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Changing Attitudes to Nature: first love, separation and pre-nuptial agreements

Lecture given by:

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Author's Biography

Presented by Professor G. Aouad PVC(Research & Innovation) and Dean of College of Science & Technology.

Upon graduating from the University of Bradford with a Degree in Applied Biology Philip worked as an agronomist for United Biscuits. There, with others he oversaw the growing and storage of 120,000 tonnes of potatoes per year.

Whilst with United Biscuits Philip was able to read for a PhD at the University of Wales (Swansea). At the conclusion of his viva he was asked to leave the room whilst the examiners came to their decision. He did not even have time to drink a cup of tea before being invited back in and told that he had passed, and that no changes were required to the thesis. His work was the foundation of further studies taken up by the then Potato Marketing Board to investigate the sub-cellular causes of the physiological changes he had discovered and documented.

His work for United Biscuits had been classified as confidential and so when Philip came to Salford in 1994 and he took the opportunity to change direction and focus on wider environmental issues.

Philip has developed an international reputation for his work in Ecology with a specific focus on urban areas, which ties in with one of the four themes for the University of Salford. His work is interdisciplinary combining elements of natural and social sciences, ecology and art, and health and town planning.

He has published more than 100 articles, received numerous research grants and awards, steered nine postgraduates to successfully complete their PhDs, some of who are able to join us tonight, and is currently supervising a further six students.

The change of date for this lecture has meant that colleagues from universities in Leeds and Birmingham, from the Centre for Ecology and Hydrology and from the Countryside Council for Wales are unable to join us. Yet the revised date meant that some who could not come last week are able to be here tonight.

An inaugural lecture represents a significant milestone in an academic's career. It provides official recognition of promotion to professor, and provides an opportunity for them to present an overview of their research career so far, update colleagues on current and future research plans, and introduce their research to wider audiences. This lecture marks Philip's appointment as Professor of Ecology in the School of Environment and Life Sciences.

Changing Attitudes to Nature: first love, separation and pre-nuptial agreements

Abstract

In his inaugural lecture Professor James addresses questions such as why we keep pets, what happened in Salford on 29th October 1827, and how to improve your personal efficiency by ten to fifteen percent. The answers to these questions address different aspects of society's changing attitudes to nature.

Professor James will review the critical episodes that have shaped the way we interpret, and interact with, the natural world. He will discuss the early tentative steps of our love affair with nature, and explore how the stresses and strains of everyday life led to individuals and society becoming increasingly disconnected from the natural world. Today there are signs that the relationship is back on, this time its foundations are based on valuing the services provided by ecosystems which, he argues, is the equivalent of preparing a pre-nuptial agreement.

During the lecture Professor James will report on his research findings and those of the Post Graduate Researchers at Salford with whom he has worked¹. He will demonstrate the contribution of these studies to the international debate re-framing our future relationship with the natural world, which, in turn, will shape the world in which we all live.

¹ These links are not set out in this paper as much of the data presented is being prepared for publication.

Introduction

Aristotle (384-322 BC), having lost out on the top job at Plato's academy in Athens went to Lesbos where he stayed for two years prior to taking up an appointment as tutor to Alexander, later known as Alexander the Great. During his time on Lesbos Aristotle laid the foundations for the science of Biology and of Ecology. He described, in detail, the animals on the island and the habitats in which they were found. Aristotle's biology and ecology was observational. Aristotle, in the same way that we all do, interpreted the world he saw about him in the context of the knowledge and context of the time. He is reported as stating: Nature made nothing in vain and everything has a purpose. Plants were created for the sake of animals and animals for the sake of men (*sic*). Domestic animals are here to labour, wild ones to be hunted (Thomas, 1984). Aristotle's ideas dominated thought through to the seventeenth century (1668) and the advent of the experimental approach of Francesco Redi. It was only in the nineteenth century, based on work by Louis Pasteur, that the experimental approach to Biology and Ecology, that distinguish those sciences today, became dominant.

In 1866 Ernst Haeckel was the first to give substance to the term Ecology, a word coined by Hanns Reiter who combined the Greek words *oikos* (house) and *logos* (study), by defining it as the study of "the total relations of organisms to the external world". Haeckel went on to state that ecology is "the body of knowledge concerning the economy of nature – the investigation of the total relations of animals both to their organic and inorganic environment. Ecology is the study of all the complex inter-relations referred to by Darwin as the condition of struggle for existence (Honari and Boleyn, 1999)." This struggle for existence is what drives evolution.

