law on Climate Change, Environmental Conservation and Sustainable Development of Amazonas.

156 Law 30215, Law on Mechanisms of Remuneration for Ecosystem Services, enacted June 29, 2014.

157 Ministry of Environment and Sustainable Development Decree 953 of 2013, establishing regulations under Art. 111 of Law 99 of 1993, as amended by Art. 210 of Law 1450 of 2011.

158 Bennett, G., and Carroll, N. (2014) *Gaining Depth: State of Watershed Investment 2014*;

159 DEFRA (2013) *Payments for Ecosystem Services: A Best Practice Guide*; DEFRA (2014) *River Basin Planning Guidance*; Inman, A. and Smith, L.E.D. (2012) 'Payments for Ecosystem Services: A Review of Existing Mechanisms with Potential to Support Delivery of the Water Framework Directive Objectives.' RELU Project RES-240-25-0018 Briefing Note, SOAS, University of London.

160 Bennett, G., and Carroll, N. (2014) *Gaining Depth: State of Watershed Investment 2014*; and see <http://ec.europa.eu/environment/nature/ecosystems/> The EU Green Infrastructure Strategy (2013) is focused on biodiversity whilst recognising other potential gains.

benefits, for example through Grey-Green Accounting.¹⁶¹ Rules under the Federal Safe Drinking Water Act¹⁶² enable waivers from filtration requirements where there is an effective watershed control programme, whilst grants under the Federal Clean Water Act¹⁶³ provide states with funding for nonpoint source pollution reduction projects, which may function as PES schemes.¹⁶⁴ In both the UK and the US Jackson suggests the legislative framework adopts a results-based approach to compliance, which better enables PES as compared to traditional command-and-control- regulation.

5.6.4.1 Case Study: Colombian legal framework for PES to protect municipal water supplies

Provisions in Colombia's general environmental law¹⁶⁵ require departments and municipalities to allocate at least 1% of their annual income to the conservation of natural areas of strategic importance for municipal water supply.¹⁶⁶ Amendments to this law, introduced in 2011, specify that these funds may¹⁶⁷ be applied towards the financing of PES schemes.¹⁶⁸ Further to this, regulations were issued in 2013 setting out rules and guidance for PES development, requiring collaboration between local government and regional environmental authorities (Corporaciones Autónomas Regionales), with oversight from the national Environment Ministry.¹⁶⁹

Under the regulation, PES may be applied to protect hydrological services '*derived from ecosystem functions that generate benefits to the community, such as water regulation, erosion and sediment control, allowing the conservation of water resources that supply water to the municipal, district and regional aqueducts*'.¹⁷⁰ Regional authorities define areas of strategic importance to water resources based on existing watershed management plans.¹⁷¹ From within these strategic areas, local governments (municipal or departmental) identify individual properties for PES based on criteria enumerated in the regulation¹⁷², and enter into voluntary contracts with landowners or landholders.

The regulation also sets out guidance on: the selection of participants (including priority to those with lower income)¹⁷³; the value of the incentive (cash or in-kind, considering opportunity cost)¹⁷⁴; and contract terms and conditions (a list of issues that a PES contract must address, with a maximum term of 5 years)¹⁷⁵. Local governments must carry out "periodic" monitoring to verify compliance¹⁷⁶ and must register each contract with the regional authority,¹⁷⁷ which submits an annual PES register to the Ministry.¹⁷⁸ The Ministry may provide funding and technical assistance to the regional authorities to coordinate and promote PES.¹⁷⁹

5.6.4.2 Case Study: Peruvian legal framework to regulate and promote PES

Peru introduced its Payment for Ecosystem Services Law¹⁸⁰ in 2014, establishing national regulation and oversight by the Ministry of Environment of all PES, whether publicly or privately funded. The purpose of the law is to '*promote, regulate and supervise*' voluntary PES for '*conservation, restoration, and sustainable use*' of ecosystems to '*permanently*' secure the benefits they provide.¹⁸¹ Ecosystem services are defined as the '*direct and indirect economic, social and environmental benefits that people obtain from the correct functioning of ecosystems*', with '*hydrological regulation of watersheds*' as one example.¹⁸²

