SUSTAINABILITY GUIDE

FOR ZOOS AND AQUARIUMS

BIAZA Environmental Sustainability and Climate Change Working Group

June 2013 (1st Edition, Draft v3)

CONTENTS

About the BIAZA Environmental Sustainability and Climate Change Working Group

Climate change and the misuse of natural resources threaten both wildlife and humanity. Zoos and aquariums have an exceptional opportunity to both lead by example and engage the public in a vital and timely dialogue.

Acting sustainably means meeting society's needs without compromising the future. Zoos and aquariums have a special responsibility to act sustainably, as they care for live animals and run breeding programmes for endangered species. Not only do BIAZA zoos and aquariums educate schoolchildren and the public about animal conservation, they are also well placed to engage visitors and the wider community on the broader challenges of achieving a more sustainable society.

Established in August 2011, BIAZA's Environmental Sustainability and Climate Change Working Group aims to support zoos and aquariums in helping to meet both local and global sustainability challenges.

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Legal Disclaimer

The contents of this guide are offered as general guidance, not as authoritative legal advice. If in any doubt, individual zoos and aquariums should seek independent legal advice on the issues raised in this guide.

INTRODUCTION

The *BIAZA Sustainability Guide for Zoos and Aquariums* is intended as initial guidance to help collections wishing to address sustainability challenges in both their day-to-day work and strategic development plans.

It is intended that the Guide will be updated periodically to reflect on-going ES&CC Working Group activities. Feedback and suggestions are warmly welcomed from both BIAZA members and external individuals and institutions.

The Guide is available electronically on the ES&CC section of the BIAZA website.

Chapter 1 CONNECTING THE DOTS BETWEEN ZOOS, AQUARIUMS AND THE GLOBAL SUSTAINABILITY DIALOGUE

By Karl Hansen, Living Rainforest / Trust for Sustainable Living

1 The intensifying global sustainability challenge

A global dialogue on sustainability has intensified over the last half-century, spurred by growing scientific consensus on the scale of humanity's impact on ecosystems and environmental change.

Seminal publications such as Rachel Carson's *Silent Spring* (1962) and the Club of Rome's *Limits to Growth* (1972) were hotly contested initially, not least because they challenged existing paradigms and power structures. Yet by the time the UN World Commission on Environment and Development (or Brundtland Commission) published its final report, *Our Common Future* (1987), it appeared that the global community was ready to accept the need for 'sustainable development' or, as the report put is so famously, "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". The debate then moved on from one of 'environment *or* development?' to one of 'environment and development, *how*?'

Major international summits helped to move the dialogue forward. The 1972 Stockholm Conference on the Human Environment produced the United Nations Environment Program (UNEP) and the 1992 Rio Earth Summit produced a trio of conventions – the Convention on Biological Diversity (CBD), the Framework Convention on Climate Change (UNFCCC) and the Convention to Combat Desertification (UNCCD), along with *Agenda 21* and the *Forest Principles*.

Yet despite the rise of sustainability on the global political agenda, the international community still struggled to address the mounting problems of unsustainable development at the much-anticipated follow-up 'Rio+20' Summit in June 2012. Governments appeared unwilling to assume lead responsibility for the future of the planet, and numerous high-profile heads of state were notably absent such as Barack Obama, Angela Merkel and David Cameron. Rich, poor and emerging economies blamed one another and appeared unable to agree on what should be done. Youth groups and non-governmental organisations (NGOs) decried the historic lack of global political leadership and the betrayal of future generations, while a few leading multinational companies declared an intention to demonstrate strong corporate leadership on sustainability.

BOX 1
Rio+20 and Beyond: 'Sustainable Development' is in Transition

- Measuring what matters (beyond Gross Domestic Product or GDP)
- Sustainable Development Goals (replacing Millennium Development Goals)
- Greening the economy
- Envisioning sustainable futures
- Empowering civil society and future generations
- Education for Sustainable Development (ESD)

2 Emerging scientific consensus on humanity's impact on the planet

"Living up to the Anthropocene means building a culture that grows with the Earth's biological wealth instead of depleting it." - Paul Crutzen

Nobel Laureate Paul Crutzen first suggested in 2000 that the present geological epoch be renamed the 'Anthropocene' to better reflect the wide-ranging impact of the human species on planet Earth. The Stratigraphy Commission of the Geological Society of London is now considering whether to formally adopt the new terminology as a modern successor to the Holocene epoch.

Scientific evidence of humanity's impact on the planet has been mounting for decades. Some recent notable milestones include:

a. the 'ecological footprint' or 'eco-footprint' (see Wackernagel and Rees, 1996) – a measure of human impact on the Earth, expressed as an area of land and sea ('global hectares' or gha) needed to satisfy our demands. In addition to becoming a popular metaphor, ecological footprint analysis offers an alternative accounting system for the Earth's biocapacity – both of how much exists and how much people use. The Global Footprint Network coordinates this on-going work, with the aim of advancing sustainability science.
b. the Millennium Ecosystem Assessment, released in 2005, which concluded that human activity is having a significant and escalating impact on global ecosystems and biodiversity, reducing both their biocapacity and resilience. The report refers to natural systems as humanity's 'life-support system', providing essential 'ecosystem services'. The assessment measured 24 ecosystem services and concluded that fifteen are in serious decline, five are stable but under threat in some parts of the world, and only four have shown an improvement over the last 50 years.
c. the Intergovernmental Panel on Climate Change (IPCC) assessment reports – most recently the Fourth Assessment Report (2007), which concluded that "warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level," and that "there is *very high confidence* that the net effect of human activities since 1750 has been one of warming". The IPCC's Fifth Assessment Report is expected to be published in 2014.
d. A safe operating space for humanity (Rockström et al., 2009), which proposed that identifying and quantifying 'planetary boundaries' that must not be transgressed could help to prevent human activities from causing unacceptable environmental change and disastrous consequences for humanity. Nine interlinked planetary boundaries or biophysical thresholds were proposed: climate change, ocean acidification, atmospheric ozone depletion, nitrogen cycle, phosphorus cycle, global freshwater use, changes to land use, biodiversity loss, atmospheric aerosol loading, and chemical pollution. At the time of publication in 2009, three of the nine planetary boundaries were already deemed to have been overstepped (biodiversity loss, nitrogen cycle and climate change).
e. UNEP's Global Environmental Outlook (GEO) reports - most recently, GEO-5 (2012), which concluded that the world remains on an unsustainable track despite over 500 internationally agreed goals and objectives and that "in far too many areas, environmental change is accelerating and pushing the planet

towards tipping points". GEO-5 assessed 90 key environmental goals and objectives and found that significant progress had only been made in four (ozone depletion, access to fresh water supplies, research to reduce marine pollution and lead removal from fuel).

Looking ahead, GEO-5 suggested that six key 'scenarios and transformations' are needed to help turn the situation around:

1. Transform human consumption (not only production)
2. Shift motivations and values
3. Accelerate the transition to sustainability
4. Forge a new social contract
5. Apply adaptive management and governance (i.e. learn by doing and adjust course accordingly), and
6. Develop clearer long-term targets and international accountability

3 A new role for zoos and aquariums? – Inspiring future generations to make a difference

While a strong scientific consensus has emerged on the destructive impact of humanity on biodiversity and Earth systems in the modern era, consensus remains weak at best on shared visions for a sustainable future.

BIAZA and its members have worked diligently to maintain and improve conservation, education and animal welfare standards, as mandated by the *UK Zoo Licensing Act* and *European Zoos Directive*. Now it is time for zoos, aquariums and other leading nature attractions to go further and address urgent global sustainability challenges head-on. Zoos and aquariums could play an important role in helping to forge a new societal consensus on the best ways forward.

BIAZA zoos and aquariums are particularly well placed to do this, given that they

- attract large numbers of visitors
- engage with a broad socio-economic cross-section of society, and
- represent the highest standards of zoo and aquarium practice, and
- inspire strong emotional connections with the public

In order to carry out this proposed 'social transformation' role effectively, zoos and aquariums need to adopt a new 'sustainability vision' which embraces their potential to act as agents of cultural change and as educators for sustainable development (see Box 2).

BOX 2

Towards a new Sustainability Vision for Zoos and Aquariums

- Agents of cultural change
- Educators for sustainable development
- Demonstrators of operational sustainability
- Practitioners of 'triple bottom line' (economic, social and environmental) reporting
- Leaders for conservation and sustainable living

Zoos and aquariums enjoy a unique place in our modern culture and it is the centrality of this position which gives them a potentially powerful platform to host a broad society-wide dialogue on how best to 'navigate' through the Anthropocene. By serving as trusted and inclusive facilitators, guided by principles of scientific objectivity and political neutrality, BIAZA institutions can perform an invaluable service to society at this critical time.

BOX 3

UN Decade of Education for Sustainable Development 2005-2014 (UNESCO, 2011)

- Education for Sustainable Development (ESD) is 'education for the future'
- Enables everyone everywhere to acquire the values, competencies, skills and knowledge that are necessary to shape sustainable development
- Essential to ensure a successful transition to green societies and economies
- Creates active and ecologically responsible citizens and consumers who are prepared to address the complex global and local challenges facing the world today, such as climate change
- Calls for a re-orientation of current formal and non-formal education at all levels

Zoos and aquariums also stand to become leaders in Education for Sustainable Development (ESD). Box 3 outlines UNESCO's vision for ESD as we approach the end of the UN Decade of Education for Sustainable Development (2005-2014). Education on sustainability issues needs to proceed both 'formally' with schools and 'informally' with the general public. Furthermore, as willing demonstrators of 'best practice' in operational areas such as energy, water, waste, procurement and transport and as practitioners of 'triple bottom line' reporting of end-of-year results, the credibility of BIAZA members as conservation leaders and champions of sustainable living also stands to be further enhanced.

BOX 4

Education, the foundation for green societies (UNESCO, 2011)

- "Education is our first motor"
- "ESD must foster the attitudes and behaviours necessary for a new culture of sustainability"
- "a vision for sustainable development that makes the most of the transformative power of education, the sciences, culture and media"
- "lifelong learning is essential"
- "culture is an accelerator"

As UNESCO argues, education and public engagement are the key building blocks of greener societies (see Box 4). And by working together, BIAZA members can play a major role in this transformation.

