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Reconnecting society with its ecological roots

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Abstract

Recent high-profile analyses of trajectories and prognoses of ecosystem decline around the world have called for a renewed focus on embedding the values of the natural world across all areas of public policy. This paper reports the results of a UK-based deliberative process involving experts from a wide range of policy domains and across societal sectors: government departments, associated agencies, national and international NGOs, professional institutions, academia and independent experts. A symposium, based on a collaborative learning approach, explored instances in which ecosystem values have successfully been embedded into public policy, identified challenges to their more widespread embedding despite commitments to do so over generational timescales, and took a backcasting approach to develop actionable outcomes required to deliver transformation change across state and civil society. Emergent themes were expressed in

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social, technological, environmental, economic and political terms. Recommendations for interventions in complex social-ecological systems are cross-sectoral in scope and will necessarily entail multiple agents of change, well beyond governmental leadership, within any given sphere of societal activity and interest. We identify strategic challenges for, and between, a spectrum of societal policy areas, many currently overlooking ecosystem dependencies, impacts and potential benefits. Reflections on the collaborative learning approach are also provided.

Keywords

Ecosystems; System change; Deliberation; Sustainable development; Transformation; Socio-ecological systems

Research highlights

- Ecosystem services and processes play key, if overlooked, roles in all policy areas
- Realising the values of ecosystems requires embedding across all societal interests
- Collaborative learning amongst senior players helped identify actionable outcomes
- All sectors of society are key role players in achieving this society-wide transformation

1. Introduction

Human history has been substantially shaped by our increasing technical capacities to manipulate ecosystems to further our own development. As the wider macro-system within which human society is embedded (Daly and Farley, 2011), ecosystems constitute often-irreplaceable roots supporting most areas of social and economic human endeavour (Raworth, 2017). Yet, cumulative human pressures exert a dominating influence on ecosystem structure and functions (Crutzen and Stoermer, 2000; MA, 2005). Among many examples, we see that global growth in GDP correlates strongly with declines in global forest cover (d'Annunzio, 2015), wider habitat declines and rates of species extinction (Scott, 2008), and per capita carbon emissions (Mardani *et al.*, 2018). A negative correlation with GDP was reported with the proportion of a population that regards global warming as a serious problem (Sandvik, 2008). However, a more recent survey found that “climate change/destruction of nature” was ranked as the most serious global issue for the third year in succession amongst younger people (under the age of 30) from around the world (WEF-

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GSC, 2017: 15). Currently, declining trends in biodiversity and ecosystem services continue (Díaz *et al.*, 2019). We are also witnessing unprecedented ‘biotic homogenisation’ through introduction of non-native species and extinction of local biodiversity. This homogenisation increases genetic, taxonomic and/or functional similarity across locations resulting in simplified, less locally adapted and increasingly vulnerable ecosystems that provide a narrower set of ecosystem services in support of societal needs (McKinney and Lockwood, 1999). Overall, the accelerating and intensifying demands of contemporary global society are claimed to effectively consume 1.7 ‘Planet Earths’ per year (Global Footprint Network, 2020). National pictures are largely consistent with global trends (e.g. UKNEA, 2011).

The central importance of ecosystems and their processes for all policy areas and human interests, from the biophysical to the spiritual and cultural, is widely acknowledged (MA, 2005; Brondizio *et al.*, 2019). The interconnectedness of economic and social with environmental development has been recognised by international consensus for at least a generation (IUCN–UNEP–WWF, 1980; WCED, 1987), supported by a range of international and national commitments including, amongst many others, the 1971 Ramsar Convention¹ and the 1992 Convention on Biological Diversity². IPBES (2020) has recently reiterated the role of social and government influence as indirect drivers or underlying causes, stating “While difficult to model, an understanding of the role of societal drivers such as culture and government is crucial to sustainable ecosystem management as these are strong drivers of value sets and decision frameworks that affect behaviours”. The 2019 IPBES Global Assessment Report on the state of biodiversity and ecosystem services (Díaz *et al.*, 2019), and the 2020 interim report for the UK’s Dasgupta Review on the Economics of Biodiversity (HM Treasury, 2020) emphasise the influence of these factors. However, systemic application of this awareness into policy and practice remains far from the norm, with the globally dominant, competitive market model prioritising production and economic throughput, reducing environmental (and many social) policies to retrospective ‘fixes’ for the collateral damage from economic progress (Vatn and Bromley, 1997). Unbridled exploitation of ecosystems, be that through free-market models such as the pervasive Nobel Prize-winning doctrine of monetarism (Friedman and Schwartz, 1963) or centrally planned industrial strategies as seen for example in Russia, serially undermine natural capital. The irony of this situation is that the dominant capitalist model serially degrades the foundational natural capital and infrastructure securing its own long-term security and progress (Porritt, 2007; Everard, 2013a). Contrary to this model is the Nobel Prize winning concept of common-pool resources (CPR) in which communities, illustrated by rural communities around the world with high levels of social interaction, self-organise to steward common natural resources (Ostrom, 1999, 2000). There are clearly both

¹ <https://www.ramsar.org/>

² <https://www.cbd.int/>

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conceptual and practical tensions between these worldviews, the former marginalising the latter in much of the manifestation of the globally pervasive market economy. With a pervasion of short-term market and other rewards favouring immediate benefits, societal assumptions and habits have progressively become increasingly disconnected from sound, long-term resource stewardship practices that ensure the security and renewability. Rather, the net outcome of current market-driven resource exploitation patterns is the progressive externalisation of unsustainable exploitation leading to inevitable system degradation. As various models articulate (for example European Environment Agency, 2019), society and the economy are subsets of the global ecosystem, so disconnection of society from its supportive ecosystem, for example from linear resource use practices that overlook natural limits including implications for ecosystem sources and sinks (for example Raworth, 2017), can only lead to serial degradation with inevitable negative impacts for humanity. The mass of societal activities and degree of technological sophistication blind to consequences for supportive ecosystems posits humanity conceptually outside of, and as an unsustainable negative pressure upon, the niche with which it evolved within planetary ecosystems, effectively creating a novel human niche (Ellis *et al.*, 2016) yet in so doing exerting an overwhelming impact on the structure and functioning of the supportive planetary ecosystems (Crutzen and Stoermer, 2000).

