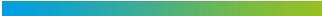




SOME THOUGHTS ON THE CONCEPTS OF NATURAL RESOURCES MANAGEMENT  
AN ESSAY FOR THE SOCIETY FOR THE ENVIRONMENT

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## About the Society for the Environment

The Society for the Environment is comprised of 24 Licensed Professional Partners, with over 500,000 members between them. It received a Royal Charter in 2004, which empowers it to regulate the Chartered Environmentalist (CEnv) qualification in the UK. There are now over 7,000 CEnvs who share a common vision of delivering sustainability through environmental professionalism. Further information can be found at [www.socenv.org.uk](http://www.socenv.org.uk).

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Peter Matthews is a Chartered Environmentalist, Chartered Chemist, and Water and Environment Manager. He has held a variety of senior positions in the environmental field, in both the private and public sectors. After a career in the water industry spanning almost 35 years, he retired from Anglian Water International as Deputy Managing Director International in 1999. And after serving on the board of the Environment Agency and as Chair of the Northern Ireland Utility regulator, he was appointed in August 2012 as Founding Chair of the Welsh Government's new body for managing natural resources in Wales, Natural Resources Wales (NRW), a position he held until December 2015.

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## INTRODUCTION: THE BROADER FRAMEWORK

### What do we mean by Natural Resources?

1. There is a growing focus on the management of our natural resources in the United Kingdom. So the Society for the Environment has decided to produce an essay on the topic. This is the first edition and it is intended that it will be developed by continuing contributions.
2. But first it must be recognised that there is a variety of understanding around the term, 'natural resources'. There are various methods of categorizing natural resources, these include source of origin, stage of development, and by their renewability. These classifications are described below. On the basis of origin, natural resources may be divided into:
  - *Biotic* — Biotic resources are obtained from the biosphere (living and organic material), such as forests and animals, and the materials that can be obtained from them. Fossil fuels such as coal and petroleum are also included in this category because they are formed from decayed organic matter.
  - *Abiotic* – Abiotic resources are those that come from non-living, non-organic material. Examples of abiotic resources include land, fresh water, air and heavy metals including ores such as gold, iron, copper, silver, etc.
3. Considering their stage of development, natural resources may be referred to in the following ways:
  - *Potential resources* — Potential resources are those that exist in a region and may be used in the future. For example, petroleum occurs with sedimentary rocks in various regions, but until the time it is actually drilled out and put into use, it remains a potential resource.
  - *Actual resources* — Actual resources are those that have been surveyed, their quantity and quality determined and are being used in present times. The development of an actual resource, such as wood processing depends upon the technology available and the cost involved.
  - *Reserve resources* — The part of an actual resource which can be developed profitably in the future is called a reserve resource.
  - *Stock resources* — Stock resources are those that have been surveyed but cannot be used by organisms due to lack of technology. For example: hydrogen.
    - a. Renewability is a very popular topic and many natural resources can be categorized as either renewable or non-renewable:

- *Renewable resources* — Renewable resources can be replenished naturally. Some of these resources, like sunlight, air, wind, water, etc., are continuously available and their quantity is not noticeably affected by human consumption. Though many renewable resources do not have such a rapid recovery rate, these resources are susceptible to depletion by over-use. Resources from a human use perspective are classified as renewable only so long as the rate of replenishment/recovery exceeds that of the rate of consumption.
- *Non-renewable resources* – Non-renewable resources either form slowly or do not naturally form in the environment. Minerals are the most common resource included in this category. By the human perspective, resources are non-renewable when their rate of consumption exceeds the rate of replenishment/recovery; a good example of this are fossil fuels, which are in this category because their rate of formation is extremely slow (over millions of years), meaning they are considered non-renewable. Some resources actually naturally deplete in amount without human interference, the most notable of these being radio-active elements such as uranium, which naturally decay into heavy metals. Of these, the metallic minerals can be re-used by recycling them, but coal and petroleum cannot be recycled.

