Mapping the environmental landscape: an investigation into the state of Environmental Science in higher education.

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Abstract

Part of Phase 1 of a project to map the landscape of Higher education (HE) for environmental science over time has been completed and the report *Mapping the Environmental Landscape: An investigation into the state of the environmental science subject in higher education* was released in March 2008. This paper summarizes the information it provided.

Introducing the landscape

Formal environmental science (ES) education in higher education institutions (HEIs) in the UK has been developing over forty years. The pervasive and unique role environmental science (ES) plays in higher education has evolved from a relatively modern movement, questioning, analysing and evaluating our influence on, and relation with, the environment.

A number of universities and former polytechnics lay claim to establishing some of the earliest environmental programmes. These include East Anglia, Hertfordshire, Lancaster, Plymouth, Southampton, Stirling and Sunderland. Governmental and public concern for the environment determined the popularity of these programmes with the number of students enrolling in environmental sciences reaching a peak in the late eighties and early nineties, following a plethora of summits and conferences advocating environmental education and responding to disasters such as Chernobyl.

It is now apparent that across government, industry, the media, and society as a whole concern for the environment is once again moving up the policy agenda. Research carried out by a generation of diverse professionals, which include environmental scientists, is revealing the multiplicity of impacts of human activity on resources and natural systems. These professions depend upon higher education institutions to provide high quality graduates who are able to link many aspects of science and society together in order to tackle environmental issues. Over 40 years of formal education the discipline has evolved and environmental perspectives have permeated many aspects of higher education both curricula and estates. Numbers of students entering the discipline have fluctuated, programmes have been shaped and re-shaped, curricula have responded to global and local agendas, departments have come and gone, and programmes have moved to different homes in different organisational structures.

The aim of this two-phased project is, in Phase 1, to try and map the complex landscape of formal ES provision in UK HE over time, by investigating recent provision from a number of perspectives. Phase 2 will involve a panel of ES higher education providers interrogating the findings in order to examine trends and issues, make recommendations for the direction of the discipline and further study. This work is being led by the Committee for the Heads of Environmental Sciences (CHES) and supported by the Higher Education Academy Subject Centre for Geography, Earth and Environmental Sciences (GEES) and the Institution of Environmental Sciences (IES).

In part, the complex landscape was illustrated in the Venn diagram in the recently revised Subject Benchmark Statement for Earth Sciences, Environmental Sciences and Environmental Studies (ES3) (www.qaa.ac.uk).

The challenge of the data

Phase 1 of the report identified issues with using JACS (Joint Academic Coding System) which, due to multiple changes in the way ES has been coded, makes detailed longitudinal studies of student numbers very problematic. To try and address this problem, undergraduate single honours programmes calling themselves Environmental Science were drawn from the plethora of JACS groups and used as an indicator to reveal five-year trends. Additionally, subject groups were joined together as the 'ES contingent' (JACS F850/851/890/900/990). It is worth noting that another change has been implemented. As from 2007/2008, the subject code for environmental science has changed to F7. The reason for this

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move can be found at the following UCAS website. http://www.ucas.com/he_staff/datamanagement/jacs/jacs20

Not only was the problematic statistical data interrogated, but surveys were also undertaken. An electronic questionnaire was sent to a list of environmental science providers maintained by the Committee of Heads of Environmental Science (CHES). This was sent to 50 programme leaders, heads of departments and lecturers. There were 20 respondents from both large and small HEIs. The key questions asked were about :

- programme restructure
- pressures on provision
- future ES provision at local and national level
- key issues over the next five years
- the future shape of the discipline.

An electronic questionnaire was also sent to 80 ES professionals from the consultation network of the Institution of Environmental Sciences. 12 responded and they included consultants, principal scientists, managers and directors.

The key questions/issues asked were about:

- quality and number of graduate supply
- factors influencing applications to ES programmes
- future shape of employment
- recommendations to the HE sector.

Use was also made of a recent report on the current agenda of sustainability in the higher education curriculum. The introduction of sustainability into the curriculum and general activity of university life has created an important and recognised agenda. As a relatively new facet of environmental science, its effects on employability and curriculum content are still being debated. Work carried out by John Baines OBE for the GEES Subject Centre and for Professional Partnerships for Sustainable Development (PP4SD) looks at the current level of sustainability skills taught by universities and their application to professional life. This report is available at http://www.gees.ac.uk/projtheme/esd/esdinprofprac.doc.