The law establishes that '*ecosystem services are national patrimony*',¹⁸³ and also enumerates '*contributors*' to ecosystem services that may be eligible to receive payments: owners, possessors or titleholders of lands; those to whom the Peruvian Government has granted a title to use renewable natural resources; NGOs under management agreements for Protected Areas; and, any others recognized by the Ministry.¹⁸⁴ The law is less specific on who the beneficiaries and 'buyers' may be: any public or private, natural or legal person who obtains a benefit and compensates the contributor for the corresponding ecosystem services provided.¹⁸⁵

161 Gartner, T. et al (Eds.) (2013) *Natural Infrastructure: Investing in Forested Landscapes for Source Water Protection in the United States* World Resources Institute.

162 Federal Public Health Service Act Title XIV Safety of Public Water Systems (Safe Drinking Water Act) 42 U.S.C. §§1400-1465; Long Term 1 Enhanced Surface Water Treatment Rule 2002.

163 Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. §§1251-1387, s.319.

164 Bennett, G., Carroll, N., and Hamilton, K. (2013) *Charting New Waters: State of Watershed Payments 2012* Forest Trends http://www.forest-trends.org/documents/files/doc_3308.pdf

165 Law 99 of 1993, creating a framework for natural resource management under the Ministry of Environment, and delegating responsibilities, including watershed management, to regional environmental authorities. Municipalities and departments are responsible for water provision and sanitation services.

166 Art. 111 of Law 99 of 1993. In addition, any project that takes water directly from natural sources (for human consumption, recreation, irrigation or industrial use), must allocate at least 1% of the total investment to the improvement and monitoring of the watershed that feeds the respective water source (Article 43).

167 Land acquisition and other watershed conservation activities are also options.

168 Art. 210 of Law 1450 of 2011, adopting the National Development Plan 2010-2014 *Prosperity for All*. The Plan's chapter on environmental protection emphasises ecosystem services and their economic value.

169 Decree 953 of 2013, establishing regulations under Art. 111 of Law 99 of 1993, as amended by Art. 210 of Law 1450 of 2011.

170 Decree 953 of 2013, Art. 3 (unofficial translation).

171 Decree 953 of 2013, Art. 4.

172 Decree 953 of 2013, Art. 5 (unofficial translation): With technical assistance from the environmental authority, the criteria evaluated are: Benefit to populations supplied by aqueducts derived from conservation of the property; Presence of streams, springs and wetlands on the property; Importance of the property to recharge aquifers or groundwater supply; Proportion of land coverage with natural ecosystems with little or no alterations; Degree of threat to natural ecosystems from anthropic pressures; Fragility of existing natural ecosystems; Ecosystem connectivity; Impact of the property on quality of water received by aqueducts

173 Decree 953 of 2013, Art. 9.1; 174 Decree 953 of 2013, Art. 9.2; 175 Decree 953 of 2013, Art. 9.3; 176 Decree 953 of 2013, Art. 9.4.

177 Decree 953 of 2013, Art. 9.5; 178 Decree 953 of 2013, Art. 14; 179 Decree 953 of 2013, Art. 9.5, paragraph 4.

180 Law 30215 of 2014, Payment for Ecosystem Services Law (*Ley de Mecanismos de Retribución por Servicios Ecosistémicos*)

181 Law 30215 of 2014, Art. 1, Article 4 (unofficial translation).

182 Law 30215 of 2014, Art. 3(b) (unofficial translation): other enumerated examples are maintenance of biodiversity, carbon sequestration, scenic beauty, soil formation, and genetic resources.