Ecology, then, is about relationships. Amongst other topics, it is concerned with the relationship between people and their natural environment. Sir Julian Huxley FRS (1887-1975), the English evolutionary biologist, humanist and internationalist, said that evolution occurs in three different sectors. The first is inorganic – the cosmic processes of matter. The second is biological – the evolution of plants and animals. The third is psychological and is the

development of man's culture (Fairbrother, 1972). The first two stages, as far as humans and our relationship with the natural world, need not overly concern us: cosmic processes operate at a time scale beyond our comprehension and experience, and evolution of humans is thought to be more or less complete, though there are some indications that we might undergo relatively minor morphological changes, to become shorter and fatter. It is however, the third stage, the development of culture that is critical. Culture is defined by the OED as "the customs, ideas, and social behaviour of a particular people or group". We can look for landmarks in that evolution of that culture to discover the people and places that shaped our ideas, and we can ask questions about the future of that relationship, what might we expect in the future. In this lecture those landmarks are described as being first love, separation and pre-nuptial agreement.

First Love

For most of human history Aristotle's stated attitude persisted: nature was there to support humans, animals were beasts of burden and once they were no longer useful, through injury, ill treatment or old age, they were disposed of. In the seventeenth and eighteenth centuries attitudes began to change. Whilst pet keeping was fashionable among the well-to-do in the Middle Ages: pet monkeys were imported in the thirteenth century, it was during the sixteenth and seventeenth centuries when pets really established themselves as a normal feature of the middle-class household. It was at this time that the middle classes, mainly in the cities and towns, could afford to keep an unproductive animal. Pet monkeys, tortoises, otters, rabbits and squirrels (red squirrels) were common. In the country pet lambs were cherished. In the eighteenth century sympathies widened and there were pet hares, mice, hedgehogs, bats and toads. Caged birds were kept either for their song (canaries, nightingales, goldfinches, larks and linnets) or for their ability to imitate the human voice (parrots, magpies and jackdaws). Certain wild birds e.g. the robin became honorary pets even though they were not caged (Thomas, 1984). This flourishing of pet keeping represents a major shift in attitude towards

animals, particularly in respect to those species whose character was deemed to be likable. Three particular features distinguish the pet from other animals (1) it is allowed into the house, (2) it is given an individual personal name and (3) it is never eaten. This final feature is not for gastronomic reasons or because of their taste but because of their close relationship with human society. Pets were company for the lonely, relaxation for the tired, and a compensation for the childless. They manifest virtues which humans all too often lack (e.g. faithfulness) and were held out as models to domestic servants (Thomas, 1984).

In the 18th century William Tuke, a Quaker philanthropist who ran an asylum for people with severe mental ill health filled the courtyard with rabbits, gulls, hawks and poultry in the hope of encouraging benevolent feelings, greater responsibility and self-control. In the 19th century the British Charity Commission recommended that sheep, hares, monkeys, and other domestic animals should be added to those institutions in a bid to create less hostile, and more attractive places. Even Florence Nightingale recognised the value of animals and in her *Notes on Nursing* (1880) indicating that people confined to the same room gained pleasure from the presence of a bird (Wells, 2011).

Pets and domesticated are particular aspects of nature, ones with which we have a particularly close bond, but what about less tamed nature? It is to the late eighteenth and early/mid nineteenth century that we look for evidence of a cultural shift towards appreciating and loving this aspect of nature.

In the late eighteenth century revolution was rife across Europe. Social revolution, (for example the French Revolution, 1789-1799), and industrial revolution, the first industrial revolution began in the late eighteenth century, brought with them massive changes in culture. Pertinent to the theme of this lecture are three major changes: people began to appreciate nature, people began to study nature and people began to protect nature.

The Romantic Era, a complex artistic, literary and intellectual movement, was a reaction to the Industrial Revolution, a revolt against the scientific rationalisation of nature, was embodied in the visual arts, music and literature, and had wide ranging implications including in to Natural History. The Revolution in France turned attention away from the Grand Tour

(1660s-1840s) and led to a heightened valuation of more local landscapes, for example the Lake District, North Wales and The Peak District. William Wordsworth (1770-1850), Joseph M. W. Turner (1775-1851), Charles Darwin (1809-1882), William Morris (1834-1896), and John Ruskin (1819-1900): poet, painter, scientist, designer, and critic were contemporaries. So were Elizabeth Gaskell (1810-1865), Charles Dickens (1812-1870), and Friedrich Engels (1820-1895). These three, through their writing, brought attention to the plight of the working class, and the inequalities that were rife in cities and nearby.