A new paradigm of understanding and action is required, regarding ecosystems not as mere receptors of our pressures, to be protected altruistically as a constraint on freedoms, but as fundamental yet currently fast-degrading living capital underpinning all policy areas. Achievement of a transition to a 'regenerative landscapes' paradigm, valuing and ideally restoring ecosystems not purely for intrinsic purposes but for their essential capacities to support human needs and wellbeing, necessarily depends on a deeper and more widespread understanding about their contributions to all areas of human activity and interest (Everard, 2020a). The March 2019 declaration of a 2021-2030 UN Decade on Ecosystem Restoration (UNEP, 2019) recognises the need massively to scale up restoration of degraded and destroyed ecosystems as a proven measure to fight climate change and to enhance food security, water supply and biodiversity. IPBES also promotes a wider conception of the values of nature beyond the instrumental (means to achieving a particular end), also including nature's intrinsic values as well as its relational values (contributions to desirable relationships among people, societies and with nature). It is recognised that these instrumental, relational and intrinsic values of nature are coincident across the world. These bold aspirations to act upon the diverse values of nature follow decades of slow or negligible progress with stated commitments, highlighting a pressing need to find means to break through log-jams to development of novel policies and practices.

As we start this UN Decade on Ecosystem Restoration, this paper reports the findings of a co-learning process centred on a deliberative symposium. The process was based on a

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collaborative learning approach (Vygotsky, 1997; Lee and Bonk, 2014), designed to co-create breakthrough insights that can underpin this emerging refocusing of sustainable development towards regeneration of linked human and ecological systems. Drawing together senior experts from across government departments and agencies, national and international NGOs, professional institutions and academia, the symposium sought to co-create practical, policy-relevant actionable measures and outcomes essential to transformation within policy formulation and practical management. Intended outcomes were, through a backcasting approach, to develop actionable outcomes required to deliver transformational change across state and civil society.

2. Methods

Experts drawn from across government departments and agencies, national and international NGOs and academia attended a symposium in Bristol (UK) during February 2020. Attendees engaged in a collaborative learning and knowledge exchange process (Laal and Ghodsi, 2012) based on deliberative process. Deliberation is understood here as “...the process by which a group of people... via a process of discussion and debate - reach an agreement” and further, one that is recognised as potentially having a “transformative effect on many if not all aspects of development, and especially in addressing problems of collective action, coordination, and entrenched inequality” (Heller and Rao, 2015). Darling *et al.* (2016) recognise that traditional top-down decision-making is limited in tackling anything other than simple and immediate problems; structured learning approaches embracing complexity and given adequate, dedicated time offer greater creativity in tackling and developing emergent, novel insights. Senior managers are frequently identified as presenting the strongest barriers to change though conversely with the greatest potential to subsequently broker institutional change (Zogjani and Raçi, 2015), so engagement of a senior, cross-institutional community in a deliberative process has particular value in addressing complex sustainability challenges.

Stimulus inputs to the symposium-based deliberation process included written information circulated prior to the event as well as a range of further short stimulus presentations at the outset of the symposium. Both sets of stimuli spanned multiple societal perspectives, substantially documented with supporting references in Everard (2020b). The range of expertise and viewpoints brought to the event by the expert participants also constituted important inputs. Deliberation among participants was further promoted by adherence to the Chatham House Rule, specifically including non-attribution of points to specific individuals outside of the symposium.

Over two syndicate group cycles, participants were divided into three deliberative working groups to develop emergent co-learning (Wood and Gray, 1991; Lee and Bonk, 2014) and to

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enable and improve critical thinking (Gokhale, 1995). In this process, the working groups focused on the development of “transition pathway narratives”, in preference to narrower forms of conceptual development (Luederitz *et al.*, 2017). An important element of the entire process was to backcast from success to identify actionable outcomes (not simply to describe barriers) that would drive societal transition towards regenerative policy and practice valuing, protecting and restoring interlinked prospects for ecosystems and future human security.

In the first of the two parallel working group sessions, symposium participants self-organised to address some of the key issues arising from stimulus presentations and prior written inputs, also informed by their own collective knowledge. They were invited to consider learning questions including: “*Where have we made lasting progress?*”; “*Where do we need most to make progress?*”; “*What are the ‘low hanging’ but powerful intervention points in complex systems?*”; and “*How do we transfer lessons from successes?*” Feedback and ensuing discussions in plenary from this first round of working groups drew out a range of key learning themes as described in the Results section.

Strategic topics emerging from this first working group session fell into three broad groups: land use; urban development, and ecosystems and health. These were then explored in more detail by a second session of three parallel working groups, self-selected by participants for further deliberation and co-learning. This second deliberative round was followed by a plenary discussion to draw out key learning points, with a focus on deriving actionable outcomes for policy and practice also acknowledging the interconnectedness between and blurred boundaries around societal policy divisions. Feedback from the concluding plenary session is predominantly stratified by societal policy sectors in the following Results section.

3. Results

Input materials, including pre-symposium documents and stimulus presentations, as well as examples brought to working groups by expert participants, showcased a broad range of exemplar case studies where an ecosystem-based approach had delivered tangible and enduring benefits to people. These ranged from developing to developed nations, such as: the reframing of a new ‘green economy’ embedding greater water, food energy and energy security for the Australian city of Adelaide (City of Adelaide, 2020); highly localised solutions such as communal village groundwater recharge practices; large landscape-scale solutions (including Africa’s ‘Great Green Wall’ and China’s Loess Plateau); and examples from both urban (particularly a diversity of ‘green infrastructure’ solutions) and rural settings. Many of these exemplars are collated in a review by Everard (2020a).

Key emergent themes arising from the first round of group deliberation and co-learning were collated and stratified using the STEEP (social, technological, environmental, economic and

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political/governance) framework (Morrison and Wilson, 1996). For this purpose, STEEP was applied as a systems model to analyse interconnections between these domains of human activity, as widely used to address meeting the goals of sustainability (Steward and Kuska, 2011) including evaluation of water systems and associated ecosystem services (Everard *et al.*, 2012; Everard, 2013b and 2015). Written and presentational stimulus materials and themes emerging from working groups were further corroborated and contextualised following the symposium by cross-checking with scientific literature (see Everard, 2020b). Overall results of this first element of the process are summarised in Table 1, structured around the STEEP framework to better acknowledge and appreciate systemic interdependencies between different perspectives and, in a less synthesised form, providing primary inputs to the second working group session.

The second working group session and following plenary sessions of the symposium drew stimulus materials and emerging themes from the first working group session, but this time with a focus on deriving actionable outcomes for policy and practice. Development of actionable recommendations follows the approach of Everard (2016), which stratifies recommendations by major policy areas in public administration as a framework against which to ensure a broad overview. Although this policy area breakdown reflects common departmental divisions in governments worldwide, we consciously straddle the distinction between governmental and non-government action presuming cross-sectoral responses involving multiple agents of change within any given sphere of societal activity and interest. Furthermore, join-up within government is as necessary as between government, business and civil society (Shepsle, 2010). The following subsections summarise key actionable outcomes for policy and practice relevant to each of the major policy areas, also recognising outcomes germane to systemic connections across policy areas.

