

(ecotourism, outdoor sports); and science and education (school excursions, scientific discovery).

Ecosystem services are imperative for the existence of humanity, animals and plants. In the past 50 years humans have changed ecosystems more rapidly and extensively than any comparable period of human history. In an effort to protect ecosystems the UN released the Millennium Ecosystem Assessment in 2005 which has shifted ecosystem services onto the agenda of environmental professionals, policy and decision makers.

1.4 Explain the importance of biodiversity and ecological stability

Biodiversity and ecological stability are essential components of nature and they ensure the survival of humanity, plants and animals. The following factors illustrate the importance of biodiversity and ecological stability:

- **Maintenance of Ecosystems** – Ecosystem relationships resemble a web of connections from one living thing to many other living and non-living things. They not only allow survival, but also maintain a balance between living things and the resources (such as food and shelter) they need to survive. Due to the complex nature of ecosystem relationships, the removal or disturbance of one part of the ecosystem could affect the functioning of many other components of the ecosystem. Our knowledge of these relationships is incomplete, and the results of disturbances are thus to some extent unpredictable.
- **Climate Stability** – Vegetation influences climate at the macro and micro levels. Growing evidence suggests that undisturbed forest helps to maintain the rainfall in its immediate vicinity. On a smaller scale, vegetation has a moderating influence on local climates and can create specific micro-climates, which some organisms are dependent on these for their existence.
- **Pollution Breakdown and Absorption** – Ecosystems and ecological processes play an important role in the breakdown and absorption of many pollutants created by humans and their activities. These include wastes such as sewage, garbage and oil spills. Components of ecosystems from bacteria to higher life forms are involved in these breakdown and assimilative processes.
- **Medicine and Scientific Discovery** - Biodiversity has many scientific benefits as there is the potential of plant species to contain drugs that have medical benefits. About 40% of the drugs used worldwide have been developed from plant material, yet 90% of identified plants have never been chemically evaluated for their medical potential.
- **Disease Resilience** – It has been suggested that species could contain answers to protect plants from pests and diseases.

1.5 Describe how human interventions impact upon natural cycles and ecological systems

Man's impacts on the environment are mainly negative. We pollute the environment, destroy habitats and cause the extinction of species. Dr. Mark Everard shows how human intervention impacts the natural cycles and ecological systems with four substances, these are:

1. **Heavy Metals** – increasing the concentration of heavy metals in the environment locally or regionally can cause a direct toxin effect. Although some heavy metals, such as copper and chromium remain essential to living organisms as components of certain enzyme systems, they are toxic beyond trace concentrations. Humans have been unlocking heavy metals at an alarming rate and modern life has not evolved to cope with them.
2. **Phosphorus** – an essential micronutrient without which living cells cannot function. However human action (largely through fertilisers) have altered this slow 'trickle' geological process by increasing concentrations, which accelerates productivity and unsettles the structure and functioning of ecosystems.
3. **Nitrogen** – Although it is essential for life, more reactive forms of nitrogen (such as nitrate or ammonia) are problematic when present in excessive concentrations. It can cause runaway growth which often causes catastrophic disturbances as it unsettles the balance built up over billions of years. 30% of nitrogen fixing is now done artificially, meaning additional nitrates are being put into ecosystems, leading to eutrophication.
4. **Organic Molecules** – Many human-made organic substances tend to be poorly broken down by cells, since nature has not evolved specific enzyme pathways for substances not encountered through evolution. Whilst the direct toxic effects of some substances have been known for a long time, we have often only discovered serious adverse consequences for many such organic substances after long time lags following commercialisation and use. These have included contributions to mutations or some forms of cancer, and disruption of genetic material and hormones.

Human intervention impacts the natural cycles and ecological systems significantly by raising natural concentrations or levels of a particular substance. Ecological systems cannot deal with these occurrences as evolution has not given them the tools to do this. Therefore, any change in the flow immediately poses hazards to organisms or ecological systems. Bioaccumulation is an example of this and this does not just affect one animal, it reverberates up the food chain as substances cannot be broken down.

and Control Act 1999 is to regulate or otherwise prevent and control emissions capable of causing pollution.