183 Law 30215 of 2014, Art. 3(b), paragraph 2; 184 Law 30215 of 2014, Art. 3(d); 185 Law 30215 of 2014, Art. 3(e).

The law requires the Ministry to provide technical, administrative and financial support to local and regional governments to promote and develop PES.¹⁸⁶ Local and regional governments are authorised to finance PES as part of their budgets, and to receive and channel donations for PES.¹⁸⁷ The Ministry must also establish a national Registrar, responsible for validating PES schemes as agreed between the contributor and beneficiary¹⁸⁸, and maintaining a publically available register of PES.¹⁸⁹

In line with national environmental strategy prioritising water resource management, and in the context of law reform in 2013 to modernize the water sector, the Ministry is first providing support for development of PES for water.¹⁹⁰ The

new water services law includes important provisions giving water utilities a mandate for PES, including requiring an 'environmental compensation' tariff¹⁹¹, and that "environmental compensation mechanisms and watershed management" be included in operational plans.¹⁹² Further, in March 2015, the Ministry signed an agreement with the national water utilities regulator, to collaborate on PES development and to jointly develop policies and guidelines to include PES financing for source water protection in water tariffs.¹⁹³ It is feasible that a small additional charge for the water services provided by Scottish Water could be used to fund wider ecosystem protection, and this is something that should be explored by Scottish Water with their customers and their regulators.

186 Law 30215 of 2014, Art, 12.

187 Law 30215 of 2014, Art, 13. This is critical to establishing a 'nested' governance structure to receive REDD funding.

188 Law 30215 of 2014, Art, 10.

189 Law 30215 of 2014, Art, 9.

190 Carried out under the Watershed Services Incubator, a capacity-building platform in cooperation with the Swiss Agency for Development and Cooperation, Forest Trends, and Peruvian NGOs CONDESAN and EcoDecisión: Bennett, G., and Carroll, N. (2014) *Gaining Depth: State of Watershed Investment 2014*.

191 Law 30045 of 2013, Law Modernizing Sanitation Services (*Ley de Modernización de los Servicios de Saneamiento*), Art, 15.4 (unofficial translation).

192 Law 30045 of 2013, Article 3(b) (unofficial translation).

193 Ministry of Environment press release: "MINAM firma convenio con SUNASS para la implementación de Mecanismos de Retribución por Servicios Ecosistémicos Hidrológicos" March 11, 2015.

6.0 Prices, Markets and Values in Water Law

Water laws across the world have been reformed in recent years, partly to meet international commitments to IWRM,¹⁹⁴ partly to address water resource management problems, especially scarcity and pollution, and partly to improve delivery of (urban) water services, especially to the unserved poor. 'Value' is of relevance to these reforms in different ways, especially in relation to the price charged for water services, and to water markets and trading. The latter especially may also provide opportunities to safeguard ecosystem services.

6.1 Prices for Services

Prices for water are set at bulk and retail level, and the institutional and governance structures of water services providers vary. In most countries, there will be a separate body – usually a public authority – responsible for bulk supply. Government may control the price of bulk water regardless of the ownership of the assets, but private companies have more freedom as to how the assets are used. Distribution and retail service to customers is often a municipal function, with or without private sector participation. The vertically integrated system in Scotland is relatively unusual; it means that the service provider is responsible for the whole water cycle, including upstream and downstream effects.

For bulk services especially, water services providers will include a unit cost of water in the price charged for the service; ideally that price will reflect capital and operating expenditure, including a return on capital (full cost recovery). Especially for domestic distribution, it is accepted in most places that there may be both subsidy and cross-subsidy, to meet the needs of the poorest or reflect the relative costs of supplying remote rural areas, or the up-front costs of extending networks. Agricultural water globally is widely subsidised.

