

# environews



NEWSLETTER OF THE ENVIRONMENTAL SCIENCES ASSOCIATION OF IRELAND - AN ASSOCIATION FOR PEOPLE WORKING IN THE ENVIRONMENTAL AREA

## Editorial

It's been a busy year for the ESAI. As described on the back page of this issue, the Council has been very active in writing to members, potential members and government agencies; managing an ever-growing database of members, colloquium delegates and others addresses; coordinating arrangements for the next annual Irish Environmental Researchers' Colloquium; producing two newsletters, now professionally designed and laid out; and running a one-day workshop on professional issues in environmental practice in Ireland. The latter (see report on page 2) has set a number of challenges for ESAI.

Already, ESAI is doing more than some larger and longer-established organisations. Next year's council will have to consider how ESAI can promote good professional practice within the constraints of its modest membership and budget. It is not possible to significantly increase membership and membership fees without providing a greater service, but a greater service is not possible without more resources (people's time and money). At present, these resources are the voluntary efforts of council members, colloquium organisers, and others, and your membership fees.

### Annual General Meeting

The ESAI AGM will be held at 5.45pm on Saturday 30 January 1999, at the annual Irish Environmental Researchers' Colloquium in Johnstown Castle, Wexford. Motions for the meeting agenda, and nominations for Treasurer and five ordinary council members for next year's ESAI Council, are now requested (from and of members only). Please obtain prior agreement of any person you wish to nominate to Council. Send motions and nominations to the Chairman or another Council member by Thursday 28 January 1999.

**Dr Mark J Costello**  
Chairman ESAI

## 9th Irish Environmental Colloquium: don't miss it!

**The 9th Irish Environmental Researchers' Colloquium will be held from Friday evening to Sunday, 29-31 January 1999 at Johnstown Castle, Co Wexford.**

The Colloquium will be hosted by the newly-emerging Johnstown Castle Campus partners, Teagasc, the EPA and the Department of Agriculture and Food, and organised by the Environmental Scientists' Association of Ireland (ESAI). It will be opened by the Minister for the Environment, Noel Dempsey TD.

The Colloquium is normally hosted by third-level institutions. Colloquium '99 represents the first joint venture of the new Johnstown Castle Campus partners. This year's Colloquium theme is "Focus on Rural and Urban Environment into the New Millennium."

About 140 posters and talks have been accepted for presentation. The poster session is being sponsored by Irish Fertiliser Industries. There will be a Colloquium Dinner on Saturday evening in White's Hotel, Georges Street, Wexford.

The Colloquium provides a forum for delegates to interact and discuss environmental research in all its facets and to allow interaction between disciplines that would not ordinarily meet. The Colloquium will cover issues relevant to Ireland's environment, particularly new research findings and views. Topics will include:

- Air, soil, water, agriculture, forestry, etc
- Industry & mining
- Species & ecosystems
- Waste
- Measurement & mapping
- Management of the environment
- Environmental quality & food safety
- Policy & ethics
- Global issues
- Ecotoxicology
- The urban environment

We are interested in encouraging the broadest possible participation. It is intended to publish suitable abstracts in the RIA journal *Biology and the Environment*. Details are available at the Colloquium conference web site: <http://www.ecoserve.ie/esai/colloquium/>

We look forward to seeing you at the Colloquium in Wexford. This will be the first time that the annual meeting has been held outside a university and city. These factors may result in new organisational arrangements (eg buses to and from the facility). So please book your accommodation and send in registration forms and payments immediately, if you have not done so already.

• For further information contact the Colloquium Secretary, Eleanor Spillane, Teagasc, Johnstown Castle, Wexford.

Tel: (053) 42888 Fax: (053) 42213

Email: [espillane@johnstown.teagasc.ie](mailto:espillane@johnstown.teagasc.ie)

**We look forward to seeing you at Johnstown Castle!**

### RESEARCH OPPORTUNITY

#### Student project in fish health

A 4-month project is on offer at the Immunology Section at FRS Marine Laboratory, Aberdeen. Much of the work will be in Norway. The project will investigate the mucosal immune system of Atlantic halibut following vaccination. Would suit someone who has registered for an MSc in aquatic science, biochemistry or immunology. Starting April 1999. For further information contact: Dr. Tim Bowden, FRS Marine Laboratory, PO Box 101, Victoria Road, Aberdeen, AB11 9DB Scotland. Tel: 0044 1224 295610 Fax: 0044 1224 295620 Email: [Bowdent@marlab.ac.uk](mailto:Bowdent@marlab.ac.uk)

### Notice of AGM

**The Annual General Meeting of ESAI will take place at 5.45pm on Saturday, 30 January 1999 during Colloquium '99 at Johnstown Castle, Wexford**

## Inside...

**Changes needed in consultancy practice  
News, views and events**

# Environmental consultancy: the issues

## A summary of the issues raised at the recent ESAI workshop in Dublin on "Professional Issues in Environmental Consultancy in Ireland"

Over 50 delegates, comprising environmental consultants, representatives of government agencies and third-level colleges, and a number of graduate students, attended the ESAI workshop on professional issues in environmental consultancy, held at the Geological Survey of Ireland headquarters in Dublin on 12th October.

The workshop provided a forum for consultants and their contractors to meet, identify and discuss major issues of importance, discuss how these issues should be addressed and the ESAI's potential role. The opportunity was taken to produce a list of consultants and relevant organisations working in this field in Ireland.

Mark J Costello (Chairman, ESAI) opened the proceedings, welcoming delegates and briefly outlining the objectives of the forum. The first speaker, Tadhg O'Mahony (EPA, Cork), outlined the EPA's recent activities in publishing guidelines for environmental assessment of waste disposal and other types of impact. Independent consultant Chris Smal discussed the poor quality of ecological assessment found in many EISs and presented some typical examples. A frank and thought-provoking presentation by Niall McGuigan (Wexford Co Council) examined the work of environmental consultants from the client's point of view. After lunch, John Crotty (AON Brokers) summarised the types of insurance environmental consultants should have. He was surprised at the low level of insurance cover in the industry. The role and current availability of relevant training courses was reviewed by Margaret Savage (Sligo Institute of Technology). The day ended with an open discussion on the priority requirements for environmental consultants and how they might be achieved.

### Code of Practice

The need to develop an ESAI Code of Professional Practice and to produce Guidelines on Good Practice in association with other organisations, particularly the EPA and the Heritage Council, was considered a priority. It was agreed that ESAI would write to the EPA (and relevant government departments and agencies) offering ESAI assistance in developing such guidelines, perhaps by holding joint meetings and reporting initiatives to our members.

