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ENVIRONMENTAL NEWS

Future developments in agriculture

The Burntwood Memorial Lecture 2000

By Sir Colin Spedding

There are two ways of looking at this subject. One way is to examine current trends and make projections, but the track record of such forecasting is not good. Of course, in the short term, many such predictions can be made with some confidence. A good example are world population projections, where, even if birth rates should decline dramatically, it is likely that the young females yet to become of breeding age will still contribute to population increases.

Over a longer period, however, neither birth rates nor death rates can be known with any certainty and calculating the result of many interacting factors is very complex. In the very long term, no upward or downward trend can possibly continue: interest has to focus on when, how and why it changes.

The second approach is to ask what we want to happen or what we believe must happen if certain standards (of life, behaviour, environment) are to be achieved and maintained. It is hard to think clearly about such complex matters and it is in this second area that clarity tends to be so poor.

I hope to contribute to the clarity of thinking about the future of agriculture, but first it is helpful to recognise the major factors that shape the industry.

Factors that shape agriculture

Conventionally, one would start with climate, soil and available plants and animals but, if cost is disregarded, technically we can now alter or control all of these, if only by total enclosure (as in animal houses and glasshouses) in which local climate can be controlled. On a large scale, of course, climate is not controllable.

Then mention is usually made of human resources (knowledge, skills and availability) and capital: but these, too, can be provided given sufficient incentive.

Agriculture is essentially an economic activity (not necessarily expressed in monetary terms) and, in general, the shape of the industry will reflect the demand for its products. If no-one wants the products, they will not be produced: in developed countries this means that if no-one is prepared to pay for them they will not be produced. And this means paying enough to reward producers sufficiently to keep them in business. One can say something, therefore, about the future shape of agriculture if one can foresee how the factors that affect demand will change.

All this applies primarily to those who produce for sale (or, possibly, exchange).

IN THIS ISSUE

Factors affecting demand

Rather obviously the product has to be wanted by a consumer or user (agriculture is not just about food production) and the main criteria are usually

- price
- safety
- quality.

All three are relative and often subjective. What is expensive to one consumer is not necessarily to another.

Safety may depend on the user: for food, the ways in which it is kept, treated, stored and cooked affect safety and are not under the control of the producer. Safety may also depend on the age, sex, health and immunity of the consumer.

Quality means different things to different people and the only use of the term is as class-name for all those qualities that people value – such as taste and flavour in food, strength and appearance in non-foods. The consumer is thus almost all-powerful: if the consumer will not buy it, it will no longer be produced. Ignorance and the power of advertising, however, mean that what is bought is not necessarily what is needed.

These factors have operated for a long time but, in recent years, new ones have been added, concerning, not the product itself, but the way it has been produced. I propose now to concentrate on the three most important.

Methods of production

Most of the concerns about methods of production focus on their major impacts beyond their effects on the product. The three I have selected are:

1. Environmental impact;
2. Animal welfare impact;
3. Social impact.

1. Environmental impact

For the sake of clarity, it is necessary to distinguish (hair-splitting as this may seem) between 'environmental impact' and 'impact on the environment'. The reason is that there is no such thing as the environment.

Einstein defined the environment as 'everything that isn't me'. Leaving aside how few of us are really interested in everything that isn't Einstein (an increasingly difficult concept) this does illustrate that he was referring not to the environment but to his environment. Since we could all take a similar view, there are as many environments as there are people (and animals and plants!). Each of us may be part of the other's environment. We are never interested in everything that is out there – we don't even know what there is and we certainly couldn't describe all that we do know.

One can refer to the environment of a particular rabbit or person but only the really important elements will be relevant and comprehensible. My own definition of my environment is 'everything that I affect and that affects me': this could be adapted for any other organism.

It makes no sense, therefore, to refer to the effect on the environment and it is unhelpful to engage in discussion so lacking in clarity. It is perfectly reasonable to refer to environmental impact but it is then necessary to specify which aspects of what environment we are talking about. It follows that consumers cannot be concerned about 'the' environment and claims cannot be made that something is good (or bad) for it.

There are, however, some extremely important environmental concerns. Some are quite general, such as the impact of scale of farming and especially monoculture over large areas.

Past crops such as mustard seem not to be remembered when objections are raised to the patches of yellow-flowering rape: this may well be because of the sheer scale on which it is grown. One aspect of this in the recent past was the removal of hedgerows and the effect on the landscape.

But there are two more specific – and topical – concerns that greatly need clarity of thought. They are the use of agrochemicals and biotechnology.

Agrochemicals

There is a perception that the use of sprays to control weeds, pests and diseases has been excessive and worrying, partly on human health grounds and partly on those of biodiversity. Conventional farming has in fact recognised this and is moving to more moderate usage and less harmful chemicals.

Fears about food safety seem less well founded than fears about a reduction in biodiversity but the former appear to be widespread and real.

The weakness of the evidence does not appear to allay concern because, it is argued, the consequences are unknown and may be long-term. The result is a heavily emotional reaction but it also needs to be recognised by scientists that 'no evidence' does not necessarily mean 'no problem'. We may not have looked hard enough or in the right places and current methods may not be sufficiently sensitive.

One reaction to all this has been the rapid growth, though from a very low base, of organic farming.

Organic farming demands high standards of animal welfare but it is more widely associated with greatly reduced use of agrochemicals, including manufactured fertilisers.

Very few people understand the whole organic philosophy and some think it is a 'con trick'. Even fewer understand the regulatory mechanisms stemming from European Regulation for Organic Production 2092/91 or the role of UKROFS (UK Register of Organic Food Standards) in approving the six organic sector bodies (such as the Soil Association and Organic Farmers and Growers).

Not many realise that it is illegal to put the word 'organic' on a food label unless the producer is properly registered and inspected, or that the only claim made by such a label is that the food was produced by the methods laid down in the European Standards. No claim is implied about food safety or quality (however that is defined): these are beliefs held by

organic enthusiasts and many consumers, who believe that the food is likely to be safer, etc, because of the way it was produced. This whole area is peppered with misunderstandings and ignorance is widespread but this does not prevent highly charged public debate. Another similarly confused area is that of biotechnology.

Biotechnology

In spite of the long history of biotechnology (in beer and cheese-making for example) and the every-day use of complex technology by all of us in our cars and homes (e.g. television, telephones), the public are suspicious of what they perceive to be modern biotechnology and, specifically, the use of genetically modified organisms (GMOs).

Again, the concerns are partly related to food safety and partly to environmental impact: there is also an underlying feeling that scientists are going too far in directions regarded as 'unnatural'. Human vaccination was viewed with the same suspicion when it was first proposed and used.

All new developments, including technology, carry some risks and it is entirely legitimate to insist on proceeding with great caution. But it is fundamentally wrong to object to a 'technology' without regard to its purposes, its methods and its techniques.

GMO technology can be undertaken for many different purposes and it is equally unwise to ignore the benefits as it is the risks.

There are alternative ways of applying the technology. For example, the perfectly reasonable worries about the use of antibiotic-resistant markers but these are now being abandoned. The details are complex and it is never going to be possible for all of us to be well-informed about them all.

But we all have a right to contribute to the discussions – not the debate. Debate requires you to be 'for' or 'against' a proposition and should not apply to major issues, such as a whole technology.

Consider the following questions:

- 'Are you for or against knives?'
- 'Are you for or against cows?'
  (in a field, in your bedroom, on the M1?)
- 'Are you for or against killing?'
  (of what, by whom, in what circumstances?)

