

# Mapping the Environmental Science Landscape



An investigation into the state of the environmental science subject in higher education



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Geography, Earth and Environmental Sciences (GEES)

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## Executive summary

Formal environmental science (ES) education in higher education institutions (HEIs) in the UK has been developing over forty years. The aim of this two phased project is to try and map this complex landscape over time by investigating recent provision from a number of perspectives and to make recommendations as to future directions and work. The complex landscape was illustrated in the Venn diagram in the recent revised Subject Benchmark Statement for Earth Sciences, Environmental Sciences and Environmental Studies (ES3) ([www.qaa.ac.uk](http://www.qaa.ac.uk)).

Phase 1 of the report identifies issues with using JACS (Joint Academic Coding System) which, due to multiple changes in the way ES has been coded, makes detailed longitudinal studies 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 5 year trends. Additionally subject groups were joined together as the 'ES contingent' (JACS F850/851/890/900/990).

Not only was the statistical data interrogated but surveys were also undertaken with ES in HEIs, providers (lecturers and programme leaders) and ES professionals. Use was also made of a recent report on the current agenda of sustainability in the higher education curriculum.

Findings from the investigation can be grouped under the following aspects:

- Recruitment
- Changing structures
- Skills and Employment
- Future Provision
- Education for sustainability

The main findings of the project include:

- applications and enrolments have seen a very minor decrease against an overall increase in recruitment to HE
- there has been a reduction in the number of institutions offering ES as a single honours programme (currently 45), overall there has been a growing 'core' and shrinking 'periphery'
- at present there are approximately 18000 students studying ES and closely aligned subjects which includes approximately 2200 students studying ES as a named single honours programme
- postgraduate provision has increased with approximately 4800 students studying in ES and aligned subjects in 2005
- academic structures have been undergoing change to cope with pressures such as student numbers, staff resources and new agendas
- providers felt concerned or uncertain about future provision though no dramatic change was thought to be on the horizon
- many ES providers saw the popularity of environmental issues in the media as a method of increasing recruitment
- many employers felt that whilst students had broad knowledge they were lacking in specialised skills relevant to the work place
- there is not a surplus of graduates and employers are still recruiting
- employers would like more input into the higher education curriculum.

Overall the ES landscape was found not to be in dramatic decline or rapid expansion and that there is scope and a platform for reigniting interest. As one respondent stated there is "the chance to make a real difference".

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 Geography, Earth and Environmental Sciences (GEES) and the Institution of Environmental Sciences (IES).



## Foreword

### Message from the Chair of CHES

*I welcome this report as an important contribution to our understanding of the nature, scope and opportunity for development of our discipline. In recent years Environmental Sciences have been characterised by falling numbers of applicants and closure and reorganisation of University provision. This important and timely review provides us with key insights into this changing terrain, one that the report reveals as characterised by concentration upon a core of providers at undergraduate level and by an increasingly important post graduate offering. The report identifies some important employer issues and a willingness for employers to become engaged in the design of the Environmental Sciences curriculum. Equally important are the insights offered into the environmental sciences priorities and concerns of higher education institutions and staff.*

*This report will be very helpful to curriculum designers, institutional managers and to employers and has already enabled CHES to define an agenda to pursue in support of the findings of the report. We will, in partnership with GEES and the IES convene a panel of Environmental Sciences academic to examine the data and to make recommendations for the future development of the discipline.*

*I recommend this report to you as an important foundation for the future development of Environmental Sciences in higher education.*

*Professor Jim Longhurst*

*Chair, Committee of Heads of Environmental Sciences*

*University of the West of England, Bristol*

*March 2008*

### Supporting bodies

This report is supported by three bodies, all of whom take active roles in supporting the Higher Education provision of ES.

The Higher Education Academy Subject Centre for Geography, Earth and Environmental Sciences (GEES) aims to improve the learning and teaching experiences of everyone in these disciplines in higher education institutions in the UK. Based at the University of Plymouth, GEES is a national and international hub in the exchange of knowledge on learning and teaching across the three disciplines. It provides a voice for these communities, contributing to government consultations and policy developments.

The Committee of Heads of Environmental Sciences (CHES) 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 the Research Assessment Exercise (RAE) and Subject Benchmarking consultations, as well as joint programme accreditation with the Institution of Environmental Sciences.

The Institution of Environmental Sciences (IES) 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.

## Environmental Science: Introducing the Landscape

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 disasters such as Chernobyl.

It is now apparent that across government industry the media and society as a whole there is a concern for the environment and that this 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 educational institutions to provide high quality graduates who are able to link many aspects of science and society together in order to tackle environmental issues.

### Report rationale

After 40 years of formal environmental science education, the discipline has evolved and permeated many aspects of higher education. It is important to gain an understanding of where we are now, how and where ES is provided and the relationship between skills and employment. From this, the discipline will be able to determine its own future, in terms of delivery, relevance and scope.

### Report aims

This report aims to map the ES discipline in higher education, investigating trends in recent provision by involving professionals, higher education providers and recruitment statistics. The findings will be released in two phases which will:

#### Phase 1

- highlight the past five years' demographics of student applications and acceptances to ES programmes
- uncover trends in the institutional provision of ES
- report any changes to postgraduate provision
- survey environmental providers (lecturers and programme leaders) and their concerns for present and future provision
- survey environmental professionals for their opinions on the current supply of graduates
- form a resource for providers to promote ES and utilise data made available by the statistical collectors

#### Phase 2

- identify key challenges facing the ES higher education community
- anticipate the future shape and structure of the ES landscape
- formulate recommendations for future provision.

## Information sources

This report is based on information collected from the following sources:

- Higher Education Statistics Authority (HESA) and the University and Colleges Application Service (UCAS) student recruitment data
- Environmental Science HE providers questionnaire
- Environmental Science professionals questionnaire
- Relevant reports.

### Student recruitment data

Environmental science by its very nature is interdisciplinary. The subject involves many modern sciences as well as the traditional core.

This interdisciplinary structure creates issues when analysing trends in student data. Depending on the source and authority, programmes of various names are grouped under “environmental science”, and cross many categories used by the statistic-gathering institutions, such as the Joint Academic Coding System (JACS) used by HESA) and UCAS.

### The environmental science coding system

Prior to 2002, environmental science resided under the F9 UCAS code “Environmental and other Physical Sciences”. During the change to the four digit JACS code in 2002, it moved under the “F8” category (Physical & Terrestrial Geography & Environmental Science) and into the sub-category F850 (Environmental Science). Along side this subgroup there are allied subgroups, which include F851 (Applied Environmental Sciences) and F890 (Environmental Science not elsewhere classified).

It is apparent however that in 2007 many institutions which run ES programmes use two “catch-all” subject codes, F900 and F990, to classify their programmes. This, coupled with the extensive coding system for environmental related degrees, makes data collection problematic.

Further to this, another change is on the horizon. In the 2007/08 academic year the subject code for environmental science will change once more, to F7. This is part of a bigger transition to JACS V2.0. The reasons for this move can be found at the following website.

[http://www.ucas.com/he\\_staff/datamanagement/jacs/jacs20](http://www.ucas.com/he_staff/datamanagement/jacs/jacs20)

The result of these alterations is that environmental science and its plethora of aligned courses is very difficult to track longitudinally. This report looks at certain codes, in order to gain an understanding of the landscape, but fully acknowledges that it is restricted to the dynamic and often counterproductive nature of the statistics. Even “Environmental Science” named as a single honours programme can appear in at least 5 subgroups.

### Targeted investigation

In order to overcome the changes in categories, this report looks at specific codes and levels (figure 2), and uses an indicator subject for the lowest level - spanning five years. In this case “Environmental Science” as a single honours programme was chosen to represent the discipline.

Secondly, the sub-codes in which environmental science and those programmes closely aligned to it sit are grouped together for the sake of this report. This is the “ES contingent” and contains:

- **F850 (Where most ES programmes should be found)**
- F851
- F890
- F900
- F990

