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CHANGING LANDSCAPES IN SUSTAINABILITY



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SUSTAINABILITY: DOING EVERYTHING (SOMEWHAT) DIFFERENTLY

Authentic sustainable development can provide the rigorous system of values, knowledge and ideas to bring about the changes we need, says JONATHAN SMALES

lanet Finance is in serious trouble, scientific and possibly even political consensus on climate change has arrived pre-Copenhagen - and here in the UK we have a new Department of Energy and Climate Change, a Climate Change Act and a legal commitment to cut carbon emissions by 80%. And, for the icing, we are promised a 'One Planet Olympics'.

And yet, global emissions of carbon dioxide and other greenhouse gases are increasing and glaciers are retreating, while habitat, flora, fauna and wilderness are being lost at an unprecedented rate.

A concerted response to overcome these challenges seems increasingly difficult. The global financial markets that underpin economic activity and development are archetypically unsustainable. Our fixation with economic growth as a measure of success has resulted in a damaging outcome where the political class is reluctant, scared even, to invest in infrastructure, in people and in place; and to make markets the servants of long-term human and planetary welfare.

Nevertheless, there exists a set of universal principles that can begin to transform politics, economics and the way we live for the better; and this is the subject of this issue of the *Environmental Scientist*.

My company has a saying -

almost a catchphrase – that 'sustainable development is easy; you just have to do everything (somewhat) differently.'

So what do we mean? We mean that there is no need to invent, we need only innovate; we mean that green has to have wit and optimism, not just high-ground piety; that if sustainable development is to be more than just rhetoric or a mantra it has to have specific application, resonance and consequence. Furthermore, we mean that, despite its conceptual elegance, sustainability only really works if we are prepared to change financial models, governance, professional cultures, perception of risk, the 'whole-life' economics of value, and even the very definition of success.

Some of the issues highlighted in this edition show us some of the barriers to sustainable development, including the difficulty of integrating sustainability principles into policy; the adverse effects of the market economy; and the inability of our educational system to adapt to this new paradigm.

Gareth Clubb's analysis of the sustainability agenda in Wales picks up on the difficulties faced by decision-makers when the urgent need for drastic reduction in carbon emissions is combined with an inability to communicate and integrate the necessary changes. The difficulty with sustainability is that its all-encompassing, transient nature is impossible to translate into a set of rules or actions, often resulting in the misinterpretation of policy. Designing a system for integrating sustainability is a challenge that every nation is now facing.

Dr Dick Morris explains the importance of systematic (rather than isolated) changes to achieving genuine sustainability outcomes. The changes we are seeing in the environment are at the level of the biosphere. Yet at the centre of this transformation is human activity or, more locally, systems of living, whereby the totality of each individual lifestyle comprises an overall system of local behaviour. The author stresses the importance of seeing beyond single cause-andeffect relationships and embracing sustainability as a complex, dynamic concept. These systems of living must be carefully managed and directed towards more sustainable patterns of behaviour by good infrastructure, financial incentives and investment in strong communities.

The next crucial step is to create a culture, a new consciousness, which can supplant the primacy of individualism and untrammelled choice, opening up the doors to a society where the individual is no longer central.

Stephen Sterling's article points to the structural problems in the higher education sector. HEFCE's goal to make higher education a 'major contributor to... achieve sustainability' is undermined by continued perpetuation of 'structured', 'maintenance learning'. This preservation of the status quo perpetuates a market-centric view of the world, rather than advancing collective wellbeing and environmental health. Similarly, Martin Haigh talks of the new imperative of a re-orientation away from selfish individualism and competition towards co-operation and interdependency. This shift in morality must be accompanied by a corresponding change in the process of teaching – a move towards more participative, dynamic learning. unstructured, Throughout the articles, there is overall consensus that education for sustainability is about ethics, long-term vision and foresight, co-operation, interdependency and connectivity. Equipping our students with eco-literacy is essential if we want to bring a Green New Deal to fruition.

Douglas Bourn's article exposes the limited integration of sustainability learning into university courses on globalisation. The externalities that stem from excessive consumption



Global emissions of carbon dioxide and other greenhouse gases are increasing and glaciers are retreating... A concerted response seems increasingly difficult

create not only grave environmental dangers, but also problems of poverty, war and injustice that are perpetuated by our lifestyles. These connections must be made explicitly and loudly. Not only are we destroying our natural heritage, but also the structures and systems that we, ourselves, created to maintain peace and spread prosperity throughout the globe.

Lastly, societies around the world must try to use the momentum of the economic downturn to stimulate the sustainable development agenda. Governments are now striving to rescue financial institutions. This is the ideal opportunity to create a new trajectory – even a new a culture – for public and private investment. This edition shows this culture is developing slowly. Phil Case and Chintal Barot provide an excellent account of how the 'triple crunch' of credit, climate and energy can motivate businesses to search for new ways of creating competitive advantage. Those companies that perceive and act on the opportunities (and prolonged risks) of the climate change economy will be the ones to create lasting competitive advantage. The crisis will subside, but the imperative of fighting climate change will only intensify.

We may fail. Arran Stibbe's view of the inevitability of climate change urges us to embrace community and local enterprise and enjoy the simple pleasures in life.

The question remains: can we again become participants in life and politics rather than its passive observers? Will we locate the common values that bind and re-build society, lift families out of poverty, rebalance our personal and collective investment between positive health and ill-health services, reduce our total carbon footprints, confirm that we really do care about the quality of planet and life, with future generations in mind, while enfranchising the rights of the other species with which we share our Earth? Is there indeed an up-side to all this down? Yes, there is: authentic sustainable development can provide the most complete, clear and rigorous system of values, knowledge and ideas to underpin the change we need and the change we will secure. After reading this edition, I think you will agree. ** Jonathan Smales is Chairman of Beyond Green and Chief Executive of sustainable developers BlueLiving. He was formerly a director and international trustee of Greenpeace and founder of the Earth Centre. Currently he is advising Manchester City Council on its Climate Change Action Plan and is lead consultant on strategic sustainability for the Olympic Legacy. The views expressed are his own.

CELEBRATING THE 10TH ANNIVERSARY OF PP4SD

Launched ten years ago, PP4SD has emerged from humble beginnings into a respected and distinctive brand. JOHN BAINES explains the progress

hen I agreed to chair the first meeting of the Programme Management Group of Professional Practice for Sustainable Development in 1998, little did I think that I would be asked to chair it again in 2008. What began as a three year project with funding from DEFRA, was extended to six years with further grants from DEFRA, WWF and RSPB. By this time the project had gained sufficient momentum and support to continue operating, albeit sometimes on minimal resources. The original partners have changed as the focus of the programme has changed. Today the Programme Management Group has representatives from Institution of Environmental Sciences, the the Environment Agency, the University of Swansea and the Society for the Environment.

The Institution of Environmental Sciences agreed to be the project's host so that PP4SD could apply for funding. The following have been or are involved in the management of PP4SD:

Council for Environmental Education Environment Agency Forum for the Future (The Natural Step) Institution of Environmental Sciences Institution of Mechanical Engineers Royal Institution of Chartered Surveyors Royal Society for the Protection of Birds Society for the Environment University of Swansea WWF-UK

enterprises working from home. Training is task orientated and involves case studies, practising systems thinking and developing action strategies or plans.

The most recent project was undertaken with Swansea University with EU funding and a further project is being considered. PP4SD recently started working with the Sustainable Consumption Institute based in the University of Manchester and funded by Tesco. Working with the company and the Institute, we are developing materials and programmes that will help all retailers train their staff to be more competent to develop sustainable practice and integrate it into everyday work. For the future, we are intending to publish a revised edition of the Foundation Course in Sustainable Development for Professionals manual. The materials are currently being used by IES in its regular sustainability workshops. These are open to all. To receive updates on new PP4SD publications and



Without the continued support of IES, it is unlikely the project would have survived through those times when enthusiasm was high, but funding marginal. However, today PP4SD is strong and secure. It has even come to have its own brand that people refer to as 'the PP4SD approach'. The term was coined to describe the process of how PP4SD works with other institutions and organisations to develop continuing professional development approaches and materials that help professionals integrate principles of sustainable development into their work. The process has evolved over the past ten years as its members continue to learn from the experience of working with groups from major corporate institutions like Barclays Bank to small workshops, sign up to the mailing list at www.pp4sd.org.uk.

The partners are proud of the success of PP4SD. The Council of the IES wanted to recognise this success and help it celebrate its tenth anniversary by offering an opportunity for PP4SD to prepare a special edition of the Institution's journal. PP4SD welcomes this opportunity and hopes that you will find this edition stimulating and encouraging.

If you are interested in finding out more about us, or in developing a project with us, please get in touch via the website: *www.pp4sd.org.uk*.

◆ John Baines (*john.baines4@btopenworld.com*) is Chair of PP4SD and Vice-President of the IES.

IN AN ECONOMIC DOWNTURN, WILL SUSTAINABILITY BECOME UNSUSTAINABLE?

Will the financial downturn pressure business into abandoning all thoughts of sustainability? On the contrary, **PHIL CASE** and **CHINTAL BAROT** argue that sustainability will play a crucial part in the eventual recovery

f 2007 was the year the world realised it was living on borrowed time in terms of climate change, 2008 and the beginning of 2009 have been marked by global panic about borrowings of a rather more literal nature. With stock markets in free-fall, bank collapses and nationalisations of an unprecedented scale, rising unemployment, and the failure of well-known and longestablished businesses, most commentators agree that this recession could be the worst since the great depression of the 1930s. Faced with challenges of this magnitude, what CEO has time for sustainability?

It is a fact of 21st century business life that in the next 15-20 years every company will be affected to some degree by the 'megatrends' of climate change, population growth, energy and food security, and water scarcity. The only questions are how quickly, to what degree, and when should businesses start taking action to confront these challenges.

Looking back, it is worth noting that the sustainability agenda has shown its staying power before: it has been gathering momentum throughout much of the last 30 years – a period in which there has been more than one economic downturn. Will the current recession herald a change in the way business views the sustainability agenda?

A recent membership survey by the 2degrees network suggests not: over 61% of respondents considered that implementation of their company's sustainability strategy was more urgent in view of the focus on efficiency and carbon reduction (provided that adequate returns on any investment required can be demonstrated).

In our experience, having worked with some of the world's largest companies, there has been a profound structural change in the business environment, particularly in the last two to three years. The pressures for change have come from all sides. Consumers are more aware of sustainability issues than ever before, and are more willing to translate their principles into purchases. We recently commissioned a survey of 4,000 UK consumers in which more than 60% of respondents said that the most important challenges the world faces are climate change, poverty, and food and water shortages (*Sustainability: are consumers buying it?* June 2008).

At the same time, governments are using environmental taxes and regulation to help accelerate the transition to a lower carbon economy, and meet their international commitments on climate change. It is clear that the pressure for progress will only increase after the new US administration takes office in January.

But perhaps most significantly, the financial markets have started to take sustainability seriously. It is far from conclusive as yet, but evidence does seem to be emerging that a company's track record in this area can be a good proxy for the overall quality of its management. As the *Economist* put it in January of this year, 'If [Corporate Social Responsibility] (CSR) helps businesses look outwards more than they otherwise would and to think imaginatively about the risks and opportunities they face, it is probably worth doing. This is why some financial analysts think that looking at the quality of a company's CSR policy may be a useful pointer to the quality of its management more generally.'¹

The Goldman Sachs model, GS Sustain, is one example of how this is being put into everyday practice, and provides convincing proof that this agenda is moving beyond the SRI funds and becoming an integral part of conventional equity analysis.

In short, sustainability has gone mainstream, which makes it much more resistant to the repercussions of a global recession. But that is not to underplay the impact of those repercussions: to cite only one of the most obvious examples, consumers who have been accustomed to paying a premium for Fairtrade and organic produce, may now be a little more concerned to cut the overall cost of their weekly shop, and the record market share figures now being achieved by discounters like Aldi and Lidl certainly bear that out.

That said, the most recent HSBC Climate Confidence Monitor survey, carried out with 12,000 people across 12 markets in September and October, tells rather a different story. The data indicates that consumer attitudes to climate change – and what they want business to do about it – are actually proving fairly resilient, even in the face of the current economic crisis. One conclusion to be drawn is that, while the economic challenges facing most companies are

See: www.economist.com/specialreports/PrinterFriendly.cfm? story_id=10491124



real, substantial, and potentially critical, a more sustainable approach to business can actually help to mitigate some of their consequences, and even turn them to competitive advantage.

Cutting costs, reducing risks

Cost is the first and most conspicuous of these challenges. Cutting energy use, waste, and landfill has always been one of the sustainability agenda's clearest and easiest win-wins, and leading players like Wal-mart are pushing this much further, and gaining much more as a result: if the company can achieve a 5% reduction in packaging by 2013 they could save as much as \$3.4 billion. Likewise, DuPont reduced its energy use by one-third at one plant, which saved over \$17 million per year on power, and reduced emissions per pound of product by 50%. In 2000 alone, the business saved almost \$400 million by using resources more efficiently and improving productivity.

British Sugar provides a further example: recognised internationally as the most efficient sugar manufacturer in Europe, the company transforms all of its inputs into sustainable products. Hot water and carbon dioxide from its Wissington CHP plant are pumped to a glasshouse to help with the production of tomatoes, rather than being released into the atmosphere. As a result, British Sugar is the UK's largest grower of classic round salad tomatoes, producing over 34 million tomatoes each year between April and November.

Another important 'sell' for sustainability is improving risk management. Companies which understand the full implications of sustainability and climate change for their business – both now and in the medium to long-term – will be far better placed to address these issues, and take effective pre-emptive action.

In the last year we have seen an increase in demand from leading global corporations for scenario planning services, helping them to identify all the sustainability risks they might face, ranging from the impact of changing weather patterns on tourism, to the sourcing of raw materials that are especially vulnerable to climate change.

In our experience, few organisations really understand how all these diverse factors work, partly because so many of them occur in parts of the value chain that the company does not directly control. But long-term business survival – never mind short-term business success – is becoming increasingly dependent on having the full picture of your value chain, both upstream and down, and coupling this with a deep and practical insight into how these new trends could affect your sources of supply, your competitive position, and your profitability.

There are plenty of other cases where a more sustainable approach can either safeguard your business from future risks, or protect your licence to trade today. Project finance for major infrastructure projects is a good example. In the wake of the credit crunch, far less money is available for big developments like these, and even if the cash is there the covenants are getting much stricter: many project finance lenders are now signatories to the Equator Principles, which means that most borrowers will have to undertake full environmental and social risk assessments, and draw up detailed action plans, before they can get access to funding.

Raising revenues, retaining talent

Sustainability also creates opportunities to make money, as well as save it, whether that is by developing new products and services, or bolstering your brand. At one end of the scale Toyota has now sold over a million Prius hybrid cars worldwide, while at the other, Persil's new Small & Mighty laundry liquid has built its brand proposition on the fact that it takes '½ the water to make it, ½ the packaging volume to put it in, and ½ the lorries to deliver it'.

It seems to be working: Small & Mighty has already gained a 3% market share in the year since launch, and 13% of the population, or three million households, have purchased at least one product in the range.² Indeed, our survey 'Sustainability: are consumers buying it?' confirmed that today's consumers know and care more about what they buy, how it is made, what it is made from, how far it travels and how it is packaged. However, the recession is taking its toll on the ethical consumer: the latest 'concerned consumer survey' carried out for *The Times* by Populus, showed that only 60% of ethically aware consumers would still try to buy the most ethically and environmentally friendly products, even at a little extra cost – down from 70% in February 2008.

In the energy sector, the drive to generate more electricity from renewables or 'clean coal' is already creating significant demand for new technologies, and this is likely to be boosted still further if President-Elect Obama carries through his commitment to invest \$150 billion to create five million 'green collar' jobs in the alternative energy sector,³ and in the face of the Committee on Climate Change's recommendation that the UK should commit to reducing greenhouse gas emissions by at least 34% by 2020.⁴

Attracting and retaining high quality staff is also a key part of the sustainability business case. Even if most businesses are more likely to be contracting, rather than expanding, their workforces, survival in a recession will depend on keeping and motivating your most creative and productive employees, and there's plenty of evidence that a more ethical workplace can be a deciding factor here.

As Richard Reed, one of the founders of Innocent Drinks says, 'The big commercial reason why going down this route delivers business results is the fact that you get a more committed, more talented group of people in your business for longer.' This anecdotal evidence is backed up by our own PwC graduate survey, which covered 4,000 new graduates across 44 countries. Eighty-eight per cent of respondents said that they actively looked for an employer whose social and ethical values matched their personal beliefs. Even more telling in the current climate, as many as 86% said they would consider leaving an employer if the company's principles no longer reflected their own.

Leader, laggard, or left behind?

The companies mentioned in this article are among those which could be considered innovators in the sustainability field. Stealing a march on their competitors like this means many have had to embed sustainability in their business in such a way as to make it unlikely to be affected by the recession to any lasting extent. Companies which have done very little in this area so far are also beginning to wake up to these issues, attracted by the opportunity to cut costs and reduce risk.

But as the recession gets deeper the most interesting group will be those in between: the companies which have done a certain amount reactively, to cut costs or address public concern about a particular issue, but little proactively, to grow revenue and exploit new markets. But taking a more active approach requires up-front investment and – inevitably – entails some risk, and this may well be where the financial constraints of the downturn will have the greatest impact.

Securing short-term savings at the cost of long-term business sustainability and competitive advantage could prove, in the end, to be short-sighted. Andy Bond, CEO of Asda, recently said: 'We will be much more aligned societally towards the sustainability agenda through an economic downturn... [it] presents an amazing opportunity for society to step up efforts towards sustainability.'⁵

Businesses are already looking to understand exactly how they could be affected by a prolonged downturn – how to identify the products and customers that generate the most value, and how to keep producing the cash they need to survive. A more sustainable approach can be an integral part of this, and could not only help UK plc to endure the downturn, but position it more strongly to benefit from the recovery that will inevitably follow, from a financial as well as reputational point of view.

 Chintal Barot and Phil Case work in the Sustainability and Climate Change team at PricewaterhouseCoopers.