### Directory of Members

The establishment of a directory of environmental consultants, a voluntary register of environmental professionals, a peer-reviewed register of environmental professionals, and more rigorous accreditation steps, were also proposed.

There was concern that any list of environmental consultants might afford a form of recognition to some who lacked appropriate qualification. It was suggested that it might be better to put in place an application procedure, as other organisations do, where Registered Members provide information on their qualifications and experience, and where applicants are proposed by other Registered Members. However, this would take some time and effort to put in place. In the meantime, it would be possible to produce a directory of ESAI members indicating their current status (eg consultant, student, academic, government agency employee, etc).

## Brief history of ESAI

### Our emphasis so far has been on communication through meetings, newsletters and the Internet.

- 1991 1st Annual Environmental Researchers' Colloquium
- 1994 ESAI association formed
- 1995 First issue of *ENVIRONEWS* newsletter produced
- 1996 Workshop on environmental standards held in Castlebar, Co Mayo
- 1996 Code of ethics established
- 1997 Web site set up
- 1997 Workshop on waste management held in Thurles, Co Tipperary
- 1997 Email listserver established
- 1998 Workshop on professional issues held in Dublin
- 1998 List of environmental consultants drawn up

### Training

There are numerous degree and other courses in the third-level colleges covering the spectrum of skills required by environmental professionals. The methods of teaching include lectures, practicals, field courses and group work. However, an examination of EISs has demonstrated that there are obvious short-comings in the quality or content of taught skills, particularly in report-writing, report structure and illustration.

Most third-level courses apparently focus on the technical aspects, without covering the wider range of skills necessary. There is no independent assessment of the quality of courses. Many provide little or no information on the relevant experience of their teaching staff. Some form of independent examining procedure is the only way to provide any indication as to what a student has learned on a particular course.

ESAI should consider providing courses and interactive workshops to develop appropriate professional skills, perhaps in collaboration with educational, state, professional and other organisations.

### Insurance

Insurance brokers and companies in Ireland were not familiar with the work and risks of environmental consultants, reflecting its small and new market. While almost all consulting engineers have Professional Indemnity insurance, few environmental consultants do.

Better value may be obtained from insurance brokers/companies based in the UK and other EU countries. ESAI could explore the possibilities of obtaining group-rate reductions for its members.

### Competition

Most third-level colleges actively encourage external consultancy activity by their staff who, already receiving a full salary from their college and sometimes using student labour, can undercut independent consultants' prices. Such colleges, as well as government agencies, can also avoid charging VAT, which is important where clients (such as government authorities and semi-state organisations) are not registered for VAT.

Colleges and state agencies often have equipment and facilities directly or indirectly paid for by the state which they use for consultancy work. Overhead charges by colleges are often arbitrary and flexible, whereas independent consultants have to cover their true overheads or go out of business.

### Conclusions

There are serious shortcomings in the content and quality of many Environmental Impact Statements in Ireland, paralleling the problems in other countries. The reality is that EIS is regulation-driven and effort is focused on satisfying regulations rather than attending to issues of good practice.

The importance of good-quality EIS is only beginning to be recognised by industry and local government. In places, there remains an attitude that an EIS is an unnecessary burden and that developers should try the cheapest EIS option first and see if any objections arise.

In conducting an EIS, the independence of consultants are compromised because they are in the employ of a developer. The minimisation of scope and detail in EISs leads to gaps being identified by objectors and thus loss of public trust in the planning process. Both developers and authorities conducting EIAs have a duty to go beyond satisfying the 'letter' of the regulations.

Like insurance, good practice is currently an 'option' only, not a requirement. Until it is clear that bad practice will not be tolerated by authorities, and there is a mechanism to censor bad practice (eg removal from a register), there will be no financial incentive

## Directory of Members

All members' names and addresses will be compiled in a **Directory of Members** which will be accessible on the **ESAI web site** and published in the next issue of **ENVIRONNEWS**

for consultants to improve their standards. These problems could be overcome by:

- Publishing guidelines detailing the content of each part of an EIS. This would help standardise EIS content so that consultants would be tendering a more similar service
- Clients being better able to identify consultants with the appropriate standard of expertise
- More use of specialists rather than generalists for key aspects of EIS
- More appropriate and continuous training for consultants.

Other measures could include:

- Better coordination between consultants conducting an EIS, eg meetings at start and end of project
- External professional peer-review of EISs by the assessing authority before they are accepted
- Contributors to an EIS verifying that the submitted document accurately summarises their findings.

### Resources for objectors

Because consultants hired by developers lack true independence, it was suggested that there should be provision of resources for objectors to a development so that they could afford to obtain independent expert advice.

### Promoting good practice

The current weaknesses in 'good environmental practice' can be overcome. However, such developments must be driven at the highest level to ensure they are taken seriously by government, industry, consultants and the public. The number of consultants in Ireland is too small to generate the necessary funding for this, and a 'bottom-up' approach cannot succeed unless its results are recognised by clients and government.

In practice, this means that those consultants who conduct better quality work can out-compete poorer quality sources. In the long term, a well-managed association for professionals in the environmental area would become self-sustaining because registration would become a competitive advantage.

Active promotion of good practice in environmental consultancy will benefit society, government and industry by providing a more transparent and competitive consultancy market, better advice and value for money to developers, and will help restore public trust in the planning process.

### The future

Such developments would require funding to establish a part-time ESAI secretariat to maintain a database of members and other relevant organisations, coordinate correspondence and meetings, produce a newsletter more frequently and to schedule, and publicise ESAI more widely. They might also require that ESAI become a company limited by guarantee, and in doing so perhaps seek charitable status. Changes to the ESAI constitution, most appropriately made at the annual AGM, would also be required if a new form of membership was to be introduced.

### Acknowledgements

For their assistance during the workshop, we extend our thanks to the speakers Tadhg O'Mahony, Chris Smal, Niall McGuigan, John Crotty and Margaret Savage; the chairpersons Theresa Doyle and Mary Brennan; the registration officers Julian Aherne, Mary Brennan and Grace O'Donovan. These and others, including Billy Moore, Declan Flanagan, Jack O'Sullivan and Ralph Sheppard, were very helpful in the preparation of the meeting.

**Dr Mark J Costello**

## Actions proposed at ESAI workshop

- To write to the EPA, DoE, Heritage Council and Dept of the Marine, offering assistance in developing Guidelines for Good Practice in the environmental area.
- To discuss issues of Good Professional Practice with related Irish organisations, including IEI, IWEM, planners, lawyers, archaeologists and landscape architects with a view to coordinated efforts and learning from their experience.
- To meet the Minister for the Environment to request his assistance in promoting Good Professional Practice in environmental consultancy, both through publicising its importance and funding the prime activities in this area.
- To establish and publish a Directory of Members, noting their interests, expertise and forms of professional activity.
- To consider expanding the current Code of Ethics into a Code of Professional Practice.
- To consider establishing training courses and workshops to improve standards in environmental consultancy, particularly in areas currently dealt with inadequately.

