An assessment of attitudes to biodiversity within company supply chain management

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Abstract

Biodiversity provides industry with the means to develop new products and technologies. However natural resources, which underpin sustainable business, continue to be used unsustainably or degraded by development. Businesses invariably have an impact through their supply chains with direct, indirect or cumulative local, national or international effects on biodiversity. The way companies deal with these impacts down their supply chains varies and may often depend on the industrial sector, knowledge of biological diversity, or level of understanding of the interdependence between biodiversity, economic growth, and social issues. A review of the literature on defining biodiversity and sustainable development is made along with current thinking on biodiversity decline and what may be driving and influencing attitudes to change in business. An example of best practice in company biodiversity policy in regard to suppliers is taken from three companies. This study will inform the development of a methodology to incorporate biodiversity impact assessments in company supply chains into their environmental management systems.

Keywords: biodiversity; ecosystem services; sustainable development; supply chain; management systems; impact management.

1. Introduction

The results presented in this paper represent the literature review and first six months of a research project. The overall aim is to develop a methodology for assessing and managing the environmental impact on biodiversity of supply chain companies and to incorporate this information into company Environmental Management Systems. The availability of natural materials and the connection between ecosystem functions, services, biodiversity and attitudes to their material use in industry is discussed. The influence of national and international biodiversity regulatory and legislative frameworks on industry is also considered. Examples of best practice of management of biodiversity are looked at in the context of supply chain companies in three cross-sectorial industries. Responding to a business demand for supply chain biodiversity assessment the outcome of the project will be a methodology that employs an EMS framework, for assessing and managing biodiversity impacts within a supply chain.

2. Ecosystem Services, Biodiversity and Industry

The Millennium Ecosystem Assessment (MA) (2005) asserted that industry could not function without natural resources provided by ecosystems and the services they provide. Unfortunately human use of biological systems nearly always means they are degraded as a result (WCED, 1987., Robinson, 1993). It should come as no surprise then that unsustainable use as businesses utilize these services contributes to ecosystem change. This was supported by the 2005 MA report on ecosystem change and human well being when it concluded that, " *If current trends continue, ecosystem services that are freely available today will cease to be available or become more costly in the near future..."*

The proposal that the services ecosystems provide depend on ecosystem function and interrelationships between components and levels of biodiversity has been the subject for discussion in the scientific community for many years (for example, Ehrlich and Ehrlich, 1981., Wilson, 1992., Shultze and Mooney, 1993). The debate has produced numerous definitions of biodiversity many of which included ecological, organismal, and genetic components (Harper and Hawksworth, 1995., Haywood and Baste, 1995), and genetic, population/species, and community/ecosystem elements offered, for example, by Redford and Richter (1999).

This was reflected and documented in the definition of biodiversity presented by the 1992 United Nations Convention on Biological Diversity (UNCBD), that is, *"the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems"* (UNCBD, 1992:Article 2). Other research and work on these interconnected relationships has generally supported this definition, for example, McGrady-Steed *et al* (1997), Naeem and Shibin, (1997), Magurran (1999), Magurran and May (1999), Naeem *et al* (2002), and Foley *et al* (2005).

As biodiversity contributes to the maintenance of ecosystem functions (Tacconi, 2000., Chapin et al, 2000) it is therefore the source of many ecosystem services and goods, for example, climate regulation, cultural heritage, food, timber, fiber, genetic resources, water etc, providing the environment and the natural resources essential for business to operate and survive. As industry requires increasing supplies of these materials greater pressure on ecosystems is compromising their ability to deliver. The resulting diminishing natural supply chain will have profound effects on business with bottom lines affected by increasing costs, scarcity of materials, stakeholder pressure, and increased regulation (MA, 2005). The World Business Council for Sustainable Development (WBCSD, 2005) supported the 2005 Millennium Ecosystem Assessment report by pointing out that, "*Business cannot function if ecosystems and the services they deliver—like water, biodiversity, fiber, food, and climate—are degraded or out of balance.*"

Having narrowed down a definition of biological diversity and introduced the interrelationship between business and its impact on ecosystem function/services the situation is now explored further. Emphasis and weight is added to the threat to industry through unsustainable use of natural resources leading to biodiversity loss, and the concept of sustainable development is brought into the debate.