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OPERATIONAL SUSTAINABILITY: PRACTICAL GUIDANCE

The ES&CC Working Group began its work on operational sustainability by focussing on five key themes – energy, waste, water, procurement and travel. These are sometimes referred to as the BIAZA 'Big Five'.

Each theme is coordinated by a lead member of the ES&CC Working Group (see p.3) and the chapters in this section are intended to offer some initial practical guidance to help fellow BIAZA collections improve their environmental performance in these areas.

In addition to chapters on the 'Big Five', there are also chapters on Auditing and Monitoring (Chapter 7) and Environmental Management Systems (Chapter 8) to help BIAZA collections measure and track their environmental performance across the five areas.

Chapter 2 ENERGY MANAGEMENT

By Ray Morrison, Chester Zoo

The objective of this section is to focus the attention of the boardroom and all those with operational responsibilities for energy use within their organisations, on the global importance of the energy topic. Further it aims to outline the principles of effective energy management, to provide an overview of the key practical interventions and to signpost further detailed expert guidance.

Energy management may be defined as 'systematic use of management and technology to improve an organisation's energy performance'. Environmental Management Systems such as *ISO 14001:2004* and the energy specific standard *ISO 50001:2011* may be used to help set and formalise objectives and targets for energy performance. Accredited Management Systems won't fit for all organisations and a simple plan, do, check, act process may well prove equally effective for some.

1 Energy Conservation and Efficiency: the Triple Bottom Line Imperative

Energy use has become a matter of complex and strategic **social**, **economic** and **environmental** importance worldwide. Against this backdrop, businesses are challenged to deliver responsible and effective energy management. This is essential to sustainable business practice, in particular for BIAZA members given the evident triple bottom line (TBL) associations, such as meeting stakeholder expectations, controlling costs and reducing carbon emissions. (See also WAZA climate change statement in *References and Web Links*, below.)

Energy has also become the focus of increasingly onerous legislation. The Energy Act of 2008 sets out the UK government commitment to reduce carbon fuel emission levels by 80% by 2050, compared with the 1990 level, the interim target for the period 2013-2017 is –29%. The forthcoming revision of the CRC Energy Efficiency Scheme may well capture the larger Zoos and Aquariums in the criteria for carbon taxes and public reporting of energy performance.

Energy costs will continue to escalate, driven by increased demand for energy from the emerging economies, the phasing out of older UK coal power stations, a necessity for enormous investment in UK energy infrastructure and investor concerns regarding the next generation of nuclear plants. These factors will increase concerns on security of energy supply. Ofgem has warned UK energy capacity margin will fall from 14% to 4% by 2015.

Between 2005 and 2011 the average price of all fuels to industry increased by 88%, equivalent to a 61% increase in real terms i.e. discounting for general inflation. A 2012 survey of European CEOs by PwC reports 53% as listing energy costs as a top threat to business. Such sentiment must translate into action, making energy a **board room issue -** not just a plant room issue.

In summary, given the accelerating legal and ethical pressures and continued escalating energy costs, it is imperative that Zoos develop effective, forward thinking and sustainable management of energy. Increasingly, organizations proclaiming to be conservation centred will be expected to demonstrate environmental best practice by stakeholders, in particular where they advocate sustainable living practice to visitors.

2 Energy Management References

There are considerable excellent information resources available to help those developing energy management programmes, including the following publications: *The Energy Efficiency Strategy* from the Department of Energy and Climate Change (DECC); *A Comprehensive Guide to Controlling Energy Use* from the Carbon Trust (CT); and *Reducing Energy Consumption* from the Major Energy Users Council. The Carbon Trust also produces over forty detailed guides dedicated to energy management and low carbon technologies. The DECC and CT documents are free to download. References to individual Carbon Trust (CT) guides are made throughout this chapter. (For further information, see *References and Web Links* below.)

3 The Energy Hierarchy

The Energy Hierarchy sets out the principles for effective or 'smart' energy management. The hierarchy states we should pursue energy saving in the following order: Reduce the need for energy, use energy more efficiently, use renewable energy and ensure any continuing use of fossil fuel is clean and efficient.

Key to implementing the Energy Hierarchy is a strategy to develop **Smart Buildings,** the utilisation of **Smart Equipment** and the development of **Smart Operational Practices***;* these aspects are the building blocks of effective energy management. Chester Zoo's energy management plan characterises these factors as **Smart Places***,* **Products and People***.* There is no 'one size fits all' energy conservation and efficiency plan; however there are guiding principles which will benefit all organisations - large or small.

4 Energy Conservation

Energy conservation is defined as 'the reduction or elimination of unnecessary energy use or waste'. **Smart Buildings** and **Smart Operations** are significant factors in this regard.

4.1 Smart Buildings

The design and specification of building fabric and the buildings orientation are major factors in determining the inherent demand of energy of our buildings. We must strive to get this critical factor right at the development concept stage and maintain it throughout the design process. Retrospective measures to reduce energy demand are likely to be greatly limited by cost and practicality. Key to an energy smart building are superior levels of insulation, reducing unwanted air leakage and maximising passive systems for heating, lighting and ventilation. In the Zoo environment this can include providing draft lobbies to exhibits and plastic strip curtains to doorways in animal exhibits. Technology can also reduce demand such as using occupancy sensors where appropriate, to detect people or animals to avoid unnecessary heating or reduced temperature heating of unoccupied spaces. Adoption of a formal sustainable building design code, such as the BREEAM eco-building scheme can help set performance standards for energy and environmental performance. We should always establish a clear understanding of the likely energy demand of a new development at the earliest possible stage in the design process, while changes can still be made to reduce the inherent energy demand. In existing building a thermal imaging survey can identify building elements that are responsible for excessive heat loss and help prioritise investments. Simple

and inexpensive draft proofing and sealing of unplanned building opening can result in huge savings yet it is often the last action rather than the first or even forgotten.

4.2 Smart Operations

We must recognise that to effectively manage we have to measure; determining the where, when and what of energy consumption is essential, as is having agreed set points and parameters which are subject to monitoring and control. The first step in any energy saving programme is to carry out an energy audit to benchmark and develop an understanding of energy use (See CTG055). Unless we have actually collected and evaluated the data of actual use, one must be guarded against complacency in thinking we have a sound knowledge of our energy use. In many of our facilities, it's likely that the energy consumption associated with the heating of exhibits and staff facilities in the visitor off peak period, is significantly higher than that of meeting visitor related energy demands in the peak visitor period. In the energy management context, '*Smart Operations'* require smart people, from the person with primary responsibility to manage energy having sound understanding of the nature of energy use on site, to all of the individuals in the organisation who have a potential to use or save energy being aware of the importance of the energy issue, i.e. the TBL. Positively engaging staff in the development and implementation of an energy action plan is essential to its success. (See CTG056). The profiling of actual energy use and continued energy monitoring are key to successful energy saving and delivering best returns on investment.

Automatic Monitoring and Targeting (AMT) of energy use, utilising smart meters and energy management software is playing an increasingly important role in delivering energy savings and can typically deliver savings in the order of 5%–15 % (See CTG008). AMT allies smart technology to inform smart operational practice and provides the measure to manage tools. Chester Zoo have employed site wide AMT to target the next phase of its energy saving action plan. Whilst recognising the importance of technology, it is important not to lose focus on the very simple measures that require no technology and can be free wins. Security personnel, if present on site after normal business hours, could for example be utilised to undertake a periodic midnight 'lights left on' report, issuing the report to the management team.

5 Energy Efficiency

Energy Efficiency is defined as the ratio of the useful output from an appliance or system to the energy input. **Smart Equipment** delivers energy efficiency and this can be identified by energy performance rating and eco-labels. Such equipment enables energy saving control or consumes significantly less energy than other similar systems and products during its lifetime. Purchase decisions for heating, ventilation and air conditioning equipment (HVAC) and pumping and lighting are critical in this regard as they constitute the most significant part of our energy consumption. The purchase cost of an electric motor can be as little as 1% of its whole life cost, illustrating the importance of making informed choices when purchasing energy consuming goods. The Energy Technologies List (ETL) is a Carbon Trust managed scheme which identifies energy efficient products. The energy-saving criteria are set to ensure eligible products represent a significant improvement in energy performance over current standard products. We can consider utilising the ETL and other certified energy efficient products in a Sustainable Purchasing Policy; see also the *GreenSpec* web site and Chapter 5 on Procurement.

6 Further Energy Saving Interventions

Specification of Energy Efficient equipment and Optimised Control of a building's Mechanical and Electrical services offers possibly the greatest potential to deliver energy saving outside of reducing inherent energy demand. This is a complex topic, a guide available on the Carbon Trust web site 'HVAC saving energy without compromise' is highly useful in this regard. Optimised controls deliver true Demand Matching output for heating, ventilation and cooling into a building space, rather than the perceived or default demand which is much greater. At Chester Zoo, energy savings of 60% have been achieved at the Elephant Exhibit by employing demand matching principles on the HVAC system, utilising air quality monitoring and variable speed drives. Similar success has been achieved at the Jaguar and Penguin exhibits. (See *References and Web Links* below.)

De-stratification - Many Zoo buildings in particular have very high ceilings and are heated by warm-air systems with poor or no de-stratification provisions. The energy potential here can be substantial as the hottest air from heaters collects under the ceiling, at a much higher temperature than the optimum heating set point, wasting heat and greatly increasing heat loss through the roof covering. If the typical outside air temperature is 5°C during the heating season, reducing the temperature of the air directly under the roof from (say) 30°C to 20°C will reduce the temperature differential from 25°C to 15°C, reducing the heat loss in the same proportion (40%).