3.1 The treasury sector

Allocation of national and other resources shapes priorities and decisions taken across society. Treasury departments and related financial institutions thereby play driving roles in stabilising or shifting paradigms, ideally in this case in a shift from current short-term profit-taking towards recognition and internalisation of the values of nature. This paradigm shift is essential to ensure investment in long-term viability and enhancement of productive and supportive ecosystems to support the needs of both current and future generations. Key actionable outcomes in driving this transition across the Treasury sector (identified prior to publication and independent of the HM Treasury (2020) Independent Review on the Economics of Biodiversity) include:

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- Revising the fiscal system to reward long-term, multi-beneficial outcomes rather than short-term returns. This includes reversing current externalisation from the market of translocation of embedded nutrients in global food and agricultural supply chains, embedded/virtual water and other essential natural resources, and fossil fuel inputs (Lovins, 2018).
- Revision of the taxation regime for land to stimulate rational, regenerative and sustainable uses, rather than as a tax-free basis for inheritance or as an investment for conversion to built development. Key to gaining support fiscal reform is the 'selling' of this concept to both public and politicians by demonstrating it as a solution to various issues.
- Embedding the principle of 'penalising bads and rewarding goods' to protect or enhance an economy's foundational natural capital (consistent with long-standing 'green economy' principles, for example Pearce *et al.*, 1989). This may include introducing taxation of carbon, embedded water and nutrients at the points they enter the economy, and importantly hypothecating revenues towards low-carbon and regenerative ecosystem practices.
- Increasing flexibility and systemic approaches to allocation of budgets and associated budgetary rules, focussing on delivering multiple benefits for multiple objectives rather than one-dimensional 'ring-fenced' allocations.
- Moving beyond reliance on economic valuation to assess natural capital, developing a broader basis of ecologically centred assessment complementing the partial economic assessment currently linked to national accounts (Natural England, 2019). This will potentially influence economic priorities and steer economic activities, necessitating going beyond market exchange values that simply shoe-horn natural assets into existing market strictures.
- Phasing in requirements for natural capital evaluations within organisations to increase awareness and sympathetic accommodation of ecosystem dependencies.
- Reinventing Cost-benefit Analysis (CBA) methods to promote an ecosystem-centred transition, including both ecosystem dependencies and impacts.
- Introducing 'appropriate' discount rates that properly value investments in natural infrastructure and the rights of future generations, recognising the enduring or increasing value of protected or restored foundational natural capital over time.

3.2 The business sector

Business is the dominant, globally pervasive capitalist model developed to convert basic resources into useful products and services. The business sector is therefore a key arena of societal sustainability innovation, including the sustainable use of ecosystems in whole

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product value chains. Actionable outcomes for businesses to move towards sustainability include:

- Stimulating novel business models around the cyclic economy as proven profitable enablers of progress towards sustainability, for example through discretionary business rate relief for progressive circular economy companies.
- Promoting eco-design of products and infrastructure, including through service-based business models (Lovins, 2018).
- Defining, recognising and supporting environmental recovery and restoration as new business sectors in themselves. (The value of ecological restoration industry in the US alone has been estimated at \$9.5 billion: BenDor *et al.*, 2015).
- Working collaboratively with regulatory institutions to strengthen policy development, promoting more systemic, long-term frameworks, targets and innovation to yield economic and social opportunities, improve risk management, and prevent undercutting of profits by irresponsible businesses (UN Environment, 2019; European Environment Agency, 2020).
- Introducing mandatory reporting of environmental and sustainability performance to increase transparency, including driving sustainable innovation down supply chains and enhancing pro-sustainable supplier ratings.

3.3 The energy sector

Under-pricing and direct subsidisation of fossil fuels used for traditional energy generation, as well as embedded in supply chains, effectively acts as a subsidy on practices that directly damage and undermine ecosystems that underpin resilience and human wellbeing (Lovins, 2018). Whilst externalisation of impact is a systemic issue across all energy-using societal sectors, actionable outcomes specific to the energy sector include:

- Sharing learning from novel energy systems as the basis of urban regeneration and novel 'green economies' in post-industrial landscapes, e.g. the Welsh Valleys and Adelaide.
- Ensuring taxation/pricing of energy based on environmental and social impact to drive down demand and encourage switching to more sustainable energy sources, sharing costs and benefits along value chains to increase cross-sectoral support for the transition to more sustainable generation. Treasury has major roles to play here, not just in fiscal policy but also full inclusion in accounts.
- Orientating hypothecated taxation of more polluting energy sources towards eco-restoration schemes to sequester carbon, underpin ecosystem regeneration and promote renewable energy systems.

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- Responses to crises such as wars and pandemics indicates the potential for governments to fast-track innovation and make novel adjustments to public finances to promote innovation and change, a necessary response to move the energy sector in a more sustainable direction given pronouncements and stated commitments to addressing climate change as an emergency.

3.4 The urban design sector

The growth and functioning of urban spaces, together with lifestyle and consumption behaviours within towns and cities, are major drivers of environment, health and sustainability challenges. This is particularly pertinent as more than half of the global population is now urban, and this trend is accelerating (UN, 2018). Actionable outcomes for the urban design sector include:

- Setting standards for the rebuilding of post-industrial cities and economies based on development of novel technologies and greater cyclic and efficient use of water, food and energy, cumulatively generating a more sustainable 'greener' economy. Progress in Adelaide (summarised as a case study in Everard, 2020b) is a global exemplar.
- Embedding requirements for infrastructure that delivers multiple benefits as preferred options in urban planning, including as examples using urban green infrastructure to simultaneously enhance air quality, flood risk, aesthetics, urban cooling and other outcomes; this includes fully accounting for all linked ecosystem services benefits when set against costs in city planning proposals and scheme approvals (for example Staddon *et al.*, 2018).

3.5 The transport sector

Mobility serves many human needs serving a range of other sectoral interests, from trade to recreation. Construction and operation of transport infrastructure and vehicles has significant effects on environmental and sustainability outcomes. For a shift to more sustainable mobility systems, actionable outcomes include:

- Broadening and deepening integration of wider environmental and ecosystem-vectored health and social impacts, such as air and water pollution and noise, within mainstream transport decision-making criteria.
- Adopting long-term economic, social and environmental sustainability objectives as equally important framing considerations to short-term travel demands.
- Promoting modal shift to active transport wherever feasible (physical activity undertaken as a means of transport rather than purely for recreation), working with

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urban planners and under policies such as the UK Department for Transport *Road to Zero* policy (DfT, 2018) to deliver multiple linked health (Public Health England, 2018) and environmental benefits such as pollution reduction, decarbonisation, and improved biodiversity and hydrology.