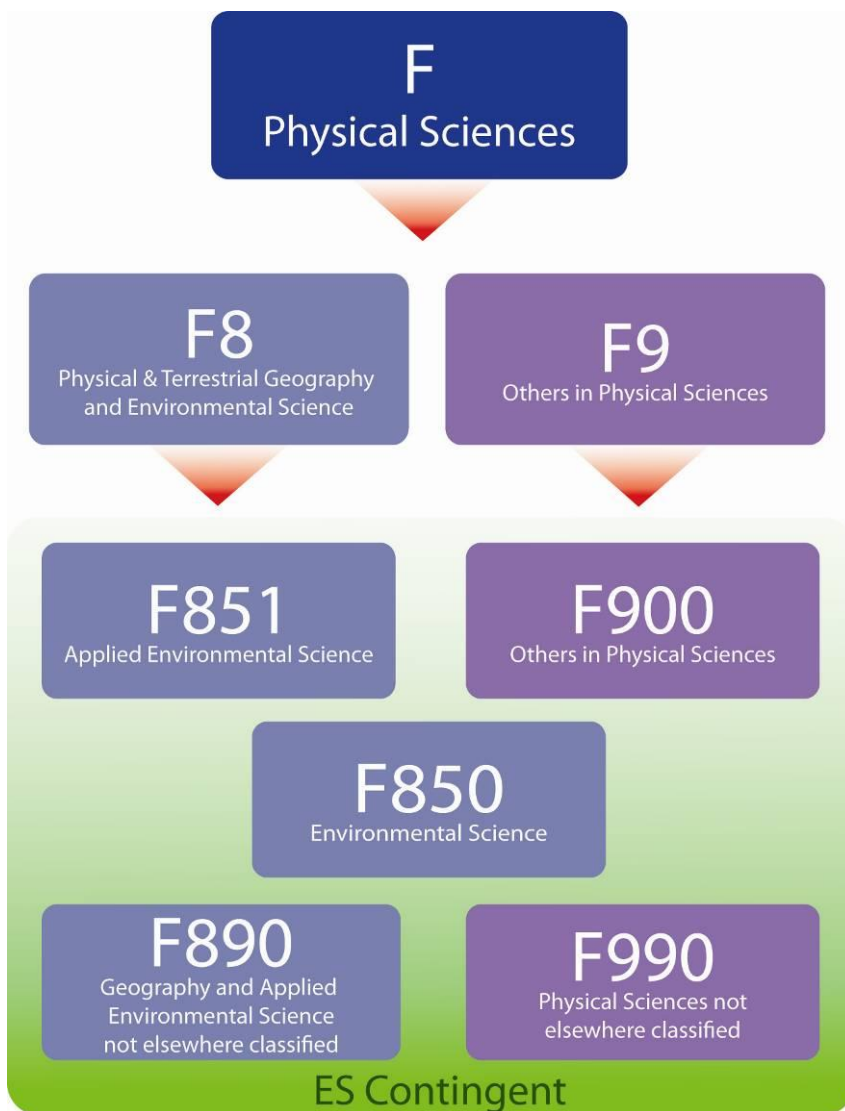


Figure 1 – Typical locations of the ES subject, post 2002

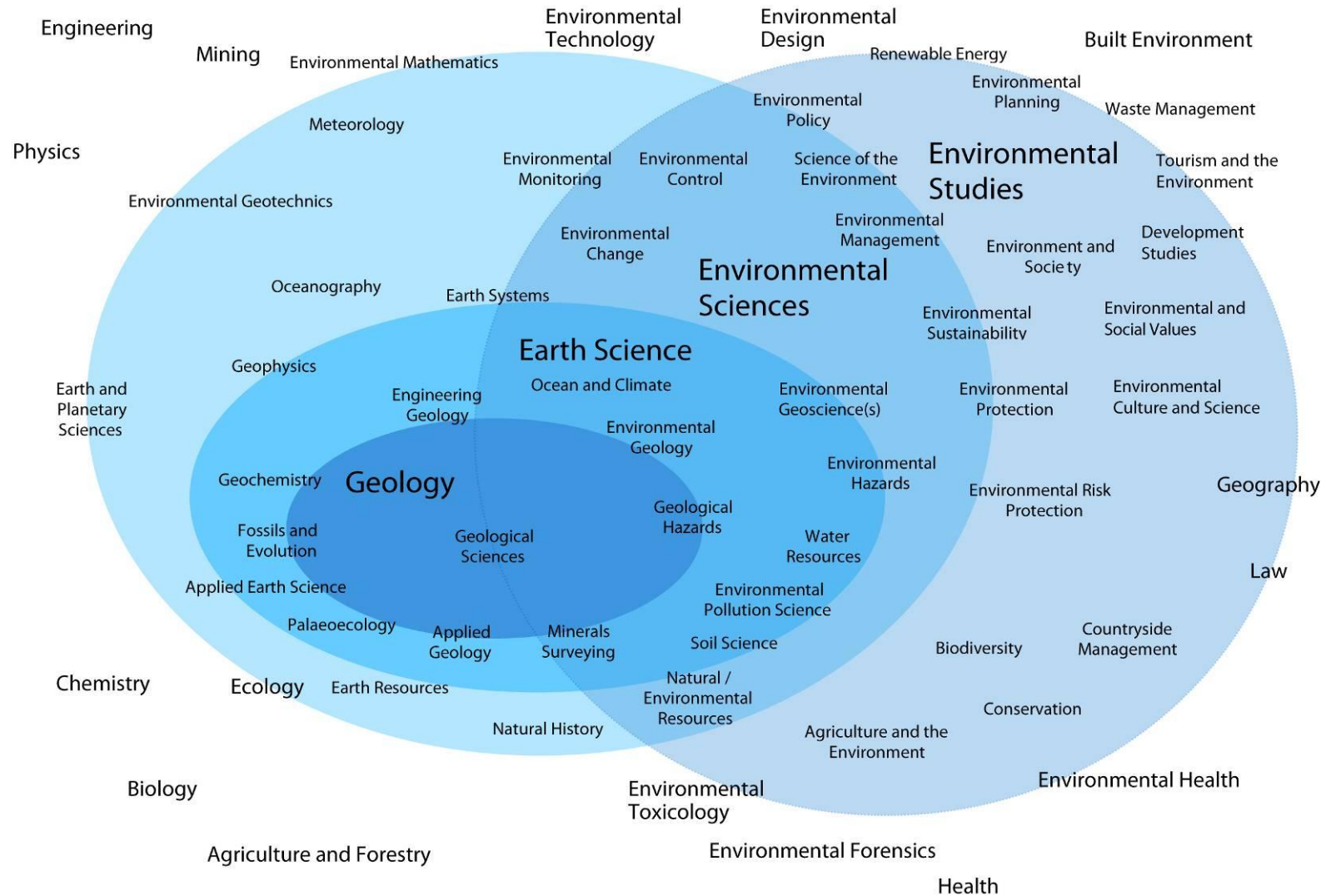


Figure 2: Venn diagram illustrating the diverse subject fields allied to environmental science. The majority of these programmes can be found in the F8 JACS group. Revised Subject Benchmark Statement for Earth Sciences, Environmental Sciences and Environmental Studies (ES3) 2006



## Questionnaires

### Environmental Science Providers

An electronic questionnaire was sent to a list of environmental science providers maintained by the Committee of Heads of Environmental Science (CHES).

- Sent to 50 programme leaders, heads of departments and lecturers
- 20 respondents
- Covered one third of UK HEIs offering ES as single subject
- HEIs ranged from largest to smallest institutions

#### Key questions

- Programme restructure
- Influencing pressures
- Future ES provision at local and national level
- Key issues over the next five years
- Future shape of the discipline.

### ES Professionals

An electronic questionnaire was sent to the consultation network at the Institution of Environmental Sciences.

- Sent to 80 professionals
- 12 respondents – included consultants, principle scientists, managers and directors

#### Key questions

- Quality and number of graduate supply
- Factors influencing applications to ES programmes
- Future shape of employment
- Recommendations to the HE sector

A copy of both questionnaires can be found in the appendix.

## Reports and studies

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 PP4SD looks at the current level, and requirement of, sustainability skills taught by universities and their application to professional life. This report is available on the following website.

<http://www.gees.ac.uk/projtheme/esd/esdinprofprac.doc>

## Results structure

Findings from the investigation have been grouped together and reported under headings which map various cognate aspects of the environmental landscape.

- Recruitment
- Changing structures
- Skills and employment
- Future provision
- Sustainability

# Findings: The Environmental Science Landscape

## Recruitment

The past five years have seen a small but steady increase in applications to university places as a whole, and the F8 category (physical and terrestrial geography and environmental science) fares well, with a marked increase in applications after 2004 (figure 3).