3. Biodiversity Loss

More recently research has been driven by loss of biodiversity through increasing anthropogenic pressure on ecosystems (Kinzig *et al*, 2002), rekindling interest in the function of diversity-stability relationships (May, 1972., May, 2000) influenced by disturbance (Hughes *et al*, 2002). The extent human use demand disturbs different components of biodiversity will vary depending on ecosystem type (Redford and Richter, 1999), but studies into the effectiveness of ecosystems in reorganising after disturbance or a destructive event point to biodiversity as a key measure of ecosystem resilience (Perrings *et al*, 1995).

The arguments are controversial however with heated debate on how biodiversity would affect ecosystem function (Kinsig, 2002), with Holling *et al* (1995), for example, suggesting that a general connection between species diversity and ecosystem resilience is not yet certain. What has emerged from studies is the clear situation that if conditions causing sustained stress or shock arise and a certain level of biodiversity loss is reached, the result often creates opportunities for diverse ecosystems to fundamentally stabilise and reorganise (Perrings *et al*, 1995).

Meanwhile it is now generally recognised that biodiversity is experiencing unprecedented changes in distribution and abundance through anthropogenic activity. Modifications of natural systems directly related to human activities, such as increasing human population and material consumption (Primack, 2000), has contributed considerably to the decline in biodiversity (Heywood, 1995., Lawton and May, 1995). Yet despite more recent initiatives for conservation and sustainability (for example, UNESCOs MAB programme), biodiversity, what Wilson (1992) called '*the key to the maintenance of the world*', has continued to decline with natural habitats being destroyed at a rapid rate (Dobson, 1996., Purvis and Hector, 2000., MA, 2005) resulting in species extinction across the world reaching their highest (Dolman, 2000., UEA, 2002., Paris, 2005).

Against this background of continued global biodiversity loss there is a perception in the business community that taking measures to halt this decline threatens economic development (Paris, 2005), with some businesses claiming they have no direct use of natural resources. This is an argument not supported in practice as indirect unsustainable use also contributes to the effects on intangible assets such as, supply chain companies (Insight, 2004), access to markets, license to operate, competitive advantage, and corporate reputation (MA, 2005). Not recognising biological diversity as a key environmental asset in decline (Mulder and Coppolillo, 2005), and the influence that has on business resilience for medium to long-term survival is the real threat. This is again pointed out in the 2005 MA report as it emphasises, "*... Loss of ecosystem services will affect the framework conditions within which businesses operate, influencing customer preferences, stockholder expectations, regulatory regimes, governmental policies, employee well-being, and the availability of finance and insurance."*

Moving away from the predominant attitude of short-term gain and looking towards long-term business interests, that is, its survival and continued profitability, depends on the ecological services provided by diverse natural systems, this is the reasoning behind the idea of sustainable development and makes biodiversity one of its key

components. This is a message that the International Union for the Conservation of Nature and Natural Resources (IUCN) continually tries to drum into business, as its director Achim Steiner (Steiner, 2005) put it, *"Investing in environmental sustainability is not a tax on development.'* There is an urgent need for business to realise that*, ' Both the development community and the environmental community must work to show that investing in the sustainability of natural resource use is in fact investing in the long term viability… and indeed the returns of economic growth,"* (ibid). The idea that economic development would have to grow in a sustainable manner (UN, 1992) has been given international credit for many years as it underpinned the fundamental principles of the Rio Earth Summit in 1992.