Findings: The Environmental Science Landscape

Findings from the investigation were grouped under the following aspects:

- recruitment
- changing structures
- skills and employment
- future provision
- education for sustainability

The main findings on student numbers and recruitment include:

- ES applications and enrolments have seen a very minor decrease, against an overall increase in recruitment to HE as a whole
- at present, there are approximately 18,000 students studying ES and closely aligned subjects, which includes approximately 2,200 students studying ES as a named single honours programme
- postgraduate provision has increased, with approximately 4,800 students studying in ES and aligned subjects in 2005
- many ES providers saw the popularity of environmental issues in the media as a method of increasing recruitment

Providers were asked to give recommendations to enhance recruitment to ES degrees nationally. Responses circle around ideas of raising awareness of the subject, especially in secondary schools. There was also consensus that the potential career path of graduates was not highlighted enough. Interestingly, the reaffirmation of the science at the core of the discipline was seen as a way to promote the subject's academic robustness. It was hoped that the current media coverage of environmental issues would spur a new generation of applicants. Respondents stated a need for a "*Stronger emphasis on employability*" and ... "*to continue to stress value and quality..Students have no idea of potential career pathways*".

The question of enhancing recruitment was also put to environmental professionals. The ES professionals had concerns about a shortage of graduates and the need to increase linkages between courses and employers. On the question of student motivations to apply to ES programmes, responses ranged from idealistic reasons,"*The chance to make a real difference*", to more pragmatic reasons of programme location or A-level points.

The main findings on changing structures and future provision include:

- academic structures have been undergoing change to cope with pressures such as student numbers, staff resources and new agendas (86% of respondents had experienced restructuring over the past five years, with nearly half experiencing withdrawal of some provision and 80% some additional provision). The main prompt for change was said to be staffing resources closely followed by decreasing

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student numbers, new agendas and negative organisational pressures.)
- there has been a reduction in the number of institutions offering ES (currently 45) overall: there has been a growing 'core' and shrinking 'periphery'
- postgraduate provision was increasing and seen by some institutions as a priority with a "*demand from the students themselves*"
- there is not a surplus of graduates and employers are still recruiting

Responses to the impacts of changing locations were polarised. Many noted the loss of power and prominence in the suite of programmes offered by their institution as programmes are moved under the management of those with little ES (or science) knowledge. Others noted the creation of opportunities for closer links with other cognate courses or improved facilities.

The main findings on skills and employment include:

- many employers felt that whilst students had a broad knowledge, they were lacking in specialised skills relevant to the work place
- employers would like more input into the higher education curriculum.

The employment of ES graduates is traditionally difficult to track, as many spend time immediately after graduating either volunteering or travelling. Three years of data supplied by HESA shows that the first destination of 50% of ES graduates fall into five areas. These include science and technology professionals and associate professionals, teaching and research professionals, business and public service associate professionals and administrative occupations. The remaining 50% of graduates enter over 24 more esoteric and often unrelated employment categories. Figure 1 highlights the average first destination for the JACS group F850, that was identified as containing most titles allied to ES.

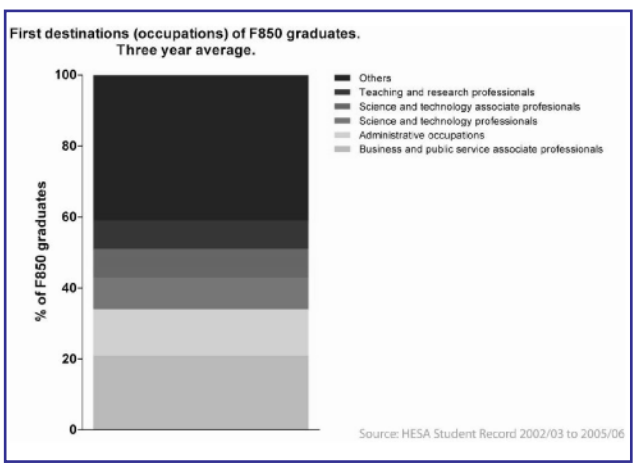

Figure 1: First destination of environmental science graduates. 50% of students are likely to be employed in sectors relevant to their degree.

