ROOTING FOR A CAREER IN ECOLOGY OR ENVIRONMENTAL MANAGEMENT?

Second edition 2001

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British Ecological Society

The British Ecological Society (BES)

The British Ecological Society is a learned society, a registered charity and a company limited by guarantee. Established in 1913 by academics to promote and foster the study of ecology in its widest sense, the Society currently has around 5,000 members spread around the world. They include research scientists, environmental consultants, students, conservationists, teachers, local authority ecologists and many others with an active interest in natural history and the environment. The core activities are the publication of the results of research in ecology, the development of scientific meetings and the promotion of ecological awareness through education. The Society's mission is:

- **to advance and support the science of ecology and publicise the outcome of research, in order to advance knowledge, education and their application.**

The Society employs full-time and part-time staff at its administrative office in London, In addition, financial support is provided for publication editors and their support staff working in universities and institutes around the United Kingdom, and a press secretary based in London. The work of the BES is underpinned by the efforts of unpaid Officers and Committee members who determine policy and carry projects forward. The Society publishes four internationally renowned journals and organises at least two major conferences each year, plus a large number of smaller meetings. It also initiates a diverse range of activities to promote awareness of ecology at the public and policy-maker level, in addition to developing ecology in the education system, and it provides financial support for approved ecological projects.

A recent survey of members of the Society revealed the following employment pattern:

- **further and higher education - 40%**
- **scientific research (excluding members in education) - 29%**
- **conservation - 10%**
- **agriculture and forestry - 4%**
- **secondary education - 2%**
- **planning - 2%**
- **consultancy - 2%**
- **miscellaneous - 10%.**

The Society is funded through income from subscriptions, publications and its investment portfolio. It is an independent organisation which receives little outside funding. The British Ecological Society is an established and progressive learned society promoting excellence in ecological research and education.

More details are available from:

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The Institute of Ecology and Environmental Management (IEEM)

The Institute was founded in September 1992 to provide professional status to the rapidly growing number of ecologists and environmental managers across a broad spectrum of work in the public, voluntary and private sectors. The Institute arose from the deliberations of a working group formed by the British Ecological Society, the British Association of Nature Conservationists, the Institute of Biology and the Royal Geographical Society.

The principle aims of the IEEM are:

- **to raise the profile of the profession**
- **to establish, maintain and enhance professional standards**
- **to promote an ethic of environmental care within the profession and to clients and employers of the membership.**

Membership of the Institute has now passed 1000, spread across six different categories, and is growing rapidly. There is no doubt that the IEEM has become well established and widely recognised. A breakdown of the membership (excluding students) indicates the following occupational pattern:

- **consultancy - 42%**
- **education and research - 12%**
- **local government - 19%**
- **statutory conservation agencies - 15%**
- **voluntary sector - 8%**
- **industry - 4%.**

The Institute aims to place a practical slant on ecological and environmental work. It runs a very popular series of workshops every year, as part of its professional development programme, and organises one- and two-day symposia. It also offers services such as Professional Indemnity Insurance and other advice to support its members. The Institute enjoys good working relationships with a number of other professional bodies representing people working in allied fields. It publishes a membership directory, which provides an invaluable source of contacts for professionals working in the field of ecology and environmental management.

More information is available from:

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INTRODUCTION

This booklet has been written for people at school and university, to help them decide whether a career in ecology or environmental management is for them. Competition for employment in ecology is intense and the profession demands high levels of commitment, but the rewards which come with this work provide great job satisfaction.

This is a joint publication between the British Ecological Society (BES) and the Institute of Ecology and Environmental Management (IEEM). The two organisations have complementary roles, one in developing and teaching ecological knowledge, the other in its professional application. Together, they embrace the professional needs of ecologists.

So, what makes an ecologist? There are general qualities, such as self motivation, teamwork, computer literacy and communicating and negotiating skills, which are necessary for most areas of work, but special qualities are needed for success in ecological work. These include:-

- **a fascination for animals and plants**
- **a thorough knowledge of the functioning of natural systems**
- **good academic qualifications in biological or environmental subjects**
- **expertise in one or more groups of living organisms**
- **the facility to infect others with enthusiasm about the natural world**
- **enjoyment of fieldwork**
- **the staying power needed to complete tedious and sometimes uncomfortable tasks in field or laboratory**
- **an objective approach to conservation issues.**

The booklet describes the kind of jobs available in ecology and environmental management, details the qualifications needed, provides guidance on how to go about finding jobs and gives first-hand accounts of the work by practising ecologists.

Tim Rich
Head of Vascular Plants, National Museum and Gallery of Wales

After picking up an interest in botany from my Sixth Form Head and watching a David Attenborough documentary, I went to Lancaster University in 1979 to study for a BSc in Ecology. I spent most of my time learning the British flora, because to be a plant ecologist you need to know what the plants are. After finals, I started work with the Nature Conservancy Council, applying my botanical knowledge to surveying and re-notifying SSSIs. I soon realised that to further my career I needed more qualifications, so in 1983 I went to do a PhD in Plant Physiology at Leicester University. You need the physiology to understand the ecology!

On finishing my PhD, I spent four years organising the Botanical Society of the British Isles (BSBI) Monitoring Scheme, a survey to assess the status of the flora of Britain and Ireland. Then I returned to Lancaster University as a Research Associate working on climate change and air pollution in the newly-established Unit of Vegetation Science. These career moves were not pre-determined, but depended on jobs becoming available at the time.

Personal circumstances intervened, since I wanted to be nearer my girlfriend of the time. I was unable to find a suitable job in London, so in 1992 I took the plunge and set up as a self-employed specialist botanical consultant, the most rewarding stage of my career. I worked for a range of clients on environmental impact assessment, rare plant conservation, monitoring and site management. I really enjoyed the hard-nosed, problem solving, directed cut-and-thrust of the commercial world. I also learned so much more than botany, through working with other professionals.

After meeting my wife-to-be, and tired of working on my own, in January 1997 I joined the National Museum and Gallery of Wales in Cardiff, as Head of Vascular Plants. I am now a dusty museum relict, applying my botanical knowledge to biodiversity and systematic biology!

Jane Still
Ecologist

My career can best be described as 'opportunist'! After taking a BSc in Biology from the University of Exeter, I went to Cambridge to do a Postgraduate Certificate in Education. Since then I've flitted between fertile fields.

Teaching gives an instant audience. During my first teaching job I used the Natural History Society to expose pupils (and colleagues) to as wide a range of outdoor/environmental experience as possible. We started a coppicing cycle in an overgrown wood, ate wild food feasts and experimented with natural dyes. I often found myself challenging (wrong) preconceived ideas in both children and adults. Ecology became part of the school's self-identity.

Marrying an Anglican Chaplain to Agriculture gave us the opportunity to unite agricultural and 'ecological/green' issues into a story that made sense to people. We were invited to speak to schools, elderly folk, farmers, etc. Friends of the Earth adopted me as a speaker. I became chairman of the local recycling group, produced recycling guides and was consulted by local government.

I have marked S-level and A-level questions for examination boards for twelve years. Often I was the only ecologist on panels and I have tried to improve the variety of ecology questions. I hope this has had a knock-on effect on the teaching of ecology, as teachers tend to 'teach to the exam.' and ecology was often taught in a rush at the end of the course.

Now my own children are in primary school. I have been asked to run a nature study club and am beginning to introduce practical ecology as part of their science curriculum. As a parent, I have a unique opportunity because I am known, so it is easier to gain trust. It has not always been easy, because the idea that any outdoor science is 'nature study' (and so is an unnecessary luxury) is a heresy that dies hard!

THE GOVERNMENT AND STATUTORY SECTOR

Many departments and agencies of central and local government have responsibilities to promote or have regard to the conservation of wildlife, habitats and landscape quality, so they need staff who have a sound knowledge of ecological practice. Employment opportunities in the public sector have been created by European Union environmental policies, the Government's agri-environment programme, which includes schemes to enhance the wildlife value of agricultural land, and the UK's acceptance of the resolutions from the Earth Summit in Rio de Janeiro in 1992. These called for sustainable development, the maintenance of biodiversity and a reduction in emissions to the atmosphere. Resolutions from Rio are being implemented both at the national level and by local authorities through Agenda 21.

The employers

The major employers include:-

- the national agencies with a specific statutory remit for wildlife and landscape conservation - English Nature, the Countryside Agency (formed from the amalgamation of the Countryside Commission for England and the Rural Development Commission), the Countryside Council for Wales, Scottish Natural Heritage, the Environment and Heritage Service, Northern Ireland
- other government agencies such as the Environment Agency (which covers England and Wales), the Scottish Environment Protection Agency (SEPA), the Forestry Authority, Forest Enterprise, British Waterways and the Farming and Rural Conservation Agency (FRCA)
- government funded research institutes (see section on *Science and research*)
- museums, including the Natural History Museum in London and provincial museums
- botanic gardens, including the Royal Botanic Gardens at Kew and Edinburgh and the new National Botanic Garden of Wales
- Government Departments such as the Department of the Environment, Transport and the Regions
- local authority planning, environment and leisure and recreation departments
- National Park Authorities.

The work

Both permanent and short-term contract work is offered by these organisations. A single job, such as that of an area officer in a conservation agency like English Nature, may involve a wide variety of activities. The main areas of work are listed here.

Katharine Bryan
Chief Executive, North of Scotland Water Authority

As a child I was always interested in the environment, but I suppose if I have to pinpoint a defining early moment it was a week's work experience with the local sewage treatment works. This helped me decide on a 'green' education path, which finally took me to Durham University to study for a BSc in Botany and Geography and then an MSc in the Biology of Water Management at Aston.