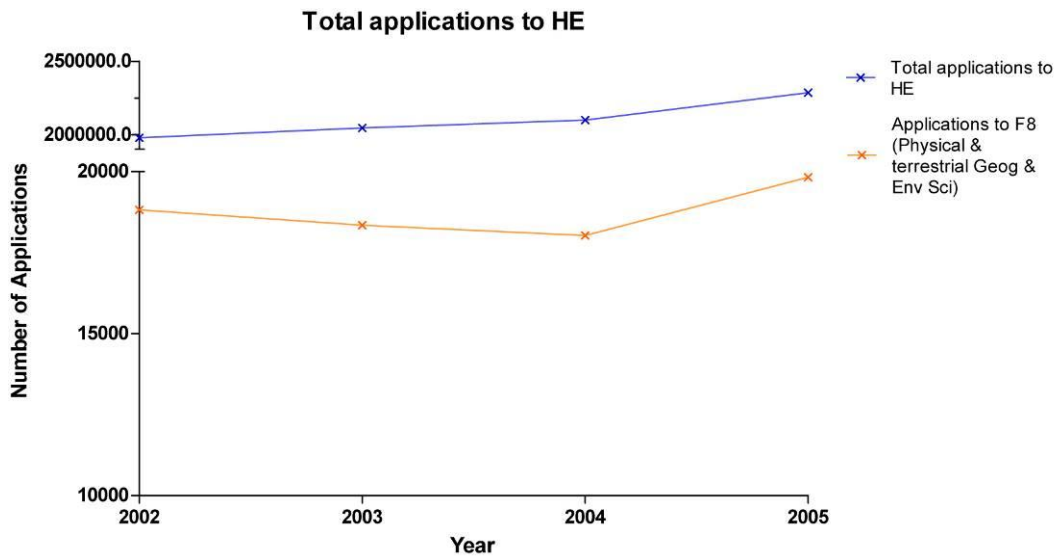
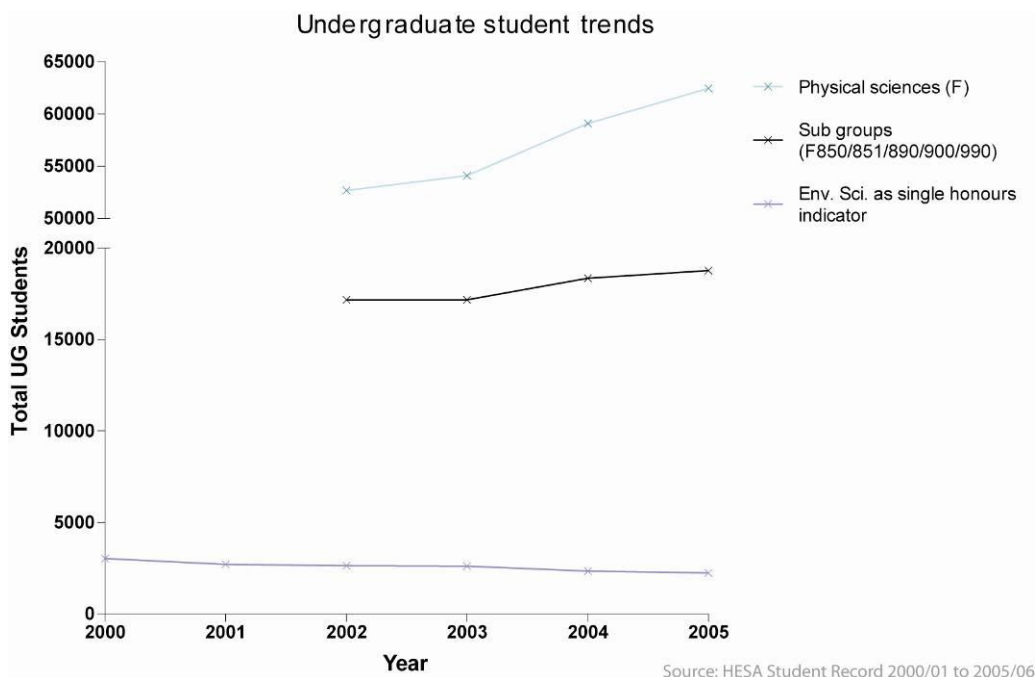


Figure 3: Graph showing trends in university applications for 4 years with the JACS group F8 (physical sciences) showing a marked increase after 2004.

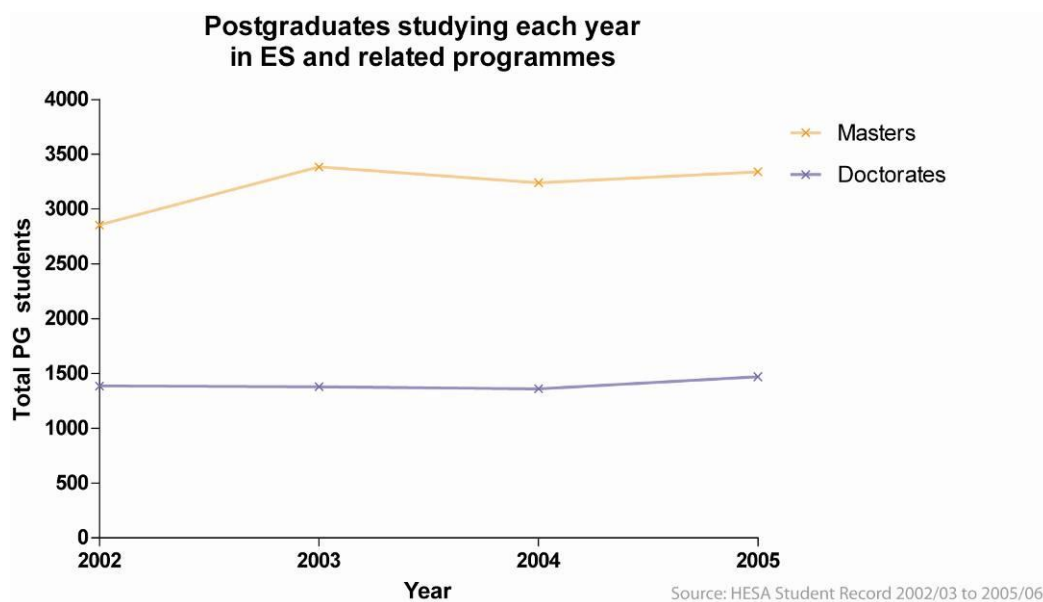
Reflecting this trend in applications, the number of undergraduate students in higher education has also seen a steady increase. The number of undergraduates studying physical sciences has undergone a healthy increase, but in comparison to other subjects is still quite low. Investigating environmental science as an indicator subject shows a very small decline in student numbers to environmental science single honours programmes (figure 4). Numbers shown are total students not full time equivalents (FTE).



Source: HESA Student Record 2000/01 to 2005/06

Figure 4: Trends of students studying environmental science. Environmental science as a single honours programme shows no dramatic change.

Data relating to the number of postgraduates students studying environmental sciences show that the number on Masters programmes is rising (figure 5). It is also worth noting that research undertaken in 2004 by Dr Simon Watts, for the CHES AGM, indicated that the growth in postgraduate provision was more evenly distributed across the sector than undergraduate provision, where the growth was in the old and Russell group universities.



**Figure 5: Postgraduate numbers for environmental science shows an increase in students studying at Masters level.**

### “Need to continue to stress value and quality... Students have no idea of potential career pathways”

Providers were asked to give recommendations to enhance recruitment to ES degrees nationally. The 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. Finally, it was hoped that the current media coverage of environmental issues would spur a new generation of applicants.

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Stronger emphasis on employability.
Encourage the re-integration of geography into the core of the national curriculum at GCSE level and encourage the teaching of science at schools via the medium of environmental issues e.g. environmental chemistry.
Greater inputs in schools to promote career opportunities (and progression to chartered status) and counter the continuing perception that all environmental jobs are badly paid!
Local employment links, stress employable nature of graduates, attractive field course opportunities, keep courses related to the real world, no hippy stuff!
Universities and schools should improve their marketing.
With more media cover of climate change and other problems this may well have an impact on recruitment as students become more aware of environmental issues.

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### “Introduce as a career option from second level in schools. Show how the sciences can lead to a life long career”

To gain views from outside of the education sector, the question of enhancing higher education recruitment was also put to environmental professionals. The answers centred on employability and again the idea that promotion of career paths would encourage students to apply for ES programmes, perhaps not surprising when the position of the respondents is considered.

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Further in-service training for both student and teacher.  
 More vocational courses.  
 Better structured career paths and commensurate salaries with other professions.  
 Increased marketing of long-term, secure career prospects. Increased linkages between courses and employers. Increase government awareness of the problem and seek additional funding of courses.  
 Show a more hands-on approach, of what can be actually done by environmental sciences and how they integrate with other environmental professionals.

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### “The chance to make a real difference”

As well as exploring ways in which the sector may recruit more students, the professionals were also asked to explore the motivations behind students’ applications to ES programmes. Responses ranged from idealistic reasons of combating environmental degradation to the more pragmatic reasons of location or A-Level points.

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Course availability, first degree experiences, A-level choices and media issues.  
 What good they can do from their qualifications against environmental degradation.  
 Usually not driven by ultimate career choice (if one has been made), rather an interest in science in general, or environmental technological aspects of the subject in particular.  
 Social responsibility – building or making a better world.  
 Entry requirements, location, college set-up, academic research, friends’ opinions.

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## Changing Structures

In addition to recruitment trends, the current shape of the ES discipline is determined both by its location in an institution and the number of institutions providing it as a subject.

Over the past five years the number of higher education institutions (HEIs) offering ES as a single undergraduate degree has fluctuated with a trend of department closures. The results for 2007 show a modest bounce back. The wider ‘ES Contingent’ shows a decline in numbers after 2002 (figure 6). Research suggests that there are fewer smaller institutions, and a stable core of larger institutions drawing students to their programmes. This changing landscape is not purely a physical one and comments made by environmental science providers highlight the factors behind change and their impact.