#### **What is the fit with Natural Capital?**

4. But there is a fit with the concept of natural capital. Natural capital is the world's stock of natural resources, which includes geology, soils, air, water and all living organisms. Natural capital assets provide people with a wide range of goods and services, called ecosystem services, which underpin our economy and society and some of which even make human life possible. It is an extension of the economic notion of capital (resources which enable the production of more resources) to goods and services provided by the natural environment. For example, a well-maintained forest or river may provide an indefinitely sustainable flow of new trees or fish, whereas over-use of those resources may lead to a permanent decline in timber availability or fish stocks. Natural capital also provides people with essential services, like water catchment, erosion control and crop pollination by insects, which in turn ensure the long-term viability of other natural resources. Since the continuous supply of services from the available natural capital assets is dependent upon a healthy, functioning environment, the structure and diversity of habitats and ecosystems are important components of natural capital. Methods, called 'natural capital asset checks', help decision-makers understand how changes in the current and future performance of natural capital assets will impact on human well-being and the economy.
5. There are four general services provided by natural capital, each of which need to be considered from the perspective of criticality:
  - *Provisioning Services* – which provide resources used in production (timber, fish, etc.)

- *Regulating Services* – which regulate ecosystem processes, such as decomposing organic wastes, cleansing of the air (by oxidation, etc.)
  - *Cultural Services* - providing benefits of a spiritual, aesthetic, recreational or psychological nature; giving meaning to place, etc.
  - *Supporting Services* - which regulate processes necessary for all the other ecosystem services.
6. There are three challenges with these ideas, which the Society has already articulated.
- First is that we should be focused on ‘Natural Income’, which is defined as the annual yield from such sources of natural capital - timber, ores, fish and plant, including farm produce and, including the benefits of service industries, such as tourism. The point at which the amount of natural income reduces the capacity of natural capital to continue providing the same amount of natural income in the future, is the point at which sustainable scale has been exceeded. So we need more attention to Natural Income
  - Second, it is difficult to quantify Natural Income from cultural services in ways which are acceptable and for this reason, for example in Wales, Natural Capital is seen as a subset of natural resources management, with NRM providing the broader ‘canvas for environmental management’. For this reason to avoid misunderstanding the term ‘environment and natural resources’ is often used to emphasis this wider notion, and it can be argued that the use of the term ‘environment’ is unnecessarily repetitive.
  - Third is communication. These ideas are abstract to most people. Even the notion of ‘capital’ is beyond most people’s ken. So whilst experts can use this syntax, we need to find a simpler language for wider communication, and this includes that between front line staff in delivery agencies and external customers. For this reason, the Society has suggested that statements like ‘Flourishing nature at one with mankind or ‘Mankind earning from abundant nature’ are more evocative.

### **So how do these ideas fit with those of a broader economy?**

7. These ideas are also linked to the notions of a green economy. But once more there is a plethora of terms, which also include Green growth

### Green Growth

8. Green growth is about fostering economic growth, development and social inclusion while ensuring that the natural assets provide the resources and environmental services on which our well-being relies. To do this, Government must stimulate investment and innovation to underpin sustained growth and give rise to new economic opportunities, human capital formation and skills building, and redistribute the proceeds of growth.
9. We refer to categories of green growth recommended by the OECD in 2010. The notion of integrated natural resources management fills the same intellectual space as natural capital. There is also the common notion of excessive growth (along with excessive

pollution) and this is sometimes expressed as 'multi-planet living'. We suggest that green growth is the mechanism by which a green economy grows. This leads to some challenging dilemmas, which if resolved, will provide some clarity. Does an economy grow in terms of its total value whilst remaining at some state of greenness or does an economy remain static whilst becoming greener? This is a manifestation of the growth or no growth debate on the future of economies. Or is it a bit of both? Is there an absolute yes/no state of affairs which defines a green economy - if the answer is no - then the mixed option is that an economy seeks to grow and at the same time metamorphose to be greener? So understanding what constitutes a green economy and how to measure it is an essential context for understanding where the Government wishes to travel and begins to bring the pieces of the jigsaw together.

