

Integration is the Way Forward .. the UK Experiences
Presented to the FIG Working Week 2017 *Surveying the world of tomorrow -*
From digitalisation to augmented reality"
Helsinki, Finland May 29 - June 2, 2017

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SUMMARY

In a world with increasing complexity and interconnectedness, we can no longer afford to have separate 'silo' approaches to environmental management. This applies to our professional lives as well as the way that we do our jobs. The paper will describe how professional bodies are now working in partnership and the application of the principles of natural resources management.

In the UK the status of being Chartered confirms the expert maturity of an individual professional. In 2004 the Society for the Environment was granted a Royal Charter which allows it to confer that status on individuals working on environmental affairs. The Society is a partnership of 24 professional bodies, (including those for surveying, forestry and water management) with individuals ranging from chemists and engineers to ecologists and biologists, and from front delivery to the very highest levels of leadership. It has access to some 500,000 individual members. There are over 7,000 Chartered Environmentalists with more registering year on year. The paper describes the practical work of the Society.

At the same time the work of the bodies delivering a better environment, such as the Forestry Commission England and the English Environment Agency are working more closely together. Wales has gone still further with organisational integration in Natural Resources Wales. The principles of such integration are focussed on natural resources management and the application of the principles of natural capital management. The paper will outline the benefits of natural resource management being based on areas and the most logical core model being river 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 are a logical basis for managing other environmental issues, such as waste and air quality.

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1. SOME PRINCIPLES OF INTEGRATION

1.1 General management

Modern management of a project or organization depends on co-operation and integration. This is the essence of team work and of approaches such as total quality management. This is understood in the surveying profession. What is important is the concept of a management matrix in which the particular core skills and competencies of an activity may be represented as a vertical and the wider team context may be represented by a horizontal, shared with individuals of other disciplines and responsibilities. The job responsibilities of an individual should have vertical and horizontal elements.

1.2 Environmental and natural resources management

At the same time, we all understand that the environment operates naturally in an integrated way. This is the underlying principle of sustainability and the sustainable use of our natural resources. This is encapsulated by the concept of ecosystem services. These are grouped into four broad categories: provisioning, such as the production of food and water; regulating, such as the control of climate and disease; supporting, such as nutrient cycles and crop pollination; and cultural, such as spiritual and recreational benefits. We discuss this later.

Understanding the way in which landscape contributes is a key component, and this is served by surveying. So equally the concept of a matrix model works well here as well, whereby the particular need or activity is managed with particular skills and competencies but against the broader needs of an interconnected environment. A very good example is the modern management of forests.

It seems logical therefore that these two concepts should be drawn together. There have been signs of this for some time, for instance in the EU Water Framework Directive, but the 'silos' in professional bodies and, indeed, in delivery organisations has persisted. But changes are afoot in the UK and these are the focus of this presentation.

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2. SOCIETY FOR THE ENVIRONMENT UK AND CHARTERED ENVIRONMENTALISTS

In the UK the status of being Chartered confirms the expert maturity of an individual professional and in 2004 the Society for the Environment was granted a Royal Charter which allows it to confer that status on individuals working on environmental affairs. The Society is a partnership of 24 constituent professional bodies, (including those for surveying, forestry and water management) with individuals ranging from chemists and engineers to ecologists and biologists, and from front line delivery to the very highest levels of leadership. It has access to some 500,000 individual members. There are over 7,000 Chartered Environmentalists with numbers increasing year on year..

It shares the common standards of skills and competencies in the attainment of Chartered status to assure virtuosity in the delivery of a sustainable environment across all disciplines and at all levels.

It also provides a single source of wisdom with the outside world and responds to Government consultations and issues 'think pieces'. A great fear at the start was that the Society would impose uniform views on its constituent bodies and this was felt most keenly by the smaller bodies. But problems have been avoided. A metaphor is that we are like a symphony orchestra created out of cacophony with solo artists. The individual bodies still express individual views. One comment made at the time of formation was that it was better for the members of the Society to explain their differences rather than leave it to other people who might not take a benign attitude. We encourage our members to work together and seek to provide the space for them to do so.

The Society recognises that the individual expertise on the focus of each constituent body remains with that body. But with the growing maturity of the Society we have identified a major horizontal role for us and that is understanding and leading the evolution of green culture in the UK. This is expressed in views like 'mankind cannot be green by regulation alone'. Behaviour plays a important part and this is a major focus for us. For example we are leading in raising the profile of World Environment Day. Much more can be found on our website www.socenv.org.uk.

3. INTEGRATED NATURAL RESOURCES MANAGEMENT

3.1 The Broader Framework – What do we mean by natural resources?

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:

3.1.1 Biotic

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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.