Price setting for water services has been extensively analysed by lawyers as well as economists,¹⁹⁵ but the cost of the raw water is not usually (yet) a key factor in comparison to the infrastructure costs. The EU Water Framework Directive expects states to have introduced water pricing reflecting the 'environmental and resource costs',¹⁹⁶ but this aspect has been poorly implemented.¹⁹⁷ This may change as raw water of

acceptable quality becomes scarcer, and that scarcity may affect the relative cost of treating and reusing wastewater. Reuse of wastewater is becoming a priority for EU water policy, and one of the few areas where the recent 'Blueprint' review indicated a possibility of legislative, as distinct from policy, reform.¹⁹⁸

The price of water – especially bulk water – is also relevant to water trading, which is the second area where water law typically provides for 'value'.

6.2 Water Markets and Trading

In theory, the market should redistribute water to higher value uses, for example higher value agricultural crops, or industrial use. This presumes that governments will not wish to protect certain low-value uses, such as irrigation for subsistence agriculture. It also may not provide for the environmental use of water. Water trading is still relatively unusual in global terms, and if permitted, may be confined to a basin, and / or to a sector (usually, irrigation).¹⁹⁹

One possibility is to have allocation systems totally dependent on marketable private rights. In the Western US, which has a prior rights system for allocating water, water rights are property rights and there are active markets.²⁰⁰ A similar system was attempted in Chile, though there it had to be modified to manage the social as well as environmental externalities.²⁰¹ Even then, it is still necessary for the state to regulate the market itself, providing a stable trading environment to minimise transaction costs. However, entrenched property rights militate against public control and IWRM initiatives. In a European context, water rights are characterised differently, and the water environment is extensively regulated and planned, including by the Water Framework Directive. So it is preferable to look instead at water markets that operate within planned systems, and Australia is a widely used comparator.²⁰²

6.2.1 Water Markets in Australia

In the Australian jurisdictions, water trading has been a cornerstone of federal policy since 1994, when the Council of Australian Governments agreed a strategic framework for water

194 UN (2002) Report of the World Summit on Sustainable Development Incorporating the Johannesburg Declaration and Plan of Implementation (Johannesburg) A/Conf.199/20 Para.26; UN-Water (2012) Status Report on The Application of Integrated Approaches to Water Resources Management available at http://www.unwater.org/downloads/UNW_status_report_Rio2012.pdf

195 See, eg, Ogus, A. (1994) *Regulation: Legal Form and Economic Theory* Clarendon Press Oxford; Littlechild, S. (1988) *Economic Regulation of the Privatised Water Authorities and Some Further Reflections* Oxford Review of Economic Policy Vol.4.

196 WFD Art.9.

197 European Commission (2012) *A Blueprint to Safeguard Europe's Water Resources* COM (2012) 673 section 2.3.

198 EC-JCR (2014) *Water Reuse in Europe: Relevant guidelines, needs for and barriers to innovation* JRC92582; Bio-Deloitte (2015) *Optimising water reuse in the EU Public consultation analysis report* (DG Environment) http://ec.europa.eu/environment/water/blueprint/pdf/BIO_Water%20Reuse%20Public%20Consultation%20Report_Final.pdf

199 Dellapenna, J. (2008) 'The Market Alternative' in Dellapenna, J. and Gupta, J. (Eds.) (2008) *The Evolution of the Law and Politics of Water* Springer Press; Bruns, B. and Meinzen-Dick, R. (2005) 'Frameworks for Water Rights: An Overview of Institutional Options' in Bruns, B., Ringler, C. and Meinzen-Dick, R. (Eds.) (2005) *Water Rights Reform: Lessons for Institutional Design* IFPRI Washington DC.

200 For a critical view, see Dellapenna, J. (2000) *The Importance of Getting Names Right: The Myth of Markets for Water*. William & Mary Environmental Law & Policy Review, 25, 317–377;

201 Bauer, C. (2004) *Siren Song: Chilean Water Law as a Model for International Reform* Resources for the Future Washington DC. The Chilean law was subsequently modified to prevent 'hoarding' of water rights by large (mainly power) companies.

