SYLWER: O ganlyniad i newidiadau yng ngofynion portffolio’r TUAAU, nid oes gan bob cylch dysgu a lwythir i CADAIR yr un nodweddiion. Mae’n bwysig bod y cyhoedd dysgu hyn yn cael eu defnyddio fel adnoddau yn unig, ac nid fel canllawiau i’r hyn sydd ei angen i fodloni gofynion y TUAAU. Os oes ei mewn iddiadau, cysylltwch â thestaff@aber.ac.uk.

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TYSTYSGRIF UWCHRADDEDIG ADDYSGU MEWN ADDYSG UWCH

POSTGRADUATE CERTIFICATE IN TEACHING IN HIGHER EDUCATION

Cylch Dygu 2 | Teaching Cycle 2

Encouraging Active Learning About 'Values' in Nature Conservation

Mae’r Cylch Dygu hwn o’r portffolio TUAAU wedi’i gyflwyno i CADAIR gyda chaniatâd yr awdur uchod. Adnodd i’w ddefnyddio gan ymgeiswyd yr TUAAU yn y dyfodol a staff eraill iddyw, fel rhan o’u datblygu proffesiynol ym Mhrifysgol Aberystwyth. Erys yn ei ddiwedd i’r awdur a Phrifysgol Aberystwyth. Os hoffech dyfynnu’r gwaith hwn neu gyfeirio ato, cysylltwch â’r awdur. Ceir y manylion cyswllt yn http://www.aber.ac.uk/cy/directory/

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Encouraging active learning about ‘values’ in nature conservation

Second teaching cycle – 28 September 2007

Peter Dennis, Institute of Biological, Environmental and Rural Sciences

Background

Interactive lectures composed of innovative learning objects have been demonstrated to encourage active learning in a higher proportion of students (Cannon & Newble 2000). This provides a theoretical foundation for departing from didactic lectures which invariably results in passive learning for a majority of students (Biggs 2003). Furthermore, passive learning is associated with a surface learning strategy where students aim to complete a course solely with emphasis on the assessed materials and tasks (Cannon & Newble 2000). The meaning and purpose of the course materials and activities often evades most students unless a deep approach to learning can be encouraged. Several challenges are encountered by staff and students alike when faced with large classes with timetabled periods for teaching and learning that extend to two hours. There will be a variety of learner motivations represented in modern, large classes classified by Prenzel (Prenzel et al. 2000 in Ecclestone 2003) into:

- Amotivated
- External
- Introjected
- Identified
- Intrinsic
- Interested.

In addition, contemporary student populations demonstrate a shorter span of attention than their predecessors (Jensen 2005) perhaps the product of conditioning by the variety and rate of information delivery in modern, popular media. The implication is that the period of effective engagement of the audience with the lecturer cannot be expected to last beyond 20 minutes (Exley & Dennick 2004). Comfort breaks and changes in learning activity can sustain this attention span beyond the initial twenty minutes of an individual culminating in a significantly greater retention of knowledge over the duration of a course (Biggs 2003). There is opportunity to present a variety of activities to students during such lectures, encouraging learners through transaction and transformation approaches (e.g., individual, paired and small group workshops and mini-assignments). This in turn allows progression from lower to higher levels of learning as presented by Bloom (1956) and Ecclestone (2003). That is, surface – strategic - deep learning is parallel to procedural – personal autonomy – critical autonomy along Bloom’s sequence:

1. knowledge, reproduction
2. comprehension
3. application
4. analysis
5. synthesis and evaluation.