### Green Economy

10. The best definition for a Green Economy is from UNEP who define a green economy as '*an [economy](#) that results in reducing environmental risks and ecological scarcities, and that aims for [sustainable development](#) without degrading the environment*'.
11. It is closely related with [ecological economics](#), but has a more politically applied focus. The 2011 UNEP 'Towards a Green Economy' report argues "that to be green, an economy must not only be efficient, but also fair". (UNEP, 2011) Fairness implies recognising global and country level equity dimensions, particularly in assuring a just transition to an economy that is low- carbon, resource efficient and socially inclusive.
12. The debate we hear and see in the papers and in politics is whether becoming 'more green' reduces competitiveness in world markets for an economy or, whether it provides more opportunities to grow national income. The ultimate in the greenness scale is 'One Planet Living '. No country has achieved this yet, but on the other hand no country has been deemed to be not green at all. Interestingly some countries do not have particularly green economies, but flourish because the economy is small compared to locally available natural resources reserves.
13. So to articulate the relationships, the goal is to achieve the desired state of a green economy, however it is structured. This is achieved by green growth, which is facilitated by green investments and green finance particularly in green infrastructure. The mechanisms of finance can include instruments such as green bonds, crowd sourcing and paid ecosystems markets. Natural capital and natural resources management are mechanisms which bring together the concepts of environmental and economic management in a practical way. In Wales this purpose underpins the work of Natural Resources Wales and the recent proposal that a new duty be given to environmental regulators in England. The Society very much supports this important concept and agrees with the Chancellor's autumn 2015 Budget statement 'going green should not cost the earth'.
14. What is the structure of a Green Economy? In the simplest terms it may be divided into economic activity from the exploitation of natural resources, perhaps defined as that arising from natural capital through ecosystem services, and economic activity from all



other sectors All sectors should create value whilst not creating excessive cost - this is the basic concept of added value. All will have some sort of impact but it is not straightforward that green sector industries are necessarily deep green in colour and vice versa.

15. So in extremis, it would be possible for a green sector industry like commercial fishing, including processing, to have high environmental impact by overfishing and irresponsible disposal of processing wastes, but for non-green sector manufacturing of high tech white goods to be environmentally responsible and carbon neutral. It must be recognised that all sectors contribute. There is a need for effort to ensure that good environmental practice is used by all sectors, for example by eradicating irresponsible waste management. No sector should be excluded. There needs to be consideration on how taxes and incentives work normal to encourage all economic growth and a circular economy in a sustainable way.
16. An economy has momentum, and infrastructure has replacement inertia. So for example it takes a long time to replace power generation assets. The challenge again is that commentators tend to focus on response to climate change and reliance on renewable energy as the central definition of a green economy. In our view a green economy can include all industries, if they are managed sustainably, but it has a massive challenge in becoming a deep green economy in the global competitive sense because of the central driver of renewable energy in the definition. An understanding of the total and exploitable natural resources of kinetic, potential, gravitational and radiant energy of the UK through wind turbines, solar arrays, hydropower, tidal power and so on will be key to increasing the green hue of the Country's economy and must be supported.
17. There are other elements in the ecological footprint of a Country other than carbon. This includes, for example, the impact on the state of nature, and of the need to move forward with a harmonious balance of the needs to improve the economy and the state of nature mechanisms in place particularly through the ways in which planning works. It is about nature conservation being at the heart of flourishing natural capital. The same is true for societal wellbeing.
18. Regulators of natural resources should ensure that advice always converges on green growth towards a very green economy. Equally they must contribute by ensuring that in their roles as regulators, they are focussed on the same goals. So once everyone is complying with consents and licences, there is a good platform to start thinking of the economy as being quite green. That requires 'fit for purpose' consents and licences monitored sensibly and using the full force of law against abuses. These 'fit for purpose' consents etc, must be based on sound legislation, strategies and policies.
19. The Society suggests that there needs to be a national consensus on what we mean by a UK green economy and how we are going to manage it. We do not have space to elaborate the systems available to measure how green the economy is, but we commend a development of the Dual Citizen model, to which the UK contributes already, and we would be pleased to share further information with Government.