### Dublin firm maps wetlands from the air

Compass Informatics in Dublin is developing and applying an airborne camera system for rapid mapping of natural resources. In two closely-linked projects, one an Irish coastline survey and the other an assessment of aerial imagery for fisheries habitat mapping, the Dublin company is using an airborne digital camera with image referencing and rectification capabilities via the use of Global Positioning Systems (GPS). The system benefits from the expertise of the US Forest Service, with whom the company are working to build in improvements to their system.

The system captures colour infrared or true-colour imagery, and has an optional GPS for image referencing, an in-flight laptop computer for image storage and camera control, and simple navigational aids. Using a light aircraft and one operator, it is a relatively cheap system to operate. Associated software transfers the imagery from the in-flight laptop to GIS-compatible image formats, assembling them as image backdrops within a GIS.

The system's value for increasing the rate of river habitat data collection is being assessed. Once the imagery is within the GIS, extraction of habitat information can be carried out by a combination of GIS and image-processing techniques and visual interpretation by biologists. The system should increase the acquisition rate of habitat data, and provide improved assessment and recording of riverside vegetation and the measurement of the wetted width of streams. The availability of such information is considered to be very important for salmon stock management.

The national coastline survey is already well advanced. The resultant colour infrared imagery is being processed with the aim of producing CD-ROMs for sections of the coastline. It is expected that typical uses of the colour-infrared imagery will include coastal tourism management and planning, seaweed resource identification and golf course erosion control.

This survey is being carried out in conjunction with Enterprise Ireland, with funding from the Marine Institute. For more details contact: Gearóid Ó Riain, Compass Informatics, 19 Nassau St, Dublin 2. Tel: 670 5761 Fax: (01)670 3037 Email: mail@compass.ie

## RESEARCH OPPORTUNITY

### Funds for research in Iceland

There will be a 3rd deadline early in 1999 for proposals from researchers for visits (<12 wks) to the Large-Scale Facility Sandgerdi Marine Centre (SMC) in Iceland. Costs will be covered under the EU's TMR Programme. For further details see: <http://www.hi.is/pub/smc> or contact the Project Manager, Gudmundur V Helgason, Sandgerdi Marine Centre, Institute of Biology, University of Iceland, Grensasvegur 12, IS-108, Reykjavik, Iceland. E-mail: gudmvid@hi.is

# EIS standards in Ireland

## An ecology consultant's view

The following is a synopsis of the presentation given by Dr Chris Smal to the ESAI Forum on Professional Issues in Environmental Consultancy in October. Chris is a wildlife ecologist with 20 years' post-doctoral experience in wildlife management, ecology and environmental impact assessment. He takes a critical look at the quality of ecological surveys and environmental impact assessments, drawing on his own wide experience and that of others. Where references are made to published articles, please note that the extracts quoted are of the author's choosing and may not fully reflect the views of their authors.

The purpose of Environmental Impact Assessments and Statements (EIAs, EISs) is to:

- provide scientific, objective and impartial ecological assessment
- seek to limit ecological impacts
- provide mitigating measures, where impacts are unavoidable
- allow for monitoring of environmental effects and provide remedial measures
- ensure firm commitments to mitigation and remedial measures in EISs.

## The ecologist's role

An EIA must provide scientific, objective and impartial ecological assessment. The ecologist is not a decision-maker. His role is to provide advice to those who make decisions, based on accurate and relevant information, for the following purposes:

- to ensure that the client is appraised of impacts
- to allow for third parties (eg residents, conservationists, objectors) in a planning process to be appraised of impacts
- to ensure that the planning authority is appraised of impacts
- to ensure compliance with legislation (Irish & EU laws and international conventions).

## Standards of EIS in the UK

A study\* of ecological statements was recently carried out for the Royal Society for the Protection of Birds (RSPB) in the UK in which 38 EISs were reviewed.

Only 54% of the statements presented base data which was considered adequate and appropriate. Baseline ecological data was frequently limited in scope, often concentrating only on vegetation and birds, which were the easiest factors to survey and the ones with most pre-recorded information. They were not necessarily the best indicators of biological change or the most important aspects of the ecological assessment. Only half of the statements used survey and analysis techniques appropriately.

Not all statements clearly identified the status of sites and species affected where these were subject to nature conservation designations or legal protection. Limitations in the base data were acknowledged in only half of the statements reviewed. Overall, only a quarter of the statements contained thorough, comprehensive and balanced baseline information. 57% of statements failed to clearly predict ecological effects. Attempts were made in 76% of cases to assess the significance of ecological effects, but only five did so clearly, fairly and competently.

All ecological and geological effects should be identified and their significance predicted. Alternative solutions should be described and assessed in sufficient detail and with impartiality.

Although 72% of the statements examined assessed the ecological implications of proposed mitigation, only four did so clearly, fairly and competently. More than half the statements claimed that the project or the mitigating measures would enhance the wildlife interest of the site, but this was a valid claim in only one case.

Only 11% of the statements showed any commitment to mitigation. Only one provided evidence of a legally binding agreement. Post-project monitoring was mentioned in only 38% of statements, and references were invariably vague or incomplete. Only two statements included any future commitment to monitoring.

Good practice, integrity and effective compliance with procedures demonstrably speeded the decision-making process and gave the decision-maker confidence. Consultees and decision-makers respect fair, balanced and honest statements. A true and full explanation of environmental effects and a commitment to mitigation enhances the prospect of gaining consent. Overstating benefits - and understating or denying adverse impacts - in many cases only served to rob the statement and the project of credibility and undermined the confidence of the decision-maker.

## Standards in Ireland

No quantitative assessment of statements was carried out and this summary is of personal experience of EISs. While many statements were clearly competent, observations similar to those noted in the RSPB report have been noted in EISs. For example:

- Existing site designations (eg of SAC, SPA or NHA status) have not been reported, though the legislative framework in place is fundamental to EIS.
- Habitats protected under the EU Habitats Directive have not been reported.
- Species protected under the Wildlife Act or EU Habitats Directive have not been noted or have been ignored (eg otters, bats).
- Impacts on SAC, SPA and NHA sites have not been evaluated in full or were downplayed. In one example concerning a development within a large NHA, it was suggested that the species present were common throughout so there would be negligible impact on the NHA. EIA should allow reassessment of development schemes where there are substantial impacts.
- Impacts and mitigation measures have not been reported in sufficient detail or at all. There is the suggestion that consultants are wary of pressure from commercial clients.
- One EIS suggested totally impractical and unachievable benefits of mitigation measures.
- Extent and area of survey has sometimes been inadequate. EIA requires survey around the development site. For example, mammals and birds are wide-ranging, so impacts may extend well beyond the immediate site. Impacts on watercourses

may extend far downstream. NHAs and other designated areas often require a buffer zone for their protection. EISs involving road schemes have sometimes considered only a very narrow corridor, whereas impacts may extend 0.5km or more.