The purpose of this teaching innovation was to modify the lecture material of a typical two-hour lecture of a 20 credit module entitled “Wildlife Management” that was inherited on appointment to the Institute of Rural Sciences, Aberystwyth University
end-September 2006. The module comprised twelve lectures given weekly during Semesters I and II, combined with four field visits to nearby wildlife habitats. Lectures are typically attended by ca. 35 students on degree schemes and ca. 15 students on Higher National Diploma schemes. Assessment comprises written assignments on wildlife survey methods and preparation of a nature conservation management plan related to one of the visited sites and an end of academic year exam paper. The series of two-hour lectures described various types of wildlife habitat, associated species and current best practice for the management of habitats to maintain "favourable condition". The material is currently designed to be presented as a series of 1 hour 50 minute didactic lectures, usually with a midway 10 minute comfort break. The various teaching and learning committees have agreed that the current content of the module is essential but there is a large amount of factual information to communicate to the students, with a significant risk that learning is ineffective due to information overload (Exley and Dennick 2004).

Description of teaching innovation

The objective of this teaching cycle was to trial the inclusion of learning activities to add variety to the delivery of the material both to increase the attention span of the students and to encourage active learning amongst students during these lectures (Biggs 2003). The factual content of existing lecture materials was first aggregated and a decision was made to classify 'map' versus 'coverage' content of the subject material (Exley & Dennick 2004). This freed up time so that innovations could be introduced that could encourage dialogue and active learning about 'values' in nature conservation. Exercises such as short quizzes, discussion topics and ballots were devised to encourage deeper understanding of the philosophical human valuation of nature, with particular reference to the 'species' concept. The intended outcome was to improve student understanding of the relative values of different species in nature conservation and why simple counts of species (species richness) may be misleading and unhelpful in conservation biology and management.

The teaching practice was implemented by the introduction of a question-answer session based on fundamental socio-ecological ideas accompanied by a general discussion about species values. This was followed by a ballot about the relative value of species for a mixture of species with varied prominence/charisma. The intention was to encourage a deeper appreciation of the limitations of the species concept and to assist in site evaluation and problem solving in conservation biology by incorporating these activities into the learning experience. Making sense of more abstract concepts of science is often improved by demonstrating their relevance in problem solving (Race and Brown 1998).

Evaluation

Verbal responses and values recorded as votes will be recorded partly for the evaluation of the teaching cycle but also made available to students on a Virtual Learning Environment (VLE) alongside handout material to assist with reflection and reinforcement of the material. Students will thus receive direct feedback through engagement in the activities and the collated results posted on the VLE. Further feedback related to the students' appreciation of lectures with or without these activities was obtained with targeted questions added to the review form in the
module review carried out at the end of Semester II. The specific wording and number of questions in the exercises could be altered, and the precise choice of species for the ballot modified during the teaching innovation. The number and type of species can be changed to maximise the contrasts in value that individuals give to different species. The criteria used to evaluate the success of the teaching innovation included the number of votes used by students throughout the exercise (a measure of engagement). The acceptance of the introduction of the learning activities as a substitute for information transmission and its relevance to the module learning objectives were evaluated using the scoring system of the module review forms.

Teaching experience and outcome of innovation

The attendance of the lecture was good, with 49 of 51 students present. A general outline of the module was quickly followed by a description of the content of the lecture topic prior to the first activity. Short explanations about the topic of conservation biology were given with the three questions being introduced for paired discussion for three-five minutes before verbal sharing during the following discussion session. The different answers were written directly into a pre-prepared Word document. Slides were then presented illustrating possible responses and comparisons were made between the collective response of the students and the conventional information. The questions ranged from those seeking general definitions to questions exploring individual values related to the role and implementation of conservation biology (Table 1).

Table 1. Results of initial pair and share quiz entitled “Why conserve?”

