environmental SCIENTIST

September/October 2006

Air quality

Journal of the Institution of Environmental Sciences

environmental
SCIENTIST

Journal of the Institution of Environmental Sciences

ISSN: 0966 8411
Vol 15 No 2
Established 1971

The Environmental Scientist provides a forum for members' contributions, views, interests, activities and news, as well as topical feature articles. Articles should be submitted to the Editor, Environmental Scientist, Suite 7, 38 Ebury Street, London SW1W 0LU or emailed to enquiries@ies-uk.org.uk

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

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Published by The Institution of Environmental Sciences, Suite 7, 38 Ebury Street, London SW1W 0LU.
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Web site: www.ies-uk.org.uk

Design and origination by Davies Communications, Gordon House, 6 Lissenden Gardens, London NW5 1LX.
Tel: 020 7482 8844.

Printed on recycled paper by Uniprint Ltd, 36 Jaggard Way, Wandsworth Common, London SW12 8SG.

LAUNCH OF ENVIROSCI NEWS ONLINE E-NEWSLETTER

The Institution of Environmental Sciences has recently launched a new online e-newsletter entitled *EnviroSci News*.

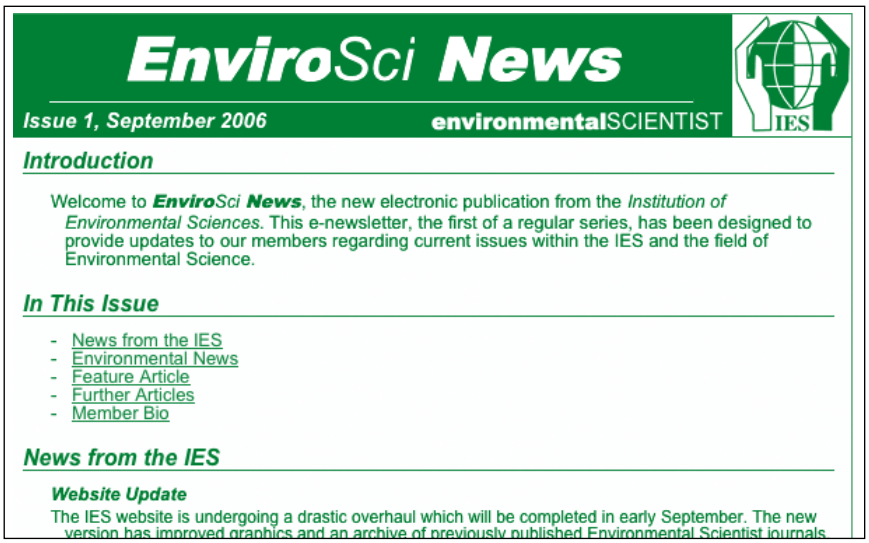
This newsletter provides members with an update of what is happening within the Institution, an overview of relevant news from the Environmental field, as well as interesting and informative articles supplied by our diverse membership.

Recent contributors have included Phil Cumming, Environmental Project Manager for the London 2012 Organising Committee (LOCOG), and Dr Mark Everard, Vice Chair of the IES. Since its release in early September, the e-newsletter has received much positive feedback from members.

EnviroSci News would like to take this opportunity to call for the contribution of articles for the e-newsletter. We are constantly on the lookout for informative articles relating to the field of Environmental Science, as well as biographies from our most active members.

We hope you get the most out of *EnviroSci News*, and will continue to strive to provide our members with informative and topical news within the environment sector.

All enquiries for contributions, as well as suggestions and comments, should be directed to *enquires@ies-uk.org.uk*. Please don't forget to update your email address with us!



EnviroSci News

Issue 1, September 2006 environmentalSCIENTIST

Introduction

Welcome to ***EnviroSci News***, the new electronic publication from the *Institution of Environmental Sciences*. This e-newsletter, the first of a regular series, has been designed to provide updates to our members regarding current issues within the IES and the field of Environmental Science.

In This Issue

- News from the IES
- Environmental News
- Feature Article
- Further Articles
- Member Bio

News from the IES

Website Update

The IES website is undergoing a drastic overhaul which will be completed in early September. The new version has improved graphics and an archive of previously published Environmental Scientist journals

NUCLEAR POWER GENERATION

Early in 2007, the Institution is planning to base a special edition of *Environmental Scientist* on issues surrounding nuclear power generation. This will be in light of a White Paper being released at the end of 2006, and the call for the use of 'cleaner' energy production from an increasing number of interest groups.

The Institution is therefore seeking written contributions on this matter, from members or relevant parties. Articles should concentrate on the science or effect of nuclear power on our professional lives, society or the environmental science field as a whole.

If you are interested in supplying an article, or know of someone who might wish to contribute, please send an email to *enquiries@ies-uk.org.uk*

A MESSAGE FROM THE IES CHAIR

CAROLYN ROBERTS considers the importance of getting across the message about the value of environmental science

Environmental scientists are becoming more and more embedded into the political economy of the UK and beyond. Issues such as climate change, ecological adjustments, urban flooding and the sustainable management of business and industry require us to liaise with a wide spectrum of stakeholders in the public, private and voluntary sectors. Rather than seeking to distance ourselves from potential aggravation, or to maintain a purist view of ourselves only as 'dispassionate scientists', we need to be sensitive to our responsibilities, and aware of communication styles and the differences in impact that these may promote among those who need to hear what we say. We also need to promote effective public and governmental education about environmental sustainability, seeking out every opportunity effectively to press home our messages.

The Society for the Environment is increasingly providing a platform for communication on UK environmental matters, and in order better to exploit this opportunity the Institution is starting a round of discussions with other constituent professional bodies. Consideration is being given to developing closer working relationships, maximising the opportunities for bringing effective pressure to bear nationally and internationally, extending the opportunities for staff development for environmental practitioners, while ensuring that the distinctive contribution of the environmental scientist continues to be recognised.

To the same end, Council has agreed that the Institution will join the European Federation of Associations of Environmental Professionals, which again will raise our profile within the European Union, foster international levels of activity, and provide additional services for members. You will receive more information about this initiative in a forthcoming mailing, and Council is keen to have feedback from readers.

The multiple competencies required by today's environmental professionals are very well represented in the personal portfolio of Emma Bennett, the first Institution of Environmental Sciences member to complete the full 'portfolio and interview' route to achieving Chartered Status, last month. Emma has had a varied and fascinating career, with particular responsibilities for coastal management, water quality and community involvement in both public and private sectors. You will be able to read more about her work and views in the next edition of the journal.

She joins an astonishingly diverse set of the Institution's Members and Fellows who are now entitled to use the coveted 'CEnv' post-nominal, and the Institution's Council takes this opportunity to wish her, and other practitioners, well. We hope that their pathway will be followed by many others.

■ Carolyn Roberts FRGS FIEnvSc CEnv ILTM is Chair of the Institution of Environmental Sciences and Associate Dean of the Faculty of Education at the Centre for Active Learning in Geography at the University of Gloucestershire.

AIR QUALITY – IS CONTINUOUS IMPROVEMENT SUSTAINABLE?

BERNARD FISHER and **DAVID MUIR**

suggest that action against particulates would be an effective driver for local action to improve air quality

Recently the Government released its new air quality strategy for consultation. Any discussion of the UK Air Quality Strategy Review needs to put the document issued on 5 April 2006 in context. This is the fourth document in a series of Strategy Reviews, starting with the National Air Quality Strategy in 1997, which set up a series of objectives for eight pollutants[1]. The aim of the strategy was to ensure that air quality met or aimed to achieve these objectives. The revised Strategy of January 2000 contained revised objectives and the Strategy Addendum of February 2003 introduced tighter objectives and different objectives in different parts of the UK.

The current review differs from the earlier two in that, instead of laying out an objectives driven strategy, it is more of an evaluation of whether the Strategy has been effective in achieving health benefits. The objectives for many of the pollutants are already being met and therefore these are not discussed further in this article. For these pollutants objectives will be retained to ensure that problems do not return and it is expected that they would be strengthened if clear evidence for effects, especially at lower concentrations, was demonstrated.