- Survey constraints have not been identified. Often, seasonal constraints of survey with regard to flora and fauna have not been noted. Floral surveys carried out in winter have seasonal constraint, as do summer surveys of sites with potential for wintering migratory birds.
- Specialist personnel have not been employed for projects, and the EIS has been undertaken by one person only. For some (smaller) EISs this may be feasible, but it has led to significant problems, especially on larger schemes.

One EIS did not employ an ornithologist for a scheme within an SPA (Special Protection Area for Birds) which resulted in the most peculiar data. Another EIS suggested it would take too long to list the plant species present. One EIS did not note major impacts on badgers and otters present.

Consultants should be aware of their own limitations in scoping and when tendering. Lowering standards to reduce costs negates the very purpose of EIS.

- Mapping of habitats and of land-uses within an EIS is the exception rather than the norm. These would provide clarity for the EIS (and for the client) with regard to the scope of the survey and potential impacts on relationships between habitats. The mapping should include areas/habitats of interest, with zonings applied to include designated areas, areas of ecological interest (undesignated) or of local ecological interest (eg estate woodlands). Existing wildlife corridors or wildlife refuges should be noted and also habitats of local scarcity. Locations of specific species of especial interest should be included.

There is a need for standardisation of habitat description in EIS. The Heritage Council are in consultation and progress in this regard, with a recommended scheme that might be adopted in 1999. Suggested in the interim are the NPW (National Parks & Wildlife) Habitats Classification for Ireland or the Phase 1 Habitat Survey (NCC, UK). No standardised schemes allow for full description, and sites of especial interest present on site will require detailed botanical description.

## Fees, costs and competition

Some of the above problems result from trying to keep costs low in order to achieve success in the tendering process, but the result is that standards may not be maintained.

To maintain professional standards, it may be necessary to exclude amateur naturalists or unqualified practitioners involved in EIA and to make clients aware of the full costs of adequate EIS. Tenders should include specialists where these are required; they should also scope adequately to allow comprehensive EIA in terms of time allotted for survey and geographical limits to the survey. Practitioners should get fair return for their work.

## Raising standards in EIS

Practitioners should adopt widely-accepted guidelines for best practice in environmental assessment. The RSPB report and *Guidelines for Baseline Ecological Assessment*\*\* are two examples. The EPA in Ireland has issued guidelines which should be considered a minimum requirement as they are neither detailed nor comprehensive.

The IEEM (UK) has produced a series of articles on standards and guidelines. The Institute is open to Irish members and offers training workshops for continuing professional development. There is a code of conduct for professional practitioners and a malpractice adjudication procedure. The Institute is in the process of preparing a Certification Scheme for Ecological Survey and Assessment. To further improve standards in EIS in Ireland, it is suggested that:

- a suitable body provide accreditation of practitioners. Accredited practitioners should agree to peer-review any EIS prepared, and should agree to undertake additional training where this would be advisable. The self-policing Certification Scheme for EIS could also be introduced in Ireland
- the EPA's guidelines be revised and enhanced, with advice from, for example, practitioners and members of the ESAI
- the scoping of environmental statements and consideration of alternative solutions should be statutory requirements
- guidelines for costing of EIA should be prepared so that (a) developers/clients are aware of likely costs; (b) practitioners get fair income for professional work of accepted standard; (c) specialists can be employed as project assistants for comprehensive EIA
- training workshops be organised for practitioners to improve standards. Such workshops could be run at cost or might be funded by, for example, the EPA or Dept of the Environment or by grants from the Heritage Council.

At present, the ESAI does not have the resources to pursue all of these avenues, especially more problematical issues such as accreditation. However, ESAI is urged to promote the raising of standards in EIS through improving the EPA guidelines, increasing the scope of environmental assessments within those guidelines, and seeking funding for approved training courses for practitioners. In time, such training courses could possibly lead to forms of accreditation also.

This presentation was given to stimulate discussion on best practice in EIA in Ireland. Comments are welcomed.

### Dr Chris Smal BSc, PhD, MIEEM

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\**Wildlife Impact: The Treatment of Nature Conservation in Environmental Impact Assessment (RSPB, 1995). Available from RSPB Planning Unit, The Lodge, Sandy, Bedfordshire, SG19 2DL. Price Stg£9.*

\*\**Guidelines for Baseline Ecological Assessment. Inst. of Environmental Assessment, UK. ISBN 0 419 20510 1*

## The role of education and training in professional practice

A brief summary of the presentation by Margaret Savage (Sligo Institute of Technology) to the Forum.

Professional practices require a company and its staff to:

- be known in the market
- determine what the customer wants
- determine if your company can do what the customer wants/needs
- complete all installations/reports to a high standard and in good time
- leave an excellent impression and a satisfied customer.

Requisite skills include technical, legislative, economic, costing, scoping, communications, report-writing, marketing and project management. As a business or organisation you will need to:

- assess your business objectives
- assess the skills of your workforce
- identify shortfalls in skills
- regularly evaluate your training needs
- identify a training course or avenue which will get the appropriate staff trained.

Following an assessment of your business objectives, establish your training needs, who needs training and the quantity of training required. There are potential problems with 'on-the-job' training, including the suitability and cost of the trainer, lost time and the effectiveness of this approach for the required learning.

Potential problems with college courses or 'off-the-job' training include:

- identifying the course which best meets your training needs
- identifying the course quality and content in advance
- motivation of staff to take on learning.

Evaluating formal 'off-the-job' training involves examination of the programme or syllabus, who the trainers are (academics, practitioners, professional trainers), what the training methods are (distance learning, lectures, projects, etc) and how the course measures the learning (continuous assessment, theory exam, practical assessments, project). Talk to someone who has used the course. Evaluate the course and methods it uses. Does it meet your training needs? What are the costs in time and money? Is there a more effective approach?