People were prepared, as they are still today, to fight for their rights to access to the countryside. In Flixton, Mr. Ralph Wright, Landowner, anxious to give his estate a more park-like appearance began removing footpaths and fences. Later, he shut in one footpath completely without applying for a Magistrate's Order and diverted another path further away from his house. His neighbours, not wishing to appear unfriendly, refrained from intervening, but when he took the next step, attempting to divert paths beyond his property, local feeling was aroused. Under The Stopping-Up of Unnecessary Roads Act 1815 any two magistrates could close a path subject to an appeal to Quarter Sessions. Mr. Wright was a magistrate and had no difficulty in persuading two brother magistrates to sign the diversion orders. Mr. Wright acted too hastily, and before the Orders were confirmed by the Quarter Sessions he stopped up the entrance to his property, ploughed up the old path, and sowed the land with oats. Mr. Samuel Wood, a local farmer, and others broke down the obstructions and restored the original path by treading down the oats. The magistrates hesitated, but in 1824 Mr Wright obtained another Order. It was appealed against and abandoned. After two more efforts the Closing Orders were confirmed at Quarter Sessions.

The Manchester Footpath Preservation Society (MFPS) formed on 15th November 1826 as a result of this and other "stopping-up" orders around numerous Lancashire towns. The MFPS was lead by a group of liberals non-conformists centred on the Cross Street Unitarian Chapel, they were challenging the established Anglican Tory politics (Taylor, 1997), and in particular the rights to walk across long established footpaths, a sign of liberty when access to the countryside was being diminished.

Mr Wright's actions in Flixton created interest outside the local area. On 29th October 1827 the new orders again came to the Salford Michaelmas Quarter Sessions. A case was held contesting a "stopping up" order relating to public footpaths in Flixton. Despite the prevalence of bribery and coercion the footpath protection lobby succeeded in retaining sufficient witnesses who confirmed that the paths were necessary. The final stopping-up order was quashed by the Court of the King's Bench, and Flixton residents and members of the Manchester Association, in orderly procession, cut down the offending fences and restored the ancient way (Peak and Northern Footpaths Society, 1973).

The people of Flixton were fortunate in being able to access countryside. A few years later, in 1844 Engels wrote, when discussing how the proletariat had established schools only for the teaching therein to be taken over by the bourgeoisie, "These arrangements are very dangerous for the bourgeoisie, which has succeeded in withdrawing several such institutes "Mechanics' Institutes," from proletarian influences, and making them organs for the dissemination of the sciences useful to the bourgeoisie. Here the natural sciences are now taught, which may draw the working-man away from the opposition to the bourgeoisie, and perhaps place in their hands the means of making inventions which bring in money for the bourgeoisie; while for the working-man the acquaintance with nature sciences is utterly useless *now* when it too often happens that he never gets the slightest glimpse of Nature in his large town with his long working hours" (Engles, 1987).

Two years later, 1846, saw the opening of opening, in Salford and Manchester, of Peel Park, Queen's Park and Phillips Park, three parks paid for by public subscription, the first public parks in an industrialised city (Conway,1996).

The Clarion cycling club was formed in 1895 after a group of likeminded individuals got together in Birmingham in 1894. It took the Clarion name from Robert Blatchford's socialist newspaper. Tom Groom, who called the original Birmingham meeting, speaking at the first National meet held at Easter in 1895 said: "We are not neglectful of our Socialism, the frequent contrasts a cyclist gets between the beauties of nature and the dirty squalor of towns make him more anxious than ever to abolish the present system. To get healthy exercise is not necessarily to be selfish. To attend to the social side of our work is not necessarily to neglect the more serious part. To spread good fellowship is the most

important work of Clarion Cycling Clubs. Then, perhaps, the 'One Socialist Party' would be more possible and we should get less of those squabbles among Socialists which make me doubt whether they understand even the first part of their name" (Source Working Class Movement Library).

Maintaining access to land is still a major concern, as evidenced by the rising of middle class voices in response to the Coalition Government's plans to sell off the national forest estate. The attitudinal change that prompted these contemporary reactions can be traced back in time to the greater thinkers, writers, and social reformers of the nineteenth century.