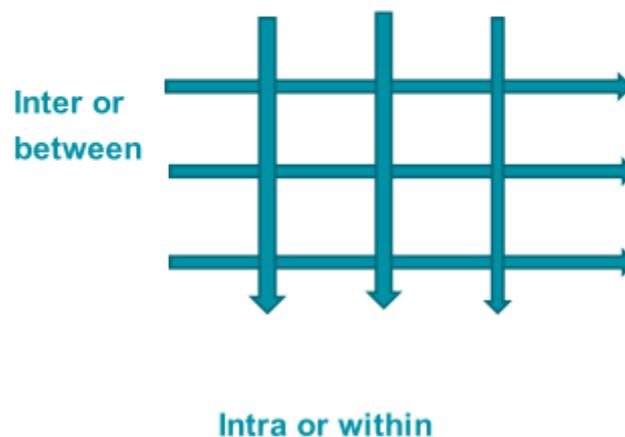
## **PRACTICAL DELIVERY OF THESE IDEAS BY NATURAL RESOURCES MANAGEMENT BASED ON RIVER CATCHMENTS**

20. It makes sense that the Nations of the UK in the post-Brexit period should come to a UK consensus on what should be determined at the UK level and what at National level. This notion of the balance of devolution and Reserved Matters is part of the Society's Framework for moving forward post-Brexit. But whatever is resolved on this, there has to be a practical way of delivering on the front-line. There needs to be geographical harmony, even integration, on the management of the components delivering the green economy. And the most practical way is to find a concept of environmental areas which makes sense. And one very practical model being discussed by DEFRA, and certainly delivered in Wales, is the use of river catchments to varying extents.
21. River basins and catchments have been the foundation of water management in the UK for some time, and that is unlikely to change in the near future, but how are these being refined and developed to match the ever-changing landscape of environmental delivery requirements? The Society has seen a growing realisation that the basis of this is much wider than just the fate of water quality, aquatic ecological status and water resources. There is a developing theme that it is about broader habitat management, so-called river corridors, the integration of ground and surface water management, the integration of flood risk management, and so on. It is about bringing together land and water management. This has been driven by practical and research experience, and also by pressures from several EU Directives. The Water Framework Directive, for example, is as much about land management as it is about water management; hence, the importance of catchment sensitive farming.
22. The Environment Act of 2016 in Wales requires of natural resource management to be based on areas and the country is moving in a direction that the most logical core model will be catchments. They are natural environmental engines, which are intertwined with many other key factors, such as microclimates, human activities, landscape and so on. They will be the basis for integrating agri-environment schemes, rural development plans, local responses to improving the state of nature, identifying and managing protected sites, the Water Framework Directive, managing forests, fisheries, hydropower, land drainage and flood risk, water resources and recreation and access. Catchments as a logical basis for managing other environmental issues, such as waste and air quality. In Wales, they will link into to the Local Well Being Plans produced by the Public Service boards under the Wellbeing of Future Generations Act of 2015. The CIWEM Magazine 'The Environment' produced a series of articles 'Viewpoint Wales' in 2014 and 2015 describing the application of these ideas in many activities. (CIWEM, 2014)
23. But that does not cover all aspects of managing natural resources, for example the requirements of landscapes, national parks, forests and even river basins transcend the immediate requirements of a catchment, and catchments might cross local authority boundaries or agri-environment schemes or Rural Development and Shoreline Management Plans. Catchments need to fit together in mosaic to serve this greater perspective. So a catchment based NRM plan should have within in internal local needs and

external elements which when fitted together with external elements from other catchments combine to form plans for those wider external needs. This even applies in the simple, single concept of catchments fitting together into River Basins This is best illustrated by thinking of catchments as vertical columns connected by a series of horizontal, cross-cutting plans and needs.

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### A MODEL FOR CATCHMENTS AS A BASIS FOR NRMAs



