Creating a Wiki to discuss the advantages and disadvantages of Biodiversity hotspots

Introduction

In this problem–based activity, students are given two resources with conflicting views on the effectiveness of demarcating biodiversity hotspots. The activity uses a Wiki to discuss the strengths and draw-backs of the hotspot initiative.

The activity

Students will need two class sessions of at least one hour each for group work.

Make it clear that you will assess the Wiki as a whole, and also comment on individual contributions.

Ideally this activity should be planned a week in advance of the lesson time that will be allocated to building the Wiki. One student or group of students should set up the Wiki, so the Wiki is ready to be used in the following lesson. If computer access is available, students can write directly onto the Wiki. You may need to book a computer room for this lesson, or allow students to go to the library / resource centre to upload their work.

Give out the student sheet, and ask students to read the two sources about biodiversity hotspots. Ask students to discuss these in groups, and to decide on the questions to be researched further. Students may need prompting once they have read the two stimulus sources. The types of questions they should be raising include:

What is biodiversity?
How is biodiversity measured in a particular area?
How are trends in biodiversity over time measured?
What are biodiversity hotspots?
What are the advantages and disadvantages of allocating biodiversity hotspots?
Are biodiversity hotspots the best way of allocating resources for conservation?
Who decides how money is spent on protection of biodiversity?

How Science Works

Ha Science-based technology provides people with many things that they value, and which enhance the quality of life or of the environment. Some technologies, however, have unintended and undesirable impacts. These need to be weighed against the benefits.

Hb Decision makers aim to make evidence-based decisions, taking into account factors that include: technical feasibility, benefits expected, economic cost, risks to human health and well-being, risks to the environment. Cost-benefit analysis is the process of estimating the size of the costs and the value of the benefits as a way of determining the best policy option. A cost-benefit analysis should consider which individuals or groups receive the benefits, and which suffer (or pay) the costs.

Hc Society exercises controls on the development and application of science and technology. Official regulations apply to many kinds of scientific activity (e.g. levels of emission of radioactive materials or other hazardous chemicals; use of human tissue in research; use of animals in research, etc.). Regulatory bodies are set up to implement these controls.

Hd Some decisions about science and technology may need to comply with national and international agreements, legislation and agreed principles such as sustainable development.

He In practice much of the evidence available to decision makers is often uncertain. It is not possible to make accurate predictions about the future. The system may be too complex; some issues may not yet be well understood.

Hf. Decision makers are influenced by the mass media, by special interest groups and by public opinion as well as by expert evidence. Decisions about science and technology may be influenced by decision makers' prior beliefs or vested interests, which can affect their interpretation and evaluation of the evidence.

Fa The interests and concerns of society influence the directions of scientific research and technological development, and the extent of funding for work in different areas.

Science explanations

Pa Biodiversity describes the whole variety of life on Earth. It includes the differences between species of plants and animals, but also their genetic variation within species, and the variety of ecosystems of which they are part.

Pd Measures of biodiversity are used to plot trends in land, freshwater and marine environments.

Students should then plan their own research and Wiki-writing. They should be given a deadline by which their page and other contributions should be ready for presentation and/ or assessment.

Brief for students' Wiki:

Give students a clear brief for their Wiki, including the criteria for assessment. Suggested criteria are:

The questions and issues being researched are defined.

A clear argument backed up by evidence from your sources

A range of sources are used for information (including text and images), and these are acknowledged with referencing and/or linking out to reference sites.

Links are made to sources of additional information.

The student has commented constructively on at least one other student's Wiki.

June 2009

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disadvantages of Biodiversity hotspots

Introduction

Biodiversity hotspots were defined in the 1980s as a guide to focussing conservation effort and
funding. Not all scientists agree that this categorisation is helpful, as it misses important habitats
and species outside the designated regions.

In this problem-based learning activity you produce a class Wiki to discuss the pros and cons of
allocating biodiversity hotspots. Each group should agree their own approach to this discussion and
take responsibility for their own learning. The group will produce a page for the class Wiki
explaining what they learned and their conclusions.

You will then comment on and add to others' work, to produce a shared class resource.