You cannot answer such questions 'yes' or 'no'. Quite apart from this, whenever you are exposed to two extreme or opposite points of view, there is no obligation to judge that one is 'right' and the other 'wrong' – it is perfectly possible for both to be wrong.

The need for clarity of thought is as great here as anywhere and both protagonists and antagonists tend to simplify their arguments to suit their starting positions.

Recognising that we are not required to be 'for' or 'against' GMOs should liberate us to think clearly about (or at least to explore) ways in which they could be safely developed and used for benefit as well as ways in which they may bring disbenefits. It is no use applying simplistic cost/benefit analysis, since the benefits may accrue to one group and the costs (of all kinds) be incurred by others.

2. Animal welfare

Consumers are increasingly concerned about the effect on animal welfare of the ways in which livestock are kept, although this varies widely from country to country and between people and cultures. What constitutes good welfare can only be specified for particular animals (species, size, age, sex etc) and the conditions under which they are kept.

The Farm Animal Welfare Council (FAWC) have generated international acceptance of the Five Freedoms (see Table 1) they use as basic criteria of good animal welfare.

I have recently generalised this concept for all animals for which we have a responsibility, relating good welfare to the satisfaction of basic needs (see Table 2).

Good welfare thus means satisfying the most important needs (physical and mental) of the animal concerned and this has to be specified in some detail. Consumers are rightly concerned about the way food animals are kept, transported and killed (see Table 3), about the ill-treatment of circus animals, bears kept in China for bile production, the killing of whales and confinement in zoos.

Table 1 The Five Freedoms

1. Freedom from hunger and thirst
   • by ready access to fresh water and a diet to maintain full health and vigour.
2. Freedom from discomfort
   • by providing an appropriate environment including shelter and a comfortable resting area.
3. Freedom from pain, injury or disease
   • by prevention or rapid diagnosis and treatment.
4. Freedom to express normal behaviour
   • by providing sufficient space, proper facilities and company of the animal's own kind.
5. Freedom from fear and distress
   • by ensuring conditions and treatment which avoid mental suffering.

From: FAWC (1997)

Yet how many who are horrified by hens in battery cages ever think about the size of cage they keep hamsters or gerbils in, about whether they are (or should be) kept on their own or not, whether they are free to exercise normal behaviour?

And how many contribute to the massive stray dog problem in this country due to turning out pets that have become too big, too costly to feed or too troublesome?

None of this means that poor welfare of farm animals is justified but improvement is hampered by the fact that imports from countries with worse welfare standards provide retailers and consumers with lower-cost products.

Table 2 Basic needs of animals

(a) Positive

1. Adequate and accessible supplies of suitable food (i.e. satisfying nutritional and health needs in a digestible and appetising form, appropriate to the teeth, jaws, beaks and alimentary tract of the animal concerned).
2. Adequate supplies of clean, fresh water at a suitable temperature, for drinking and bathing (where necessary).
3. Suitable conditions relating to the atmosphere (e.g. temperature, humidity, wind/draughts, gaseous concentrations and light*) and underlying surface (e.g. ground conditions, bedding, perching area). This may imply housing or shelter.
4. Adequate space and a sufficiently stimulating environment, allowing and encouraging the expression of those natural behavioural patterns that are characteristic of the animal concerned and in some way necessary for a healthy life.
5. Appropriate contact with other animals.

(b) Negative

1. Freedom from fear and stress, over and above that which is part of normal life for the species.
2. Freedom from physical abuse, mutilation and avoidable pain.
3. Freedom from disease and injury.
4. Protection from predators and parasites.
5. Protection from damaging conditions (e.g. excessive exposure to solar radiation and noise).

* Light is rather different from the other parameters but is extremely important. Animals vary greatly in their requirements, which may be quite complex, involving light quality (wavelength, natural, e.g. sunlight, composition), quantity (light intensity), daylength (patterns of light/dark) and variation in space (so that animals can seek what they want at different times). Some animals prefer to live in the dark (it follows that there is no satisfactory way in which such animals can be exhibited, for example).

From: Spedding (2000)

Table 3 Concerns about animal welfare

Close confinement	Very early weaning
Overcrowding	Bullying
Intensive feeding	Lack of shelter
Lack of food or water	Bleak environment
Lack of attention to health	Mutilations
Physical ill-treatment	'Unnatural' processes

From: Spedding (1996a)

Although better welfare does not necessarily cost more, costs can certainly be cut by disregarding welfare entirely. So our farmers may suffer from unfair competition from such cheap imports.

Even consumers who are concerned about animal welfare will often, for a variety of reasons, buy the cheaper products. Many who can afford to pay more will choose to buy, for example, free range eggs (with no assurance that this guarantees better welfare) and continue to purchase pâté de foie gras!

In fact, consumers do have the power to influence what is produced by insisting on animal products from high welfare systems. This requires informative labelling or trusted logos, such as 'Freedom Food' or the recently launched red tractor logo that is only available to food produced to high standards of food safety and animal welfare within approved farm assurance schemes.

Imports cannot be prevented, even if common standards were agreed within the EC (and this would take time and compromise). The WTO means that imports from anywhere in the world cannot be excluded on animal welfare grounds.

The best hope for improvement therefore lies with the exercise of consumer power or, more realistically, the power of the retailers, especially in relation to government. The retailers have considerable advantages (see Table 4) and, in this country, great power. Because of this power – to which many farmers object – they can, if they wish, determine that high standards of animal welfare are applied simply because they decide whether to buy it for sale or not.

Table 4 Retailers' advantages over government

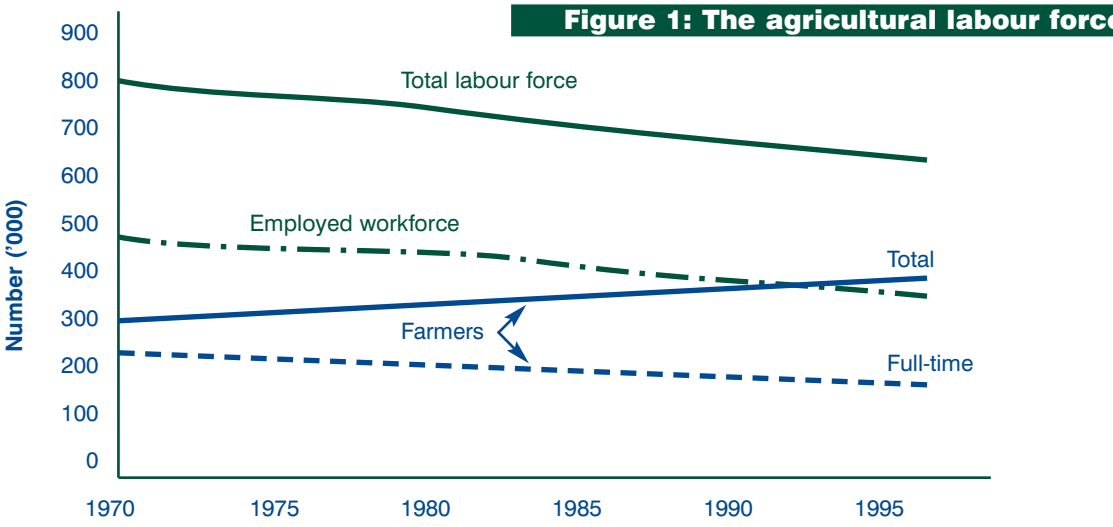
1. They can move faster.
2. Their power is not limited by national boundaries: it applies wherever in the world they source their supplies.
3. They are not bound by international trade agreements in the same way that governments are.
4. They have great power: if a supplier does not conform, his contract can be cancelled and this can represent his livelihood.
5. They have mechanisms for checking on standards: they already inspect their sources for food safety, quality and hygiene.