Further health benefits are potentially very large; it has been estimated that in 2005 man-made particulate air pollution reduced average life expectancy by eight months; less in some cases, more in others. Moreover what has emerged is that for certain pollutants long terms trends are flattening or even at some locations reversing. It appears that one is reaching a region of diminishing returns. For NO_2 (nitrogen dioxide) and PM_{10} (particles of aerodynamic size less than 10 µm on average, 1 µm = 10^{-6} metres), achieving objectives appears to be difficult as there are no obvious easy ways of making further large improvements. The present strategy review also extends the time frame from 2010, as in the original strategy, out to 2020 and starts to include some reference to climate change effects.

The structure of the 2006 review is to use models to predict concentrations out to 2020 using a baseline, which assumes that policy measures are adopted, and forecasts for air quality improvements if further policy measures are introduced. One could imagine a whole range of potential policy measures, but focus to the review has been given by considering a simple range of measures with emphasis on technological improvements mainly associated with road transport. It turns out that the most effective measures in terms of estimated benefit are of this type and are broadly of the kind: incentives for early uptake of Euro standards (for road vehicles), reducing emissions from small combustion plants and reducing emissions from shipping. A total of 14 individual measures are evaluated along with three scenarios combining two or more of the individual measures. One of these, designated Q in the review, is predicted to give considerable benefits and because of the importance placed on this measure it is discussed in more detail later. It is recognised that measures can have benefits in other ways apart from air quality and they can have qualitative benefits, which are not possible to quantify in monetary terms. The 2006 strategy review also gives greater emphasis to the effects of air pollution on ecosystems and begins to address the links between air quality and climate change.

Particles and exposure reduction

In this article, however, we focus particular attention on one aspect of the review, the approach to particles, which is seen as rather novel compared with the objectives defined in earlier strategies. It was recognised in the earlier strategies that particulate matter has no threshold for health effects, nor were these species dependent, so that any reduction in total particulate concentration would produce an improvement in terms of life years saved. One change in the 2006 Strategy revision has been that smaller particles $PM_{2.5}$ (particles of aerodynamic size less than 2.5 µm on average), which would be included in any PM_{10} measurement, are now seen as being more harmful. There are currently no objectives for $PM_{2.5}$ and it is not widely monitored in the UK at present. The treatments of PM_{10} in earlier Strategies set objectives for PM_{10} in terms of a numerical value which should not be exceeded, accepting that particulate matter concentrations could not be reduced to zero everywhere, if anywhere.

What is new is a change in approach to an 'exposure reduction' method and this is worth elaborating as it shows how thinking about achieving environmental objectives can develop. The review of past trends of measurements has confirmed that reducing concentrations of particles by any single measure can be intractable. One wishes to set an objective, which acts as a driver towards reducing concentrations, but at the same time this has the effect that attention is focused towards areas of exceedence. Eliminating these areas of exceedence does not necessarily have the desired effect of generally reducing particle concentrations, which is what is

1. The eight pollutants are sulphur dioxide, nitrogen dioxide, particles as PM10, benzene, 1,3-butadiene, ozone, carbon monoxide and lead.

Table 1: Comparison of measures using four different criteria

Improvement measure	Percentage of UK population above 20 μgm^{-3} (background areas only) in 2020	Public health improvements expressed as additional million life years saved compared to baseline in 2020	Percentage exposure reduction in urban areas between 2010 and 2020, PM_{10}	Percentage exposure reduction in urban areas between 2010 and 2020, $PM_{2.5}$
Baseline	26.7	0	6.7	11.5
Combined measure Q	11.9	3.25	11.7	17
Scenario Z	0	1.57	10.1	13.4

desirable for a pollutant, which has no safe threshold of effect. Hence a proposal has been put forward, which also has support in European negotiations on the implementation of Directives, which is based on the assessment of the exposure of the population as a whole, to particles.

The starting point is that the exposure reduction is formulated in terms of the smaller particle fraction $PM_{2.5}$ which has implications for the way measurements are made. Based on measurements in urban background site (these are sites which are neither near the roadside nor in rural areas) the objective is that between 2010 and 2020 the exposure of the population to ambient levels of $PM_{2.5}$ should reduce by 15%. The 15% has been chosen to act as a reduction since it has been estimated that existing policy should reduce levels by about 10% and the extra policy measures, such as the combined measure Q, would lead to an extra 5% reduction. There is also merit in addressing the $PM_{2.5}$ fraction in this way rather than PM_{10} in that this fraction is potentially more amenable to control than the $PM_{Coarse} = ([\ PM_{10}] - [\ PM_{2.5}])$ fraction.

This is illustrated explicitly by Table 1, which is taken directly from page 118 of Volume 1 of the Strategy document. It compares the benefits achieved by a number of alternative measures. The baseline is the predicted effect of current measures already agreed, some of which, for example tighter vehicle standards, will take time to work through the system before they are fully effective. The general principle was to include in projections those policies or commitments that are already in place or those on which agreement has been reached, even if full administrative procedures have not been finalised.

Combined measure Q involves three actions:

1. a programme of incentives introduced to the UK in which Euro V standards are applied to light duty vehicles from 2006 onwards, and Euro VI standards are applied to heavy duty vehicles from 2010 onwards;
2. a series of incentives to increase the use of low emission vehicles to replace petrol and diesel cars; and
3. a reduction in SO_2 and NOx from small combustion plant.

These measures and others described in the review are ones which could be implemented and costed, accepting the inevitable uncertainties in this kind of policy evaluation. It is clear that this is a national review and so the impacts of the large number of other possible, local measures cannot be evaluated in the same way. It is a matter for regret that the Department for Transport recently announced the end of some of the incentive schemes for cleaning up vehicle emissions.

Example of strategy evaluation

The table shows four alternative ways of assessing the relative benefits of proposed measures. The first one is the percentage of the population exposed to concentration greater than 20 μgm^{-3} (microgrammes per cubic metre). This is the current National Air Quality Strategy objective for the UK (excluding London and Scotland), which is the hardest to achieve. The equivalent levels for London and Scotland are 18 and 23 respectively. It is also an indicative value in an EU Directive.

The benefit can also be assessed in terms of the life years saved. These are large numbers. However they roughly equate to a reduction in life expectancy of a few weeks.

The exposure reductions are relative measures of improvements expressed as percentages based on the reduction in the estimated concentration multiplied by the population density over all urban areas relative to the base year. A large percentage reduction indicates a large improvement. The assessments are undertaken separately for PM_{10} and $PM_{2.5}$. The $PM_{2.5}$ is the amount of particulate in the smaller size fraction.

Scenario Z does not correspond to any actual measures to control emissions. Instead it represents a hypothetical situation in which all concentrations above 20 μgm^{-3} have been reduced to 20, with all other concentrations staying the same. It represents a situation in which measures are taken on a local basis just to reduce concentrations in the hot spots defined as areas where concentrations are above 20 μgm^{-3}. It is hypothetical because many of the

components of PM_{10} are long-range, that is they travel long distances before being removed from the atmosphere, so that a source control measure does not necessarily have a localised effect. It is not known at present which component of particulate matter has the most damaging effect so that each μgm^{-3} is treated in the same way, regardless of whether it is soil dust, sea salt, an organic compound or carbon, sulphate or nitrate, metal etc. The increased focus on $PM_{2.5}$ would mean a significant change in the way many local authorities did their monitoring.

Figure 1 shows a picture of the inside and outside of a monitoring site run by Bristol City during a comprehensive trial comparing different methods of sampling for particulate matter. It turns out that even when monitors are placed side by side different results are obtained and it is not easy to derive a simple correction factor to enable readings from one instrument to be converted into the equivalent reading from another.

Table 1 also illustrates how the other assessments in the review have been undertaken. They all rely on a comparison between projected concentrations and air quality objectives, expressed in a variety of ways, such as in terms of background air concentrations or roadside concentrations, with the aim being to see how close the country as a whole can get to a desirable outcome. Since for particles there is no safe limit, there will always be a health disbenefit, unless particles could be removed from the atmosphere completely, which is an impossible aspiration.