- Ensuring that the currently seriously undervalued societal benefits of natural infrastructure – for transport systems and for wider societal needs – become fully accounted for in transport planning decisions (for example, where planned new infrastructure might destroy irreplaceable habitat such as ancient woodlands).
- Developing inclusive cost-benefit approaches – qualitative and quantitative – to articulate impacts on net societal benefits and disbenefits across whole life cycles, and reporting on them transparently. This includes moving away from assumptions based on narrowly transport-based assessments of contributions to societal welfare (Naess, 2016).
- Investing in support of a step change in public transport to make it a viable alternative to the private car in terms of efficiency, frequency, cost and connectivity needs. Allocation of resources needs to be consciously addressed as investment towards the many recognised benefits of a more sustainable future rather than a pure cost, thereby averting many currently externalised societal costs from current narrowly framed investment models.

3.6 The agriculture and food sector

The food system, encompassing agriculture, fisheries and food processing (and ultimately) waste management, is essential to sustain human wellbeing yet, conversely, current practices are recognised globally as major contributors to environmental and sustainability challenges. Actionable outcomes include:

- Applying the “public money for public goods” principle to redefine the fundamental purpose of public support for agriculture and fisheries as the production of multiple, interlinked societally beneficial ecosystem services, audited on this basis for subsidies and payments to proceed including, as an example, a mandatory environmental element to farm business plans.
- Increasing investment in development and use of existing best practice and novel arrangements to ensure that land is used productively but also multi-beneficially, treating this as a publicly beneficial investment (with expected returns) rather than a cost or a subsidy.
- Reforming taxation to reverse the current bias towards substitution of human capital with inherently petrochemically intensive mechanical solutions (‘fossil fuel farming’), thereby regenerating local economies and connections with productive landscapes

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including promoting more cyclic use of nutrients, local food cycles and productive uses of farm and post-consumer wastes.

- Promoting, including by fiscal means, dietary change towards a greater plant-based component to reduce carbon- and nutrient-intensive and non-linear use of farmed ecosystems, whilst simultaneously supporting healthy eating guidelines.
- Investing in novel farming systems, significantly including urban and peri-urban agriculture, particularly those efficiently reusing waste streams (with appropriate safeguards on pathogen and chemical contamination) contributing to the cyclic economy.
- Increasing supply chain transparency to inform value chain choice and potential regulatory or fiscal reforms to shape a more cyclic economy.
- Investing in impartial, evidence-based and accredited advisory services to drive forward uptake of best practice and innovation, backed up by regulation and incentives.
- Identifying and promoting, by fiscal and advisory means, the profitable accommodation of natural processes in farmed landscapes. This may include, for example, nature-friendly farming, ecotourism diversification and pluriactivity (having two or more different professional activities at the same time, which may in this case include combining farm or non-farm employment).
- Developing integrated farm plans in the context of the wider landscapes in which they sit, including optimisation of multiple ecosystem service outcomes well beyond individual landholding scales (for example in Pont Bren (Woodland Trust, 2013) and in the Brecon Beacons Mega Catchment scheme (Dŵr Cymru, 2020) or the larger-scale 'regreening' of sloping lands on the Loess Plateau in China (Li *et al.*, 2019)).
- In addition to enforcement of existing rules, such as the 'New farming rules for water' (Defra, 2017), measures such as the Favourable Condition index as used for Sites of Special Scientific Interest (SSSIs) can be applied, potentially as a basis for alternatively taxing or subsidising respectively land in degraded or well-managed condition.

3.7 The health and wellbeing sector

The links between environmental and human health and wellbeing outcomes are recognised globally as crucial to securing transitions towards sustainability (UN, 2019). Actionable outcomes include:

- Promoting ecosystem-based solutions that benefit both health and the environment, consistent with current trends in public health thinking and policy towards investing in prevention and salutogenesis (pro-health measures) (Department of Health and Social Care, 2019).

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- Strengthening evidence of the health benefits provided by the natural environment and its components, quantified and valued where possible with further research to address areas currently lacking evidence or subject to high uncertainty, but ensuring that all of these benefits are represented transparently in decision-making.
- Highlighting environment and ecosystem-vectored health benefits or disbenefits, using health evidence as a lever to influence decisions in other sectors (e.g. urban design).
- Using health evidence as a key metric for development of, or influencing upon, policies and plans that affect ecosystems and the environmental determinants of health.
- Encouraging communication of desired natural environment and public health outcomes in common terms, embedding health and the environment as a linked package to maximise influence on other policy areas.

3.8 The arts and culture sector

Arts and cultural sectors provide significant opportunities to amplify critical public engagement in and understanding of the need for sustainability transitions. The arts and cultural sectors are key in their capacity to “inspire people and direct attention to things that really matter” (Saratsi, 2020: 1). Actionable outcomes include:

- Making use of creative media and industries to challenge, provoke and excite interest in the meaning and value of natural systems, and approaches to their management.
- Curating traditional/lay wisdoms and knowledge based on working with natural processes, and recognising their relevance to evolution of current policy and management practices in contemporary settings.
- Developing, using and promoting language that resonates with the wider public and policy-makers, explaining concepts and objectives in simple, consistent, meaningful terms. For example, ‘regeneration’ may better express the integrated nature of opportunities than recent discourses of ‘recovery’, ‘restoration’ and ‘sustainability’.

3.9 The local government sector

Governance at sub-national levels plays a significant potential role in achieving sustainability objectives by focusing devolved decision-making into local geographical and cultural contexts. Actionable outcomes across this sector include:

- Engaging with central government to develop an enabling multi-level approach to governance that is less ‘siloesd’; emphasising the integration of high-level aspirations and priorities with local concerns and contexts.

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- Mandating local authorities to account for natural capital in all areas of decision-making, aligned with strategies such as biodiversity net gain (for example as outlined in the Environment Bill currently going through UK parliamentary processes), as a foundation for provision of benefits to local communities. This may be superseded by seeking wider environmental net gain if recommendations of the UK's Natural Capital Committee (2020: 3) are followed: "Government should urgently work towards replacing biodiversity net gain with marine and terrestrial environmental net gain in the Environment Bill". This is allied to targets in the UK government's *25-year Plan for the Environment* (HM Government, 2017), which need to be transparently assessed and integrated with targets at local government level.
- Delegating powers to Local Authorities to regulate land use based on transparent ecosystem service criteria, aimed at optimising societal benefits and optimisation of equitable benefit distribution.
- Articulating clearly the roles of ecosystems and opportunities for ecosystem-based solutions in delivering Climate Emergency and Biodiversity Crisis declarations made by Local Authorities as part of co-delivery of other linked policy priorities.
- Exploring the potential for greater local accountability though, for example, the Danish example of 75% of money spent locally also being raised locally (OECD, 2020). In this context, further experimentation should be undertaken regarding the use of local currencies in local cash economies. This needs to be balanced with nationally redistributive policies.