202 Grafton, R.Q. et al (2010) *Water Markets: Australia's Murray-Darling Basin and the UU Southwest* NBER Working Paper 15797. Grafton, R.Q et al (2010a) *An Integrated Assessment of Water Markets: Australia, Chile, China, South Africa and the USA* NBER Working Paper 16203.

reform, including trading,²⁰³ followed by a series of initiatives tied into national competition policy and seeking to ensure, ultimately, full cost recovery of all water services.²⁰⁴ Trade in irrigation water was instituted at state level and usually within the irrigation sector; water rights were made severable and registrable, but the markets operate within a planned system, whereby rights are allocated for that period, and can then be traded.

Whilst the focus in the 1990s was competition and efficiency, and cost recovery for services at bulk and retail levels, the focus at federal level in the last decade, prompted by a ten year drought, was the environment. A further tranche of reforms was agreed under the National Water Initiative.²⁰⁵ This has specific objectives including secure entitlements, transparent statutory planning, statutory provision for the environment and other public benefits, returning over-allocated or over-used systems to 'environmentally sustainable levels of extraction', removal of trade barriers and assignation of risk regarding future availability.²⁰⁶ 'Environmentally sustainable levels' are defined as those which would not 'compromise key environmental assets, or ecosystem functions and the productive base of the resource'.²⁰⁷ Federal government then enacted legislation to buy 'environmental water' from farmers who hold tradable rights; ecosystem services and functions are explicit drivers in the legislation. Thus markets in Australia have shifted from seeking higher (economic) value uses, to securing water for ecology.

Water Buy-Backs in the Murray-Darling Basin

In 2007 and 2008, the federal Government of Australia legislated to produce a new management regime for the Murray-Darling river basin, including facilitating water buy-backs to improve environmental condition. The 2007 and 2008 Water Acts have an explicit focus on ecology as a driver, including but not restricted to ecosystems protected under international law, especially the Ramsar Convention. The Murray-Darling Basin Authority will produce inter alia an environmental watering plan designed to restore water to the environment, and the diversion limits and trading rules are designed to provide water for that purpose, whilst the water quality and salinity plan, and associated objectives and targets, are intended to ensure that the resultant water quality is adequate to protect those ecosystems. There is no overall mandatory target for ecological status as there is in the EU, though the Australian model is explicit about addressing ecosystem services and functions.

Water (Cwlth) Act 2007 No.137, Water Amendment (Cwlth) Act 2008 No.139. See Connell, D. and Grafton, R.Q. (Eds.) (2011) *Basin Futures: Water Reform in the Murray-Darling Basin* ANU E-Press.

The emphasis on ecosystems and environmental water, or water for in-stream ecology, is reflected in other water (and environmental) laws in other places. In South Africa, there is an environmental "Reserve", water that must be left in-stream, and it is a priority use.²⁰⁸ This is not a market-based system, but is implemented via an ecological classification exercise not unlike the Water Framework Directive,²⁰⁹ and both instruments operate within an IWRM-type system of catchment planning.²¹⁰

It may also be possible, where there is a market, for private purchase of water rights 'for the environment', or for in-stream ecology. Charitable, conservation or recreational bodies may choose to do this, or (depending on the relation between land and water rights) to purchase land on which water is situated. In some US states where there is a requirement that water be 'beneficially used', the environment may be designated as a use of water.²¹¹ Such acquisitions are not new, but are certainly a mechanism for PES.

Generally, water legislation relevant to ecosystem services may protect ecosystems, through regulatory acts, similar to biodiversity law mechanisms. Water laws also set prices for services, and may establish markets for trade. Usually these types of provisions are not co-located with ecological provisions. There may well be references to the ecological, or non-monetary values of water, and duties placed on public authorities, but such protective provisions are unlikely to be co-located with duties to maximise commercial, as well as other, value, as is the case in the Scottish legislation. Bringing together these parallel approaches to value would seem to be a novel approach.