^{2.} See www.icis.com/Articles/2008/01/21/9093893/soap-anddetergent-makers-go-small-in-their-drive-for-green-products.html

^{3.} See www.msnbc.msn.com/id/23148959/

^{4.} See www.guardian.co.uk/business/feedarticle/8104138

See www.yorkshirepost.co.uk/businessnews/Its-time-to-go-back. 4703077.jp

SUSTAINABLE DEVELOPMENT, SYSTEMS THINKING AND PROFESSIONAL PRACTICE

Education for sustainability needs to concentrate less on teaching and the transmission of knowledge, and more on dialogue, inquiry and participation, says **STEPHEN MARTIN**

ecuring the Future, the UK government's strategy, recognises the need for a change in direction to embrace the concept of sustainable development: 'The goal of sustainable development is to enable people throughout the world to satisfy their basic needs and enjoy a better quality of life, without compromising the quality of life of future generations... Government must promote a clear understanding of, and commitment to, sustainable development so that all people can contribute to the overall goal through their individual decisions.' (*Securing the Future*, HM Government, 2005.)

Building the capacity for such change is an essential objective of our education system, particularly to help those who are about to enter employment from higher education or those in employment who are taking post-graduate or other forms of training as part of continuing professional development (CPD). Building 'sustainability literacy'¹ means developing the knowledge and the skills necessary for doing things, both individually and collectively, in more sustainable ways.

Effective management of sustainability performance in private sector businesses and public sector organisations has improved cost-savings, reputation and communication with stakeholders as well as enhancing risk management. Innovative business models are emerging which use resources more efficiently and ethically.

Many of those employed by our public, private and voluntary institutions are among the estimated 5.5 million people in the UK calling themselves professionals. A sizeable proportion of these belong to a recognised professional body, trade association or union. Professionals increasingly have to deal with complex social, environmental and economic issues (Martin and Hall, 2002). Employers are seeking competency in ethics, human ecology, conflict resolution, environmental management and interdisciplinary problem solving. All of these have a major bearing on curricula and learning in higher education, since many professional bodies now rely on accredited degrees as the main route for membership.

Trade unions in the TUC representing some 6.5 million members in every sector of the UK economy also recognise the need to build the capacity of their members to manage sustainable development. Through their 'Greening the Workplace' programme and membership of TUSDAC (the Trade Union Sustainable Development Advisory Committee) they are beginning to make positive contributions to policy and practice in sustainable development in the work place and the wider community.

Issues for the professions

Some of the issues and implications of the emerging sustainable development policy framework and its impact on professional practice (and by implication the undergraduate curriculum) are summarised below (Essence 2001):

- There have so far been relatively few attempts to relate environmental higher education to the changing needs of the labour market.
- The qualifications required for many jobs in the emerging labour market are very different to those that have previously characterised the environmental professions in Europe.
- New kinds of competencies in business, economics, law, politics and public administration, sociology, communications, ethics, human ecology, environmental management as well as more traditional natural sciences are being sought by employers.
- There is a need for people with an interdisciplinary problem-solving capability, rather than a traditional and often overly specialised scientific competence.
- Graduates from existing environmental programmes find it difficult to get employment, largely because their curriculum is insufficiently differentiated to meet the needs of employers. Handling inter-disciplinary practice in an economic, environmental and social context is an essential requirement (see The Egan Review, 2004 and Martin *et al*, 2004).
- The issue of academic quality is closely connected to the more general issue of professional competence in the new and emerging environmental labour market.
- Many of the tasks of company/organisation environment officers and managers are often company or brand specific, hence general education programmes are difficult to devise.

^{1.} Sustainability literacy is about learning how human actions affect the immediate and long-term future of the economy and ecology of our communities. In short, how we must learn to live and work on a planet whose resources are finite.

- The skills most often required by employers are of the softer kind—communication, leadership, organisational, etc. These are notoriously difficult to teach in a formalised university setting.
- Future qualifications will need to include conflict management and an understanding of cultural differences in an international context.

The challenge of sustainable development has profound implications for professional bodies in terms of those higher education courses for which they control or influence the curricula and the CPD that they facilitate or deliver. For almost ten years PP4SD has sought to work with professional bodies and their members to help them engage with the principles of sustainable development.

Professional Practice for Sustainable Development (PP4SD)

PP4SD was launched in 1999 and worked with 14 professional institutions to create a common curriculum framework for sustainable development from which to develop, test and publish training materials. PP4SD was funded initially through the UK Government's Environment Action Fund and from corporate sponsorship. Later phases of the project have been funded by working partners and EU funds. Following the publication of the initial generic training materials, PP4SD developed sector specific materials for the financial services sector and the land-based sector. The most recent publications were developed in partnership with Swansea University and targeted Small and Medium Sized Enterprises in the land-based sector in Wales.

The design and delivery of a typical PP4SD one-day workshop in sustainable development is set out below (Baines, Brannigan and Martin, 2001).

The workshop structure

The workshop structure has five overlapping themes:

- Principles of sustainability
- Introduction to systems thinking and practice
- Tools and techniques for analysing and planning future scenarios
- Business and other benefits arising from sustainable development practices
- Action planning

Principles of sustainability – a systems perspective

One of the first steps in designing the workshop was to create with the representatives of the professions an intellectual framework within which to explore the concept

of sustainability. The framework (Martin and Hall, 2002) has a number of key characteristics:

 The earth as a sustainable system is dependent on the working of a number of well-defined bio-geo-chemical cycles.

- The earth as a sustainable system is open to flows of energy and closed to matter (based on the first and second laws of thermodynamics).
- There are four principal ways of undermining the biogeo-chemical cycles (Porritt, 2000).
- The framework is set in a futurist perspective.

By setting the sustainability agenda in an 'earth as a system' context, it became much easier for professionals to engage with what needs to be done, rather than focusing on measuring, managing and mitigating downstream environmental impact, as environmental scientists tend to do (Martin, 2002). The framework provides a mental model for defining what a sustainable world might look like (Table 1). Thus, it critically supports the process of interprofessional dialogue and reflection about issues and solutions.

Table 1: The PP4SD Framework forSustainability

In a sustainable society:

- Any materials mined from the earth should not exceed the environment's capacity to disperse, absorb, recycle or otherwise neutralise their harmful effects to humans and the environment.
- The same principles should apply to synthetic substances.
- The biological diversity and productivity of ecosystems should not be endangered.
- A healthy economy should be maintained, which accurately represents the value of natural, human, social and manufactured capital.
- Individual human skills, knowledge and health should be developed and deployed to optimum effect.
- Social progress and justice should recognise the needs of everyone.
- There must be equity for future generations.
- Structures and institutions should promote stewardship of natural resources and the development of people.

The workshop begins by using one of a number of available activities that facilitate dialogue and learning on sustainable development and sustainability. These terms are often used interchangeably but they mean different things. In simple terms, sustainability means the capacity for continuance into the long-term future. Sustainable development is the journey or the means of achieving the goal of sustainability.

Systems thinking and practice

Diagrams can be used to explore the relationships or boundaries between systems of interest such as sustainability and sustainable development. In systems thinking, both represent separate but connected systems of interest. To an individual or an organisation, sustainable development represents a 'sphere' of influence and action over which they have some control and direction, whereas sustainability, represents a 'sphere' of concern, over which an individual or organisation only exerts some limited impact indirectly through their sphere of influence. Identifying a professional's sphere(s) of influence facilitates a much more focused and productive dialogue on achievable actions and outcomes.

Tools and techniques for taking a futurist perspective

The workshop also applies a number of techniques to help participants to think in a futurist perspective because one of the challenges of sustainable development is developing resilient and adaptive decision-making tools that can cope with risk and uncertainty. These techniques exemplify the two different approaches we can take to the future and, importantly, how these approaches influence the way we act. The usual way of approaching the future is through forecasting by starting from where we are and projecting trends over relatively short time intervals, e.g. one to three years. Planning based on such trends tends to lead to shortterm and incremental changes. A major limitation of forecasting is that many present trends are clearly unsustainable.

The alternative approach is 'backcasting' which starts by taking a 20 to 30 year perspective based on scenarios or on the sustainability framework outlined earlier (Ison and Blackmore, 1998). The idea is to think imaginatively about the business or organisation to which you belong and seek to explore a range of fundamental changes that will make it more closely fit the sustainability framework. From each alternative future created, you then work your way backwards from the future towards the present in stages, asking such questions as: What barriers did we overcome? Who helped us? Who did we need to persuade?

Business benefits

The next phase of the workshop uses case studies from business and industry to illustrate how sustainable development principles have been applied and to provide an opportunity for participants to develop their own thinking around practical examples. The case studies are based on going businesses and organisations and have been drawn from a variety of sectors including construction, manufacturing, horticulture, banking and aquaculture. All the case studies can be downloaded from *www.pp4sd.org.uk* where they are updated and added to over time. These case studies illustrate examples from banking, (The Cooperative Bank), construction (Carillion Plc), and textiles (Interface). They all feature the business benefits of taking a more sustainable approach to business practice.

The project has recently worked on other case studies in land-use such as farming and horticulture (*www. growingforthefuture.com/start.htm*) and in the financial services sector. Case studies ground the systems theory of the course workshop in real-world examples, allowing participants to reflect on the progress made by some substantial businesses, and also highlighting the issues surrounding organisational change. They emphasise that organisational change based on the principles of sustainability is not a steady process, but a dynamic and complex state of affairs.

Action planning

Throughout the workshop an emphasis is placed on putting sustainability into practice. The final section of the workshop re-emphasises this aspect through a short action planning session, which incorporates a follow-up with participants to encourage implementations of the actions identified.

Conclusion

There is growing acknowledgement that a wide-range of skills, knowledge and attributes are required to create an action orientated sustainability literate graduate body. Some examples of these requirements are shown in Table 2 (Martin *et al*, 2006).

It is becoming increasingly evident that the approach to sustainability needs to be different from the traditional forms of education and training that are currently delivered through schools, colleges, universities and continuing professional development (CPD) (Jucker, 2002; Sterling, 2001). As many commentators are now articulating, the emphasis is more on action learning, dialogue, inquiry, participation and inter-professional partnership (Scott and Gough, 2003). Hence, the approach should not be based solely on teaching and the transmission of knowledge, or just working to a national syllabus or curriculum, but on allowing the exploration of issues and problems through open-ended inquiry and learning, as part of an ongoing process.

PP4SD has developed and successfully tried a number of new ways of exploring how sustainable development can be a vehicle for influencing the existing cultures of organisations and the professionals who are employed in them. The PP4SD workshops demonstrate what can be done by challenging existing beliefs and values in a process based on appreciative inquiry. This, in essence, is a process which focuses not on what is wrong with an organisation but rather on how by using the principles of sustainability we can develop new and positive ways of organising its activities sustainably. Appreciative inquiry recognises that inquiry and change are not separate elements but are simultaneous. Inquiry is intervention.

The PP4SD process has a number of implications for undergraduate and postgraduate environmental programmes. The most significant is to offer more opportunities to develop the skills of dialogue and inquiry in an inter-disciplinary and participatory way. Few can argue with the goals of sustainability, but many should contest and explore how sustainability can be achieved. Hence, it is critical that environmental programmes accommodate approaches to dialogue, systems thinking and practice, principles of sustainability, values and ethics in a professional and personal context and above all emphasise the importance of achieving systemic change.

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Table 2: Sustainability literacy –skills and knowledge

- An appreciation of the importance of environmental, social, political and economic contexts of their discipline
- A broad and balanced foundation knowledge of sustainable development, its key principles and the main debate within them, including its contested and expanding boundaries
- Problem solving skills in a nonreductionist manner for highly complex real life problems
- Ability to think creatively and holistically and to make critical judgments
- Ability to develop high level of selfreflection (both personal and professional)
- Ability to identify, understand, evaluate and adopt values conducive to sustainability
- Ability to bridge the gap between theory and practice: in sustainable development only transformational action counts
- Ability to participate creatively in interdisciplinary teams
- Ability to manage change

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GLOBALISATION AND SUSTAINABILITY: THE CHALLENGES FOR EDUCATION

The UK's education system has recognised the need to address the challenges of globalisation, global poverty and climate change. **DOUGLAS BOURN** reports that institutions are increasingly responsible for equipping people to make sense of a rapidly changing and complex world

o-one can avoid global and environmental issues. Every day in the media there are references to the impact of global forces, particularly economic ones, on people's everyday lives. Climate change and calls for reduced carbon emissions are increasingly being mentioned as issues that need to be considered. Common examples are methods of travel, food production and simply switching off the lights.

Education is being cited by policy-makers as central to ensuring the public understand and engage with these agendas. For example, Gordon Brown, the UK Prime Minister, has stated that it is only 'through education that we will foster citizens with the conviction to speak out against world poverty, that we will find the creativity we need to tackle climate change and that we produce the next generation of social entrepreneurs' (DEA, 2008). The Department for Innovation, Universities and Skills (DIUS) in its Sustainable Development Action Plan emphasises the importance of equipping our students and workforce with the skills to respond to the challenge of climate change (DIUS, 2008a). The Implementation Plan of the Leitch Review of Skills made direct reference to sustainable skills as an area that needs development:

'If the nation is to play its full part in challenging global poverty and combating environmental problems like climate change, it is imperative that everyone in this country develop the skills of sustainable living and working. That means placing sustainable development at the heart of the skills provision, ensuring that it is a fundamental goal of our economic and social progress.' (*DIUS*, 2007).

Despite these linkages being made by policy-makers between global poverty and climate change, there is a tendency to see global and international and sustainability issues as separate strategies and initiatives. For example DIUS in 2008 published both Sustainable Development and Globalisation strategies (DIUS, 2008b). This separation of initiatives can be reflected within higher education and professional development (Bourn, 2008a).

It is suggested here that if a framework of Global Perspectives is taken as an overarching term, not only can connections between sustainability and global poverty issues be made, but a recognition of the impact of globalisation and the interconnected world in which we live will become more evident.

The UK is a central player in the global economy, with one quarter of UK jobs connected to overseas business. Globalisation has had an impact on UK society not only in terms of jobs and changing employment patterns but in the lifestyles we develop, the people we meet, the food we eat and the clothes we wear. Instant global communications enable us not only to be aware instantly of issues and people elsewhere in the world, but also create a sense of living in a 'global village.' As Giddens (1991) suggests globalisation can be seen as 'the intensification of worldwide social relations which link distant localities in such a way that local happening are shaped by events occurring many miles away and vice versa'.

The context of globalisation is recognised by government ministers' policy statements, funding bodies and training agencies (LSC, 2007). An example that has put the debates around globalisation in a broader social and cultural context was the report of the Commission on Integration and Cohesion, *Our Shared Future*, published in June 2007, which notes that the global is now local. 'Policies', the report stated, 'need to recognise the complex nature of communities and the influence of global affairs on local communities'. 'Globalisation', the report notes, 'adds a new "layer of complexity" to community cohesion.' (Commission on Integration and Cohesion, 2007.)

As Buonfino, in a think-piece for the Commission, has commented:

'as travel becomes within the reach of most people and communication technologies enable people to be immersed in cultures located elsewhere, and to cultivate multiple identities, the question of belonging becomes more complex and more central to the debate on how we live together.' (Buonfino, 2007.5)

At a European level similar observations can be identified. The European education and training 2010 targets (CEDEFOP, 2008) include the development of skills for the knowledge society, ensuring access to ICT for everyone, making learning attractive, supporting active citizenship, improving foreign language expertise and increasing mobility and exchange.

There have been major debates within the academic community on the impact of globalisation on education and

the need for all aspects of learning to be more international in outlook. Whilst much of the discourse has been around the economic impact of globalisation on education, there has been a recognition that globalisation raises some major new challenges for education. These include instant global access to information and knowledge, increased social mobility, contact and dialogue with people from a wide range of cultural backgrounds, information on differences in education around the world, and above all the myriad cultural influences leading to challenges to one's own sense of identity and belonging within a community (Stromquist *et al*, 2000).

Ulrick Beck, one of the key thinkers over the past decade in the area of globalisation, has noted that one of the main political responses to globalisation has been to build and develop the 'education and knowledge society'. This, he suggests, has led to expansion of training, and to the loosening of, or doing away with links to a particular job or occupation, taking a more holistic approach. Beck goes on to suggest this should be seen not only in terms of 'flexibility' but also areas such as 'social competence, ability to work in a team, conflict resolution, understanding of other cultures, integrated thinking and a capacity to handle uncertainties and paradoxes of secondary modernity' (Beck, 2000).

Beck notes that learning within the framework of globalisation also poses questions about where, what and how people learn. Part of the exciting dialectic of globalisation, he suggests, is that it replaces 'traditional lecturing societies with dialogic attentiveness and courage to disagree – people beginning to realise transnationalisation of uneventful education and curricula.'

Bournemouth University is an example of a UK institution that has attempted to address these social,

economic and cultural challenges within a global context. Using the term 'global perspectives', academics supportive of this approach have stated that they see global perspectives as an approach that:

- values methodologies, techniques and academic analysis from other cultures;
- challenges and discards prejudice;
- considers with sensitivity the effect of our actions on others locally and globally, both now and in the future;
- questions Eurocentric, rich developed world, restricted perspectives and takes into account viewpoints and circumstances from the whole planet, all regions of the world;
- presents learners with the capacity to calculate the risks of decision making;
- acknowledges the global forces that affect us all and promotes justice and equality;
- empowers learners to bring about change;
- provides an international curriculum and seeks opportunitites to develop students' international awareness and competence (Shiel 2007).

Developing a global perspective is seen essentially as being about broadening curricula and incorporating pedagogic approaches that empower students to develop as critical beings who are able to challenge orthodoxy and bring about change. It involves a 'shift in approach, rather than a radical change of content' (Shiel 2007).

Behind the approach from Bournemouth is the recognition that to address the influence of the power of global forces is the need to encourage learning from a range of perspectives and approaches and a sense of social responsibility.



An example of using these themes and approaches is *The* Global Engineeer (Bourn and Neal, 2007), produced by a small non-governmental organisation 'Engineers Against Poverty' in response to increased interest by higher education academics in the global and environmental agendas. This publication notes that the future of engineering is being framed by global forces, which transcend national boundaries, such as the impact of globalisation, rapid technological advances, climate change and inequality. It shows the relationship of climate change and poverty in terms of habitats, access to water, energy and transport and the key role engineering can play in addressing these problems. It further suggests that globalisation through economic development, increased tourism and new technology can, through effective use of engineering skills, play a key role in combating global poverty.