From here it was a natural step into the world of work and to securing a job as a scientific officer with the Severn Trent Water Authority. From an 'on the ground' post with the Fisheries and Recreation Department, I moved to work as a senior scientist on the environmental and conservation aspects of the Authority's work. Tasks varied from providing an advisory service on pesticides to carrying out botanical surveys.

Increasingly, I became interested in how these responsibilities related to other water authority activities and to the managerial side of improving the environment. Three years working in research and development confirmed this career direction. I was therefore really delighted to secure my first senior management position as Regional Manager, Fisheries, Conservation and Recreation for the newly formed National Rivers Authority (NRA).

In 1992, I moved on to become a Regional General Manager for the NRA and in 1996 was appointed as the South West Regional Manager for the new Environment Agency. Since then I have moved again, to take up the post of Chief Executive of the North of Scotland Water Authority. This is a vastly different role from my first job, but the end result is the same - the drive to sustain a better environment for present and future generations.

The environment is a wonderful field to work in and I would encourage anyone involved to find the area of work that gives them the most satisfaction and go for it!

Simon Leach
Plant ecologist, English Nature

My earliest memory: a hot summer's day, sitting on the lawn trying to catch tiny, gold coloured beetles rushing about through the grass. Nature was there to be collected - birds' eggs, butterflies, fossils, conkers. Being a collector, I have decided, was what made me an ecologist. After all, if you want to collect something you have to know where to look for it, so you need to appreciate that each plant or animal lives in a particular habitat.

In my early teens I was first and foremost a bird-watcher. Enthusiasm for botany came later, thanks to a teacher who thought the best place to learn about plants was in the field. I did A-levels in botany, zoology and geography, then had a year out, including six months at the Institute of Terrestrial Ecology, Monks Wood. There I acted as a general 'dog's-body', occupied mainly in sorting insect samples.

A degree in Natural Environmental Science with Landscape Studies at Sheffield was followed by 18 months on a job creation scheme, doing vegetation surveys at Stackpole Warren, Pembrokeshire. In 1979 I got a permanent position in the Nature Conservancy Council (NCC) as Assistant Regional Officer in Fife, where much of my time was spent revising the list of Sites of Special Scientific Interest and writing management plans for them. This was followed in 1985 by a two-year secondment as leader of a field survey team for the Department of Environment in Northern Ireland. We tackled vegetation surveys of hay meadows, raised bogs, hazel woods, salt marshes and fens, as well as doing duck and wader counts. Then back to the NCC in Peterborough as a botanist in the England Field Unit, to do surveys of grassland and grazing marsh ditches and to monitor habitat translocation sites.

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Practical countryside and site management

Site managers, rangers and wardens are employed to run national and local nature reserves, country parks and recreation areas. There is an increasingly important relationship between habitat and landscape conservation and the provision and management of public access to designated and protected areas. This provides employment opportunities for footpaths and project officers. Many of these trained as ecologists and, like most rangers or wardens, they perform an educational role as part of their responsibilities.

Research

Openings for ecologists to work in research are limited, except in the research centres (see section on *Science and research*).

Because much of the research carried out by government departments and their agencies is done under contract, staff normally spend time administering contracts rather than carrying out research themselves.

Field survey work
A large amount of field survey work is carried out by government agencies, research institutes and local authorities. The Environment Agency and the Scottish Environment Protection Agency, for example, employ ecologists to carry out monitoring (e.g. of pollution and river quality). Some survey work is carried out by permanent staff and there is a large, albeit irregular or cyclical demand for field staff for short-term contract work.

Providing advice
Much of the work of statutory agency and local authority staff is concerned with giving advice to Government, land owners and the general public on topics such as nature conservation strategies, site management, species protection, urban and rural development and even pest control. Some advice is in the form of publications. Government seeks advice from the statutory agencies to help it develop policy and legislation affecting the environment. Project officers responsible for co-ordinating environmental projects are often employed by local authorities. Ecologists are required to work closely with engineers, planners, landscape designers and estate management colleagues. The greater emphasis now placed on environmentally sensitive forms of farming and forestry has opened up advisory roles for ecologists, for instance in agri-environment schemes involving the reversion of arable land to chalk downland or heathland.

International work
For senior staff in the statutory sector there are opportunities to represent the United Kingdom at international conferences and in specialist meetings of organisations such as the European Community and the Council of Europe.

Qualifications and qualities

Scientific positions are available for graduates or people with post-graduate qualifications in biological or environmental subjects. Increasingly, site managers and rangers, as well as scientists, hold degrees or similar qualifications. However, there are clerical and administrative jobs available in these organisations for people who wish to be associated with environmental work and who have the required GCSE (Standard Grade in Scotland) or A-level (Higher in Scotland) qualifications.

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In 1991, with the demise of the NCC, I moved to Taunton, to become English Nature's Survey and Monitoring Officer in South West Region. Then, in 1994, organisational change struck again and my job disappeared. I finally found my niche as one of a small, dispersed band of specialists in English Nature's newly-formed Botanical Service. I am currently engaged in producing action plans for rare plants.

In 1990 I went part-time, an unusual step for a bloke to take, but one which allowed me to embark on my second career - fatherhood! Keeping the balance between home and work can still be hard. Apart from my paid work, I am an active member of the Botanical Society of the British Isles and sit on the editorial board of *Ecology in Somerset*. But most of my time is spent just being Dad - and, let's face it, the children's fossil collection is already looking pretty impressive.....

Andy Parfitt
Sites Manager, Hampshire County Council Countryside Service

I grew up in rural Somerset, spending most of my spare time helping out on a friend's family farm. Early formative experiences included being involved in rough shoots. This form of involvement with the countryside engendered a close relationship with wildlife, but I soon came to the conclusion that I required a more satisfying and positive interaction.

I obtained A-levels in biology, chemistry and pure maths., but was uncertain which direction I wished to follow and initially toyed with the idea of pursuing a career in marine biology. For fifteen months following school I worked as a farm labourer and enjoyed the physical and varied nature of the role. In 1974 I went to the University of Edinburgh to take a BSc in Ecological Sciences with Honours in Wildlife and Fisheries Management, principally because it had a more applied bias than most courses offered at the time. I developed a more profound interest in ecology and natural history during the course, with birds and ungulates holding a particular appeal.

A vacation job as a water bailiff in Sutherland provided an outlet for a common thread which runs through my career, namely that I need involvement at a hands-on level. After graduating, I moved onto a series of short-term contracts, including a survey of fish species in the catchment of the River Tweed, work as a countryside ranger in Edinburgh, a survey of Dutch elm disease and temporary wardening on the Isle of Rhum. I moved south in 1978 to carry out research on fallow deer in the New Forest, but decided that what I most wanted to do was to become a warden, which would enable me to be in close day-to-day contact with habitats and wildlife.

During a period of unemployment I became a volunteer warden on both Martin Down National Nature Reserve and Farlington Marshes Local Nature Reserve, and in 1987 I took up employment with Hampshire County Council as a countryside ranger. After eighteen months I moved to the post of Senior Naturalist Ranger, to initiate a new service in the south east of the county. This initiative developed and, following a review in 1992, I took up my present post. I am responsible for the management of thirteen sites, including one National Nature Reserve and three Local Nature Reserves. A wide variety of habitats is represented on the sites, from coastal heathland to ancient woodland to chalk grassland. I manage a team of four and much of my time is spent planning work, controlling budgets, managing Health and Safety and liaising with other organisations or individuals. Although my role is somewhat more office-based than I would ideally like, its varied nature and the new challenges which are presented retain my enthusiasm and interest.

Increasing seniority requires management skills and a willingness to relinquish specialisms for more supervisory roles. Within the statutory sector there are opportunities for gaining experience through periods of secondment.

Posts are highly contested. You will have a much better chance of finding a job if you have proved your worth by working previously as a volunteer, for instance for a Wildlife Trust or the RSPB.

BUSINESS AND INDUSTRY

Most industries have some effect on the natural environment. The intensity of the impact depends on the nature of the resources utilised, the manufacturing processes used and waste produced. Environmental action by industry is largely driven by legislation on pollution and the requirement for environmental impact assessment in the planning stage of developments. Many of the potentially or actually harmful activities of manufacturing industries are monitored by the Environment Agency and the Scottish Environment Protection Agency.

The employers

Industries and businesses which provide the greatest scope for employing ecologists deal with:-

- mineral extraction
- growing and processing food or timber
- production and supply of energy
- abstraction and supply of water
- collection, processing and disposal of waste
- the pest control industry
- civil engineering
- landscaping and gardening
- provision of out-door leisure facilities and pursuits
- holidays and tourism.

The work

Most of the scientific and technical work in industry is for chemists and engineers, but there is some scope for ecologists. Opportunities for direct employment by manufacturing firms and businesses are limited, as much of the environmental work is done by consultants under contract. However, some companies do employ in-house ecologists and environmental managers. There may be opportunities for work abroad, for instance on large civil engineering projects. The following are examples of the areas of work available.

Planning

Ecologists and environmental managers are frequently employed during the preparation of specifications for civil engineering projects. Impact assessments for large industrial, road building or housing developments are required

prior to the submission of planning applications and the expertise of ecologists and environmental managers may be called upon. Their advice may be needed, for instance, in route planning for new road schemes, to prevent important wildlife areas being threatened.

Land and water restoration and utilisation

Environmental managers may be involved in designing and supervising restoration projects for disturbed, degraded or contaminated land, in order to maximise nature conservation value. Ecological expertise may be needed in the development of opportunities for recreation in reservoirs or sites used for mineral extraction or forestry. Environmental managers may also be asked to advise on such varied activities as mitigating site management effects in large industrial complexes,

PROFILES

Mandy Gore
Environmental Management Scientist, English China Clays

Like many people working in the environmental field, I came to my present job via a circuitous route.