Non-formal training includes reading literature ranging from periodicals to textbooks and technical papers. Examples include *ENVIRONEWS*, *Environment Bulletin*, *Warmer Bulletin*, *Environment Business Magazine*, *NAB*, *ERP Environment*, *Wastes Management*, *EMI*, *Environment Initiative*, EPA publications, specialist journals, and legislation available from Government Publications and European Commission offices. The Internet is an increasingly valuable source of information. However, it has been likened to a herd of elephants with diarrhoea: massive, awe-inspiring and entertaining, but difficult to direct and a source of mind-boggling amounts of s\*\*\*.

Margaret Savage

## 1) Training courses, third-level:

### Sligo Institute of Technology:

Dip. in Pollution Assessment/Control (full-time)  
Dip. in Water Engineering (full-time)  
Deg. in Environmental Chemistry (full-time)  
Deg. in Environmental S&T (full-time)  
Deg. in European Env'l Engineering (full-time)  
PgD in Environmental Protection (dist. learning)  
MSc in Environmental Protection (dist. learning)  
EMS Environmental Auditor's course (dist. learning)

### Dublin Institute of Technology:

Diploma in Environmental Resource Management

### Athlone Institute of Technology:

Environmental Pollution and Control (10 evenings)  
Environmental Awareness Training (IPC) (8 hrs)

### Waterford Institute of Technology:

Certificate in Environmental Engineering (2 yr)  
Diploma in Environmental Engineering (3 yr)

### Limerick Institute of Technology:

Certificate in Environmental & Analytical Science

### Dundalk Regional Technical College:

Dip. in Science (Environmental Monitoring) (3 yr)  
Certificate in Environmental Monitoring (2 yr)  
Foundation Course in Env'l Mgmt. (10 evenings)

### University College Dublin:

Deg. in Agric. and Environmental Science (full-time)  
Dip. in Rural Environmental Management (full-time)  
European Dip. in Env'l Conservation (full-time)  
M.Appl.Sc in Environmental Science (1 yr)  
M.Eng.Sc in Water Engineering (1 yr or p'time 2 yr)  
M.Eng.Sc in Env'l Engineering (1 yr or p'time 2 yr)  
MSc (Agric) in Env'l Resource Mgmt. (full-time)  
College Dip. in Rural Env'l Mgmt. (p'time 1 yr)  
College Dip. in EIA Mgmt. (6 mths, 2 days a wk)

### Carlow Institute of Technology:

Cert. in Env'l Monitoring & Instrumentation (2 yr)  
Deg. in Industrial Env'l Science (full-time 1 yr, add on to Diploma in Analytical Science)

### Trinity College Dublin:

MSc in Environmental Science (full-time)  
PgD in Env'l Engineering (part-time weekends)  
Wildlife Mgmt. & Conservation (night course)

### National University of Ireland-Galway:

Degree in Environmental Science (full-time)

### University of Limerick:

Deg. in Environmental Science (full-time)

### National University of Ireland-Cork:

BSc in Environmental Studies (part-time at night)  
PgD in Env'l Engineering (part-time weekends)  
Cert. in Field Ecology (distance 2 yr)  
Dip. in Env'l Sci. & Social Policy (2 yr, 2 nts a week)

## 2) Other training courses:

### IBEC:

Environmental Legislation (2 day)  
Maintaining an IPC licence (1 day)  
EMS (2 day)  
Waste Mgmt. & Auditing Workshop (2 day)  
Chemical Safety Training (1 day)  
Packaging Waste Auditing Workshop (1 day)  
Carrying out an Environmental Audit (1 day)

### Clean Technology Centre, Cork:

Executive Briefing (2 hrs)  
Cleaner Technol. & Waste Minimisation (2 hrs)  
Waste Minimisation Basics (1 day)  
Cleaner Technol. in Process Industry (half day)  
Environmental Issues (1 day)

### Enterprise Ireland:

Biological Effluent Treatment (1 day)  
Activated Sludge Systems (1 day)  
Groundwater Monitoring and Sampling (1 day)  
Air Emissions and IPCL Compliance (1 day)  
Waste Management (1 day)

### Institute of Acoustics:

Courses in environmental monitoring

### Institute of Engineers of Ireland:

Waste Management (6 x 3 days)  
Water Course

# News digest

## Search for 'elite' Irish birch trees

A project to improve the quality of Irish birch is being carried out by The Dept of Botany in UCD and the Forestry Service at Teagasc, Kinsealy, Co Dublin, funded by COFORD (National Council for Forestry Research and Development). It is seeking to identify and select superior specimens of birch; use seed from selected trees to establish progeny trials; and establish a seed orchard and gene bank.

Birch (*Betula* sp) has excellent potential as a commercial crop. Birch improvement projects in Finland, Sweden and Scotland have shown that substantial genetic gain can be achieved within the first generation of selection. Birch now constitutes 17% of forest planting in Finland. In Ireland, it is capable of growing on a wide range of sites, most notably on soils where other broadleaves do badly. Birch timber has a strength and density intermediate between that of oak and beech. It veneers well and yields high-quality pulp.

*Betula pendula* and *B pubescens* are native broadleaves and could contribute significantly to the Forest Service's plans for species diversification. But in order to convince people to plant birch, quality planting stock is urgently required. We are asking people involved in forestry to please assist us in locating 'elite' trees so they can be included in the Irish Birch Improvement Project. If you know of birch stands or birch individuals of superior form in your area, whether planted or naturally regenerated, please contact us.

### Characteristics of an 'elite' birch tree

- Retention of leader
- Straight stem
- Thin branches at 90° angle
- Round in cross section
- Minimal taper
- Crown narrow in relation to stem
- Smooth-peeling bark (*ie* fast growing tree).

If you know of any trees older than 15 years and >10m in height which satisfy the first three of these criteria, we would be interested in hearing from you. If they have any of the additional characteristics listed, all the better!

• *Please contact: Dr Niamh O'Dowd, Teagasc, Kinsealy Research Centre, Malahide Road, Dublin 17. Tel: (01) 846 0644 Fax: (01) 846 0524 Email: nodowd@kinsealy.teagasc.ie*

## Coral reefs off west coast

It is not often one sees a paper by Irish authors or on Ireland in *Nature* (Vol 391, pp648-49, Feb 1998). However, researchers from the government's Petroleum Affairs Division (PF Croker) and UCD (PM Shannon & V Unnithan, Geology Dept) described carbonate mounds in the Porcupine Basin where deep-water corals (*Lophelia* sp) occur. The coral reefs are associated with methane seeps from hydrocarbon reservoirs, so their locations are of interest to oil/gas exploration companies.

Their discoveries indicate that the Porcupine Basin is a major deep-water coral reef province. Their findings indicate that a

largely unexplored habitat exists in Irish waters, and that it has potentially commercial hydrocarbon reserves.