From: Spedding (2000)

Virtually all of the multiples have now announced that they will only source from suppliers with high welfare standards, wherever they are in the world. There is thus the possibility of (a) eliminating unfair competition and (b) bringing about the improvement of animal welfare in other countries.

One reason for retailers doing all this is that they believe that, eventually, consumers will demand that the products they buy have been produced with proper regard to animal welfare – and also to environmen-

Figure 1: The agricultural labour force



Based on McInerney (1998)

tal impact and, perhaps, social issues (especially in developing countries).

The current attitude to food produced by genetic modification well illustrates how rapidly such consumer reactions can develop.

Social issues in the UK

Numbers of farmers and farm workers continue to decline (see Figure 1) and, although public concern is expressed about this, it seems unlikely this trend will be reversed – it clearly has to stop and level out at some time.

This has implications for the rural economy but pressures for the maintenance of small farms, local and direct marketing, small abattoirs and butchers seem unlikely to affect the future shape of the bulk of UK agriculture.

Pressures for less intensive farming could have the opposite effect by reducing the resources available to provide employment.

The need for clarity of thought

I have discussed only some of the crucial issues in agriculture, chosen because they illustrate current confusion and the need for clarity.

There is one more major concept where the need is especially great: sustainability. Almost everybody seems to believe that 'sustainability' is good, desirable, even essential.

Yet babies are not sustainable and nor are any of us. Nor can we tell, given our ignorance about climate change for example, what will be sustainable in the long term. Even a cursory glance around the world shows that poverty, cruelty and suffering are perfectly sustainable and one could guarantee this continuing if we did nothing.

One of the easiest ecological systems to sustain is the desert – everything works in your favour, overpopulation, over-grazing, neglect of soil structure, etc.

The idea that sustainable equals good is ridiculous. Sustainability of good things is good; sustainability of bad things is bad – obviously. So why do people put the word into research proposals to help get them funded, attach it to any scheme they wish to promote and, in particular, any form of agriculture they favour? As currently used the concept is often a substitute for clear thinking about a subject – the equivalent of a tabloid headline.

Sustainability only means that you can carry on doing something for a very long time.

It may be a necessary condition but it can never be sufficient. This is not a novel view – I have pointed it out many times (Spedding 1995, 1996a, 1996b, 1997, 1998, 2000) and dealt in detail with what it could usefully mean for agriculture.

The most important aspect of the future was expressed by Dennis Gabor when he said, 'We cannot predict the future, we can do better than that – we can invent it'.

But great clarity of thought is required to establish what it is that we (all of us?) actually want to invent, the extent to which it is achievable and how it can best be achieved.

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Making sense of sustainability

James Wilsdon and Jonathon Porritt

The web of life

Imagine it is midnight. Everything is black. No sun, no stars, nothing. In one blinding flash, less than a ten-billionth of a second long, every particle of matter which exists today erupts in the Big Bang. Within four seconds, stable atoms have formed, but it is hours, maybe five, before the sky is dotted by the light of stars and galaxies, spinning amongst the currents of space dust. Our own solar system emerges from the debris at around 6pm.

Two hours later, life is born in the oceans, in the form of a tiny single-cell bacteria. At 10.30, the first vertebrates step onto the land, and at 11.35 the dinosaurs arrive. With ten seconds to go, our earliest ancestors pull themselves upright. It is only within the last thousandth of the last second of the day that the Industrial Revolution begins.

Yet in that tiny flicker of biological time, we have managed to ravage, pollute and undermine the support systems upon which all life depends.

Compressing the history of the universe – an inconceivably vast period of time – into 24 hours is a familiar device for getting some perspective on our current crisis. Over thousands of millions of years, the Earth has been transformed from a toxic wasteland into a rich, complex biosphere, which stretches around the planet in a thin and fragile layer.

A hundred kilometres below our feet, the planet is white hot; thirty kilometres above our heads, the air is too cold to sustain life. In between is the realm of life: a diverse, reciprocal web in which every organism is linked in some way to all the others. Microbes, plants, insects, fish, birds and mammals all play their part in the cycles of energy, nutrients and waste that flow through the biosphere.

Though you'd never know it from the natural history programmes on TV, plants are central to all these cycles. Through photosynthesis, they alone can convert sunlight into the chemical energy that animals need. They are the first link in the food chain, they regulate water, stabilise the climate and protect the soil. It was the emergence of the first algae in the oceans two billion years ago that first released oxygen into the atmosphere – a catastrophe for the sulphur-based organisms that existed at the time, but a precondition for life ever since. By acting as a 'sink' for carbon dioxide from the air, ocean-based algae still supply 70 per cent of our oxygen, and underpin the systems of order in the biosphere.

Until a couple of centuries ago, we lived comfortably within these systems, depending on the Earth's resources without affecting its ability to replace them. Then we discovered concentrated energy, in the form of coal, oil, gas and, later, nuclear power. In the past fifty years, we have begun to reverse the evolution of increased order in the biosphere. For the first time since the beginning of life, the earth is experiencing a build up of toxins in its air, soil and water at a rate which natural systems cannot absorb.

Humans are unique amongst all living creatures, both in our capacity to create and to destroy. Our ability to utilise the Earth's resources has enabled us to multiply at an extraordinary rate, and has led to enormous advances in civilisation, health and quality of life. But in the past thirty years, we have come to realise that we cannot continue indefinitely down this path. Our systems of production and consumption are taking us beyond critical thresholds in the use of non-renewable resources and the assimilation of wastes. The effects of this – air pollution, climate change, loss of biodiversity, deforestation, soil erosion and water scarcity – are visible all around us.

After 250 years of industrialised progress, the web of life is starting to unravel.

Moreover, even with all these resources at our disposal, we have still failed to create a world in which everyone has access to the basic requirements of food, shelter, healthcare and education. The statistics are no less shocking for their familiarity: 1.3 billion people live in absolute poverty; 35,000 die each day from hunger-related causes; the richest 20 per cent own 86 per cent of the world's resources, while the poorest 20 per cent own less than 2 per cent. If this is the situation now, we need to ask ourselves what it will be like in 2025, when the world's population will exceed 8 billion.

There is no consensus among scientists over the exact degree of the threat we face. The Earth is hugely resilient and has withstood many shocks to its system in the past, including meteorites, ice ages and volcanic eruptions. What we do know is that current levels of resource use and pollution are taking us far beyond the Earth's restorative capacity, so that we need to look urgently for alternatives.

Ours is the first generation to have been able to look down on Earth from the outside, to be able to conceive of it as a closed system, and to understand its limits. With that realisation comes responsibility. Many of the solutions necessary to restore the Earth's ecological and social balance already exist. Now we must start putting them into practice.

This is the challenge of sustainability.

Defining sustainability

Uncertainty over what we mean by sustainability is one of the biggest barriers to achieving it. The plethora of definitions scattered through books, journals and reports (one recent study found over 200!) can leave even the best informed reader feeling very confused. But in reality, sustainability is quite simple. It refers to the capacity for continuance into the long-term future. Anything that can be done indefinitely is sustainable. Anything that cannot is unsustainable.