Behind this framework is the recognition that to respond to the challenges of globalisation and sustainability means more than just having increased knowledge about global forces, important as they are. It requires a recognition that the key skills needed to live and work in a global society and economy are:

- an ability to communicate with people from a range of social and cultural backgrounds;
- an ability to work within teams of people from a range of backgrounds and other countries;
- openness to a range of voices and perspectives from around the world;
- the willingness to resolve problems and seek solutions;
- recognition and understanding of the impact of global forces on people's lives;
- a willingness to play an active role in society at local, national and international levels. (Bourn, 2008c)

Research to support this framework on global skills and engineering (Bourn and Sharma, 2008) shows that these ideas are being recognised by an increasing number of employers. Archer (2005) has suggested that having a global perspective is increasingly compatible with employability. In the 2005 recruitment cycle, employers were looking for graduates who could understand and adapt to an increasingly complex, integrated and interdependent world in which it is the norm to work in a multicultural setting with colleagues and clients from a range of backgrounds and cultures. This means that to be effective team players and leaders, it is vital that graduates are able to communicate effectively across cultures and have a good understanding of others' perspectives (Bourn and Sharma, 2008).

There is evidence as alluded to in this paper that policymakers are recognising these challenges. Within education systems in the UK, the Welsh government through its strategy on education for sustainable development and global citizenship provides an interesting example of a policy-maker that has attempted to look at globalisation, international development and sustainable development in a holistic way. The strategy is located within a learning framework, recognising that a key element of the programme should be to 'build the skills that will enable learners to think critically, think laterally, link ideas and concepts and make informed decisions.' (Welsh Assembly Government 2006).

These examples demonstrate that aspects of the education system within the UK are recognising the need to address the challenges of globalisation, global poverty and climate change. However, there is also evidence from the examples of Bournemouth, the work within engineering and initiatives in Wales that it is not the job of education to merely respond to these challenges, but to equip the learner with the opportunities for their engagement on these issues on their terms.

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THINKING ABOUT SYSTEMS FOR SUSTAINABLE LIFESTYLES

DICK MORRIS considers the way we look at sustainability and suggests some useful techniques for organising and sharing our thoughts on the subject

Ithough the concept of sustainability relates to the whole biosphere, at its core it is concerned mainly with sustainable human lifestyles. To achieve such lifestyles, we all need to make decisions about a complex mix of interacting requirements: for food, housing, livelihoods, health, transport, etc. Decisions about one aspect can have unexpected, and perhaps undesired, effects on others and on our wider biophysical environment. Choosing to work from home can save transport fuel, but may use an even greater amount of extra fuel for home heating. To be effective, we need to consider our whole lifestyle system, not just the separate activities we undertake. For individuals, this is most relevant in terms of small, often local, systems of living.

This word system has become so much a part of our 21st century vocabulary, as in 'the transport system' (when it breaks down), 'the Social Security system' (ditto), a 'computer system', etc, that we probably take its use for granted, and do not consider some of the implications of using the word. Really to think in terms of systems is not necessarily so easy, but is an essential part of our outlook if we are to develop our world in a sustainable manner. When thinking in terms of systems, we have at least partially to move away from our usual habits. These have been heavily influenced by the generally science-based model that has characterised post-Enlightenment European thought.

Such thinking in science and its partner, technology, has produced enormous strides in our material well-being, although we also recognise that it has brought some problems. A key feature of classical science has been to work under carefully controlled experimental conditions, looking in detail at the effects of one factor at a time. The success of this approach has perhaps unintentionally encouraged a widespread popular belief that we can isolate a single cause for any observed event. We regularly see headlines suggesting that childrens' behavioural problems arise from food additives, street crime is the result of shortage of police on the beat, traffic accidents or congestion are the result of inadequate expenditure on the roads, etc. As we read these, we may mentally note reservations about their over-simplification, but all too often, political or societal responses to such concerns are based on such monocausal explanations. It's much easier for a politician or a manager to demonstrate that the supposed single cause is being tackled, than to ask the much harder question as to whether it will really produce the desired result. The question of whether that result is indeed the best one in a wider context is even less likely to be asked.

A classic example arose from a series of rail crashes in England in the first years of this century. Tragically, several people were killed, and the obvious 'cause' was problems with the rails. To avoid further loss of life, inspections and repairs to the tracks were instigated and draconian speed limits were imposed on trains. This certainly prevented further rail accidents, but also persuaded many people to abandon rail travel, often in favour of their cars (Allison, 2000). Given that the probability of an accident per kilometre travelled is a couple of orders of magnitude larger for car travel than rail travel, the decisions taken about the railways may actually have increased the subsequent number of travel-related deaths and injuries, rather than reduced them. A decision taken about the safety of the railway system may well have had completely the opposite effect to that intended when considered in relation to the wider transport system.

Similar examples could be drawn from any number of situations, highlighting the need to think beyond single cause-effect relations. One of the responses to this has been the movement, particularly in some aspects of medicine, towards so-called holistic approaches which look beyond one-to-one links, to consider the whole range of factors affecting human health. These might include diet, income, social relations, posture, etc, and the complex interactions between them. This approach undoubtedly has its strengths, but there is always a danger that it is impossibly time-consuming and may even conceal or confuse simple solutions. Somewhere between the delightful simplicity of reductionist, monocausal explanation and the possibly unreal requirements of unrestricted holism, there should be a pragmatic level of discrimination that is both effective and efficient.

When we start to think about sustainability, it is essential that we ask questions at a range of levels from the local to the global. Questions arise about what aspects of our existence we want to sustain, how much are we prepared to compromise with the needs of others and what unexpected results might arise from our actions. This is where the ideas of systems and of systems thinking become valuable. Therefore, we need some agreed definitions and some techniques for thinking about systems. A possible definition of a system, based on one first used in the Open University's Technology Faculty, is:

A collection of entities... that are seen by someone... as interacting together... to do something.

The implications of the various elements of this definition are that a system is not a single, indivisible entity, but has component parts (which may themselves be regarded as systems and so termed sub-systems) and that the components interact with one another to cause change.

Consequently, the land, animals, machinery, and organisations involved in supplying our food can (and should) be regarded as a complex, interacting system, rather than just examined in isolation as crops, retail outlets, consumers, etc. Perhaps the most difficult aspect of the definition is the subjective one – the collection of entities is seen by someone as a system. Different individuals may see different systems in a particular situation. For example, a farm can be seen as a system to produce food, to produce a profit or to maintain a particular landscape. Equally, a consumer thinks of a supermarket as a system that supplies food, whereas to its Choosing an appropriate system for decision-making can be crucial since we cannot solve all the problems of the world at once. It is essential to put some boundary around the system we are debating

operator and shareholders it is primarily a system to provide profit. Both farms and supermarkets can also be seen as part of a wider food supply system, as for example in Figure 1 (below).

Negotiating and choosing an appropriate system for debate and decision-making can be crucial since we cannot solve all the problems of the world at once. It is essential to put some boundary round the system we are debating, and different conceptions of the system of interest can also carry with them different criteria for the success or otherwise of that system. It is important to recognise that while the components of a suggested system often have concrete form, it is a human decision to group them together as a system. Therefore, systems are purely constructs, and the



system properties that are judged to be important by their human observers or participants are not a given of some pre-existing system. Choosing an inappropriate boundary, and with it, inappropriate criteria, can be misleading. For example, choosing to put a boundary around a system of food production from livestock can suggest that this is grossly inefficient, since it takes about 10 kg of feed to produce 1 kg of meat. However, if the system is redefined to include the land, then a more interesting measure may be the total amount of food produced from the total area of land available. On this basis, some ruminant animals can have an important role. They can provide useful human food from those areas (some 6 million hectares in the UK) that can only grow grass or other plant materials which cannot be used directly as food by humans. Changing the system boundary and the criteria for system effectiveness can produce very different conclusions.

So what are the possible systems associated with sustainable living? We are all concerned with this, but with different emphases, timescales, and skills. We are all

stakeholders in some sustainable, humanoriented system, but we are unlikely all to have the same visions of what it is, what we expect of it, or knowledge of how it functions. In order to share our visions, and to debate futures, we need to have some way of explaining what we regard as the system of interest and its key features. We need to have some model of a relevant system which is necessarily simpler than the whole, complex situation itself, but shows what we think are the important aspects. It might be possible to create this model in words, but often it is much quicker and more powerful to use some sort of diagram. Words have to flow in a sequential manner to make sense, and one of the features of most systems is that the interactions between entities are often recursive. That is, they form loops, where A may affect B, which in turn affects C, but C can also affect A. In such a situation, a diagram can literally be worth a thousand words. In the same way that a map highlights a selection of important features of the landscape, an appropriate diagram can make clear the key features of our interpretation of a system. Diagrams can provide the means for sharing different understandings of the world around us and of the potential results of our actions within the multiple, complex systems of which we are a part.

Two diagrammatic forms that can be useful here are Systems maps and Multiple-

We are all stakeholders in some sustainable, human-oriented system, but we are unlikely all to have the same visions of what it is

cause (alternatively, causal loop) diagrams. An example of each is given on this page, and some further detail is provided in Lane and Morris (2001). A systems map uses closed shapes (usually circles or clouds) to show the components that the person drawing the map regards as important in the system they see in some situation. The spatial relationship between the shapes can be used to highlight some of the structural links between these aspects. So, going back to the earlier example, the farms, food



processors, supermarkets and the distribution network shown in Figure 1 are all components of a food production sub-system, and might be grouped together on a map of a larger economic, or nation state, system. More dynamic relationships can be represented on a multiple cause diagram, where arrows are used to show where one factor causes another to change, or causes some event to occur. Such diagrams can be developed into more formal, even computable models of systemic behaviour. However, for many purposes, a diagram alone is more than adequate.

C xamples of the use of these ideas and techniques for creating and sharing understandings in order to work towards more sustainable lifestyles are provided by the Anglian Schumacher conference in 2001 and in Collins et al (2007). Groups of stakeholders in the relevant regions were given briefings on various aspects of sustainability and an introduction to these diagramming techniques. They then worked in small groups to produce diagrams of some relevant systems associated with sustainability in their area, and compared their interpretations with those of the other groups. Subsequently, stakeholders claimed to have achieved improved understanding of and, importantly, gained a greater commitment to act in, situations relevant to sustainable development at their local level. This approach offers a simple but effective tool for learning towards sustainable development.

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TOWARDS SUSTAINABLE EDUCATION

Sustainability is not a subject for an already overcrowded curriculum, says **STEPHEN STERLING**, but an opportunity to transform our approach to education

ducation is a slow learner. The increasingly apparent conditions of uncertainty, complexity and threat across systems, not least exemplified by the 'triple crunch' of peak oil, climate change and financial instability – and the urgency of the quest for sustainability - call for a matching and commensurate response in educational purposes, policies and practice. And yet, despite decades of debate and work at national and international levels on environmental education, development education and, more latterly, education for sustainability and education for sustainable development (ESD), mainstream educational thinking and practice has still to embrace fully the implications of current socioeconomic-ecological trends, let alone explore, critique and inform the urgent changes in thinking, practices and lifestyles that many observers deem necessary to assure a liveable future.

That said, there is a growing energy in the sustainability education movement and some signs of change in policy, at least in higher education, that augurs well. Yet hard questions remain about the pace, depth and extent of educational response, seen against almost daily headlines that raise sustainability concerns. Take just two, occurring on the same day in October: 'UK will face peak oil crisis within five years, report warns'; 'World is facing a natural resources crisis worse than financial crunch – humans using 30% more resources than sustainable'. (Clark, Jowit, 2008).

What competencies – dispositions, values, understandings, practical abilities – do people need to both cope with this kind of world and shape the transition to a more stable and sustainable one? David Orr's line that 'sustainability is about the terms and conditions of human survival, and yet we still educate at all levels as if no crisis existed' (Orr 1992, 83) comes to mind. That was written some 16 years ago. Undoubtedly, it is less valid today, but still rings largely true. And if so, society's reliance on education, or at least formal education – reflected for example in HEFCE's vision that 'higher education will be recognised as major



contributor to society's efforts to achieve sustainability' (HEFCE 2008) – seems a risky strategy.

A recent report from the New Economics Foundation argues that HE's role has narrowed too far towards servicing the market economy and that HE needs to rethink its purposes to advance collective well-being. It needs to equip its learners 'with the knowledge, skills and understanding to pioneer innovative and creative responses to achieving wider economic, social and environmental well-being', the report suggests, adding that well-being should be a part of quality assurance (Steuer and Marks 2008). Meanwhile, there has been an increasing debate and attention around social learning in the community rather than in formal contexts (Wals 2007), where there is more fecund potential for change focused on well-being – as evidenced, for example, by the growing Transition Towns movement (Hopkins, 2008).

For over three decades, ever since the UN Conference on the Human Environment (Stockholm 1972), education has been identified in international conferences, reports and agreements as a critical key to addressing environment and development issues. And we are now in the UN Decade of Education for Sustainable Development (DESD). The overall goal of the DESD is to 'integrate the principles, values, and practices of sustainable development into all aspects of education and learning' which will in turn, it is hoped, 'encourage changes in behaviour that will create a more sustainable future in terms of environmental integrity, economic viability, and a just society for present and future generations' (UNESCO, 2008). This is a worthy goal, which has stimulated much good work internationally, but it does not question the assumptions, values and dominant epistemologies of educational traditions, policies and practices that, by default, still contribute to decline. For example, drawing on reports on sustainability in higher education in six European countries, Wals suggests 'at present most of our universities are still leading the way in advancing the kind of thinking, teaching and research that... accelerates un-sustainability' (Wals, 2008: 31). If this is valid, then layering or inserting sustainability into policy and practices that otherwise remain largely unchanged may have value, but is insufficient.

s I have argued elsewhere, sustainability 'implies a change of fundamental epistemology in our culture **M**and hence also in our educational thinking and practice. Seen in this light, sustainability is not just another issue to be added to an overcrowded curriculum, but a gateway to a different view of curriculum, of pedagogy, of organisational change, of policy and particularly of ethos (Sterling 2004: 50). What is at stake then is 'response-ability', the ability of the educational community to respond adequately to the conditions that face us and will face our graduates, and our children. Yet this is a big task. The paradox of education is that it is seen as a preparation for the future, but it grows out of the past. In stable conditions, this socialisation and replication function of education is sufficient. In volatile conditions where there is an increasingly shared sense (as well as numerous reports indicating) that the future will not be anything like a linear extension of the past, it sets boundaries and barriers to innovation, creativity, and experimentation.

A key problem is that 'education' is perceived by politicians, policymakers and the public as a system through which learning is facilitated. It is not seen as a system which itself learns. But it is very clear from the current history of attempts to 'embed' sustainability in HE that learning within educational systems, not just learning through educational systems, is required. The challenge is such that systemic learning across educational paradigms, purposes, policies and practices is required if education is to be able to foster the kind of learning that is envisaged by the DESD. So what is commonly perceived as a single learning challenge is in fact a double learning challenge. How do we work towards transformative learning in a system that itself is designed to be the prime agency of learning?

It is helpful to elaborate a distinction made between two arenas of learning, that is, between 'structured learning' – the designed learning associated with courses and programmes for students – and the social or organisational learning within institutions which needs to take place in order to facilitate the former (Sterling 2006): the degree of change possible in the former depending on the degree of change in the latter. It is also helpful to distinguish between levels of learning, as recognised in organisational learning theory, following Bateson (1972). Most universities and schools are engaged in promulgating first order learning in either arena. This is content-led and is 'learning within paradigm' which is not itself examined or questioned. This is sometimes called 'maintenance learning' in that it supports continuity and is conformative. Arguably, however, sustainability requires 'education for discontinuity', supporting not more of the same but developing radical thinking and innovation in economics, engineering, design, architecture, health and so on. In other words, sustainability requires at least second order learning, or critical reflexivity, in both learning arenas, whereby assumptions are critically examined and fresh and innovative thinking is nurtured. In short, educational institutions need to become less centres of transmission and delivery, and more centres of transformation and inquiry, less teaching organisations, more learning organisations critically engaged with real world issues in their community and region. They would be less engaged in 'retrospective education', following on from past practice, and more involved in 'anticipative education': that is, in Scharmer's words, 'learning from the future as it emerges' (Scharmer, 2006:5).

The issue here is the difference between where education arguably *should* be and where it *can* be, given structural, perceptual and other barriers. To this end, it is useful to have models of staged change that give some indication of what a more sustainable institution and education would look like. For some years on the Education for Sustainability Programme at London South Bank University (*www.lsbu.ac.uk/efs*) we have made a distinction, summarised here, between:

- Education *about* sustainability: content and/or skills emphasis. Fairly easily accommodated into existing system. Learning *about* change. Accommodative response (first order – 'bolt-on')
- Education *for* sustainability: additional values emphasis. Greening of institutions. Deeper questioning and reform of purpose, policy and practice. Learning *for* change. Reformative response (second order – 'build in')
- Sustainable education: Capacity building and action emphasis. 'Living' inquiry-based curriculum. Sustainable institutions as permeable, experiential learning communities and organisations. Learning *as* change. Transformative response (third order – 'redesign')

This model, which roughly equates with Bateson's learning levels, suggests that first order change may be a necessary early response but is not sufficient, while the third response is the most difficult to achieve, particularly at institutional level, as it is most in conflict with existing structures, values and methodologies, and cannot be imposed. 'Sustainable education' suggests a change of educational culture, shifting attention from 'adding on' some desired learning outcomes as in 'education for sustainable development' towards thinking about the kinds of education through which sustainability qualities and well-being manifest as emergent properties in the institutional and wider communities. As such it has the potential to integrate other HE agendas be they skills, employability, internationalisation, and enterprise into a broader whole which is responsive, creative and proactive.