At the turn of the century, Irish researchers described many species new to science off the west coast, though there has been minimal biological research in these areas by Irish scientists since. However, they have been trawled to such an extent that their fish stocks, already sensitive to over-fishing because of their slow growth rate and late age of maturity, are in decline. The impacts of trawling on these deep-water ecosystems are likely to be significant as the fauna of such areas are not tolerant to physical disturbance. Trawling also impacts on the food-web through removal of the fish predators.

The UN Convention on Biological Diversity requires countries to protect and research both the economic (fish) and ecosystem (sea-bed species of indirect economic importance) aspects of their native biodiversity.

**Dr Mark J Costello**

## CORDIS launched in Ireland New information service on EU R&D

The European Commission has launched a new Internet service in Ireland in conjunction with the government's Office of Science and Technology. CORDIS covers all EU-supported R&D and Innovation. It provides Irish companies, businesses and education bodies with info on R&D opportunities at European level, including info on Irish participation in EU-funded R&D. Details will be provided on projects supported by European structural funds. The Spotlight/Showcase section will detail Irish success stories concerning EU-funded projects. The WWW URL for the CORDIS web site is: [www2.cordis.lu](http://www2.cordis.lu)

## GIS listservers

GIS is now an almost essential tool in environmental survey, data-handling and analysis, and management. The following web site contains a long list of GIS-related listservers: [http://www.ctmap.com/gisnet/notebook/gis\\_list.htm](http://www.ctmap.com/gisnet/notebook/gis_list.htm)

### Some GIS listervers of Irish interest are:

**COASTGIS** (on coastal GIS issues)

List: [coastgis@irlearn.ucd.ie](mailto:coastgis@irlearn.ucd.ie)

### COASTNET

(Discussion list on coastal management & resources)

Server: [listserv@uriacc.uri.edu](mailto:listserv@uriacc.uri.edu)

List: [coastnet@uriacc.uri.edu](mailto:coastnet@uriacc.uri.edu)

Contact: [aland@gsosun1.gso.uri.edu](mailto:aland@gsosun1.gso.uri.edu) (Alan Desbonnet)

### CONSGIS-I

(Biological conservation and GIS list)

To subscribe, email to the server and put only

SUB CONSGIS firstname lastname

in the body of the message.

Server: [listserv@uriacc.uri.edu](mailto:listserv@uriacc.uri.edu)

List: [consgis@uriacc.uri.edu](mailto:consgis@uriacc.uri.edu)

### LANDSCAPE-RESEARCH

List: [landscape-research@mailbase.ac.uk](mailto:landscape-research@mailbase.ac.uk)

### SEA-GIS

(Coastal and marine applications of GIS)

List co-moderators are [djb@ucc.ie](mailto:djb@ucc.ie) (Darius Bartlett)

and [dawn@dusk.geo.orst.edu](mailto:dawn@dusk.geo.orst.edu) (Dawn Wright).

Server: [listserv@listserv.heia.ie](mailto:listserv@listserv.heia.ie)

List: [sea-gis@listserv.heia.ie](mailto:sea-gis@listserv.heia.ie)

Contact: [dawn@dusk.geo.orst.edu](mailto:dawn@dusk.geo.orst.edu) (Dawn Wright)

### TWSGIS-I

Wildlife Society GIS list

List: [twsgis-l-request@vmi.nodak.edu](mailto:twsgis-l-request@vmi.nodak.edu)

## CAMPAIGN FOR LANDSCAPE POLICY

In 1994, Terry O'Regan, a landscape architect from Waterfall, Co Cork, called for a greater awareness of landscape quality and the impact of developments on the landscape. He suggested that a National Landscape Policy would be a logical means of addressing the issues, often contentious, that have arisen in relation to different aspects of landscape management.

The debate resulted in the preparation of discussion documents which were circulated widely and submitted to government, detailing how such policies might be formulated and implemented. The initiative won the support of people from many different backgrounds and, with their assistance, the first National Landscape Forum was convened in June 1995, with 80 participants and 19 speakers. The Forum explored many aspects of landscape management and quality.

The National Landscape Forum has since convened each year, with 120 participants and 50 speakers at the three-day Forum held in 1998. Each year, the proceedings of the Forum have been audio-recorded and published. The proceedings of the 1998 Forum are currently in preparation.

Success in moving the concept of a national landscape policy up the public agenda has been demonstrated in the interest shown by the government in early 1997, when an inter-departmental committee was set up to explore the concept. Both the Green Party and Fine Gael have published discussion documents on their concepts of national landscape policy. At the 1998 Forum, speakers from the Green Party, Democratic Left and the Progressive Democrats each demonstrated a clear grasp of what a holistic approach to landscape management was all about.

Landscape Alliance Ireland (LAI) is a partnership of individuals, non-governmental organisations, representative organisations and public officials, all committed to quality in our shared landscape, present and future, and the view that the landscape must be considered in its totality - with an urban, suburban and rural rather than the present piecemeal approach.

The necessity for such an organisation arose from the fact that the approach to landscape management was fragmented and reactive, resulting in a dissipation of energy and scarce resources and a progressive deterioration in the quality of our landscape.

LAI believes that the quality of our landscape requires sensitive and informed management with a balanced mix of protective, creative and strategic planning.

Copies of the published proceedings of the 1995, 1996 and 1997 Landscape Fora can be obtained from:-

*Landscape Alliance Ireland, Old Abbey Gardens, Waterfall, Co Cork. Price: £10 (1995), £15 (1996, 1997), P&P incl.*

**Terry O'Regan**

### Mary Brennan reports on the seminar 'The Future Development of Ireland's Inland Waterways' hosted by The Heritage Council in Tullamore in November

The Heritage Council intends to submit an advisory package on Ireland's inland waterways to the Minister for Arts, Heritage, Gaeltacht & Islands by the end of 1998. A consultative document was circulated widely in August. It focused on developing inland waterways as an amenity and it proposed an Inland Waterways Authority. There was no section on potential environmental impacts.

The Heritage Council completed the process by hosting a seminar, "The Future Development of Ireland's Inland Waterways," in Tullamore on 24th November. Beatrice Kelly (Heritage Council) summarised the feedback to the document and told delegates that submissions had been received from 72 respondents. Most of the Heritage Council's suggestions had been favourably received. For example, the priority list of waterways, headed by the Royal Canal, was widely endorsed. However, issues of environmental protection were identified by many as not receiving sufficient emphasis, especially in relation to development along the waterways.

Twenty submissions included substantial sections on environmental issues. All of these pointed out that tourism and recreational developments might affect adversely the ecology of the inland waterways. The need to integrate nature conservation into all aspects of the management of the waterways was strongly emphasised, as the plan had failed to take this into account.