My first interest was geology, triggered by romantic illusions of the historic mining industry developed during family holidays in Cornwall. So I studied for a degree and on graduation applied for and was given a job as a scientific adviser in a small tin mine. This rapidly dispelled my illusions, these being replaced by a realisation of the challenges faced by an historic industry in today's economic and political climate. And then the price of tin collapsed and the mine went down with it. So I moved into Cornwall's other important mineral industry, china clay.

This was an industry facing even bigger challenges than the tin mines, because its effects were so visible and concentrated in a relatively small area. I became more interested in integrating environmental management into the complexities of this industry than I was in geology. When this was recognised by my senior manager, the company (English China Clays) offered to fund me through a distance learning Master's course in Environmental Management. I jumped at the chance.

I now work in the Environmental Section, within the Mineral Resources Department. My job is to make sure that all aspects of the industry which could impact on the environment are managed to minimise effects. I am also responsible for identifying ways in which opportunities for environmental improvement can be maximised. To be able to do this job effectively, I need to understand the industry and its culture, the local environment and its communities and also to foresee the implications of any actions.

Life is never boring, because of the huge range of issues that have to be addressed. These vary from developing ideas to maximise the environmental quality of land restoration schemes, to identifying technological fixes to minimise emissions from the working of large and heavy machines.

So, although my job title is Environmental Management Scientist, I actually work as an Environmental Oracle supplying information on demand and foreseeing future issues - or at least trying to!

designing marine protection schemes around fish farms and oil terminals, or ensuring habitat and species protection on golf courses.

Maintaining and monitoring standards

The introduction and implementation of accredited environmental standards, including energy use and waste minimisation, is a requirement for industries, and this may involve ecological input. Agrochemical companies may employ ecologists or environmental managers to test and monitor the effects on wildlife and the environment of products such as toxic chemicals and, increasingly, genetically modified crops and other organisms. At the supply end, another form of monitoring which may require ecological knowledge is the sourcing and certification of sustainable raw materials for manufacturing and distribution industries.

Horticulture

The gardening industry is becoming very conscious of its potential for promoting wildlife conservation. Advice is needed on such things as water and wetland gardens, wild flower gardening, attracting birds and enhancing butterfly populations.

Ecotourism

The rapid growth of the ecotourism industry offers opportunities for ecologists. Their expertise is needed in planning for tourism, to ensure that the activity is sustainable and does not damage the environment. Organising, marketing and guiding wildlife tours throughout the world is a developing area.

Qualifications and qualities

A first or second degree in a biological or environmental subject is needed for most positions. Experience or qualifications in business management and an understanding of the commitments and culture of the business world are assets.

Very often, the ecologist or environmental manager is the lone voice in a multi-disciplinary team. As he or she has to be a good persuader or ambassador for the ecological case, ecologists who work for industrial companies have to be highly effective communicators.

Ecotourism guides need to be sociable and experienced in survival techniques and first aid. They need a sound scientific knowledge of the species and habitats being visited, to ensure both visitor satisfaction and the least possible impact on the environment.

John Box

Principal Ecologist, Wardell Armstrong

Brought up next to a farm in Sussex, my early interests included bird-watching and dairy farming. Indeed, I can still vividly remember bringing in the hay in the late 1950s and riding on top of the hay wagon.

A key period was spent with the British Trust for Conservation Volunteers (BTCV) in Scotland. After leaving school, I went on a series of week-long tasks in the Cairngorms, Beinn Eighe and Loch Lomond. These taught me about ecology and the practical work required for public access and education on nature reserves. I also learned basic leadership skills and how to work with a group in all weathers in rough countryside.

University choices were hard. I was offered a place in forestry, but decided, after the summer with BTCV, to do a more general degree in biological sciences at the University of East Anglia. The course had an ecology option. Part of the summer holidays was spent working at a couple of research stations run by the Institute of Terrestrial Ecology.

My first job was working on blue-green ('toxic') algae at the Institute of Freshwater Ecology in the Lake District. The view from my desk was northwards up Lake Windermere to the Fairfield Horseshoe. Having got a PhD, I went around the world for a year. In Australia I applied for a job on freshwater algae. Coming back to Britain, a year of unemployment eventually resulted in my creating a Manpower Services Commission project for Telford Development Corporation. It employed up to 50 people on a wide range of work from ecological survey, to preparing educational packs, to constructing sleeper walkways. This was a good springboard for a job with English Nature, covering the metropolitan county of the West Midlands.

Subsequently, I was asked if I would like to join Wardell Armstrong (minerals, mining, engineering and environmental consultants) as their Principal Ecologist. It was a wrench to leave English Nature, but a chance to work with engineers and geologists on mineral extraction, ground engineering and urban regeneration schemes.

In all, a career path where opportunity has been more important to me than any overall plan.

ENVIRONMENTAL CONSULTANCY

Generally speaking, consultancy work is rewarding but very demanding. It is driven by the needs of the client, which are usually profit related, so that time allocated to tasks is expected to be kept to a minimum. Consultants may have to accept long hours and be prepared to spend periods of time working abroad, where conditions and local attitudes may be far from ideal. As in most jobs, there is a great deal of administrative work and sometimes intense pressure to work quickly in order to meet deadlines.

The upsurge in volume and complexity of European legislation, together with new environmental laws and regulations in the UK, has resulted in a corresponding growth in the environmental consultancy sector. International bodies, the European Community, national governments, statutory agencies, small to multinational companies and non-government organisations all employ consultants.

The employers

Consultancies vary in size from firms with one or a handful of staff to much larger concerns. Some practitioners combine academic work with consultancy - indeed, a requirement to work as a consultant is now written into the contracts of some college and university teachers. The research institutes carry out many of their activities on a consultancy basis and NGOs, such as some of the county wildlife trusts, may also have staff who carry out consultancy work.

The work

Environmental consultancies provide a range of services on a contract basis to organisations which do not employ specialist staff. Many consultancies which employ ecologists also have staff with estate management, forestry and landscape design skills and experience, so staff tend to work in multi-disciplinary teams. The work of consultancies is well described in the *Directory of environmental consultants* (see *Useful contacts and publications*). Consultant ecologists and environmental managers carry out a wide range of tasks.

Field survey and monitoring

Ecologists in consultancy are often employed in routine field survey of flora and fauna, in data analysis and in monitoring of protected areas, development schemes and species.

Impact assessment

Impact assessments are carried out for industrial or building developments and road schemes and produce evidence of the impact of proposed developments on the environment for use by planning departments and in public inquiries.

Provision of advice

Consultants are called upon to give advice on a wide range of ecological issues, for instance nature reserve management (including the preparation of management plans), habitat restoration schemes, species protection and enforcement of wildlife law.

Business management

The more senior staff in consultancies generate policies, give advice, deal with legal and financial matters, engage in activities to generate new business and work closely with clients. They also supervise the work done by more junior staff, appraise their training needs and provide the training required.

Qualifications and qualities

A first or higher degree in a biological or environmental subject is essential. IdQs (Identification Qualifications), offered by the Natural History Museum as proof of taxonomic skills, are an advantage for field survey posts. Entry into ecological consultancy often requires an ability to identify a range of plants and animals accurately, particularly 'indicator' species. Staff usually need to be able to apply and to be comfortable with current techniques (e.g. the National Vegetation Classification) used in ecological surveys and appraisals.

You will have to excel in both writing and verbal communication. Ability to make effective use of computers and notebooks, linked to the most up-to-date equipment and techniques used in communications technology, is essential for consultancy work.

Increasing seniority requires a full range of management skills, including the ability to get on with and to persuade others. Normally, years of experience and a range of skills are required before people can run consultancies.

PROFILES

Andrew Baker, Partner, Baker Shepherd Gillespie

I was brought up in a small village in the Peak District National Park and my first ambition was to become a Park Ranger. I took four A-levels, including biology, geography and economics. At weekends and during the holidays I worked for a fledgling biotechnology company. At the University of Nottingham I concentrated on ecology options, including a field course in Bavaria, which proved very useful in my subsequent career. I then began ten years as a peripatetic ecologist working on short-term contracts. I wrote management plans for a County Trust; undertook river surveys throughout the UK for the National Rivers Authority and the Nature Conservancy Council; spent three months in Malaysia working in rainforest and coral reef nature reserves; repaired paths in a National Park in Queensland; and carried out botanical surveys for the Peak District National Park. After a year in an engineering consultancy, carrying out environmental impact assessments, I joined an ecological consultancy. The breadth of experience I had gained during the previous ten years was ideal training. Three years ago, I and two of my university colleagues established Baker Shepherd Gillespie, which has gone from strength to strength.

Kate Fisher, Ecologist, Baker Shepherd Gillespie

My passion for all things wild arose, according to my mum, as a result of the ecological wallpaper with which she lined my room when I was a baby. I studied zoology at the University of Wales, Cardiff, and completed a vocational Masters in Environmental Protection at Salford University. The modules I studied included environmental law and politics. While at University, I was involved in voluntary work with a variety of conservation organisations. Interacting with business throughout the MSc course and a three-month unpaid work placement with the Countryside Council for Wales gave me an insight into both the business sector and the conservation movement. Feeling despondent that I was yet to secure a job (even after all my experience), I gave up applying for advertised posts and sent speculative CVs to organisations of interest. With a bit of luck, I obtained a position with the ecological consultancy Baker Shepherd Gillespie. Advice to anyone out there who has lost faith in getting a job in ecology: keep trying, do as much voluntary work as you can and don't be afraid of knocking on doors.