4. Against a Background of International Awareness

The Rio Earth Summit placed the issue of biodiversity, as Byron (2000) noted, '*firmly on the international agenda*', with the development of the Convention on Biological Diversity (CBD). The CBD has a primary aim to conserve biological species, genetic resources, habitats, ecosystems (Rao, 2000), with member states implementing their own programmes, for example, the UK committed to the '*conservation and sustainable use of biodiversity*' (Wicks and Cloughley, 1998). The ideals of the CBD are periodically reaffirmed, for example, the Kyiv Resolution (2003) on biodiversity reiterated the 'Pan-European' intention to implement the CBD.

Other European Community Directives in related areas strengthened the legislative framework, for example, the Directive 85/337/EC, implemented in the United Kingdom in 1988 (EC, 1985), gave the issues of sustainability and the relationship between economic development and the environment an international and national legislative foundation (Glasson *et al*, 1999). This helped open up possibilities for more public participation in decision making with more environmental information made available, for example, environmental statements, environmental appraisals of development sites and eventually corporate environmental reports (iema, 2002).

The CBD requires biodiversity to be incorporated into national decision-making processes, such as EIA (CBD, 2001.14 (1)). Article 14 of the convention suggests that an Environmental Impact Assessment be used for '*potential projects likely to have significant adverse effects on biodiversity*' (CBD, 2001. Article 14, (1) (a) (b)). While Article 6 (b) requires that the conservation and sustainable use of biodiversity be integrated into relevant sectorial and cross-sectorial plans, programmes and policies (CBD, 2001.14 (b)). It also required signatories, in accordance with the CBD and its Agenda 21, to implement a national biodiversity strategy to protect biodiversity and use biodiversity resources sustainably (Treweek, 1999., Dolman, 2000, Defra, 2001). In 1994 a UK Biodiversity Action Plan (UKBAP) was adopted (UKBAP, 1994), resulting in Local Biodiversity Action Plans (LBAP) being put into practice throughout the UK (DEFRA, 2003). The CBD treaty changed the emphasis away from just preserving areas with exceptional diversity, to the more holistic view of sustainable development of biological resources (Pearce, 1992).

Despite these initiatives applying government pressure on industry there is a feeling that the notion of sustainable development has lost momentum, concerns expressed by Steiner (2005), when he said, ' …*in the international development policy discourse has sustainability been mainstreamed or has it been relegated to being a significant issue of marginal concern?'* Certainly sustainable development generally would seem to be stalling on the grid with confusion fuelling arguments such as; *'sustainable development plays a dominant role over sustainability*' (Rao, 2000) or is a '*vague concept when used in the context of planning and conservation*' (Lutz and Freyfogal, 2005). A recent survey of 40 of the worlds largest technology companies appears to support industries use of this confusion when it found only 18 consider any sustainability factors when designing new products and services (Ethical Performance, 2005). Disappointing as these findings are, they suggest sustainability is gaining momentum as the figures are double that of a similar 1999 survey (ibid).

An example of this momentum is given from one of the business sectors that would be regarded as representing capitalist worldviews, that of banking, which has recently found itself the focus of attention from non-government organisations (NGOs) in regard to its ethical and environmental stance. In response a group of leading institutions including ABN Ambro, Barclays and Citigroup, established the Equator Principles in 2003 (EP, 2003) to address the social and environmental issues of projects they finance. Since then the 'greening of the banking sector' has gathered pace according to Sevastopulo and Houlder (2004). The head of environmental risk management at HSBC, Jon Williams (2005), underlined this sectors awareness of the threat to its bottom line with, ' …*no one piece of business is worth risking the reputation of the bank*'.

This is all heading in the right direction but there is confusion conveyed to business not only as to what biodiversity is but how it relates to the other confused concepts of sustainability and sustainable development, which are often seen as synonymous. This state of confusion has clouded the fact that these are two very different concepts whose explanations are not helped by the estimated 220 plus definitions of them (Brady, 2005). The business community's ability to manipulate environmental agenda's to suit their own objectives (Rikhardsson and Welford, 1997) seems to be a product of this. As Brady (2005) explains, sustainable and sustainable development 'are not difficult concepts', with sustainability being a state where systems continue indefinitely, whereas sustainable development is a process of development working towards that state.