The second societal change was that people began to study nature. The early interest in observing birds for their aesthetic rather than utilitarian (mainly food) value can be traced to the late-18th century and the works of Gilbert White, Thomas Bewick, George Montagu, and John Clare (Moss, 2004). Gilbert White (1720-1793), considered by many as England's first Ecologist and one of the founders of the modern respect for nature (Hazell *et al.*, 2005), wrote his best known work *The Natural History and Antiquities of Selborne* in 1789. Thomas Bewick (1753-1828) published *A General History of Quadrupeds* in 1790 and the *History of Birds* (two volumes) from 1797-1804. George Montagu (1753-1815) is best known for his *Ornithological Dictionary* published in 1802, and John Clare (1793-1864) for his celebratory poetic representations of the English countryside and his lamentation of its disruption.

The first evidence of Ornithology as a science was in 1822 when John Blackwall presented three papers to the Literary and Philosophical Society (President – John Dalton) including: "Tables of the various species of periodic birds observed in the neighbourhood of Manchester with a few remarks tending to establish the opinion that the periodic birds migrate" (Holland *et al.*, 1984).

The third change was that people began to protect nature. Until the Victorian era the Great Crested Grebe (*Podiceps cristatus*) was widespread. Its flesh was considered poor eating, but its eggs were prized both as food and for sale to collectors. The bird's plumage was popular in women's fashion accessories. The summer head and neck plumage were considered an ideal source of ostentatious adornment, and the fine, soft, but extremely dense feathering on the bird's body, known as "grebe fur" was used in hats, muffs, boas, shoulder capes and other

trimmings. The population of Great Crested Grebes fell in about 10 years from over 10,000 breeding pairs to 42 pairs in 1860. The crash can be traced to one single act, a chance letter from one Richard Strangways to *The Zoologist* in 1851 who remarked on the ease with which he had obtained 29 grebes in Norfolk. This letter is credited with encouraging a switch from the European source to a harvest of the native stock.

The wearing of bird plumage as a fashion accessory was not confined to the UK, or to the wearing of plumage from Great Crested Grebes. Frank Chapman, walking the streets of New York, noted feathers from 40 species of birds in 700 hats. It is estimated that between five and 200 million birds were shot annually to feed this trade. In 1889, Mrs Robert Williamson, aided by Hannah Poland both living in Didsbury, Manchester responded to this carnage by founding the Society for the Protection of Birds (Holland *et al.*, 1984). The word “birdwatching” originates from around the same time: it appeared as the title of a book by Edmund Selous in 1901 (Moss, 2004). In 1904, the organisation founded by those women conservationists obtained its royal warrant and became the Royal Society for the Protection of Birds (RSPB) which is the largest wildlife NGO in Europe with over one million members i.e. around one person in 60 of the UK population (Cocker and Mabley, 2005). In the USA similar changes in attitudes were also prevalent and visible in the establishment of the National Audubon Society (Audubon) in 1905.

There was also a significant shift towards seeing nature as a public good. In 1893, meeting in Grosvenor House, off Park Lane, under the chairmanship of His Grace, the Duke of Westminster, Octavia Hill, Robert Hunter (later Sir Robert), and Canon Hardwicke Rawnsley saw the fruition of an idea first put forward by Robert Hunter in September 1884: the National Trust for Places of Historic Interest and Natural Beauty, now known more simply as the National Trust was found. The central idea which Hunter put forward in 1884 was of “a Land Company formed ... with a view to the protection of the public interests in the open spaces of the country” (Fedden, 1974). Importantly here was a vision of the public interest replacing that of the private landowner.

The British Outdoor Movement burgeoned in the interwar years. Walking and mountaineering groups were predominantly populated by the upper-middle-class, metropolitan professional and intellectual élite. The character of that movement had been shaped by manifold forces: eighteenth-century Romantics; early nineteenth-century, utilitarian, urban, middle-class, liberal radical footpath campaigners, proponents of anti-capitalist organic and regenerative alternatives, such as John Ruskin and William Morris; and the Christian nonconformist church – and chapel – based improving culture all hand their influence (Taylor, 1997).