This may sound far from the realities of everyday institutional life. But the question is how far these realities can correspond to the global and local realities of everyday life beyond academe. I am currently working at the Centre for Sustainable Futures (CSF) at the University of Plymouth, which is working – ambitiously – to 'develop the transformative potential of higher education at the University of Plymouth and beyond for building towards a sustainable future' through a five year initiative funded by HEFCE. We have made real strides towards this end, employing a holistic methodology of systemic change, working at all levels across the university, seeking synergies, building partnerships and trust, researching change, and offering support (*www.csf.plymouth.ac.uk*).

Seen as a whole, the programme has been an experiment and a learning experience, both for CSF core staff and for members of the university, which has been fed back into the process. It is no coincidence perhaps that Plymouth has won second place for two years running in the People and Planet's Green League. Yet Plymouth is a long way from being what might be termed 'a sustainable university'. At the same time, by developing and maintaining what might be called a 'critical, connective and collective intelligence' around sustainability across the university, CSF is, we think, developing the conditions by which the institution can grow its sustainability policies and practices systemically in the areas of 'campus, curriculum, community and culture': a '4C' model that has informed CSF's work since its inception in 2005.

eanwhile, all the funding councils for HE in the UK are now recognising ESD as a strategic priority. HEFCE's revised Action Plan for sustainable development will be published soon (see HEFCE 2008), and consultation on the document showed that many respondents are urging HEFCE to prioritise actions supporting teaching and learning. DIUS produced its own action plan for sustainable development in July, which makes specific mention of sustainability in the curriculum. Add to that evidence of increasing activity (Sterling and Scott, 2008) as shown, for example, by the establishment of the UUK's sustainable development group at VC level, by the Green Gowns awards and People and Planet's Green League, the work of the HE Academy's ESD Project and the vitality of EAUC – and there are grounds for hope that higher education might yet rise to the challenge of transformation, so that it might be more transformative.

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SUSTAINABLE DEVELOPMENT IN THE PROFESSIONS

SARAH ELLIS explains the role of a new Special Interest Group which aims to help professionals acquire 'sustainability literacy'

ARN and PP4SD have recently launched an online Special Interest Group (SIG) on sustainable development for professional bodies. The overall aim of this joint initiative is to encourage dialogue and disseminate knowledge and understanding about sustainable development for professional bodies. Sustainable development is becoming an increasingly important topic for all professionals. The 21st century is presenting a range of inter-connected economic, social and ecological issues that professionals are expected to address, such as corporate social responsibility, sustainability and environmental management. Professionals are increasingly required to be knowledgeable about sustainable development and how it can be integrated into their profession.

The Professional Associations Research Network (PARN) is a not-for-profit independent organisation with a mission to:

'increase the profile of issues relating to professionals, professionalism and professional bodies through research and networking with the aim of determining and promoting professional good practice.'

PARN is a centre of knowledge and expertise on issues relating to professionalism and the professionalisation of professional bodies. It provides a research enriched network for professional bodies and a range of specialist knowledgebased services and events. PARN's main activities consist of research, publishing, consultancy and networking events and our key areas of research are continuing professional development, governance, ethics and standards, membership issues and strategic management issues relating to professional bodies. The PARN research process combines the rigours of academic research with an appreciation of the practical implications of the real world. Some of our most recent research includes evaluating higher education institutions as suppliers of CPD, the online CPD market, output measurements of CPD and diversity in recruitment. PARN has done a limited amount of work on an aspect of sustainable development already. In a recent book from PARN, Professionalism and Sustainability in the Professional Associations Sector: UK and Ireland (2007), Andy Friedman applied concepts of sustainable development to professional associations and the ecology and the professionalisation of the professional associations 'sector' (chapter 2).

It is at the heart of PARN's philosophy to bring professionals together to exchange experiences, ideas and advice. The online forum will be hosted on PARN's website and will allow all SIG members to post their comments and respond to others. The SIG is open to all PP4SD supporters, all PARN members and to other interested parties who want to contribute to the debate. The online forum will allow discussions and will develop and stimulate further learning in an informal process where members can receive advice, learn about interesting practice and get information without having to wait for formal or physical networking opportunities.

We all need to be aware of how human actions affect the immediate and long-term future of the economy and ecology of our communities. We all need to learn to live and work on a planet whose resources are finite. In the UK policy context it has been noted that in order 'To maintain a more competitive economy, to compete internationally and build ourselves sustainable communities, we need to improve the knowledge and skills base of everyone, including professionals and others in the workplace... we

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SKILLS FOR A LOW CARBON AND SUSTAINABLE ECONOMY

MAUREEN and STEPHEN MARTIN argue that boosting investment in the development of green jobs will prepare us for a more sustainable future

early 80 years ago, during the Great Depression, the economist John Maynard Keynes argued that a 'New Deal' was essential if the global financial meltdown was to be resolved. The fact that conventional economic solutions were not working led Keynes to warn that the result would be 'a peregrination in the catacombs with a guttering candle'.

While most economists and politicians claim that we are not facing such a calamitous time as that experienced in the 1930s, we are faced with some serious and complex issues and this which has led to new thinking about a green new deal.

According to the authors of A Green New Deal¹ the global economy is currently facing a triple crunch - the financial crisis, climate change and peak oil. They claim this triple threat could plunge the world into a recession on a scale akin to that of the 1930s. A Green New Deal argues that the government should put in place a national plan for a low energy future and support action to implement it. But there is no such plan, no contingency for the threat of peak oil, or for security of gas supply. Nor is there a plan to develop the skills needed for a low carbon economy. The latest assessment by the Intergovernmental Panel on Climate Change (IPCC) and the Stern Review on the economics of climate change has lent a new urgency to these challenges. A more recent report by the economist Ross Garnaut for the Australian Government has warned that the world has no realistic chance of meeting the ambitious targets set by international agencies as well as those set out in the UK's recent Climate Change Bill because most of the targets are based on outdated data.

The Green New Deal identifies a need for a substantial education, training, research and development programme for the 'carbon army' of workers needed to create a low carbon world. The specifics of what is needed are difficult to define but there is a growing realisation that the expertise required covers a wide range of economic activities such as the design and production of high tech renewable energy solutions, including large scale off-shore wind and wave sources and combined heat and power units as well as skills to ensure energy efficiency in homes, offices and factories. Indeed, it is probable that the speed of green job creation will accelerate in all of our key economic sectors: finance, construction, transport, manufacturing, retail, and food production. The Green New Deal envisages that the transition to a low carbon and sustainable economy will create large numbers of new jobs across many sectors, which in themselves will become engines of development.

'Thousands of new and existing businesses and services will benefit, and a large increase in tax revenue will be generated for the government from this new economic activity.'

The positive result of both environmental benefits and new employment opportunities is referred to as the 'double dividend' – a dividend most of us would welcome to counter the current gloomy economic predictions.

But what do we know about these so-called green jobs? Are they an illusion? Will they materialise? A recent report *Green Jobs: Towards decent work in a sustainable low carbon*

The Green New Deal

- Execute a bold low-carbon energy system that will include making 'every building a power station'
- Create and train a 'carbon army' of workers to provide the human resources for a vast environmental reconstruction programme
- Set up an Oil Legacy fund, paid for by a windfall tax on the profits of oil and gas companies to pay for the programme, plus local authority green bonds, green gilts and green family savings bonds
- Make sure fossil fuel prices include the cost to the environment, and are high enough to tackle climate change by creating economic incentives to drive efficiency and bring alternative fuels to market
- Minimise corporate tax avoidance by clamping down on tax havens and corporate financial reporting, deducting tax at source for all income paid to financial institutions in tax havens
- Re-regulate the domestic financial system, cutting interest rates – including the Bank of England's interest rate – and changing debt-management policy to enable reductions in interest rates across all government borrowing
- Break up the financial institutions that have needed so much public money to prop them up in the latest credit crunch, de-merging large banking and finance groups and splitting retail banking from both corporate finance and securities dealing

¹ New Economics Foundation (2008) A Green New Deal, www.neweconomics.org

world (2008) suggests that the global market volume for environmental products and services currently amounts to about $\in 1,000$ billion which, according to some sources, will grow to $\in 2,200$ billion by 2020. Also, compared to fossil fuel powered plants, renewable energy generates more jobs per unit of installed capacity, unit of power generated and euro invested. In 2006 2.3 million people were employed globally in the renewable energy sector. Although almost half of these were growing and harvesting bio fuel feed stocks, the overall number is still considered to be a conservative estimate (see Table 1 below).

The absence of any reference to employment statistics in the UK in this report indicates a low priority and limited investment in skills development for renewable energy.

The authors of this report suggest that employment will be affected in four distinctive ways as we move towards a low carbon economy:

- 1. Additional jobs will be created, as in pollution control, environmental regulation and the manufacture of monitoring and control devices.
- 2. Some jobs will be substituted, as in the change from our reliance on fossil fuels to renewable energy sources or from landfill and waste incineration to recycling.
- 3. Some jobs will be eliminated without direct replacement, as when certain packaging material is banned and production discontinued.
- 4. Many jobs, particularly in construction and construction crafts e.g. plumbing and electrical installation, will be radically changed as skills and work routines are progressively made more responsive to environmental concerns.

Undoubtedly there are huge opportunities for universities, colleges and training providers, as well as professional bodies, to help build the skills for this growing and important market.

The Government has exhorted the education and training system to place greater emphasis on developing sustainability literacy in all education and training programmes to support more sustainable production and consumption within the economy. However, there is an economy-wide gap in skills needed to implement this policy. The current courses and specialist training facilities in colleges and training institutions are nowhere near adequate to meet the agenda being set by the Green New Deal, IPCC and Stern. Present levels of investment, both here and globally, for the development of green jobs is abysmally low.

The Stern Review noted that investment levels in energy saving technology in power generation actually fell by as much as 50% in the last two decades in real terms and energy conservation investment was a paltry \$1.1 billion in 2006. The United Nations Development Programme estimates that an effective global climate adaptation programme will require \$86 billion by 2015, a relatively small investment when compared with the hundreds of billions of dollars being poured into our unsustainable and failing global financial systems. • The authors are sustainable development consultants and advisors to the Environmental Association of Universities and Colleges. Stephen Martin is a Council

Renewable energy source	World	Selected countries	
Wind	300,000	Germany	82,100
		United States	36,800
		Spain	35,000
		China	22,200
		Denmark	21,000
		India	10,000
Solar PV		China	55,000
	170,000	Germany	35,000
		Spain	26,449
		United States	15,700
Solar Thermal	624,000-plus	China	600,000
		Germany	13,300
		Spain	9,142
		United States	1,900
	1,174,000	Brazil	500,000
		United States	312,200
Biomass		China	266,000
		Germany	95,400
		Spain	10,349
Hydropowor	39,000-plus	Europe	20,000
nyaropower		United States	19,000
Geothermal	25.000	United States	21,000
	23,000	Germany	4,200
Renewables, Combined	2,332,000-plus		

Table 1: Estimated employment in the renewable energy sector, 2006.

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SECURING THE FUTURE THROUGH PROFESSIONAL PRACTICE: GETTING SUSTAINABLE DEVELOPMENT INTO CPD

There is an urgent need to upgrade the skills of millions of professionals, says **GLENN STRACHAN**, and PP4SD is leading the way, by championing sustainable development

The challenge identified

'Government must promote a clear understanding of, and commitment to, sustainable development so that all people can contribute to the overall goal through their individual decisions.'

(Securing the Future. HM Government, 2005)

he UK Government recognises that everyone has a role to play in sustainable development. On an individual level we all make decisions as consumers and, although these decisions may be small, the multiplier effect of large numbers of consumers means that these decisions have an impact. In our professional roles the decisions we make can be more strategic and the impact of individual decisions more far reaching. Whatever the context of the decision, whether it relates to budget, procurement, choice of materials, allocation of resources, land management, design or investment, sustainable development is a factor in the decision-making process. So how are professionals meeting the Government's desire for achieving a clear understanding of, and commitment to, sustainable development?

Education and training have a key role to play as recognised by the Government Department for Innovation, Universities and Skills (DIUS) in its *Sustainable Development Action Plan 2008-9*, which is a response to the challenges set out in *Securing the Future*.

'Our future as a prosperous nation depends on our higher and further education and training systems. We rely on those systems to prepare young people fully for life, and to develop in both young people and adults the skills and knowledge that are necessary for the productive and competitive economy that underpins our quality of life and many of our national ambitions. 'And climate change will present new challenges to all sectors of the economy: workforces in all sectors and industries will need new and/or different sets of skills, capabilities and knowledge to deal effectively with them.' (*Sustainable Development Action Plan 2008-9*, DIUS, July 2008)

Bringing in different sets of skills, capabilities and knowledge demands changes to our education systems, whether initial training or CPD, which is not a quick and easy task. Traditional practices and vested interests can mean that change is painfully slow and yet the scientific predictions around climate change, loss of biodiversity and the rate of resource use are generally being revised into shorter time frames, increasing the urgency for shifting towards sustainable practices.

A review of the initial training of environmental scientists conducted on behalf of GEES¹ in 2006 demonstrated that the undergraduate training received by the majority of the environmental scientists surveyed did not prepare them for the sustainable development issues they confront as professionals, although the review did identify that some of the foundations were laid for later training.

'There is a huge gap between what undergraduate degrees in environmental subjects provide in relation to sustainable development and the sustainable development knowledge and skills required by environmental professionals. However, there was recognition that undergraduate programmes provided a basis on which to build sustainable development knowledge and skills appropriate to their professional work at a later date. About 70% of respondents had gone on to take a postgraduate qualification.' (*Integrating Sustainable Development Principles into Professional Practice: Initial training requirements for environmental scientists*, prepared by PP4SD/IES, March 2006)

There are over 5 million professionals working in a wide range of industries who are being challenged to acquire skills and capabilities that will not have been addressed in their initial training. Given the accelerating rate of the environmental, social and economic issues driving unsustainability, there is an urgency in addressing the skills and capabilities of professionals, and as DIUS points out the role of education is paramount in addressing this situation. This puts a great deal of emphasis on CPD.

This is essentially the challenge that PP4SD was set up to meet when it came into being in 1999. It consulted with professional bodies to determine the gaps in competencies that professionals felt existed in relation to sustainable development and produced a training programme to introduce the knowledge and skills that underpin sustainable development and to enable professionals to reflect on the implications of integrating the new knowledge and skills into their practice.

^{1.} The Geography, Environment and Earth Sciences subject centre of the Higher Education Academy

What are the skills and capabilities?

The original work carried out by PP4SD with 14 professional bodies along with input from the Environment Agency, WWF-UK and others developed eight principles for a sustainable society, which helped to establish a basis for the aims and content of the training programmes that followed.

In a sustainable society:

- Any materials mined from the earth should not exceed the environment's capacity to disperse, absorb, recycle or otherwise neutralise their harmful effects to humans and the environment.
- The same principles should apply to synthetic substances.
- The biological diversity and productivity of ecosystems should not be endangered.
- A healthy economy should be maintained, which accurately represents the value of natural, human, social and manufactured capital.
- Individual human skills, knowledge and health should be developed and deployed to optimum effect.
- Social progress and justice should recognise the needs of everyone.
- There must be equity for future generations.
- Structures and institutions should promote stewardship of natural resources and the development of people.

Over the last ten years there has been much debate about what the sustainable development skills and knowledge might be. Sustainability literacy has emerged as a contested term, which is generally used to refer to the learning that is necessary to change to a more sustainable way of living both individually and organisationally, in short, how we must learn to live and work on a planet whose resources are finite. However, the debate about the specific generic knowledge and skills associated with sustainable development continues. In November 2006 PP4SD held a workshop in collaboration with the Science Council to explore the skills for sustainable development; arising out of that workshop was the notion that 'capabilities' would be a better term than skills, and included in those capabilities that were seen as central to sustainable development was: 'the ability to view their professional activities in a holistic way and apply systems thinking skills when finding solutions to specific problems'.²

How does the PP4SD methodology reflect the new skills and capabilities?

PP4SD has always approached sustainable development from a systems thinking perspective and the methodology employed in the training programmes developed by PP4SD has reflected this. All PP4SD training programmes attempt to start by exploring the existing perspectives that participants have of sustainable development before introducing them to a systems perspective using among other concepts the four systems conditions of The Natural Step and the Five Capitals model. In the sustainable problem-solving resource in the PP4SD Horticulture materials³ a systems approach is taken in a cause and effect model of problem-solving.

Sustainable development is a dynamic process of change and a systems approach argues that everything is connected and that all actions have consequences. Therefore when participants in PP4SD training engage in appreciative inquiry to challenge existing beliefs and practices they are intervening and changing the status quo. The process of appreciative inquiry through dialogue is a pervasive method in PP4SD training and it is based on the belief that inquiry and change are not separate elements but happen simultaneously.

Reaching beyond the professional bodies?

The Five Capitals model has taken a central role in one of PP4SD's latest projects which was carried out in partnership with Swansea University and was aimed at delivering training in sustainable development to small and medium sized enterprises (SMEs) in the land-based sector in Wales. A large number of the target group for this project are concerned with operational rather than strategic decisionmaking. The content of the training was adapted to meet their needs while the framework of the PP4SD training programme was retained, including the systems approach, the use of case studies and the action oriented outcomes.

For professionals working in SMEs the survival of their business is often the dominant concern. Helping them firstly to recognise the five capitals within their business and secondly to recognise the inter-relatedness of these five capitals, encourages a systems perspective to sustainable development in the business context that emphasises the importance of the non-financial capitals.

The Five Capitals

- Natural Capital
- Human Capital
- Social Capital
- Manufactured Capital
- Financial Capital

Professionals working as owner-managers of SMEs or as part of a very small workforce are often unable to access training courses that take them away from the workplace for a day. Therefore the PP4SD Swansea University project

- This resource is downloadable at www.pp4sd.org.uk/downloads/land_SM.htm
- All the workbooks and resources are available to download at www.pp4sd.org.uk/UWS/UWS_intro.htm

Report by PP4SD and the Science Council on the Skills for Sustainability event held at London South Bank University on 27 November 2006



developed ways of taking the training to the workplace through supported self-study using workbooks in conjunction with the resources from the one day training programme. To aid the self-study a flow diagram (shown above) explains the links between the training course materials and the self-study workbook.⁴

The challenge continues

PP4SD continues to develop and explore new contexts including the retail sector and developing a partnership with the Professional Association of Research Networks (PARN). A new generic training manual for professionals across all sectors will be published in 2009 with an increased emphasis on methods such as diagramming and mind mapping. The idea that CPD alone can resolve the challenges of sustainable development may be unrealistic, but there is no doubt that CPD has an important role to play and PP4SD has been responding, and continues to respond, to the task of supporting sustainable development by facilitating change within CPD and through CPD. • Glenn Strachan is a Member of PP4SD Project Management Group and Senior Research Fellow at the International Research Institute in Sustainability at the University of Gloucestershire (gstrachan@glos.ac.uk).