5. Reasons and Targets

The current status of biodiversity reported in the 2005 Millennium Ecosystem Assessment (MA) continues the theme of human activity as the primary driver of biodiversity change and loss, with responsibility for quick action placed both collectively and on individuals for future sustainability (MA, 2005., Diversitas, 2005). The essential role and value of ecosystem services is highlighted and emphasises the urgent need to improve conservation and sustainable use of biodiversity. Alongside this the IUCN has concluded that biodiversity faces multiple challenges. In Europe, for example, habitat loss, fragmentation, intensive agricultural practices, urban expansion, increased transport and road networks, the illegal harvesting of flora and

fauna being the primary threats (IUCN, 2005). In response European governments have committed to a series of global and regional agreements aimed at halting biodiversity loss. The UK along with other European Union member states (see table 1 for examples) has committed to halt biodiversity loss by 2010 (UN, 2002). With the 2010 objective assessed for appropriateness, effectiveness and implementation at conferences in Killarney (2004) and Malahide (2004). Although it is argued that the practicalities of achieving this target are '*demonstrably omitted*' (Mace, 2005). The sceptic camp meanwhile wonder if sustainable development can live alongside, often destructive, market-based methods as a basis for conservation (Kiss, 2004), and that a '*persisting industrial revolution mindset*' (Brady, 2005) necessarily degrades ecosystem integrity.

Table 1. Halting Biodiversity Loss 2010 Commitments.

2010 Commitment	Level	When it was made	What was said
WSSD-World Summit on Sustainable development	International	2002	"The achievement by 2010 of a significant reduction in the current rate of loss of biodiversity"
CBD-Convention on Biological Diversity	International	2002	"To achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level"
Kiev Resolution on Biodiversity	Pan European	2003	"To halt the loss of biodiversity by 2010"
EU Sustainable Development Strategy	EU	2002	"To protect and restore the structure and functioning of natural systems and halt the loss of biodiversity both in the European Union and on a global scale"
Gothenburg Agreement	EU	2001	"To halt the loss of biodiversity by 2010"
Public Service Agreement 3-	UK	Public service Agreement 2005-2008	"Bringing into favourable condition by 2010 95 per cent of all nationally important wildlife sites"

Source: UN (2002)

6. Attitudes of Companies and their Supply Chains

The research has found that biodiversity consideration varies between industrial sectors. As would be expected companies with a direct business interest in natural resource supply or industries listed in the F&C Asset Management high and medium biodiversity impact risk by sector list (F&C, 2004) such as food (farming), timber products, and the retail sector involving pharmaceuticals have been pro-active in this area

6.1 Smaller Enterprises

Counter to this companies that do not see biodiversity as a business risk cite the main priority is to stay in business, along with inflexible management allied to feelings of uncertainty, particularly within top management. This situation is particularly prevalent in the majority of small companies who see no incentive to consider their environmental responsibility (Thankappen *et al*, 2004). This is an obstacle companies with large supply chains have to counter as their potential impact on biodiversity goes beyond immediate suppliers and often influences more distant ones in the global theatre. Lack of environmental knowledge and often a poor understanding of biodiversity loss in relation to risks to the business leads to biodiversity impacts in supply chains being ignored (F&C, 2004) despite evidence that ecosystem degradation may severely affect long-term shareholder value (ibid). The risk of taking this stance is not realizing their possible vulnerability to reputation from invisible resource impacts (Ends, 2004).

The smaller the enterprise often means the resources available for dealing with environmental responsibilities are progressively limited or management don't see the cumulative impact potential on biodiversity of small companies. Supply chain companies are invariably small to medium sized enterprises (SMEs), for example, these companies make up 99% of the three million businesses in the UK, of these '94% do not believe they have an impact on the environment' (EA, 2004). Thankappen *et al* (2004) found it is often the threat posed from non-compliance to legislative and regulatory regimes that are likely to drive environmental initiatives, concern by management on environmental issues may be voiced but the majority of SMEs '*do relatively little in practice*.'