Sarah Fowler, Director, Nature Conservation Bureau

My grandmother, who lived in the Isle of Wight, was a great traveller and collector of shells. Possibly this, combined with summer holidays on the coast and Jacques Cousteau's films, directed me towards a joint honours degree in zoology with marine zoology at the University College of North Wales, Bangor. My parents' move to Monaco provided opportunities for diving in warmer waters than those of the Menai Strait and wangling holiday 'work' at Monaco's Oceanographic Museum and Aquarium. I first came into contact with the Nature Conservancy Council (NCC) in Bangor (now the Countryside Council for Wales) as an undergraduate, and developed an interest in conservation as a career. A year off, travelling and working in Australia, was followed by the MSc Conservation Course at University College, London.

During this year it became obvious that any job opportunity in conservation was rare - until the situation suddenly changed because the Wildlife and Countryside Act was passed, with provision for the establishment of Marine Nature Reserves. A casual marine ecology contract with the NCC was followed by a permanent post as Assistant (subsequently Deputy) Marine Ecologist, covering research and casework in England, Scotland and Wales. Eight years later, with career prospects in NCC almost non-existent, I left to become Director of the consultancy, the Nature Conservation Bureau. I was again in the right place at the right time, as shark conservation became an issue of concern. Today, I co-chair the World Conservation Union's Shark Specialist Group, and am Executive Director of the Shark Trust (a charity promoting shark and ray conservation) and the European Elasmobranch Association. My recent work for the Nature Conservation Bureau has involved me in writing contributions to the UK Biodiversity Action Plan; reviewing the impact of mussel and winkle harvesting; setting up a fish farm monitoring programme in Shetland and Orkney; and reviewing the nature conservation importance of the Solent area.

NON-GOVERNMENTAL ORGANISATIONS (NGOS)

For the young and aspiring ecologist, NGOs provide an accessible and attractive route into work in practical ecology. Organisations such as the Royal Society for the Protection of Birds (RSPB), County Wildlife Trusts and the National Trust employ, between them, a large number of ecologists and environmental managers, but competition for salaried posts within NGOs is very strong. The employment opportunities offered by NGOs are as wide as the variety of work done by them, but many jobs are temporary or seasonal. Voluntary work for NGOs is often used as a stepping stone to work elsewhere.

NGOs have an increasing influence on attitudes to the environment. The Farming and Wildlife Advisory Group (FWAG) is an excellent example of an NGO which enjoys recognition and acceptance by the Government Ministries, the National Farmers Union, the Country Landowners Association, farmers and other NGOs. Changes in the attitudes of many farmers and landowners towards conservation have been achieved by persuasion and sound reasoning provided by FWAG advisers.

The employers

Broadly, NGOs can be split into four main categories which would be of interest to ecologists or those wanting environmental work. Some organisations fit more than one of these categories.

Some wildlife bodies own or manage land for wildlife conservation. This group contains the Royal society for the Protection of Birds (RSPB), the Wildlife Trusts (the County Trusts in England and Wales and the Scottish Wildlife Trust), the Wildfowl and Wetlands Trust, the National Trust, the National Trust for Scotland, Plantlife and the Woodland Trust.

Campaign or pressure group organisations include Friends of the Earth, Greenpeace, the Marine Conservation Society, the Worldwide Fund for Nature (WWF) and the World Conservation Union (IUCN). Many of the first group of NGOs are also campaigning organisations.

Practical conservation organisations include the British Trust for Conservation Volunteers (BTCV), the Conservation Volunteers for Northern Ireland (CVNI), the Scottish Conservation Projects Trust (SCPT), the Farming and Wildlife Advisory Group (FWAG), and Groundwork

Trusts. The last are bodies co-funded by government and industry, which carry out practical environmental work in urban or regeneration areas.

The larger research and data recording organisations, such as the Botanical Society of the British Isles (BSBI), the British Trust for Ornithology (BTO) and Birdlife International, employ research and administrative staff.

The work

Practical conservation

NGOs own or manage a very large area of land throughout Great Britain. Whilst much of the estate work carried out by land owning NGOs is done by their own rangers, estate workers and members, some of them use other practical conservation organisations to help with specific tasks. These might include scrub management, hedge laying, ditch

Neil Lambert

Site Manager, Otmoor RSPB Nature Reserve

Coming from a farming family, I spent a most of my time as a child in the countryside and developed a love and respect for wildlife. The only ambition I can recall was to be the warden of a nature reserve managed by the Royal Society for the Protection of Birds (RSPB).

Strangely, I did not make any positive attempts to achieve this goal until I left university. Biology, chemistry and geography at A-level, followed by an environmental sciences degree, were all good choices. These subjects were based on interest, rather than on seeking a career with the RSPB.

By graduation day, many of my fellow students had organised high-flying careers in the commercial world. It was time to make some decisions and the choice was obvious. Gaining employment was not so easy, however, and numerous applications met with no replies. It's a hard fact that most wardens start off by volunteering - the duration depending on a combination of luck, being in the right place at the right time and ability. Determination and enthusiasm are both essential ingredients for success.

I followed a slightly different route, by joining an RSPB Employment Training Scheme. Essentially, this involves volunteering with structured training and extra money to boot. Enter the luck - the assistant warden was promoted and I was offered his contract. I have been employed continuously ever since.

Initially, most of my work was outdoors, doing survey or habitat management work. With experience comes responsibility and, although I still see the great outdoors, I am now a manager. Staff need to be guided, budgets allocated and habitat management planned. Seven years on, I am managing one of the RSPB's newest and most exciting reserves, recreating a wetland on former arable land.

When people ask me about a wardening career, I usually do my best to put them off. If this proves unsuccessful, they could well be choosing the right job. That said, wardening is not a job - to me, it's a way of life.

maintenance, stone wall construction, pond digging and woodland management. The BTCV, SCPT and CVNI run programmes of tasks throughout the UK. Volunteers are trained by professional staff to carry out practical tasks in nature reserves and on land which has other forms of amenity value, like recreation. Groundwork Trusts employ, amongst others, ecologists and project officers. Some Trusts operate a graduate training scheme. Opportunities also exist for volunteers to work with these organisations.

Information gathering and campaigning

The energies and resources of campaigning and pressure group NGOs are devoted primarily to gathering environmental data and to fund raising. They employ campaign managers, advisors and project-based staff, who may collect evidence on conservation issues, supervise ecological surveys, carry out impact assessments, assess planning applications, prepare and give evidence at public inquiries, formulate conservation policies or produce campaign literature. The information which comes from their research is used to persuade central and local government, companies, landowners and farmers to act on conservation issues, demonstrate greater environmental awareness and manage resources in sensitive and responsible ways. Some NGOs are very active and influential at an international level. WWF, IUCN and Birdlife International, in particular, offer opportunities for work overseas.

Biological data recording

A number of NGOs specialise in the collection, compilation and dissemination of biological records. Most of this information is gathered by volunteers, but the NGOs employ project managers and research staff to co-ordinate surveys, often at a national level, and to analyse the data. The information is used mainly in nature conservation and applied research. Further reference to this is made in the section on *Science and research.*

Qualifications and qualities

Since so many people apply for jobs, employers are able to be very selective. They tend to favour people whose commitment, skills and ability to work with others has already been tested and proven through voluntary work.

A relevant degree is needed for entry to science-based posts. For more practical jobs in countryside management National and Higher National

Diplomas or Certificates are often acceptable. Some employers offer 'on-the-job' technical training in skills which lead to vocational qualifications. NGOs employ clerical and administrative staff and for these jobs some ecological knowledge (e.g. a GCSE in a biological subject) is an advantage.

In the case of FWAG advisers, a sound knowledge of farming, as well as ecology and habitat management, is essential. The larger NGOs offer opportunities for a range of land based professionals to be employed, including land agents, foresters, agriculturists, economists and lawyers.

People who work for campaigning bodies need to be excellent communicators, as well as technically qualified.

Jane Smart
Executive Director, Plantlife

It was on Watership Down, a beautiful chalk grassland in Hampshire (I was at sixth form college doing environmental studies at A-level) that I became convinced that ecology was the science that I wanted to study. What could be better than looking at flowers and trying to work out why they grew where they did? I also felt perplexed and angry about the complete sterility of the field below the Down - not a wild flower in sight.

This led to a BSc in Botany at Kings College, London, which was a wonderful mixture of ecology and old fashioned (but incredibly useful) taxonomy. On a field trip to Wales I became fascinated by raised bogs - their magical colours and how the peat itself was a living record of the development history of the bog. So I applied to the then Nature Conservancy Council and obtained a holiday job studying peat bogs. During one heavenly summer surveying the peat bogs of Caithness and Sutherland with the NCC's peatlands team I realised that not enough was known about the ecology of damaged peat bogs. The next three years were spent doing a PhD at Sheffield investigating the ecology of Thorne Moors - a large raised bog which had been cut for centuries.

It was a fascinating time, but I soon learned that my studies were not going to save this wonderful place, which was being slowly destroyed by the peat industry. A career in conservation beckoned and I was lucky enough to become Habitat Management Ecologist with the Greater London Council, a job which allowed me to combine an academic background with getting things done on the ground. After the abolition of the GLC I worked in the London Ecology Unit, funded by London Boroughs. By this time I had become intrigued by the voluntary sector and became Deputy Director of the London Wildlife Trust.

Having always been convinced of the need for special efforts to save wild plants, it was fortuitous to meet others who felt the same - it was our view that wild plants were slipping through the conservation net. Six of us worked to form Plantlife, and by August 1990 I was sitting in its small office, behind the giant redwood in the Natural History Museum. Since 1990 Plantlife has grown and now has 10,500 members, 10 full time staff and 18 nature reserves, and is a significant player in the nature conservation field. My own role changes as we grow and develop, but is always challenging and exciting.