The question of exposure reduction reopens a certain question, which has been glossed over in earlier strategy reviews. The review nowhere considers the thorny question of personal exposure, which is the real mechanism of exposure, since people generally spend most of their time indoors particularly in the case of the young or elderly, who may be at greatest risk.

A new kind of objective

The conclusion to be drawn from the table is that measure Q achieves notable benefit to human health by 2020, however it is judged, but does not totally eliminate the problem. The hypothetical scenario Z, which removes all areas with high concentrations, does not do as much for health improvements. This leads to the proposal for a novel approach to this otherwise intractable problem. It requires that on the base of measurements averaged over a suitable long period to remove meteorological variability, a new 'exposure-reduction' objective should be introduced for $PM_{2.5}$, because of its greater health significance. The draft Strategy proposes a 15% reduction in $PM_{2.5}$ at urban background monitoring sites between 2010 and 2010. Although such a reduction is welcome, the figure of 15% does seem to reflect what can be achieved without much, if any, additional action.

The proposal would be applied on a national level. The role of the local authorities, which hitherto has been very important, would thus be diminished. Local authorities are required to designate Air Quality Management Areas on the basis of exceedences(s) of objectives in specified locations. Since exposure reduction on its own could lead to PM concentrations remaining high in some areas, notably in the centres of large urban areas, there is a proposal for a so-called backstop objective of 25 μgm^{-3} for $PM_{2.5}$ to be achieved everywhere by 2010. The choice of 25 μgm^{-3} arises because of the current annual mean objective of 40 μgm^{-3} PM_{10}, to be achieved everywhere by 2004, which has been successful, and because $PM_{2.5}$ is roughly 5/8 of 40 μgm^{-3} by mass. In Scotland the current 18 μgm^{-3} objective for PM_{10} is a legal objective, and so the backstop objective for Scotland has to be chosen to be 12 μgm^{-3} $PM_{2.5}$. One might well argue that the proliferation of objectives is unnecessarily complicated and harms the successful implementation of air quality

improvements. A local authority elected member might not have the patience to listen to the logic behind the arguments for setting objectives, though he or she would appreciate the principle of improving air quality.

Implications for local authorities

The key question for local authorities is how to continue to fulfil their role in the future. Local authorities currently have as part of Local Air Quality Management duties the responsibility to review and assess air quality in their areas, an activity undertaken or managed by local authority staff. Over 180 Air Quality Management Areas have been declared, the majority of which are due to likely exceedences of the air quality objectives for NO_2 and PM_{10} as a result of road transport, either on local authority roads or the strategic road network. These objectives are set in order to tackle local air quality problems where air quality objectives are exceeded. The 2006 Strategy Review continues to recognise that local authorities have an important role to play in helping Government and the devolved administrations deliver cleaner air. They will still be required to take action, by implementing measures within an action plan in pursuit of the air quality objectives in the designated air quality management areas. The question which arises under the new arrangements is how much of a driver is there towards local air quality improvement?

Action and action plans

The 2006 Strategy Review documents summarise what local authorities have done. Over 110 local authorities have so far produced action plans. Local authorities in England are being encouraged to integrate their air quality action plans into Local Transport Plans, where road transport is the major source of local exceedence of the air quality objective. The content of action plans can vary from one authority to another, and depends on the main sources of the pollutants of concern. It is assumed that local authorities know best how to tackle local problems, but there are some common elements to many of the action plans, especially those relating to road transport.

Action plans comprise local measures, which contain;

1. commitments, such as putting air quality at the heart of the decision making process, particularly in other policy areas such as planning decisions or including air quality in the unitary development plan; promoting green travel plans; working closely with the Highways Agency and/or the Environment Agencies on emissions reduction measures; sustainable freight distribution strategies; school and business travel plans etc;
2. measures, such as local traffic management measures to limit access to, or re-route traffic away from problem areas; Low Emission Zones; using cleaner-fuelled vehicles in the authority's own fleet; bus or fleet operators using cleaner, quieter vehicles, or more flexible freight delivery arrangements; congestion charging schemes and/or workplace parking levies; park and ride schemes; improved public transport; roadside emissions testing etc;
3. raising awareness and generating behavioural change by informing members of the public about air quality issues via local newsletters or other media; publicity campaigns, workshops and stakeholder dialogue, etc.

These local measures could be part of a future national strategy. However it is difficult to evaluate them using the 2006 Strategy Review methodology. Some attempt has been made and studies undertaken in support of the 2006 Strategy Review conclude that the most successful measures in delivering health and economic benefits from air quality improvements are usually larger or citywide schemes. This is different to the focus on reducing air quality exceedences, where the location of emissions is important. Specifically targeting particular roads or transport corridors (usually the air quality hotspots of concern where objectives are exceeded) leads to greatest progress towards eliminating objective exceedences, which has essentially been the local authority role up to now. Moreover, it is also likely that improvements in air quality from many local measures will decline in future years, as the general traffic fleet becomes cleaner, assuming that traffic does not grow in city centres, where many of the air quality management areas are situated.

Accepting that the role of local schemes directed at emission improvements may decline in importance in future, the local schemes thought to bring the highest improvements in air quality and health benefits are Low Emission Zones, early scrappage schemes and local motorway speed restrictions. Local schemes whose primary aims do not include the reduction of air pollution (such as improvement to public transport), have low air quality benefits compared to the costs of the scheme. However since these schemes are implemented mainly to address other concerns (such as congestion or improvement in accessibility) any air quality benefits would be complementary. There are a number of different local transport measures that can successfully deliver improvements to air quality at a local level. It is important that air quality benefits should be taken into account when considering proposals aimed at improving the local urban environment more generally (such as other transport measures included in local transport plans or any other spatial development plans formulated at local and regional level). An example would be to consider air quality in the design of sustainable communities, for new housing in the South East of England.

A local air quality strategy review?

The evaluation of the Local Air Quality Management system in 2003 concluded that the system was successful. The recent encouragement to integrate air quality action

plans into the second round of Local Transport Plans for English local authorities, shows that the Government and the devolved administrations remain committed to Local Air Quality Management as a tool to deliver improved air quality. The third round of the Local Air Quality Management system started in April 2006 and the UK Government and the devolved administrations, are committed to re-evaluate the role of the Local Air Quality Management system in 2010.

The local authority role to promote local measures is weakened by the 2006 Strategy Review. The future role of local authorities in tackling hotspots is unclear. By this stage in the local air quality management process one expects that there should be more specific treatment of the value of local powers. There is also the recognition that technical measures, such as end of pipe technologies, are showing diminishing returns. Greater emphasis is needed on non-technical measures of precisely the kind being suggested in Action Plans. One must therefore conclude that the 2006 Strategy Review does not give enough weight to the future role of these so-called softer measures. There is also the question of public reaction to a shift away from dealing with hot spots that are perceived as affecting a number of individuals to addressing the more wide ranging question of exposure reduction.

What will happen, if the strategy is adopted, is that a local authority cannot designate an Air Quality Management Area for particulate matter on the basis of exposure reduction. The backstop objective of 25 μgm^{-3} $PM_{2.5}$ will be too weak to require any additional action to reduce PM concentrations in all but a very few locations except in Scotland where the 12 μgm^{-3} objective will drive policy. NO_2 will be the driver for air quality improvements in urban areas in the rest of the country even though particulate matter is the pollutant of greatest concern. For England and Wales one might consider a more ambitious target for $PM_{2.5}$, such as setting the backstop and exposure reduction objectives as 20 μgm^{-3} and 20% respectively, would have the desired effect of retaining the best elements of national and local air quality management.

Other issues in the strategy review

There are other issues in the 2006 Strategy Review which are not discussed in the article, such as the protection of ecosystems and ammonia. The purpose has been to focus on implementation of the Strategy and the future local authority role.

It is also a consideration that climate change as opposed to air quality is now a powerful political driver for emissions reduction and the Strategy Review ought to reflect this. One concept that is gaining credence is that greater effort is required to harmonise the management of air quality and climate concerns both at local and national/international levels.