<table>
<thead>
<tr>
<th>Question</th>
<th>Group answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is biological conservation?</td>
<td>Preserve and enhance nature</td>
</tr>
<tr>
<td></td>
<td>Maintain biosensitive habitats</td>
</tr>
<tr>
<td></td>
<td>Maintaining a balance</td>
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<tr>
<td>2. If you believe biological conservation is important, why?</td>
<td>Biodiversity – pre-eminent, dependence</td>
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<td></td>
<td>Ecosystem services</td>
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<td></td>
<td>Moral duty</td>
</tr>
<tr>
<td>3. Can you suggest how you might contribute to biological conservation?</td>
<td>Recycle</td>
</tr>
<tr>
<td></td>
<td>Education</td>
</tr>
<tr>
<td></td>
<td>Support sustainable development</td>
</tr>
<tr>
<td></td>
<td>Lobbying decision makers</td>
</tr>
<tr>
<td></td>
<td>Donation to conservation charities</td>
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<tr>
<td></td>
<td>Ethical purchasing</td>
</tr>
<tr>
<td></td>
<td>Volunteering</td>
</tr>
<tr>
<td></td>
<td>Reduce carbon footprint</td>
</tr>
</tbody>
</table>

Once these subject areas were covered in more detail through a series of slides, the notion was introduced that nature conservation is resource limited so that difficult decisions are needed to prioritise species for conservation. Questions were introduced to define the area for further consideration:

- How do we evaluate species?
- Are all species valued equally for biodiversity conservation?
- How can we apply scientific objectivity?
The idea that some species might be of greater priority in conservation nature was explored at two levels. Firstly, a ballot was held simply asking in turn if each species on a list of seven species merited equal weight to all other species. This revealed differences between species based on personal judgement and prior knowledge at least of some of the species (Fig. 1).

**Figure 1.** Results of ballot “Does each species have equal weight to all other species?

The first ballot provided predictable results such as the lower importance to undesirable status for mosquitos, equal status to priority for white rhino, black grouse and European wolf but surprise equal status to priority for soil springtails and equally surprising equal to undesirable for wax cap fungi. Some discussion about the underlying reasons was facilitated before describing Kellert’s classification of human values for nature before a second ballot requesting individual student values for the same seven species under each of the classes of valuation. Each student was given multiple votes for each permutation. This was relatively time consuming but worthwhile and again numbers of votes were entered directly into a pre-prepared table. The distribution of votes (Table 2) was an excellent basis for identifying why very different species may be given more or less value in comparison with others under different criteria.

The lecture closed with a section describing other criteria that are used to distinguish the conservation value of species from one another, namely population size, geographic extent, taxonomic relatedness, and whether genetically distinct species are superior to hybrids or symbioses between different organisms, e.g., lichens composed of interdependent algae and fungi.
Table 2. Results of ballot “What values would you associate with these species?”. Highest scores highlighted with bold characters.

<table>
<thead>
<tr>
<th>Species</th>
<th>Utilitarian</th>
<th>Naturalistic</th>
<th>Ecological-scientific</th>
<th>Aesthetic</th>
<th>Symbolic</th>
<th>Humanistic</th>
<th>Moralistic</th>
<th>Dominionistic</th>
<th>Negativistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>White rhino</td>
<td>1</td>
<td>18</td>
<td>8</td>
<td>22</td>
<td>11</td>
<td>23</td>
<td>27</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Black grouse</td>
<td>0</td>
<td>11</td>
<td>5</td>
<td>13</td>
<td>8</td>
<td>6</td>
<td>15</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Marsh orchid</td>
<td>0</td>
<td>10</td>
<td>6</td>
<td>28</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wax cap fungus</td>
<td>3</td>
<td>4</td>
<td>12</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Soil springtail</td>
<td>16</td>
<td>0</td>
<td>21</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mosquito</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>36</td>
</tr>
<tr>
<td>European wolf</td>
<td>0</td>
<td>9</td>
<td>6</td>
<td>31</td>
<td>15</td>
<td>23</td>
<td>19</td>
<td>10</td>
<td>7</td>
</tr>
</tbody>
</table>

The number of votes cast demonstrated a high level of engagement with the different activities and this was supported by the extent of the discussion associated with each set of results and the reasonable proportion of the class providing inputs indicated a higher than average level of attention (Tables 1 and 2, Fig. 1). The final evaluation was based on feedback received at the end of the module, achieved by adding some questions specifically associated with the modified lecture/s and provision of results and associated materials on the VLE (Blackboard). There was a reasonable proportion of students that found the lectures generally interesting and well-prepared and organised (Fig. 2a). There was a broader spread of students in terms of the use they made of additional materials loaded onto the VLE (Fig. 2b). Students also indicated that the mix of traditionally taught and activity-based learning was either about right or could be extended to more of the lectures (Fig. 2c).