Polluter Pays Principle

The polluter pay principle states that all producers of waste should be legally and financially responsible for the safe handling and environmental sound disposal. It is regarded as a regional custom because of the strong support it has received in most Organisation for Economic Co-operation and Development (OECD) and European Community (EC) countries. An example of the polluter pay principle being enforced is BP being ordered to pay £4.5 billion for the clean-up of the Gulf of Mexico oil spill.

Application of the principle has been far from comprehensive and there have been numerous disputes on the practical interpretation. One recurring theme is the role of regulation versus economic instruments in the implementation of the principle.

The polluter pays principle underpins environmental policy such as an Eco tax, which, if enacted by government would deter and essentially reduce greenhouse gas emissions. The Gas Guzzler Tax in the US is an example of an eco-tax underpinned by the polluter pays principle.

Extended Producer Responsibility (EPR)

Like the polluter pay principle, extended producer responsibility (EPR) aims to encourage organisations to decrease their impacts on the environment by reducing the amount of waste they produce and increase reuse and recycling. Organisations are incentivised to design and manufacture environmentally friendly products by holding them responsible for the costs of managing their products at the end of their life. Thus the cost of dealing with the waste is born by the company and the customer, not the taxpayer.

Under UK law producers are responsible for packaging, electrical and electronic equipment, batteries and vehicles. For example, the price for paint and tyres in the UK includes the cost for disposal as they are classed as hazardous waste materials.

Best Available Techniques (BATs)

The Integrated Pollution Prevention and Control directive (IPPC) uses the concept of Best Available Techniques (BATs) in the integrated control of pollution of air, water and soil. It requires organisations that produce pollution to use the most effective methods and equipment to prevent or reduce the amount of pollution produced and minimise the impacts on the environment.

The EC Directive (96/61) requires the determination of BATs to consider the following: use of low-waste technology, use of less hazardous substances,

For example, the Pollution Prevention and Control (PPC) regulations (Statutory Instrument 2006 No. 2311) controls all the environmental and health impacts associated with the emissions and discharges from an installation.

Strengthens:

- Provide a degree of certainty for business planning
- Consistent environmental standards and uniform rules.
- They are explicit allowing all parties know where they stand, 'do not do this otherwise this will happen'.

Disadvantages:

- Inhibit continuous improvement, as they can encourage parties to do the minimum required.
- Not the best approach for dispersed pollution sources
- Potential higher costs for regulated parties
- Information intensive – the burden is on the government to work out how best to protect the environment.
- Enforcement and regulation can be expensive.
- Can be rigid and not able to respond quickly to industry changes.

The renewable obligations require a specified proportion of energy to be supplied by companies from eligible renewable sources. These obligations incentivise renewables with the use of renewable obligation certificates (ROCs). The level of the annual obligation on electricity suppliers is published by 1 October in the year before it comes into effect. Eligible renewable electricity generators report the amount of renewable electricity they generate on a monthly basis to the Office of the Gas and Electricity Markets (Ofgem). Ofgem issue ROCs to electricity generators relating to the amount of eligible renewable electricity they generate. Generators sell their ROCs to suppliers (or traders), which allows them to receive a premium in addition to the wholesale electricity price. Suppliers present their ROCs to meet their obligation must pay a penalty (known as the 'buy-out price'). The money Ofgem collects in the buy-out and late payment funds is re-distributed on a pro-rata basis to suppliers who presented ROCs.

Fiscal Instruments

Fiscal instruments are taxes and fees aimed at dissuading organisations from damaging the environment. Fiscal instruments depend on regulators setting clear direction and rules, and then allowing markets to achieve desired environmental outcomes through price signals. For example, the Landfill Tax is designed to reduce the amount of waste organisations send to landfill, while the Aggregates Levy aims to reduce the noise, dust and loss of biodiversity resulting from the extraction of aggregates and encourage the use of alternative materials.

Fiscal instruments can take many forms, including: resource uses fees and charges; environmental subsidies (provides grants and low interest loans to promote specific activities or behaviour); legal liability (polluter pays principle); and taxes (e.g. landfill tax)

The International Monetary Fund (IMF) suggests that these costs are manageable if policies are well designed. It states that policies should be credible and provide long-term price stability, flexible enough to be able to adjust to emerging information and changing economic conditions, implemented as broadly and equitably as possible, and accompanied by broader fiscal reform.