Although the assessments and projections are based on the best available knowledge, it would also be prudent to consider alternative scenarios. For example, technological solutions may not deliver as anticipated, or where consumer and societal trends impact detrimentally upon air quality.

Conclusions

The 2006 Strategy Review needs to consider more carefully how a national strategy works in relation to local action. One needs to retain sufficiently challenging local objectives to ensure that progress on local air quality management is continued. This means setting a stricter backstop objective for particulate matter, which acts as an effective driver for local action.

A Local Air Quality Strategy Review needs to be undertaken, which would give national advice on the opportunities for effective *softer* air quality improvement measures, such as financial incentives, energy efficiency, demand management and behavioural change.

References

All the information referred to in this article is available on the web page and links:

www.defra.gov.uk/corporate/consult/airqualstratreview/index.htm

Specific information is given in the following three documents:

Air Quality Strategy for England, Scotland, Wales and Northern Ireland.

A consultation document on options for further improvement in air quality.

Volume 1: Main consultation document.

Volume 2: Technical annex and Regulatory Impact Assessment.

An economic analysis to inform the Air Quality Strategy review consultation – Third report of the Interdepartmental Group on Costs and Benefits.

See also:

Laxen D. and Moorcroft S., 2006, *Options for an Exposure-Reduction Approach to Air Quality Management in the UK*, Air Quality Consultants report.

Watkiss P., 2004, *An evaluation of the Air Quality Strategy: Additional Analysis of Local Road Transport Measures*, AEA Technology report.

For health effects see:

www.advisorybodies.doh.gov.uk/comeap/pdfs/interimlongtermeffects2006.pdf

■ Bernard Fisher works in Risk and Forecasting at the Environment Agency, Reading, and David Muir in the Environmental Quality Unit of Bristol City Council. The views expressed in this paper are those of the authors and are not necessarily those of the organisations for which they work.

AIR QUALITY MANAGEMENT AND THE ENVIRONMENTAL SCIENTIST

BERNARD FISHER, Chairman of IAQM, describes the role of the environmental scientist in improving air quality

The Institute for Air Quality Management (IAQM) is a division of the Institution of Environmental Sciences (IES) set up to promote the practice of air quality management. Since the publication of the first National Air Quality Strategy in 1997, there has been a framework in this country for improving air quality, supported by underlying national and European legislation. The aim is to meet objectives chosen so as to protect human health and ecological systems. The aim is simple, but the practice is complex and rather technical.

The national capability has been advanced by the identification of the main pollutants of concern, the setting of standards, the establishment of emissions inventories, making measurements and modelling using emissions inventories, leading to the prediction of concentrations, so that trends can be assessed and future policy determined to bring about improvements. Detailed guidance at a local level have been provided to assist in the production of air quality reviews. This has led to the need for the air quality management professional.

Ultimately there is the requirement for action, often in relation to transport plans. The professional needs a wide range of skills and ultimately the ability to persuade decision makers. The subject is technically involved but is a legal requirement, arguably the most technically advanced legislation to implement, but does not always lead directly to action as seen in the new draft National Strategy for which 100-plus action plans were reviewed.

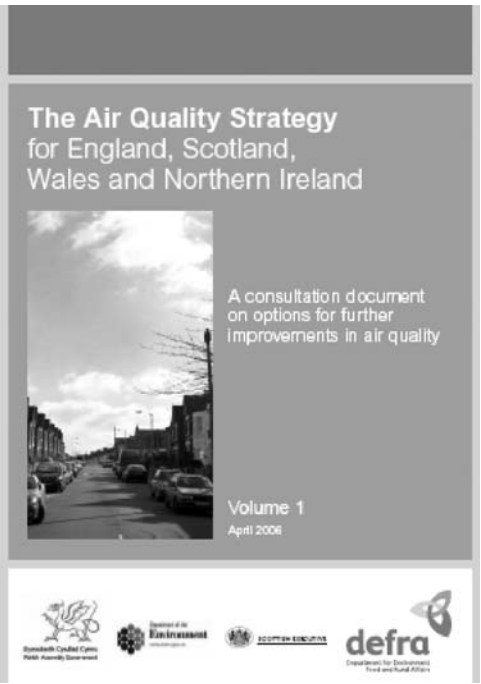


Figure 1: The consultation document describing the draft National Air Quality Strategy on which views are actively sought.

Local measures included in action plans range from: a corporate commitment to putting air quality at the heart of the decision making process, particularly in other policy areas, such as planning decisions or including air quality in the unitary development plan; to practical traffic management measures to limit access to, or re-route traffic away from problem areas and in the longer term, perhaps, congestion charging schemes and/or workplace parking levies. One role of the air quality management professional in the future is to make these plans more of a reality.

However, compared with other environmental areas, air quality management has a clear structure and purpose. It is recognised that for air quality there are large cost benefits, of concern mostly to people who live in urban areas.

Air quality practice can be rather procedural, but involves wider, more subjective issues. This is why the IAQM values its place within the Institution of Environmental Sciences. For example, there has been increasing concern about the overall environmental quality of a locality (noise, litter, green space, etc), particularly in socially deprived areas.

The UK Government's Sustainable Development Strategy published in March 2005 contained a list of indicators relating to environmental effects (stresses) that the population of the country were subject to. Some are related to consumption, such as resource use, some are related to the adverse effects of modern life, e.g. emissions from road transport, some are related to social factors, e.g. employment and housing, some are, as yet, undefined, such as social justice/inequality/local environmental quality.

It would be valuable to be able to establish a commonly accepted set of these indices to cover the natural environment. It is anticipated that each of the variables represents a way of measuring a distinct environmental effect. The Environment Agency has attempted to identify the worst (high priority) environmental areas according to local wards, based on criteria related to

1. ambient air pollution,
2. industrial airborne releases,
3. green space,
4. bio-diversity,
5. derelict land,
6. flood risk,
7. river water quality,
8. street cleanliness,
9. road traffic noise, and
10. fly tipping.

To undertake this task in detail would involve most of the specialist areas of the IES.

Readers of the *Environmental Scientist* with interests in these environmental areas should be involved in promoting the overall environmental quality of life. The main issue with many of the individual factors in an environmental index is the choice of the proximity factor relating environmental data with a distinct effect on the local quality of life. For air quality this is straightforward and is the defined by the model relating an emission to the ambient concentration. In the air quality management community this is described by the dispersion model selected, which while the selection may still be open to discussion, is a well established field (see the Dispersion Modellers Users Group).

It may be wishful thinking to suppose that practitioners within the Institution of Environmental Sciences in widely differing environmental areas should be working together. However, I am encouraged by the way that the EPSRC Sustainable Urban Environment (SUE) programme has promoted science engagement with, and responsiveness to, the needs of local communities, through its is Citizen Science for Sustainability (SuScit) Programme.

Further information about the Institute of Air Quality Management can be found on the IES and IAQM web sites, and about SuScit on its web site.

Web sites

Institute of Air Quality Management:
www.iaqm.co.uk
Institution of Environmental Sciences:
www.ies-uk.org.uk
UK Dispersion Modellers User Group (UK-DMUG):
www.nsca.org.uk
Citizen Science for Sustainability (SuScit) Programme:
www.suscit.org.uk

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INTEGRATING SUSTAINABLE DEVELOPMENT PRINCIPLES INTO PROFESSIONAL PRACTICE

JOHN BAINES outlines views about the place of sustainable development in the initial training of environmental scientists

Environmental professionals increasingly need to be knowledgeable about and competent in sustainable development. There is strong support from members of IES for the inclusion of sustainable development in environmental degree programmes. Research undertaken for the Higher Education Academy Subject Centre for Geography, Earth and Environmental Sciences (GEES) shows that while environmental degree programmes provide a useful broad base on which to build, graduates need to take further education and training to be better qualified to integrate sustainable development principles into their chosen environmental profession.