On the 24th April 1932 the mass trespass of Kinder Scout took place. It was staged to highlight that walkers in England and Wales were denied access to areas of open country. However, it took the Second World War for society to shift sufficiently for this dream to be realised. There was a general recognition that the Britain to which the soldiers and sailors returned was not a land fit for heroes and something had to be done. At the end of the 1940s conservation became part of a new approach to the manifold problems of town and country, involving the rehabilitation of towns, economic revitalisation of the countryside, planning for leisure and the creation of new national and regional parks and nature reserves. The centre piece was the 1949 National Parks and Access to the Countryside Act (Adams, 1996). In 1951 the first National Park in the UK, The Peak District National Park (1438 square kilometres), was created. Today it has around 20 million day visitors a year (Peak District National Park Authority, Not dated).

Separation

All would seem rosy and relationship between people and their natural environment was on a good footing. However, complacency is not appropriate.

A recent RSPB survey (2005) of 1,000 people indicated that 86% of them enjoyed watching garden birds. However, the organisation said the public's knowledge of birds is not

always impressive. Sixty five per cent did not know the house sparrow was the UK's most common garden bird, and almost half did not realise the numbers of that species is falling. The distinctive blue cap and yellow breast helped only 70% of people to pick out the blue tit from a line-up of the five most common garden birds House sparrow, Blackbird, Starling, Blue tit, Chaffinch (The Daily Telegraph, 2011), and when asked to identify the Chaffinch, only 56% recognised it. Why is it that the British Public so ignorant of their natural environment? Perhaps the answer lies in understanding what sparks a person's interest in, passion for nature, for wildlife. One of the most important factors is the experience of a place in which you are able to explore, interact with, and get to know nature (Leroi, 2010). Where were, are the important places to you; those places that sparked your passion and enthusiasm? Are there any? Have we moved away from personal contact with nature towards a virtual contact?

Data collected by England Marketing for Natural England show a pattern in childhood play that moves away from experiencing nature (Table 1).

Table 1: Where children and adults played (based on England Marketing, 2009)

Location	Age (%)		
	50+	<50	Children (7-11 yoa)
At home or my friend's home indoors	73	78	83
Garden	73	78	75
Indoor activity centre	2	12	22
Indoor after school club	5	15	23
Indoor sports centre	5	14	20
Indoors (mean)	4.0	13.7	21.7
School playground	58	64	40
School playing fields	35	51	25
Outdoor adventure playground	16	31	22
"Formal" outdoor (mean)	36.3	48.7	29.0
In the street near my home	80	74	40
Woods	52	44	10
Heat/Fields/Farmland	49	39	9
Riverside/ Canalside/Pond	33	22	7
Mountains/Moorland/Other wild spaces	18	11	4
Informal outdoors (mean)	46.4	38.0	14.0

Parents struggle with competing, rational, and emotive judgments (personal and social in nature) about positive and negative risks associated with play. With long working hours parents are tired at the end of the day, have little time to supervise their children at outside play and by the time most parents get home they just want to relax. Finally, contemporary discourse describe the hazards associated with nature: infectious disease, harmful plants and animals, and people. We are encouraged to manage our own risks, but without the necessary information to understand and take the necessary precautions. Safety is also a huge issue for parents who are afraid to let their children roam the streets and woods for fear of who might be out there. The current disconnect between society and natural history means that parents are often not the conduit for natural history education for their children for the parents are also disconnected and are often not able to identify common plants and animals (Reagan and Fleischner, 2009).

If the parents cannot provide this experience what about the teachers? People enter the teaching profession, by and large, at similar ages to parents whose children they teach. Teachers have the same background the same experience as parents. It comes; therefore, as no surprise that there is a dearth of individuals available to consult who actually know natural history. At present we are employing a generation of teachers who are uncomfortable with the outdoors and who are not well versed in techniques for exploring or teaching natural history. Our current generation of children are not getting out into the field. Field trips are expensive and difficult to schedule and the logistics of moving students from campus to field sites can be challenging for schools with limited budgets.

If not parents and teachers, what about the children's peers? Since the 1970s there have been giant technological advances. Outdated black and white televisions have been replaced by a plethora of electronic technologies which consume people's time. Peer pressure is directed away from direct contact with nature in to ever more virtual worlds.

If we do not gain our knowledge and understanding of nature at first how do we obtain it vicariously? Oliver G. Pike (1877-1963) premiered his film “In Birdland with Oliver Pike” at London’s Palace Theatre of Varieties in August 1907. This was the first British wildlife film to be screened to a paying audience. The BBC established its Natural History Unit in 1957 and in its 50 plus years of history has become preeminent in the field. How many people watch natural history programmes (Table 2)?