Energy Efficient Lighting also offers significant energy saving opportunities with favourable return on investment. (See CT163). Once again the starting point is an audit to determine saving potential and prioritise an action plan. Demand matched lighting controls utilising occupancy sensors, photo cells and timers allied with LED luminaries, high frequency controls and energy efficient lamps can typically deliver savings greater than 50%. Lighting technology has progressed significantly in the last few years and energy efficient lighting to suit most or all of the demands of the zoological and aquarium environment, is now available. London Zoo has undertaken an extensive programme of works to utilise energy efficient lighting which has shown excellent return on investment, such investment can typically be repaid within twelve months.

Cleaner Fuels - When using fossil fuels for heating, mains gas, where available, should be the default fuel as it has a significantly lower carbon footprint and is cleaner than LPG, oil and grid electricity and is significantly less expensive. (Natural gas 0.1836. LPG 0.2147. Gas oil 0.26744. Electricity 0.5246 Kg CO^2e per kWh respectively). Where not readily available, an evaluation of the TBL return on investment of bringing mains gas on site should be undertaken.

Renewable Energy (RE) - The first step in evaluating the RE potential is to undertake a Site feasibility study. Many energy partners, such as energy brokers and suppliers will arrange such on a no fee 'added value' basis to support their client relationships. The Carbon Trust has a guide for *Renewable Energy Sources* (CTV010); see also *Retrofitting Renewables* (CTG050). There are a number of WAZA members who have made a significant commitment to renewable energy sources. Toronto Zoo, Canada has made significant investments in solar hot water and ground source heat pumps. Most notable is Cincinnati Zoo, USA which in addition to ground source heat and wind power, has a photovoltaic (PV) array rated at 1.5 Megawatts, contributing around 22% of their electrical needs. Both Toronto and Cincinnati Zoo have excellent web sites showcasing their sustainable development achievements. In the UK, Bristol and Marwell Zoo have invested in more modest, but still sizeable PV systems. Many Local Authorities have a target for the inclusion of renewable energy in all significant new developments, typically 10% in line with the *Merton Rule* for new buildings. While this

may be a supplementary planning requirement, organisations wishing to deliver on best practice, should consider adopting it in their development plans. The UK government has committed to the EU target of having 15 per cent of our energy provided by renewable energy sources by 2020. In addition to the financial and environmental benefits which renewables can deliver, they also provide a highly palpable means of demonstrating an organisation is 'walking the talk' on environmental sustainability.

Combined Heat and Power (CHP) also referred to as 'cogeneration' is the simultaneous generation of usable heat and power within a single process (see CTV044). The power generated is usually electricity. CHP can, for suited applications, offer the most significant single opportunity to reduce fossil fuels consumption. CHP recovers waste heat from power generation and can typically deliver energy savings in the order of 20% and depending on the capacity of the system may also offer further financial incentives such as income from the *Feed in Tariff*.

Incentives & Funding - The Carbon Trust web site provides a good source of information on this topic, including details on the *Green Deal*, the *Renewable Heat Incentive* and the *Feed in Tariff* (see the Implementation and Finance page on the CT web site). Joint venture or partnership arrangements with private sector energy partners are also possible which may provide zero capital cost options or 'pay as you go' options in return for a commitment for future energy purchase.

References and Web Links

Department of Energy and Climate Change – Energy efficiency strategy - https://www.gov.uk/government/organisations/department-of-energy-climate-change/series/energy-efficiency-strategy

Carbon Trust Energy Management page - http://www.carbontrust.com/resources/guides/energy-efficiency/energy-management

WAZA climate change statement - http://www.waza.org/en/site/conservation/climate-change/position-statement

Major Energy Users Council - http://www.meuc.co.uk

Danfoss Chester Zoo project - http://www.danfoss.com/NR/rdonlyres/A58F05B8-1EAD-480C-BDC2-C600A7337130/0/ChesterZoo.pdf

Green Spec - http://www.greenspec.co.uk

Chapter 3 DEALING WITH WASTE SUSTAINABLY

By Claire Oldham, Twycross Zoo

1 Why Is Waste Important?

Waste that has been disposed of to landfill is the largest contributor to the UK's methane emissions, a greenhouse gas more than 20 times more powerful than carbon dioxide. In addition landfilled waste can often lead to pollution of aquatic systems and soils through leachate.

As well as the environmental aspects, waste can also be very costly for your organisation. Landfill tax currently stands at £64 per tonne (2012/13) and is set to rise to £80 per tonne in 2014/15. Dealing with your waste more sustainably can often lead to significant financial rewards.

2 Your Responsibilities

2.1 Legislation

Waste disposal in the UK is controlled by European Waste Directive, which is implemented in England and Wales through the Waste (England and Wales) Regulations 2011. There are slightly different variations in waste legislations for Northern Ireland and Scotland. It is your responsibility to make sure that you comply with legislation and you have a legal 'Duty of Care' when dealing with your waste.

- England and Wales: http://www.environment-agency.gov.uk/business/topics/waste/121280.aspx
- Scotland: http://www.sepa.org.uk/waste.aspx
- Northern Ireland: http://www.doeni.gov.uk/niea/waste-home.htm

2.2 Duty of Care

You have a legal responsibility to ensure your waste is dealt with correctly. Duty of Care states that *'everyone who produces, imports, keeps, stores, transports, treats or disposes of waste must take all reasonable steps to ensure that waste is managed properly.*' When you are dealing with your own waste you MUST:

- Ensure that the person who takes control of your waste has the correct permit or exemption to do so
    - There are online registers to help you do this (England and Wales, Scotland, Northern Ireland)
    - If they can't show you their permit, don't let them take your waste
- You must take steps to prevent it from escaping from your control
- Store it safely and securely
    - Ensure it is in a suitable container, if it is hazardous waste, this may need to be a locked bin
- Prevent it from causing environmental pollution or harming anyone

- Make sure that run off cannot reach aquatic systems, fumes are not harmful, etc.

- Describe the waste in writing and prepare a transfer note if you intend to pass the waste on to someone else
    - Make sure your waste is labelled, even when storing on site and that a waste transfer note is prepared when you pass it to the carrier

Failure to take these actions can lead to prosecution, fines and damage to your reputation.

2.3 Transfer of Waste

To be able to carry waste from one location to another you may need to be a registered waste carrier. This might apply if you collect someone else's waste for use on your site or you take your waste off site for disposal at another location.

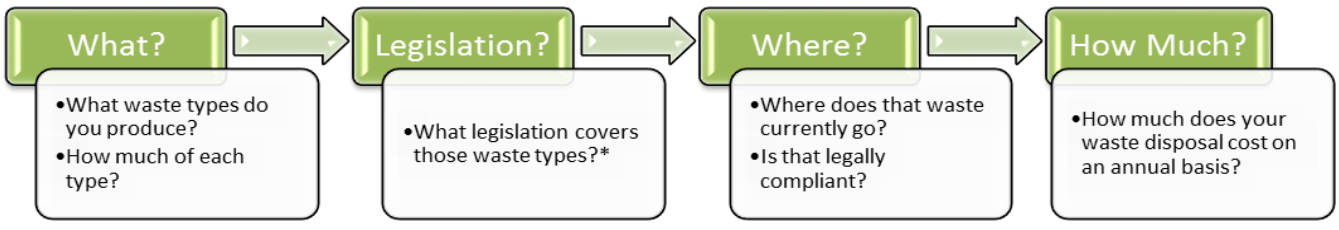
3 Zoo and Aquarium Waste Streams

Zoos and aquariums have a diverse catalogue of wastes and it is important that you look into the legislation that covers each of these. There are several guides online that give advice on disposal of specific waste types. Make sure that you check the date of the advice to ensure that it is still relevant. Two of the most comprehensive sources of information are the Environment Agency's Waste Types page and Waste Guide.

4 Dealing with Your Waste Sustainably

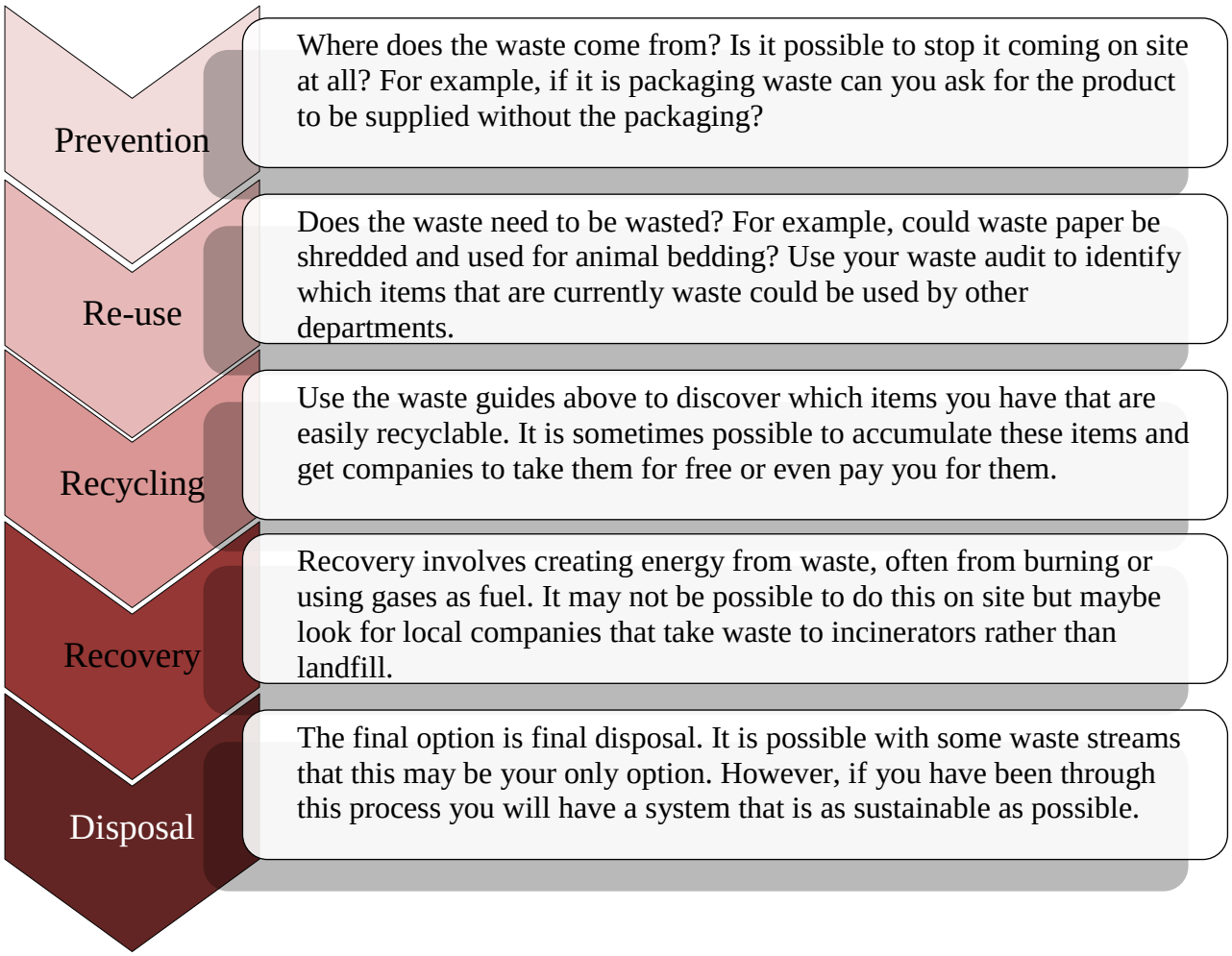
Landfill should be the last option when you dispose of your waste. The guides above can give you the best advice on waste management strategies for each of your waste streams.