About the research

The primary aim of this research project was to identify curriculum priorities for the initial training of professionals in the field of environmental sciences and related subjects to enable them better to integrate sustainable development principles into their professional work. A questionnaire survey of 350 members of the IES was undertaken to find out if sustainable development knowledge and skills were required in their professional work and, if so, how well their undergraduate programmes had equipped them for this. Forty-six respondents completed the questionnaires. Twelve had studied Environmental Science/Studies and the remainder a related degree. Thirty-three had a further academic qualification.

It was decided not to be too prescriptive about the interpretation of the phrase 'sustainable development'. Although there are numerous definitions, there is sufficient consensus about key concepts for there to be a shared understanding of what sustainable development is all about, especially among this target group. The researcher considered the research was best served by allowing respondents to use their own interpretation, albeit guided by the provision of some key concepts. A few respondents appeared to interpret sustainable development only in ecological and environmental terms. The social aspects seemed to have a low priority.

The questionnaire required respondents to assess the value of their undergraduate programmes to the application of sustainable development principles in their current and previous employment posts. Respondents were asked to name their undergraduate programme and the date of their graduation.

Respondents had received their degrees over the past 40 years but sustainable development did not start to become a mainstream concept until after the publication of *Our Common Future*[1] in 1987. However, most respondents who graduated pre-1990 recognised that parts of their programmes were covering environmental, social and economic matters and were therefore covering aspects of sustainability in all but name.

The findings

Yes to sustainable development

Without exception, all respondents agreed that sustainable development should be included in undergraduate programmes and some expanded their answer with comments including that it needed to be appropriate and rigorous. The universal 'Yes' from so many different subject areas suggests there is a high level of support from environmental professionals for the inclusion of sustainable development in undergraduate programmes.

Sustainable development content

Respondents were asked to specify if the following topics were included in their programmes and if so whether in a minor or substantial manner.

- Environmental and ecological aspects
- Economic aspects
- Social/cultural aspects
- Systems thinking (inter-relationships)
- Future responsibilities
- Equity
- Practical aspects, eg legislation, company policies and practice, application of technology, standards
- Other aspects

Respondents mentioned some very specific topics under other aspects, including:

- Land contamination and pollution,
- Resource management
- Diffusion and dispersion
- Environmental impact assessment
- Management of flood risk
- Geographic planning theory
- Environmental psychology
- Field work

1 *Our Common Future*, The World Commission on Environment and Development, Oxford University Press 1987.

- Energy, soil science, geology, environmental chemistry, atmospheric chemistry

The responses from those who graduated up to and including 1990 were analysed separately from those graduating after 1990. As one would expect, undergraduate degree programmes after 1990 show a marked increase in sustainable development content. Before 1990 environmental and ecological topics and issues were covered well. These remained important after 1990, but there was a rise in the study of social and moral issues, albeit still minor parts of programmes. The greatest growth was in the practical aspects of sustainable development such as legislation, company policies and practice, application of technology and achieving relevant standards. Surprisingly only two post-1990 environmental science programmes provided substantial covering of systems thinking, a major competency identified by respondents if professionals are to adopt an holistic approach to sustainable development issues.

Need for sustainable development knowledge and skills

Respondents were asked if they needed sustainable development knowledge and skills in both their current and previous employment. Fifty-three per cent of respondents scored eight[2] or more for their current post and 33% for their previous post. When asked how well their undergraduate programme had prepared them for this aspect of their work, only three respondents in their current posts scored 8 or above. Eight gave a score of zero. In their previous posts, out of 19 responses, no respondents gave a score of 8 or more and four scored zero. It appears that undergraduate programmes are not providing specific knowledge and skills to cope with the sustainable development aspects of the jobs they move into. Given the range of posts that respondents filled, it is probably unrealistic to expect undergraduate programmes to provide comprehensive coverage of sustainable development. What some did say was that the degree provided a sound basis of sustainable development on which to build specific knowledge and skills later as needed.

There was a minority opinion that newly qualified graduates may have sufficient knowledge and skills in sustainable development to integrate sustainable development principles into their professional work, but that senior management fails to provide opportunities for them to do so. This perceived obstacle was not explored further.

2 Using a scale of 0-10 (0 = not at all, 10 = completely).

What knowledge and skills?

When asked to consider what were the sustainable development knowledge and competencies/skills required in their current post, responses fell into three broad categories: knowledge related, skills related and attitude related.

Knowledge

The knowledge competencies listed by respondents were often very closely tied to their professional work, such as knowledge of waste minimisation and recycling, and knowledge of flood hydrology and management of flood risk. Others were less specific but still orientated towards particular professions or areas of work, for example having a good knowledge of environmental management methods. There were also other responses that suggested there is some general background knowledge that is useful in most of the professions. These included:

- Possessing a sound knowledge and understanding of natural systems and their importance.
- Having an understanding of the meaning of sustainable development and a good knowledge of sustainable development issues.
- Being familiar with the UK's sustainable development policies and mechanisms including appropriate legislation.
- Understanding the impacts of human activities and the means, such as environmental impact assessments, of reducing their damaging impacts.
- Having a broad knowledge of the environmental, ecological, economic, political and socio/cultural components of sustainable development and how actions in one area affect another.
- Having awareness and understanding of a 'systems thinking' approach and its benefits to planning and implementing projects to make them more sustainable.
- Being aware of the costs and benefits of implementing sustainable development in their professional area.

Skills

Many of the skills cited by respondents were appropriate for particular professions or areas of interest, for example, how to do an environmental impact assessment. Other more generalised skills were cited too. Many recognised that effective sustainable development actions develop out of inclusive processes that require good social and communications skills to enable them to work with a range of stakeholders. Other important skills cited were the ability to think holistically and to work across disciplinary boundaries. Underlying many of the statements seemed to be a suggestion that professionals should be able to understand the sustainable development context of their work and adapt or use their professional skills appropriately. One respondent suggested, 'Perhaps

you should be asking why some graduates don't use their skills?'

Specific task related skills included:

- Be able to understand and assess risk and then apply appropriate measures to reduce unwanted risks.
- Be able to carry out social impact assessments.
- Be able to use environmental management systems and auditing techniques of sustainable objectives and targets.
- Be able to facilitate local decision making by different sectors of the indigenous society.
- Have the social skills, including the ability to communicate with all levels of stakeholders.
- Be able to use assessment and evaluation techniques, including quantitative assessment methods.
- Be able to deliver training for sustainable development.

Values and attitudes

Sustainable development is not only a technical issue, it is a moral one as well. For example, it considers issues in relation to equity, future generations and participation. Although not specifically requested, many respondents listed values and attitudes. They mentioned remaining objective, being fair to all and managing resources now to sustain future generations.

What can we learn from this?

The research showed there is strong support for the inclusion of sustainable development in undergraduate environmental programmes. At the moment it is the perception of former students that 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 also 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.

Undergraduate programmes are becoming more responsive to the sustainable development agenda but do not yet provide a coherent or comprehensive understanding of sustainable development. The emphasis is on environmental and ecological aspects and other important aspects are considered in a minor way or not at all. The research has identified some areas of knowledge, skills and processes that could provide students with a broad but rigorous understanding of sustainable development.

A number of respondents working in the private sector commented that their situation is not conducive to integrating sustainable development principles into their professional work. Ignorance and perceived economic priorities provided obstacles at middle and senior management levels. They suggested that other professionals need sustainable development training as well if progress is to be made.

Some personal reflections

The following statements are the personal reflections of the researcher but arise out of the findings of the research. They are offered to assist a further discussion of the report.

Environmental undergraduate programmes focus on the science of the environment and the importance of using this science in addressing global problems such as climate change, pollution and natural disasters. Such programmes are not claiming to address sustainable development issues explicitly yet assert they are critical to finding solutions to issues such as climate change, pollution and habitat loss that are part of a sustainable development agenda. Advocates of sustainable development hold that such problems can only be resolved if economic, social, cultural and political factors are considered as well.

Those providing environmental sciences and related courses need to be explicit about how far their purpose and learning outcomes intend to prepare students for tackling sustainable development issues.