Discussion

The overall experience from the introduction of innovative learning activities into a traditional large lecture class was favourable. Evidence both from engagement with the activities and later feedback from students suggested a generally favourable response and possibly a demand to increase such elements in other lectures in the module. The second ballot related to the human values of species was rather time consuming to record. One solution would be to introduce this part of the lecture as a Quizdom exercise – essentially automating the vote recording process. However, there are too many students for the available number of voting handsets. Another possible approach is to replicate the table on the white board and simply ask students to allocate votes by the application of adhesive, coloured labels.
Figure 2. Responses of students to questions added to the module evaluation questionnaire to target the activities used in the “Why conserve species?” lecture (n = 22).

a. ‘The module was interesting’ and ‘Classes were generally well-prepared and organised’
b. ‘How much use did you make of supporting materials on Blackboard?’
c. ‘Would you like more or less interactive sessions in lectures, e.g., exploring values of different wildlife species in the "Why conserve" lecture?’

![Graph showing responses to survey questions](image-url)
The design of the lecture maintained the strengths of the didactic approach although including sequencing (Baume & Baume 1996) to take the students from the simple to complex situation. Social science concepts are less familiar to these students and the basic concepts needed to be communicated early in the lecture to set the scene. The introduction of the discussion and ballot helped to break up the two hour period with variation to extend the attention span of students (Exley & Dennick 2004). The activities themselves encouraged deeper learning because the time given for discussion before the ballot encouraged transaction to transformation, certainly to a level that increased comprehension (Bloom 1956). The pair and share approach in the discussion about the key concepts of conservation biology built up the topic from basic definitions to complex global issues related to the topic. Populating a proforma handout with the group responses and suggestions live during the session meant that the completed document could be saved and added to the VLE straight after the lecture for any students to review. An example list of species was used in the valuation exercise, a range that was hopefully more or less familiar to the students. This provided opportunity for comparisons of the contrasting human values of nature that reinforced appreciation and therefore understanding of the subject. Again, votes were collated on a pre-prepared form that was posted on the VLE but also used as the basis for a recap of the subject at the start of the following lecture. This made a valuable connection between valuing species in conservation and the later emphasis on populations of those species to achieve conservation objectives, fulfilling the so-called “interconnections” described by Biggs (2003) as fundamental to successful teaching. Providing a short rest period half way through the lecture period also acted to include further variation in format and has been demonstrated to provide a learning gain through the latter half of lectures (Bligh 1998 in Cannon & Newble 2000). The feedback from Blackboard suggested that the inclusion of these levels of interactions was about right but the implication is that all lectures in the module should be redesigned in a similar way. The only difficulty with this demand is the time required to redesign and prepare complimentary exercises and handouts, so a rolling programme of updating content and format of material has been adopted.
References


Appended

Associated lecture slides and handout.
Why Conserve?
Understanding Biological Conservation

Learning outcomes
Why conserve nature?
What is biological conservation?
Setting priorities - scientific objectivity and values.
Species level conservation.
Flaws in the species concept.
Different levels of biodiversity.
Biodiversity conservation in practice.

Why Conserve?

Why can't wildlife species and their habitats co-exist in perpetuity without need for human intervention?

Ideally, we could live in a world in which nature is able to take care of itself, in which we could leave ecosystems alone and they would return to their natural state. In all but the remotest areas, this ideal cannot be realised.

Human pressure on nature

We know that there is an immense diversity of organisms; the numbers of which are difficult to estimate. The fossil record and historical accounts demonstrate that extinction has occurred throughout the period of life on Earth.

Human population growth and activities have created major pressures on natural resources:
- Habitat loss and fragmentation
- Hunting and harvesting
- Trade
- Introduced species
- War
- Pollution (Greenhouse gases, eutrophication, oil, pesticides)

What is biological conservation?