Stage 1   Understanding the problem and writing questions - in groups
You have been provided with two resources about biodiversity hotspots. They put opposite points of
view on whether these are the best way for money to be channelled into the conservation of
endangered species and habitats.
- In this stage you have to make sure that you understand the problem. Read the two resources
  and then think about what the issues are that might influence a decision.
- Discuss them in your group, accept all ideas and note them down.
- Then begin to focus on the questions that you will need to answer before you can reach any
  conclusions.
- There is a range of possible approaches; you might want to focus on the issue from the
  perspective of one or two particular species or habitats or hotspots; or you might want to take a
  more general overview of whether hotspots are the most effective use of limited funding for
  conservation..
- Remember that the ideas you will need to use may be at several different levels ranging from an
  understanding of individual species and ecosystems up to social, economic and political factors.
  Include How Science Works ideas; for example the quality of the data available or ways of
  modelling the future might both be relevant.

Try to reach agreement in the group on the approach you will use and a set of questions that you
will need to answer. At the end of this stage, discuss your questions with your teacher.

Stage 2   Finding resources - in groups
Plan how you will research answers to your questions and share out the questions amongst the
members of your group. In this stage you find the resources you need to answer your questions.
You will find a list of links below but you may well need to find others.

Each group will need their own page on the Wiki. You should aim to publish the outline of your plan
and the key questions you will try to answer by the end of this stage. Don't worry it can be changed
later as your ideas develop.

Stage 3   Answering the questions - private study
You will need to research answers to your questions. Summarise each resource that you use and post your summary and comments as well as conclusions onto your group's page on the class Wiki. Don't forget to include web links or references.

Stage 4   Response to the problem - in groups
The group will have access to its members' work via the Wiki. You may wish to comment online or to wait until you all come together to agree on the final format. Before the group session try and look at the work everyone in your group has done. In the meeting discuss the answers to each of the questions You may find you have lots to discuss at this point as you consider all the evidence.

Stage 5   The product - in groups
Put all the information together to produce a coherent argument that can help others understand your group position on the value of biodiversity hotspots. Ensure that the evidence you use is available on the Wiki as summaries of resources, with your comments and evaluations and links.

Stage 6   Evaluation of the whole Wiki
Instead of a class discussion on the issue you will comment on the work of at least one other group. Use a constructive approach, complimenting interesting ideas or resources, comparing their conclusions with your own. You can engage in an online argument. Remember to respond to comments on your group's pages.

Advice on using a Wiki
Designate a class ICT 'expert', who will be responsible for setting up the Wiki and supporting other students in using it.

Most free Wiki providers allow educational Wikis to be free of advertising. Your ICT expert needs to find a suitable Wiki (Google search on free educational Wikis), and organise registration.

As a class, you need to decide on the overall layout.

You should decide whether the Wiki will be public or password-protected, and, if you wish, make personal pages for all the contributors.

Each group will plan headings for their pages and decide who is responsible for each page and the deadlines for producing and uploading work.

Once your group has decided on an area for research you should make a spider-diagram of the key ideas that your Wiki page will contain.

Write a summary of the article/s and other information that you find, and make sure you refer to the question or problem that you have defined.

Post your work onto the Wiki, and add any links to other websites, references and a link to your personal page.

Commenting on the Wiki
Edit and comment on one other group's work on the Wiki. Your comments should be connected with the content rather than the writing itself, and you could ask questions about the content. Your editing should attempt to improve the style of writing, and remove any errors.

Be alert to comments and questions on your own work.

Brief for your Wiki:
You will plan the details of your Wiki's structure and content, but the Wiki will be assessed against the following criteria:

The questions and issues being researched are defined.

A clear argument backed up by evidence from your sources

A range of sources are used for information (including text and images), and these are acknowledged with referencing and/or linking out to reference sites.

Links are made to sources of additional information.

The student has commented constructively on at least one other student's Wiki.

Further resources which may be useful for this activity are suggested on the Weblinks page on the Science in Society website for topic 6.