The Kyoto Protocol is an international treaty, which extends the 1992 United Nations Framework Convention on Climate Change (UNFCCC) that commits State Parties to reduce greenhouse gas emissions, based on the premise that global warming exists and man-made CO₂ emissions have caused it. The Kyoto Protocol was adopted in Japan in December 1997 and entered into force in February 2005. It set binding emission reduction targets for 37 industrialised countries and the European community in its first commitment period (2008-2012). In December 2012 the Doha Amendment to the Kyoto Protocol was adopted, launching a second commitment period, 2013 to 2020. Japan, New Zealand and Russia participated in Kyoto's first-round but have not taken on the new targets in the second commitment period.

The main goal of the Kyoto Protocol is to contain emissions of the main anthropogenic greenhouse gases (GHG) in ways that reflect underlying national differences in GHG emissions, wealth, and capacity to make the reductions. The ultimate objective of the UNFCCC is the stabilisation of greenhouse gas concentrations in the atmosphere at a level that would stop dangerous anthropogenic interference with the climate system. However, much greater emission reductions will be required in the future if atmospheric GHG concentrations are to be stabilised.

In 2009, the Scottish Parliament unanimously passed the Climate Change (Scotland) Act, which aimed to reduce emissions from 1990 levels by 42% by 2020 and by 80% by 2050. The Scottish Government says it is on track to achieving these targets, despite recent announcements of it failing to meet interim targets for the fourth year in a row. Climate change minister, Aileen McLeod has defended Scotland's efforts stating the figures show Scotland continues to outperform the rest of the UK as a whole.

Resource Use Policy

Resource use policies involve the management of components of the biophysical environment, both living (biotic) and non-living (abiotic); and can cover both infinite and finite resources.

The Common Fisheries Policy (CFP) is the fisheries policy of the European Union (EU). It sets quotas for which member states are allowed to catch what amounts of each type of fish, as well as encouraging the fishing industry by various market interventions. It addresses an open access resource problem by giving fleets equal access to EU waters and fishing grounds, and allows fishermen to compete fairly. It manages an international common resource and prevents a 'tragedy of the commons'. CFP aims to ensure that fishing and aquaculture are environmentally, socially and economically sustainable and provide a

several related legal papers) to create principles and distinguishes substantive rules from procedural rules.

Because some courts have both civil and criminal jurisdiction, civil proceedings cannot be defined as those taken in civil courts. In the United States, the expression 'civil courts' is used as a 'shorthand for trial courts in civil cases'. In the UK, the burden of proof in civil proceedings is in general, with a number of exceptions such as committal proceedings for civil contempt, proof on a balance of probabilities.

Criminal Law

Criminal law is the body of law that relates to crime. It regulates social conduct and proscribes whatever is threatening, harmful, or otherwise endangering to the property, health, safety, and moral welfare of people. It includes the punishment of people who violate these laws. Criminal law varies according to jurisdiction, and differs from civil law, where emphasis is more on dispute resolution and victim compensation than on punishment.

Five objectives are widely accepted for enforcement of the criminal law by punishments: retribution, deterrence, incapacitation, rehabilitation and restoration. Jurisdictions differ on the value to be placed on each.

Scottish criminal law relies far more heavily on common law than in England and Wales. The Crown Office and Procurator Fiscal Service (COPFS) provides independent public prosecution of criminal offenses in Scotland and has extensive responsibilities in the investigation and prosecution of crime. The Scots legal system is unique in having three possible verdicts for a criminal trial: 'guilty', 'not guilty' and 'not proven'. The 'not proven' verdict is often taken by juries and the media as meaning 'we know they did it but there isn't enough proof'. This verdict, especially in high-profile cases, often causes controversy.