"Maintenance of the diversity of living organisms, their habitats and the inter-relationships between organisms and their environment"

If you believe biological conservation is important, why?

Can you suggest how you might contribute to biological conservation?
Different levels of biological conservation

1. Protection of wildlife from human exploitation
2. Exploitation but on a sustainable basis
3. Conservation as integral to economic development

Wildlife Management therefore requires a great deal of ecological understanding

This is the focus of much of this and later modules

Three steps to biological conservation ...

1. Exhortation (e.g., E. O. Wilson; Norman Myers)
   Learn to appreciate nature, leading to a desire to protect nature.
2. Articulation (e.g., Dan Perlman & Glenn Adelson)
   Articulate what you value in nature and decide on the priorities for protection.
3. Protection (e.g., Malcolm Hunter; Richard Primack; Ian Spellerberg; Mette & Carroll)
   Protect the elements of biodiversity that you have prioritised.

There are limited resources for biological conservation - setting priorities

How do we evaluate species?
Are all species valued equally for biodiversity conservation?
How can we apply scientific objectivity?

Human value of nature - Kellert's classification

- Utilitarian - practical and material exploitation of nature
- Naturalistic - satisfaction from direct experience/contact with nature
- Ecologist-scientific - systematic study of structure, function, and relationship in nature
- Aesthetic - physical appeal and beauty of nature
- Symbolic - use of nature for metaphorical expression, language, expressive thought
- Humanistic - strong affection, emotional attachment, "love" for nature
- Moralistic - strong affinity, spiritual reverence, ethical concern for nature
- Dominionistic - mastery, physical control, dominance of nature
- Negativistic - fear, aversion, alienation from nature

But there are other reasons to conserve

Taxonomy of Rationales

Ethical

Aesthetic

Moral

Anthropocentric — Foods, medicine etc

Economic

Non-anthropocentric — Sustainability

R G Norton 1987 - Why Preserve Natural Variety
Non-anthropocentric justification

- Values keystone species and habitats as agents of environmental protection
- Also targets hotspots of diversity
- Requires complex ecological knowledge about the sustainability of systems

World Convention Strategy 1980

Mostly justified by human needs

- Maintain essential ecological processes (ecosystem services)
- Conservation of genetic diversity and wild species (to facilitate future evolution and human exploitation)
- Sustainable use of species & ecosystems (careful use of natural resources considering future generations)

Is Diversity Linked to Sustainability?

Ecologically we think so, but the mechanisms involved are complex

However Orr argues that we don't actually 'like' diversity because we are control freaks

Species level conservation - values

Species weighted by population size

Species weighted by taxonomic relatedness e.g., reptiles
What about lichens?
Lichens contain species of both algae and fungi, which may occur in several lichen species. Do all combinations need conserving? Another problem with lichens is that their taxonomy frequently changes - if one protected species becomes two, are both now protected?

Flaws in the species concept
Are bacterial species as 'real' as others? Are the contents of a rumen as valuable as those of a rain-forest?

Species change over time and space
E.g. herring gulls & lesser blacked backed gulls

Inbreeders vs outbreeders
E.g. Yellow rattle and greater yellow rattle
Are these true species of just the same species with different breeding systems?

What is a native species?
How long does a species need to be resident before it is considered native? What if its native in one area and spreads to another? What about formally native species? etc

Slugs vs. Pandas
- Is this a real problem?
- Discussion before reintroductions
- LBAP authors
- Champions from industry
- Public / landowner concern

Conservations might not like to accept that charismatic species have higher conservation priorities, but look at their logos!

12
Why measure species diversity for inventory?

So ... if species are not equal, why is there such emphasis on species diversity (=number) in site assessment for nature conservation.

Alternatives:
Population trends of basket of species, e.g., State of the UK's birds annual census. Umbrella species, etc.


Different levels of biodiversity

Population Declines

Why - drivers and pressures? Can it be reversed?