The first step towards a sustainable waste plan is to audit what you currently produce and get a complete picture of everywhere it goes and how much it costs you.



*be aware that some legislation has level thresholds so check quantity against legislation also!

Once you have a complete picture then you can use the sustainable waste hierarchy to divert from landfill.



5 What Help is Out There?

Waste legislation can be daunting and in many cases it is complex. The Environment Agency, the Scottish Environment Agency and the Northern Ireland Environment Agency are always happy to answer queries and will give you the best advice. There are a number of other organisations that are good to contact if you are in need of advice. Some of the most useful can be found in the directory below.

Organisation	Advice On:	Contact Details
Association for Organics Recycling	Composting and dealing with animal waste	020 7925 3570
GOV.UK	Waste advice for businesses	n/a
National Industrial Symbiosis Programme	Matches waste producers up with waste users	0845 094 9501
NetRegs	Environmental regulation advice for Northern Ireland and Scotland	NI: netregs@doeni.gov.uk Scotland: 01786 457700
Scottish Environmental Protection Agency	Waste legislation and disposal in Scotland	Various numbers for local offices: see website
The Environment Agency	Waste legislation and disposal in England and Wales	03708 506 506

The Northern Ireland Environment Agency	Waste legislation and disposal in Northern Ireland	Various depending on waste type: see website
Waste Information Network	Advice on various subjects	win@southeastiep.gov.uk
Waste and Resources Action Programme	How, where and what can be recycled	0808 100 2040

6 Sources of Information

Authority of the House of Lords, 2008, Science and Technology Committee Waste Reduction Report: Volume I

European Commission Directorate-General Environment, 2012, , Guidance on EU Waste Directive

Environmental Protection, England and Wales, The Waste (England and Wales) Regulations 2011)

Environmental Protection Act 1990, Waste Management A Duty Of Care Code Of Practice

The Environment Council, The Waste Guide Online

Chapter 4 MANAGING WATER SUSTAINABLY

By Aylin McNamara

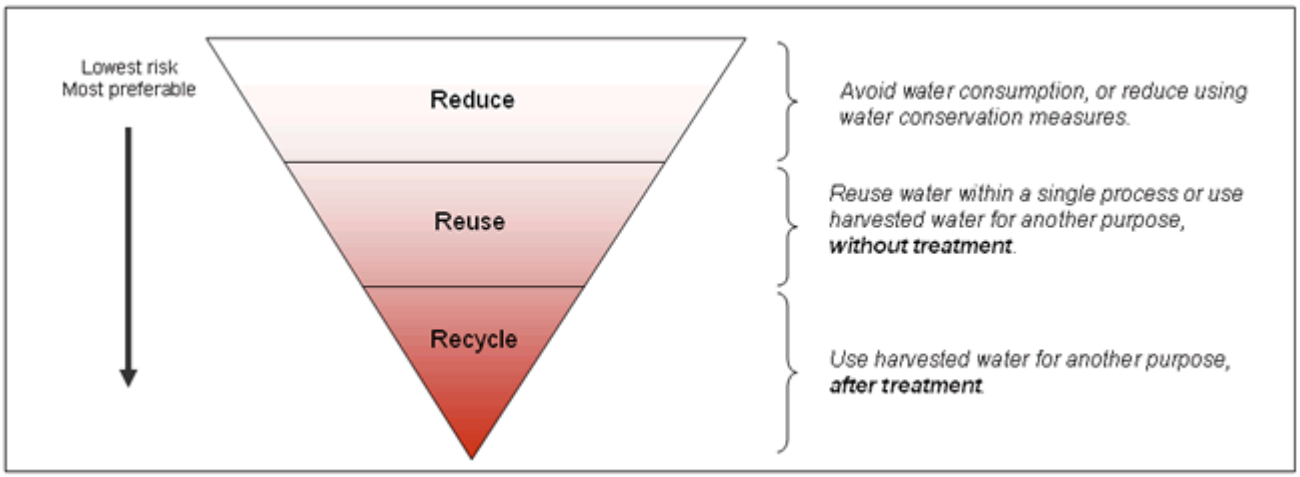
Managing water sustainably

1 Water wise, water aware

The world's water consumption rate is doubling every 20 years, outpacing by two times the rate of population growth (world water organisation, 2011). By 2030 it is predicted that water demand in many countries will exceed supply by 40% due to the combined threat of climate change and population growth (2030 water resources group, 2009). Rapildy increasing water efficiency is needed to avoid problems of water shortages in the future. The use of water along the supply chain means that buisinesses are not only consuming water directly but also indirectly through products bought. The issue of water sustainability will have to be moved up the buisiness agenda if it is to be tackled effectively with clear targets set for reductions, alongside those for carbon and energy. Reducing our water footprint will be a key challenge over the next 10-20 years. Within Zoos and Aquaria taking action now will both provide substantial financial savings and in many cases also support adaptation to climate change.

This chapter will focus on practicle ways that zoos and aquaria can reduce their direct water consumption and manage water onsite. It will not focus on indirect water used through the supply chain although this does form a large part of an organisations overall water footprint, however it is recommended that this is taken into consideration where possible through sustainable procurement strategies. Examples of water management in Australian zoos will be provided alongside those in the UK.

Water conservation hierarchy



Source: http://www.epa.vic.gov.au/your-environment/water/reusing-and-recycling-water

2 Legal requirements and incentives

Carbon Trust Water Standard

In 2013 the Carbon Trust launched the world's first international standard on water reduction. The water standard will require firms to measure water use and demonstrate efforts taken to reduce consumption in order to achieve the standard. This is in response to an estimated 60% of

Europe's largest citied consuming water faster then it can be replenished. According to the Carbon Trust businesses around the world are not acting fast enough, despite the fact that global water use is predicted to far exceed supply by 2030. For more information visit: www.carbontrust.com/waterstandard

Environment Agency requirements
The EA has a number of requirements for waste water and discharges to ensure pollution is prevented. For example, dirty water or run off from vehicle washing and cleaning activities is categorized as trade effluent and as such arrangements must be made to dispose of effluent to prevent pollution (see EA PPG13 guidance). It is illegal to discharge trade effluent to the environment or drains without permission. This includes discharge of waste water (effluent and cleaning products) from exhibits to surface water or ground. Please contact the EA for further information or visit:
http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx.

HMRC Enhanced Capital Allowance
ECA (enhanced capital allowance) water scheme, managed by Defra and HMRC encourages businesses to invest in technologies that save water and improve water quality.. It provides the opportunity to claim 100% of the cost of qualifying water efficient technologies against taxable profits. Qualifying technologies include water efficient taps, toilets and monitoring equipment. A full list of qualifying equipment and further information can be found here: http://www.hmrc.gov.uk/capital-allowances/fya/water.htm

Water Supply (Water Fittings) Regulations
The Water Supply (Water Fittings) Regulations 1999 provides national requirements for the design, installation and maintenance of plumbing systems, water fittings and water using appliances. Their purpose is to prevent wastage and contamination of water and incorrect monitoring. Exact text can be found here: http://www.legislation.gov.uk/uksi/1999/1148/contents/made. The Regulations set minimum standards for the water consumption of WCs, urinals, washing machines, dishwashers and washer driers. They also contain requirements to ensure the durability and leak tightness of water fittings and guidance on minimising the length of pipe runs to reduce the run-off necessary to get hot or cold water at the tap. For example the regulations have reduced the maximum flush volume of new WCs to 6 liters and supports more efficient dual flush systems (http://archive.defra.gov.uk/environment/quality/water/industry/wsregs99/documents/waterregs99-wcspec.pdf). It also mandatory to install occupancy activated urinal flushing controls under the regulation.
Details of all other regulations relating to water in the UK can be found here including The Water Supply Regulation 2010 with guidance in preparation: http://dwi.defra.gov.uk/stakeholders/legislation)

3 Reducing water consumption

Fixing leaks
Fixing leaks can be an incredibly effective way to reduce water consumption especially on older sites. For example, due to the implementation of a water reduction programme which in its first year focused on fixing leaks and problem pipes around the site, ZSL Whipsnade Zoo reduced water consumption by 25% in just one year. This required simply fitting extra meters and monitoring the difference between day and night consumption in different zones of the site to help identify where there was excessive usage in non peak hours and thereby helping to identify where leakages were occurring. To ensure ongoing ability to track and respond to leaks effectively extra water monitors will be regularly reviewed to help identify if any unaccounted for spikes in water use are occurring.