3.3 Describe key environmental legislation (legislation in relation to natural environment, air, water, land, waste, energy, climate change, producer responsibility and planning)

Natural Environment

Habitats Directive 1992

The Habitats Directive, more formally known as the Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora, is a EU directive adopted in 1992 as the EU response to the Bern Convention. It is one of the EUs two directives in relation to wildlife and nature conservation, the other being the Birds Directive. It aims to protect some 220 habitats and approximately 1,000 species listed in the directive's Annexes. These are species and habitats which are considered to be of European interest, following criteria given in the directive. The directive led to the setting up of a network of Special Areas of Conservation, which together with the existing Special Protection Areas

better for the environment but could also save money if fewer deliveries are required. The Toyota Prius emits 30% less carbon dioxide than that of an equivalent petrol car. As little as 2% of carbon dioxide emissions come from the burning of fuel versus 80% of that of a normal car. 98% is made up of gathering raw materials, production, transport, maintenance and disposal. Overall, the Toyota Prius is more environmentally friendly than its non-hybrid equivalents. Despite the overall lower carbon footprint, the resource gathering and transportation stages of the Prius has caused significant public scepticism towards its actual environmental benefits.

4.7 Explain the importance of effective resource use and recovery

Using the value chain approach will enable managers to identify where resources are used and ensure procedures are put in place to use resources efficiently. In most cases, resources such as gas, coal, oil and minerals are expensive and any savings made will reduce costs as well as having environmental benefits. Not only is it important to reduce the resources used by an organisation, but resources should also be recovered where possible., this can be done by applying the Waste Hierarchy.

Research indicated that resource efficiency can save businesses considerable amounts of money. McKinsey reported in 2011 that the potential global savings of between \$2.9 trillion and \$3.7 trillion could be achieved by 2030 through a range of resource-productivity measures, 40% of which would have investment returns of 10% or more per year.

The global population is rising, while resources are declining, so effective resources use is key to being able to sustain future generations. Products need to be designed with the environment in mind, for instance reducing the material intensity (less material per unit) and reducing the energy intensity (less energy per unit). However, these principles go against the capitalist business culture that we have created (the 'throw away culture'), e.g. mobile phones only being designed to last a couple of years. Changing the design process to minimise the use of raw materials and extending product lifespans to reduce waste is key to reducing the overall impact on the environment. The National Industrial Symbiosis Programme (NISP) has been proving that one company's waste is another's valuable resource since 2005. This concept is demonstrated by the anaerobic digestion industry where waste is converted into energy or fertiliser.

- Check – Here the organisation monitors, measures, analyses and evaluates its environmental performance through internal audits. This is also a check that compliance obligations are being met. Finally there is a management review to determine the areas requiring improvement.
- Act – The organisation acts to understand, control and correct non-conformances and prevent them occurring again. It reviews the effectiveness of corrective actions taken and changes the EMS if necessary. The effectiveness of the EMS is regularly audited to ensure the organisation's environmental performance continually improves.

Managing Risk and Opportunities

Managing risk and opportunities effectively by using a risk matrix enables an organisation to assign a value for the significance of its aspects and then rank them in order. This will allow an appropriate person in the organisation to manage these risk and opportunities. Risks and opportunities can be managed in a number of ways:

- Develop environmental objectives to reduce the negative impact or increase the positive impact
- Stop the negative impact occurring (ideal but often very difficult)
- Develop procedures to reduce the probability of the impact occurring and lessen its effects should it occur (contingency planning)
- Acknowledge that the impact will occur and produce procedures to deal with the effects.

Successful EMSs

An effective EMS will have seven key elements (based on ISO 14001) and includes:

- Context of the organisation
- Leadership
- Planning
- Support
- Operation
- Performance evaluation
- Improvement

The requirements of the EMS should be integrated into an organisation's main processes such as facilities management, human resources, procurement and sales and marketing. The EMS should also take account of the requirements of interested parties.

Examples of EMS

Organisations may decide to develop their own in-house EMS, which may bring many benefits. However, most interested parties, that is, those affected by the environmental performance of the organisation, such as customers, insurers and lenders, will want to see an EMS certified to a recognised EMS standard such as the ISO 14000 series of standards.