3.1.2 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.

Considering their stage of development, natural resources may be referred to in the following ways:

3.1.3 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. **3.1.4 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.

3.1.5 Reserve resources

The part of an actual resource which can be developed profitably in the future is called a reserve resource.

3.1.6 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.

3.1.7 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.

3.1.8 Non-renewable resources

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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.

3.2 What is the fit with Natural Capital?

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. 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.

There are three challenges with these ideas.

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

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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.

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

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

3.3.1 Green Growth

This 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.

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 a Government wishes to travel and begins to bring the pieces of the jigsaw together.

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3.3.2 Green Economy

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’. 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.

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.

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 concept that ‘going green should not cost the earth’.

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.

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.

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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.

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.

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 focused on the same goals. So once everyone is complying with consents and licenses, there is a good platform to start thinking of the economy as being quite green. That requires 'fit for purpose' consents and licenses 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.

We have suggested 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. So one message for the conference on integration is that this is possible between economy and environment as many delegates will be aware.

4. PRACTICAL DELIVERY OF THESE IDEAS BY NATURAL RESOURCES MANAGEMENT BASED ON RIVER CATCHMENTS

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 the Government dealing with English Regions, and delivered in Wales, is the use of river catchments to varying extents.

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

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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.

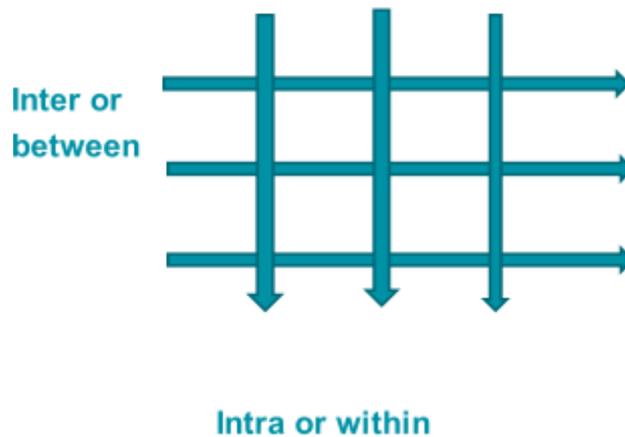
Catchments are natural environmental engines, which are intertwined with many other key factors, such as microclimates, human activities, landscape and so on. They can be the basis for integrating agri-environment schemes, rural development plans, local responses to improving the state of nature, identifying and managing protected sites, the Water Framework Directive, managing forests, fisheries, hydropower, land drainage and flood risk, water resources and recreation and access. They can also be a logical basis for managing other environmental issues, such as waste and air quality.

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. In other words the application of the matrix model described at the start of this presentation

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A MODEL FOR CATCHMENTS AS A BASIS FOR NRMAs



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.

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 ,but not sole, model will be catchments. Trials were started in 2014 and Natural Resources Wales reported on these in 2016. The catchment 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. . Details of progress can be found on the Natural Resources Wales website. 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).

The UK Government department (DEFRA) dealing with the environment of England has also been trialing the use of catchments for extended water management which includes land husbandry. A report on the trials was published in early 2017. But these still do not embrace the whole environment.

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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.

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?

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.

Natural Resources Wales is managed on the basis of matrix management to reflect the integrated outcomes for natural resources in Wales and much information can be found on its website.

5. FINAL COMMENTS

We are excited about our participation in these changes, which we believe will benefit the future of our environment and we are already sharing our experiences with colleagues in Continental Europe. We are determined to continue with this no matter what the future brings. This determination extends to other international organisations such as FIG.

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
- UNEP, 2011. Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication, www.unep.org/green_economy

<https://naturalresources.wales>

www.socenv.org.uk

<https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs>

BIOGRAPHICAL NOTES

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Dr Emma Wilcox

Emma joined the Society for the Environment as CEO in July 2015 and over the last 18 months has successfully overseen growth in the number of registered environmental professionals whilst also ensuring the reputation of Chartered Environmentalists and Registered Environmental Technicians has been enhanced and maintained. Particular recent success includes ensuring registered environmental professional's collective voice has influenced policy.

Emma's strong academic and research background is supported by an in-depth knowledge of both public and private sector landscapes along with commercial experience. During her career to date Emma has successfully demonstrated the ability to combine creative and analytical thinking and lead multi-disciplinary projects, business activity and navigate complex challenges.

Emma is a member of the Institute of Materials and a committee member of the European Network of Environmental Professionals. Emma is also graduate of the Goldman Sachs 10k Small Business Programme.

Dr Peter Matthews

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 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.

He was one of the founding team for the Society for the Environment and was elected as Chair in 2005 and again in 2015

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