Table 2: Television viewing figures week ending 7th November 2010

Programme	Viewing Figures (Millions) w/e 7 Nov 2010	Percentage of UK Population (61.84 Million)
The X Factor Results	14.29	23.11
Strictly Come Dancing	11.12	17.98
Eastenders	10.40	16.82
Downton Abbey	10.20	16.49
Countryfile	8.00	12.94
The One Show	4.98	8.05
Masterchef: The Professionals	3.26	5.27
David Attenborough’s First Life	3.16	5.11
Eggheads	2.37	3.82
The Natural World	2.17	3.51
Autumnwatch	2.15	3.48
Autumnwatch Unsprung	1.81	2.93

(Source: <http://www.barb.co.uk/report/weeklyTopProgrammesOverview? s=3> accessed 21 Nov 2010)

What emerges from these data is that relatively few people are watching the specialised nature programmes whereas many more pick up natural history slots in programmes such as The One Show. The largest audience, as we know, are for the general entertainment programmes. Perhaps new technologies are providing people with natural history information in different ways?

There is another factor. Where is nature? In North America, a frontier mentality persists in the cultural mindset and rich biodiversity is associated only with remote areas, reflecting a model of an empty world in which human development is completely isolated from

the natural (wild) processes. This need not be the case and Farina *et al.* (2003) contrast the North American paradigm with the Mediterranean paradigm which they describe as the full world vision in which plasticity, adaptation to disturbance, and the persisting of biological refugia are key factors responsible for the landscape dynamics. However, it is the empty world model that dominates our thinking. It is from which this model that the mindset of the dominance of the economic capital over the natural and cultural ones is drawn, a mindset that has been exported worldwide.

This attitude of otherness can also be seen in attitudes towards wildlife in cities. Elton (1966) considered urban areas to be biological deserts as he assumed that the multitude of exotic plants found in gardens would have few species associated with them. Loram *et al.* (2007) estimated that approximately 8,000km² of the UK is covered by gardens. Owens (2010) records 2,673+ species of plants and animals in a 741m² garden in Leicester. The plus sign in the figure of 2,673+ is attributed to the unidentified Coleoptera. Owens notes that exotic as well as native species of plant are used by the animals in the garden with, for example, one moth larva feeding on 12 native and 42 exotic species.

Nature is important to children's development - intellectually, emotionally, socially, spiritually and physically; and research indicates as children's connection to and time spent with nature has diminished, childhood ailments and medical problems have vastly increased (Staempfli, 2009; Louv, 2005). Nature is also important to the health and wellbeing of adults. People who live within 500 m of accessible green space are 24 per cent more likely to meet recommended levels of physical activity, while reducing the numbers of sedentary individuals in the population by just 1 per cent could reduce morbidity and mortality rates valued at £1.44 billion for the UK.

Pre-nuptial agreement

Despite this low level of knowledge we are seeing a shift, one that brings the importance of nature once more to the fore. The European Environment Agency's fourth Environment State and Outlook report (SOER 2010) highlights a need for a greater understanding of the links between climate change, biodiversity, resource use and people's health — and how tools like spatial planning, ecological tax reform, pollution prevention, precaution and resource accounting can underpin a natural capital-based approach to their management (EEA, 2010).

The natural environment provides a range of services from simple and obvious things like food, water and many materials, to more complex things like the regulation of climate through carbon sequestration or of flooding through water storage. There are also less tangible aesthetic and recreational services that it provides such as places to relax, seek inspiration or exercise. These benefits that humans receive from the functions of the natural world have been called *ecosystem services*. They are the direct and indirect result of past and present ecosystem processes such as soil formation, water and nutrient cycling and primary production (harnessing energy from sunlight). *Biodiversity* (a convenient technical term that has entered broader usage to capture the diversity of the whole living world, from genes and individual species, through to plant and animal communities and entire biomes) plays a critical role in all of these processes and as a result is often viewed as the vital underpinning for most, if not all, ecosystem services.