3.10 The environmental sector

Whilst ecosystem-related matters have often formerly tended to be viewed as purely 'environmental', with associated management external and retrospective to other departmental priorities, ecosystems in reality constitute crucial resources underpinning but also potentially affected by all other areas of societal decision-making. Actionable outcomes relating to these more connected implications of the environmental sector include:

- Promoting awareness, through demonstration of practical relevance across other sectors, that natural systems are foundational infrastructure, a vital primary resource (not simply a receptor to be 'protected' for altruistic reasons) underpinning and delivering value to all sectoral interests.
- Basing conservation initiatives on creation of dynamic and living landscapes, consistent with the "Bigger, better more joined up" vision of the 'Lawton Review' (Lawton, 2010), coincidentally enhancing biodiversity with multiple other linked societal value systems.
- Championing traditional and novel nature-based solutions (such as natural flood management, catchment-based raw water quality protection, wetland treatment, urban

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green infrastructure, etc.) as viable, often preferable and greater aggregate value solutions, entailing lower resource inputs and outputs, fewer negative externalities and greater multi-sectoral benefits compared to energy-intensive and engineering approaches.

3.11 The international development sector

The depth and breadth of global connectivity in pursuing sustainability are recognised in the ideas of universality and interdependence underpinning the UN global Sustainable Development Goals (UN, 2015). This means that international development and foreign affairs are critical, so many of today's sustainability concerns being international in scale in terms both of ramifications and solutions. Actionable outcomes include:

- Continuing partnership approaches in international development framed by the expressed needs of recipients in which ecosystem stewardship is of central importance for sustainable livelihoods (Schreckenber, 2018).
- Reinforcing narratives across other policy areas about national benefits arising from global action to drive ecosystem-based approaches to sustainability challenges, challenging 'austerity' arguments about reducing international aid in addressing issues that are truly global in nature feeding back to national interests (disease origination and transmission, environmental refugees, climate instability, etc.)
- Working with developing countries and indigenous peoples to further integrate and embed traditional/lay and 'scientific' knowledge in ecosystem-based approaches.

3.12 The defence sector

There is strong and growing evidence globally about the central role of ecosystem security in peace-keeping and peace-making. Actionable outcomes identified include:

- Drawing on analyses within the defence sector of global strategic trends (MoD, 2018; NIC, 2017) to highlight and underline the security and defence implications of sustainable versus unsustainable uses of natural resources, emphasising the central importance of ecosystems and a supportive natural environment in maintaining stability and peace.
- Linking ecosystem-based thinking and the importance of ecosystem protection and enhancement with wider consideration of 'critical infrastructure', including for disaster risk reduction (for example under the Sendai Framework: UNDRR, 2020) and civil protection, preparedness and resilience (Cabinet Office, 2008).

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- Management of often large defence sector estates to promote biodiversity (Lawrence *et al.*, 2015) and its associated wide-scale delivery of ecosystem service benefits such as water storage and purification, erosion regulation and carbon storage.

3.13 The foreign policy sector

Many problems are global in nature, and are best addressed on a global scale. This is amply demonstrated by the origination and transmission of pandemics and other novel diseases, disasters causing global and regional recessions, refugee flows and other forms of instability. Actionable foreign policy outcomes include:

- Influencing foreign and international governments and institutions concerning the necessity for, and means to, transition in trade and policy founded on a regenerative approach safeguarding or rebuilding supporting ecosystems as a basis for security and progress.
- Promoting ethically and ecologically neutral or restorative principles for the progressive reshaping of international trade protocols currently favouring neoliberal economic principles, such as World Trade Organisation rules, to better account for systemic ramifications for long-term stability, equity and linked ecosystem service benefits.
- Supporting actionable outcomes for the 'international development' and 'defence' sectors above in wider international and intergovernmental policy-influencing activities.

3.14 The research, innovation and education sector

It is widely recognised globally that research, innovation and education are central to developing and implementing approaches to tackle sustainability challenges (UN, 2020). Actionable outcomes include:

- Embedding sustainability as a key driver of policies and mechanisms in research, innovation and learning and as a basis for the evaluation of research outcomes and impact.
- Increasing focus and expenditure on research, innovation and learning based on developing systemic approaches to sustainability challenges, drawing on and integrating different forms of knowledge, to support coherent policy and decision-making.
- Developing actionable, solutions-oriented evidence about how to promote pathways from ecosystem processes through services into multi-beneficial outcomes, including inclusive cost-benefit analyses, to support more systemic political and business decision-making.

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- Incentivising researchers, innovators and educators to work with policy and decision-makers to co-create methodologies and tools to explicitly link across policy areas, making clear the value of and implications for (for example) ecosystem health for human health in ecosystem use, management, policies and actions.

3.15 Systemic connections across policy areas

The above considerations, stratified by distinct policy areas typically reflected in the segregation of government departments, highlight both the need and opportunities for these sectors to take actions to regenerate ecosystems as vital underpinning resources and thus to drive transitions towards sustainability through the embedding of their values. However, as described previously, it is clear that many issues span traditional policy areas. This has spurred recent attempts to take a more holistic systems or ‘nexus’ approach to managing ecosystems and natural resources. In 2019, IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) announced two new assessments related to this to be carried out as part of its work programme up to 2030. These are the so-called ‘nexus’ and ‘Transformative Change’ assessments (IPBES, 2019).

A key aspect of taking a ‘systems’ approach is to recognise the centrality of values and hence the need to seek out understanding of the diversity of perspectives and considerations that are important to different stakeholders and communities. This is embedded in the Convention on Biological Diversity and manifest in its guidance on the Ecosystem Approach. Here, the rationale for the Ecosystem Approach makes clear that “...ecosystems should be managed for their intrinsic values and for the tangible or intangible benefits for humans, in a fair and equitable way” (Secretariat of the Convention on Biological Diversity, 2004).

There are already multiple agreements pertaining to the embedding of the diverse values of ecosystems into the mainstream of policy development and implementation. Internationally, these include acceptance of the 1987 report of the Brundtland Commission (WCED, 1987) and the Convention on Biological Diversity (1992), and ratification of treaties such as the Ramsar Convention (1971). National examples include the UK’s 25-year Environment Plan (HM Government, 2017) and the 2011 Natural Environment White Paper (HM Government, 2011), the latter setting out aspirations to recognise the multiple values of nature and to bring them into the mainstream across societal interest areas, including as higher-level guidance for interpretation and contextualisation of often narrowly framed former regulations and legislation.