THE MEDIA AND PUBLIC RELATIONS

There has recently been an enormous growth in the environmental media industry, with television, radio, magazines, books, websites, exhibits and interpretation centres contributing to the quality and amount of material available. The people who control and direct the industry tend to come from journalistic backgrounds, but many of the people who make the films, write the books and magazine articles and take the photographs are ecologists by training or persuasion. The BBC Natural History Unit provides an excellent example of effective symbiosis between media people and biologists.

The employers

Three important categories of employer are:-

- publishers of books, magazines and newspapers (scientific journals are covered in the section on *Science and research*)
- radio, television and film companies
- environmental NGOs
- statutory nature conservation and countryside agencies
- museums, zoos and botanical gardens.

The work

Writing about the environment

Many national newspapers and magazines employ environment correspondents. Professional ecologists and campaigning journalists may also be paid to write articles for newspapers, magazines and journals. This kind of writing is mainly 'piece' work, in which an author is commissioned to write (or may write and then submit) articles to magazines like *British Wildlife, BBC Wildlife, Natural World* or *New Scientist*. Larger commissions (e.g. for books on environmental topics) are arranged by publishing houses or sometimes by organisations such as the statutory conservation agencies. Staff of these agencies are often required to produce reports and booklets about conservation issues for publication. Increasingly, information is being made available through the Internet, so there is a growing demand for people who are able to design websites. Journalism may provide opportunities for foreign travel.

Editorial and commissioning work

Publishers (including NGOs such as the RSPB and the National Trust) of magazines and books about the environment employ editorial staff who work with or commission material produced by others. Photographs, as well as written material, are in demand. (See also the chapter on *Science and research*).

Radio, television and film

Production of films and

broadcasts about wildlife and the environment creates openings for presenters, researchers, technicians, film crews and producers. The popularity of wildlife films and programmes gives this kind of job a romantic appeal. Not surprisingly, competition is intense and those who are successful often work on short contracts.

Public relations and environmental interpretation

The dramatic growth of NGOs and the need for them to create and maintain an effective public image offers opportunities for ecologists who are good communicators. Publicity managers and fund raisers are employed by NGOs. Statutory agencies, too, have publicity and press officers. Many organisations, including NGOs, statutory conservation agencies, Forest Enterprise, national parks authorities and local authorities, run visitor centres to inform the general public about nature reserves, parks and other areas of

Professor David Bellamy OBE

Conservationist and media personality

My dream was to dance in classical ballet. I grew too big, so I became an ecologist and have been dancing around the world ever since. The problem is that like many ballets what I see rarely has a happy ending.

A BSc honours degree in Botany and a PhD in the Ecology of European mires, both at London University; lecturer and senior lecturer in botany at Durham University; research interests - phytosociology, ecology and evolution of ecosystems, especially mires, coral reefs and inshore marine ecosystems. Marine pollution was my downfall or my upgrade, depending on which way you view it, for the Torrey Canyon disaster pitchforked me onto the media, where I have been ever since.

The upside of the media has been access to the whole world of botany, the powerhouse of the biosphere. In my travels I have seen the mounting problems, as well as the solutions, first hand. The sad thing is that good news is of little interest to the media, so there is a lot of talk and little gets done.

Ecology as a career? Well, at least you will never be alone, for wherever you find yourself you will always be affecting the local ecosystem. Ecologists are surrounded by insurmountable opportunities - lots of ecosystems with lots of problems which only people well trained in ecology can solve.

Forty-three books, more than 400 television programmes, three honorary professorships, several honorary degrees, an OBE, a Global 500 Laureate and almost 40 years of campaigning to save the natural environment. Deep down I am still a phytosociologist trying to understand why plants live in recognisable communities and what the continued destruction of the world's natural vegetation means to all our futures. Some days I wish I had stuck with Academia, but the grass always looks greener from the other side, especially if you are an itinerant botanist and peatnick. Wow, that dates me!

ecological or landscape value and to generate appreciation of the environment. Scope also exists in museums, zoos and botanic gardens for work in environmental education, interpretation and customer care. Much of the work involves the maintenance and display of collections, but the modern emphasis has moved on from the simple acquisition of material to exhibits which demonstrate how conservation and high biodiversity can be achieved. There are specialist groups such as the Museums Association which provide an introduction to careers in museum work.

Campaigning

The chief activity of many NGOs is campaigning on environmental issues. The effectiveness of these organisations depends to a large extent on employing forceful and credible campaign promoters and political lobbyists. (See the chapter on *Non-governmental organisations*)

Qualifications and qualities

Openings in broadcasting and the film industry are very few and the offer of positions is dependent on evidence of flair. Competition is intense and it is necessary to establish a good reputation to ensure future involvement. Technical or academic qualifications, for instance in film production, photography or media studies, are often required.

An ability to write fluently and accurately and a sound knowledge of ecology are essential for people wishing to be considered for environmental journalism. A science degree and specialist biological knowledge are advantages, and a qualification in journalism is normally required. Environmental correspondents and journalists must be prepared to produce material to strict deadlines and may need to cover a wide range of environmental topics. Examples of material written and accepted for publication should be presented as evidence wherever possible.

A qualification such as a postgraduate certificate or a masters degree in museum studies is an advantage for museum work. Experience in art and design is valuable in publicity work and a teaching qualification can be useful for interpretive work. Publicity managers, campaign promoters, political lobbyists and fund raisers have to be effective persuaders.

Gail Vines

Zoologist and science writer

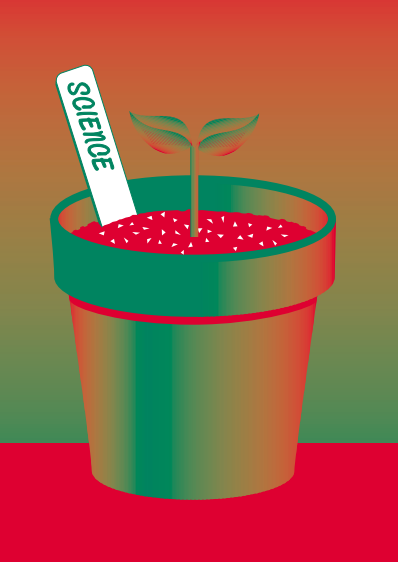
Do ecologists make good journalists? A surprising number of the biggish fish in the small pond of British science publishing have done research in animal behaviour and ecology. Perhaps it's because we're sometimes known as 'reptiles of the press' - no insult there!

As it happened, I studied not lizards but birds for my doctorate in Aberdeen, followed by an avian post-doc at Bristol. When a lectureship eluded me I baulked at the obvious alternative: a peripatetic life of short-term contracts on somebody else's research grant.

I hatched a plan to study sheepdogs, sheep and shepherds, as a window into the cognitive life of animals. The research council raised sceptical eyebrows, but the features editor of *New Scientist* smiled on my consequent stab at a popular article on sheepdogs, and even published it. It was a turning point: it gave me the idea that writing about science for a wider audience was perhaps something I could do and really enjoy.

A couple of years later I was lucky enough to land a job on *New Scientist*, commissioning and editing (well, mostly rewriting) biological features written by scientists. I loved it - a team of sparky people to work with and always something new to learn.

After a stint as features editor, I left full-time work at *New Scientist* to combine journalism with book-writing. It's a life I'd recommend to anyone captivated by ideas and by the challenge of trying to write in a clear but lively way. How do you learn the craft? I wish I knew.... but my advice is to read good writers, study their style and try to look critically at your own.



SCIENCE AND RESEARCH

Research into ecology and environmental management covers a very wide range of topics and ecologists are employed as researchers in many of the employment sectors listed previously. Academic institutions and research centres carry out much of the baseline research, working to contracts awarded by organisations such as the Research Councils, countryside agencies, agriculture departments and industrial clients. Other research is done as personal projects, carried out alongside other aspects of the job, such as university teaching. Results of research are published in scientific journals and specialist magazines. Some of the research data generated are published and used by the media to create awareness or to lobby and persuade.

The employers

The main employers in this field are:-

- universities
- research organisations funded by the Natural Environment Research Council (NERC), including the Centre for Ecology and Hydrology, the Centre for Coastal and Marine Sciences, Southampton Oceanography Centre and the British Antarctic Survey (see also the section on *The government and statutory sector*)
- organisations which carry out environmental and biological research for government departments dealing with agriculture (e.g. the Institute for Arable Crops Research, the Institute for Grassland and Environmental Research and the Scottish Agricultural College)
- government agencies (see also *The government and statutory sector*)
- museums (both national and local), zoos and botanic gardens
- industry (see also the section on *Business and industry*)
- non-governmental organisations (see the chapter on *Non-governmental organisations*).

The work

Junior scientific positions are often laboratory based or involve fieldwork. Senior staff act as team or project managers and as strategic planners. Opportunities exist for working abroad on some projects. There are also less academic jobs available, offering support to research scientists. Examples are laboratory technician work or practical work in zoos and botanic gardens. The following are examples of the type of work.

Pure and applied research

Pure ecological research is carried out mainly in

universities and specialist organisations such as the Centre for Ecology and Hydrology, although some takes place in other government funded institutes, museums, zoos, botanic gardens and large companies. Much of the work carried out in universities for higher degrees is pure research. Most of the organisations already mentioned also carry out applied ecological research. This may investigate the population dynamics of species which are either too numerous or are under threat; the ecological impacts of agricultural policy, climate change, genetically modified crops, pollution, implementation of legislation or introduced species; or methods of habitat restoration. Some applied research involves the testing of products on species or ecosystems; some is concerned with campaigns to create awareness (e.g. the effects of stress on hunted animals); some is directed towards monitoring the quality of air and water.

Helen Roy

Lecturer, Anglia Polytechnic University, Cambridge

Pond dipping, bat watching and small mammal surveying are the activities which initially began my fascination with ecology and prompted my decision to study biology at University. During my first degree I developed a specific interest in behavioural ecology which led me to undertake a PhD in ladybird behaviour.