Perhaps part of the reason for this situation is the high degree of scepticism within industry and a 'lack of suitable business models', supplying the disinclination to be pro-active on environmental sustainable development issues (Ethical Performance, 2005). An increasing number of companies however are investigating various management methods that will enable them to anticipate surprises and identify potential events that may affect earnings, for example, the Enterprise Risk Management (ERM) framework (Scott, 2005). Negative attitudes are becoming more of a risk to business than in the past however with environmental regulation compliance having to be demonstrated, as the Environment Agency is indicating with their chief executive, Barbara Young, announcing that SMEs should '*expect special attention this year*' (Mills, 2005).

6.2 A Systems Approach

Efforts to demonstrate self-regulation such as departments dealing specifically with environmental issues are now accepted as part of overall corporate management. These departments invariably look at internal environmental policies and voluntary standards such as ISO 14001 and EMAS, which are increasingly being implemented as guides to compliance throughout industry. However voluntary environmental management systems (EMS) alone are not sufficient drivers to initiate environmental consideration, particularly farther down the supply chain, and indeed are often seen as

holding back economic development. Also Standards are, as Sheldon (1996) said, '*nothing more than a management tool*'. These standards are minimum criteria for environmental consideration and are generally seen as short-term problem solving mechanisms and very different from the '*strategic and more holistic principles of sustainable development*' (Sheldon, 1996). They are, having said that, part of the process of contributing to, as Welford (2000) put it, '*businesses acting in ways that are consistent with sustainable development.*' However guidance applies only passive pressure on business to comply, for example calls from the Department for Environment Food and Rural Affaires (Defra) for all sectors to '*engage in managing and reporting on biodiversity as an integral part of its processes and activities*' (Defra, 2003), and further to, '*manage supply chain and investment decisions to reduce the risks of indirect adverse impacts and to enhance biodiversity opportunities*' often being ignored. The situation remains that despite regulatory and stakeholder pressure on industry and abundance of guidance information available, statements of intent promising biodiversity impact measures in company environmental policies have proved largely empty as actually adopting biodiversity impact into EMSs is exceptional (Calow, 2003).

7. Drivers Influencing Change in Supply Chains

The criteria that are the main drivers for any move to consider a company's environmental impact seem not to be primarily legislative or voluntary standards, as suggested, but more directly related to the economic area of the bottom line. This argument seems counter to the adoption of standards being a result of regulatory pressures, as Khanna and Anton (2002) suggest, but holds with the potential of competitive advantage and pacifying stakeholders being the drivers for quality environmental management and reporting (ibid).

The above arguments also apply to supply chain management where the same internal barriers need to be overcome to get management to buy into sustainable procurement. Research by Morton (2004) outlined the main obstacles, which were: Senior management, finance directors, budget holders, internal customers/specifiers, users of products and services and the environmental manager if appointed.

Studies so far have found that the majority of owners, directors, and managers, particularly in smaller supply chain enterprises, will look to general environmental issues concerning their companies if it affects corporate objectives. It could be taken from this that protecting biodiversity would be off their radar altogether. A study by Holt (2005) of a cross-sectorial sample of UK businesses identified '*internal environmental attitude as a key driver*', and there was some indication the size of the company was an influence in considering environmental issues with legislative drivers a close second.

The Business community however does have champions with 'clear values and commitment' who are looking to lead their companies in a long-term sustainable direction (Ethical Performance, 2005) and away from an undercurrent often circulating in industry of, as Orr (2005) put it, 'human kind cannot *afford* to survive', relating to short-term costs of sustainable development. It is worth noting that from

April 2006 stock market listed companies will be required to disclose important environmental issues affecting their businesses (EA, 2005).