24. This is not a 'water take over'. Rather, it is an evolution in which we recognise that integration needs to take place in a geographical unit and a catchment makes the most sense. It means that the work which has been done already in catchments in terms of social engagement can be built on. It is about place-based engagement and management. It will also allow us to think about other issues that might have a local focus, such as payment for ecosystems markets, citizen evidence and meaningful local reporting. The Brexit referendum showed that the citizens of the UK want to feel more involved and empowered in making decisions about their future it might even provide the opportunity of identifying unique local species of interest, not just for conservation, but for tourism also.
25. Wales has made progress in these ideas, but applied its own interpretation. The Environment Act (Wales ) 2016 sets out the way forward and, in simple summary, defines sustainable management of natural resources (SNMR) as using them in a way, and at a rate, that promotes achievement of the objective to maintain and enhance the resilience of ecosystems and the benefits they provide, to meet the needs of present generations of people without compromising the ability of future generations to meet their needs, and to contribute to the achievement of the well-being goals in the Well-being of Future Generations (Wales) Act 2015. The principles of SNMR are set out extensively.
26. The application is on an area basis. NRW must prepare and publish area statements for all of Wales that it considers appropriate for the purpose of facilitating the implementation of the national natural resources policy, which is defined by the appropriate Minister. This is expected

in March 2017. The Statements will link into to the Local Well Being Plans produced by the Public Service Boards under the Wellbeing of Future Generations Act of 2015.

27. In anticipation of the Act, Natural Resources Wales (NRW) started three trials based on catchments in 2014. These were in the Rhondda and Tawe in South Wales, and Dyfi in Mid Wales. They were chosen to represent a variety of places and interests. Each trial was based on a catchment, but was chosen because of its different environmental, economic and societal circumstances. A report was produced in 2016.
28. NRW has a duty under the Act to prepare a State of Natural Resources Report (SoNNR). These will underpin the preparation of Area Statements and the first was produced in September 2016
29. The trials and SoNNR were vital in producing the evidence to move forward. Catchments will be a core, but not exclusive basis to produce Statements. At its January 2017 Board meeting, a way forward was approved for Area Statements to be available for all Wales by the end of 2019. Much more is available on the NRW website.
30. The Society is also very much aware of the September 2016 edition of delivery of the DEFRA's 25-year Plan for action on the environment, the publication of which is imminent. The Environment Agency and Natural England will produce joint plans for 14 new aligned areas and are working with the Forestry Commission.
31. Details of 11 pioneering catchment management projects in England have been published in a bid to encourage others to follow suit. The case studies, which were published in early February, implement DEFRA's catchment-based approach and aim to inspire similar projects around England. DEFRA has said that the imminent 25-year environment plan will use catchments as its "building blocks" and sharing best practice in this area has therefore risen up the agenda. The catchment-based partnerships have included organisations such as NGOs, water companies, local authorities, agencies, landowners, angling clubs, farming bodies, academia and local businesses, working together to improve water quality, biodiversity, flood risk and resilience. But these are still focused primarily on the delivery of a better water environment rather than the total environment. The concepts described in this essay would underpin this work very well.
32. The Nexus project of the International Union on the Conservation of Nature and the IWA highlighted the need to integrate food, water and energy security and touched on this bigger picture. (Ozment, et al., 2015) It offers the opportunity for organisations to link together on water infrastructure solutions.
33. It is a challenge to understand the totality of the knowledge underpinning these thoughts. But governments and their agencies must have sight of this big picture through their policy setting roles. There is a need to understand better how some research, which might be valuable but very narrow, fits wisely into the bigger picture of natural resources management. But then once the wisdom is created, how can it be accessed readily?
34. In recognition of this, we advocate that natural resource management should have four pillars - the environment, economy, community and knowledge. Just as modern management depends on knowledge – the concepts of the so called Learning Organization - then so NRM must be based on learning and wisdom. Our way forward



post the 'Great Repeal Bill' gives us the opportunity to embed these ideas. The Society has set out already a six-point framework in moving forward post Brexit. This is being developed by consultation and debate; this is given as an Appendix, we advocate that all decisions should be tested against this framework and NRM passes that test well

35. It is not just 'joined-up government' we want and need, it is 'joined-up 'action and delivery by us all.

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## References

CIWEM, 2014. *Viewpoint Wales*. [Online]

Available at: <http://www.wemmagazine.com/news/2014/aug/viewpoint-wales.aspx>

[Accessed 9 November 2016].