After completing my PhD (which was a thoroughly fun and rewarding experience) I was offered a lectureship at Anglia Polytechnic University. Lecturing is providing me with the opportunity to share my enthusiasm for biology and continue with my research.

There isn't really a typical day as a lecturer - each day is extremely varied. The teaching part of the day may comprise of a formal lecture followed by less formal seminars or tutorials. Practical classes in the laboratory or in the field are another aspect of teaching and these provide a great way to put some of the things learnt into practice.

In amongst the teaching it is important to find time for research. I am currently investigating the impacts of environmental stresses on aphids and their predators, in terms of assessing their populations and behavioural responses. Research is not only another fun part of the job, but enables a lecturer to contribute to the current development of their chosen subject. Furthermore, exciting results can be promptly conveyed back to the students, giving lectures a very new perspective. Conferences are another venue for presenting results and provide an excellent opportunity for hearing about the latest work in the field and catching up with other enthusiasts. However, ultimately it is important to produce publications from the results obtained and this is yet another part of the job.

The lecturers within one biology department represent a wide range of research interests and expertise from molecular to ecological or even a combination of both! This ensures there is always someone to discuss a new idea with and often someone who will provide a different perspective or approach, but the exchanges of ideas aren't just between lecturing staff. Undergraduates, postgraduates, research fellows, technicians all contribute to the lively discussions within a biology department. Furthermore, lecturers are encouraged to form links with other institutions (both academic and non-academic) and these can also provide exciting opportunities.

Lecturing is providing me with the ideal career - time to pursue my research interests at the same time as meeting many interesting people from a variety of backgrounds with a diverse range of interests.

Biological recording

A huge amount of data on species distribution is collected, mainly by amateurs in botanical, ornithological, entomological and similar specialist societies. Some NGOs, such as the British Trust for Ornithology (BTO), hold their own information and employ staff to handle the data. Others pass data to local biological record centres (often run by provincial museums) or to the national Biological Records Centre, operated by the Centre for Ecology and Hydrology, for storage on computer, analysis and dissemination. Biologists are employed to staff records centres and the information is used in nature conservation, planning and applied research.

Conservation work in zoos and botanic gardens

Zoos and botanic gardens are important employers of biologists and ecologists and many are deeply involved in conservation projects. Some zoos are now running captive breeding programmes in which the release of endangered species back into the wild is the major objective. Parallel studies aim to determine the habitat requirements of endangered plants and animals. The international seed bank at Kew is the most important in the world and is making a significant contribution to the conservation of threatened plants.

Editorial work for scientific journals

Publishers of scientific journals, such as *Biological Conservation* and *Journal of Ecology* employ editorial staff, often on a part-time basis. Journal editors are experienced scientists, whose job includes sending proposed papers to referees and, in the light of their comments, making a judgement on the suitability of the contributions for publication. Some organisations employ staff to compile databases of references and abstracts on scientific topics, including ecology, for publication in electronic form.

Qualifications and qualities

Research posts are highly sought after and some staff are employed on the basis of short term contracts. For scientists, a first degree is essential and usually entry to the profession follows the acquisition of a higher degree. Skills in computer use, a high level of numeracy and the ability to communicate effectively are all required. Knowledge of the natural environment, taxonomic skills and experience of environmental management are in demand for posts in applied ecology.

Clerical and technical support posts are available in some areas of work to those with appropriate HNDs and to school leavers who are numerate and have suitable GCSEs (Standard Grade in Scotland) or A-levels (Higher in Scotland).

James Bullock

Plant ecologist, Centre for Ecology and Hydrology

I did biology at university because I had a long-standing interest in natural history, particularly insects. I did not want to restrict my options, so I chose a biology course at Imperial College, London, which offered variety and flexibility.

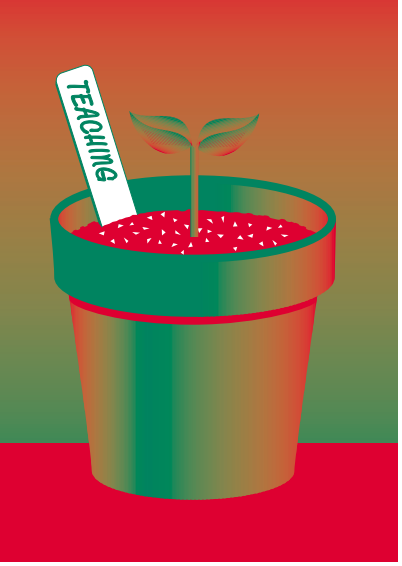
Insects retained my interest and I went on to Liverpool University to do a PhD on insect-plant interactions. Strangely, this metamorphosed, under my own impetus, into a study of plant population ecology concerning growth dynamics and competition in grasses. I was then offered a post-doc at the Open University, where I was part of a small team studying aspects of both applied/conservation and theoretical plant ecology by looking at plant population responses to grazing.

At the end of this I had four months of unemployment, looking for a job in universities or research institutes. At this time I considered other careers because of the lack of jobs, but I decided to stick at it.

I was offered a post in the Institute of Terrestrial Ecology (ITE) in Dorset. This had started out as part of the old Nature Conservancy but subsequently became a government funded research institute and has recently been re-organised to become part of the Centre for Ecology and Hydrology (CEH). Since the 1980s, government funding has declined and so a majority of funding now comes from contracts.

Working for ITE/CEH allowed me to keep my interests in plant population ecology and expand into new areas. My core research has been well funded within ITE/CEH and I have been especially interested in applying population ecology techniques to looking at landscape-scale processes such as dispersal and colonisation. Other work has been more contract-driven, and while this can be a bind and in some cases tedious, it has opened up new interests, for instance in species and community translocation and genetically modified organisms.

It can be complicated juggling many different projects and budgets, with deadlines pressing at all times, but the variety of the work stops too narrow a focus on a single academic discipline and encourages me to think of the wider world and how my research may be of use.



TEACHING

Teachers in schools, colleges and universities enjoy more job security and have better promotion prospects than people in many other jobs in ecology. Career opportunities include promotion within the system, involvement in teacher training and working for examination boards. There is plenty of opportunity to choose where to live - there are schools everywhere from inner cities to remote island communities, from the Isles of Scilly to Shetland. For the right kind of person, teaching can offer great job satisfaction. The multi-disciplinary nature of ecology helps to make ecologists flexible and effective science teachers.

The employers

There are at least 5000 secondary schools in the United Kingdom and each employs several science teachers. There are many more primary schools. This could mean that school teaching offers ecologists more jobs than all the other careers in this book put together. There are teaching posts in colleges and universities, as well as opportunities for ecologists to teach in field study centres. Some of these are administered by local authorities or national park authorities, others are run by universities, commercial enterprises, the Field Studies Council or other NGOs.

The work

Mention has already been made in the chapters on *The government and statutory sector* and *Non-governmental organisations (NGOs)* of environmental interpretation. This section deals with more formal aspects of education.

Primary school teaching

A primary school teacher often teaches a range of subjects in an interdisciplinary fashion, so primary teaching offers scope for creativity without the rigid subject boundaries of the secondary school. Most young children are fascinated by animals and plants and will appreciate a teacher who knows about ecology. Out-of-classroom activity can combine ecology with number, creative writing and art work, and teach children to enjoy, understand and care for the environment.

Secondary school teaching

Ecologists entering secondary teaching tend to specialise in biology up to A-level or Higher in Scotland. There are schools which welcome teachers who are keen ecologists to develop field studies and organise field trips. A biology teacher needs to be able to teach not only ecology but also elementary chemistry and physics, cell biology, microbiology, genetics and human physiology. For many teachers, one of the main things that makes secondary teaching rewarding is seeing adolescents growing up.

Teaching in sixth form colleges

In a sixth form college the absence of younger pupils means that the institution differs in character from a traditional school. There is greater emphasis on specialist academic disciplines than in a school, with more opportunity to teach A-level courses. Sixth form colleges also run one-year GCSE courses and may offer General National Vocational Qualifications (GNVQs), covering some environmental subjects. A few colleges even offer the International Baccalaureate.

Teaching in colleges of further education

Colleges of further education not only cater for the 16-19 age group, but also deal with older people. They offer a wide range of specialist courses, including those which support or are aligned to National Vocational Qualifications (NVQs) or Scottish Vocational Qualifications (SVQs). These are workplace, competence focused qualifications, which

John Harteshorne and Mark Smith, Secondary school teachers

John Harteshorne
Queen Elizabeth High School, Hexham

I began my career working at the Royal Botanic Gardens, Kew as a botanist and landscape gardener. After gaining a Postgraduate Certificate in Education at Warwick University, I became a biology and science teacher in 13-18 comprehensive schools, becoming Head of Biology at Prudhoe Community School, Northumberland and then Head of Science at Queen Elizabeth High School, Hexham, also in Northumberland.

I am a very active environmentalist and a Green parish councillor and have also stood for election as the Green candidate in General and Euro elections. I am involved with Greenpeace, Friends of the Earth and direct action networks, as well as with the Worldwide Fund for Nature (WWF) panel discussing Sustainable Development Education within the current National Curriculum review.

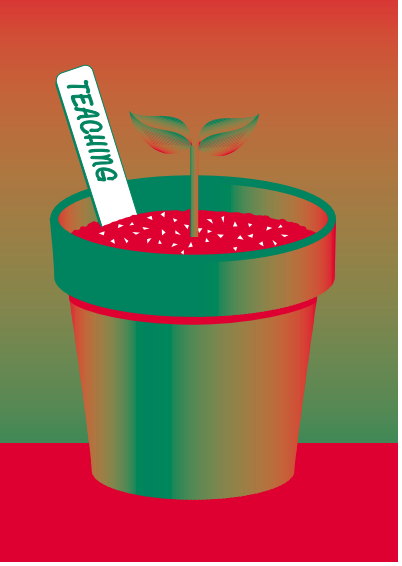
My involvement with the Internet includes WWF Internet conferences and writing the Internet slot for Green Teacher. I am on-line at home and author a lot of pages. I am firmly committed to IT as a learning tool and my A-level students are expected to be able to access work on the Net, process it and e-mail their responses to me.