Perhaps the most helpful way of understanding sustainability is in terms of the economic concepts of

capital and income. Sustainability depends upon maintaining, and where possible increasing our stocks of certain assets, so that we manage to live off the income without depleting the capital.

There are five main types of capital:

- **Natural capital** is any stock or flow of energy and matter that yields valuable goods and services. It includes resources, some of which are renewable (timber, grain, fish and water), whilst others are not (fossil fuels); sinks which absorb, neutralise or recycle wastes; and processes, such as climate regulation. Natural capital is the basis not only of production but of life itself.
- **Human capital** consists of our health, knowledge, skills and motivation. Investing in human capital – for instance, through education – is vital for a flourishing economy. Failure to invest generates poverty, which is both morally indefensible and socially inefficient in that it prevents millions of people from fulfilling their potential and becoming engaged in the creation of wealth.
- **Social capital** is the value added to any activity by human relationships and co-operation. It is located in social structures or institutions such as families, communities, businesses, trade unions, schools, and voluntary organisations.
- **Manufactured capital** comprises material goods – tools, machines, buildings, and other forms of infrastructure – which contribute to the production process, but are not used up in it.
- **Financial capital** reflects the productive power of the other types of capital, and enables them to be owned and traded.

Our wealth depends on maintaining an adequate stock of each of these types of capital. If we consume more than we invest, then our opportunities to generate wealth in the future will inevitably be reduced. Sustainability can only be achieved if the stocks of capital are kept intact or increased over time.

At the heart of the current environmental crisis is the way in which we are unsustainably depleting natural capital, to the extent that the ability of the Earth to support the projected levels of human population in the next century at any level, let alone at the standard of living we in the industrialised world enjoy, is seriously brought into question. Sustainability can only be achieved if the impacts on the Earth's ecosystems are kept within limits that allow them to function properly.

Sustainable development

But sustainability is about much more than just protecting the environment. The social dimension is equally vital, and this requires available resources to be distributed fairly, both now and between ourselves and future generations.

This brings us to the concept of sustainable development, which is the process by which, over time, we succeed in managing all the different capital flows in our economies on a genuinely sustainable basis. Sustainable development is a dynamic process, which enables all people to improve their quality of life, whilst at the same time protecting and enhancing the Earth's life support systems.

It was the Brundtland Commission's 1987 report *Our common future* which popularised the idea of sustainable development, with its now famous description of 'development which meets the need of the present without compromising the ability of future generations to meet their own needs.'[1] Five years later, at the Rio Earth Summit, sustainable development leapt onto the political agenda, when 153 governments endorsed a 'sustainable development action plan', known as Agenda 21, and agreed a package of measures to tackle problems such as climate change and loss of biodiversity. In 2002, world leaders will meet again to review progress and set fresh targets for tackling the environmental and social challenges of the 21st century.

Beyond eco-efficiency

Agenda 21 emphasises that all sectors of society must work together if sustainable development is to become a reality. One of the most significant developments at Rio was the entry of business into the sustainability arena.

Business has shown particular enthusiasm for the idea of eco-efficiency. This has been defined by the World Business Council for Sustainable Development as 'the delivery of competitively priced goods and services which satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout the life-cycle, to a level at least in line with the Earth's estimated carrying capacity.'[2] In other words, it means doing more, better, with less.

There's no doubt that eco-efficiency can make a major contribution to reducing resource use and pollution. But at the same time, business as usual, with a bit of bolt-on eco-efficiency will not deliver sustainability. As Tom Gladwin, Professor of Sustainable Enterprise at the University of Michigan, points out, attempts to 'green the rich' whilst ignoring the need for poverty alleviation amount to little more than rearranging the deckchairs on the Titanic. A commitment to equity and improved access to opportunity is fundamental to any serious strategy for sustainable development.

Over the past ten years, business has found it relatively easy to respond to the environmental aspects of sustainability. Yet the social aspects – the question of how to channel the gains from greater efficiency towards bringing the world's rapidly growing population up to an acceptable standard of living – is one that it has barely begun to address.

The real challenge of sustainability is to combine greater efficiency in our use of resources with a new understanding of sufficiency in our attitude to consumption and quality of life. This challenge applies to business as much as to consumers themselves. Virtually any product or service sold by business is going to have an environmental impact. Eco-efficiency offers wonderful opportunities to slash that to a minimum. But if the product to which it's applied has

no place in a sustainable society, then we're right back to where we started: remodelling the deck-top seating plan while the iceberg hoves into view.

The science of sustainability

The debate over eco-efficiency is a good illustration of the way different groups in society have tended to develop subtly conflicting interpretations of the sustainability message, despite the availability of clear definitions (such as the one above based on the different types of capital). One way around this is to move beyond definitions, and looking instead at the underlying science of sustainability.

Madonna's mid-80s hit 'Material World' celebrates the affluence of consumer society. But it also reflects a basic truth: that our most vital needs (food, water, shelter and fuel) rely on flows of energy and material through the biosphere. Without these, we could not survive. In an industrialised economy, our material interactions with the environment go far beyond the basic requirements of food and shelter, to encompass an ever-expanding range of consumer goods and services. Yet despite this complexity, our economy operates according to the same set of physical laws which govern all material systems:

- *The law of conservation of energy and matter (the first law of thermodynamics)*
  All economic activity involves the transformation of energy from one form to another. The first law of thermodynamics tells us that nothing ever disappears or is created during these transformations. The total energy input always matches the output. In other words, the concept of 'waste disposal' is an illusion; the natural resources that we consume are not destroyed but are converted into industrial products and molecular waste. Waste can change its form, but it cannot be thrown away because there is no 'away': the Earth is a closed system.
- *The law of increasing entropy (the second law of thermodynamics)*
  If energy cannot be destroyed, it would seem logical that we should keep re-using it without ever needing to obtain any more. The second law of thermodynamics shows why this is impossible. It tells us that energy becomes less productive over time through a process known as entropy. Put simply, entropy means that everything spreads: all matter has a tendency to decay and disperse. Steel eventually rusts, coal is burned, and wood turns to dust. The first law is about the quantity of energy, but the second law is about the availability of that energy to perform useful work, and therefore less valuable, as it passes through successive transformations.
- *The source of material quality*
  It follows that what we consume is not matter but order: the concentration or quality of energy and material. The value of oil lies in the fact that it releases energy through combustion. We do not consume that energy, but we benefit from its release. Similarly, iron has value in a concentrated form as the basis of steel, but in making steel what we consume is not the actual iron, but the qualities of its structure. It is the availability and maintenance of this order that determines human prosperity: if we consume it faster than it can be replaced, we are becoming poorer.

But if matter is always being dispersed, how is it that we continue to develop an ever more advanced economy? Where does the energy come from? The answer, of course, is the sun, which keeps disorder at bay through its constant flow of energy to the Earth. Over billions of years, the Earth has developed a complex network of material cycles which use this solar energy to counteract the tendency for materials to decay or dissipate through transformation.