The Millennium Ecosystem Assessment published in 2005 introduced ecosystem services to a wider audience and made an assessment of the state of these services on a global scale. A national assessment of these services, the UK National Ecosystem Assessment, is currently underway and due to report in June, 2011. The interest in attempting to place a monetary value on ecosystem services is to help inform policies and other decisions by all sectors (see Defra, 2007). In practice, while some services such as food and timber already have defined market values, many are not (and may never be) traded. Some benefits are intangible and difficult to value, even though many of them are simply irreplaceable — the way in which

water is filtered and cleaned for example, as it passes through healthy wetlands is for all practical purposes irreplaceable. The economic benefits from the mangroves of collecting wood, providing nurseries for offshore fisheries and protection against storms total \$10,821 a hectare, far outweighing the benefits of converting them into a shrimp farm. Valuation is particularly problematic for species that simply enrich our lives (what price a Skylark?) and other cultural services such as the aesthetic qualities of our landscapes. Nonetheless, it has been estimated that the cost of global biodiversity decline under a business as usual scenario could be 14 trillion Euros by 2050 (Braat *et al.*, 2008). More specific valuations of the benefits derived from ecosystem services, and the cost of their loss, already provide a compelling case for the conservation of our natural heritage in England (Natural England, 2009).

In 2007, environment ministers from the governments of the G8+5 countries, meeting in Potsdam, Germany, agreed to “initiate the process of analysing the global economic benefit of biological diversity, the costs of the loss of biodiversity and the failure to take protective measures versus the costs of effective conservation.” The Economics of Ecosystems and Biodiversity (TEEB) study, which emerged from that decision, has delivered a series of reports addressing the needs of major user groups: national and local decision makers, business and the wider public. TEEB is hosted by the United Nations Environment Programme and supported by the European Commission, the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, the UK government’s Department for the Environment, Food and Rural Affairs, and Department for International Development, Norway’s Ministry for Foreign Affairs, Sweden’s Ministry for the Environment, The Netherlands’ Ministry of Housing, Spatial Planning and the Environment and Japan’s Ministry of the Environment. Interestingly it was chaired by a career banker, Pavan Sukhdev.

TEEB make the case for systematic appraisal of the economic contribution of biodiversity and ecosystem services to human well-being; and for routine steps to prevent that contribution being lost or diminished through neglect or mismanagement. It is an appeal to each of us, whether a citizen, policy maker, local administrator, investor, entrepreneur or

academics, to reflect both on the value of nature, and on the nature of value. Applying economic thinking to the use of biodiversity and ecosystem services can help clarify two critical points: why prosperity and poverty reduction depend on maintaining the flow of benefits from ecosystems; and why successful environmental protection needs to be grounded in sound economics, including explicit recognition, efficient allocation, and fair distribution of the costs and benefits of conservation and sustainable use of natural (TEEB, 2010).

Valuation is seen not as a panacea, but rather as a tool to help recalibrate the faulty economic compass that has led us to decisions that are prejudicial to both current well-being and that of future generations. The invisibility of biodiversity values has often encouraged inefficient use or even destruction of the natural capital that is the foundation of our economies (TEEB, 2010).

In summary, TEEB's approach to valuing ecosystems and biodiversity is one that acknowledges the limits, risks, and complexities involved; covers different types of value appreciation; and includes various categories of response at the level of public policies, voluntary mechanisms and markets. In situations where cultural consensus on the value of ecosystem services is strong and the science is clear, it may be relatively straightforward to demonstrate values in monetary terms and capture them in markets. This applies most obviously to commodity values such as the number of livestock or cubic meters of timber, but can equally be applied to amount of carbon storage or the supply of clean water. On the other hand, in more complex situations involving multiple ecosystems and services, and/or plurality of ethical or cultural convictions, monetary valuations may be less reliable or unsuitable. In such cases, simple recognition of value may be more appropriate (TEEB, 2010).

As approaches to valuing a wider range of ecosystem services are developed, it is important to realise that most services are provided by the interaction of living and non-living components of nature, rather than by individual species, and that many of the services are provided by the little things about which most members of the public know little, and care even less. Nevertheless, there is good evidence that increased rates of some ecosystem processes

(plant productivity for example) are associated with increased numbers of species (Hooper *et al.*, 2005; Balvenera *et al.*, 2006; Hector & Bagchi, 2007) and as conditions change, different species may fulfil different roles. So how can diverse ecosystems be valued? Is placing an economic value on everything the way forward? Standard neoclassical economic analysis suggests certain outcomes but assumes that humans are rational and behave in a way to maximise their individual self-interest. This model of the 'rational man' yields a powerful tool for analysis, but it has many shortfalls that can lead to unrealistic economic analysis and policy-making. The many concepts from behavioural economics and psychology can be distilled down to seven key principles, which highlight the main shortfalls in the neoclassical model of human behaviour.