Workable decision-support frameworks have been developed to guide decision-making that is better informed by the roles and values of ecosystems and cross-disciplinary synergies across

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policy and interest areas (e.g. Everard 2016; 2020a). However, the cross-policy area transition has been slow to emerge despite the increasing relevance and validity of these visions and commitments. A diversity of frameworks can and should be used to guide, and ideally structure the enforcement of, cross-departmental interest and collaboration to achieve stated sustainability end-goals. These include, as examples, the UN Sustainable Development Goals (SDGs), the ecosystem services framework, and logical implementation of the UN 2021-2030 Decade on Ecosystem Restoration. Using or linking with existing or revamped coordination frameworks within government, such as the UK's Civil Contingencies Act approach of local resilience forums / working groups at local level with national coordination from above, may provide mechanisms to promote ecosystem awareness and ecosystem service integration across government and civil society. However, it is not just the creation of systemic frameworks but, crucially, their adoption and particularly embedding them into 'organisational routines' that is vital if change is to be achieved (see Rerup and Feldman, 2011).

Novel information technologies can potentially support a more transparently co-creative approach to decision-making and policy formulation, as a key means to further foster a more pluralistic and deliberative model of government and decision-making. A more integrated approach to government-allocated funding is also essential, framed around systemic net benefit spanning policy areas rather than the currently narrow ring-fencing of budgets that tend to work against cross-policy synergy and integration. Achieving a less myopic approach to delivering generally narrowly-framed policy outcomes requires greater devolution of powers and spending.

4. Discussion and conclusion

Ecosystems, at all scales from the global to the local, constitute often-irreplaceable roots supporting most areas of social and economic human endeavour (Mundaca and Richter, 2015), in addition to their underlying intrinsic values as recognised, for example, by the Secretariat of the Convention on Biological Diversity (2004) and IPBES (2020). Ecosystems play key and direct roles in meeting biophysical needs for food, water, clean air and warmth. They also constitute primary resources underpinning supply chains and breaking down wastes, regulating flooding and climate stability, pollinating crops, sequestering carbon, purifying air and water, and enhancing life opportunities and benefits. Equally widely acknowledged, and the subject of numerous often long-standing, high-level pronouncements and stated commitments, is the increasingly urgent need to promote a transition in societal habits to recognise the fundamental importance of ecosystems for continuing human security and opportunity. Well-documented precipitous declines in biodiversity, ecosystems and their services inevitably compromise a sustainable future (Brondizio *et al.*, 2019).

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The fundamental importance of ecosystems for continuing human security and opportunity, and the urgent need for a transition in societal habits, is equally widely acknowledged and the subject of multiple high-level pronouncements and stated commitments. However, despite the rhetoric, ensuing action across all policy areas is as yet very far from proportionate. Obstacles to action are numerous, just some of them including: established vested interest; assumptions that problems stemming from ecosystem degradation are owned by ‘other’ societal sectors; that these problems are soluble by technology alone; failing to go beyond creation of systemic frameworks into practical adoption and embedding into organisational routines; or that the prognoses will only play out in a remote future, or beyond political terms of office or financial return-on-investment periods. These factors have contributed to inaction over generational timescales. Inertia in instigating substantive change can serve only to jeopardise not just future wellbeing, but to increasingly limit current security and opportunities, perpetuating the ‘business as usual’ trend towards an increasingly impoverished and unstable future. This current undervaluation of biodiversity and ecosystem services as primary assets upon which economies and livelihoods rely, and acknowledgement of our current failure to manage them efficiently as a fundamental asset management problem if total demand on the goods and services ultimately outstrips nature’s capacities to supply them on a sustainable basis, is a fundamental recognition in the UK Government’s Dasgupta Review (HM Treasury, 2020). The Dasgupta Review further calls for reform of policy and practice across society to “...acknowledge that the human economy is embedded within – not external to – Nature, which helps us to recognise the limits Nature places on the economy and, in so doing, reshape our understanding of sustainable economic growth”. This clearly synthesises multiple preceding powerful philosophical ideas around reconnecting with our ecological roots, resonant as expressed by the Dasgupta Review particularly with emerging learning concerning Treasury and Business sectors. Unless the demands and actions of society are reconnected with their ecological roots through proportionate reform of cross-sectoral policy and practice, continuing degradation of foundational ecosystems is likely to continue to limit human security, opportunity and potential.

It is therefore vital to find means rapidly to overcome barriers to translation of largely consensual realisations about human-ecosystem interdependencies into ‘real world’ policy across all areas of human interest, and their ultimate transformation into new and sustainable societal norms, practices and routines. This collaborative learning approach, taking a backcasting approach to identify actionable outcomes outlined in the Results section, was a serious attempt to drive momentum through co-created learning across policy areas, societal sectors, and institutional and disciplinary remits. In summary form, the identified actionable outcomes may appear normative; further work is certainly required to progress these outcomes into ‘real world’ policy reformulation and changes in routine practice. Consequently, a key consensual point agreed amongst participants at the symposium and

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ongoing dialogue including in its write-up was that this is the start of a journey, rather than a conclusion. Co-creation and recognition of actionable outcomes represents a first staging post towards actual transformation of policy and practice. Further steps are already being undertaken through continuing dialogue between symposium partners, in individual actions undertaken by partners implementing outcomes within their spheres of influence, and by a collective intention to maintain an ongoing learning network potentially featuring future meetings.

This paper has focused on a first stage of identification of solutions, prior to their further development into practical policy and action. Recent lockdown measures due to the Covid-19 pandemic have limited opportunities for physical follow-up workshops, but digital dialogue between symposium partners has continued. The wave of Covid-19 spread does, however, present opportunities due to the inevitable resetting of societal norms as, it is hoped, the pandemic abates. Although different societal groups are affected by Covid-19 in different ways exposing multiple ‘fracture lines’ across society (Scambler, 2020), it has not only introduced a range of positive and negative indirect environmental effects in the short term (Zambrano-Monserrate *et al.*, 2020) but has also placed greater emphasis on links between public health and ecosystem health. This environment-health link is being further investigated, for example, by exploration of the role of ecosystem processes and management in the emergence of zoonotic diseases where over 75% of all new infectious diseases in humans have their origin in animals (Diaz, *et al.*, 2019), and in natural resource security enabling management of subsequent human-to-human transmission and disease treatment (Everard *et al.*, 2020). Recalculation of societal norms and establishing new routines in the wake of the pandemic, and importantly also in pre-empting and ideally averting the likelihood of Covid-19 resurgence and also future novel disease epidemics, has ramifications for embedding ecosystems thinking more widely across societal policy areas. The unprecedented scale and pace of mobilisation of legislative and financial responses to the current Covid-19 crisis demonstrates that society can react rapidly, substantively and internationally to crises. The contemporary ‘climate emergency’ and ‘biodiversity crisis’, both also recognised globally, demand equally proportionate responses as their long-term consequences are likely to be even more profound, albeit that these existential threats are perceived as unfolding at a slower pace and thereby evade such immediate political focus. There is also the matter of societal choice post-pandemic. In news media (if not yet peer-reviewed literature), we are witnessing widespread recognition and welcoming of cleaner air and waterways and an upsurge of wildlife in urban centres, as well as quieter and less travel-demanding working and domestic lifestyles also contributing positively to better home-work balance during ‘lock-down’. All sectors of society having agency in influencing increasingly nature- and human-centred norms going forwards, rather than permitting degrading cycles to automatically reassert.