Plants are the basis of this process, since only they can convert sunlight into energy through photosynthesis. The interaction between plants and animals, along with the rhythms of the climate, minerals, water, sun and tide, constitute the cyclical basis of life. These cycles – the carbon cycle, nitrogen cycle, and phosphorous cycle – had been self-regulating for millennia, until the recent past when humans began to access vast stores of high-quality energy in the form of oil, coal and gas. Armed with this supply, we have created a global consumer economy, built vast cities, and put people on the moon. But these advances have come with a heavy cost attached; our unsustainable behaviour is now undermining the capacity of the Earth to support life, and we still don't seem to understand that our complex social and economic systems are entirely dependent on those natural systems continuing to build order and quality.

These scientific laws are fine in theory, but how do we translate them into a useful set of principles that can help us shift to more sustainable patterns of development? It was this challenge that motivated the Swedish scientist Karl-Henrik Robért to develop a model of sustainability known as The Natural Step. At the heart of The Natural Step lie four key concepts, or 'system conditions', which collectively define the conditions that must be met for society to live sustainably within the Earth's supportive capacity. It is only by understanding how the biophysical world works that we can understand how we need to operate our human systems so that they do not breach biophysical limits.

For our societies to be genuinely sustainable, the diversity and productivity of the natural world must not be systematically undermined by:

1. increasing concentrations of substances extracted from the Earth's crust. This means that in a sustainable society, fossil fuels, metals and other materials are not extracted at a faster pace than their slow redeposit into the Earth's crust.
2. increasing concentrations of substances produced by society. This means that in a sustainable society, substances are not produced at a faster rate than they can be broken down by nature.
3. over-harvesting or other forms of ecosystem impoverishment. This means that in a sustainable society, the productive surfaces of nature are not diminished in quality or quantity, and we must not

harvest more from nature than can be naturally replenished.

4. At the same time, resources must be used fairly and efficiently in order to meet basic human needs worldwide. This means that in a sustainable society, basic human needs must be met with the most resource-efficient methods possible, including a just resource distribution.

The Natural Step is a powerful means of opening eyes and minds that have previously been closed to the imperatives of sustainability. It uses our scientific knowledge of the way the Earth works to provide a framework for sustainability that can be applied at any scale: households, companies, communities or countries. The four system conditions operate as a compass to help us navigate our way towards sustainability. If we act according to these conditions, then *homo sapiens* should survive as a species. If we continue to live as if in total ignorance of them, then our prospects appear bleak.

The drive towards sustainability is based on a recognition that we need to live within the constraints of the Earth's life-support systems. Current patterns of production and consumption have placed these systems under enormous strain. The recently published Living Planet Report estimates that the Earth has lost more than 30 per cent of its natural capital since 1970.[3] Before we can explore ways of reversing this trend, we will need to identify the major pressure points and prioritise our actions accordingly.

■ *Forum for the Future, 9 Imperial Square, Cheltenham GL50 1QB.*

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1. World Commission on Environment and Development Our Common Future, Oxford University Press, 1987
2. L. DeSimone & F. Popoff Eco-Efficiency: The Business Link to Sustainable Development, MIT Press, 1997
3. Worldwide Fund for Nature Living Planet Report, October 1998

Birds and agriculture

Dr Jeremy Greenwood, Director, British Trust for Ornithology

There have been serious losses of bird populations breeding on farmland in recent decades. A few farmland species have increased in numbers but many more species have declined. In most other habitats, by contrast, the numbers of decreasing and increasing species have been roughly equal. The losses are nationally important because 45 per cent of the area of Great Britain is managed grassland or arable land. Thus even species that prefer other habitats may have large parts of their populations on farmland – 45 per cent of Blackbirds live on farms for example, although suburban gardens are the species' preferred habitat.

Thousands of amateur birdwatchers

Farmland birds are in trouble over much of Western Europe. We know far more about both the scale and the causes of the problem in Britain than anywhere else because of the efforts of thousands of amateur birdwatchers, who conduct systematic bird counts each year, in a long-term programme co-ordinated by the British Trust for Ornithology. BTO is an independent research charity whose nearly 12,000 members cover 40 per cent of the trust's costs through subscriptions and donations. In addition they put in 10 to 40 times as many person-hours to the trust's work each year as do the staff of around 80 people. As a result, the trust is able to conduct not only long-term monitoring of bird populations but also specific research focused on issues that are raised by the monitoring – like the reasons for the decline of farmland birds.

The major period of decline for farmland birds began around 1977, slowing (but not ceasing) in the late 80s. With a few years delay in the start, this coincides with a period of rapid change in British farmland, mainly dependent on technological advances – especially mechanisation, artificial fertilisers and pesticides. The long-term nature of BTO data allows us to point clearly to the coincidence in time between the

Percentage change in breeding populations of representative farmland birds over the period 1970-98

Tree Sparrow	-87	Skylark	-52	Greenfinch	-2
Corn Bunting	-85	Reed Bunting	-52	Goldfinch	+10
Grey Partridge	-82	Yellowhammer	-43	Little Owl	+17
Turtle Dove	-77	Linnet	-38	Whitethroat	+34
Starling	-58	Kestrel	-17	Stock Dove	+140
Lapwing	-52	Yellow Wagtail	-13	Jackdaw	+148

rapid declines of bird populations and the intensification of farming.

Mechanisation has meant less waste grain (so less food for birds) and the more frequent mowing of grass, interfering with nesting. Fertilisers have replaced leys and farmyard manure, both of which benefit invertebrates and thus the birds that feed on them. Many birds need a varied landscape to provide all the resources they need but, since dung is no longer needed to fertilise crops, mixed farming has declined and there is less reliance on traditional rotations to control pests and to build fertility. Pesticides reduce the numbers of seeds and insects that are available for birds. Pre-emergence herbicides have allowed a switch from spring- to autumn-sown cereals, removing the stubbles that were important feeding grounds for birds in winter.

The volunteers do not just count birds. They record their breeding success, sending in details of over 30,000 nesting attempts each year. They also put rings on the legs of some 800,000 birds each year; when the bird is later recaptured or found dead we can get information on both migration patterns and on mortality rates. Since changes in numbers are driven by breeding (input) and death (output), this allows demographic models to be built, the core of a programme of Integrated Population Monitoring. Such analyses allow us, for example, to pinpoint the cause of the decline of the Song Thrush as being increased mortality of first-winter birds.

Man is taking more out of the land

The decline in the Skylark population appears to be largely a result of the conversion to autumn-sown cereals. These are too tall by the later part of the breeding season, so significant numbers of Skylarks are prevented from producing second and third broods, or even from breeding at all. The Lapwing has declined largely because of the loss of mixed farms, which provided spring cereals for nesting and pasture close by for rearing chicks. Many of the species that are in trouble are seed eaters, which generally seem to breed successfully enough but to survive less well because of lack of food outside the breeding season. Combining has done away with stack yards (where many seed-eaters used to flock) and has reduced the spillage of grain in the fields; herbicides have reduced the numbers of weed seeds produced; and autumn cultivation has buried the seeds that would otherwise have lain available in stubble. The problem may be summed up simply: man is taking more out of the land, leaving less for birds and other wildlife.

The problems are not confined to the classic arable regions of the east and south. Ninety percent of British grassland was agriculturally improved or semi-improved in the 20th century, through drainage, reseeding and the use of artificial fertilisers; silage has displaced hay; sheep have proliferated, grazing away cover for ground-nesting birds and trampling nests. Changes in the soil and vegetation have reduced invertebrate numbers (as have residues of anthelminthics in the dung). As a result, many birds primarily associated with grassland areas have declined and many farmland species no longer occur in parts of west and north Britain.