203 Council of Australian Governments (COAG) (1994) *Water Reform Framework* available at <http://www.environment.gov.au/resource/council-australian-governments-water-reform-framework>

Although water is a state matter under the Australian Constitution, the Federal Government engages in the water agenda under its trading powers and via financial measures.

204 COAG (1995) *National Competition Policy and Related Reforms Agreement* and related documents available at <http://ncc.ncc.gov.au/pages/about>

205 COAG (2004) *National Water Initiative* (NWI) available at <http://nwc.gov.au/nwi>

206 NWI para.23.

207 NWI Sch.B(i).

208 National Water Act (South Africa) Act No.36 of 1998 Part 3.

209 NWA s.ss.12-15

210 NWA ss.5-11

211 In *Idaho Dept. of Parks v Idaho Water Administration* 1974 5 ELR 20508 the Court held that constitutional priorities were not exclusive, and recreational use was beneficial, so could have an allocation.

7.0 Conclusions

Conclusions are set out in relation to each of the objectives of this project.

1) To review and identify whether other legislatures across the world have also explicitly incorporated the notion of value of water resources in legislation, and if so, to identify these and their specific consequences for the water industry.

Many other jurisdictions have provisions relevant to 'value' and to 'water'. These tend to fall into two groups:

Firstly there are provisions explicitly relevant to the maintenance of ecosystem services and protection of the natural environment from which those services are derived. These are likely to be found in biodiversity / conservation laws, or environmental laws, or other areas of public law. Most of the examples identified fell into this group and may provide mechanisms for payment for the relevant services, as well as powers of compulsion. These types of provisions often involve water, as so many ecosystem services are derived from or dependent on water. They often also involve the management of forests, linked to water and (especially in developing countries) to climate change.

Within this group there are examples of legal provisions that specifically refer to water services in the sense of urban water services. These laws are designed to enable catchment protection of sources of drinking water along with other ecosystem services. Such schemes may involve an additional environmental tax at an appropriate level of government; or a specific additional charge for water services provision. We recommend that consideration be given to this latter option by Scottish Water, in dialogue with their customers and regulators.

Using Jackson's categorisation, it is unlikely that Scotland would move towards a 'national' PES system funded directly and exclusively by government, though a 'regulating' scheme providing oversight and a register might be an option. It seems more likely that the UK as a whole will remain in the 'enabling' category but with increased interest in, and attention to, the value(s) of these services and the relationships between them. We do recommend that consideration be given to a register of all PES-type schemes in Scotland.

Secondly, there are many provisions in water laws relevant to the value of water in a narrower economic sense, especially, related to water trading and the price of raw water. Trading provisions are usually intended to divert water to higher value uses, especially within the agricultural sector. The price of raw water is relevant to trading mechanisms but also to the delivery of urban services. Usually it is bulk suppliers who are engaged in trading raw water where markets exist. Developed countries especially accept the principle of full cost recovery for water services (albeit with some subsidy or cross-subsidy, for example in small-scale rural supply) and many 'market' reforms have been introduced to move towards this objective.

Water laws may also specify environmental goals. In the Murray-Darling, environmental buy-backs are utilised for specifically ecological goals but these then depend on the market value of water. This does bring together different concepts of value, but is only indirectly related to the provision of services by the water industry as understood in Scotland. In Australia and globally, sectoral water use is dominated by agriculture.

We did not find any examples of legislative initiatives in point with the 2013 Act in Scotland. The research identified clearly that in law reform, there is usually a distinction between legal instruments seeking to identify and protect ecosystems, and those addressing the value (or price) of water for service providers. Scotland is unusual in seeking to bring these together in one instrument. This may be because of Scottish Water's vertical integration and a context where urban supply is a large proportion of the whole, or it may be that the 2013 Act is simply ahead of its time in trying to bring together commercial and other values of water in one instrument. We would suggest that in practice it will still be useful to distinguish between contributions to economic value, and the assessment of the wider (environmental and social) values of ecosystem services of different types; even if some of the latter are given an economic proxy value for decision-making.