In this study, application of the deliberative and co-learning approach amongst mainly senior

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representatives from a range of disciplines, policy areas and societal sectors has proven valuable in co-creating actionable outcome, and in promoting a continuing learning journey, seeking to overcome the obstacles and navigate the complex issues entailed in reconnecting society with its ecological roots. The journey of co-learning and application is still continuing as a legacy of the seminal symposium, and will be progressed to explore pathways to 'real world' impact on policy formulation and reform of practice. This approach is suitable for replication to address other 'wicked problems' (*sensu* Rittel and Webber, 1973), particularly pertaining to sustainability challenges for which simple solutions are elusive due incomplete, contradictory and changing requirements and evidence, and inevitable trade-offs between stakeholders.

Key conclusions emerging from this study are that:

- Ecosystem services and processes support and connect all policy areas, and may equally be affected by them, yet this broadly internationally consensual worldview and its supporting pronouncements and commitments (many adopted over generational timescales) have yet substantially to drive transformation of current societal norms that are undermining vital supporting ecosystems.
- Reconnecting society to its ecological roots practically entails recognition of the foundational roles played by ecosystems and their services in meeting societal needs across all major societal policy areas and sectors, leading to proportionate reform of policy and practice progressively to ensure that their capacities to continue to support societal needs are no longer serially undermined.
- The collaborative learning approach amongst senior players from UK and international institutions was helpful in identifying breakthrough ideas concerning actionable outcomes to overcome obstacles to the embedding of the values of ecosystems across major societal policy areas.
- Altruistic and preservationist approaches to safeguarding ecosystems cannot work if their consideration is external and retrospective to decision-making spanning all societal policy areas.
- Embedding awareness and recognition of the values of ecosystems across all areas of societal interest is the only practical means to recognise their enduring value, to provide grounds for their protection and enhancement, and to safeguard or ideally regenerate the biophysical basis of continuing human security and opportunity.
- Awareness of societal interdependence with ecosystem health and processes needs to be established as a new dominant paradigm if sustainability and the meeting of the UN Sustainable Development Goals is to be achieved.

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- All sectors of society are key role players in achieving this society-wide transformation, with emergent perceived crises offering particular points of leverage, learning and advocacy to influence societal change.
- Societal transformation is feasible, evidenced by many fragmented exemplars of emerging and traditional ecosystem-based approaches across the world, and, far from being a regressive step, is a matter of enhanced human security and opportunity founded on increasing value delivered by the supportive capacities of ecosystems.

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Table 1. Key Themes and Claims

Social	<ul style="list-style-type: none"> • Harness the power of narrative to transform information into meaning: <ul style="list-style-type: none"> ○ Stories that link with norms for different stakeholder groups have power to inform and motivate, as do allegories and personal testimonies ○ Scientists and others can develop succinct and simple communications tools to narrate key issues including recognition of complexity and uncertainty ○ Segment your narrative to different demographics; engaging with youth is important, using appropriate, resonant language and motifs • Prioritise equality and inclusivity are outcomes of all decision-making: <ul style="list-style-type: none"> ○ Every ecosystem services encodes benefits or disbenefits to different sectors of society – within societies, internationally, and generationally – such that inclusivity in debate and solutions identification and equity of outcomes are fundamental to all policy, use and management decisions • Emphasise a sense of urgency and alert to the opportunities presented by threats and regime changes: <ul style="list-style-type: none"> ○ Emergent ‘disasters’ need to be seized as opportunities to broker wider systemic awareness and change (severe flooding, Australian bush fires, plastic pollution, etc.) ○ ‘Moments’ of heightened public awareness (e.g. extinction rebellion demonstrations) create opportunities for rapid responses, especially where supported by evidence of benefits (e.g. plastic bags, ‘green’ Brexit, climate and nature ‘emergencies’) • Where possible, depoliticise: <ul style="list-style-type: none"> ○ Politicisation of issues can lead to ideological polarisation, including potentially rejecting increasingly robust science ○ Cross-sectoral coalitions create momentum for coherent political action ○ Official focal-points create opportunities to harmonise messages and meanings and communicate in less partisan ways (e.g. UN 2021-30 Decade of Ecosystem Restoration) • Re-imagine the rebuilding of post-industrial cities and city-regions: <ul style="list-style-type: none"> ○ Rebuilding urban economies and city metabolisms need to be founded on new opportunities arising from smart technologies and ‘greener’ jobs and greater resource resilience (e.g., Adelaide, Welsh Government ‘Our Valleys, Our Future’ programme, India’s ‘Smart City’ programme, South Korean ‘fourth industrial revolution’, and US stimulus policies aimed at renewable energy (RE) technologies) ○ Re-imagining the environmental basis of rural-regional economies (e.g. Wiltshire Wildlife Community Energy scheme in the UK, the ‘Living Landscapes’ approach, and the Ecosystem Services for Poverty Alleviation (ESPA) agenda)
Technological	<ul style="list-style-type: none"> • Foster the development of both novel and traditional technologies <ul style="list-style-type: none"> ○ Traditional ecosystem-based wisdoms are relevant to modern problems, as much as advanced technologies have roles to play ○ Technological innovation and targeted investment can play a significant role in advancing greater human value per unit ecosystem impact (as for example Germany’s ‘Energiewende’) ○ Disinvestment from non-renewable technologies is also important (for example declining investment in oil in favour of increasingly cost-advantageous renewable generation¹) ○ Increasing supply chain transparency accelerate novel technology uptake.