Set-aside is preferred over crops

Set-aside, though designed to curb overproduction rather than to benefit wildlife, may well have been good for birds. The vegetation on set-aside is patchy, sparse and weedy and it receives no fertiliser or pesticides, so it should provide more food and more nesting sites for birds. The results of BTO studies are clear: set-aside is preferred over crops, especially winter cereals, by most birds. Most species mainly use parts of the field within 20 metres of the hedge, so the most beneficial layout of set-aside, in terms of birds helped per hectare, is to have it in broad strips around the edges of fields rather than over entire fields. (Skylarks, preferring the centres of fields, would not benefit from this arrangement.)

On organic farms, the exclusion of synthetic pesticides and fertilisers, the use of crop rotations and mixed regimes should all benefit wildlife. Weeds, especially those whose seeds are eaten by birds, are more abundant on organic farms, as may be some invertebrates important to birds. Furthermore, organic farmers tend to manage non-crop habitats more sympathetically. Hedges, for example, are taller, thicker and more numerous on organic farms. The numbers of birds are certainly greater on organic than on conventional farms, in both summer and winter, but it is difficult to place exact figures on the scale of the difference, despite the large sample sizes that are available through the involvement of so many volunteer fieldworkers. The reason is that there is so much variation in numbers from farm to farm. Such variation bedevils any investigation of farmland wildlife. It can only be overcome by careful attention to the design of the study and by having sample sizes so large as to be impossible in a purely professional study.

The half-informed not infrequently point out that the farmland habitat is artificial, created by man over thousands of years; thus, they say, the loss of farmland birds is merely the loss of species that should not anyway be numerous in Britain. This ignores the obvious fact that the original spread of open-country birds like Lapwings and Skylarks was at the expense of woodland species, yet the latter are not now returning – we are, rather, being left with a void. A less obvious point is that many of our farmland birds are essentially birds of woodland and scrub that happen to be able to use farmland; the number of species that actually benefited from the ongoing woodland clearances was probably quite small.

Losses of woodland birds have recently started to become apparent. No one knows the causes. We can be sure, however, that the birdwatchers of Britain will bend their efforts to delivering the data that will help us find out, just as they have done in respect of farmland birds.

■ *Reprinted from Science in Parliament, Vol 57 No 2 with the kind permission of the publishers.*

UK announces new packaging targets

An estimated 4.7 million tonnes of packaging waste is expected to be recovered as a result of new packaging waste recovery and recycling targets released by the Environment Minister Michael Meacher. These figures will help ensure that the UK meets its compliance commitments under the 1994 EU Packaging Directive.

The first recovery and recycling targets which member states must reach under the European Packaging Directive come into force in 2001, and the obligations placed on UK producers, under the Packaging Regulations, are central to the UK meeting these targets.

Under the Packaging Regulations the targets are 56 per cent for recovery and 18 per cent for material-specific recycling of packaging waste, applicable for 2001. These replace the proposed targets of 52 per cent recovery and 16 per cent for material-specific recycling. These targets apply to companies who handle over 50 million tonnes of packaging and who have a turnover of more than £2 million.

Increased paper recycling proposed

The European paper industry has pledged that it will recycle an additional 10 million tonnes or more of recovered paper by 2005, in a voluntary declaration announced by the Confederation of European Paper Industries (CEPI) and the European Recovered Paper Association (ERPA).

The industry maintains that the recycling rate was 38.8 per cent in 1990 compared to 48.7 per cent in 1999. These figures can be improved upon and the above organisations, along with others in the paper chain, have voluntarily taken on the target of 56 per cent recycling rate by 2005. This figure will be applicable across the EU rather than for each member state since collection and recovery rates differ from country to country.

Signatories to the European Declaration on Paper Recovery have shown their commitment to:

- further reducing the production of waste in the paper and board life cycle
- improving efficiency of raw and auxiliary materials use
- sharing expertise with organisations responsible for collection systems
- stimulating and supporting further research and development
- improving consumer awareness of paper recycling
- aiming to ensure that by 2005 at least 56% of the paper and board products consumed in Europe will be recycled.

Director General of CEPI, Marie Arwidson, hoped that the declaration would encourage the European paper and board industry to commit to environmental concerns and contribute to achieving the targets. Further, she commented that 'we would be willing to continue work towards achieving a voluntary environmental agreement with the European Commission' in a step to contribute to sustainable development.

The declaration was prepared after consultation and broad cooperation with other organisations in the paper chain and a newly formed European Recovered Paper Council (ERPC) will monitor progress.

Top UK businessman to chair G8 renewable energy taskforce

The Prime Minister has announced that Sir Mark Moody-Stuart, Chairman of the Royal Dutch/Shell Group, has been appointed co chair of the G8 Renewable Energy taskforce.

The Prime Minister said Sir Mark would bring valuable business expertise to the group together with his long experience in the energy sector and his interest in promoting renewable technology. He will co-chair the taskforce with Dr Corrado Clini, Director General of the Italian Environment Ministry.

G8 leaders in Okinawa called for 'all stakeholders to identify the barriers and solutions to elevating the level of renewable energy supply and distribution in developing countries'. The taskforce will report to next year's G8 Summit in Genoa.

The UK successfully persuaded the G8 that it should launch an initiative on renewable energy. Some 2 billion people in the world do not have access to electricity. Renewable energy can make a real difference to these people's quality of life with obvious benefits for health, education, heat and light.

Renewable energy is a key component of promoting sustainable development, with minimal polluting effects and avoiding a dramatic increase in global warming. At Okinawa, G8 Heads of Government agreed to set up a taskforce to identify the barriers to increasing the level of renewable energy supply and distribution. Its goal is to prepare firm practical recommendations for making a step change in the level of renewable energy supply and distribution. The taskforce will have a small core group of business and government representatives but from the start will involve developing countries, non governmental organisations, international finance institutions and other energy experts.

Sir Mark Moody-Stuart is Chairman of the Royal Dutch/ Shell group. As well as his extensive background in the energy industry he has a particular interest in expanding energy from renewable sources. Shell recently launched a new charity, the Shell Foundation which includes a Sustainable Energy Programme to support projects that either encourage environmentally cleaner energy use or help tackle poverty by providing sustainable energy to poor communities in developing countries.

UK takes action to save duck

The fight for survival of Spain's 2,000 white-headed ducks will be boosted by a UK initiative to co-ordinate conservation action across Europe, announced by the Environment Minister, Michael Meacher.

The white-headed duck numbers only 2,400 in Western Europe, and only 10,000 globally. The major threat to the white-headed duck is hybridisation with the non-native North American ruddy duck. The UK wants Europe-wide action to save the endangered birds by cutting the numbers of North American ruddy ducks in the wild. The UK, France and Spain have already taken positive action to control their ruddy duck populations. At a meeting proposed by the UK for the autumn, European governments will be urged to implement their own control programmes. The meeting will also discuss methods to manage European population of captive ruddy ducks, to prevent escapees forming future feral populations.

As part of the UK Government's commitment to the European White-headed Duck Action Plan, the Government is funding a three-year control trial of the North American ruddy duck. The first year of the control trial has now been completed with just over 1,000 birds having been culled. This could represent up to 25 per cent of the UK population of feral North American ruddy ducks. The control work has been carried out in the most effective way and with the minimum of disturbance to other species. The results have been encouraging but more information is required to establish whether the ruddy duck can be eradicated from the UK.