However the interrelationship of company objectives with social and environmental ones, the idea of corporate social responsibility (CSR), is gaining momentum with business recognising it has a responsibility to a wide group of stakeholders (Mylrea, 2005., MEA, 2005). This is also the area of socio economic/political/ethical issues to do with globalisation, north/south, rich/poor divides (Ehrenfeld, 2005), all with fundamental links to biodiversity. The aim should be to make industry sensible of the distinctions, as Pearce and Moran (1994) pointed out, between proximate causes of biodiversity loss, that is, habitat loss or pollution events, and the fundamental causes behind them such as '*economic, institutional and social factors*'.

8. The Business View

A cross-section of the business community comprising of international and national companies as well as SMEs (reflecting varying requirements and impacts on ecosystem services) responded to the Millennium Ecosystem Assessment (2005) report on the present position and state of ecosystem services. The following common themes relating to moves towards more sustainable operations emerged.

Major companies realise that survival in the long-term depends on considering a wide range of stakeholder interest and involvement and also competitive advantage can be gained through differentiation within a sector. It was thought important to develop strong mutual relationships with external operations encouraging voluntary commitment to processes and actions, verified externally, that help deliver better environmental and social outcomes. Also thinking strategically by working with and influencing public policy development and thereby improving industry performance and finally commitment to transparency and accountability (MA, 2005).

The cross-sectorial businesses represented included the agri-business, mining, oil and gas, energy/utilities, forestry, and tourism. From this list agri-business is taken as an example of common business concerns and also because the nature of agri-business has resulted in major impacts on ecosystems globally. Intensive methods have degraded ecosystems marginal and fragile ones in particular. This situation remains with '*projected demands on ecosystem services set to double in coming years*' (MA, 2005).

The business impacts on agri-business include; licence to operate – public driven concern over ecosystem damage instigates new national/international law and regulations; reputation and brand-risk – consumer concerns increasing pressure for less intensive and less toxic chemical methods; cost of capital and perceived investor risk – confidence in the long-term viability of companies; access to raw materials – access to ecosystem services could be restricted, for example, fishery restrictions due to overtake; operational impacts and efficiencies – reduction of impact footprint by business and customers by reducing, for example, waste or recycling.

The other industries represented cited the following common themes for a sustainable approach to business; Reputation and brand risk; access to raw materials; new business opportunities and partnerships; operational impacts and efficiencies.

These results from the MA 2005 report are now compared with the general business case for sustainable procurement highlighted above and the findings of a sustainable procurement workshop held in London in May 2005 by Business in the Community, Manchester University Business School and The Chartered Institute of Purchasing and Supply to explore what criteria influence environmental and procurement managers to consider their environmental responsibilities.

The delegates from a large cross section of industry from insurance to defence gave the following reasons to apply sustainable procurement practices: Reputation – enhancing and protecting reputation which then links to share price and as a marketing tool – potential to build areas of brand around achievements. However they recognised the potential risk of 'sticking your head above the parapet'. Cost savings – packaging, waste not going to land fill and a reduction in energy and remediation costs; legislation – reduction of risk and the ability to pre-empt legislation; finite resources – protecting the long-term value of the business; consumers – raising awareness; employees – attracting and retaining staff; borrowing money – improved status; increased sales opportunities and the ability to differentiate from competitors.

These business cases were similar to the general business case for incorporating sustainable procurement into corporate management compiled by the Strategic Supply Chain Group (SSCF, 2005) and endorsed by Business in the Environment (BitE, 2005). The business case criteria are: Reputation; brand equity; share value; new markets and innovation; cost avoidance; attracting and retaining staff.

The common themes from these findings are that company and brand reputation are the primary drivers for environmental consideration with license to operate and the links to regulatory factors also a key factor. The general theme though is one of economic reasons to operate and not necessarily one of sustainable development. Any commitment to improving environmental performance or acting beyond compliance is mainly voluntary and certainly not connected to the biodiversity crisis facing the planet. This ties in with the literature research, which so far has found that industry does not generally mention biodiversity specifically as a driver and company environmental policy statements in general do not mention biodiversity.