Four respondents claimed that the Council did not take into account, or misrepresented, the Ramsar Convention

and the EU birds and habitats directives. There are 12 SPAs, 3 SACs and at least 12 proposed NHAs in the waterways system. Some of the most important waterways are designated (or proposed for designation) for conservation, including the entire length of the Royal and Grand Canals and much of the Shannon system (including Loughs Ree and Derg and the Shannon Callows).

#### Comments and recommendations

Delegates made comments and recommendations on aspects of organisational, resource and usage management of inland waterways. There was general agreement that the existing organisational management was inadequate. Three options were envisaged: (a) a new body, (b) a restructuring of the existing organisation within Dúchas~The Heritage Service, and (c) a mixture of both. It was agreed that, whichever model was chosen, it would need to be a powerful coordinating authority, like, for example, the Central Fisheries Board or the National Roads Authority. The authority should be able to integrate all the heritage aspects of waterways, with accountability, communication skills, hands-on experience, a planning function and the ability to balance conservation and development.

Regarding resource management, it was agreed that liaison between all interested bodies was essential. Corridor areas appropriate to different stretches of waterway needed to be defined, and activity and development in these areas regulated and monitored. The resource could perhaps be controlled through planning and land-use regulations.

It was noted that the waterways were currently under-funded. Funding should have both private and public sources, and revenue from the resource should be put back into management.

#### Managing waterway usage

The principle of multi-use of both the waterbody and its corridor was accepted by most. Careful management and enforcement would be necessary, and zoning of activities. Special attention would need to be paid to conservation areas. A code of practice for all users would be required.

It was questioned whether the resource was suitable for marketing at present. It was agreed that the infrastructure on the Shannon, for example, could not sustain its present use. In the future it would be desirable to have a specific body in charge of overall marketing, and that marketing be tailored to the carrying capacity of each waterway. Promotion should include a strong educational component.

Mary Brennan, Secretary ESAI

#### Reviewing EISs

Following on from concerns raised at the ESAI workshop about the often limited external review of EISs, particularly with regard to their ecological aspects, it is interesting to read in *The Badger* magazine that the Irish Wildlife Trust (IWT) has arranged for Dr Declan Doogue to provide a second opinion on the adequacy of EISs. (I believe that *VOICE* and *An Taisce* may also provide independent reviews, but I have no record of this.)

Independent reviews will improve standards in EIS because developers and their consultants will know that their work is being externally criticised with consequences for the development in question and their reputations.

This initiative also overcomes another concern mentioned at our October Forum, ie that objectors to planning applications are often individuals or local groups with more limited financial resources than the developers. Thus objectors cannot hire their own consultants to review applications. Indeed, it is arguable that, seeing as the development was not initiated by them, they should have automatic access to independent professional review. In the absence of any financial mechanism to provide for this, the IWT has provided the next best option.

A notable aspect of the IWT arrangement is that Dr Doogue, a school-teacher, is providing his services free. At the International Limnology Symposium in UCD last summer, the Plenary Speaker, Dr Colin S Reynolds from the UK, pointed out how few academics used their academic freedom and government-funded salaries to focus their research on issues of long-term importance to society. Instead, their universities encouraged them to do research for industry and government and so gain extra income for their employers. For example, industry may fund academics to study biodiversity in the tropics, with the consequence that they will not learn of environmental damage occurring at home. There is thus a bias towards research and services that assist development rather than the wider society and the environment.

We are fortunate in Ireland that some academics spend much time doing research or providing services which may not be funded by industry and government but are of benefit to society, heritage and future generations.

Dr Mark J Costello

#### Northern Ireland canals

Shane Belford told the seminar that the infrastructure of the canals in Northern Ireland was basically good but that much of the system was derelict. He described developments taking place on the following canals:

- Ulster Canal and Blackwater
- Lower Bann Navigation
- Newry Canal (a development committee is at work)
- Lagan Navigation (a feasibility study has been undertaken)
- Erne Basin (has been enhanced by connection to the Shannon)

Future developments would be influenced by the Northern Ireland Assembly, cross-border cooperation on inland waterways and a new UK Rivers/Water Order being prepared.

### ENVIRONNEWS

ENVIRONNEWS is published by the Environmental Sciences Association of Ireland (ESAI) and distributed free to members.

**Editorial production team:** Chris Emblow, Mark Costello, Cólín MacLochlainn Fax: 01-492 5694 Email: cemblow@ecoserve.ie

**Advertising:** A half-page ad in ENVIRONNEWS costs £40. A brochure will be inserted for c £75 (depending on weight). Members' names and addresses are not provided to commercial concerns.

**ESAI Officers: Chairman:** Dr Mark J Costello EcoServe, 17 Rathfarnham Road, Terenure, Dublin 6. Tel: 01-490 3237 or 01-453 3195 Fax: 01-492 5694 Email: mcostello@ecoserve.ie

**Vice-chairperson:** Dr Theresa Doyle, 73 Barton Road East, Rathfarnham, Dublin 14. Tel: 01-493 4657, 086-234 7334 Email: tmdoyle@indigo.ie

**Secretary:** Dr Mary Brennan, Letterkenny Institute of Technology, Letterkenny, Co Donegal. Tel: 074-24888 ex 4239 Email: mary.brennan@rtc-letterkenny.ie

**Treasurer:** Donal Marron, KT Cullen & Co Ltd, Bracken Business Park, Bracken Rd, Sandyford Industrial Estate, Dublin 18. Tel: 01-294 1717 Fax: 01-294 1823 Email: ktcullen@iol.ie

**ESAI membership subs:** £12 (contact the Treasurer).

## ESAI Council activity in 1998

The ESAI Council met seven times in 1998. Here's a brief summary of items discussed and action taken:

- **Membership:** currently exceeds 120. The membership database is being updated to include as many environmental consultants, local authorities and third-level colleges as possible, and upgraded to generate addresses easily for correspondence/email. A working group was set up to handle these tasks.
- **Brochure:** A new ESAI brochure was printed.
- **Newsletter:** two editions of the newsletter ENVIRONNEWS (200 copies of each) have been produced (on recycled paper) and circulated.
- **Listserver:** about 70 members have joined. They receive information on jobs, useful websites and may engage in debate on the net. They were invited to contribute to discussions on consultative documents. Environmental organisations are invited to use our listserver to advertise conferences, etc.
- **Web Site:** you can find our new web site at: <http://www.ecoserve.ie/esai>  
It contains information on our constitution, code of ethics and colloquium.
- **Correspondence:** ESAI made submissions to the Dept of the Environment on the National Environment Partnership Forum, and to The Heritage Council on *The Future of Ireland's Inland Waterways* consultative document. We also sent over 700 letters to members, lapsed members and others with environmental interests.
- **Finances:** satisfactory. We started the year with a surplus. The treasurer will prepare a financial report for our AGM on 30 January 1999. Our only source of funding at the moment is membership subscriptions. This is not enough to cover the cost of letters, newsletters, brochures and annual workshop. (Our application to the National Environment Partnership Fund of DoE to support dissemination activities was unsuccessful.) We need to increase income significantly.
- **Workshop:** held in October, on "Professional Issues in Environmental Consultancy in Ireland." Proved very successful (see full report on page 2).
- **Colloquium:** will be held at Johnstown Castle, Co Wexford on 29-31 January 1999. Agreement was reached with the Royal Irish Academy (RIA) to publish the Colloquium abstracts annually in the journal *Proceedings of the RIA: Biology and Environment*.
- **SCOPE:** we have agreed with the RIA to nominate through them an Irish representative to the UNESCO Scientific Committee on Problems of the Environment (SCOPE). This is the first time Ireland will participate in this committee and is the result of two years' lobbying by ESAI.
- **Comhar:** The Dept of the Environment designated ESAI as a nominating body for Comhar (National Sustainable Development Partnership Forum). The ESAI nominated Dr Richard Moles as our representative on Comhar.

If any member would like to comment on the Council's activities, raise issues at Council meetings or contribute articles to ENVIRONNEWS, then please contact any Council member. Please attend our AGM on 30 January 1999, if you can (at Colloquium '99).

Mary Brennan, Secretary ESAI

## Publications

### Manual on teaching field ecology

**Reference:** Davenport, J. 1998.

*Marine biology field teaching forum.*

*Occasional Publication No 7,*

*University Marine Biological Station*

*Millport, Isle of Cumbrae, Scotland.*

*Available from (email):*

*gbfe01@udcf.gla.ac.uk*

*<http://www.gla.ac.uk/Acad/Marine>*

This publication (based on a workshop on teaching field ecology) includes papers (with a marine emphasis) on suggestions for field-course teaching; safety/hazard assessment in field ecology; training for ecologists; experiences from teaching marine field ecology.

### 'GIS Europe' magazine

Geographical Information Systems are now as standard an element of electronic environmental research and management systems as maps were of old. *GIS Europe* is a glossy mag, with news of new software. The articles are rarely over-critical but contain useful information. They cover applications of GIS, such as in dealing with toxic waste spills. In Donāna national park in Spain last April, for example, the environmental agency for the region had an impressive GIS already established, with 300 networked workstations. Contact *GIS Europe*, 3rd floor, Garrard Hse, 2-6 Homesdale Rd, Bromley BR2 9WL, UK.

### 'The Irish Sea: An Environmental Review'

*Published by Irish Sea Forum,*

*University of Liverpool (1990)*

*Price: £15 sterling (post free)*

This is not a new publication, but is currently available at a bargain price. It is a valuable reference set in four parts:

Part 1: Nature Conservation

Part 2: Waste Inputs and Pollution

Part 3: Exploitable Living Resources

Part 4: Planning Development and Management.

Send cheque (payable to University of Liverpool) to: The Administrator, Irish Sea Forum, Oceanography Labs, University of Liverpool, Liverpool, L69 3BX, UK.

## Irish Sea Forum: meeting on Irish Sea archaeology

The Irish Sea Forum will meet on 14 January 1999 in the Senate Room, Senate House, Univ of Liverpool. The theme is "Marine Archaeology of the Irish Sea." Bookings should be made by 5 January with cheque for Stg£10 made payable to University of Liverpool. Bookings to Hilary Davies, Irish Sea Forum, Oceanography Labs, Univ of Liverpool, Liverpool L69 3BX. Email: [H.Davies@liv.ac.uk](mailto:H.Davies@liv.ac.uk)

## Useful web sites

### Living Planet Report

The *Living Planet Report* by the World Wide Fund for Nature International provides a critical assessment of the state of the world's environments. It has received much media attention, and is available at:

<http://www.panda.org/livingplanet/lpr/index.htm>

### Burren Action Group web site

<http://www.iol.ie/~burrenag/>

It provides a history of their campaign, which was a milestone in environmental planning in Ireland.

### EC Environment Directorate web site

[http://europa.eu.int/comm/dg11/index\\_en.htm](http://europa.eu.int/comm/dg11/index_en.htm)

It includes links to policy, funding, etc.

There is a useful index to documents at:

<http://europa.eu.int/comm/dg11/abc.htm>

### Environmental indicators web site

The EC Statistical Office in collaboration with the European Environment Agency has produced a suite of indicators of pressures on the environment. A full list of the methodology for deriving each indicator is available at:

<http://www.telcom.es/tau/sheets.htm>

### Scuba diving web site

The Irish Diving Council (CFT) has a useful web site with links to scientific, tourism & other info at:

<http://www.indigo.ie/scuba-irl/>

### Directory of marine/freshwater experts

The Global Directory of Marine (and Freshwater) Professionals (GLODIR) is a database containing information on individual scientists and their interests. It is a tool for scientists, policy-makers and anyone who needs to contact a marine scientist. GLODIR was developed under the auspices of the IODE's Group of Experts on Marine Information Management (GE-MIM). It is a free product but can be used ONLY for non-profit purposes. It is possible to create your own record at:

<http://ioc.unesco.org:591/glodir/default.htm>

### Biodiversity web site

There's an impressive web-site devoted to biodiversity at: <http://ibs.uel.ac.uk/ibs/>

It has links to databases and websites on special taxa (see below) and, more uniquely, links to free software for plotting global biodiversity patterns, rarefaction curves, etc.

1) **Taxonomic links:** VIRUSES (virus databases on-line); PROTISTA (Protista resources from BIOSIS); FUNGI; PLANTS; ANIMALS; TRITON (Taxonomy Resource and Index to Organism Names).

2) **Searching the data:** Useful examples include:

- Mapping Global Plotter
- Palaeogeographic Maps plus PFR data
- Animated Palaeogeographic Maps (JAVA)
- 3-D Maps (VRML)
- WORLDMAP Natural History Museum
- Manipulating Palaeontological Data Fossil Record 2
- Fuzzy Analyzer (JAVA) Interactive Manipulation of Enigmatic Palaeontological Data
- Hierarchies in Biology 1 (JAVA). A demonstration programme about the hierarchic relationships between entities in biological data.
- Hierarchies in Biology 2 (JAVA) WWW Rarefaction. Programme calculating the rarefaction estimates and their 95% confidence intervals.