Those that intend to extend their programme into a more coherent and comprehensive programme for sustainable development will need to:

- Build on sustainable development learning received at school
- Provide a holistic and academically rigorous understanding of sustainable development
- Demonstrate the relevance of sustainable development to their area of study and future employment opportunities
- Learn and practise skills that enable them to make professional use of that understanding
- Give greater emphasis to the economic, social, cultural and political factors that provide greater understanding of the issues.
- Consider if students need to be taught different skills or be taught how to use existing skills within the context of their understanding of sustainable development?
- Consider how to integrate the moral aspects of sustainable development into courses.

When considering change to existing programmes programme developers will need to consider if the material should be additional to, instead of or integrated with existing course material?

IES MEMBERS INVITED TO APPLY FOR CHARTERED ENVIRONMENTALIST STATUS

Following the success of the 'grandparenting' scheme, which saw more than 200 IES members achieve Chartered Status, the Institution is inviting members to apply through the 'full process'. The Institution is a Licensed Constituent Body of the Society for the Environment (SocEnv). This enables the IES to award the Chartered Environmentalist qualification to those members who meet the criteria laid down by SocEnv, which include key competences in relation to work and academic experience as well as knowledge of sustainable practice.

For more information on the Society for the Environment, please go to its web site at *www.socenv.org.uk*

Why become a Chartered Environmentalist?

Chartered Environmentalist embraces a wide range of disciplines and is an excellent way of recognising virtuosity in environmental management and sustainability.

The designation benefits all concerned with the environment:

- **the public,** who can be confident in the knowledge and competence of an environmental practitioner;
- **practitioners,** by identification as a professionally qualified environmentalist that puts them at the forefront of their profession;
- **employers,** with confirmation of the professional ability and competence of employees and candidates;
- **governments and governmental bodies** seeking to appoint advisers or consultants will be assured about an individual competence;
- **professional bodies,** which will be able to benchmark the qualification for membership purposes;
- **higher education,** in setting and monitoring benchmarks for environmental courses, and promoting study programmes;
- **regulatory bodies,** which could be confident in specifying the CEnv designation in Acts of Parliament and regulations;
- **legal credibility,** enabling expert witness participation at a defined standard;
- **professional standing,** recognising equality of excellence across a wide range of environment disciplines.

Applying for Chartered Environmentalist

Chartered Environmentalist status is only open to Full Voting Members of the Institution. If you are an existing Associate Member and would like to be considered for re-grading, please contact the IES office.

Application for Chartered Status is through a 'three stage process' and we advise applicants to read through the application pack thoroughly before applying.

If you require more information, please contact the IES. The application pack is available on line at *www.ies-uk.org.uk* or by emailing *enquiries@ies-uk.org.uk*

SOCIETY FOR THE ENVIRONMENT REGISTERS 4,000 CHARTERED ENVIRONMENTALISTS IN FIRST 18 MONTHS

The Society for the Environment is celebrating 4,000 Chartered Environmentalists on its register only 18 months after receiving its royal charter. Working in many different aspects of the environment – regulation, industry, consulting, government, research, academia – Chartered Environmentalists hold the highest level professional qualification available to environmental practitioners. It demonstrates high standards of professional practice, knowledge and engagement.

'This is a great achievement, especially for those who have been awarded the qualification,' said Dr Peter Matthews, chair of the society. 'It demonstrates a real need for a single high level qualification that employers, environmental professionals and the public can support and trust.'

Chair of the Society's Registration Authority, Neil Atkinson, added: 'The Chartered Environmentalist qualification is now the recognised standard of excellence for environmental practitioners. It is the Chartered Environmentalists, working in many sectors of business, regulation, academia and national agencies, who will take a leading role in managing environmental assets and who will play such an important part in the goal of a sustainable world.'

Mike McNulty said: 'I'm very proud to be the 4,000th registered Chartered Environmentalist and part of a network of professionals who can really help industry, commerce and the public sector make decisions and deliver projects in a much more sustainable way.' In his role as Environment Agency Project Manager of the Tees Valley Project, Mike leads a wide range of bodies improving the environment and quality of life of local communities.

The Society for the Environment (SocEnv) was first established in 2000 and gained its Royal Charter in 2004. It is the leading co-ordinating and regulatory umbrella body in environmental matters and a pre-eminent champion of a sustainable environment. Now with over 4,000 Chartered Environmentalists, the Society says it has the resources to influence the sustainability agenda in a meaningful way.

STEMMING THE DECLINE OF A VITAL NATIONAL RESOURCE

Environmental science is being subverted by a management culture that is preoccupied more by targets and compliance with methods than by evolving best practice informed by advances in environmental thinking, argues **DR MARK EVERARD**

'Environmental science' first appeared as an undergraduate course in the UK, and arguably as a discreet discipline, in the mid-1970s. This was in response to escalating concerns about the environmental issues that had forced themselves into public consciousness throughout the 1960s and early 1970s as unexpected consequences of society's pathway of economic development.

The emergence of environmental awareness and science

In reality, 'environmental science' is not a primary discipline. However, what its constitution achieved was to contextualise pure disciplines of biology, chemistry, geography, geology, ecology and others into a concerted whole that represented at least some of the fundamental ways in which the environment functions as an integrated unit. 'Environmental science' as an integrating theme has since been successful in bringing environmental concerns to organisational consciousness and into policy- and other decision-making.

Time has, of course, moved on. The concept of 'sustainable development' has since emerged into public dialogue, particularly since the publication in 1987 of the Brundtland report. The concept of a direction of human development that simultaneously resolves environmental, social and economic challenges clearly rests upon fundamental knowledge of the mechanisms and functions of the environment, as it is these environmental processes that ultimately provide the 'goods' and 'services' underpinning all subsequent social and economic progress.

The concept of sustainable development has been tested and evolved for nearly two decades since, and is increasingly embedding itself within the vocabulary of local and national government, corporate reporting and the media. Proportionate action remains as yet less tangible than rhetoric, though the need for serious progress towards sustainability is gaining wider acceptance. The relatively recent emergence of the issue of climate change into mainstream public consciousness and political dialogue, backed up particularly by the interest of insurance and other financial institutions, means that this aspect of sustainable development is becoming truly embedded. This progressive 'main-streaming' is implicitly 'a good thing', if we intend to engineer a future that is not impoverished by the continued erosion of social wellbeing and environmental support systems including natural water and air purification services, productive soils and oceans, climatic stability, and so forth.

As we begin to challenge the direction of global, corporate and other forms of human governance, propelling ourselves towards either a sustainable future or the dystopia of degraded societal cohesion and supportive ecosystems, then the underpinning science base that informs our decisions grows in importance. After all, without robust scientific foundations, can we be sure that our decisions will incrementally lead us onto a sustainable pathway?

Underpinnings in robust science

Common sense suggests that the answer to this rhetorical question is a resounding 'No!' After all, unless our decisions are founded upon how the world actually works, how can we be sure that we are doing the right things? The shifting sands of opinion alone offer greater scope for continued debate and prevarication than for the kind of consensus from which substantive action and associated investment will flow. It is inconceivable to think that sustainable development will happen by pure chance, given the trajectory of industrialised society to this point, and the embedded vested interests that reinforce a course that most acknowledge as unsustainable. It is for these reasons that current trends in environmental science education give great cause for alarm.

Commitment to a more sustainable future by many sectors of society surely means that we have a growing need for environmental scientists. But where will they all come from?

At its peak in 1998, UK universities were producing 15,000 environmental science graduates. Today, in 2006, that number is believed to be closer to 5,000, although changes in the way student data are captured means that it is hard or impossible to be prescriptive about recent figures. Many leading educators in the UK believe that, in ten years time, environmental science will have been

reduced to a predominantly postgraduate preoccupation. Crudely, if the reduction by two-thirds of the number of environmental science graduates in just eight years continues on its current trend or even merely stabilises at today's depressingly low level, what does this say about our commitment and capacity to underpin the roll-out of sustainable development?