9. Industry Best-Case Examples

The sectors of industry with a more direct interest or obvious impact on biodiversity are understandably more pro-active in its conservation, for example, the food and farming, leisure, transport, sections of retail, and mining industries. The project has so far looked at these sectors for best practice in biodiversity consideration and integration into their management systems. Three company examples are given, however in the area of case studies of specific companies no detailed analysis has yet

been undertaken as the project is at its pre-detail stage. As an indication of how and where industry is impacting on biodiversity, English Nature (EN) and the Joint Nature Conservation Committee (JNCC) singled out the main FTSE sectors impacting habitat and species action plans in relation to SSSIs and BAPs. Table 2 shows the sectors identified along with the main impacts and BAP sectors.

Table 2. Impacts of the Main FTSE Sectors on Habitat and Species Action Plans

BAP Sector	Main Impacts	Relevant FTSE economic sectors
Agriculture	Pollution, intensification, over-grazing and agro chemical use	Food producers and processors; food and drug retailers
Water and Wetlands	Abstraction, drainage and pollution	Water, food producers and processors
Coasts and Seas	Coastal defence works, development pressure, over-fishing and pollution	Water; transport; electricity; oil and gas; chemicals; leisure, entertainment and hotels; construction and building materials; food producers and processors; food and drug retailers
Woodlands and Forestry	Inappropriate management	Construction and building materials
Tourism	Visitor pressure and disturbance	Leisure, entertainment and hotels
Transport	Infrastructure development	Transport; construction and building materials

Source: Defra (2003)

Defra state that companies operating in the above sectors have the 'most direct impact on landholdings and indirect impacts through their processes, supply chain and products' (Defra, 2003). The following three companies representing transport, tourism and agriculture/food have been chosen as examples of best practice beyond compliance within sector, and investigated for their general approach to supplier selection and evaluation criteria in relation to biodiversity issues.

Transport: British Airport Authority (BAA) Heathrow have an active biodiversity policy that recognises both the direct and indirect impacts of their business. Their environmental policy is a formal recognition of responsibility for managing its impacts on biodiversity and their management vision complies with Defra (2003) guidelines. BAAs supply chain is an integral consideration in their EMS, recognising it as one of the significant impacts the business has on biodiversity and as such takes into account the need for sustainable procurement. Their strategy for considering biodiversity in the supply chain has clear objectives, goals, and impact mitigation measures.

Their view is one of continual monitoring and improvement in this complex area. They use biodiversity as one of their sustainability indicators and factor that into their own in-house sustainable development systems, which includes suppliers. Based on a biodiversity risk ranking, individual products are analysed with the relevant suppliers

and action taken to minimise any impacts. The supply chain is managed as a partnership relationship with quarterly reviews and audits to ensure compliance with their criteria and findings and results openly reported in annual statements. They have attained the Wildlife Trusts Biodiversity Benchmark and will look to extend this process into supply chain management. The interrelationship between biodiversity and social responsibility is recognised and BAA work with and involve local communities in their activities. BAA state, 'By proactively engaging with our potential and existing suppliers we are able to promote sustainable development as an integral part of our supply chain.'

Tourism: Center Parcs (UK) is a business providing a holiday village setting in hundreds of acres of woodland with the aim of combining ecology with tourism. They have the ISO 14001 standard for their environmental and green policy. They operate supplier assessment criteria as part of their management system. Center Parcs look to support and provide training in good environmental practice in their supply chain and they have a partnership relationship with suppliers. This involves supportive visits to sites, which focus on encouraging legal compliance and waste minimisation. They are taking biodiversity seriously and they have accreditation for the Wildlife Trusts Biodiversity Benchmark for their Sherwood Forest Site. Center Parcs also work with local communities and have an active re-cycling initiative involving the local workforce.