Water use in exhibits
Exhibits that use large amounts of water benefit from both the instillation of a water monitor and the development of an effective filtration system that reduces the need for replacing the water. Thought must also be given to the substrate next to water features, especially in external exhibits where runoff may cause an increase of substrate in the pond which will in turn increasing the need to replace water. Two features at ZSL London Zoo are useful in highlighting this case. Penguin Beach built in 2011 is currently one of the largest penguin pools in the England holding around 460 kilolitres. The water is kept clean by a specially designed water filtration system. Pebbles and stones are used as substrate around the pool to reduce unnecessary contamination. Animal management practices also play a part in reducing the amount of water used by this exhibit. Having a monitor fitted showed that in the early months of this exhibits life (not including filling) a large amount of water was still being used every month. By altering the animal management team's regimes and practices this was reduced by over a half. In the Tiger Territory exhibit newly opened in 2013, planting around the pool was carefully selected to reduce runoff into the water and the filtration system was designed to limit the need to replace the water, hopefully to less then once every 2 years.

Waste water from reverse osmosis
Reverse osmosis is widely used by aquariums to ensure the water quality is of a high enough standard. Ordinary tap water quality and chemistry varies hugely from region to region, but often can contain nitrates, phosphates and silicates any other chemicals harmful to sensitive organisms in an aquarium environment. Unfortunately in the process of making RO water can be hugely wasteful. Typically 2-4 litres of waste water is produced every 1 litre of pure RO water. Performance of any RO unit depends on several factors, notably temperature and pressure of the mains water (with 65 PSI and 21°C often being the optimal). Permeate pumps, pressurised tanks and refiltering the water through a secondary membrane can help reduce the waste water produced. It is recommended to review the amount of waste water from any RO units and look to reduce this. If further reduction is not possible then you can look to recycle and re-use RO waste water rather then sending this usable water down the drain. Also a useful way of avoiding having to use RO water in the first place is by collecting and using rainwater, which has far fewer contaminates then tapwater. Rainwater is being harvested in ZSL London Zoo aquarium in 150,000 litre underground reservoirs for use in the freshwater tanks above.

Toilets and Urinals
Old style single flush toilets use around 11 litres of water per flush, older dual flush toilets use 4.5 or 9 litres per flush, while modern water efficient dual flush toilets use 3 or 6 litres per flush. If every visitor goes to the toilet just once this could add up to a lot of water being wasted. Replacing old toilets with water efficient versions is the best solution and in the meantime quick water saving measures can be made by simply modifying current toilets (incorporating a 'hippo' or recalibrating the cistern). Uncontrolled urinal flushing can also easily account for a much larger proportion of water then you might expect. UK Water regulations apply but flow rates are often much higher in organisations. Fitting flush controllers (which can save 70% of water used) or waterless urinals provide a practical solution.

Taps and hoses
Fit water minimising controls where possible, eg. self closing taps either non-concussive or sensor controlled, flow regulators/restrictors and spray nozzles on hoses.

Sustainable horticulture
Planting within exhibits and around the zoo can also be a source of water consumption, however this can easily be reduced by choosing species strategically that are less water intensive and planting at the correct times of the year. Limiting the need for irrigation of plants is important however if it is absolutely essential it is best done at the end of the day to limit evaporation.

Staff engagement
Engage staff with water saving as part of your water reduction programme. Staff are an invaluable resource for effective reporting of leaks, ensuring taps are turned off and they can also help identify where further savings can be made within different departments and areas of work.

4 Increasing recycling and harvesting of water

Re-using water
Greywater, which uncontaminated with harmful chemicals or biological agents, can be used around the site for landscape irrigation and constructed wetlands amoungst other things. Waste water from RO processes is probably one of the cleanest forms of greywater and can be re-used in a range of way such as for toilets, hand basins, showers, dishwashers, washing machines, cleaning animal areas or filling moats.

Water can be stored and re-used through different exhibits by development of carefully designed water features (including moats and ponds) and reedbed systems. For example, at ZSL Whipsnade Zoo water runs through a number of different exhibits and its re-use is made viable by reedbed systems, which naturally filter and purify the water before it enters the next exhibit. Reedbeds also provide a functional way that zoos can treat waste water from exhibits in areas without a foul drainage system, allowing the water to cleaned and then drained through soakaways, to ground or natural waterways.

Water treatment plants
Apart from Reedbed systems water treatment plants provide a way for water to be cleaned onsite. There are a number of different types of water treatment plants. But the ones common to the UK use natural filtration principles, using microbes to clean the water as it runs through sediment layers. This effectively turns contaminated water into water that can be either re-used around site or provides a way of dealing with waste water on a site without foul sewage systems. At ZSL Whipsnade a small water treatment plant is also used to process water coming from a number of animal exhibits. For this to be most effective the microbes must be kept wet at all times and the water flow relatively constant. For an example of highly efficient water use, Melbourne Zoo has its own water treatment plant which produces Class A classified water, cleaner than tap water. Water collection covers 85% of the zoo grounds. Rainwater run-off and animal wash-downs to storm water are collected into the water treatment plant, through 4.5 kilometres of reticulation pipes. The plant has the capacity to store 780 kilolitres of untreated water and 620 kilolitres of treated water.

Harvesting rainwater
The average summer rainfall for England and Wales from 1971-2000 was 195.8mm. For every 10 mm of water falling on a 1 sq m flat area 10 litres of water can be collected, meaning that in an average summer you could harvest on average 195.8 litres per square metre. Within urban areas rainwater harvesting also saves water from running off quickly from buildings and hard surfaces and into the drainage system. This can be very useful to reduce the risk of flooding. Many buildings can be fitted with rainwater harvesting capabilities and if plumbed into toilet systems etc. can supplement potable water. In Healesville Sanctuary's Australian Wildlife Health Centre, rainwater is harvested and filtered in a three-stage filter. As a result, the centre does not require additional mains water.

Local natural sources
The use of local natural sources is only advised if there are no knock on impacts on the environment downstream or in other parts of the water catchment area. Underground aquafers can be reached with boreholes that can be used to abstract water. Water can also be abstracted

from springs and lakes, rivers, streams and canals using pumps. Pumps have now been developed that require no external source of energy but instead are powered more sustainably from the movement of water itself making them ideal for locations without power supply. For any abstraction of water of more the 20 cubic meters a day then an abstraction license will have to be gained from the Environment Agency. More informaito can be found here: http://cdn.environment-agency.gov.uk/geho1108boyr-e-e.pdf . Water companies are also licensed by the envirnment agency to abstract water, which monitors the process to make sure the effects are not damaging to the ecosystem. Abstracting water means that the carbon emissions asssociated with the supply and treatment of water are reduced, especially if borehole water is used at source as little treatment is required to make it fit for consumption. At Whipsnade zoo a borehole is used to collect water to suppliment mains supplies. In 2012-2013 this zoo was self sufficient in water from November – March (both reducing scope 3 greenhouse gas emissions and costs associated with water).

5 Reducing waste water issues

Reducing flood risk

Taking a more life cycle approach to your water strategy will have many benefits. Water comes into site not only through mains water supply but through rainwater and sometimes natural waterways. Water running off buildings and hard surfaces onsite go drainage systems and therefore contribute to waste water. The risks of flooding will likely increase with climate change and the more permeable your site the more this water can be absorbed rather then creating flood and waste water issues. Permeable paving and tarmac is available that can act as soakaways reducing the risk of flooding. Rainwater harvesting large surface areas will also help.

Limiting pollution

Limiting potential pollutant chemicals used onsite will reduce the need for treating waste water. Check with the EA for any discharge consents for drain to foul or ground that are needed.

Waste water removal

For sites that do not have foul drains water will need to removed for treatment. This can be costly and carbon intensive. Where possible it is better to develop a system whereby water can be treated onsite.

6 Reducing carbon emissions

Water falls under the category of Scope 3, indirect, carbon emissions for businesses. For each litre of clean water received around 350 KgCO2e is emitted to supply and treat this water. The UK water industry in 2007/8 were responsible for 0.8% of annual UK greenhouse gas emissions (5 million tonnes), with 56% of this from the treatment of wastewater, 39% from the treatment and supply of clean water and 5% from administration and transport (for more information see: http://www.environment-agency.gov.uk/static/documents/Research/%2816%29_Carbon_water_mitigation_FINAL.pdf)

Reducing mains water consumption will reduce your organisations scope 3 carbon emissions levels. Carbon emissions from water / wastewater can be calculated by multiplying the data for water use / wastewater production volume by the appropriate carbon conversion factor to give a total emissions figure reported as KG CO2e. Do not include water use volumes from rainwater recycling or borehole extraction in this calculation. The latest conversion factors can be gained from Defra / DECC guidance on their website; https://www.gov.uk/measuring-and-reporting-environmental-impacts-guidance-for-businesses. Below is the latest guidance using figures from 2010/2011:

2010/2011 carbon conversion figures	Volume		Conversion factor (Kg CO2e per unit)
Water used	Cubic meters	X	0.3441
Water treated	Cubic meters	X	0.7085

Bottled water has even higher levels of embodied CO2 so it is best to provide the public with a way of accessing water at source rather then depending on bottled water.

7 Monitoring and measuring

Metering

Metering is essential if you are going to identify where excessive water is being used and for identifying the savings made by activities undertaken. Depending on the size of your site it is recommended that several meters, preferably with automatic meter readers, be installed zoning different areas. Within these areas it is important to know what is using water and when. Regular recording of water meters will help to show how developments and changes in activities affect consumption.

Setting KPI's and targets

For an effective water management strategies, setting targets and developing measurable KPI's is an important step to track success. KPI's can be in the form of litres/m3 of water consumed, rainwater harvested and waste water sent off for treatment. For example ZSL London zoo has nearly halved its water consumption over the last 10 years through its water management strategy. Tin the same time the cost of water per unit for the organisation has nearly doubled. This has meant that the budget line for water at ZSL London Zoo has remained stable creating a meaningful business model for water sustainability. Setting KPI's to link with the rising cost of water provides a business case. When setting targets chose a time frame that best suits your organisation. Then either look at the predicted rises in costs over this time or a feasible rate of reduction and set targets against this. If you want to go further then set higher targets so you have ambitious and aspirational goals for your organisation to reach towards.