Declining capacity

The universities have fought back against this decline, for example by the formation of CHES (the Committee of Heads of Environmental Science) as an academic 'pressure group' to raise the profile of the discipline. However, the exclusion of the topic of 'environment' from the 2004 Research Assessment Exercise (RAE) has had radically negative implications for the funding of environmental science capacity in the UK institutions. Furthermore, publication of RAE 'league tables' has a knock-on negative impact in dissuading students from applying for institutions offering environmental education.

The net consequence is that universities end up competing for a declining pool of student numbers, or else shutting science departments, for a topic that nonetheless remains of fundamental importance to the long-term aspirations of society at regional, national and global scales.

However, this importance remains sadly under-represented in government priorities, educational expenditure and the consequent public perception of the discipline.

The vanishing environmental scientist

Part of the tale of the vanishing environmental scientist is that, a generation and more on from the creation of the discipline, 'the environment' is making the journey from the periphery to the mainstream.

It is certainly true that 'environmental' issues feature now in higher education courses in engineering, water management, fisheries, geography, etc. Furthermore, many professional bodies – engineering, chemistry, soil science, waste management, urban planning, etc – now feature environmental matters where 20 years ago there was little or no awareness let alone acknowledgment or education. Equally, 'environmental science' is clearly an underpinning of sustainable development, to which many, even most, organisations across society profess some level of commitment.

Dumbing down?

However, the take-up of environmental matters into academic courses, professional development and organisational management is sometimes more at the level of a briefing in environmental management practices and tools, rather than education in the underpinning environmental sciences themselves. And yet it is the fundamental environmental sciences that are the 'seed corn' from which current environmental management principles and methods have sprouted.

As time goes on, unless our study and application of the underpinning environmental sciences continues to evolve, all that this sub-optimal mainstreaming of sustainable development will serve to achieve is to cement today's imperfect environmental management practices in their current form. Instead, we need to continue to deepen and communicate basic environmental understanding, upon which evolving management methods may stem to drive us incrementally towards a truly sustainable society.

Already, we see the pervasion of business administration qualifications rather than genuine environmental science expertise populating the key decision-making roles in government and its agencies, as well as business and the education sector. This is a certain indicator of the devaluation of the science itself in the face of subsidiary environmental management protocols. Somewhere along the line, environmental science, and the continuing insight it can offer in guiding society's ever more complex choices, is being subverted by a management culture that is preoccupied more by targets and compliance with methods than by evolving best practice informed by advances in environmental thinking.

Investment in a critical national resource

It is for this set of reasons that the UK government, indeed governments more widely, must back up stated commitments to sustainable development and to 'joined-up government' as an urgent priority. This has to go beyond mere rhetoric, delivering tangible support for the ailing yet essential discipline of environmental science.

'Education, education, education' was the manifesto mantra, so let's see the erosion of funding and reputation of environmental science education rapidly redressed to deliver the environmental science capacity that we need to achieve a better world for all people. This is actually a relatively minor step for government and for the public purse, yet has huge significance. It is certainly a necessary move if we are to have confidence in our ability to achieve true sustainable development.

It is the primary Charitable Object of the Institution of Environmental Sciences (IES) to '…advance the education of the public in the environmental sciences'. It is therefore incumbent upon all trustees and members of the IES to urge government leadership to regenerate the environmental science capacity of the UK, urgently required in the short term if the best interests of all are to be met in the long term.

This article was informed by discussions with the IES Council at the February 2006 strategic away day.

INTRODUCING OUR VOLUNTEER SCHEME

A new volunteer scheme, designed to help the IES with administration and launching special projects, is underway this summer. Two fantastic volunteers are currently working with the Project Officer, on accreditation, monthly newsletters, promotion, events and updating membership details.

Adam Donnan

After graduating with a 2:1 from the University of East Anglia Adam moved to San Francisco. Between extensive travel around the US and Canada, he worked with an appellant lawyer attempting to reduce the sentences of imprisoned youths and as a researcher on a local TV station producing current affairs programmes. On his return to England he set himself up as a self-employed consultant advising engineering companies on their supply-chain and business development, including environmental aspects. He aims in the future to become an environmental consultant and is currently working hard on making Westminster into a Fairtrade Borough.

email: *a.donnan@ies-uk.org.uk*

Adrian Mill

After graduating with Honours from the University of the Sunshine Coast in Queensland, Australia, Adrian continued working for the university in research and consultancy. He was subsequently invited to study the environmental impact of beavers with the Omora Foundation, an NGO in Puerto Williams, Chile. His contributions to a number of projects helped the organisation to obtain 'Biosphere Reserve' status for the Cape Horn region. Most recently, he has travelled extensively, published an article in the Marine Pollution Bulletin journal, worked for London South Bank University in a teaching role, and is currently looking to continue his development in the UK Environment sector.
email: *a.mill@ies-uk.org.uk*

The IES volunteer scheme is ongoing, if you or someone you know might be interested in applying for a placement please contact the office.

IES NEW MEMBERS

Mrs Louise Adams	Laboratory Supervisor	A
Miss Harriet Astbury	Environmental Scientist	A
Mr Richard Baldwin	Trainee Environment Protection officer	A
Miss Julie Bankes	Environmental Advisor	M
Mrs Emma Bennett	Environmental Strategy co-ordinator	M
Prof Clive Bentley	Acoustic Consultant	M
Mr Kirkland Braithwaite	Manager, Health, Safety, Security and Environment	A
Ms Charlotte Bryant	Advisory Officer	M
Dr Euan Burford	Pollution Control Officer	A
Ms Melissa Burgan	Senior Transport Planner	M
Mr Philbert Chan	Junior Environmental Consultant	A
Mr William Clark	Regional Co-ordinator	M
Miss Emma Collins	Environmental Scientist	A
Miss Rachel Conti	Environmental Consultant	A
Miss Charlotte Cook	Flood Risk Manager	A
Mr Richard Cope	Senior Environmental Scientist	M
Mr Benjamin Crabb	Self employed	M
Mr Peter Daniels	Health, Safety and Environmental Consultant	M
Mr Samuel Davison	Asbestos Surveyor	A
Mr Aaron Dixey	Planning Liaison Team Leader	M
Mr Paul Duce	Air Quality Specialist	M
Prof Bernard Fisher	Air Quality Assessor	M
Mr Kieran Gaylor	Acoustic Consultant	M
Mr Andre Gilleard	Geo-Environmental Engineer Manager	M
Miss Sofia Girnary	Senior Consultant	M
Ms Victoria Gouge	Environmental Scientist	A

KEY: **F = Full Member** **A = Associate Member**

Mr Lee Heffernan	Environmental Specialist	M
Mr Giles Hewson	Environmental Team Leader	M
Mr Philip Hill	Environmental Control Officer	M
Mr Jamie Hinks	Environmental Consultant	A
Mr Gerald Hughes	Environmental Scientist	A
Mr Emlyn Jones	Group Environmental Officer	M
Mr Jeremy Kirkham	Principal Environmental Scientist	M
Mr David Kirkup	Project Manager	M
Mr David Lord	Environmental Assessor	A
Mr John McDonald	Health Safety and Environmental Advisor	A
Miss Heather McIlwraith	Assistant Chemist	A
Mr Robert Meldrum	Self employed	M
Mr John Mills	Environmental Analyst	A
Mr Philip Morris	Field Monitoring and Data Officer	A
Miss Martina Mullarkey	Peaked Elm Cottage	M
Mr John Naylor	Environmental Protection Officer	M
Mr Stuart Nelmes	Engineer, Water Team	M
Ms Carol Pettit	Senior Research Fellow	M
Mr Kanan Purkayastha	Senior Scientific Officer	M
Miss Cherri-Ann Rennie	Engineering Geologist/Geoenvironmental Engineer	M
Mr James Richer	Technical Director – Air Quality	M
Mr Philip Roberts	Admin Team Leader/Duty Manager	A
Mr Archibald Rowatt	Environment Protection Officer	A
Ms Linda Rudd	Student	M
Mr Mark Scerri	Environment Protection Officer	A
Miss Antonia Scrase	Environmental Consultant	A
Miss Caroline Shaw	Assistant Drainage Engineer	M
Mrs Jane Shaw	Graduate	M
Mr Paul Sheehan	Principal Environmental Consultant	M
Mr James Short	Senior Environmentalist	M
Dr Philip Sinclair	Research Fellow	M
Mr Randip Singh	Pollution control officer	M
Miss Sarah Slater	Alcan Smelting and power UK	A
Mr Paul Slaughter	Scientific Officer	M
Mr Neil Smith	Engineer – Environment Department	M
Mr Michael Stallard	Town and Country Planning	M
Dr Tom Stenhouse	Senior Environmental Scientist	A
Miss Gemma Stroud	Environmental Scientist	A
Mr Robert Thomas	Graduate Air Quality Scientist	A
Mr Cameron Thomson	Senior Environmental Scientist	M
Miss Nicola Trought	Assistant Air Quality Specialist	A
Mr Damon Tweedie	CORUS Engineering Steels	A
Mr Konstantinos Tzoulas	Research Assistant	A
Mr Nigel Weller	Senior Environmental Scientist	M
Miss Kirsty Weston	Senior Air Quality Consultant	M
Mr David Wilson	Graduate Trainee Software Tester	A
Mr Gareth Wilson	Senior Environmental Planner	M
Mr Wai Wong	Environmental and Safety Manager	M
Miss Ella Yerushalmi	Environmental Scientist	A
Ms Catherine Yong	Environmental Scientist	M