The second year of the control trial aims to

- build on the work already undertaken;
- test control methods ;
- establish whether it is possible to eradicate the ruddy duck in the UK; and
- establish whether a national eradication programme would be feasible.

In Spain, the population of white-headed ducks continues to increase, due to the determined efforts of Spanish conservationists and government. The population in Spain is now estimated at over 2,400 birds. However, the North American ruddy duck still remains the major threat to the continued survival of this native European species.

Ruddy ducks are a North American species imported into wildfowl collections in the United Kingdom. Some birds escaped from these collections and formed a free flying population that now numbers around 4,000 birds. In America they are common and widespread and number over half a million.

Ruddy ducks have been proven to hybridise with the white-headed duck. The white-headed duck is classified as globally threatened, with the latest estimated world population of no more than 10,000 birds. The West European population of white-headed ducks is estimated at around 2,400 birds, all of which are found in Spain. This population has grown from only 22 individuals in the 1970s because of a determined and costly effort by the Spanish Government and conservationists.

Hague talks on climate change

The 6th Conference of Parties (COP6) to the 1992 United Nations Framework Convention of Climate Change (UNFCCC), took place in November at The Hague.

The meeting aimed to identify the operational requirements of reducing greenhouse gas emissions under the Kyoto Protocol and delegates from around 160 countries were represented to define their commitments.

The Kyoto Protocol, adopted in December 1997, focused on emissions related commitments from developed countries. Under the protocol, these countries have committed themselves to reducing collective emissions of six greenhouse gases by 5.2 per cent below 1990 levels which must be achieved in the period 2008-2012. Different targets were adopted, for example, the European Community agreed to set a collective target of 8 per cent and the UK Government has agreed on a 12.5 per cent reduction.

For the protocol to come into practice, 55 parties to the convention must ratify it, which should represent at least 55 per cent of the total carbon dioxide emissions for 1990.

The protocol also establishes flexibility mechanisms to help countries meet their national targets cost-effectively – an emissions trading scheme, joint implementation and a clean development mechanism. These are designed to help countries reach their targets with minimal reductions in greenhouse gas emissions.

For example, one of the key issues which has dominated discussions concerns the use of 'carbon sinks' which would allow countries to earn credits by planting trees to restore CO_2. The USA has been keen to implement this measure and has argued that it should be phased in during the first period of Kyoto, 2008-12. The EU, on the other hand, has argued that sinks should be excluded from this first period.

The emissions trading scheme would allow developed countries to financially support clean energy initiatives in the developing nations in exchange for emission rights at home. The question of how much a country's emissions reduction targets can be met through mechanisms has been the cause of much disagreement.

The USA has come under increasing criticism from the EU and the French President, Jacques Chirac opened the second week by calling for greater commitment from the US, especially as it is the largest emitter of carbon dioxide (25 per cent of all global emissions but only 5 per cent of the world's population).

In the end, a compromise deal engineered by John Prescott foundered on the rock of French opposition. As a result there was no agreement and nothing to show for two weeks of hard talking (and three years' preparation).

This must be seen as both a political disaster and a disaster of global scale for the move towards sustainability. In the words of the *Mail on Sunday*: 'It was a heart-breaking moment for environmentalists, who for a few hours believed the world's leaders had forged an agreement that would halt what they perceive to be the wish by man to destroy his own planet.'

R.A. Fuller

Sustainable development professionals: who needs them?

Professor Shirley Ali Khan,
Director, Sustainability First

There is mounting evidence from public and private sector organisations to suggest that powerful, highly skilled sustainable development advocates are needed to help organisations to respond to the challenge of sustainable development.

We suspect that the majority of environment/sustainable development post holders do not possess the skills to reshape their organisations along sustainable development lines, and that the minority who do are rarely correctly positioned within organisational power structures, or adequately paid. We also have evidence to suggest that HE environmental specialist providers are not providing programmes which prepare students for the sustainable development policy/advocacy roles which are beginning to be demanded by proactive employers. All this leads us to believe that there is a need to open a debate on the desirability of establishing a sustainable development profession.

As our understanding of the environmental challenge has evolved, so too has the language used to describe it. There has been a shift from environmental responsibility to sustainable development responsibility. To those whose job it is to promote environmental responsibility within their organisations, this shift in understanding has resulted in an extension of their job remit and, in some cases, a change of job title. Alan Knight of B&Q describes the shift: 'I used to be environmental policy controller, now I am head of sustainable development. I have shifted from a being a damage limiter to a strategic planner or to put it another way, from environmental practitioner to a sustainable development professional.'

The new duty on local authorities to integrate environmental, economic and social considerations into the community plan provides the best opportunity for main-streaming sustainable development to date. This change is forcing local authorities to ask where both LA 21 work and the five hundred or so LA 21 coordinators fit into the community planning process. Proactive local authorities are beginning to recognise that a senior professional is needed to facilitate the main-streaming process and that many LA 21 coordinators do not fit this job description.

We hear that some LA 21 coordinator posts are at risk. At the same time, adverts for LA sustainable development policy officers have been seen in the press. Ted Cantle, chief executive of Nottingham City Council's view is indicative: 'I don't want to take anything away from the achievements of LA 21 coordinators whose tireless efforts have helped to make the case for main-streaming sustainable development. But the landscape has changed. In Nottingham, the sustainability team is located within my Policy Unit and is involved in all aspects of regeneration, social inclusion, economic development and environmental issues. They are fundamental to the Community Plan and link into a multi-agency partnership with all sections of the community, from business leaders to community groups, and are now very focused on the climate change agenda, They have adapted well – we all need to.'

A sample of first destination statistics of graduates of HE environment specialist programmes coupled with current recruitment statistics for specialist environment programmes (ESSENCE report, 1999) suggests somewhat ironically that there is an oversupply of environmental practitioners. The establishment of a career structure which maps out professionalisation routes for environmental/sustainable development practitioners would facilitate a better match of supply and demand for the kind of sustainable development professionals which employers are beginning to call for, and which are needed. It is, however, important to note that the value of sustainable development professionals is only just beginning to be recognised.

We also need to bear in mind that we are now in an era of life-long learning and portfolio careers. Life-long learning makes it possible to develop high levels of professionalism in a number of fields. As such, we need to be open to the idea of other professionals, be they managers, engineers, architects or planners, achieving professional status in the sustainable development field. The idea we are seeding is of a sustainable development profession which has a number of routes into it. However, to avoid confusion we need to define what we mean by a sustainable development professional whose knowledge, skills and commitment would go far beyond the lower-level, basic sustainable development competence which all professionals now need to do their jobs.

The Institute of Environmental Management and Assessment and Sustainability First are hosting a conference, 'Sustainable development professionals: who needs them?' on 5th February 2001 in central London, to open the debate.

The conference will bring together key stake holders including:

- those who hold dedicated environment or sustainable development posts in the public, private and voluntary sector;
- HE providers of environment/sustainable development graduate, post graduate and continuing professional development programmes;
- environment/sustainable development consultants;
- professional bodies with an environment/sustainable development focus;
- employers who have a view on the kind of environment/sustainable development specialists they need.

Please contact R. Foster at the Institute of Environmental Management and Assessment for further details, or to book a place.

- *Address: St Nicholas House, 70 Newport, Lincoln LN1 3DP;*
  Tel: 01522 540069;
  Fax: 01522 540069;
  Email: www.iema.net

The Hon. Secretary's news desk...