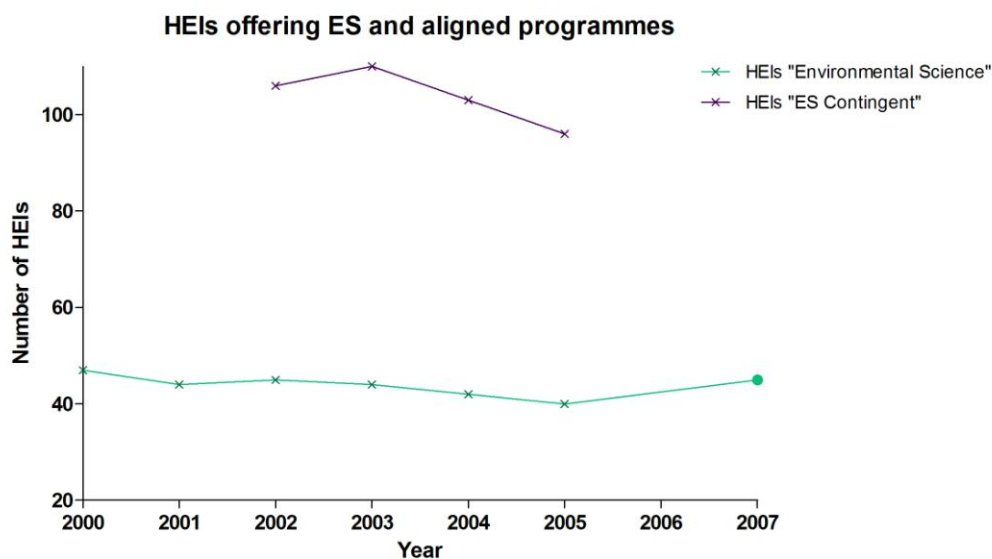


Figure 6: Number of institutions offering environmental science as a single honours programme, and those offering the ES contingent. 2007 figure derived from UCAS course search.



The research shows that the majority (86%) of institutions have experienced restructures over the past five years including 46% experiencing withdrawal and 80% experiencing additional provision. Whilst restructuring is a usual part of academic life, the reasons behind them and effects they have, are an important driver of the discipline as a whole. When asked to rank how certain factors are relevant to them, ES providers show that staffing resources are the biggest prompt for change (figure 7). Negative organisational pressure and decreasing student numbers were also seen as very relevant.

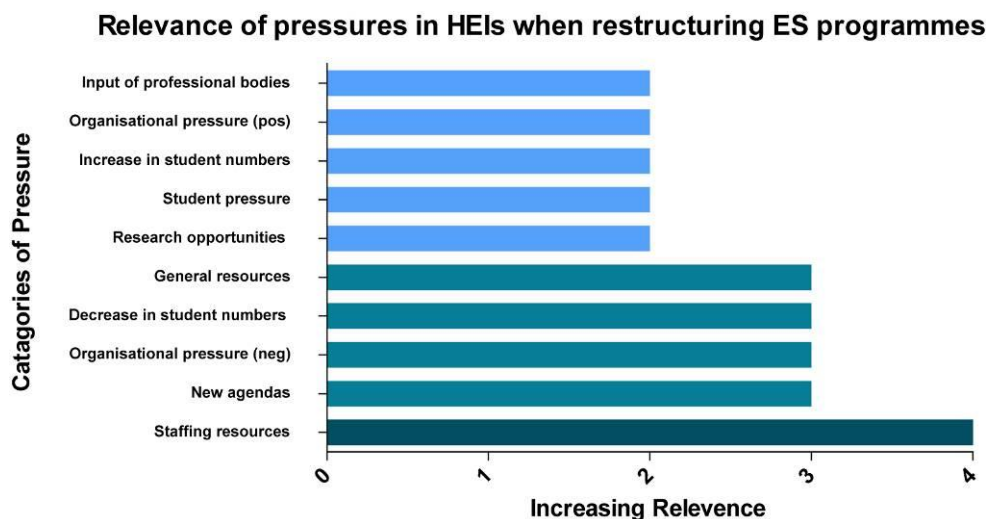


Figure 7: Relevance of pressures in HEIs when restructuring environmental science programmes.

“We continue to maintain steady but low recruitment numbers on to our environmental science BSc programme. By re-structuring we hope to increase these numbers. This is the main incentive behind any changes.”

Reference was also made to fitting in to wider university changes or new agendas. Focussing on postgraduate provision, most respondents claimed that restructuring was positive, increasing provision at this level; however, some noted that this was sometimes to the detriment of undergraduate provision.

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Most changes flow from student comments on evaluations but also from visit days from prospective students.

The overwhelming reason for withdrawal was fall in student numbers. In retrospect, opportunities to restructure and refocus the course were not taken in time.

Lack of understanding by the faculty and university plays a vital role.

Courses have been restructured to reduce chemistry/pollution material and increase fieldwork and descriptive material - in response to student desires.

Postgraduate growth is an institutional priority. Also demand from students themselves.

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“For undergraduate restructuring, the impacts have been that students receive more core skills provision, but outside of the specialism in many cases, with both negative and positive impacts.”

In order to map the impact of restructuring in ES, programmes providers were asked to comment on the results of institutional change. Many cited streamlining due to lower student numbers or changes in content as being the result of change.

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Streamlining and reduction in duplication of provision.  
 Sustained recruitment numbers, larger group sizes but reduced staff teaching hours.  
 Enhancement of postgraduate provision, removal of UG provision.  
 In response to a collapse in student numbers, BSc. Environmental Pollution Science was withdrawn.  
 Additional student recruitment.

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School of Science · Science Faculty · School of Biological and Environmental Sciences · Applied Sciences · Faculty of Applied Sciences · School of Biosciences and School of Environmental and Interdisciplinary sciences · School of Health and Social Science · Business, Environment and Society · Humanities, Social Sciences and Law · Faculty of Health and Human Sciences · School of Life Sciences · School of Conservation Sciences · Faculty of Science and Technology · School of Physical & Geographical Sciences · Faculty of Natural Sciences · Science and Engineering · Engineering & Physical Sciences · Health, Natural & Social Sciences · Department of Science and Sport

Figure 8: Example locations of environmental science programmes in UK HEIs.

Respondents were asked to note where their ES programmes currently reside (figure 8), whether this had changed in the past five years and if so, what the impacts had been. Over 50% recorded that their programmes had changed location recently. The range of names of the faculties or departments in which programmes currently reside is diverse, reflecting periods of mergers and fragmentation of the discipline.

“The creation of these two schools instead of the old department has made management of the programmes problematic...”

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 ties with other cognate courses or improved facilities.

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Dilution of science focus.  
 Faculties and associated Subject Networks have only been introduced in the last five years - this has been very effective in drawing together staff from a wide geographic and academic range.  
 The university boasts "environment" in titles to department, faculty and institute whilst closing UG provision.  
 Initially negative impact on existing students and prospective applicants.

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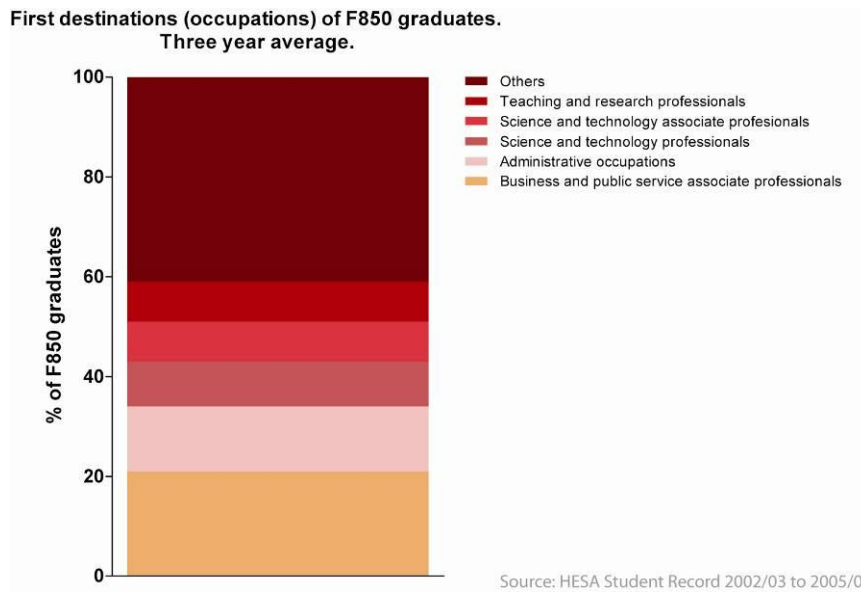


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## Skills and Employment

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

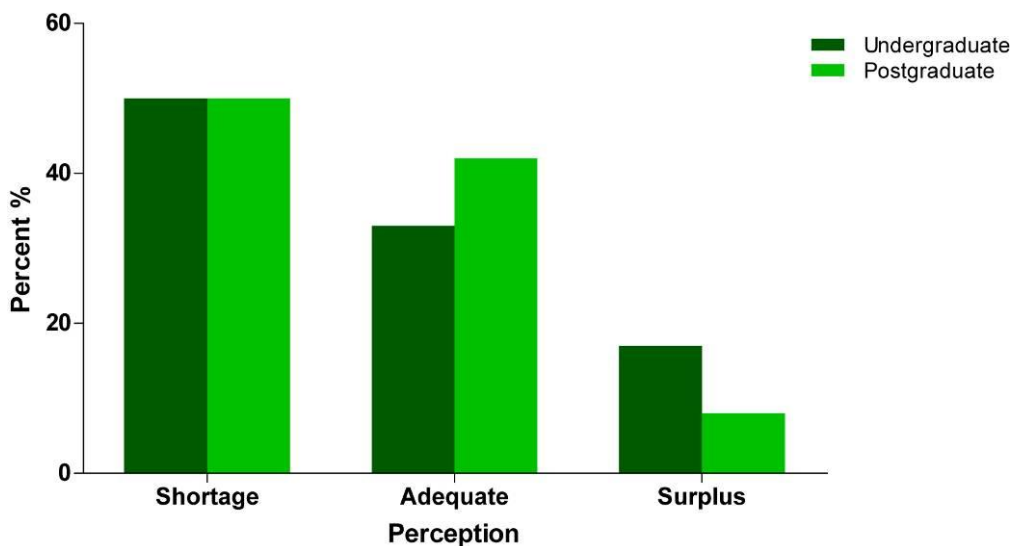
employment categories. Figure 9 highlights the average first destination for the JACS group F850, identified as containing most titles allied to ES.