Accurate methods for estimating population size in the field. Modelling - Population Viability Analysis.

Ecosystem to landscape level

Biodiversity Conservation in Practice

- Conservation effort tends to focus on:
  - The 'best' local examples of habitat (and this can get bogged down in national politics)
  - Rare or high profile species

  e.g., the 2007 revised UK BAP habitats and species lists
Practical Conservation

We need to understand why are things rare?
- Restricted niche
- High tropic level
- Endemics
- New species
- Population decline

Wildlife Management =
Managing Natural Populations & includes:
- Killing & culling = reducing population size
- Harvesting = maintaining population size
- Conserving = increasing population size

The Take Home Message

- Many species & habitats are in need of conservation effort - For many complex reasons
- In practice - what is possible frequently takes precedent over the ideal
- But the issues raised in this lecture are real problems for conservation policy makers
RS 27020/RD22020 Wildlife Management module

Lecture 1. Why conserve?

Exercises and references

Initial questions

1. What is biological conservation?

2. If you believe biological conservation is important, why?

3. Can you suggest how you might contribute to biological conservation?
Does each species have equal weight to all other species?

<table>
<thead>
<tr>
<th>Species</th>
<th>Undesirable</th>
<th>Lower importance</th>
<th>Equal status</th>
<th>Higher importance</th>
<th>Priority</th>
</tr>
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<tbody>
<tr>
<td>White rhino</td>
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<td>European wolf</td>
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What values would you associate with these species?

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</table>
References


You should discuss your planned teaching cycle with your Mentor, and consider how you plan to gather feedback and evaluate what happened.

Class/Module
RS30310 Countryside Management in Practice

The module description (intended learning outcomes, teaching and learning strategies and assessment methods may be attached).

Level  Final year degree
Numbers in class  25 students
Meetings (timetable)  15-19 September 2008
Semester  I
Venue  W10, Stapledon Building, Llanbadarn campus and various outdoor teaching locations

The intended development:-

Effective use of formative assessment in field courses

Issue to be addressed

Increase attendance, opportunities for deeper learning (transformation) and improved performance in the assignment report. The field course comprises five one-day outings to sites around Wales under different management for one or more land use objectives. In previous years these tend to be interpreted as fragmented snapshots rather than pieces in a jigsaw. This will be addressed by this intervention.

Sources of appropriate scholarship on issue

Intended outcome for students?
1. Increased engagement in the teaching-learning activities of the course.
2. Reflection on the information communicated during each exercise or visit.
3. Transformation in the process of completing evening assignments.
4. Improved performance in the final assignment report through practice and connections made in the formative assessment.

How will the teaching practice be implemented?
Worksheets will be designed to encourage reflection and transformation of each day's learning. These will be issued each evening to encourage note taking and avoid shallow learning. Simply to complete worksheet.
25% of the module mark will be allocated to the five assignments which must be handed in each morning (issued lunchtime Friday, collected that evening). Marked worksheets returned with comments at assignment workshop the following Friday as formative assessment; worksheets providing template.

What feedback on student learning will be produced?
1. Attendance as an indication of engagement.
2. Number of evening assignments handed in each morning.
3. Profile of marks for each of five evening assignments.
4. Mark and extent of integration of diverse information in major assignment report.

What opportunities will there be for modification along the way (if any)?
It will be possible to modify the content of worksheets as the basis for each evening's assignment dependent on changes in the programme of workshops and visits. The information presented by hosts from private, charitable and Government Agencies sometimes digresses from the intended area.

What criteria will be used to evaluate the success of the teaching cycle?
Demonstrate increased daily attendance compared with the 2007 field course.
Higher mean and lower SD of marks in major assignment report compared with 2007 cohort.
Favourable feedback from the module review; frequency of replies from categories "Very good" to "Very bad" in 5 bands.

Please ask your Mentor to countersign this form.
The top sheet should be kept in your Portfolio.
A copy should be given to your Mentor.