Farming/Food: Jordan's Cereals are whole grain food producers. They have a company policy that has sustainable farming as its aim through its Farming for Wildlife initiative. They buy direct from farms that meet the criteria of their in-house standard 'Conservation Grade' and in return the suppliers receive a premium for the oats, wheat and barley they produce. These standards are audited annually and the main criteria are: Farmers in the scheme have to provide 10 % of land for areas such as wildflower meadows as a pollen source for invertebrates and habitat for wildlife and other specified wildlife habitat management They have to have full membership of relevant Assured Food Standards Assurance Schemes and Guild of Conservation Grade producers. They participate in training programmes for complying with Conservation Grade production standards. Farmers have to manage the wildlife areas selected, which are extra to existing woodland and ponds etc, to maintain habitat type and only specified pesticides can be used. The aim is to provide the conditions for a sustainable business by differentiating within the sector and at the same time protect future grain supplies by maintaining the function and resilience of ecosystems.

Jordan's also have an active CSR policy and are working with local communities and conservation groups to enhance and conserve biodiversity. Local wetland areas have been restored with key species such as, otter, vole, kingfisher, great crested newt and white-clawed crayfish identified and their requirements factored into habitat creation design. The re-introduction into the wild, from their own captive breeding colonies, of the Corncrake is part of the biodiversity programme, as well as being sponsors of the RSPB's Lapwing Champion competition which encourages farmers to increase numbers of Lapwings on their farms.

10. Building on Initial Research

The next stage in the project is to achieve cooperation in the research with selected companies over a cross-section of industries. A multiple case study will be undertaken with each of at least three of the cooperating companies and will look at organizational and managerial processes in the supply chain concerning biodiversity assessment and environmental management systems. The scope of the studies will be determined with the cooperating companies. Evidence for the studies will be obtained from documents, records, interviews and direct observation. Supporting text books on case study theory will be used, for example, Yin, (2003., 2004), Kotzab *et al* (2005), and social research, for example, (Bryman, 2001., May, 2001., de Vaus, 2001). The collated data will then be analysed and a methodology for applying and incorporating biodiversity impact data into environmental management systems will be designed.

11. Conclusion

Biodiversity enables the mechanisms for ecosystem resilience providing services that are the foundations on which business is able to operate and develop. Despite knowing the importance of this humans continue to be fundamentally responsible in its rapid decline.

In a bid to prevent and reverse this trend regulatory and legislative pressures have been introduced to enforce the concept of sustainable development. Business has also had to consider the introduction of environmental management systems that undoubtedly can be an essential tool and process to continually improve their biodiversity impacts. The danger here is that businesses implementing voluntary management systems and standards that are based on confused ideas about biodiversity, and with the option of devising user-friendly definitions of sustainable development, will continue to use biodiversity unsustainably. There is little sign yet of improvement in reducing global biodiversity loss. In fact according to an evaluation of peer reviewed literature on the health and condition of global biodiversity undertaken by Bini *et al* (2005) there is '*no indication that things are getting any better, rather things appear to be getting worse with degradation rates far outstripping recovery rates*'.

Business has generally been slow to react to the problem and particularly those who perceive no direct involvement in using natural resources, with a few notable exceptions, and view biodiversity as too esoteric or solely as a means of short-term exploitation for maintaining or boosting profits aiming to satisfy one stakeholder only – the shareholder. However it is this area of fiduciary relationships between company and shareholder that is starting to be challenged. Shareholders are aware of the legislative risks and consumer awareness is a driver for protecting product brands and gaining competitive advantage in the market place. Biodiversity loss it emerges is not only an environmental problem but also a social one and as such there are opportunities for economic benefits and incentives for business to develop sustainably. The companies used as examples show it is possible to stay in business and at the same time continually improve methods to halt biodiversity loss and develop the business sustainably. The next stage is to get the message out to a wider audience.

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