**Figure 9: 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 10). 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.

**ES professionals' perceptions of ES graduate supply**



**Figure 10: Perception of environmental science graduate supply.**

**“Not prepared for immediate application”**

When required to comment on their assessment of supply, responses were polarised between the suitability of undergraduates to employment and the actual number entering the job market. Comments about postgraduates were more esoteric, many suggesting that there was an increasing number of higher level graduates and that the associated specialisation had both positive and negative impacts.

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We are having difficulties in filling posts with staff with the right skills  
 We don't seem to suffer all that badly when it comes to how many applicants we get for advertised jobs  
 Not all graduates that I have come across in my capacity as a lecturer have skills knowledge, they tend to learn and dump for each module  
 Lacking sufficient basic expertise to be able to progress

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In addition to the supply of graduates to the job market, professionals were asked to assess the skill of graduates and whether they were adequately prepared to enter the environmental science sector. The majority of responses indicated that currently students were not prepared.

### “Expectations do not appear to correlate with real-world work scenarios”

Several themes recur in the responses given to this question. Practical experience was often lacking, many noting that graduates from vocational courses were better than those with purely theoretical knowledge. Secondly, it was thought that the nature and content of the programmes were not equipping students well. Often, students' knowledge was too broad with not enough focus on industrial or professional skills including report writing, negotiation and business skills.

The majority of surveyed professionals also indicated that they would like to have more influence over the ES curriculum. Comments referred to the practical and skills-specific roles professional could play within universities.

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Environmental degrees on offer cover so broad a range of topics that graduates are too general in their approach when it comes to specific activities in the workplace.  
 They are better where the course they have undertaken had a vocational element. Nothing can replace hands-on experience.  
 Many graduates who work in this sector become consultants. Training in how to be a good consultant is not available  
 There is a lack of up to date training.

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## Future provision

Environmental science providers were asked to comment on their perception of ES provision in the future, on both a local and national scale. The results show a range of responses (figure 11). When combining results it can be seen that most are either concerned or uncertain about the future provision at either local or national level. More were concerned about local provision.

“Some courses are thriving with high numbers, but the outlook is uncertain elsewhere... may be capacity for growth in medium term.”

When asked to comment on their predictions for local provision many cited a fall in student numbers as a reason for concern. Interestingly, many believed that media attention in environmental issues had not yet translated into increasing student numbers. There was agreement that there is a wish to keep ES courses going and that there will always be a demand for the programmes.



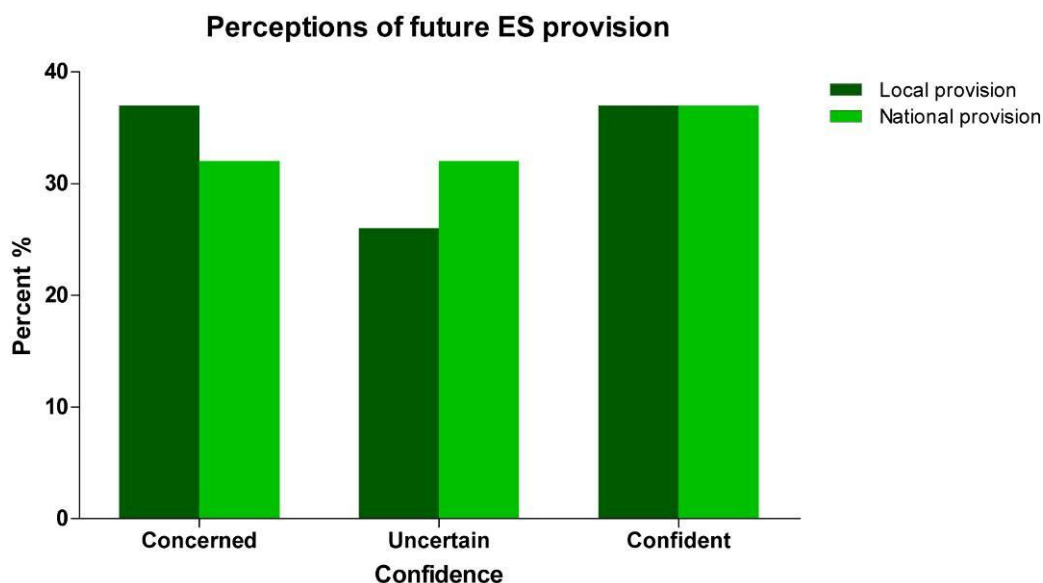


Figure11: Perception of environmental science provision over the next five years.

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They may be some hope for a new course with emphasis on current issues, descriptive material and high fieldwork content.

There is a willingness to keep the environmental programmes going, however, their future rests on the number of students we can attract.

Environmental Science as a discipline is suffering decline in student numbers. This however is offset by marked increases in Environmental Geography and continuing buoyancy in post-graduate numbers.

We are a strong research institution with expertise in a breadth of disciplines relevant to Environmental Science.

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

“We need to train graduates that are increasingly exposed to and competent in field, laboratory and computational methods”

Further to these questions, 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.

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Maintaining/increasing recruitment; producing graduates with high levels of numeracy and analytical and data interpretation skills; being proactive in course design.

To produce more useful graduates with practical skills such as identification, EIA, GIS, to make them more employable. Currently our students seem to have problems getting jobs that are classed as 'graduate jobs'. Employability is a key theme for universities.

Maintaining student numbers and therefore the range of programmes currently on offer within HEI. With increasing pressure on staff to spend more time on research, consultancy etc, more innovative ways of delivering the curriculum and developing independent learners need to be explored.

Increased awareness of sustainability.

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In answer to the question “In five years what do you envision the shape of the discipline to be?” there was a narrow spectrum of responses, from “not a healthy as it is now”, to “a slow revival”. In summary, comments suggested that providers thought there would not be a dramatic change over the coming years, but many suggested that there would be fewer programmes concentrated in the larger institutions.

**“Maybe more specialist courses instead of just environmental science. Much more emphasis on environmental change.”**

Similarly environmental professionals do not see a dramatic shift on the horizon: when asked to forecast the employment landscape over the next five years, many expected not much change, or a gradual increase due to better environmental awareness and increasing legislation requiring more environmental professionals.

**“Potentially - current thinking in the way we see our environment is changing and will permeate into recruitment and employment”**

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I can't see it changing.

There is a constantly growing demand for environmental graduates, this will increase as the need for environmental professionals is recognised as a necessary part of our present and future work force.

I expect to see a relative status quo.

The basic R&D funding streams are reducing, and there will be a move to more consultancy based work placements.

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**We've recognised the problem too late; the skills gap cannot be filled overnight but we can plan better for the future.”**

When asked if they had any other concerns about environmental education, environmental professionals reinforced the idea of links with industry in the future as a way to ensure highly skilled, work place ready graduates.

## Sustainability

The following is an extract from a report compiled on behalf of GEES and PP4SD. It outlines the current agenda of sustainability in the higher education curriculum and provides a useful insight into the range of provision available, together with recommendations for further development.

*Environmental professionals increasingly need to be knowledgeable about and competent in sustainable development. There is strong support for the inclusion of sustainable development in environmental degree programmes. Environmental degree programmes provide an adequate base on which to build, but graduates need to take further education and training to be better*

*qualified to integrate sustainable development principles into their chosen environmental profession.*

The primary aim of this research project is 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 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.

Without exception, all respondents agreed that sustainable development should be included in undergraduate programmes, but it should be appropriate and rigorous.

Programmes after 1990 show a marked increase in sustainable development content, as one would expect. 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. 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.

Twelve programmes with environmental science or studies in the title were analysed separately. Environment and ecology figured strongly in these programmes. Pre-1990 there was little coverage of other issues, with the exception of social and economic issues, which were covered a little. Post-1990 all issues were represented, but not in all programmes. Two provided a substantial coverage of systems thinking and practical aspects. All others had minor coverage only.

Using a scale of 0-10 (0 = not at all, 10 = completely) 53% of respondents scored 8 or more when asked if they needed sustainable development knowledge and skills in their current post. This fell to 33% for previous posts. When asked how well their undergraduate programme had prepared them for this aspect of their work, only 3 respondents in their current posts gave a score of 8 or above. Eight respondents gave a score of zero. For their previous posts, out of 19 responses, no respondents gave a score of 8 or more and 4 scored zero.

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.

The knowledge related responses fell into two areas: general knowledge relating to sustainable development and knowledge specific to a particular profession. The most commonly cited general aspects were: knowing about sustainable development and sustainable development issues, in particular looking at issues holistically, being familiar with government policies and legislation, understanding the importance of natural systems and the impact of human activity on them and being aware of the costs and benefits of implementing sustainable development.