8 Useful resources

- Conserving water in buildings, a practical guide. EA, 2007: http://www.elementalsolutions.co.uk/wp-content/uploads/2012/08/conserving-water-in-buildings.pdf
- DEFRA Zoos Handbook, Chapter 3: sustainability initiatives in UK zoos, 2007: http://archive.defra.gov.uk/wildlife-pets/zoos/documents/zoo-handbook/3.pdf and specific zoo examples http://archive.defra.gov.uk/wildlife-pets/zoos/documents/zoo-handbook/3app.pdf in appendices
- The ripple effect: water efficiency for business – provides support http://www.wrap.org.uk/content/rippleffect-water-efficiency-businesses
- Defra: http://www.defra.gov.uk/environment/quality/water/conservation/non-domestic/
- Waterwise - Good for business, great for the environment, EA, 2006: http://cdn.environment-agency.gov.uk/geh00406bknl-e-e.pdfhttp://cdn.environment-agency.gov.uk/geh00406bknl-e-e.pdf
- Water for business guide:: http://www.wbcsd.org/waterforbusiness3.aspx
- Envirowise, a programme run by Defra and the Department for Business, Enterprise and Regulatory Reform: http://www.enviro-wise.co.uk/site/uk/content-folder/homepage
- Charting our water future:

http://www.2030waterresourcesgroup.com/water_full/Charting_Our_Water_Future_Final.pdf

- Water saving at Melbourne Zoo: http://www.zoo.org.au/about-us/vision-and-mission/environmental-sustainability/saving-water
- Calculating carbon emission from water (case study from the education sector): http://www.york.ac.uk/energyconservation/what_we_are_doing/scope%203%20emissions.pdf

Chapter 5 WHAT IS SUSTAINABLE PROCUREMENT?

By Peter Morgan, Paignton Zoo

1 Overview

Over the years there has been a growing realisation that the current model of development is unsustainable. In other words, we are living beyond our means. We are consuming too many resources, generating too much waste, and causing irreversible damage to the environment and the climate. The increasing burden we are placing on the planet cannot go on forever. WWF's Living Planet Report 2012 shows that we're putting huge pressure on wildlife - and threatening our own future well-being. The report, which measures the health of 9,014 populations of more than 2,600 species, reveals a 30% decline in the health of species since 1970. And it shows that we're consuming 50% more natural resources globally than our planet can sustainably produce. Since the last report's country-by-country analysis in 2010, the UK's position has worsened. We're now the 27th largest per capita consumer.

Procurement therefore has an important part to play in delivering a sustainable future. By thinking carefully about the goods, services, works and utilities we buy, how we buy them, and who we buy them from, purchasing decisions can contribute to the achievement of sustainable development goals such as wise use of natural resources, reduced energy consumption and carbon dioxide emissions through transportation, waste minimisation, fair and ethical trade, social progress, equality and economic stability. The ideas of sustainable procurement encompass ideas of carbon foot printing of products and food miles and ecological footprints which are used to measure the impact of a product on the environment.

2 So what is it?

Sustainable Procurement is a method of purchasing goods or services that allows a business to support organisations and businesses which are conducting their operations in an ethical and ecologically sensitive manner. Through choosing suppliers, organisations can integrate environmental and social criteria into decisions throughout the procurement lifecycle by looking at what products are made of, where they come from and who has made them. The primary objective is to reduce negative environmental and social impacts of procurement decisions, while maintaining or improving business value.

As an example, forests and woodlands around the world are being destroyed, not only to meet demand for timber and timber-based products, but also to clear the way for large-scale agriculture. Approximately 6-19% of the timber imported into the EU is from illegal or suspicious sources. Forests store large quantities of carbon and when destroyed they release this carbon into the atmosphere. Forests also play an important role in regulating global climate; continued destruction of forests around the world reduces their ability to perform this vital function.

By implementing a responsible timber purchasing policy, you can reduce your environmental footprint and make a significant contribution to protecting the world's forests and the local communities they support. Furthermore, it does not need to cost the earth. Procurement is critical in enabling businesses to become more sustainable, for regardless of what a company does within the confines of its own operations, any organisation is only as 'sustainable' as the products and services it supports.

3 What are the benefits?

Sustainable procurement is often thought of as an add-on or an approach that costs more when in actual fact it doesn't have to increase costs, and can help with cost savings. Numerous organisations have made savings through implementing sustainable procurement, for sustainable products or services can often cost less over the whole life of the purchase.

Some key benefits can be:

- value for money
- protection and enhancement of the environment
- more efficient use of resources
- greater social inclusion
- fair and ethical trade
- support for innovation
- better risk management
- lower whole-life costs
- improved supplier relationships
- a diverse and flexible supply chain
- a competitive edge in your industry

Good procurement practice requires that all of the costs associated with the procurement be taken into account – considering factors such as operational, maintenance and disposal costs as Figure 1 illustrates:

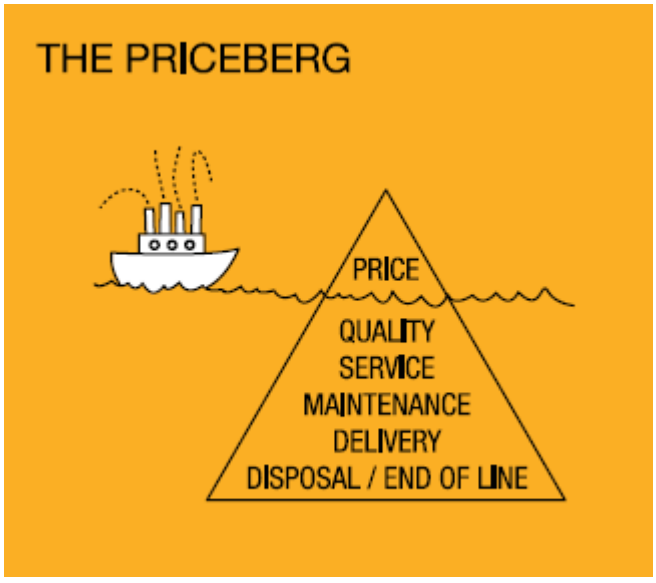


Figure 1

4 Key challenges

For members of BIAZA, however, the issue is not always as simple as just buying from the most ethical or environmental organisation for money saved through cheaper suppliers can often be spent achieving the organisation's objectives which in turn benefit the environment. With this in mind the following should be considered.

1 Estimating and comparing the life expectancy of a product

2 Evaluating the economic considerations: best value for money, price, quality, availability, functionality and whole life cost
3 Measuring the environmental aspects, i.e. the impacts on the environment that the product and/or service has over its whole life-cycle, from cradle to grave
4 Quantifying social aspects: effects of purchasing decisions on issues such as poverty eradication, international equity in the distribution of resources, labour conditions and human rights
5 Estimating the operational costs of different products
6 The environmental, ethical and other impacts of the construction / supply of the product or service
7 Time to investigate options
8 Obtaining support from relevant staff and a willingness to challenge current procurement practices
9 Lack of understanding from companies with no ethical stance or policy
10 Level of control over process –especially if area is outsourced or franchised (such as catering) – issues if partner organisation is profit-margin driven
11 Prioritising – which measures do we choose to implement?
12 Putting across the right message to visitors –practical advice on their own spending

Despite the impacts of procurement recent research has shown that

- 30% of people claim to care about companies' environmental & social records
- only 3% reflect this in the purchases they make

5 Practical considerations and first steps

Sustainable procurement policy

A sustainable procurement policy is a public statement of an organisation's commitment to environmentally and socially sustainable procurement. It is important for organisations to fully understand the significance of their sustainable procurement policy and to implement it effectively. It is also important that a sustainable procurement policy reflects the organisation's individual values and priorities. Generic policies that are developed merely as lip-service to the agenda will more than likely end up sitting on the shelf, with no ownership or impetus for action. It is important to remember that whilst good ethical choices can strengthen an organisation's image, choosing products with poor ethical or environmental impacts can negatively affect an organisation's image.

A good sustainable procurement policy should:

- Be specific and relevant to the procuring organisation
- Address the key environmental and social impacts of the goods and services being procured
- Include SMART (Specific-Measurable-Achievable-Realistic-Time) objectives and targets
- Assign responsibility for implementation to a senior member of the organisation
- Be effectively communicated to all staff members, suppliers, service deliverers, contractors and users
- Define parameters – where is resource from, how produced?, etc.
- Give priority to resources that can be produced or provided by local businesses

- Use suitable industry marques and accreditation schemes – e.g. Soil Association, Green Accord, Marine Stewardship Council, FSC certification and licensing – to identify preferred suppliers

Work with suppliers

After implementing a procurement policy, an organisation should ensure that it allows the suppliers of goods and services to be measured against the sustainability criteria agreed. This policy should also ensure that when contractors or suppliers are approached, they are aware that these will be taken into account before placing an order.

When issuing large orders, time should be allowed to negotiate terms and conditions in advance to ensure that purchasing includes environmental and social considerations. Small suppliers cannot always be expected to have certain standards or accreditations in place, but they can often be deemed sustainable in their own way. Likewise some preferred suppliers may not be very sustainable due to a lack of support or knowledge, in which case it is entirely appropriate to support and encourage them to adopt more sustainable practices.

Include 'sustainable' or 'green' contract clauses

Procurement decisions made solely on the basis of cost are effectively more inefficient than they are efficient. This is because many products can have hidden costs and so it is not enough simply to take the initial purchase price as the total cost.

Suppliers in principle should be able to adhere to the conditions and they should be covered in the price of the contract. 'Low carbon' clauses can be included to require suppliers to carry out certain obligations in relation to sustainability, for example:

- a requirement to take back packaging
- delivery / packaging of goods in bulk rather than by single unit
- delivery of goods in re-usable containers
- collection, take-back recycling or re-use of waste produced during or after use, or consumption of a product by the supplier
- transport and delivery of chemicals (like cleaning products) in concentrate and dilution at the place of use
- a mode of environmentally sound transport can also be specified in a contract clause if, in the specific circumstances of the contract, it does not lead to discrimination
- deliveries made outside of peak traffic times
- development of a sustainability improvement plan
- environmental performance indicators

It is important to monitor the agreed sustainability requirements throughout the lifetime of the contract, to ensure that these requirements are being met and to avoid the risk of them merely being seen as 'add-ons'.