Questions about the supply of graduates and associated skills were put to the ES professionals. When asked how they would describe the current supply of graduates (from undergraduate level), the majority of responses voiced that there was a shortage (Figure 2). This was also the case with postgraduates entering the job market, although the percentage responding that there was an adequate supply of postgraduates was higher than for undergraduates.

The professionals were asked to assess the skills of graduates and whether they were adequately prepared to enter the ES sector. The majority of the responses indicated that currently students were not adequately prepared, but noted that graduates from vocational programmes fared better. There was also a call for more focus on industrial or professional skills and "training in how to be a good consultant".

The main findings on future provision include:

- providers felt concerned or uncertain about future provision though no dramatic change was thought to be on the horizon
- key issues were identified as maintaining student numbers; responding to new agendas, such as sustainability and employability; ensuring science in the discipline; and maintaining resources, such as laboratory and fieldwork.

Some respondents were optimistic. For example:

"Arguably, environmental issues have never been given such prominence or priority at a

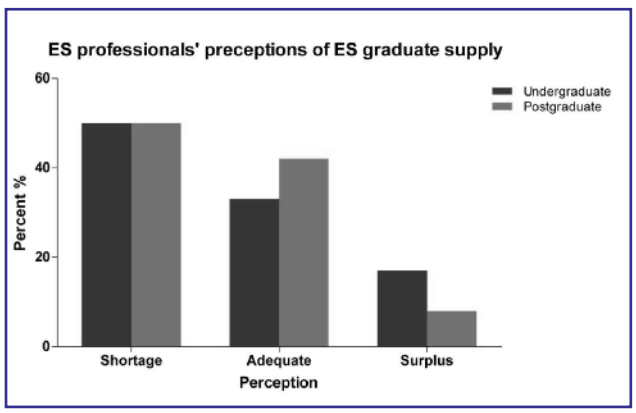

Figure 2: Perception of environmental science graduate supply.

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government level – there is likely to be strong demand for well trained environmental science graduates."

In terms of national provision, more noted again that the current media coverage and government priority will secure the demand and supply of students in ES programmes for the foreseeable future.

Some noted, however, that the link has not yet come to fruition. Additionally, some noted that there is a worrying decline in students studying the scientific aspects of the discipline.
ES providers were asked to identify the key issues for ES in higher education over the next five years. Suggestions ranged from maintaining student numbers to new agendas, such as employability and sustainability. Special reference was made to the need to ensure the credibility of science in the discipline; ensuring students are engaged with the academia of ES as well as its practical elements. Additionally, comments were made in respect of resources such as fieldwork and laboratory time, echoing concern that these vital elements of the discipline are under continued threat. The ES professionals reinforced the idea of links with industry in the future as a way to ensure highly skilled, work place ready graduates.

The main findings on sustainability include:

- environmental professionals increasingly need to be knowledgeable about and competent in sustainable development
- there is strong support for the inclusion of sustainable development in ES programmes
- ES programmes provide an adequate 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
- These are based on John Baine's survey of 350 members of the IES with 44 responses. This work contributes towards the discussion on curriculum content and design and could help shape future provision.

Phase 2

The findings of Phase 1 of the Mapping the ES Landscape report will be discussed at the CHES AGM in London, June 23rd 2008. This group will examine the trends and issues outlined in Phase 1, and begin the process of identifying the key challenges facing the ES higher education community, anticipating the future shape and structure of the ES landscape and formulating recommendations for future provision.

This paper is an abbreviated version of the full report that can be found at http://www.ches.org.uk/publications.html

CHES – The Committee of Heads of Environmental Science is an organisation that includes senior environmental scientists from both colleges and universities. CHES aims to promote and facilitate environmental education within higher education and has been active in RAE and benchmarking consultations, as well as joint programme accreditation with the Institution of Environmental Sciences.

IES – The Institution of Environmental Sciences is a professional body, created at the same time as the first environmental science courses in higher education. It has very strong links with the university and further education sector. Believing that science and professionalism should underpin our understanding and interaction with the environment, the Institution accredits programmes in universities which are of high merit. Its members are very high quality scientists working in every aspect of the environmental field, from air quality to nuclear power.

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