Copy from Conservation International's Biodiversity Hotspots website:
Every effort has been made to obtain permission to use this content
http://www.biodiversityhotspots.org/xp/Hotspot

HOTSPOTS DEFINED
A seminal paper by Norman Myers in 1988 first identified ten tropical forest "hotspots" characterized both by exceptional levels of plant endemism (plants which only occur in this region) and by serious levels of habitat loss. In 1990 Myers added a further eight hotspots, including four Mediterranean-type ecosystems. Conservation International, CI, adopted Myers' hotspots as its institutional blueprint in 1989, and in 1996, the organization made the decision to undertake a reassessment of the hotspots concept, including an examination of whether key areas had been overlooked. Three years later an extensive global review was undertaken, which introduced quantitative thresholds for the designation of biodiversity hotspots:

To qualify as a hotspot, a region must meet two strict criteria: it must contain at least 1,500 species of vascular plants (> 0.5 percent of the world's total) as endemics, and it has to have lost at least 70 percent of its original habitat.

IMPACT OF HOTSPOTS
The impact of the hotspots concept has been astounding. Searching the Web yields numerous scientific papers that use the word "hotspot" to refer to biodiversity conservation, and analyzing these citations over time reveals a clear pattern of increase. More importantly, the impact of the hotspots concept in terms of investment in conservation has been dramatic. CI adopted hotspots as its central strategy in 1989, and in the same year, the John D. and Catherine T. MacArthur Foundation implemented the hotspots as its primary global investment strategy.
In 2000, the World Bank and the Global Environment Facility joined CI in establishing the Critical Ecosystem Partnership Fund. The MacArthur Foundation became a partner in 2001 and the Japanese Government joined the partnership in 2002, bringing the total investment to $125 million. The $100-million CI Global Conservation Fund, supported by the Gordon and Betty Moore Foundation, also uses hotspots (along with high-biodiversity wilderness areas) to guide its investments. In total, more than $750 million is estimated to have been devoted to saving hotspots over the last 15 years, perhaps the largest financial investment in any single conservation strategy. The hotspots concept has also entered the mainstream as a tool for private sector businesses. For

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example, Office Depot explicitly gives preference to pulp and paper vendors that protect natural forests in the biodiversity hotspots and high-biodiversity wilderness areas.

Biodiversity conservation efforts in hotspots often require the ability to withstand and adapt to a rapidly changing socio-political climate. While it can be tempting to write off high-risk areas, experience demonstrates both the importance and the potential for maintaining a conservation presence in hotspots that are undergoing political difficulties. Madagascar, one of the most important hotspots, was almost abandoned by conservationists in the early to mid-1980s, and again during 2001 and 2002. Fortunately, several conservation (CI, the World Wildlife Fund, and the Wildlife Conservation Society) and funding (USAID and the World Bank) organizations persevered with their investments in the country. This resolve paved the way for the new President, Marc Ravalomanana, to give conservation a high priority in his government's development plans. In September 2003, President Ravalomanana committed to tripling the country's protected area network over the next five years, and just five months after this pledge he announced the establishment of 14 new protected areas, increasing coverage by 65 percent. This provides an excellent illustration of the conservation return on investment produced by the hotspots strategy.

A quote from Science News:

Study Questions The 'Biodiversity Hotspot' Approach To Wildlife Conservation
http://www.sciencedaily.com/releases/2006/12/061212091649.htm
Source: Science Daily (Dec. 12, 2006)

In a report for the Proceedings of the National Academy of Sciences (PNAS), researchers say that it's time for ecologists to reconsider the hotspot approach to conservation.

For the PNAS study, the authors assessed the global distribution of 4,818 species of land mammals, with the goal of evaluating the "utility of hotspots for determining conservation priorities for the mammals of the world."

"We found that if you use species richness as a criterion, you're not going to protect the endemic or endangered species," said Gerardo Ceballos, Professor of ecology at National Autonomous University of Mexico.. "So the 'hotspot' approach, which was extremely valuable in focusing attention on species diversity in the past, has limitations. What's needed is a more comprehensive analysis that also takes into account the species that live outside the hotspots." Ceballos explained. " ….even if we can protect 10 percent of the Earth, which is the target set by the World Conservation Union [IUCN], we still won't prevent species extinctions," "Most of the significant habitats that need protecting are outside of hotspots, and we should do a better job managing them properly."