The skills cited also fell into two categories: those needed in a particular profession and more general skills that all environmental professionals need. Many recognised that effective sustainable development actions develop out of inclusive processes that require environmental professionals to have good social and communications skills that enable them to work with a range of stakeholders. Another important skill cited was the ability to think holistically and work across disciplinary boundaries. Underlying many of the statements was the need for environmental professionals to understand the sustainable development context of their work and adapt or use their existing professional skills appropriately.

Although not specifically requested, many respondents listed values and attitudes, suggesting that sustainable development has a moral as well as a technical dimension. Respondents mentioned remaining objective, being fair to all and managing resources now to sustain future generations.

Thirty-three of the respondents had taken a further degree in an environmentally related subject. When asked if aspects of sustainable development were included in their studies, 16 replied YES and 7 NO. Nine stated the content had been useful in their professional work. Graduate and postgraduate programmes both helped develop an understanding of sustainable development, but postgraduate programmes were most useful in providing the competencies/skills needed in their professional work. Environmental programmes at 'A' level and undergraduate level were considered to be a good base on which to develop an understanding of sustainable development.

### Priorities

Environmental science programmes focus on the science of the environment. University literature describing programmes emphasises the contribution made by environmental scientists to understanding and resolving issues such as climate change, pollution and use of natural resources.

These are also sustainable development issues, and finding sustainable solutions will require people to have an understanding of associated economic, social, cultural and political factors. These factors do not seem to be covered comprehensively or coherently in most environmental science undergraduate programmes.

Finding solutions will require professionals to work in an interdisciplinary way and with a variety of stakeholders. New working practices will require additional sets of skills.

If those who graduate in environmental science and related subjects wish to be recognised as leaders in finding sustainable solutions to environmental problems, programmes will need to include new areas of knowledge and skills. How this can be done in an academically rigorous way without diminishing the standard of the environmental qualification will have to be addressed.

Even acting as an information provider, advisor or decision maker in a multi-disciplinary team will require environmental scientists to have an understanding of different perspectives and the ability to work as members of a team.

Full report can be found at: <http://www.gees.ac.uk/projtheme/esd/esdinprofprac.doc>



## Phase 2

The findings of this section of the Mapping the ES Landscape report will be put before a panel of environmental science providers. This specially convened group will examine the trends and issues discovered in Phase 1, whilst making recommendations for further study and the direction and administration of the discipline. In summary Phase 2 will:

- Examine the data in the report, recommend other aspects for investigation
- Identify key challenges facing the ES higher education community
- Anticipate the future shape and structure of the ES landscape
- Formulate recommendations for future provision

The panel will be convened by the report authors and will sit in the first half of 2008. If you wish to take part, please inform the contact below. Phase 2 will then be published as an addendum to Phase 1.

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## APPENDIX

### Qualitative Responses to ES Professionals questionnaires

#### 1. How would you describe the current supply of skilled graduates?

##### 1.a Please give reasons for your answer...

- Inability to attract candidates in numbers to many job advertisements: not just in my own discipline - this occurs throughout the natural sciences. There appears to be a lack of degree courses/spaces.
- Our organisation seems to always be interviewing for graduate positions. However, for Senior + positions, there are just no candidates.
- Current ability to meet recruitment needs, though requirements for suitable experience can compound this.
- There seems to be an excess of 'environmental' degrees producing graduates.
- Not prepared for immediate application
- Current job applications seen to be indicating low demand
- We don't seem to suffer all that badly when it comes to how many applicants we get for advertised jobs
- We are having difficulties in filling posts with staff with the right skills
- Not all graduates that I have come across in my capacity as a lecturer have skills knowledge, they tend to learn and dump for each module
- It is a difficult career in which to obtain full time employment
- Lacking sufficient basic expertise to be able to progress
- When we have recruited externally there has been a large number of first degree applicants of varying quality.

#### 2. How would you describe the current supply of skilled postgraduates?

##### 2.a Please give reasons for your answer...

- As above. Postgrads also often have inflated view of their own worth and seek academic kudos rather than applying knowledge to solution of practical problems.
- Our organisation seems to always be interviewing for graduate positions. However, for Senior + positions, there are just no candidates
- Many candidates for job vacancies have a minimum of a lower and higher degree, the latter quite often obtained having failed to achieve suitable employ following first graduation.
- Lack of courses offering specialist skills or understanding that the research element could be applied to increase marketability of candidate
- Little job applications being offered
- It is a difficult career in which to obtain full time employment
- The individuals are trained within a specific required field.
- When we have recruited externally there has been a sufficient number of postgraduate applicants. There are also a number of relevant internal applicants who are qualified to at least MSc level.

#### 3. Do you feel environmental science graduates are adequately prepared for careers in environmental science?

##### 3.a If "no" please give your reasons

- Apparent lack of theoretical knowledge and total lack of practical, hands-on, experience.
- In reality you can get quickly sidelined into a specialism. Trying to return to a broad approach even with a couple of years absence is difficult
- Expectations do not appear to correlate with real-world work scenarios.
- Environmental degrees on offer cover so broad a range of topics that graduates are too general in their approach when it comes to specific activities in the workplace. There also needs to be a robust understanding of the industry in order determine the environmental issues and appropriate mitigation
- Potential candidates lack skills in writing and discussing reasoned argument, presentation of factual information within context and specialised skills that can be 'sold' to a client.
- They are better where the course they have undertaken had a vocational element. Nothing can replace hands-on experience

- Whilst they appear to have a broad training in environmental issues, the depth of understanding appears to be reducing. In addition the ability of new graduates to write reports appears to be diminishing
- In pure environmental science yes, but there are many aspects which bolt onto this subject in which they are not adequately prepared, such as pollution, water, monitoring contamination etc.
- Many graduates who work in this sector become consultants. Training in how to be a good consultant is not available
- There is a lack of up to date training.
- There is not enough appreciation of the legal, commercial or project management constraints that apply to us as a Government Department. We therefore prefer to recruit experienced staff internally wherever we can - if necessary releasing staff to obtain degree qualifications by part-time study.

#### **4. From your experience what factors do you think affect a student's decision to choose a degree in environmental science?**

- It's no longer seen as "cool" and future career opportunities are insufficiently promoted.
- Broadness of topic and ability to take a holistic view
- Course availability; media issues; first degree experiences; A-level choices
- Social responsibility - building/making a better world
- Entry requirements, location, college set-up, academic research, friends opinions
- The chance to make a real difference.
- Whilst many are interested in wider environmental issues, many see environmental science as an easy option
- What good they can do from their qualifications against environmental degradation
- A love for the natural environment/ science/ natural history/ environmental conscience/ help change to a better world.
- A desire to find a successful way of living that does not impact on "natural" systems.
- Usually not driven by ultimate career choice (if one has been made), rather an interest in science in general, or environmental technological aspects of the subject in particular.

#### **5. What recommendations could you give to enhance recruitment to environmental science degree programmes?**

- Increased marketing of long-term, secure, career prospects. Increased linkages between courses and employers. Increase government awareness of the problem and seek additional funding of courses.
- Better structured career paths and commensurate salaries with other professions.
- Improved college facilities, closer involvement of industry
- More vocational courses
- Env. science is very broad, and specialisation would be useful. In addition, whilst oral skills have improved, written and numeracy skills have reduced.
- Show a more hands-on approach, of what can be actually done by environmental sciences and how they integrate with other environmental professionals.
- Further in-service training for both student and teacher.
- Environmental science needs to be applied to the industrial or government context. Therefore including modules on programme or project management, EU and UK law, commercial management.
- Introduce as a career option from second level in schools. Show how the sciences can lead to a life long career

#### **6. Do you think employers should have a greater influence on the environmental science curriculum?**

- Yes, responsibility cannot be devolved to government alone.
- Not really. Although covers broad area, env science people tend to think "outside the box". And if they don't know the answer they know where to get it. Something you don't actually learn, but you absorb
- Yes if this is borne out by needs and benefits study. It would also need to be sector specific.
- Yes, in particular there needs to be more practical experience.
- Yes
- Yes
- Yes
- Yes
- Yes, they should show what environmental scientists can really do

- Visit schools. Provide work placements for second level students
- Yes.

## 7. How do you see the environmental graduate employment landscape changing over the next five years?

- Continued increase in demand due to further EU legislation. A significant number of recruits from the '70s are also approaching retirement age.
- I expect to see a relative status quo.
- I can't see it changing
- Potentially current thinking in the way our environment is changing will permeate into recruitment and employment
- The basic R&D funding streams are reducing, and there will be a move to more consultancy based work placements.
- Not very much
- There is a constantly growing demand for environmental graduates, this will increase as the need for env professionals is recognised as a necessary part of our present and future work force
- Further specialisation and simplification of to aid profit making.
- It needs to become more applied to other subjects - perhaps forming part of joint courses with management studies in particular.

## 8. Do you have any other comments or concerns regarding environmental science in higher education?

- We've recognised the problem too late: the skills gap cannot be filled overnight but we can plan better for the future.
- Courses offered by higher education institutes should be benchmarked against the current and predicted job market.
- Closer liaison with industry, lowering supervisors' expectations of what constitutes research so that students can use data generated from consultants' projects in their areas of research
- Again, the emphasis on environmental change must be supported by adequate resources to HE Institutions
- I wish I could enter the teaching profession as a teacher rather than research paper fodder. It seems to me that getting the environment message across has been lost in efforts to make money.