I have authored a lot of habitat guides for schools - mainly through Northumberland National Parks Department - and have written practical ecological packages for 16-plus students. I am involved with the post-16 A-level group in Northumberland and am a moderator and panel member for biology, with the Northern Examination and Assessment Board. Last year I led an expedition of 11 youngsters to Venezuela for a month - mainly because I wanted to live in the rain forest! Out of school I love walking, climbing, archery, bee-keeping, gardening and making things. The latest 'thing' is my geodesic dome in the garden!

Mark Smith
Leeds Grammar School

I have always been fascinated by the living world and by the challenge of explaining and interpreting it to others; that's why I became a teacher. Although my degree course, at Exeter University, was in zoology, my interest and choice of optional modules was increasingly concerned with the interactions between organisms. So began my conversion to an ecologist.

As a teacher in the secondary sector, I teach all aspects of biology to a whole range of ages and abilities. However, ecological field work has always featured strongly in my teaching, because of my belief that biology comes to life in real outdoor situations. Early in my teaching career, I took part in several overseas expeditions for school pupils, organising field projects investigating aspects of these new and exciting environments. I realised that there was tremendous opportunity for using such expeditions to interest young people in the ecosystems of other parts of the world and for them to confront global conservation issues at first hand. Since then, my teaching has been a mixture of the formal in school and the informal on expeditions, but with the common aim of enthusing young people about life science and encouraging them to face up to crucial environmental issues. No two days are the same!



include subjects such as environmental conservation and management. Many colleges offer National and Higher National Certificates/Diplomas and some provide degree courses. An ecologist appointed as a biology lecturer might have to teach an A-level/Higher class, a non-examination recreational evening class on plant ecology for adults, a GCSE science re-sit class, a science course for hair dressing students and microbiology input to a catering course! This type of institution offers interesting variety to those able to adapt their teaching to a broad ability range.

Teaching in colleges of higher education and universities

A young university teacher may have to accept short-term contracts before being appointed to a permanent post and university lecturers are not necessarily better paid than school teachers. But in spite of this, entry is highly competitive. The challenge of teaching ecology to a high level to well motivated students, combined with the opportunity to be at the cutting edge of research, make this a very attractive career for many people. Initial Teacher Education (ITE) takes place in university faculties of education or in colleges of higher education.

Teaching in field study centres

A field study centre may provide for the whole age range from primary to higher education and will also cater for groups of adults who wish to spend time studying natural history or participating in an increasing range of other outdoor pursuits. A number of centres collaborate with employers to offer workplace experience and assessment towards NVQ/SVQs. A field study centre offers the opportunity to specialise in teaching ecology in both geographical and biological contexts and usually the chance to live in a rural situation. Some centres provide opportunities for research and involvement in local conservation initiatives. Staff may work unsocial hours, but in spite of this the job satisfaction means that there is a lot of competition for vacancies.

Qualifications and qualities

A degree with an emphasis on ecology can provide an excellent preparation for a career in teaching. A graduate usually enters teaching by taking a one-year course of ITE (Initial Teacher Education), leading to a Post Graduate Certificate in Education (PGCE). Another route into teaching is through a degree course combining ITE with academic and creative subjects, which may include environmental science, biology or geography. The second route is the way many people enter primary teaching. Lecturers in colleges of higher education and universities usually have a PhD and post-doctoral research experience. ITE lecturers normally have

some experience of school teaching. Field study centres may employ graduates without a teaching qualification.

A good teacher makes a contribution to education which goes far beyond just teaching academic subjects. Qualities which make a good teacher include:

- **a liking for children and young people and enjoyment of their company**
- **a good command of his or her subject**
- **good communication skills**
- **creativity**
- **enthusiasm and a satisfaction in sharing this enthusiasm with young people.**

Mike Pennington
Primary school teacher, Shetland

I got a BSc in Ecology from Loughborough University in 1983. I began working at bird observatories, initially in Kent, where the scarcity of birds was made up for by the plants and my introduction to moth-trapping. In 1986 I came to Fair Isle, where I developed a common ecological fascination - islands. I found my niche in the far north of Scotland, on Unst, an island small enough to know intimately, yet big enough to keep coming up with surprises.

I was fortunate to discover that I enjoyed work that brought me unto contact with schools and I was encouraged to do a Postgraduate Certificate in Education, which I gained in 1991. I now teach in Baltasound Primary School on Unst, the most northerly of the Shetland Islands and the locality of my choosing. My preferred classes are upper primary, where the children have some maturity without the cynicism of the teenager.

I still have time for my hobby. While I try to emulate the broad interests of the old-time naturalist, my most 'significant' contributions are, perhaps, with insects. I helped form the Shetland Entomological Group in 1992. There is still the sense of breaking new ground in such a poorly-worked area and we are helping to revise ideas on insect migration. I hope I enthuse my pupils with interest in nature and help them grow up as responsible and informed guardians of the environment.

Alison Gimingham
Regional Education Coordinator, East Midlands, National Trust

I wanted to work in field studies from a very early stage in my career. The subjects I enjoyed most at school were biology and geography and I loved being outside and going on school trips (whether they were anything to do with field studies or not!). My degree is a BSc in Ecology from Edinburgh University. It was one of the first of its kind in Britain and gave a very good introduction to a wide variety of aspects of ecology and involved lots of field work.

After some thought I then decided to go on to do a teacher training course, in rural and environmental science. This was a great success and I soon got a job teaching biology in a large comprehensive, with special responsibility for ecology and field work.

Six years later I moved on to teach ecology field work full time at the Cranedale Centre in North Yorkshire. I was in heaven! I loved being outside whatever the weather, I loved teaching pupils who were fascinated by the new worlds they were discovering, I loved designing new projects and finding new sites to visit, and I loved collecting data and helping students to analyse it and understand it. I also loved the rare glimpses of something really special - those treats that you only get if you are out in the field a lot.

After nearly ten years in North Yorkshire, I decided it was time to move on, time to have a change, to work in some new sites and on some different courses, to gain experience in other aspects of field work and to develop new ideas. I obtained the post of Director at Kindrogan Field Centre in the Highlands of Scotland, which offered me all of this and more. In addition to the work with school pupils, Kindrogan provides specialist courses for adults and is involved in professional training for countryside staff. Being at the forefront of environmental education in Scotland was exciting, as the potential is enormous.

A move south a few years later, due to my husband's career, gave me a new opportunity to work in a large organisation (the National Trust) and to develop a much wider spectrum of educational activities, involving all age groups. These activities range from ecological work in the Peak District to art and heritage projects in large mansion properties. The scope is enormous and the challenge of working on such a large scale is very exciting.

FINDING A JOB

An ecology degree provides a good education, as it equips people with a broad range of transferable skills and knowledge relevant for many careers, not all of which are primarily in ecology. Options are degrees in ecology or biological subjects, or modular degrees containing elements of ecology. A wide variety of other relevant training exists. It is best to approach careers advisors or specialist teachers about courses, but the final section of this booklet gives some sources of information. Remember that during your career you may need to retrain.

These are steps you can take towards finding a job once you are academically qualified:

- produce a well written and neatly laid out CV
- take advantage of the student membership schemes of the BES and the IEEM, as our conferences and special courses provide opportunities to meet professionals, gain skills and acquire knowledge to improve your employment prospects
- keep yourself informed about current issues, ideas and developments in the fields of ecology and environmental management
- spend time as a volunteer - natural history societies, Wildlife Trusts and other voluntary conservation organisations offer many opportunities, including help with identifying plants and animals, chances to contribute to structured surveys, management work on nature reserves
- if you are considering a job requiring taxonomic skills, take yourself on short courses at field centres and/or obtain one of the Identification Qualifications offered by the Natural History Museum, London
- learn to drive
- develop your computer skills by taking short courses or training yourself in the use of word processing packages, databases, spreadsheets and Geographical Information Systems
- as well as consulting job centres, search the national press (e.g. *New Scientist, Nature, The Guardian, The Times Educational Supplement, Farmers Weekly, Horticulture Weekly*), local newspapers, the Web and other sources listed in the *Useful contacts and publications* section for advertised jobs

 consider enrolling in a New Deal job creation scheme, for instance with a voluntary conservation organisation

 send your CV, with a covering letter explaining what motivates you to seek a job in ecology or environmental management, to consultancies listed in the *Directory of environmental consultants* or the Environment business directory (see *Useful contacts and publications*)

 approach possible employers and find out more about the work they offer, the qualifications they require and the people they employ.

We hope that this booklet has given you a fair picture of the many different ways in which ecologists and environmental managers are employed in the UK. If, after reading it, you feel attracted to these jobs, do go ahead - it will be worth the hard work. We wish you success and fulfilment in your career.

USEFUL CONTACTS AND PUBLICATIONS

The organisations mentioned previously in this booklet can supply further details about their roles and the opportunities they provide for employment. Universities and most of the NGOs and statutory organisations have websites. The following list includes more contacts which could be of use when job hunting.

Organisations

Careers and Occupational Information Centre

COIC publications provide up-to-date, reliable and unbiased information about jobs and careers. The *Working in* series currently includes *Working in environmental services* (£5), *Working in outdoor jobs* (£5), *Working in agriculture and horticulture* (£5.50), *Working in geography* (£5.50), *Working in natural sciences* (£5), *Working in local government* (£5), *Working in the water industry* (£5.50) and *Working in the voluntary sector* (£5.50).