The Natural Step

The approaches used by PP4SD owe a lot to the theory and practice of the Natural Step who were involved in the first six years of the project.

The Natural Step is an international not-for-profit organisation dedicated to education, advisory work and research in sustainable development. Since 1989, it has worked with thousands of corporations, municipalities, academic institutions and not-for-profit organisations. In the UK, Forum for the Future held the licence to use its approach.

The Natural Step Framework is a simple sciencebased tool for analysing the complex issues associated with sustainable development. It helps organisations make pragmatic decisions to move toward sustainability. It researches the science of sustainability and links it to real world applications. It creates dialogue with partners about the opportunities for and challenges of building a sustainable future.

For information about the Natural Step in the UK, see www.forumforthefuture.org/our-approach/tools-andmethodologies/TNS.

COUNTING ON EDUCATION FOR A SUSTAINABLE FUTURE

Education needs to be steered away from its fixation with selfish individualism and acquisitive competition towards personal responsibility, citizenship and ethics, says **MARTIN HAIGH**

ustainability is about living as though the future matters. Educating for a sustainable future is 'the process of learning to make decisions that consider the long-term economy, ecology and equity of all communities. Its goal is to build an enduring society. This involves learning how to anticipate the consequences of our actions, to envision a sustainable future and to create steps needed to achieve the vision' (UNESCO, 2005, p1). It is a doctrine of self-management and the development of ethical maturity. Its chief educational task is to persuade society that it is better not to consume everything today but rather to save something for the future, not least the functionality of our environmental life-support system.

Environmental education for a sustainable future, often branded ESD, 'Education for Sustainable Development', reflects a sea-change in social attitudes that impacts both society and education. Keywords are citizenship, personal responsibility and ethics. Belatedly, it is recognised that our society's self-centred, 'me-first', 'grab-as-much-as-you-can', materialistic approach to the world no longer provides the best prospect of a secure future (Berry, 1999). Similarly, faith in the market and the power of free competition to solve all of the world's ills seem to be fading along with the idea that the world is best governed through corporate boardrooms (Loy, 2000). Potentially, the financial chaos of 2008 marked the point where the tide finally turned against a worldview that lauds exploitation and greed. As US president-elect Obama suggests, our society may, henceforward, begin to insist that the first question each of us asks isn't 'What's good for me?' but 'What's good for the country my children will inherit?' (Obama, 2009, p1). However, in a world already struggling to come to terms with the prospect of a future that is very much less liveable than the present because of climate change, resource depletion, loss of habitat quality and declining human welfare, there is also a realisation that the main problem is

the way that people have been brought up to think. The chief threat to the future welfare of everyone and everything in this living world is the individual, uncaring, human mind.

David Orr asks: 'How are minds to be made safe for a planet with a biosphere?' (Orr, 1994, p204). The United Nations believes that some of the answer lies in education, which is why in 2005, it launched its Decade of Education for Sustainable Development (DESD). The DESD recognises that education, including higher education, is the key to promoting the change in social attitudes that is needed to defend the welfare of the future. It envisages an education that prepares people to become better individuals, better world citizens and be more deferential to the needs of future generations. It intends that, at all levels, existing educational programmes should be reoriented toward sustainable development. It asks that educators should take a lead in developing public awareness and understanding of sustainability and in providing the training needed to put sustainability intentions into practice (UNESCO, 2008). This means helping all learners achieve 'ecoliteracy', especially society's future leaders and policy makers (Martin and Jucker, 2004). It involves building an understanding in learners that, collectively, their personal lifestyle decisions have consequences for the whole planet. Some of these consequences are very unpleasant: adverse climate change, extinction of species, pollution, resource depletion, war, famine, pestilence and disease: environmental degradation on a planetary scale. These are facts known to almost every educated human being. However, while most people appreciate that there is a problem, most also turn away from doing anything about it, mainly on the presumption that nothing they can do personally can make any difference. Of course, multiplied some billion individual times, it is this single thought that is the greatest problem.

In 2001, UN Secretary General Kofi Annan stated: 'Our biggest challenge in this new century is to take an idea that seems abstract - sustainable development - and turn it into a reality for all the world's people' (Annan, 2001, p2). This is why education for sustainability stresses strategies that help learners connect with and accept their personal responsibilities for the welfare of other people, for the environment and for the future: the development of 'connective practices'. This is also why it stresses empowerment and works that help society develop the skills needed to cope with the challenge of securing the future. Often, this involves taking environmental education outside its classroom, outside its academic ghettos in the environmental sciences, geography, etc, to bring learners into the real world and sustainability learning into society at large. Professional Practice for Sustainable Development (PP4SD) is a good example of this kind of activity, which seeks to embed sustainability into professional practice,



'Education for sustainable development is about... believing that there is a future out there to be created and committing to... make that future the best place possible'

much as others seek to embed it into community or business thinking (PP4SD, 2008).

Swami Vivekananda once declared that 'Education is the manifestation of the perfection already in Humans. Therefore, the only duty of the teacher... is to remove all obstructions from the way... That is our duty, to clear the way' (Vivekananda, 1894, Vol. 4, p358). Clearing this way is not easy but its first stage involves envisioning what the system of education in a truly sustainable future would be like (Tilbury and Wortman, 2004; Sterling, 2001). This paper addresses this process by enumerating some key ideas worth embedding in any vision of education for a self-sustainable future.

The first principle: sustainability means living as though the future matters.

'Living as though the future matters' means prioritising the welfare of the future in policy and practical decisions made today. It involves making decisions for reasons that lie beyond the scope of simple, short-term, economics but within the realm of ethics (e.g. ethical consumerism).

Two roles for educational institutes

Educational institutes across all sectors can serve two roles. First, they can help their learners consider their personal responsibilities to the future and train them in some of the key skills they will need to realise these responsibilities. Second, they can set a good example by demonstrating how good citizenship and sustainability are practised. Through their actions, they can provide a beacon and guide for their host communities and engage with them to help them develop their own sustainability policies, practices and resources.

Three giant steps for human values

Studies by Stern and Dietz (1994) among others have recognised three sets of values that guide human proenvironmental behaviour. These are: egoistic, where the chief beneficiary is the personal self; altruistic, where the chief beneficiaries are a social group; and biospheric, where the chief beneficiary is a larger multispecies environment (Schultz, 2001). Deep Ecology, taking a more instrumental approach, tries to convert 'ego to eco' through the three step process of ecological self realisation, a concept founded in the thinking of Mahatma Gandhi and Spinoza.

Each step in this education of self-consciousness may be linked, metaphorically, to human maturation. Step one is linked to childhood, where a toddler first recognises its personal autonomy and individuality, most notably the will to say 'No!' Step two contains the woe of adolescents, who associate their identity with a social group such as family, peer group, nation, and occasionally the whole of humanity. In this, they subsume their 'I-self' within a larger 'we-self'; the same notion underpins anthropocentric eco-socialism (Coward, 2000). Step three reaches toward maturity, which is attained when the individual and society recognise that they are part of a larger wholeness: the community of all life, the human life support system; and with Gandhi recognise that all living beings are members one of another (Naess, 1987). The question remains - how can this insight be encouraged through education?

Four pillars for education

In 1996, the report of UNESCO's International Commission on Education for the Twenty-first Century agreed that education should be thought about in a more all-encompassing manner as a whole life and whole society activity. They proposed an education constructed upon four pillars:

- **1. Learning to know** using learning skills to comprehend the world and the joy that grows from understanding, knowledge and discovery.
- **2. Learning to do** building the personal competencies needed to interact constructively with people and problems and to innovate.
- **3. Learning to live together** discovering people, engaging in common projects, appreciating the interdependence and value of all beings.
- **4. Learning to be** the integral development of mind, body, intelligence, sensitivity, aesthetic appreciation and spirituality; categories that extend into ethics, empathy, citizenship responsibility and sustainability (Delors, 1996).

Five powerful Ps of invitational engagement

The Pillars show the path but leave open the question of what must be done to create a habitat where it is possible to build an education around these four pillars and help learners ascend the three steps. Clearly, there is a need to create an environment that is supportive and that invites learners to accept the opportunities that educators would provide to them. Such thoughts are the driving force behind Invitational Education (IAIE, 2008). This approach is developed in terms of Invitational Education's Five Powerful Ps: People, Places, Policies, Programmes and Policies (Purkey and Stanley, 1991).

- **1. People** should feel empowered and enabled to act in an environment of cooperation, courtesy, consideration and respect. Achieving this requires training in educational processes that include stress and conflict resolution.
- **2. Places** must be 'inviting', in other words well kept, comfortable, and supportive of learning activities. They should demonstrate sustainability values, good (natural) lighting, be well-maintained and clean both within classrooms and public spaces (Haigh, 2008a).
- **3. Policies** must be implemented that support and promote class attendance, fair grading, enthusiasm and participation within a circle of respect. Policy making should be created democratically, applied honestly, inclusively and openly.
- **4. Programmes** emphasise personal development, social and environmental responsibility, and citizenship; they should have a future-orientation and extend to community outreach, wellness and personal enrichment.

5. Processes, as Mahatma Gandhi argued, should contain congruence between their means and intended ends. The way things are done should model the best in society. In other words, these educational processes should be inclusive (democratic), ethical, honest, open and directed to goals that begin with personal development and ethical self-awareness.

A sixth P: political will

Implementation of the five Ps, however, is a matter that requires sustained political will, so P6 is politics (Fink, 1992). Dean Fink goes on to recognise 15 guidelines but the recipe for the successful implementation of the five Ps is described by means of an analogy. When a starfish wants to open a clam, it places itself on the top shell, then gently but continuously uses each of its arms in turn to keep steady pressure on the one muscle that holds the shells shut. While one point pulls the other four rest, but the single clam muscle, although strong, gets no rest and eventually, it gives way (Purkey, 1998).

Seven Cs of the curriculum and campus for a sustainable future

Once the ways and means are determined, the next step is to focus on educational structures, an educational curriculum and campus for a sustainable future. Here, it may be worth navigating the following seven Cs.

- Constructive Alignment: this means holism, joined up thinking, making the means and the ends match seamlessly. The concept emerges from the writings of John Biggs (2003), who originally applied it to linking course contents, learning objectives and assessment – but later extended the notion to the whole learning habitat including campus and management structures.
- 2. Curriculum Content: this begins with ecoliteracy, which means creating informed learners who are capable of understanding the processes of the environment and environmental change, who also understand the processes and challenges of environmental management, at least to the degree that they are capable of providing a critique of the pros and cons for most environmental interventions, and hence who are able to engage in the processes of environmental decision making. Beyond this lies the deeper issue of making minds fit for the biosphere and the future (Orr, 1994). This introduces agendas that begin with schooling in applied ethics, in the development of an awareness of personal responsibility - through exercises that aim to connect the learner to both the environment and the welfare of future generations (Macy and Brown, 1998), and continue into the disputed territory that contains the notions of citizenship, especially 'planetary citizenship' as first conceived by Rabindranath Tagore (Haigh, 2008b).

- **3. Conscience** is the core of social responsibility and its development involves helping learners realise and evaluate their own personal ethical choices and develop the custom of reflective practice. There is no way of guaranteeing that greater mindfulness will lead to greater caring about the future. However, the veil of ignorance can be lifted. The awakening and development of the individual conscience is the most important service that sustainability learning can provide.
- 4. Citizenship is a catchall term but at its core is the concept of belonging to a social group that is greater than the individual self. The problem with most definitions of citizenship is that they are divisive; they recognise a community that includes some and excludes others. The challenge is to shift the concept of citizenship to the global scale and awaken the learner to the fact that all citizens share the same, indivisible, planetary system (Seed *et al*, 1988).
- 5. Culture, these days called the educational 'corporate ethos', is important because learners are not so foolish that they learn from only what they are told and not from what they see and experience. The Dharmic religions promote the notion of the 'acharya', who is someone who leads by example, whose life is their teaching, as for example Acharya Vinoba Bhave, who walked from village to village across India promoting social equity (Bhave, 1986). Presently, UK higher education has a huge problem because of self-serving, cynical and financially driven decision-making on the part of educational leaders who conceive their role in corporate managerial terms. Education for a Sustainable Future requires a management system that demonstrates the aims of its curriculum through demonstrating openness, democracy, inclusiveness, responsibility, and that accepts accountability including a real commitment to the values and purposes of learning – not just the needs of the balance sheet. Each educational establishment should aim to act as a role model for society (Orr, 1991).
- **6. Campus:** similarly, each campus has to become a physical manifestation of the goals of the educational curriculum. It should be the physical expression of sustainability, of invitational education, and of respect for its educational values (Haigh, 2008b).
- 7. Community: finally, the curriculum and campus should not be isolated 'ivory towers', but thoroughly embedded in its community, however defined. Community concerns should drive the work on campus. Learners should involve and engage with the challenges of the community through placement, work-based and, of course through, 'seva', service learning with local social and environmental service organisations (cf. Learn and Serve America, 2008).

UNESCO's and PP4SD's eight key action themes

Of course, the PP4SD team have their eight principles, which are oriented to professional practice (PP4SD, 2008). Briefly, these argue that a sustainable enterprise should: not exceed either the environment or society's capacity to absorb, disperse, or recycle products or wastes, either through extracting materials from the Earth or by the production of synthetic materials. An admonition which, in the case of an educational enterprise, might also be applied to 'products' such as graduates. It should not otherwise endanger the vitality of our life support system, either directly or indirectly, by reducing the biodiversity or productivity of ecosystems, which creates the educational duty of ensuring that graduates understand how their actions may have adverse impacts in the environment, how these may be avoided, and how remedied. It should recognise the true value of the natural, human, social and manufactured capital that is the key to a healthy economy (PP4SD, 2008).

Education for sustainability... must involve entire institutions in creating a seamless constructive alignment of curriculum, campus, conscience, culture and educational process that extends outwards into the host community

The financial crisis of 2008 and ongoing problems in the environment will, for the foreseeable future, highlight the negative consequences of false economic valuation, shortterm accounting and an inability to plan for the long term (Obama, 2009). PP4SD also asserts that a sustainable enterprise should deploy human skills, knowledge and health to optimum effect because inequity, social injustice and greed are a large part of the global problem. It should also embody commitment to social progress and justice and recognise the needs of everyone, not least those of future generations. Finally, it should promote the good stewardship of resources and people through the development of reflective, supportive and accountable structures and institutions (PP4SD, 2008). Currently, the activities of most educational institutions fall very far short of these professional ideals.

However, education is being challenged to play a central role in leading global society towards a sustainable future (Haigh, 2008b). UNESCO, lead agency for the UN's Decade of Education for Sustainable Development, takes ESD into its larger global framework (UNESCO, 2008). UNESCO sees its priorities as building strategies that will foster peace, hope, stability, tolerance, and mutual understanding. It hopes to support local initiative, starting in every classroom, and to ensure that supportive structures (national, regional, and international) are in place. Its recipe for a sustainable future begins with basic education for literacy but it expands into eight global action themes to be addressed by the curricula of a sustainable future (UNESCO, 2005).

UNESCO's priorities are:

- **1. Overcoming poverty,** which is the driver for much unsustainable activity across the world.
- **2. Gender equity,** which includes a broader need for social inclusivity.
- **3. Health promotion,** which includes community health and recognition of the need for a healthy habitat.
- **4. Environmental sustainability** and reconstruction, which includes the conservation of the world's productive, renewable resource base.
- **5. Rural development,** which helps rural communities live well with and within their habitats.
- **6.** Cultural diversity, which recognises the sensitivities and contributions that all human cultures may bring to the future.
- **7. Peace and human security,** since social unrest and insecurity undermine all forms of future thinking,
- **8. Sustainable urbanization,** which tries to create cities that support the welfare of the future and not consume its potential.

Nine Es of sustainable development

Sustainable development is something that affects everyone. It is not only about promoting the uplift of 'developing nations'. However, this is no reason for neglecting insights that have been collected by the practitioners of international development. Iconic among these are the insights of Roland Bunch, a field worker who has done enormous service to improving the lot and habitat of subsistence farmers in Central America through promoting better land husbandry (Bunch, 1982). In attempting to teach Bunch's message to aspirant environmental managers, the author has distilled his ideas into nine Es: Encouragement, Enthusiasm, Engagement, Empathy, Ethics, Empowerment, Enabling, Employment, and Economics. The argument is that successful programmes first satisfy basic needs through making Economic sense and promoting Employment. They move ahead by Encouraging Engagement and building community-wide Enthusiasm for their goals. They Empower their client communities to take control of their own destinies and help develop the skills needed to Enable each community to function and innovate autonomously. Their activities demonstrate Empathy for the conditions of all stakeholders and demonstrate sensitivity and understanding of the Ethical implications of any action commended.

Finally

In sum, the challenge for education for a sustainable future is to re-orient education, away from its current fixation with selfish individualism and acquisitive competition, toward an emphasis on personal responsibility, citizenship and ethics. It is not adverse to business or economic activity but aims to ensure that such activity is responsible, ethical, and beneficial to the long term wellbeing of both society and environment. Education for a sustainable future is about the way we live our lives; about learning to respect the lives of others, and developing the will power and strengths of selfrestraint sufficient to conserve the viability and qualities in the world around us for a future that, individually, we will never experience. It involves creating a learning environment that fosters future awareness, also environmental and social responsibility, and that prepares each individual to accept the responsibilities of global citizenship. In this process, it tries to foster environmentally, socially and economically sustainable ways of life.