Ozment, S., DiFrancesco, K. & Gartner, T., 2015. *The role of natural infrastructure in the water, energy and food nexus, Nexus Dialogue Synthesis Papers*, Gland, Switzerland: IUCN. [http://www.iwa-network.org/wp-content/uploads/2015/12/1438066960-Natural-Infrastrucure-in-the-Nexus\\_Final-Dialogue-Synthesis-Paper-2015.pdf](http://www.iwa-network.org/wp-content/uploads/2015/12/1438066960-Natural-Infrastrucure-in-the-Nexus_Final-Dialogue-Synthesis-Paper-2015.pdf)

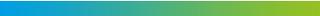
UNEP, 2011. *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*, [www.unep.org/greeneconomy](http://www.unep.org/greeneconomy)

## **APPENDIX: FRAMEWORK FOR RESPONDING TO BREXIT**

The Society has created an initial framework of six outline principles, which we suggest should guide 'Team Environment GB and NI' in moving forward. It has shared these thoughts with the Secretaries of State for EFRA and BEIS. This framework will guide our actions and contributions. It will be developed over the coming months with contributions from many sources. It has used the Framework already to guide its Responses to Parliamentary Inquiries. It will fit in well with the concept of the 'Great Repeal Bill', followed by an extensive review of the transposed legislation. The principles are given below:

1. The Society recognises that our Nations face a challenge in moving forward in the wake of the decision to leave the European Union. As members of the European Union, we have made significant progress with the quality and quantity of our natural resources over the last 40 years. The Society wish to help protect that progress and maintain it going forward. But, we believe that there is the now the opportunity to enhance environmental mitigation and protection.
2. Excessive bureaucracy can be inimical to the objectives of legislation. So we would be pleased to work with the Government in finding ways and means of transposing national legislation made in pursuit of European Union legislation into purely UK driven legislation, which sustain the objectives but which are at the same time efficient and effective. It is essential that this wisdom is applied to new legislation in future. This will add additional impetus to current efforts for better regulation and the work of the Regulatory Delivery team in the Department of Business, Energy & Industrial Strategy. However, we urge the Government not to deregulate essential environmental and natural resources management.
3. Threats to our natural resources do not recognise national boundaries. For the last 40 years, the UK has shared wisdom with Continental colleagues in pursuit of better environmental standards across Europe. The Society will continue maintain our European contacts. We urge the Governments of the UK to also continue conversing with their colleagues from across the EU and striving for the betterment of Environmental standards.

Because of the international nature of environmental and natural resources management, we have believed that it must be a key component of pan-European policy. This is our description of the Policy which recognises that the UK is part of the 'Great European Project', but as an independent nation and not part of the EU. The objectives shared with the EU and other components of Europe must be in pursuit of the highest principles of individual and environmental wellbeing which transcends the needs of a common trading agreement.



The Society will continue to pursue our European partnerships on that basis and we would be pleased to assist the Government in helping to maintain relationships between environmentalists and decision makers across the EU.

4. The relationship of the UK with the EU has been a Reserved Matter which has restricted the flexibility of devolved administrations to implement appropriate national legislation. We believe that appropriate devolution of environmental and natural resources legislation to better approach issues at a more local level would be beneficial and will be a key component of the way forward.
5. We recognise that the result of the EU referendum highlighted a need to re-engage with communities in decision making, in order to replenish their trust in experts, governments and decision making bodies. The wellbeing of society is paramount to a thriving economy. With this in mind, we would welcome an opportunity to discuss potential models for to promote wellbeing, such as the Welsh Wellbeing of Future Generations Act, and how that might be adapted to strengthen community resilience across the UK.
6. Our preferred structure for political leadership of confronting climate change is that there should be a distinct position within the Cabinet, but we can see opportunities for the new Department of Business, Energy and Industrial Strategy (DBEIS) in embedding climate change awareness and action for adaptation and mitigation at the highest levels in business.

The creation of a link between climate change and business must be beneficial and DBEIS is well placed to properly embed climate change policy within the UK 's Industrial Strategy and to help develop a sustainable circular economy and promote proper natural resource management. We call upon DBEIS to honour the commitments made by the former Department Energy and Climate Change.

There are number of Corporate and Director codes on governance; we would like to see these revised to ensure that those in a position of power, wherever and whatever that might be, will act in the best interests of our future on sustainability.

The Society is in the process of developing the framework through consultation and debate. It has used it already to guide its Responses to Parliamentary Inquiries.