COIC's address is:
W4B, Morefoot, Sheffield S1 4PQ
Tel: 0114 2594564
Website: www.dfee.gov.uk

For ordering publications:
PO Box 298A, Thames Ditton, Surrey KT7 0ZS
Tel: 020 8957 5030
Email: COIC@dataforce.co.uk

Countryside Jobs Service

This organisation publishes *The Countryside Jobs Service*, a comprehensive weekly list of jobs available from a wide range of employers. A 15 week subscription costs £18 and the journal is available in many university careers libraries. The jobs are also advertised on the website. *The Countryside Jobs Service review* is published annually and gives a summary of jobs advertised during the year.

The address is:
Groves Bank, Sleights, Whitby,
N. Yorks. YO21 1RY
Tel: 01947 810220
Email: ranger@onyxnet.co.uk
Website: www.countryside-jobs.com

Environment Council

The Environment Council is a charity dedicated to enhancing and protecting Britain's environment through building awareness, dialogue and effective solutions. It produces *Who's who in the environment: England 1995*; *Who's who in the environment: Scotland 1996*; *Who's who in the environment: Wales 1995*. *Who's who in the environment UK* (1998) is also available on PC disk.

The address of the Environment Council is:
212, High Holborn, London WC1V 7VW
Tel: 020 7836 2626
Email: info@envcouncil.org.uk
Website: www.the-environment-council.org.uk

Environmental Data Services

Environmental Data Services (ENDS) publishes the *Directory of environmental consultants*. This is available on the ENDS website. A list of jobs in the environment, updated weekly, is also on the website. *The ENDS report* is published monthly and advertises jobs. It is available in some university libraries.

ENDS can be contacted at:
Finsbury Business Centre, 40 Bowling Green Lane, London EC1R 0NE
Tel: 020 7814 5300
Fax: 020 7415 0106
Email: post@ends.co.uk
Website: www.ends.co.uk

Royal Town Planning Institute

The Royal Town Planning Institute publishes a weekly journal *Planning for the natural and built environments*, which is available to members and is sent to all universities which run RTPI accredited courses in planning. The jobs advertised in the journal appear on the journal's website *www.planning.haynet.com*

The address of the RTPI is:
26 Portland Place, London W1N 4BE
Tel: 020 7636 9107
Email: online@rtpi.org.uk
Website: www.rtpi.org.uk

Some websites that advertise jobs

recruitnet.guardian.co.uk

www.environmentpost.co.uk

www.ends.co.uk (Environmental Data Services)

www.jobs.ac.uk (for universities and research)

www.milkround.co.uk

www.netjobs.co.uk

www.planning.haynet.com (Royal Town Planning Institute)

www.prospects.csu.man.ac.uk

www.rgs.org (Royal Geographical Society - look in *What's new* section)

www. countryside-jobs.com

www.workweb.co.uk

Other publications

Ausenda, F. 1998. *Green volunteers.* (Available from Vacation Work Publications, 9 Park End Street, Oxford OX1 1HJ, price £11.99. Website: www.vacationwork.co.uk)

Council for Environmental Education. 1996. *Courses and training in environmental education.* (Price 50p from the Council for Environmental Education, 94 London Street, Reading RG1 4SJ. Updates are given on the website: www.cee.org.uk)

English Nature. Regularly updated. *Career pack.* (Available free from English Nature, Northminster House, Northminster, Peterborough PE1 1UA)

Institute of Biology. 1999. *A career with biology. An introductory guide to the range of jobs using biology.* 3rd ed (Price £4.75, from the Institute of Biology, 20-22 Queensberry Place, London SW7 2DZ)

Institution of Environmental Sciences. 1995. *The environmental careers handbook.* 2nd ed. (Price £9.95 plus p&p, from Trotman & Co. Ltd., 12 Hill Rise, Richmond, Surrey TW10 6UA)

Jenkins, T. and McLaren, D. 1994. *Working future? Jobs and the environment.* Friends of the Earth. (Price £5.95 from Friends of the Earth, 26-28 Underwood Street, London N1 7JQ. The text is available on the Friends of the Earth website: www.foe.co.uk)

McCarthy, T. ed. 2000. *Environment business directory.* (This is updated annually and lists local authorities and other public sector organisations, environmental charities and environmental consultancies which offer jobs in ecology or environmental management. It is available, price £99, from Gee Publishing, 100 Avenue Road, Swiss Cottage, London NW3 3PG, tel: 020 7393 7400. There are plans to publish much of the information on Gee Publishing's website: www.gee.co.uk)

Pybus, V. 1999. *Working with animals - UK, Europe and worldwide.* (Available from Vacation Work Publications, 9 Park End Street, Oxford OX1 1HJ, price £11.95. Website: www.vacationwork.co.uk)

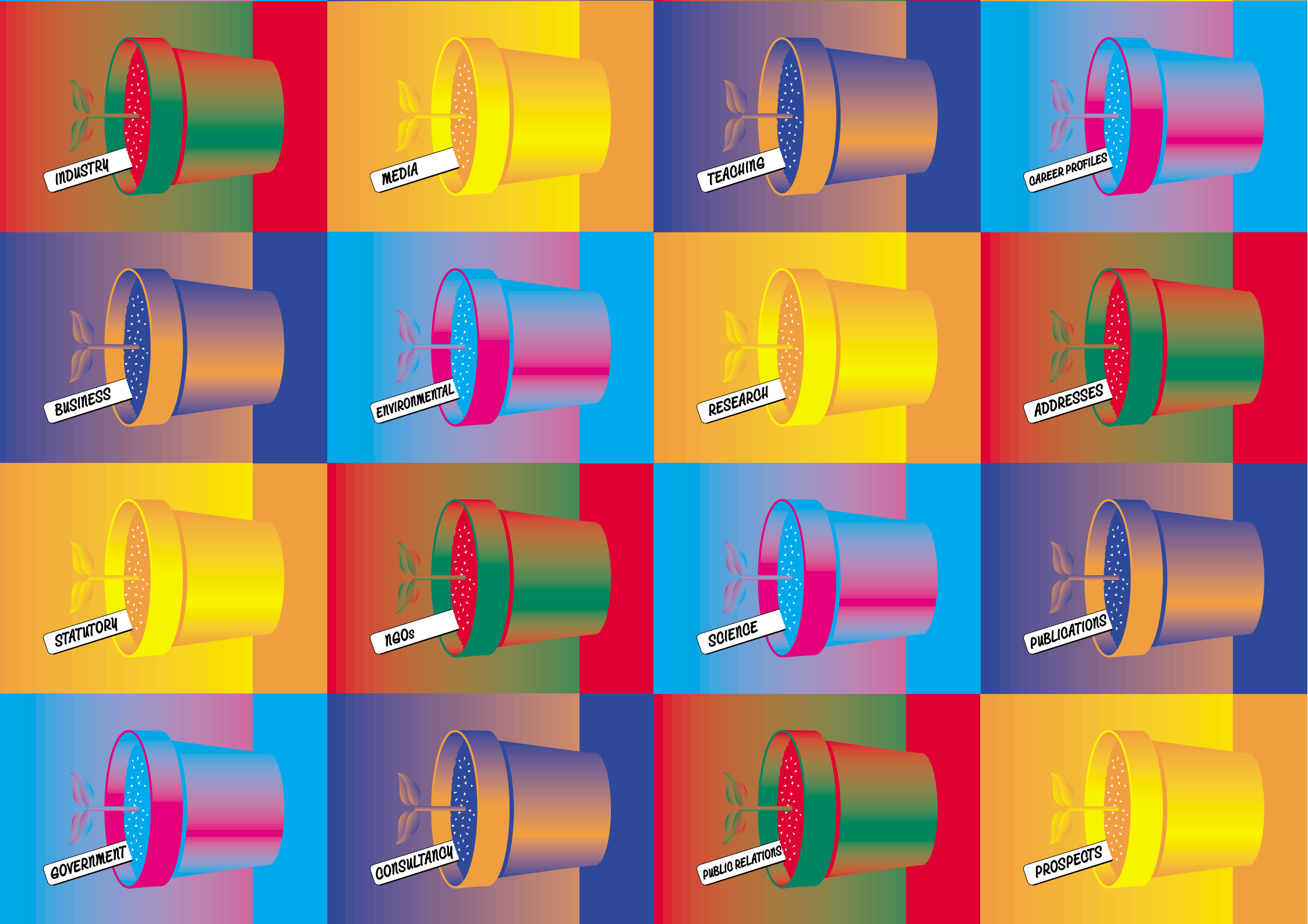
Royal Geographical Society. 2000. *Exploring the world of work: geography and careers.* (Available free from the Royal Geographical Society, 1 Kensington Gore, London SW7 2AR. Also on www.rgs.org)

Royal Society for the Protection of Birds. 1997. *Careers in conservation.* RSPB, Sandy. (Available for £5 from Mail and Dispatch, RSPB Phoenix, The Lodge, Sandy, Beds. SG19 2DL. To be updated)

Ryder, T. 2000. *Working with the environment.* 2nd ed. (Available from Vacation Work Publications, 9 Park End Street, Oxford OX1 1HJ, price £11.95. Website: www.vacationwork.co.uk)

Scottish Natural Heritage. 1998. *Jobs and the Natural Heritage. The natural heritage in rural development.* (Available free from Publications Section, Scottish Natural Heritage, Battleby, Redgorton, Perth PH1 3EW. Website: www.snh.org.uk)

Whetter, L. and Pybus, V. 2000. *The international directory of voluntary work.* 7th ed. (Available from Vacation Work Publications, 9 Park End Street, Oxford OX1 1HJ, price £11.99. Website: www.vacationwork.co.uk)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