The seven principles:

1. **Other people's behaviour matters:** people do many things by observing others and copying; people are encouraged to continue to do things when they feel other people approve of their behaviour.
2. **Habits are important:** people do many things without consciously thinking about them. These habits are hard to change – even though people might want to change their behaviour, it is not easy for them.
3. **People are motivated to 'do the right thing':** there are cases where money is demotivating as it undermines people's intrinsic motivation.
4. **People's self-expectations influence how they behave:** they want their actions to be in line with their values and their commitments.
5. **People are loss-averse** and hang on to what they consider 'theirs'.
6. **People are bad at computation when making decisions:** they put undue weight on recent events and too little on far-off ones; they cannot calculate probabilities well and worry too much about unlikely events; and they are strongly influenced by how the problem/information is presented to them.
7. **People need to feel involved and effective to make a change:** just giving people the incentives and information is not necessarily enough (Dawney and Shah, 2005).

What this suggests is that we need a re-think, a re-appraisal of how we approach the future, and this is where my and my Post Graduate Researchers' (PGRs) endeavours have resonance. Collectively we have been examining issues such as the establishment of large scale conservation strategies in Cheshire, Greater Manchester, and more recently in Halton and Warrington. We have been exploring how ecosystems are valued, and how those values change spatially and temporally, and we have been working to engage with communities in these discussions through aspects of art and science. However, this is dangerous thinking. Environmental politics, as any politics, can be described in three layers: preservation, reformation, and transformation. The first is directed at the preservation of certain aspects of our natural environment, or more widely at our nature and built environment, for example establishing a nature reserve. The second layer is to reform particular kinds of activity which are seen as environmentally damaging, for example adding pollutants, inadvertently or accidentally in to rivers -- we see the benefits of such an approach in the markedly improved water quality in the River Irwell. The third layer, the most radical, is directed at transforming society, including their work and consumption patterns, for example the consumption of land for development. It is into the area of transformation that my research work and that of my PGRs fits. The "environmental citizen" position concentrates on the first two layers. The third layer is generally not encouraged as it challenges social, political, and economic structures and is, to a greater or lesser extent, destabilising (Peterson and Lupton, 1996).

Yet, this might not be enough. Is Natural Capital is to be viewed as a commodity? If it is we see from the studies of Pine and Gilmore (1999) that commodities pass through stages: as commodities, goods, services, experiences, and transformations. What does this mean for the natural environment? Will we begin to move from perceiving the Natural Environment as providing services into something that provides experience? If so how will we adapt to this change? We see it in other forms of culture: music, art, theatre are all marketed as experiences, so why not our Natural Capital?

Conclusion

Sir John Lawton, an Ecologist, former head of the Natural Environment Research Council, and former Chair of the Royal Commission on Environmental Pollution, reminds us in the talks I have heard him present, that we undertake our nature conservation activities under licence from society. Put another way, through legislation as well as through a moral code -- that is to say through culture --, it is society that provides the context and gives permission for conservation actions to be undertaken. So how are our cultural changes reflected in our attitude to the natural world? How has our culture, our customs, ideas and social behaviour towards the environment around us, developed over the last millennia? Have we evolved culturally? This has been the central question of this lecture. It is a question for each of us to answer individually.

Whilst the nuances of the relationship might have changed it is contestable whether we have evolved in terms of the major theme of Aristotle's statement; that is that nature is there to serve people. What we have seen over the centuries is simply a re-framing of the same idea. At different times different things are valued as more or less important. In the future with the pressures of high human population, the lack of cheap energy and the impact of climate change which bits of nature will be valued more highly and which less so. Will we value local food production and see, as many forecast, roof gardens, green edible walls and gardens and parks devoted to horticulture? Will access to green spaces become a commodity that is sold? In the UK where we have free access to parks this seems abhorrent. However, in London there is a history of restricting access to the green space in many of the squares; in Shanghai, China I came across a park with an admission fee and in Crete a walk down a valley to the coast where there was a toll. Darwin acknowledged that the prime notion which catalyzed the rest of his theory was derived from Malthus; a fact repugnant to many then as today (Todes, 1989). Malthus' central idea was that nature (agriculture and sexual behavior) placed limits on man, just as, as Darwin confirmed, natural forces explained the growth and disposition of other species (Malthus, 1798). However, Dresner (2008) recently remarked that what was once understood as a profoundly reactionary view, the setting of mankind's limits by nature, might today be seen as both valid and intellectually progressive.

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