Education for sustainability has a holistic vision: it aims to help individuals to realise their role in the world. Its key attribute is ethics and it promotes the ethical integration of mind, values, behaviour and environment. It is not something that can be developed in the classroom alone. Its development must involve entire institutions in creating a seamless constructive alignment of curriculum, campus, conscience, culture and educational process that extends outwards into the host community. As several educational institutions have already realised, this is not something that yet exists, nor something that will be created easily or overnight. However, if that sixth powerful P, Political will, is applied and sustained, if a shared vision is created, then change can be advanced using the progressive improvement model, pragmatically and opportunistically, using the implementation of visible and tangible changes as the priority (Bunch, 1982). Education for sustainable development is about living as though the future mattered but it is also about believing that there is a future out there to be created and committing to working to make that future the best place possible (Laszlo, 2002).

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SUSTAINABLE DEVELOPMENT IN WALES – POLICY AND PRACTICE

Wales faces a big challenge as it struggles to reduce per capita CO_2 emissions. However, **GARETH CLUBB** makes the case that Wales could set a benchmark in sustainability that is envied around the globe

'Top of the list... of our priorities which will continue to improve the quality of life for people today and in the future... is sustainability.' Rhodri Morgan, First Minister of Wales, 8 February 2008.

ales is one of the few countries in the world with a statutory commitment to sustainable development. Welsh Ministers have a duty under section 79 of the Government of Wales Act 2006 to promote sustainable development in the exercise of their functions. The Act requires the Ministers to make a scheme setting out how they propose to implement the duty, to publish an annual report on progress, and evaluate its effectiveness every four years.

There are aspects of policy in Wales that are distinctive. For example, the stated policy objective that all new-built residential properties should be zero-carbon by 2011 (if Building Regulations are devolved in time) – in England, the same target is for 2016. And Wales (the world's first Fairtrade country) already has the lowest ecological footprint of any of the UK countries.

However, in March 2008, an independent report¹ assessed how effective the Welsh Assembly Government's activities have been in promoting sustainable development. The report concluded:

'While there is enthusiasm and willingness among the Welsh Assembly Government's partners to progress this agenda... progress between 2003 and 2008 on addressing the weaknesses identified... has been slow. In many cases,

2. Welsh Assembly Government, Starting to live differently, March 2004

the SD Scheme has become weaker in its influence and interpretation by key delivery agents. Much of this is down to the weak and inconsistent messaging, tokenism, lack of co-ordination, limited understanding, weaknesses in corporate working and bounded horizons from the Welsh Assembly Government. Much more progress is needed in interpreting the crunch issues, communicating the scale of the challenge that SD presents, integrating SD into policy, providing the structures, processes, monitoring, accountability, target setting and reporting required to progress SD in Wales. Until this is done there will continue to be limited evidence of delivery on the ground.'

So how has the Welsh Assembly Government responded to the challenges set out in the Sustainable Development Effectiveness Report?

- ◆ In February 2008, the Minister for Environment, Sustainability and Housing stated that it should be feasible for Wales to be producing more renewable electricity than we consume as a country, and so published a Renewable Energy Route Map consultation to describe how the aim could be achieved.
- In July, the Minister proposed that Welsh local authorities meet a recycling and composting target of 70% by 2025: in 2007-08, the recycling/composting rate was 32%. In October, she outlined her vision for a zero waste and zero landfill future for Wales.
- Also in July, the Minister unveiled proposals to set minimum standards for the sustainability of buildings and for the incorporation of renewable and low carbon energy technologies to meet 10% of anticipated emissions. Under the plans, homes submitted for planning permission after 1 April 2009 will need to meet Level 3 on the Code for Sustainable Homes. Furthermore, in November, a Green Jobs for Wales strategy was unveiled, although the document contains no specific target for the number of green jobs the Welsh Assembly Government hopes to create.

Of principal interest is the publication of the Welsh Assembly Government's quadrennial sustainable development scheme, on 19 November 2008. One Wales: One Planet is the Welsh Assembly Government's consultation on its third sustainable development scheme. It follows on from the first two reports, Learning to Live Differently and Starting to Live Differently², and it responds to issues raised in the Sustainable Development Effectiveness Report.

A number of important principles arise from the consultation document:

- Achieving the target of sustainable development will require 'radical changes in all sections of society', within a timescale limited to 30 to 40 years.
- All of the Welsh Assembly Government's policies will demonstrate how they will reduce Wales's ecological

Flynn, Marsden, Netherwood and Pitts, The sustainable development effectiveness report for the Welsh Assembly Government, March 2008

In terms of per capita emissions, of the 206 countries listed by the US Energy Information Administration, Wales would appear among the poorest-performing 20 countries

footprint, initially concentrating on reducing carbon emissions by 3% year-on-year from 2011.

 Policy making will consider the full range of costs and benefits, including those that are long-term and those not measurable in monetary terms.

The target set by the Welsh Assembly Government is to reduce Welsh use of global resources to the global average – 1.88 global hectares per person – by about 2045. In order to achieve this, carbon-based energy use must reduce by 80-90%, we need to be approaching zero waste status, we must source more food locally, travel by car less, and reduce income inequality.

Actions to achieve these aims include:

- Benchmarking progress on Welsh Assembly Government sustainability against UK Government departments
- Delivering a series of 'Sustainable Travel Communities'
- Aspiring to ensure that all new buildings constructed in Wales from 2011 are zero carbon
- Facilitating the generation annually of 30TWh of electricity, and 3TWh of heat, from renewable sources by 2025

Progress will be measured by five headline indicators:

- Economic output Gross Value Added (GVA) and GVA per head
- Social justice percentage of the population in lowincome households
- Biodiversity conservation percentage of Biodiversity Action Plan species and habitats recorded as stable or increasing
- Ecological footprint Wales' ecological footprint
- Wellbeing positive physical, social and mental state (means of measuring still to be determined)

Using UK measures for well-being, people in Wales have enjoyed modest improvements in mean life expectancy

- 5. Information is only available for the years specified
- 6. 2010 target emissions are 43.2 x 0.8 = 34.6Mt. Latest emission figures (2006) are 42.5Mt. Reduction required is therefore 7.9Mt, or 4.6% per year

since the early 1960s, but these improvements have been accompanied by a slight decline in average life satisfaction of around 6%. It will be interesting to see how the measure of wellbeing develops, and how influential it will be in determining policy in comparison with traditional economic measures of wellbeing.

Much will need to change if Wales is to demonstrate real progress towards sustainability and one planet living. Examining greenhouse gas emissions in particular, Wales has performed inconsistently in reducing emissions over the past 15 years; emissions of carbon dioxide in 2006 were just 1.6% lower than they were in 1990.³

In 1997, the UK committed itself to a domestic target of reducing carbon dioxide emissions by 20% below 1990 levels by 2010.⁴ One aim of the Welsh Assembly Government's Environment Strategy is to 'contribute fully to meeting UK-wide targets'. An interpretation of this aim is that the Welsh Assembly Government has a target to reduce Welsh carbon dioxide emissions by 20% below 1990 levels by 2010. A path of the 'desired emissions' can be plotted showing the steadily decreasing emissions that would have been necessary since the UK commitment in 1997 in order to achieve a 20% emission reduction by 2010 (Table 1, next page).

To meet the 2010 emissions target, Welsh emissions need to reduce by 4.6% per year between 2007 and 2010⁶. This emission reduction path is shown in Figure 1, along with the actual carbon dioxide emissions up to 2006, and the 'desired emissions' path.

Achieving the target of sustainable development will require 'radical changes in all sections of society', within a timescale limited to 30 to 40 years

The issue of 'carbon leakage' is significant for Wales. Carbon leakage can occur where domestic energy-intensive industries operate in international markets, in which their non-EU competitors are not subject to similar carbon constraints, and are thus able to gain economic advantage. The processes used in these other countries may be less efficient than in the relatively highly-regulated European market, thereby emitting more CO_2 per tonne of product. A European Commission non-paper indicated that the Commission is minded to extend free allocations to certain sectors of the steel and aluminium industries.⁷ This is significant, as in 2006 the Corus steelworks in Port Talbot was responsible for 6.6 million tonnes of CO_2 emissions, or approximately 16 per cent of all carbon emissions in Walesⁱ⁸. However, one recent report convened by Climate

^{3.} AEA, 2008, Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2006, September 2008

DEFRA, Progress towards national and international targets (accessed 2 October 2008)



Strategy suggests that 'free allowance allocation distorts the carbon price signal for efficient investment, operation and consumption choices'.⁹

In terms of per capita emissions, of the 206 countries listed by the US Energy Information Administration, Wales would appear among the poorest-performing 20 countries. For comparison, Scotland, Northern Ireland and England would all rank outside the top 50. Excluding small island states,¹⁰ Wales had the 12th-highest carbon dioxide emissions per capita in the world in 2005.¹¹

The jury is still out, and probably will be for some time to come, on whether or not the Welsh Assembly Government's policies are delivering on the sustainable development scheme. The challenge is enormous, but the prize of blazing a sustainability trail for the world is a tantalising prospect.

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- 8. Calculated from EUETS submissions
- Neuhoff K et al, 2008, *The role of auctions for emissions trading*, Climate Strategies, September 2008, p3
- 10.Smaller than 1,400km²: Bahrain, Faroe Islands, Gibraltar, Netherlands Antilles, Singapore, and US Virgin Islands.
- 11. The countries with higher per capita emissions, in descending order of per capita emissions, were: Qatar, Trinidad and Tobago, United Arab Emirates, Kuwait, Luxembourg, Australia, USA, Canada, Brunei Darussalam, Netherlands, and Saudi Arabia.

Table 1: Carbon dioxide emissions for Wales between 1990 and 2006,⁵ difference from the 1990 baseline, and difference from the 'desired emissions' required to meet the 20% reduction target by 2010.

Year	Carbon dioxide emissions (Mt)ª	Change since 1990 (percentage points)	Difference from desired emissions (per cent) ^b
1990	43.2	-	-
1995	40.8	-5.6	-
1998	43.1	-0.2	+3.3
1999	44.4	+2.8	+7.9
2000	46.5	+7.6	+14.7
2001	43.9	+1.6	+9.9
2002	37.4	-13.4	-4.9
2003	38.7	-10.4	-0.1
2004	42.5	-1.6	+11.4
2005	40.6	-6.0	+8.1
2006	42.5	-1.6	+15.0

a. AEA, 2008, Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2006. A different methodology has been used from the one used in previous years, so the data for some years have changed since the previous report.

b. Calculated by Members' Research Service

^{7.} European Commission, *Commission services paper on Energy Intensive Industries exposed to significant risk of carbon leakage* (accessed 7 October 2008)

EMPOWERING CITIZENS TO PARTICIPATE IN ENVIRONMENTAL DECISION MAKING

MARK MIFSUD offers a critical review of the global events that have shaped the development of education for sustainable development

1. Early environmental education definitions

he term 'Environmental Education' has been continuously evolving through a period of five decades or more. The two words were most probably used together for the first time internationally in 1948 by Thomas Pritchard in a meeting of the International Union for the Conservation of Nature and Natural Resources (Disinger, 1983). An early definition of the term, which later served as a basis for many subsequent efforts was coined by Stapp in 1969:

'Environmental Education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution.' (Stapp *et al*, 1969).

There are three objectives stated in this definition: knowledge of environmental problems, awareness of potential solutions and motivation to work towards solutions. However, research evidently shows that acquisition of knowledge and information will not necessarily lead to positive changes in pro-environmental behaviour (Kollmuss & Agyeman, 2002).

A number of definitions of environmental education stress the importance of values and ethics that are essential for the nurturing of an environmental ethic. One of the initial attempts to define Environmental Education was an IUCN/UNESCO 'International Working Meeting on Environmental Education in the School Curriculum' held in 1970 at the Foresta Institute, Carson City, Nevada, USA. A classic definition of Environmental Education was formed in this working meeting, which is considered to be an important landmark in the evolution of Environmental Education:

'Environmental Education is the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture, and his biophysical surroundings. Environmental Education also entails practice in decision making and self formulation of a code of behaviour about issues concerning environmental quality' (IUCN, 1970).

Nonetheless, it is relevant to note that because of the multidisciplinary and interdisciplinary nature of Environmental Education, it is often challenging to define. The discipline can focus on ecology, outdoor education, environmental science or teaching (Ramsey, Hungerford & Volk, 1992). In addition, it focuses on developing responsible environmental behaviour in individuals and social groups (Ramsey & Hungerford, 1989).

A simple and relatively effective model to define Environmental Education describes its components as 'education in, about and for the environment'. This model was developed by Lucas in 1972, and was disseminated in the school sector by the United Kingdom Schools Council 'Project Environment' in 1974. In this model education 'about the environment' is mainly concerned with providing cognitive understanding and skill development. Education 'for the environment' refers to environmental conservation and preservation for particular purposes. Finally, education 'in the environment' means a special type of instruction that usually refers to the world outside the classroom (Lucas, 1980). Therefore, education here is seen as being a vehicle for the environment, while the environment is seen as a vehicle for education (Sterling, 1992). The model is based on a perspective analysis of the literature of Environmental Education and remains one of the most influential models in the local and global context.

2. Recognition at conferences

Environmental Education was given global recognition in 1972 at the United Nations Conference on Human Environment held in Stockholm. This conference was an important landmark in the history of Environmental Education and strongly expressed the need for an international framework for its development, as well as marking the beginning of global discussions on the subject. The most important outcome of the talks was the recognition that Environmental Education was one of the most important elements of a strategy to resolve the world's environmental crisis. This conference also led to the establishment of the World Environment Day and to the United Nations Environment Programme (UNEP) in 1975. The Stockholm Declaration includes 26 principles and explains major environmental goals that humans should strive to achieve: 'To defend and improve the human environment for present and future generations has become an imperative goal for mankind - a goal to be pursued together with, and in harmony with, the established and fundamental goals of peace and of worldwide economic and social development' (UNEP, 1972). In addition the conference encouraged 'Governments and peoples to exert



common efforts for the preservation and improvement of the human environment, for the benefit of all the people and for their posterity' (UNEP, 1972).

The International Workshop on Environmental Education took place in Belgrade in 1975, and through the 'Belgrade Charter' defined the aims and objectives of the discourse, established its principles and launched the International Environmental Education Programme (IEEP).

'The goal of environmental education is to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively towards solutions of current problems and the prevention of new ones' (UNESCO-UNEP, 1976).

The goals of the Belgrade Charter were internationally recognised at the Tbilisi Conference; the world's first intergovernmental conference on Environmental Education. The Tbilisi Conference (1977) established three broad goals for the discipline that can be seen to offer the foundation for much of the work that has been done in the field:

- 1. To foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas;
- 2. To provide every person with opportunities to acquire

the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment;

3. To create new patterns of behaviour of individuals,

groups and society as a whole towards the environment. Organised by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) in partnership with the United Nations Environmental Programme (UNEP), the Tbilisi Conference is considered one of the main landmarks in the history of Environmental Education. It defined Environmental Education as 'a learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action' (UNESCO, 1977).

The Tbilisi Conference was the first Intergovernmental Conference on Environmental Education ever held and resulted in a Declaration which established a framework for international Environmental Education. Since then, the event has become the main guide for the development of Environmental Education policies around the world. The guiding principles of the Tbilisi Declaration emphasised the importance of considering the environment in its totality and that Environmental Education be considered as a lifelong process and be interdisciplinary in its approach.

3. A change in emphasis

In 1983 the United Nations appointed an international commission to propose strategies to improve human wellbeing in the short term without threatening the local and global environment in the long term. In 1987, the outcome of these deliberations was published by the World Commission on Environment and Development (WCED). The report, known as 'Our Common Future' or the Brundtland Report, deals with the environmental and development issues which were facing the world as one common challenge that needs to be tackled through collective action rather than through the pursuit of national self-interest. It examines population and human resources, food security, ecosystems, energy, industry, and 'the urban challenge' of humans in their built environment through a holistic perspective. The Brundtland Report led the way to the emergence of international agreements such as the Montreal and Kyoto Protocols, and Agenda 21, as well as the UN Earth Summits in 1992 and 2002. The Brundtland Report popularised the term 'sustainable development' and created this classic definition: 'Development which meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED,1987).

The new idea of 'sustainable development' probably influenced the methodology and epistemology of Environmental Education. It appears that Environmental Education didn't deal simply with conservation and preservation of natural areas, but challenged the very meaning of 'development'. In terms of content, Environmental Education broadened the concept of environment which was not restricted to the natural world, but also included built and social environments. Consequently, human beings and their social interactions were introduced to their surroundings, and Environmental Education gradually became the study of this new web of relations, in search of the elusive balance.

In 1988 the European Community, through the Council of Ministers, passed a resolution to 'take concrete steps for the promotion of Environmental Education so that this can be intensified in a comprehensive way throughout the community' (CEC, 1988).

The resolution included the following objective and guiding principles:

'The objective of Environmental Education is to increase the public awareness of the problem in this field, as well as possible solutions, and to lay the foundations for a fully informed and active participation of the individual in the protection of the environment and the prudent and rational use of natural resources. For the achievement of the objectives environmental education should take into account particularly the following guiding principles:

• the environment is a common heritage of mankind

the common duty of maintaining, protecting and

improving the quality of the environment, as a contribution to the protection of human health and the safeguarding of the ecological balance

- the need for a prudent and rational utilisation of natural resources
- the way in which each individual can, by his own behaviour, particularly as a consumer, contribute to the protection of the environment' (CEC, 1988).

This resolution played an important role in promoting Environmental Education in a number of European countries (Palmer, 1998), but probably did not have such an effect locally.