Monitor and assess success

- Set targets which can be measured and assessed such as recycled material in construction projects or the amount of use of only MSC accredited seafood in outlets/canteens
- Apply relevant industry standards, such as BREEAM for construction projects

- Perform regular reviews to ensure effective and consistent implementation of a sustainable procurement policy, including management review and sign-off
- Initiate procedures to achieve steps toward improvements, and simplify the process

Be aware of potential barriers

Whilst many will be aware of the wider implications resulting from purchasing goods and services, in reality there can often be a priority given to 'profit' above 'ethics'. Each zoo and aquarium, whether charitable or profit-driven, has its own institutional and day-to-day priorities and it often comes down to individual managers, staff and directors to try to lead by example and address new procurement barriers as they arise.

6 Selected accreditations and standards

7 Further information

http://ic.fsc.org/
http://www.msc.org/get-certified/restaurants
http://www.green-accord.co.uk/
http://www.soilassociation.org/certification
http://ukprocurement.com/procurement-guide/sustainable-procurement/green-procurement.php
https://www.ungm.org/sustainableprocurement/default.aspx
http://www.wwf.org.uk/what_we_do/about_us/living_planet_report_2012/
http://hub.westmidlandsiep.gov.uk/uploads/files/whats%20current/enviro_sustain_procurement_final.pdf
http://www.rspo.org/backup/
http://www.sustainablepalmoil.org/
https://www.ungm.org/SpTraining/OnlineTraining/training.aspx

Chapter 6 SUSTAINABLE TRAVEL FOR STAFF AND VISITORS

A summary compiled following the experience of developing a Travel Plan

By Tim Wilson, Bristol Zoo Gardens

1 How to approach sustainable travel in a zoo or aquarium

For many zoos and aquaria, visitor travel may make up the largest part of their carbon footprint. Staff travel from commuting can also account for a large amount of carbon emissions. While the choice of how to travel ultimately lies with the visitor or staff member, zoos and aquaria can use a range of initiatives to encourage staff and visitors to travel more sustainably by writing a travel plan.

2 Travel Plans

Many local authorities will be able to provide a template for a travel plan for staff. This can be amended to also include visitor travel. A good starting point is to look at existing travel policies and audit your site looking at your travel facilities against the number of staff or visitors.

3 Monitoring

Monitoring is key to the success of your travel plan. Annual surveys must be provided to staff in the same month each year. Examples or templates for surveys may be obtained from your local authority. Visitor surveys should run in the same month each year, and ideally for a full week inside and outside of the school holidays. These surveys will be short, a typical visitor survey may include the questions below:

ALL:	Can you tell me the first part of your postcode? How many people are there in your party? Are you a member? How did you travel here today? How long did the journey take door to door?
VEHICLES ONLY:	How many vehicles did your group travel in? Where did you park?

The results of these surveys can then be compared year-on year to identify modal shifts.

4 Marketing

Communicating with staff and visitors is really important in trying to change their travel habits. On your website put links to public transport timetables and information about cycling and walking above parking information. Include sustainable transport information on newsletters and leaflets. On the intranet or a staff notice board, make sure that they have access to relevant bus and train timetables. Tell staff about travel initiatives through newsletters, emails, notice boards and the intranet. Get staff involved with travel, encourage interested cyclists to form a bicycle user group, where they meet quarterly and discuss facilities and initiatives that may make it easier to encourage more staff to cycle to work. Find out about local sustainable travel events, many cities or counties have a sustainable travel week or festival, get involved and publicise events to your staff.

5 Incentives for visitors

1. What is sustainable travel for visitors?

Sustainable travel is a loose term which can be defined in many ways. It is generally considered to be walking or cycling, using public transport, a park and ride or shuttle bus, and car sharing.

2. Car travel

It is important to define what you want to achieve in your travel plan, if you want as many visitors as possible to travel in a more sustainable way, or if you want to reduce the number of cars in total, in which case car sharing may not be included in your visitor travel plan. Parking availability, location and cost are often the major factors that may deter visitors from travelling by car.

3. Public transport

Investigate partner offers, such as two for one entry if you travel by train, to incentivise the use of public transport by visitors. Other incentives include offering a discounted entry or free drink for visitors with a valid public transport ticket. A shuttle bus to the local station, especially on busy days may encourage people to use the train. A park and ride scheme may also be an option on busy days.

4. Cycling and walking

Visitors are more likely to cycle if they know that there are appropriate facilities for cycle storage. Monitor the use of your cycle storage so that you can identify if more capacity is needed for busy times.

5. Motorcycles

Let your visitors know on your website if you have spaces available for motorcycle parking.

6 Incentives for staff

1. What is sustainable travel for staff?

Sustainable travel by staff is generally considered to be car sharing, using public transport, using a park and ride, cycling, walking or using a motorcycle under 125cc.

2. Car travel

Incentivising staff not to travel to work alone usually means restricting car parking at the workplace to only those members of staff who have a disability, need to use their car for work purposes during the day, or who car share. To encourage staff to car share and meet prospective car share partners, write a guaranteed ride home policy which will get the passenger home in an emergency. To help staff find a match, you can hold a car share coffee break a few times a year, and use staff newsletters and the intranet to

advertise websites which match car sharers in your area (often shown on your local council's sustainable transport page), and to highlight the benefits of car sharing, such as reduced petrol costs. Other incentives could be discounted car park passes, a free car wash twice a year for car sharers or a free breakfast twice a year for car sharers.

3. Public transport

To encourage staff to use public transport, talk to your local bus or train companies to see if you can arrange any discount when staff buy an annual pass. Many companies also buy the annual pass outright and take it from the salary of the staff member across the year.

4. Cycling and walking

To encourage staff to cycle or walk to work, your site must have facilities such as enough cycle storage (secure if possible). The cycle storage/parking site is absolutely critical to its success. It must be located as close as possible to the entrance or it will not be used. It must offer a real advantage over the location of the nearest car parking space. Showers, lockers and a place to dry wet clothing also encourage people to cycle or walk. Monitor the use of these facilities so that you know what is being used and if there is enough capacity.

Local councils and Sustrans have information on cycle facilities, and may also be able to tell you if you are eligible for grants to improve your facilities. You can also arrange a cycle mechanic to come in quarterly to service bikes (Dr Bike, available from many local councils), and have a full cycle repair toolkit available for staff members to borrow if they have a puncture or need to fix their bike before leaving work. You can also have visitor and staff cycle days, where staff who cycle may get a free breakfast and visitors who cycle on that day get half price entry. Events like these are designed to encourage people who are not normally cyclists to give it a go for a day, and see how easy it is. Councils may offer bike loan schemes to residents who want to try cycling.

5. Motorcycles

Ensure you have enough parking for motorcycles.

6 Business travel

Consider writing a business travel policy that prioritises sustainable travel. This will emphasise the importance of your travel plan to your employees. Measures may include:

- Encouraging the use of public transport. When comparing the costs of different modes bear in mind the benefits of using public transport, for example, being able to use the time productively.
- To encourage staff to use public transport, information and ticket booking procedures need to be accessible and straightforward.
- Ban all short haul flights where an equivalent journey by train of less than six hours is available.
- For local trips walking, cycling and local public transport should be encouraged where practical.
- Offering a cycle mileage rate to individuals using their own bike for business journeys. HM Revenue & Customs (HMRC) permit a tax-free allowance of up to 20 pence per mile.

- Consider purchasing a pool bike (perhaps an electric bike) if employees often make short journeys where they do not need a car.
- Car use may still be the only viable solution for some business trips. However, in addition to regular and frequent vehicle maintenance there are still options available to ensure the environmental and cost impact is managed appropriately. If you have many employees making similar journeys for business purposes, for example, travel to training venues or to other company locations, then car sharing is an ideal option to promote.
- If you use pool cars, select a fuel efficient and lower emissions vehicle and monitor vehicle usage too.
- Car clubs are an option. They tend to be newer, more carbon efficient models, and like pool cars, provide flexible access to vehicles but without the lease costs and therefore you can maximise your use to get the most out of your booking fee.
- Use videoconferencing or Skype instead of meeting face-to face where possible.

Chapter 7 Auditing & Monitoring

By Claire Oldham, Twycross Zoo

1 Why Audit?

Auditing your environmental performance will provide you with the benchmark against which you can measure your future performance. It will quantify a baseline so you will be able to see the effects of the improvements and changes you have made. Monitoring your progress against an audit will enable you to demonstrate and quantify financial and unit savings.

BOX 1 – BIAZA's 'Big Five' Areas of Environmental Performance (ES&CC Working Group)

1. Energy Use
2. Waste Production
3. Water Use
4. Staff & Visitor Travel
5. Procurement

Normally an audit can be done from the desk as data from the 'Big Five' (see Box 1) can usually be gained through analysis of paperwork. Ideally, twelve months' data is best practice for a full audit, especially in organisations that are so season dependent.

Environmental Impact	Source of Data
Energy Use (gas, electric, oil, petrol, etc.)	Bills Invoices Half Hourly Data from Supplier
Waste Production	Waste Transfer Notes Invoices
Water Use	Bills Invoices
Transport	Mileage Claims Travel Surveys
Procurement	Supplier Analysis Contracts

2 Your Responsibilities

There is no legal obligation for you to audit and monitor your environmental performance. However, DEFRA encourages businesses to monitor and report through their reporting structure. For more information on their comprehensive reporting structure see their document 'Guidance on how to measure and report your greenhouse gas emissions.'

3 How to Audit

The audit process is very similar for each of the environment impacts. A very simplistic process is outlined below.

4 Converting into Carbon

You may want to translate all the data you collect into a 'carbon footprint' for your organisation. This is a simple or as complicated as you would like to make it. DEFRA's reporting guidelines referenced above give conversion factors for a range of activities. Some of the most commonly used can be found below (as of April 2013). It is often practical to simply convert to CO_2; however, converting to CO_2e also takes into consideration other greenhouse gases like methane. Converting to CO_2e is considered best practice.