Sustainability

The debate on GM foods and sustainable agriculture that we have featured over the past few issues of the Journal concludes for us in grand style in this edition with the full text of this year's Burntwood Memorial Lecture given by Professor Sir Colin Spedding. I am sure, however, that the debate will continue elsewhere.

In parallel with this major article we feature another topical and globally important subject of even wider significance – sustainability. We are pleased to note that both within the UK and in the EU efforts are continuing to improve environmental performance, but unfortunately the news is not all good. The failure of the recent Hague conference to ratify the Kyoto Protocol has been a major set-back in attempts to reverse trends in climate change. The implications of this could be far reaching.

Manual of Environmental Policy

A team of experts from the Institute for European Environmental Policy (IEEP), London have recently completed an extensive and all-encompassing manual dealing with most aspects of European environmental law and policy. This is an update of earlier publications and is available through Elsevier Science. It contains 14 chapters and four appendices. Discount opportunities are available to recognised environmental bodies. For further information contact Lucy Brodie or Annabelle Galt, Elsevier Science Ltd. Tel: 01865 843610, Fax: 01865 843960, e-mail: l.brodie@elsevier.co.uk

Membership subscription 2001

The Institution Council at its meeting on 1st November approved an increase in subscription levels for 2001. This is the first all-round increase for some years and the good news is that it does *not* come into effect until 1st April 2001. Members will be invoiced for their subscriptions at the beginning of January and provided payment is made by 31st March it will be at 2000 rates. After 1st April the rates will be:

Fellow	£70
Member	£55
Other Grades	£44

Students renewing or joining after 1st January will fare rather better as their subscription is being reduced to £10.

CIWEM awards

CIWEM are currently inviting submission for two annual awards – the Chris Binnie Award for Sustainable Water Management and the Ken Roberts Award for technical innovation in the water industry. Both are for the funding of deserving projects in the relevant field, the former in an amount of £500 and the latter for £1,000. Closing date for submissions is 1 February 2001. For further information see the CIWEM Website at *www.ciwem.com* or contact Lorraine Pool at CIWEM Tel: 020 7831 3110, e-mail: lpoole@ciwem.com

Season's Greetings

It remains for me, on behalf of Council, to thank all those who have given us their support over the past years and express our appreciation for the continuing interest of our Sponsor Members – Unilever and United Utilities.

Lastly, may I take this opportunity to wish all our members and other readers a Happy and Peaceful Christmas and a Prosperous New Year.

RAF

New members

The IES is pleased to welcome the following to membership of the Institution:

Mr C. Bates	Student, Swansea Institute of Higher Education
Mr M. Birchall	Environmental Manager British Safety Council
Mr B. D. Crabb	Recent Graduate De Montfort University
Mr P. J. Dixon	Environment & Health Co-Ordinator Hartlepool Borough Council
Ms H. Evans	Student, Swansea Institute of Higher Education
Mr N. Gardner	Student, University of Birmingham
Miss G. E. Harris	Student, Swansea Institute of Higher Education
Miss A. J. Harwood	Student, Swansea Institute of Higher Education
Dr K. Harwood	Environmental Scientist WSP Environmental Ltd
Miss S. J. Hayes	Student, Swansea Institute of Higher Education
Mr A. J. Lees	Student, Swansea Institute of Higher Education
Mr J. McGinlay	Environmental Consultant Ove Arup & Partners
Mr S. R. Milburn	Student, Swansea Institute of Higher Education
Miss H. Moore	Student, Swansea Institute of Higher Education
Miss R. P. H. Nash	Student, Swansea Institute of Higher Education
Mr D. E. Olney	Student, University of Glamorgan
Mr N. L. A. Price	Student, Swansea Institute of Higher Education
Ms G. E. Read	Student, Swansea Institute of Higher Education
Mrs T. M. Reuter	Environmental Scientist Mitchell McFarlane & Partners Ltd.
Miss C. S. Richards	Student, Swansea Institute of Higher Education
Mr R. H. W. Seniscal	Civil Engineer Kvaerner E&C UK Ltd
Mr W. J. Stevens	Environment Health & Safety Advisor, British Nuclear Fuels plc

Forthcoming conferences, courses and other events

23 January 2001
In field monitoring/crop and soil sensors
London
Details: SCI (Agriculture & Environment Group),
SCI Secretariat,
020 7598 1563
email: sonia.walter@soci.org

23-24 January 2001
Sustainable Waste Solutions
Central London, £1,395
Waste management conference, covers waste management policies, environmental risks, waste minimisation.
Details: ICM Conferences, 4 Cavendish Square, London W1M 0BX
020 7436 5735

26 February-2 March 2001
Managing Conservation & Amenity Sites for People
Plas Tan y Bwlch, Wales
Short course, £210-420
Details: Dewi Jones, Plas Tan y Bwlch, Maentwrog, Blaenau Ffestiniog, Gwynedd, LL41 3YU
01766 590324
email dewi.jones@eryri-npa.gov.uk

26 February-2 March 2001
An introduction to the conservation of areas of geological interest
Plas Tan y Bwlch, Wales, £210 – 419
Short Course which aims to introduce to those involved in nature conservation, the concepts, techniques and issues involved in the conservation of areas of geological importance.
Details: Dewi Jones, Plas Tan y Bwlch, Maentwrog, Blaenau Ffestiniog, Gwynedd, LL41 3YU
01766 590324
email dewi.jones@eryri-npa.gov.uk

Thursday 8th March 2001
Beating the climate change levy: an engineering challenge
Institution of Agricultural Engineers. Group forum at Farm Energy Centre, Stoneleigh and technical visit to W.H. Findon & Son, Stratford on Avon. Contact John Weir, 020 8788 0062.

19-23 March 2001
The third international conference on Urban Air Quality
Poseidon Hotel, Loutraki, Greece.
First announcement and call for papers.
Details: Jasmina Bolfek-Radovani.
Conferences Department,
Institute of Physics
76 Portland Place, London W1N 3DH
Web site:
http://www.iop.org/IOP/Confs/UAQ

Diary dates 2001

15th January	GP Committee	13.00
7th March	Education Committee	10.30
	AGM and Council	13.30

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- From waste to woods – planting trees on landfill
- From waste to woods: trees on landfill and their place in landscape
- Enhanced landfill strategy
- Waste minimisation: the long term benefits
- European study on EISs of installations for the treatment and disposal of toxic and dangerous waste
- Mercury fall-out from crematoria

Education and training

- Environmental courses undergo a quality assessment
- Student environmental declaration
- On-line information systems in environmental sciences courses
- Global environmental charter and network for students

Business and industry

- The tourism challenge
- The tourism debate and environmental scientists
- Enjoying environmental science as a career
- The Brent Spar and the best practical environmental option

National and local government

- Transport policy, environmental pressures and the new UK government
- Local Agenda 21 – making it work

Price: £5 per paper including p&p (£3 per paper for members)

Contributors

The *Environmental Scientist* aims to provide a forum for members' contributions, views, interests, activities and news, as well as topical feature articles. Articles up to 3,000 words should be submitted to the Editor, *Environmental Scientist,* PO Box 16, Bourne, PE10 9FB, three weeks prior to publication in the last week of January, March, May, July, September and November.

Views expressed in the journal are those of the authors and do not necessarily reflect IES views or policy.

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