ISO 14001 is an international environmental management system specification standard with guidance, approved by the European standards body CEN in 1996

- Initial Environmental Examination – this is a low-cost environmental evaluation of the proposed development and may make use of information already available. The main advantage of this approach is that the information derived from the examination can be used in planning the EIA. It also provides a good source of information for later stages.
- Project Lists With or Without Thresholds – this is essentially a list of projects that require an EIA. The list can be sub-divided into different levels of EIA. This is the approach adopted in the UK, where two levels of EIA are undertaken; a complete EIA (Annex I projects) and a partial EIA (Annex II projects). Annex I projects require an EIA in every case, whilst Annex II projects require an EIA only if the particular project in question is judged likely to give rise to significant environmental impacts.
- Exclusion List – this approach is uncommon but is still used. In essence they are the reverse of a project list. They list all of the projects that don't require an EIA. This means that they are very long lists and it takes a long time to search them to determine if an EIA is required.

EIA Scoping

Scoping is the second stage of an EIA and defines the areas where the EIA should be conducted. This provides the basis for all of the later stages of the EIA. The plan for the whole of the EIA is developed at this stage. When an EIA is conducted, it should consider the impact of the development over the whole life cycle of the project. Environmental impacts can be addressed at the concept stage, in the design process, at the construction stage, when the project is operating and when the plant is decommissioned. At each of these parts all potential impacts should be identified, their significance assessed, appropriate control measures determined and amelioration mechanisms or alternative design options identified.

Scoping should identify as early in the EIA process as the: appropriate boundaries of an EIA study; important issues and concerns of interested parties including environmental, social and economic concerns; information necessary for decision-making; and significant effects and factors to be considered.

The scope of the EIA should be recorded in the plan for the EIA and this should be communicated to all parties concerned. All interested parties and stakeholders should play a role in scoping the EIA.

Baseline Studies

Baseline studies are the main part of the EIA. In order to maximise their effectiveness, they should provide adequate information early in the decision making process. Areas that the baseline studies cover are defined by the scope of the EIA. The baseline study may focus on environmental, social and economic issues.

- Environmental Issues – include biodiversity, pollution, land use, noise and nuisance, animal behaviour, atmospheric pollution, human health, loss of habitat and the presence of legally protected habitats and species.

- Establish an inventory of all instances where fuel is combusted by vehicles owned or operated by the organisation (reporting entity) (scope 1).
- Establish an inventory of all production/manufacturing processes which result in the release of GHG emissions (scope 1).
- Establish an inventory of all fugitive emissions (scope 1), e.g. leaks from air conditioning and refrigeration units.
- Obtain purchase records for all GHG sources and compare them with the data collected above to identify any missing GHG sources.
- Establish an inventory detailing the consumption of purchased electricity at all sites owned or operated by the organisation (scope 2).
- Construct a lifecycle model for all products manufactured by the organisation to identify scope 3 carbon sources related to the manufacture.
- Obtain purchase records for all materials related to products you manufacture and perform a check against the scope 3 GHG sources identified in the product lifecycle model.
- Obtain purchase records for all products not related to the Manufacture of products to identify further scope 3 GHG sources.
- Establish a waste inventory for products not related to manufacturing and compare this with the scope 3 GHG sources identified from the above purchase records.

Carbon Conversions

Once you have collected all the baseline data, it is possible to convert the values to CO₂ equivalents using values obtained from a recognised source, such as the Department of Energy and Climate Change (DECC). There are carbon calculators which will do this for you, some such as the one produced by Loreous also analyses stores and presents data graphically.

Environmental Reporting

Shareholders and potential investors are becoming anxious about the effects that climate change will have on the profitability of businesses. The Carbon Disclosure Project (CDP) is a project working with the Climate Disclosure Standards Board to agree and promote a generally accepted international framework for carbon reporting by corporations. The CDP already obtains information from corporations about their greenhouse gas emissions for the world's largest coalition of investors. It publishes these data on their website.

Organisations should begin a carbon reduction programme and report on their progress, particularly if they wish to attract future inward investment. In the future, an organisation's carbon report may become as important as its financial statement.