Environmental Impact	Units	Conversion to CO_2	Conversion to CO_2e
Electricity Use	kWh	0.49072	0.49390
Gas Use	kWh	0.18483	0.01914
Diesel Use	Litres	2.6569	0.5644
Petrol Use	Litres	2.3051	0.4638
Fuel Oil	Litres	2.5319	0.5271
Average Petrol Car	Miles	0.32361	0.20188
Average Diesel Car	Miles	0.29805	0.30098
Average Van (3.5 tonne max)	Miles	0.39487	0.39779

5 Monitoring Performance

Carrying out the audit using the process above will give you a benchmark to measure against. It is an important part of the process to monitor how your organisation is doing. Monitoring will give you an idea of which solutions work the best and which don't work at all. As you go through your action plan it will also enable you to see when you biggest users/producers change.

Monitoring is commonly done by setting key performance indicators (KPI's) for each of the big five. Most organisations measure on an annual basis but when you first start you may want to measure and compare more often. Some of the most common KPI's are detailed below. However, it is important that you pick ones that work well for your organisation and the data you are able to collect.

Environmental Impact	**Possible KPI's**
Electricity/Gas Use	kWh used per annum Annual kWh use per visitor
Liquid Fuel Use	Litres used per annum Litres used per mile Annual litres used per member of staff
Waste Production	Tonnes produced per annum Tonnes diverted from landfill per annum Tonnes sent to landfill per annum Annual production per visitor
Water Use	Litres used per annum Annual litres used per visitor Annual litres used per animal
Transport	Miles travelled per annum Annual miles travelled per visitor/staff
Procurement	%age procurement on fair trade/sustainable badges etc £ per annum on raw materials/recycled materials

Chapter 8 Environmental Management Systems

By Duncan East, Marwell Wildlife

Many companies now use an Environmental Management System (EMS) to manage their environmental impacts and ensure that their operations meet minimum legal requirements. Many organisations will already use a basic management system without ever thinking to give it the title of EMS. If you have any procedures in place to tell staff which bin to use for their waste, or a policy of turning lights out at the end of the day, then chances are you already have the basis of a simple EMS. The EMS can be an internal set of documents for staff use only or it can be externally verified and certified by a third party.

At its core an EMS consists of three things: An Environmental Policy; a set of procedures describing how the commitments in the policy will be met (operational procedures) and a further set of procedures saying how you will check that you are doing what you said you would (system procedures).

1 Environmental Policy

This is a public statement of your organisation's commitment to the environment. A good policy will include three key components.

- A commitment to comply with all applicable legislation and any other specific requirements that may apply to you or your industry. Other requirements could include commitments by BIAZA, EAZA or WAZA regarding climate change or specific requirements from your insurance company.
- A commitment to prevent pollution in all forms whether it's land, water or air, including global atmospheric pollutants like CO_2 and methane.
- A commitment to continually improve.

In addition your policy could include specific areas to improve that are important to your organisation and many policies now include a commitment to work with the supply chain to reduce 'upstream' impacts. Several BIAZA members have good policies published on their websites so look these up for ideas on what to include and how to relate it to your business.

Your policy should fit onto a single side of A4, be signed by your chief exec or equivalent and be dated to show it is still relevant. If your policy is running onto several pages chances are you are starting to include detail on how to achieve your objects which would be better placed in a procedure.

2 Operational Procedures

Operational procedures describe the processes in your organisation that could lead to environmental impacts. Any specific commitment made in the environmental policy should be covered by an operational procedure that describes how it will be achieved. Common areas covered by procedures are the same as those in the preceding chapters of this guide: Energy, Waste, Water, Purchasing and Transport. In some cases you may have other types of documentation that serve the same purpose as a procedure such as an action plan, travel plan or a carbon reduction strategy. How you write your procedures will be unique to your organisation. For example you may have one comprehensive waste procedure covering all the waste streams from your site or you may different procedures covering waste from animal

departments, waste from catering outlets and waste from the visiting public. The format will also be individual. You might use a list of instructions, a flowchart or photographs of bins. Pick a format that works for you and that staff can use. A procedure that is never used achieves nothing and can become a hindrance to real progress.

An EMS should cover all of your organisation's significant environmental impacts. For BIAZA members in particular some of these impacts will be positive through conservation programmes, breeding, education or public engagement. When forming your EMS make sure you include these positive aspects of your operations as increasing positive output is at least as important as reducing negative.

3 System procedures

These procedures define how the system as a whole is controlled. They could be audit plans and checklists, legal compliance procedure, monitoring and measurement, impacts identification and control and document control. If you already have Health & Safety procedures you may well already have some of these so don't make new ones, look at how the H&S ones can be adapted to cover health, safety and environmental management.

4 Certification

Environmental Management Systems are entirely voluntary and there is no requirement to have your system externally certified, however, external certification by a third party is a very effective way of ensuring you haven't missed any significant impact of your organisation and of gaining external recognition of your effort and achievements.

Several certification programmes exist for an organisation to choose from.

ISO14001 is probably the most prevalent and most recognised. This international certification standard is quite short and expressed in fairly simple terms. By breaking management down into sections covering all the areas necessary to achieve certification, producing a compliant management system is relatively straightforward. If an organisation addresses each section then they will end up with a comprehensive EMS capable of delivering real environmental improvement. Starting from scratch it should take around 12 – 18 months to achieve certification using ISO14001.

http://www.iso.org/iso/home/standards/management-standards/iso14000.htm

BS8555 is British certification standard that covers all the same ground as ISO14001 but breaks progress down into stages, each of which is individually certifiable. This gives the organisation confirmation that they are doing it right as they go and they can stop or pause at any stage knowing that they are gaining a measure of control without having to go all the way to a full ISO14001 certification scheme. An organisation completing all stages of BS8555 should have all the necessary procedures in place so they can then apply for ISO14001 certification if they wish to. The disadvantage of BS8555 is that it will generally take longer overall and will cost more as the organisation will need to pay for several certification visits along the way.

Green Dragon & Project Acorn - These two projects are based on the BS8555 methodology and gain the intermittent certification in the same way. Organisations joining these schemes get consultancy support to lead them through the process and are allowed to use the logo to promote their achievements.

http://www.wales.groundwork.org.uk/what-we-do/green-dragon-ems.aspx

http://ems.iema.net/acorn_scheme

EMAS is a European standard similar to ISO14001 but which includes a requirement for annual reporting of environmental improvements with the contents of the report verified by a third party. This is a fairly significant requirement and hence EMAS is generally only used by the largest organisations and public bodies, mainly in Europe. The next version of ISO14001, due in 2015, is expected to include a requirement for public reporting but it is not expected to be as onerous as the EMAS standard.

http://ec.europa.eu/environment/emas/

A very good guide to Environmental Management Systems is available from the Waste & Resources Action Programme (WRAP) at

http://www.wrap.org.uk/content/your-guide-environmental-management-systems-ems

FURTHER READING AND WEB LINKS

- BIAZA Sustainability Policy
- WAZA Recommended Approaches to Implementing a Sustainability Programme
- Possible schemes to join – e.g. Green Tourism, etc.
- Legislation and compliance
- Palm oil resources
- BIAZA Guidelines on Field Conservation
- WAZA docs: Climate change, etc.
- What is Climate Change Adaptation?
- ES&CC 'Knowledge Bank' on BIAZA website

What is Climate Change Adaptation?
By Claire Oldham, Twycross Zoo

The Earth's climate is changing, and these differences in global temperatures are already altering weather patterns, causing sea levels to rise and increased frequency and intensity of extreme weather. Even if emissions stop today, our past emissions mean changes to the climate will continue for the next 30-40 years.

Altering our behaviour to respond to these impacts of climate change is known as 'adaptation'. It means not only protecting against negative impacts, but also making us better able to take advantage of any benefits.

For the UK the Climate Projections Projects has predicted that:

- **Average UK summer temperature is likely to rise by 3-4°C by the 2080s.** In general, greater warming is expected in the southeast than the northwest of the UK, and there may be more warming in the summer and autumn than winter and spring.
- **Average summer rainfall across the UK may decrease by up to 27% by the 2080s.** While this is the average, there will be a big change in rainfall between the seasons, with winters becoming wetter and summers drier.
- **Sea levels are expected to rise.** The central estimate (taking into account land movement) highlight sea level is projected to rise by 36cm in London by the 2080s.
- **Extreme weather events are likely to become more common.** For example, research published by the Met Office Hadley Centre suggests the 2003 heatwave could become a normal event by the 2040s; by the 2060s, such a summer would be considered cool according to some models.

What can we do?

There are steps that all organisations can take to adapt for the future ensuring that buildings are organisations are prepared for the changes that may take place. The follow suggestions are a good place to start.

Water Control

The risk of pluvial and fluvial flooding will increase. In all new development considerations should be made as to how it will affect the water flow around the area.

Sustainable Urban Drainage Systems (SUDS) are mechanisms/features than enable water to soak away naturally, slowing flow rather than speeding up transition into watercourses. The types of features that would enable this are; reed bed systems, green areas dedicated to soak away, ditches and the bottom of slopes to collect water, permeable car parking surfaces.

Heat Control

As the summer's heat up there are steps that can be taken to facilitate air cooling. The main way to do this is to cut down on hard landscaping, increase green infrastructure and utilise reflective surfaces. For example increases the number of trees, installing green walls and green roofs, using light coloured building materials and creating areas of open water. All of these options will aid reduction of temperature and encourage breeze.

Futureproofing

When thinking about new developments taking changing climate into consideration is important. For example there will be a balance to be made around minimising building heat loss in the winter and preventing heat gain in the summer. By considering orientation and layout of developments alongside solar gain, natural ventilation and natural ventilation strategies can be very helpful.

As the incidence of drought conditions increases it will become more important for developments to reduce their water demand. In all new developments installation of low flow water devices, low flush toilets and rainwater harvesting strategies should be standard