2) To analyse the regulatory framework and legislation relevant to Scotland's water industry to:

a) identify opportunities within the existing regulatory and legal framework for developing the notion of value and ecosystem services:

The report has identified a number of ways in which the Scottish water industry, and especially Scottish Water, can contribute to the 'development of value' of the water resource under the Water Resources (Scotland) Act 2013 and within the wider regulatory structures in which the industry operates. These regulatory and governance structures are recognised as having fostered an efficient and effective public service and as such, are of interest to other jurisdictions seeking to reform their water services delivery in the public sector. This in itself is a contribution to the Hydro Nation agenda.

In general, Scottish Water's existence as a public entity can be seen as contributing positively, through a public service ethos, to the delivery of wider public goods. A number of areas have been identified where Scottish Water may contribute through exercise of its core functions: Catchment protection; Flood management; Environmental improvements; Biodiversity; Climate change; and through its Innovation agenda. Activities in these areas can contribute to multiple concepts of value.

Currently, commercial activities beyond core functions are carried out by Scottish Water Horizons or Scottish Water International. Their activities are ringfenced, so that the customers do not incur risk – or reward. Such activities (power generation being the easiest example) will contribute in a commercial sense to 'value', to GDP or similar measures. But whilst this might be relevant to a broad conception of

value, it has little direct relationship to the water resource. Equally, their activities will be fenced by the general public law framework including environmental etc. rules; and within that may contribute to protecting or enhancing ecosystem services.

Scottish Water International, especially, will be involved in exporting innovations by the parent in core service delivery – and in particular in the export of the regulatory ‘model’. This was always envisaged as a central part of the Hydro Nation agenda. This is not really connected to the value of the (biophysical) resource as such, but it is relevant to economic and to social value(s).

Other public good benefits of Scottish Water’s core activities can be enabled as part of their functions under the Water (Scotland) Act and Sewerage (Scotland) Act, or their duties under other public laws. It would be possible for Ministers to direct, through the Objectives (and Principles of Charging) that Scottish Water should divert more attention (and funding) to these wider public goods. Given that at least 95% of the population of Scotland is served by Scottish Water, the correlation between the public and the customers is high.

Any bulk provider, including any vertically integrated water services provider, should be engaged in resource management. Scottish Water’s position as a public provider enables it to provide public goods and take a holistic approach, but nonetheless the costing of the goods it provides is not only relevant to their value, but also to the prices charged of its customers, especially if the benefits are to be measured over long time periods and with some uncertainty. Wider public goods only indirectly related to core services (biodiversity, flood management, climate change) could usefully form part of Scottish Water’s ongoing dialogue with customers over spending priorities – especially if the relative proportion of spend on these wider benefits will increase over time, and if the payback of such activities is long-term relative to the strategic review process.

The current governance model offers positive opportunities for Scottish Water to interact with its customers, regulators, the Government and other organisations, to achieve multiple goals. Scottish Water’s existing duties under other relevant legislation (especially, the Climate Change (Scotland) Act, Nature Conservation (Scotland) Act, Flood Risk Management (Scotland) Act) could provide a framework both for that dialogue and for further development of their activities in these areas under the Objectives and Principles of Charging. We recommend that consideration be given to Scottish Water working with their partners to consider a specific additional charge for water services, to meet such multiple goals and enhance both the supply of ecosystem services.

b) reflect on the forms that development could take (e.g. Payments for Ecosystem Services, Benefit Sharing Mechanisms, local partnerships, etc.):

A number of legal frameworks, in public and private law, can be used to manage the relationship between humans and their environment, and specifically, manage the uses of land that contribute to, or detract from, provision of ecosystem services, whilst also recognising that not all services can be provided simultaneously, and there may be potential conflicts, requiring tradeoffs. For example, within the system of derogations under the EU Water Framework Directive, environmental protection may not be prioritised in comparison to ensuring the flow of services

to communities. The making of these tradeoffs will continue to be refined during the second round of river basin planning.