Timeline	Key Events
1948	IUCN conference – first use of term Environmental Education
1949	Establishment of IUCN
1968	UNESCO Biosphere Conference
1972	UN Conference on the Human Environment, Stockholm, Sweden
1975	Founding of UNEP and IEEP UNESCO/UNEP International Workshop on Environmental Education, Belgrade. The Belgrade charter
1977	UNESCO – First Intergovernmental conference on Environmental Education, Tbilisi, USSR
1980	World Conservation Strategy (IUCN,UNEP, WWF)
1987	UNESCO/UNEP Educational Congress on Environmental Education and Training. Moscow (TBILISI Plus TEN) European Year of the Environment World Commision on Environment and Development – Our Common Future – The Brundtland Report
1988	European Resolution on Environmental Education
1992	The Earth Summit – UN conference of Environment and Development
1997	Thessaloniki Declaration. Environment and Society Conference: Education and Public Awareness for Sustainability, held in Thessaloniki, Greece
2002	World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa
2005- 2014	UN Decade of Education for Sustainable Development

Figure 1: Key global events in the history and development of Environmental Education

4. Consolidation through the summits

In 1992, the UN organised a Conference on Environment and Development (UNCED), also called the Earth Summit (UNCED, 1992) in order to assess two decades of work in the field of environment following the 1972 Stockholm conference. The key issues discussed in the 1972 Stockholm conference such as desertification, marine and freshwater pollution, the destruction of habitats and wildlife and poverty had in many cases worsened (UNCED, 1992). In response to this, the outcomes of this conference were published as Agenda 21. One chapter which is directly related to Environmental Education is Chapter 36, entitled 'Promoting Education, Public Awareness and Training'. This chapter established three main areas of action in Environmental Education for Sustainable Development for the years to come including:

- Reorienting education towards sustainable development
- Increasing public awareness
- Promoting training.

Education infiltrates all of the above three areas and the document also recognises education as a 'process by which human beings and societies can reach their fullest potential. Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues' (UNCED, 1992).

In 1995, the Mediterranean Information Office for Environment Culture and Sustainable Development (MIO-ECSDE), in cooperation with UNESCO and the University of Athens, organized the Inter-regional Workshop on 'Reorienting Environmental Education for Sustainable Development'. The results of this workshop were used as the basis for the organisation of the International Conference on 'Environment and Society: Education and Public Awareness for Sustainability' that was held two years later in Thessaloniki. The most significant outcomes of the Conference were the drafting and the unanimous acceptance of the 'Thessaloniki Declaration' and a series of positions included in the volume of the conference proceedings. These fundamental documents include principles and proposals on which the follow-up process was based. Some authors such as Knapp argue that the Thessaloniki Declaration is evidence that international support for Environmental Education is decreasing as it is only mentioned in two of the 29 statements of the Declaration (Knapp, 2000). On the other hand, as a followup to the conference, MIO-ECSDE organised a 'Mediterranean Workshop on the Promotion of Education and Public Awareness for Environment and Sustainability in the Mediterranean' in 1998. An apparent positive step brought about by the Thessaloniki Conference in the Mediterranean region was the creation of a network of Environmental Educators throughout the Mediterranean cooperating with NGOs.

The World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa was organised ten years after Rio in September 2002, with the aim of assessing progress in the field of the environment in the direction of sustainable development. Poverty was expanding and environmental degradation was worsening and therefore limited progress had been registered in implementing sustainable development since the 1992 Earth Summit. There emerged the realisation that 'practical and sustained steps were needed to address many of the world's most pressing problems' (United Nations, 2002).

The Johannesburg summit established new targets which should be achieved by humanity including:

- to halve the proportion of people without access to basic sanitation by 2015;
- to use and produce chemicals by 2020 in ways that do not lead to significant adverse effects on human health and the environment;
- to maintain or restore depleted fish stocks to levels that can produce the maximum sustainable yield on an urgent basis and where possible by 2015;
- to achieve by 2010 a significant reduction in the current rate of loss of biological diversity.

The Johannesburg summit not only produced outcome documents but also resulted in the launch of more than 300 voluntary partnerships to ensure implementation and to support efforts on instigate sustainable development. These included commitments on expanding access to water and sanitation, on energy, on protecting biodiversity and improving ecosystem management, on improving agricultural yields and managing toxic chemicals.

In December 2002, the United Nations General Assembly proclaimed the years from 2005 to 2014 the Decade of Education for Sustainable Development (DESD). Governments from around the world were invited to strengthen their contribution to sustainability through focusing on education. Furthermore, the General Assembly 'invites Governments to promote public awareness of and wider participation in the Decade, *inter alia*, through cooperation with and initiatives engaging civil society and other relevant stakeholders, especially at the beginning of the Decade' (United Nations General Assembly Resolution, 2002).

There are a number of priority areas which the DESD tries to address: poverty alleviation, gender inequality, natural resources, health, rural transformation, human rights, peace, international understanding, cultural linguistic diversity and the potential of information and communications technology. The DESD emphasises the importance of education as a central strategy for sustainable development and the need to re-orientate educational policies towards sustainable living. The Decade also underlines the need to support local initiative and ensure that national, regional, and international structures provide direction and guidance for local initiatives. The main objectives for the DESD include the facilitation of networking and interaction among stakeholders in education for sustainable development; the increased quality of teaching and learning in education for sustainable development; and the provision of new opportunities to incorporate ESD into education reform efforts.

5. Conclusion

A great deal of the work on Environmental Education at the global level has been guided by the Belgrade Charter (UNESCO-UNEP, 1976) and the Tbilisi Declaration (UNESCO, 1978). Although there has been evolution in the field of Environmental Education these documents remain a good foundation of the core concepts and processes that are inherent in Environmental Education. The Brundtland Report popularised the important connection between environment and development, and increased the area of influence of Environmental Education to the built and social environments. The much publicised Rio Summit resulted in the publication of a plan of action to promote sustainable development popularly known as Agenda 21. The Thessaloniki Conference was quite influential in the Mediterranean region and led to the creation of a network of Environmental Educators throughout the Mediterranean cooperating with NGOs. The need to re-orientate educational policies towards sustainable living is the main strategy of the DESD.

All this work in Environmental Education eventually needs to find its way in the local communities, schools and individual citizens, as the ultimate goal of Environmental Education, identified by a number of international documents, is the promotion of pro-environmental behaviour. Current research indicates that there is no significant relation between environmental knowledge and behaviour (Kuhlemeier et al 1999; Makki et al 2003, Negev et al 2008). Nonetheless, a number of efforts in Environmental Education are still aimed mainly at providing environmental information (Mifsud, 2008). Research and evaluation into the effectiveness of Environmental Education programmes in achieving proenvironmental behaviour should be enhanced in order to develop programmes, methodologies and curricular material that can attain this aim. These programmes should empower citizens to effectively participate in environmental decision making and management in sustainable development (Leff, 1997). 18

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need to make 'sustainability literacy' a core competency for professional graduates.' (From Chapter 2, *Securing the Future – delivering UK sustainable development strategy*. HM Government 2005.) We hope the sustainable development SIG will help professionals to contribute to this effort.

A coordinating group has been established; this comprises members of the PP4SD network, one representative from PARN and three representatives from professional bodies. The role of the coordinating committee will be to propose topics for workshops, feed discussion topics into the forum, provide ideas for research activities. However, we hope that much of this will come from members through the online forum; as the SIG will be entirely member led and its development will depend on member participation. The sustainable development online forum can be found at *www.parnglobal.com*

In addition to the online discussion forum, PARN and PP4SD plan to organise workshops on various topics of interest to the members of the SIG. The first event will be in April 2009; it will be an opportunity for all those interested to inform how the SIG can be used to bring professionals together to exchange experiences, ideas and Environment and Development. NY, United Nations.

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advice about sustainable development.

PARN particularly supports learning through networks and cooperation so the relationship with PP4SD, a body that we have many interests and purposes in common with, will provide us and our members with valuable opportunities to share experiences and learn from others. One particular area of commonality is Continuing Professional Development. PARN has researched widely in the area of CPD and we have detailed knowledge of professional bodies' CPD policies, schemes and provision, how they support their members' CPD and how they relate to suppliers of CPD. More specifically, PARN's most recent research has looked at how professional bodies use online technologies to support their CPD policies, how universities and professional bodies are working together to create or accredit CPD provision, and how professional body members feel about their CPD and about learning online.

PARN believes the possibilities for the sustainable development SIG are vast and we look forward to developing this initiative with PP4SD and providing professional bodies with a resource on sustainable development.

• For further information or to join the online forum contact Sarah Ellis, Research Project Leader, PARN (*sarab@parnglobal.com*).

CONSTRUCTING A SUSTAINABLE BUILT ENVIRONMENT

ANNIE HALL surveys the pace of change in the construction industry and urges those who commission buildings – as well as the builders – not to compromise our future by short-term thinking

y involvement with sustainability in the built environment started with my role as Head of Partnership and Learning at the Environment Agency eight years ago, where construction was a particular focus. The built environment has a huge impact - both negative and positive - on the environment, people and the economy, as we have seen only too vividly in recent months following the credit crisis. Construction and the built environment shape our lives in ways that we all take for granted. It is not just the homes we live in and the roads and railways we travel on, but everything in our daily lives, at home, work and leisure is dependent on the infrastructure or buildings that have been, are being, or will be constructed. The question is whether or not that construction is paving the way for a more sustainable future, or one that is storing up problems that our children and future generations will inherit as our legacy to them.

The sustainability agenda has evolved over past decades out of initial concern for the natural environment. Recognition that people, our (single) planet and business profitability have an interdependency, has grown in strength and maturity across societies, and is ignored at the risk of humanity itself, not to mention whole economies (as Stern¹ identified). However, that maturity and understanding of what to do, how to do it and, importantly, to actually do it, differs greatly across countries, industry sectors and companies. The construction industry is notoriously cautious about change, so how has change for sustainability been greeted by different parts of this large and influential sector? And crucially, is the economic slow down going to adversely affect progress in this direction? I have worked with the built environment/construction sectors for almost a decade, more recently in my capacity as a Corporate Responsibility and Sustainability Consultant. My experience and knowledge of the sector suggest there is no better time

1. Stern Review on the Economics of Climate Change, October 2006

than now to push ahead with change for sustainability. The economics of a trained workforce constructing better quality structures within engaged communities; using recycled/sustainable materials, reducing waste, carbon emissions and business risk; together with lower running or lifetime costs, support this. However, the reality when funds are short is that elements described as 'sustainable options' are often the first casualties, cut out by clients. Those companies who have integrated sustainability and a responsible business ethic into their operations will be in a much better shape to withstand the economic downturn and first in line to take advantage of the upturn when it comes.

Construction – a sector of many parts

The more one works with the construction sector, the more one understands just how big and complex it is. Not just the different types of construction in terms of infrastructure, commercial buildings and housing, but the multitude of expertise involved from initial product conception, to construction of the end structure. And then you have different sized companies from sole operators and micro businesses of less than five people, to multi-national companies, operating in several different countries and largely with subcontracted workforces. Making an assessment of 'the construction industry' as a whole, in any context, is therefore somewhat challenging! No more so than when considering how sustainability has been, is being, or might in future be addressed by this formative industry sector. Perhaps one of the ways in which to assess progress and pace of change for sustainability in the construction sector is to look at examples of how some real companies, large and small, view sustainable development and what, if anything, they are doing to contribute to it.

A major engineering contractor's view

Costain Group Plc – International engineering, construction and land development Annual turnover – £877.9 million Employees – 3,622

Costain's SD journey - so far

It was just over seven years ago, when the words 'sustainable development' were increasingly commonplace, but less frequently acted upon, that Costain really started its sustainability journey. The starting point was health and safety and the need for 'tidier sites' as untidy sites presented hazards and wasted resources – a cost to people's health, the environment and to company profits. Soon after, Costain set up its Sustainable Development Advisory Group led by the Group SHE Director, Peter Fisher, with three external advisors (ConstructionSkills, Environment Agency and BAA) and three internal champions leading on social, environmental and economic issues.

As considerations around security, risk and corporate

governance grew in importance, the Chief Executive, Andrew Wyllie, set in motion a review of Costain's approach to SD in 2006. This resulted in its current strongly focused Corporate Responsibility (CR) strategy and programme which is being integrated into the whole business. Driven by its Board Sponsor Stephen Wells, Board colleagues and a CR Committee, Costain has embraced CR as the route to achieving its goal of 'Being Number One' in everything it does.

Costain's CR work² since 2006, with the support of Business in the Community (BITC) and its external CR Advisor, has positioned the company well on its way to achieving BITC Silver Award in less than two years. However, the challenges continue, with climate change and carbon emissions taking centre stage – but not at the expense of maintaining the focus on other environmental, social and economic priorities.

Drivers, challenges and benefits

Driving the change process internally are strong business imperatives, not least of which in these challenging economic times is getting new/repeat business. Increasingly, tender requirements include the highest level of CR commitment in policy and practice, and a supporting track record. Costain believes that being able to demonstrate its corporate responsibility to customers provides a commercial differential that is definitely good for business. It is working with preferred suppliers and partners to reinforce this responsibility ethic throughout its business operations and projects, through shared standards and outcomes.

One of the early challenges for Costain was persuading internal colleagues that SD was not just about environmental impacts. With 'churn' (staff turnover) rates rising due to the ever increasing number of opportunities within the construction industry at that time (and the cost of recruiting and training staff only to lose them to competitors) together with the drive to ensure established customers were happy to keep coming back to Costain, the time was right for shifting up a gear.

Already the benefits of its revised CR approach are clear to Costain. Measuring performance highlights areas of waste – materials, process, time, manpower, etc and focuses efforts to secure improvements, for example:

- Churn rates reduced
- Less materials waste reduced waste to landfill and greater recycling
- Increased staff welfare and holidays
- Reduced site pollution incidents
- Reduced business mileage and CO₂ emissions
- Trained and qualified workforce

Learning points

Whilst the journey so far could not be described as 'easy', with the usual challenges of any change process being evident, Costain has found that starting at the 'coal face' with practical initiatives certainly made a difference. Simple, practical steps taken on site by an engaged workforce, and then measured and reported back to the business, built up experience and confidence that SD/CR were worthwhile and 'do-able'. There is no doubt that strong leadership and support from the top is absolutely imperative, but engaging and empowering the workface early on in the process makes it *bappen*.

A regional developer's view

Ecos Homes Limited – A social enterprise developer Annual turnover – £1,100,000 Employees – Seven

Ecos Homes SD journey - so far

Ecos Homes was set up in 2000, with a primary focus at the outset of sustainable construction. It is a social enterprise, which covenants its profits back to Ecos Trust, a charity which sets out to create a new breed of developer (that offers training to others in the sector). Ecos Homes gives equal weight to environmental and social issues, as well as competing within the commercial market place. From the start, they recognised there was a niche market to go for and took the risk as an 'early mover' to focus the entire business on sustainable construction. Part of that risk was proving there was a market and then developing that market and securing the investment to move forward. Over the years the focus has changed towards being a small developer and employing more people directly on projects who share the same values and SD ethos with the required skills to do the work. While new contractors are emerging all the time with the relevant skills and expertise to build sustainably, this was not the case seven years ago. While most eco-homes were built as 'one-off' projects when Ecos Homes started, it is now more commonplace for housing associations to build groups of sustainable housing but still not on the scale of the major house builders.

Ecos Homes works with partners on small developments – a current project in Stawell (Somerset) is being built to Code for Sustainable Homes (CSH) Level 5, which is recognised as probably the highest CSH standard possible on small developments. Other projects are planned in Merriot (Somerset) and Bridport (Dorset) to similarly high CSH standards.

Drivers, challenges and benefits

The majority of Ecos Homes' clients are private sector, but increasingly public sector (housing association) clients are requiring sustainable housing. In future, Ecos Homes' main challenge is going to be developing more cost effective ways

^{2.} Read more about Costain's CR work at www.costain.com/index.php?p=default_index§ion=70

CARDBOARD ONLY

Right: Costain recognises that being environmentally responsible is not only a moral duty, but an integral part of good business practice. It takes precautions to prevent environmental harm being caused by its activities and is improving environmental performance on both its sites and in its offices. The 'Save it' campaign promotes recycling, the reduction of waste and improved management of materials, thus minimising the company's impact on the environment.

Below: Everything Costain does relies on good communications and the key value of being open and honest. Building relationships with communities is essential and that means providing continual information to various stakeholders. Local children are pictured talking to Costain in South Wales.



of meeting the increasingly high standards being set by government and others to achieve sustainable construction. That, and keeping up to date with innovation, new technologies, materials and techniques, will enable them to retain their market advantage in being an 'early mover' on sustainable construction. As for their supply chain, Ecos Homes admit they could be more sophisticated about influencing them, but many voluntarily attend training events held by Ecos Home.

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The company is now established in the market place – a market it now better understands. Even though the current economic climate is very tough, it believes the expectation will still be to deliver increasingly high standards of sustainable construction. To do that will not be easy, but being efficient and delivering within constrained budgets Ecos Homes believe will help them survive the downturn.

As with all small businesses, access to funding for growth is limited, but the niche market they serve puts them at an advantage in many respects as does their experience of this work across the south west region over the past eight years.

Learning points

Ecos Homes³ has been surprised by how rapidly the sustainable construction agenda has moved forward. Standards have been raised, and both government and industry have moved more quickly than anticipated to accept the need for radical change. That process of change shows no sign of slowing and Ecos Homes recognises it needs to keep up to date with the process of change if it is not to lose its early mover advantage on sustainable construction.

A small general builder's view (family business)

JJ Sullivan Building Contractors – a micro SME builder (refurbishment) Annual turnover – £250,000-£300,000 Employees – Three (plus subcontracted labour)

Sullivan's SD journey – so far

This small family business believes that sustainability is and will be increasingly important to their continuing development as a company. From the outset, being able to demonstrate to customers that they provide a quality service and care about what their customers think is really important – initially accredited via the NFB's Quality Mark Scheme. Training has been very important to the business, made possible via the CITB grant scheme at no cost to their small turnover company – it enabled father and son (both of whom are dyslexic) to achieve building related qualifications. The third family member, Veronica, provides the office and accounting skills, once again achieved via CITB grant funding which provided a real incentive to gaining formal qualifications.

Like many small/micro businesses, the current economic climate is presenting significant challenges for JJ Sullivan, as fewer people are choosing to refurbish their homes. The economic downturn is a real risk to the continuing viability of small businesses, particularly with a virtually stagnant housing market. Sustainability for this company like many other small builders means survival. However, on each project, the Sullivan team re-use/recycle as much material as possible, which reduces waste to landfill and cost to both customer and builder. They have reduced the use of their three company vehicles to one when going to site which saves emissions and fuel costs – another of the vehicles is a Toyota

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Prius. Being respectful of customers and their neighbours by keeping disruption and noise to a minimum and protecting the natural environment while on site are the other practical ways in which JJ Sullivan contributes to sustainability.