Increasingly, organisations are also being assessed on their ability to achieve sustainable development. Various indexes exist to distinguish between sustainable organisations:

- The FTSE4Good Index Series – this is designed to measure the performance of companies that meet globally recognised corporate responsibility standards, and to facilitate investment in those companies.
- The Dow Jones Sustainability Indexes – these indexes track the financial performance of the leading sustainability-driven companies worldwide. These indices help managers of ethical funds to select appropriate companies and there are clear benefits for the company in being included in these indexes.
- Business in the Community – This UK-based, voluntary scheme reports on the environmental performance of organisations. There may be business benefits in joining these benchmarking schemes.

Advantages of Carbon Footprints

- Encourages us to understand that the environment has limits.
- It can be used to model different scenarios
- Can help to identify unsustainable trends.

Disadvantages of Carbon Footprints

- Only a quantitate measure, it gives a snap shot and is limited to the data put into it and therefore can be weak if there are inaccuracies.
- Doesn't account for any economic, political or cultural factors such as well-being.

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existing organisational structure and how the new programme will sit within this.

3. The pathway – map the path towards sustainability, this includes the vision, values and policy.
4. The evaluators – gauge the organisations progress towards sustainability. Through targets and objectives. This enables an organisation to make appropriate adjustments when performance is not improving at the pace wanted. Indicators and goals show if an organisation is on track and making expected progress. This also includes stakeholder engagement and feedback.

It is crucial during the programme planning phase that the organisation consults with all the relevant people to ensure the plan is realistic and comprehensive. For example Bristol City Council has established a partnership with Bristol Water in order to collaborate on environmental programmes and share best practice.

8.3 Describe how to implement a programme to improve environmental performance

It is recommended to apply William Blackburn's Sustainability Operating System principles when implementing a programme to improve environmental performance. This process involves:

- Decide on a champion and convince management to internalise sustainable development and create an environmental policy.
- Draw up an accountability mechanism, this is important as it shows the programme has teeth. The mechanism should dole out rewards or withhold rewards based on progress.
- Encourage the champion and their team to assess the environmental aspects of the organisation and rank the significance of these aspects.
- Create a team who can communicate the sustainability message throughout the organisation and can collect and compile feedback (stakeholder engagement) and ensure appropriate action is being taken first for the most significant impact and then continue implementing procedures to reduce other impacts.
- Create a pathway by setting objectives and goals, and operational standards to ensure there is a cyclical management process that serves as an engine for change.
- Constantly evaluate by setting indicators and goals which will show if you are on track or if there is a need to further improve. Measure and report on progress, by utilising stakeholder feedback.

8.4 Describe the methods to monitor a programme to improve environmental performance

9.0 Communication With Stakeholders

9.1 Identify internal and external stakeholders

There are many internal and external groups that have a stake in the environmental performance of an organisation.

Internal Stakeholders:

- Employees - most employees want to work for a company that is sustainable and has a good corporate image. Therefore, an organisation with a good reputation will find it easier to recruit and retain staff.
- Board Members
- Volunteers

External Stakeholders:

- Suppliers – suppliers want the reassurance that their clients operate a sound financial and sustainable business.
- Clients – an organisation's environmental credentials are becoming increasingly important in the award of contracts. An organisation doesn't want to be associated with, or procure from, a company that damages the environment.
- Shareholders – before shareholders will invest in a company they need reassurance that it is well managed. Effective management of a company's environmental performance is one sign of good corporate governance. Indeed there are indices that rank companies according to their environmental performance such as the FTSE4Good Index.
- Regulators such as the Environmental Agency seek to monitor and improve the environmental performance of organisations.
- The Local Community – organisations should be aware of the impacts of their activities on the local community and strive to minimise these impacts. Impacts may be in the form of pollution from chimneys, dust and particles from the site or the movement of vehicles causing noise and disturbance.

According to Professor Brian Clark, stakeholders can have three categories – the proponent, the decision maker and third parties.

Organisations can develop stakeholder matrixes, in order to determine who are the most important stakeholders and how sensitive these groups are to a particular environmental aspect.

9.2 Describe the environmental information needs of stakeholders

It is important to communicate effectively with all stakeholders and provide them with appropriate information. For example, a regulator, such as the Environmental Agency, may require information regarding an organisation's

Agency and the United Nations Environmental Programme. However, in many cases the provision of information in itself is an insufficient catalyst for change, especially if there are cost implications.

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