## Qualitative Responses to ES Providers questionnaires

### 1.a Impacts of restructuring

- In response to a collapse in student numbers, BSc. Environmental Pollution Science was withdrawn. Some staff were re-allocated, others retired. One new MSc course was started then discontinued due to inadequate numbers; another continues.
- Streamlining and reduction in duplication of provision
- Enhancement of postgraduate provision, removal of UG provision
- The introduction of BSc Environmental Science with Business Management complements our combined Geography degrees and offers more flexibility for students without significant impact on teaching loads. Our UG programme in Environmental Science is currently being restructured and impacts will not be known until next year.
- Sustained recruitment numbers, larger group sizes but reduced staff teaching hours
- Additional student recruitment
- Reduction in amount of material taught
- For the undergraduate restructuring, the impacts have been that students receive more core skills provision, but outside of the specialism in many cases, with both negative and positive impacts.



## 2. Pressure affecting UG restructures

- Major development has been the introduction of Environmental Geoscience as a degree pathway reflecting better the areas where the main staff expertise lies
- Stabilising taught post-graduate numbers; more focussed undergraduate programmes freeing of staff time for administration / research
- Introduction of BSc Environmental Health in 2004 - some ES content. Also minor changes to modules taken within existing BSc Environmental Management programme.
- Opportunities afforded by University restructuring were important. Environmental programmes moved from a Social Sciences Faculty in 2003 into an Applied Sciences School.
- Extended scope of offering - e.g. BSc Environmental Science with Year Abroad - new programme; MSc Economy, Environment and Place - has added a new Environmental Management option to core ESRC recognised Masters
- Most changes flow from student comments on evaluations but also from visit days from prospective students - for example we have strengthened the business and environment module
- They have allowed us to maintain buoyant student numbers. We included a programme in Conservation Biology as students seemed to be put off with titles containing the word 'Environment' for a while. We now offer and MSc in Env Consultancy which has proven attractive. We have also moved to a more common first year to maintain numbers on modules which has worked very well.
- We still have problems of staffing issues which are preventing us from further modifying our programmes. We would like to include more contemporary modules.
- Lack of understanding by the faculty and university plays a vital role.
- We continue to maintain steady but low recruitment numbers on to our ES BSc programme. By restructuring we hope to increase these numbers. This is the main incentive behind any changes.
- It improves the intake of our PG programmes and maximise our resources. However, we can no longer rely on a UG stream to feed into the PG programmes, we now have very low UK intake.
- Numbers of students distributed on 3 closely related programmes led to rationalising and merging of some modules to retain choice within the new programme
- The overwhelming reason for withdrawal was fall in student numbers. In retrospect, opportunities to restructure and refocus the course were not taken in time.
- Changes- many as a response to standardisation across the university and trying to save time/resources to cope with increased students
- Student numbers led to School of Science review, which, in turn, led to redundancies and need to restructure
- Courses have been restructured to reduce chemistry/pollution material and increase fieldwork and descriptive material - in response to student desires.

## 3. Pressure affecting PG restructures

- Widening provision at Masters level is a University priority
- Postgraduate growth is an institutional priority. Also demand from students themselves
- Expansion of provision, despite loss of key staff
- The enforced changes are due to standardisation of credit framework system within the University

### 4.b Impact of changes in the location of ES departments

- Reduced number of undergraduate modules; greater synergies between ES and Biological Sciences
- The creation of these two schools instead of the old department has made management of the programmes problematic...
- Dilution of science focus
- We are looking to develop new programmes within the Env Science umbrella. Applications for Env Science have been increasing over the last few years.
- Lack of empathy from all line managers (who have no environmental/scientific/technical knowledge), threats to lab resources which are now owned by a different faculty.
- The university boasts "environment" in titles to department, faculty, and institute whilst closing UG provision.
- Initially negative impact on existing students and prospective applicants (change from self-standing Department, incorporated into a larger and more diverse School/Department); inevitably has to be greater awareness of strategic plans for larger unit.
- Faculties and associated Subject Networks have only been introduced in the last five years - this has been very effective in drawing together staff from a wide geographic and academic range

- Improved facilities
- Loss of status as School, then as separate department and losses of staff

## 5. At a local level, how do you feel about the future of environmental science programmes at your institution?

### Comments:

- Environmental Science as a discipline is suffering decline in student numbers. This however is offset by marked increases in Environmental Geography and continuing buoyancy in post-graduate numbers
- There is a willingness to keep the environmental programmes going, however, their future rests on the number of students we can attract.
- We will continue to recruit small numbers as we are one of the few institutions still offering this degree choice.
- Uncertain particularly about postgraduate programmes due to low recruitment, although more confident about undergraduate programmes.
- This view is affected by current high media attention.
- To provide ES at HE level in the Highlands and Islands is very difficult to sustain economically due to the inevitable low cohort size in small catchment areas. UHI networking is of enormous assistance with this but negative economies of scale .....
- The future will depend on student recruitment. Ironically, the university is now jumping on the sustainability bandwagon having ignored our arguments about the importance of environmental science and geography.
- We are a strong research institution with expertise in a breadth of disciplines relevant to environmental science
- Media concerns do not yet seem to be translated into increased student interest in undergraduate courses. There may be some hope for a new course with emphasis on current issues, descriptive material and high fieldwork content.
- Some courses (e.g. Plymouth) are thriving with high numbers, outlook uncertain elsewhere. May be capacity for growth in medium term.

## 6. At a national level, what do you feel about the future of environmental science as a discipline?

### Comments

- There will be changes but courses and institutions will adapt, as they always have.
- Decline in UCAS applications to the hard science end of environmental sciences
- Environmental Science as a discipline is suffering decline in student numbers. This however is offset by marked increases in Environmental Geography and continuing buoyancy in post-graduate numbers
- NB recent cancellation of CHES meeting
- There is so much publicity about the environment which can only be good.
- The general public is more aware of environmental issues such as Global Warming, but not certain whether it will transpire into increase in student uptake. Our students mainly come from overseas.
- We struggle to recruit scientifically literate students and our students are reticent to engage with chemistry, biology and maths.
- The perception - and reality - of Geography as the "home" for coverage of subjects relating to environmental matters probably leads to students selecting Geography as the known and familiar subject to choose at degree level.
- Growth in job opportunities should attract continuing student interest
- The population at large is beginning to realise the importance of being educated about the environment
- Arguably, environmental issues have never been given such prominence or priority at a government level - there is likely to be strong demand for well trained environmental science graduates

## 7. What recommendations could you give to enhance recruitment to environmental science degree programmes nationally?

- Local employment links, stress employable nature of graduates, attractive field course opportunities, keep courses related to the real world, no hippy stuff!
- No recommendations, just the hope that the recent awareness of major environmental change possibilities will be reflected in career choices at school level

- Give a human focus to the environmental sciences; emphasis cross-disciplinary activity
- Better science teaching at schools; greater awareness of ES
- Need to continue to stress value and quality. Have to stress earning potential of students leaving with ES degrees
- More TV programmes featuring env scientists would work very well! Overall though just more publicity about careers in the environmental sector. There is still a perception that Env jobs are hard to find and poorly paid.
- Students generally look for placements, if we have support from the industry, it will be a great attraction.
- Illustrate relevance to industry, commerce, society
- Students have no idea of potential career pathways, do not see ES as an application of the traditional sciences, but rather as a 'soft option' and assume that a career in ES will have little financial reward. Unfortunately, the last part is true.
- Greater inputs at schools to promote career opportunities (and progression to Chartered status) and counter the continuing perception that all env jobs are badly paid!
- More understanding of the discipline at school level (and not just as a sub-component of Geography)
- Emphasise the employment opportunities, improve linkages with school curriculum
- Universities and schools should improve their marketing
- With more media cover of climate change etc this may well have an impact on recruitment as students become more aware of environmental issues
- Promote issues such as volcanoes, earthquakes, climate change and other hazards as core to environmental science - geography is gradually hijacking the agenda on this.
- Encourage the re-integration of geography into the core of the national curriculum at GCSE level and encourage the teaching of science at schools via the medium of environmental issues e.g. environmental chemistry etc
- Centrally organised careers events (cf. events organised by the Geological Society for geology graduates); Advocacy with organisation responsible for content of A-level science courses (not just environmental science, but also in physics, chemistry, biology, geology, law, economics ...)
- Stronger emphasis on employability

## 8. Over the next five years what do you think the key issues will be for higher education provision of environmental science?