Drivers, challenges and benefits

As their main customer base is domestic housing repair and refurbishment, JJ Sullivan recognise that SD is not driven by the client so much as in the major construction projects and the public sector. They estimate that roughly a third of customers are 'SD aware' and ask for some SD related work – such as reusing materials, sustainably sourced timber, renewable energy technologies and natural light and ventilation solutions.

Customers generally appreciate a responsible approach by the company, the main benefit of which is recommendation to others for future work. However, the current economic situation is made worse by the lack of people moving house and upgrading existing properties – something that Veronica feels needs government intervention to encourage more first time buyers (e.g. raising the Stamp Duty threshold and making more in-fill land available for the development of affordable housing).

Learning points

The harsh reality in the private domestic house building market is that while there are a growing number of people who are aware of SD, ultimately cost still determines what is actually built and how it is built. The economic environment might put pressure on those who currently choose to select more sustainable construction design and build methods, to use price as the main driver in future – time will tell. However, JJ Sullivan plan to continue to learn about sustainable construction and to update their skills to enable them to compete with others for future business.

Sustainable construction survey

In April 2008 the National Federation of Builders (a trade body with a membership of some 1,700 companies) conducted a survey of over 340 members on sustainable construction. The survey results provided a valuable insight into what its members know about SD, their attitude to it, their actions to support it and what skills they have, use or need. Courtesy of the NFB and its members, the report on the research findings is available from their website⁴ and makes for interesting reading, given the diversity of membership. The NFB is currently developing ways in which it can support its members on sustainable construction in response to the survey results.

The future – CR/SD in construction companies

Whatever the type and size of company, being responsible and trying to integrate ways in which to do business successfully, without preventable adverse impacts on people

^{3.} Read more about Ecos Homes at www.ecoshomes.co.uk

^{4.} www.builders.org.uk/resources/nfb/000/261/951/NFB_Report_



and the natural environment, is now widely accepted to be good for business, good for the individual company, its supply chain and clients and for the local, national and global economies. Too often the task is seen as 'too big' and is delayed or at worst forgotten. Sustainable development should be seen as a journey, where you take a few steps at a time, not least because the destination is likely to change along the way. New technologies, research and practices inform decisions along the way, so a flexible and open mind is definitely required to make the most of the opportunities and benefits that SD can and does afford.

The start of any journey requires knowing where you are now, where you want to go to and then planning the best route for you given available methods of transport – you might also plan some stops along the way to refresh yourself. The same is true when starting your business on the sustainability journey. Since May 2007, supporting companies to do that has been the focus of my work as an independent CR/SD consultant. From my experience of working within the construction sector over the past decade, I am optimistic about a sustainable built environment being constructed – the pace of change within the sector has been truly amazing.

However, much still needs to be done and many working within the construction sector still talk more about sustainability than put it into practice. Often, though, that is because clients – and that includes people like you and me – do not demand sustainable construction solutions, or compromise when capital cost considerations outweigh long term cost savings in use.

This is truly a complex and influential sector that holds so many solutions to the sustainability agenda within its grasp. It is incumbent upon all who commission construction as well as those who build and use the end product to ensure that our future is not compromised by short-term thinking – there is too much at stake as each of the examples above, in their different ways, is demonstrating. Whether that relates to competitive market position, niche markets or just survival, each of the three companies recognise the inextricable link between the sustainability of their company and their role, doing what they can now, to contribute to a more sustainable future for all.

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BLUE WATER THINKING?

We need to think differently about Sustainable Drainage Systems (SuDS), incorporating the full range of 'sustainability' characteristics, not just technological aspects, into our drainage designs, says **CAROLYN ROBERTS**

uestions about the role of scientific research and technology within strategies for promoting 'sustainable development' have surfaced ever since the early uses of the term in the late 1970s. For some scientists, describing relevant research findings has seemed sufficient in itself to allow management of the environmental problems that currently bedevil human society. However, most people today would recognise that simply 'knowing more' about the way the environment functions is insufficient to address increasingly large-scale and complex challenges. The way society operates, the unstable economic systems on which we rely, and the politics, ethics and psychology of decision making, are now seen also to be crucial parts of promoting sustainable development. The involvement of a wide range of non-specialist stakeholders, and the social learning that needs to be undertaken to support that process, is key to securing beneficial changes.

Sustainable drainage systems (SuDS) address the increased risk of surface water flooding that typically follows from urban development. Instead of linking impermeable surfaces such as roads and roofs into gutters, and thence through sewers to nearby streams, local water storage and infiltration into the subsoil is promoted. By designing linked systems of 'green roofs', water butts, permeable paving, infiltration trenches, vegetated swales, retention basins and ponds, rainwater is led more slowly down through river catchments. If SuDS are appropriately laid out, peak flows are minimised, and there is evidence of potential improvements to water quality, or at least the reduced chance of a toxic spillage reaching natural watercourses. Suspended sediment can be trapped in substrate, and potential contaminants such as oil or excess nitrate can be degraded by microbiological activity, or taken up by plants. The flow leaving a carefully-designed system is frequently purer than the streamflow that it eventually enters. The increased infiltration also maintains soil moisture during drought, and mitigates falling groundwater

levels. Moreover, properly designed SuDs can enhance biodiversity, especially if native species are planted to enhance and extend green spaces.

Given the recognised all-round benefits, why has takeup of SuDs been so slow in England? SuDS have been promoted by the UK government for years, latterly through strategic planning documents such as *Making* Space for Water and Planning Policy Statement 25 Development and Flood Risk. Technical information, and a multiplicity of workshops and online tuition, are available for engineers. The reasons for reluctance are often conceived as technical, relating to difficulties over the legal adoption, by local authorities or water and sewerage undertakers, of systems that are partly underground and partly on the surface. It is also suggested that the 'land-take' of these systems is too high, and that developers would have to sacrifice potential housing plots to water storage features, or reduce plot sizes, making the resultant property unattractive to potential buyers. However, recent research suggests that the reasons for limited deployment of SuDS may be more fundamental than this.

Research undertaken in a Knowledge Transfer Partnership (KTP) between Gloucestershire University and Illman Young Landscape Design, a Cheltenham-based landscape architecture practice, has been exploring the characteristics of current SuDS sites. KTPs are government-supported collaborations between universities and businesses, allowing technology transfer into the private sector and business development. Almost 30 SuDS locations in England (and a small number elsewhere in the world) were investigated, including several intended as demonstration sites; most were visited and their landscapers, engineers and users were cross-examined.

SuDS designs in England can be seriously depressing. A high proportion of the investigated sites were uninspiring insofar as aesthetics and biodiversity were concerned. Some required navigation around fences, past signs warning of deep or contaminated water, and through tangled undergrowth. In others, householders were clearly trying to screen off bleak vistas of mown grass or acres of disturbed and broken pavers. A minority of schemes were clearly dangerous, broken ironmongery providing opportunity for children to clamber into deep, dark concrete tanks. Such designs may function in terms of reducing the potential flood risk, but they promote fear of water and exclude people from engaging with the environmental issues associated with development. As such these schemes cannot be considered to be 'sustainable', regardless of the 'SuDS' nomenclature.

Conversely, there were examples of wonderful landscape designs, with beautiful and accessible areas of woodland, interesting shrubs and flowering plants, and plenty

SUSTAINABILITY PAST THE POINT OF NO RETURN

What happens if our efforts to reduce CO₂ emissions fail and we experience catastrophic climate change? **ARRAN STIBBE** considers the possibility of mitigating global disaster – or living with the consequences

hey are probably all dead now, but I learned a lot from them. My early research (before human ecology and sustainability) focused on how cancer patients thought about their life before and after the moment that their doctor performed an act of social magic in declaring their illness terminal. Before, patients tended to employ metaphors of fighting, battling, and conquering their illness, metaphors which gave them energy and determination, helped them to bond with the people around them in common cause, and avoid thinking about death. After, however, the metaphor failed entirely, because the fight was lost, no preparations had been made for what came next, and sometimes bodies had been damaged by extreme interventions made in a last-ditch and unrealistic hope to win the battle (Stibbe 1996, 1997). It is with some surprise that I find this early research increasingly relevant to my research topic: responses to the unprecedented global conditions of the 21st century.

This is not the place for a detailed analysis of the figures

BLUE WATER THINKING?

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of opportunity for visitors to enjoy the views or play. In these cases, development was focused on enjoyment of the water environment, with zones of tranquil and flowing water celebrated, and encouragement to touch, smell and listen. Swedish and New Zealand SuDS, for instance, commonly promote recreational use, and many include displays explaining particular landscape features and the crucial importance of the hydrological cycle and ecosystems. Seating, fitness trails and delightful features, such as stepping-stones, had been included. Designs had drawn upon the aspirations of local stakeholders, and there was evidence of strong community backing, even where individual garden territory had been surrendered to release larger blocks of public space. Sadly, in England these areas were in a minority. - what the economist Ross Garnaut (2008) calls the 'awful arithmetic' of climate change - but merely the place to put forward some crucial trends. The first trend is that estimates of the level of CO_2 in the atmosphere that we must keep below to preserve a liveable climate tend to fall rather than rise, firstly from 550ppm, to 450pm, to a more recent figure from Jim Hansen of 350ppm (Hansen et al 2008: 217) which is well below current levels (383ppm). In line with this, targets for reduction of emissions tend to increase, recently from 60% to 80% by 2050 in the UK Government's Climate Change Bill, but with other commentators insisting on a 100% decrease by 2050 (Tickell 2008). At the same time though, global emissions are rising. The longer these emissions grow, the higher the target needs to rise and the earlier it needs to be fulfilled. Another trend is that predictions of the impacts of climate change are not keeping pace with the actual impacts observed, and are being revised to show larger, earlier impacts, such as the melting of summer Arctic sea ice. Also, something which has perhaps not been fully realised is that the first few percentage points of emissions cuts are the easiest, as obvious excesses are reigned in and savings made, but then it becomes progressively harder to squeeze out savings towards the end, for instance from 70% to 80% cuts.

All this means that if things continue on the trajectory they are on now, targets will become increasingly unmeetable, perhaps eventually becoming as absurd as a 147% reduction in CO_2 emissions by last week. At some point between now and then, there is likely to be an act of social magic in which major climate change is officially declared unstoppable and irreversible. In fact this would not be a single declaration, but a slowly building global consensus of statements from authorities that would eventually infiltrate into people's psychology. The point of no return is, after all, a psychological moment of realisation

Our research suggests that for national SuDs policies to be effective, building designs must start with the water environment, firstly working with it, and then celebrating it. People will then be more inclined to see these schemes as inspirational, desirable and accessible. A perception that SuDS are an unfortunate necessity on technical grounds, best hidden away, is unlikely to lead to widespread adoption. The required change in mind-set seems to mirror the attitudinal shift of the last two decades from a focus on 'environmental problems' through to 'sustainable development', where social, cultural and economic aspects are recognised in an integral and holistic way alongside the environmental science.

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as much as it is a physically measurable phenomenon. For James Lovelock (2006), the point of no return has already been reached, and he uses the metaphor of himself as a 'planetary physician' to perform the social magic:

'This article is the most difficult I have written... My Gaia theory sees the Earth behaving as if it were alive, and clearly anything alive can enjoy good health, or suffer disease. Gaia has made me a planetary physician and I take my profession seriously, and now I... have to bring bad news... before this century is over billions of us will die and the few breeding pairs of people that survive will be in the Arctic where the climate remains tolerable.' (Lovelock, 2006)

George Monbiot, whose book *Heat* gives one of the clearest pictures of the kind of radical technological and social changes necessary to reduce carbon emissions by 90% by 2050, may be feeling the heat himself as the numbers he based the book on increasingly appear over-optimistic. His reaction to the latest scientific evidence is as follows:

'Can we do it? Search me. Reviewing the new evidence, I have to admit that we might have left it too late. But there is another question I can answer more easily. Can we afford not to try? No we can't.' (Monbiot, 2008)

Bill McKibben has chosen Jim Hansen's figure of 350ppm, a number he uses to name a campaign aimed at encouraging the world to act and reduce carbon dioxide concentration to this level (see *www.350.org*). However, his language is very similar to Monbiot's:

'We're already past 350. Does that mean we're doomed? Not quite... we just need to stop putting more $[CO_2]$ in[to the atmosphere]... To use the medical analogy, we're not talking statins to drop your cholesterol; we're talking huge changes in every aspect of your daily life. Maybe too huge. The problems of global equity alone may be too much... And we simply may have waited too long.' (McKibben 2007)

Both McKibben and Monbiot are trying to communicate a complex message – both are aware that the trajectory they are suggesting society needs to take is completely opposite to the one that politicians are currently leading it down, and that the narrow window which would allow us to 'preserve a planet similar to that on which civilization developed' (Hansen *et al* 2008:217) is extremely narrow and closing fast. Both argue that it is still (remotely) possible to avoid runaway climate change and so we should do everything in our power to fight, but increasingly the calls resemble patients who are so obsessed with the fight that they cannot plan for the possibility of anything other than recovery.

Social magic (Bourdieu's 1991 term) occurs when a declaration of some kind profoundly changes the perception of our lived reality, such as a declaration that we are under arrest, have passed a PhD, are sentenced to

prison, are fired, are now husband and wife, or are terminally ill. If the current trajectory of increasing global emissions and increasing targets for CO_2 reduction continues, then it is likely that the voice of James Lovelock will be joined by many authorities in declaring that we are past the point of no return in terms of prevention of significant climate change. On hearing enough of these declarations, one by one, people's perception of their lived reality will change, and they will perceive that they are living in a world where the ability of the Earth to support human life is in decline. They will perceive that for many human communities around the world and a great number of species this decline is a terminal one.

My argument is that everything we do now in massively transforming our society towards a low carbon future needs to take into account the possibility (or probability) of a declaration of the point of no return in the near future. We have to ask ourselves whether the kind of measures we are putting in place would still be valuable if that point is reached. For example, a massive infrastructure of carbon capture and storage devices would be practically useless, and building it would require a high cost in terms of money and the use of the last remaining fossil fuels. The chair of the UK Government's Climate Change Committee, Lord Turner, recently suggested that, through the large-scale use of biofuels 'it is possible for the world to cut greenhouse gases while still not cutting aviation by anything like as much, even increasing aviation emissions' (in Jowit 2008). Again we must ask if, at the point of no return, we really need a large fleet of biofueled planes? What purpose would they serve, other than consuming biological resources at a time when communities around the world find it increasingly difficult to grow food and find enough fuel to survive?

Alternatively, it would be possible to build a low carbon future in ways which prove valuable at the point of no return. If diverse and resilient woodland including fruiting trees were planted on flood plains to reduce CO₂, then after the point of no return it could protect from floods, provide homes for a variety of species and provide food for humans. A robust public transport system built to reduce CO₂ emissions could prove more resilient to climatic shocks and energy crises than a much larger scale private transport system. And perhaps most importantly of all, strong communities built to craft local goods from local materials in carbon efficient ways would have the ability to work together to react to climate crises. For too long, mitigation and adaptation were seen as separate, and any talk of adaptation was seen as a declaration of surrender. Sustainable development focused almost entirely on mitigation. As the IPCC points out 'few plans for promoting sustainability have explicitly included either adapting to climate change impacts, or promoting adaptive capacity' (IPCC 2007:76). From now on, with the trajectories of targets as they are, there is little choice but to

mitigate in ways that simultaneously enhance the ability of communities to adapt if the mitigation fails.

The nature of sustainability itself changes past the point of no return. The goal of creating a stable sustainable state by using only as many resources as can be replaced by natural systems and discarding only as much waste as can be absorbed by the biosphere becomes increasingly unrealistic (though no less desirable). Instead, the ability to survive and (as far as possible) to thrive in deteriorating conditions becomes more central, with attempts made to do so in ways which slow down (or at least do not accelerate) the inevitable deterioration.

There is a further level to think about though, because the idea that we can adapt our way out of any of the calamities that climate change may throw at us could be as unrealistic as the belief that we can simply avoid climate change. As the IPCC points out:

Even the most stringent mitigation efforts cannot avoid further impacts of climate change in the next few decades, which makes adaptation essential, particularly in addressing near-term impacts. Unmitigated climate change would, in the long term, be likely to exceed the capacity of natural, managed and human systems to adapt. (IPCC 2007: 71)

There is another possible turning point then, another point of no return, when it becomes apparent that efforts to adapt cannot continue to keep pace with the rate of change. The question is, at that point, what do those communities which face annihilation do, and is it possible to start preparing for the second point of no return right now?

One answer comes from some of the voices of cancer patients speaking after the life-changing news has completely sunk in. These patients, again and again, describe the same experience: that the news has brought them to a new realisation of the preciousness of life, that they regretted all the time spent in meaningless activities, that some of the things they saw as important (salary, position, type of car, etc) no longer seem important now, and they wish that they had taken more risks, loved more, spent more time with friends and family, more time in beautiful places, more time feeling totally and fully alive. Preparing, then, for the second point of no return therefore requires realising very early on that life is precious, reflecting on what it is that is important and meaningful in that life, and ensuring that there are no regrets about missed opportunities when the turning point is reached.

What does this mean practically? To give an example: it means that tonight we turn off our central heating, our televisions, our stereos, our individual electric ovens. We pick up some left over ingredients from our cupboards and an acoustic guitar and head off for a party at a neighbour's house. The heat of bodies and laughter will keep us warm, the talking, singing and dancing will keep us entertained, and shared food will keep us nourished. The carbon savings from sharing the oven, from avoiding wasted food, and from shared heating will contribute to mitigating climate change. The strengthening of community will prepare us to work together in adapting to a changing climate and looking after each other to survive climatic shocks if the mitigation fails. And, perhaps most importantly, if adaptation looks like it is to fail too, we will at least feel that we have lived a little before we reach the ultimate point of no return. Arran Stibbe is a Senior Lecturer in the Humanities Department at the University of Gloucestershire and Chair of the Education for Sustainability Advisory Group (EAUC) (*astibbe@glos.ac.uk*).

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IES: NEW MEMBERS

The Institution of Environmental Sciences is pleased to welcome the following new members and re-grades:

Robert Ainsworth	Geo-Environmental Engineer	А	David Kemp	Environmental Consultant	Α
Maria Andrews	Customer Relations	Af	Graham Kerr	Group Manager	\mathbf{M}
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