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Environmental	<ul style="list-style-type: none"> • What happens on the land has a major impact on wider flows of benefit to society <ul style="list-style-type: none"> ○ It is vital to recognise the multifunctionality of land and landscapes, reversing current norms treating landscapes as ‘factory floors’ ○ Licensing farmers to undertake common standards of husbandry is essential ○ On-farm best practice is important, but so too are linkages across wider landscapes to avoid ‘islands’ of biodiverse areas and landscape functioning fragmented by poor practice elsewhere ○ Land use economics, including fiscal policies, have major roles to play including land use decisions and practices, but also promotion of employment reversing the substitution of human capital with inherently polluting petrochemical energy (‘fossil fuel’ farming) ○ Novel technology has roles to play in more sustainable farming ○ A cyclic food economy Food, like carbon or public health, can be a framework for connecting across policy areas and disciplines ○ Further action is needed to transparently reconnect food production and supply chains through to consumers, potentially linked with product standards, labelling, etc., based on globally consistent evaluation methodologies addressing ecosystem impacts. ○ More progress could be made with urban agriculture ○ Organic waste and wastewater management systems need to change emphasis from disposal to one of resource recovery ○ Challenges include the quality of anaerobic digestate going on to land, which has a lower ratio of carbon to nitrogen compared to conventional composted vegetation and food waste ○ Local food cultures can help make significant progress towards greater synergy between people and the ecosystems that support them. ○ Dietary change, particularly a greater plant-based and/or microbial component, can reduce carbon and nutrient intensive and non-linear use ○ Both ‘re-localisation’ and supply chain transparency can, ideally, refocus farmer attention on shifting practices to improve their practices ○ There is a need for better impartial advisory services ○ There is a strong case to link farmers up to address issues at wider landscape scale, for self-benefit as well as for wider societally beneficial outcomes, as exemplified by the Pontbren Projectⁱⁱ in the Welsh uplands and WholeScape thinking (Natural Capital Initiative, 2017) • Land use grants and incentives require reform <ul style="list-style-type: none"> ○ The mantra of “public money for public goods” is welcome and needs to be realised in practical terms that demonstrate clear delivery of desirable publicly beneficial ecosystem services
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Economic	<ul style="list-style-type: none"> • A circular economy is a basic requirement, and should influence thinking across sectors <ul style="list-style-type: none"> ○ Circularity, based on material, energy and value recovery from end-of-life products, needs to be reflected across societal sectors ○ A focus on regenerative agriculture (Regeneration International, n.d.) is necessary, including lessons from rewilding and other global examples of ecosystem restoration • The fiscal system needs reform <ul style="list-style-type: none"> ○ Taxation has a significant impact on ecosystem management and use (for example the UK's Landfill Tax, the Aggregates Tax, the London Congestion Charge and Ultra-low Emission Zone), as do incentives if appropriately targeted ○ Hypothecation with a clear goal of enhancing ecosystem services is essential if they are to bring about lasting and beneficial change ○ Discount rates must be reformed as they devalue ecosystems over time whereas, unlike built assets, they in reality accumulate in value ○ Fiscal policy needs to be more systemically informed conferring greater emphasis on innovation leading to net outcomes for societal value ○ Fiscal policy and law at international scale also needs reform to remove structural obstacles to incentivising clean energy and other 'breakthrough' technologies ○ The loophole on purchase of land as an inheritance tax haven needs closing ○ A novel fiscal extension is taxing carbon at the points it enters the economy, also potentially 'virtual water' or nutrients, penalising exploitative practices and incentivising local and cyclic practices ○ Novel instruments for green finance, such as Green Bonds (and equity) should be investigated and further trialled as a means to secure valuable natural capital
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Political	<ul style="list-style-type: none"> • All sectors have a major contribution to make, but there is need to align sectors as the catalyst or change: <ul style="list-style-type: none"> ○ Change potentially happens when the differing priorities of sectors are integrated through taking a whole systems approach ○ Regulation works with adequate enforcement, and when supported by robust evidence ○ A new model of accounting is required that goes beyond financial return and activity: many such models have been developed ○ Monetary systems and fiscal measures need to be influenced by ideas such as ‘natural capitalism’ and the wider integration of natural and social capital ○ There is a receptive business context. Leading businesses are starting to understand sustainability as a core necessity to succeed in future markets inevitably shaped by sustainability pressures ○ Well-founded advice can be a significant lever for improved practice, particularly in the land use sector ○ Education schemes have roles to play in shaping more sustainable, regenerative behaviours within compulsory and non-compulsory sectors of education, as well as ongoing public awareness ○ Progress with the UK Bristol One City plan and reconstruction of the green economy in the Australian city of Adelaide demonstrates the powers of a collaborative approach extending beyond the authority, remit and perspective of any participating societal sector • Mapping of ecosystem service flows can add value to policy and decision-making <ul style="list-style-type: none"> ○ Mapping of ecosystems, their services and who benefits from them can reveal the multiple values of land and landscapes, potentially informing wiser decisions concerning urban and rural land use ○ Knowledge of the ecosystem service values of land and landscapes can form a basis for cost-benefit assessment taking account of a broad spectrum of societal benefits as well as disbenefits to support decision-making • There is no single policy ‘home’ for ecosystems thinking <ul style="list-style-type: none"> • Ecosystems and their services deliver value across all policy areas: defence and peace-making/peace-keeping; green infrastructure for urban health; flood risk management. However, the cross-sectoral nature of ecosystems thinking can expose bespoke/ring-fenced budgets for the environment to risk. • Backcast to systemically connected end-goals, rather than focus on narrow policy area goals <ul style="list-style-type: none"> ○ Backcasting to desirable end-goals can help break circles of short-term and narrow disciplinary decision-making ○ Strategic frameworks for thinking are essential to link across policy areas to address broader-scale, interconnected goals ○ Treasury is a key agent for change, cost-benefit analysis a key tool to demonstrate tangible as well as indicative multi-beneficial outcomes from approaches rebuilding ecosystem capacities and services • A more inclusive approach for effective governance and management <ul style="list-style-type: none"> ○ In opening a polycentric space between government departments and other societal sectors as well as civil society in all its diversity, it is important to ensure that power relationships do not continue to enforce ‘top-down’ norms in tackling sustainability goals. ○ There is a need to think about how all policy instruments combine to achieve clearly articulated outcomes: regulation and markets are just two amongst many more possible levers of change ○ At a higher political scale, adversarial government models (such as in the UK’s ‘first past the post’ system) are a problem, tending towards polarisation and suppression of marginal views ○ Local accountability can also be built into fiscal mechanisms. For example, in Denmark 75% of the money spent locally is also raised locally • A more adaptive approach is required for effective governance and management <ul style="list-style-type: none"> ○ Unintended outcomes and newly available data and evidence should be accounted for
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	<p>reflexively into policy and decision-making</p> <ul style="list-style-type: none"> ○ There is a need to move to more deliberative and ‘upstream’ approaches helping anticipate, at an early stage, otherwise unforeseen perverse outcomes ○ A systemic filter, for example using the ecosystem services framework, is required assess the ramification and ideal integration of regulations, subsidies and institutions to optimise net societal benefit, including avoidance of unintended consequences ○ Novel information technology can provide a co-creative environment to enable more open and deliberative decision-making and policy formulation
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