KEY: **F = Full Member** **A = Associate Member**

GEES PROJECT TO INVESTIGATE WHAT SCHOOL STUDENTS THINK ABOUT GEOGRAPHY AND ENVIRONMENTAL SCIENCE

The Higher Education Authority National Subject Centre for Geography, Earth and Environmental Sciences, GEES, is facilitating a project, investigating student perceptions of the discipline.

Geography, earth and environmental sciences (GEES) are very much in the media at present. There are a wide variety of natural history television programmes and the news regularly contains references to natural disasters, climate change and so on. However, this coverage does not seem to translate into a high demand for higher education courses in the disciplines (at least not in the same way that dramas such as *Silent Witness* have created a demand for forensic science courses, for example).

Do school students make the connection between 'natural history' and our disciplines? What are their perceptions of the disciplines in general? Developing an understanding of school students' attitudes to and perceptions of the GEES disciplines will help to inform HE departments' transition and retention strategies as well as providing an opportunity to better promote the disciplines in schools, colleges and to the public.

Project objectives

Given the limited time and financial resources of this project, the main objective will be to provide information for higher education staff in geography, earth and environmental sciences that will help to enhance their outreach activities into secondary schools.

Activities

The following activities will be undertaken:

- **Literature review of the UK education system,** focusing on:
  - student choice (including media influences) ('generic')
  - perceptions of GEES
  - transition from secondary to higher education in GEES
- Research to develop a better understanding of:
  - school texts/language in GEES;
  - learning environments/styles in schools;
  - youth culture;
  - HE staff's perceptions of their subject (GEES) and reasons for choosing their degree;
  - undergraduate students' perceptions of their subject (GEES);
  - **school students' (studying any subject area) perceptions of GEES;**
  - examples of HE GEES outreach activities.

(Items in bold will be the primary activities of the project. The other items will be researched to a much lesser extent in order to provide relevant supporting information.)

Outcomes

As a result of the above activities, the following outcomes will be produced:

- resource pack for higher education staff in GEES;
- further ideas for extending the research;
- papers and articles as appropriate.

Progress to date

This project has generated a large amount of interest and over 20 colleagues from throughout the UK have become involved to various degrees. A literature review has been conducted to provide background information and recommendations (available shortly on the web site) and a survey of A level students is to be piloted. The main survey will be conducted in September/October with a view to the final papers and toolkit of resources being produced by May 2007.

This project provides opportunities for links to other programmes and organisations including the DfES Action Plan for Geography and the Experiential Learning in the Environmental and Natural Sciences CETL.

RECENT GEES PUBLICATIONS

Assessment in the Earth Sciences & Environmental Sciences and Environmental Studies:

Peter Hughes and Alan Boyle; ISBN 1-84102-143-1 (available to download from *www.gees.ac.uk/pubs/guides/assess/gees%20assesment.pdf*).

This is the first in a short series of guides aiming to provide academics teaching in Earth Science, Environmental Science and Environmental Studies (ES3) subjects in higher education with some support and ideas for their practice. It has been written from a UK context, but much of what follows is relevant internationally.

The existence of these guides acknowledges that there are learning and teaching issues specific to these disciplines, and that academics in these disciplines can find the generic educational literature inaccessible.

Geography, Earth and Environmental Sciences Employability Profiles Resource Pack

(available to download from *www.gees.ac.uk/projtheme/emp/empprofs.htm*).

This resource pack contains profiles of the subject disciplines of Geography, Earth Science and Environmental Sciences (GEES), written from an 'employability' perspective. The profiles are intended to assist students in articulating what they have to offer employers, i.e. what was their degree about and what qualities it has helped them develop.

The employability profiles are not intended to be definitive descriptions of the GEES subjects. Rather, they are summaries that are designed to emphasise the skills, knowledge and competencies that students can offer.

The Institution of Environmental Sciences

The professional body for environmental scientists

STUDENT MEMBERSHIP

About the Institution of Environmental Sciences

The Institution of Environmental Sciences is a charitable organisation which promotes and raises public awareness of environmental science by supporting professional scientists and academics working in this crucial arena. As a seminal environmental sciences organisation, founded in 1971, the Institution is consulted by the Govemment and other interested parties on environmental issues. The Institution has strong ties with higher education and promotes and supports environmental science and sustainable development in universities and colleges both nationally and intemationally.

Membership of the Institution offers stepping stones on a career path, from student to Chartered status, attracting professionals of high standing with significant specialist and interdisciplinary experience.

Student Membership

Students who are enrolled on the Institution of Environmental Science's accredited undergraduate or postgraduate programmes and courses may apply for the special grade of **Student Member** of the Institution.

This grade is available **free of charge** and students will be able to use the post-nominal **StMIEnvSc.**

On graduation, students will be able to use their membership up to the end of that calendar year. Additionally, on graduation Student Members are eligible for the higher grade of **Associate Member** of the Institution.

The application forms for Student and Associate membership can be found on our web site: *www.ies-uk.org.uk*

Benefits of Student Membership

- The experience of being a member of a long established and highly reputable environmental science professional body
- The ability to use StMIEnvSc up to the end of the calendar year in which you graduate, signalling your professional commitment, to potential employers
- First steps on an environmental career path which could take you to Chartered status
- Exclusive access to the members' area of our web site, with news about jobs and events, in addition to information on our careers web site: *www.environmentcareers.org.uk*
- Access to the Members' Forum, to network with other students and environmental science professionals
- Access to the latest edition of our journal *Environmental Scientist* with opportunities to publish articles about news, current issues, or even your project work
- Preferential opportunities for volunteer placements in the Institution's offices in London
- Opportunity to participate in student events supported by the Institution
- **Free of charge**

Steps on the Environmental Sciences Career Path

Student Member

- **StMIEnvSc** post-nominal
- Exclusive grade to students on IES-accredited courses/programmes
- Free of charge

Associate Member

- **AMIEnvSc** post-nominal
- Recognised membership of a professional body
- Membership made up of leading professionals and academics
- Access to journal and workshops/seminars
- Continuing professional development (CPD) for your career
- Offered to students graduating from IES-accredited courses/programmes
- Offered to ES professionals with relevant academic and some professional experience

(Full) Member

- **MIEnvSc** post-nominal
- Full voting status
- Can apply for Chartered Environmental status
- Offered to Environmental Science practitioners of academic and professional merit and high standing

Fellow

- **FIEnvSc** post-nominal
- Full voting status
- Offered to members in recognition of their exceptional academic and professional standing
- Can apply for Chartered Environmental status

Chartered Environmentalist

- **CEnv** post-nominal
- Internationally recognised award of excellence across a wide range of environmental disciplines