- Maintaining student numbers, providing adequate fieldwork, possible litigation relating to fieldwork/safety
- Better integration of earth system science
- Contributing to debates on how societies live with environmental change
- We plan to retain ES embedded within existing broader provision
- Student numbers at UG level, including international student interest - need to broaden markets
- To produce more useful graduates with practical skills such as identification, EIA, GIS, to make them more employable. Currently our students seem to have problems getting jobs that are classed as 'graduate jobs'. Employability is a key theme for universities.
- Employment, funding, professional recognition
- Skilled graduates able to address environmental issues in clear, responsible ways
- Maintaining/increasing recruitment; producing graduates with high levels of numeracy and analytical and data interpretation skills; being proactive in course design.
- Clear professional career opportunities advertised, linking with both geography and biology at school level; clearer advertising of expertise in different parts of the discipline for different types of career. Promoting course provision to link with environmental strategies within Universities
- Maintaining student numbers and therefore the range of programmes currently on offer within HEI. With increasing pressure on staff to spend more time on research, consultancy etc more innovative ways of delivering the curriculum and developing independent learners needs to be explored.
- Resourcing practical/field work (staffing numbers and expertise and facilities)
- Affordable sustainability
- Increased awareness of sustainability
- Lack of scientific and analytical ability in students, coupled with a lack of interest in these areas.
- Recruitment
- Environmental Science is widely perceived to be a "soft" science. To be credible, we need to train graduates that are increasingly exposed to and competent in field, laboratory and computational methods - many of these are expensive to teach and increasing financial pressures in the Higher Education sector are likely to discourage such changes .

- Fieldwork in relation to travel costs; sustainability based on environmental limits for water, energy, soil, etc.; implications of limited future energy supplies.

## 9. In five years what do you envision the shape of the discipline to be?

- More scientific I hope, less associated with geography, more with the PBC sciences
- Not as healthy as I would like or it should be!
- Focused in fewer but larger operations
- Maybe more specialist courses instead of just Env Science. Much more emphasis on environmental change.
- More recognition but the student numbers are unlikely to increase significantly.
- Integrated into disciplines such as engineering, design etc
- Media interest should boost recruitment, but lack of resources may force some institutions to close.
- Currently becoming very geography focussed-need more interdisciplinary promoted
- Fewer programmes and less institutes delivering environmental based programmes. Research funds will be allocated to a relative small number of institutes.
- Under resourced
- Little changed, but with emphasis shifting to cover perceived environmental threats
- Dominated by sustainability and social aspects of environmental science, with less on processes.
- Much more of a hybrid and post positivist subject than it currently is
- Similar to today but with a much greater reliance of computational models
- A slow revival in face of generally decreasing numbers of school leavers able to afford degree courses. Courses available in more flexible format for p/t and adult learners.

## 10. Any other comments...

- My own discipline (Geology) has for decades been a "hidden" science in UK - maybe, linked with other environmental sciences, its increasing relevance to the environment will sharpen its recognition in years to come in the UK - and provide increasing job opportunities for graduates.
- Even less emphasis on the science (especially maths) and more social science related topics.

## Where do your ES programmes sit?

School of Science

Science Faculty

School of Biological and Environmental Sciences

Applied Sciences

Faculty of Applied Sciences

School of Biosciences and School of Environmental and Interdisciplinary sciences

School of Health and Social Science

Business, Environment and Society

Humanities, Social Sciences and Law

Faculty of Health and Human Sciences

School of Life Sciences

School of Conservation Sciences

Faculty of Science and Technology

School of Physical & Geographical Sciences

Faculty of Natural Sciences

Science and Engineering

Engineering & Physical Sciences

Health, Natural & Social Sciences

Department of Science and Sport

ES Providers Survey

Mapping the Environmental Science landscape – 2007

Institution:

As part of a national report entitled “Mapping the Environmental Science Landscape” this questionnaire is a unique and essential opportunity for providers of ES in higher education to voice their opinions about the state of the discipline. The results will build up a national picture about current provision and structure as well as concerns and recommendations for the future.

All answers will remain anonymous and will not be related to specific institutions. Answers about programmes should be based

1. Over the past five years have you made any changes to your environmental sciences provision?  
Please summarise the number of programmes affected...

Additions		Withdrawn		Restructres	
Undergraduate	Postgraduate	Undergraduate	Postgraduate	Undergraduate	Postgraduate

1a. What have been the impacts of these moves?

2. How important have the following factors been in any restructuring of your **undergraduate** environmental programmes?

1 = No relevance - 5=Very relevant

- Student pressure
- Staffing resources
- General resources (lab time, books, facilities etc)
- Increase in student numbers
- Decrease in student numbers
- Organisational pressure (negative effect)
- Organisational pressure (positive effect)
- New agendas (e.g. employability, sustainability...)
- Research opportunities
- Input of professional bodies

Comments

3. How important have the following factors been in any restructuring of your **postgraduate** environmental programmes?

1 = No relevance - 5=Very relevant

- Student pressure
- Staffing resources
- General resources (lab time, books, facilities etc)
- Increases in student numbers
- Decreases in student numbers
- Organisational pressure (negative effect)
- Organisational pressure (positive effect)
- New agendas (e.g. employability sustainability...)
- Research opportunities
- Input of professional bodies

Comments



4. In which faculty / school do your environmental science programmes currently reside?

4.a Has this changed over the past five years?

Yes  No

4.b If "yes" What have been the impacts of these changes?

5. At a **local** level, how do you feel about the future of environmental science programmes at your institution?

Concerned

Uncertain

Confident

Comments

6. At a **national** level, what do feel about the future of environmental science as a discipline?

Concerned

Uncertain

Confident

Comments

7. What recommendations could you give to enhance recruitment to environmental science degree programmes nationally?

8. Over the next five years what do you think the key issues will be for higher education provision of environmental science?

9. In five years what do you envision the shape of the discipline to be?

10. Any other comments...

Please complete the questionnaire and email to [p.holmes@ies-uk.org.uk](mailto:p.holmes@ies-uk.org.uk). Further information about the project can be obtained by the above email address. The Mapping the Environmental Science Landscape report is supported by GEES, CHES and the Institution of Environmental Sciences.

Environmental  
Professional SurveyMapping the Environmental  
Science landscape - 2007

Occupation:

Nearest city:

As part of a national report entitled “Mapping the Environmental Science Landscape”, this questionnaire is a unique and essential opportunity for environmental science (ES) professionals to voice their opinions about the state of this higher education discipline. The results will build up a national picture about current provision, concerns for the future and recommendations for securing skilled graduates. All answers will remain anonymous

1. How would you describe the current supply of skilled graduates?

- Shortage  
 Adequate  
 Surplus

1.a Please give reasons for your answer...

2. How would you describe the current supply of skilled **postgraduates**?

- Shortage  
 Adequate  
 Surplus

2.a Please give reasons for your answer...

3. Do you feel environmental science graduates are adequately prepared for careers in environmental science?

- Yes  No

3.a If “no” please give you reasons

4. From your experience what factors do you think affect a student’s decision to choose a degree in environmental science?

5. What recommendations could you give to enhance recruitment to environmental science degree programmes?

6. Do you think employers should have a greater influence on the environmental science curriculum?

7. How do you see the environmental graduate employment landscape changing over the next five years?

8. Do you have any other comments or concerns regarding environmental science in higher education?

Please complete the questionnaire and email to [p.holmes@ies-uk.org.uk](mailto:p.holmes@ies-uk.org.uk). Further information about the project can be obtained by the above email address. The Mapping the Environmental Science Landscape report is supported by GEES, CHES and the Institution of Environmental Sciences.

## Explanation of data sets for HESA and UCAS graphs

### HESA statistics

Source: HESA Student Record 2000/02 to 2005/06

Copyright: Higher Education Statistics Agency Limited 2007

HESA cannot accept responsibility for any inferences or conclusions derived from the data by third parties.

### Figure 3

- Data taken from the UCAS annual data tables and online statistics. They are defined by the following:

#### Applicants

UCAS applicants are those who apply to full-time, undergraduate higher education courses offered by universities or colleges in membership of the UCAS scheme.

#### Applications

Up to 2007 entry, each applicant could make up to six applications to different courses and/or institutions. From 2008 entry onwards, each applicant may make up to five applications. From 2000 entry onwards applicants to Medicine were limited to four applications. From 2001 entry this restriction also applied to Dentistry and Veterinary science applicants.

- Data restricted to F8 due to availability.
- These statistics and definitions can be found at [www.ucas.ac.uk](http://www.ucas.ac.uk).

### Figure 4

- Data supplied by HESA purchased and free online HESA statistics.

[http://www.hesa.ac.uk/index.php?option=com\\_datatables&Itemid=121&task=show\\_category&catdex=3](http://www.hesa.ac.uk/index.php?option=com_datatables&Itemid=121&task=show_category&catdex=3)

- Physical sciences figures (F) calculated by summing part-time and full-time undergraduates from the online tables, Students and Qualifiers Data Tables.
- “ES contingent” and “indicator” trends derived from purchased HESA statistics. Examples of single subject programmes include:
  - Environmental Science
  - Applied environmental science
  - Environmental and research science
  - Science of the environment
  - General environmental science

### Figure 5

- Data assembled from HESA purchased data
- Masters and Doctorate students studying in the “ES Contingent”

**Figure 6**

- “ES contingent” and “indicator” trends derived from purchased HESA statistics, as above.
- 2007 calculated from UCAS “Environmental Science” search.

**Figure 9**

- Data assembled from HESA purchased data
- Three year average (2002 – 2005)
- F850 group chosen as this is the sub group which contains most ES programmes. The removes the effects of other allied programmes such as geography which may have differing first destination profiles.



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