In relation to the public law, the report has identified the options and difficulties with a regulatory, command-and-control approach, and with payments for services via private landowners. The first requires regulatory capacity but is likely to continue to be used in Scotland under biodiversity and general environmental law, as well as policy frameworks for land use planning in the broadest sense.

Currently, the Scottish Government is proposing regulations for river restoration taking a ‘two track’ approach whereby public authorities and private owners with commercially viable assets can be compelled to make improvements, but private owners of historic structures should be incentivised to cooperate. Such a ‘mixed’ approach to partnership working could be a good way forward.

Emerging concepts of ‘stewardship’ especially may provide conceptual frameworks for collaborative approaches to better land use management including by landowners, public authorities and communities (both communities of place and communities of interest).

In terms of economic mechanisms, globally and nationally, Payments for Ecosystem Services (PES) schemes are increasingly common. The DEFRA review identified several options and in both Scotland and England these schemes are likely to be one mechanism for improving ecological status.

It seems likely that many PES schemes will continue to utilise public money which can then reflect public priorities as to trade-offs. It seems less likely that private legal persons will contract between themselves for environmental benefit, but there is no reason why this could not be done. As would also be the case where payment came from the public purse or a public authority, it would be difficult to ensure that such contracts would be enforceable indefinitely except through the use of land obligations.

Reid has analysed these schemes in a Scottish and UK context, along with other public and private law mechanisms, and has suggested investigating the possibility of tax incentives to private owners, to encourage them to participate in PES schemes and ensure longterm viability. We suggest consideration also be given to the use of statutory conservation burdens in relation to water, which should provide longterm stability.

Further work is required in terms of economic analysis of value of different types, and this will be part of the second round of WFD planning. We suggest that the developing debate around natural capital and green accounting will make a positive and practical contribution.

c) identify any legal barriers to development of the notion of value and ecosystem services and suggest any necessary legislative changes.

The ecosystem services paradigm is a way of allocating financial values to benefits of different types, which can allow comparisons and aid decision-makers, but it can be criticised philosophically, for putting a price on nature; and even if accepted, in practice it is (as yet) incomplete and imperfect.

There is a fundamental dichotomy in the 'value' debate, between commercial value, and non-monetary values, whether social or environmental.

The dichotomy affects all analyses of 'value'. Commercial value and public goods may coexist – but they may also compete for the resource. Although it is helpful to look for win-win benefits, there will be situations where activities bringing commercial value will conflict with the public good nature of water, and the ecosystem services that water provides. Nonetheless, any policy frame that recognises multiple, or parallel approaches to 'value', as is done in the Hydro Nation initiative, is useful in taking the debate forward.

The Water Resources (Scotland) Act recognises these different concepts of 'value' – social and environmental as well as economic. It does not go so far as to enshrine 'ecosystem services' or 'ecosystem services-based approaches' as was discussed in its passage through Parliament, but the terminology used is broad enough to encapsulate the different concepts. Indeed, insofar as 'ecosystem services-based

approaches' are anthropocentric, 'environmental' values especially may be more inclusive (of the inherent value of the resource in its natural state).

We have not identified any specific barriers and we do not recommend any specific changes, in the domestic law. Developments at EU level including the 2019 review of the Water Framework Directive might enable a different approach to trade-offs, especially around morphological alterations vis-à-vis ecological status, but that is outwith the scope of this report.

We recommend:

- a register of PES-type schemes;
- investigating incentives to encourage private owners to agree to long-term initiatives;
- continued work on green accounting as well as economic value;
- continued analysis of the trade-offs under the Water Framework Directive;
- dialogue on the possibility of a small addition to water charges, to enhance multiple public goals.



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