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A LEVEL
Transition Guide

BIOLOGY B (ADVANCING BIOLOGY)

H422
For first teaching in 2015

KS5–HE Focus Sustainability

Version 2

www.ocr.org.uk/biology

Introduction

A LEVEL
BIOLOGY B (ADVANCING BIOLOGY)

Key Stage 5 to Higher Education Transition guides focus on how a particular topic is covered at the different key stages and provide information on:

- Differences in the demand and approach at the different levels;
- Useful ways to think about the content at Key Stage 5 which will help prepare students for progression to studying the subject in Higher Education;
- Common student misconceptions in this topic.

Transition guides also contain links to a range of teaching activities that can be used to deliver the content at Key Stage 5 to Higher Education and are designed to be of use to teachers of both key stages. Central to the transition guide is a Checkpoint task which is specifically designed to help teachers determine whether students have developed deep conceptual understanding of the topic at Key Stage 5 and assess their 'readiness for progression' to Higher Education content on this topic. This checkpoint task can be used as a summative assessment at the end of Key Stage 5 teaching of the topic or by Higher Education lecturers to establish their students' conceptual starting.

Key Stage 5 to Higher Education Transition Guides are written by lecturers at named Higher Education Institutes.

This Transition Guide has been developed in collaboration with Harriet Jones from the University of East Anglia.

Key Stage 5 Content

A Level Biology Criteria Content

- Sustainability of resources depends on effective management of the conflict between human needs and conservation

First year at HE Content (UEA)

First Year Content from University of East Anglia

At UEA in BIO this is spread between a couple of modules, forming usually the last lecture or lectures in a module. In a module on 'biodiversity', we consider extinctions and how man is creating the sixth big extinction. When we have time we sometimes lecture to them on conservation of different groups of plants animals and microbes. In a module on 'ecology evolution and behaviour' which deals with conservation in relation to ecology, very basic theories of conservation biology are covered as well as ecosystem services. Sometimes they are taught about conservation in the English countryside.

This is also a subject which is covered in seminars when considering ethical issues, for example. Students would study research papers and case studies and discuss the issue. Some might be required to write an essay.

Comment

One of the problems with this subject is that the concepts that are being taught are essentially completely new to them. Most don't have any sort of appreciation about the importance of conservation in the world and how the human population is shaping the biodiversity around them unless they have a personal interest. When they are lectured about the impact man is having it is extremely depressing to them and something they had not appreciated before. This may have more to do with their age and becoming adults rather than what is covered at school.

As with most topics and study in the transition, it is not content that matters. It really doesn't matter what they were specifically taught at A level. Some have considered issues relating to conservation either through school projects or from home. We run a sort of diary when they first arrive and in many of these one or two entries will deal with something to do with recycling or our destructive role in the grand scheme of things. But the diary entry requires them to pose a question on the topic and come up with their opinion. They tend to find these very difficult and their thoughts on the topics are generally unsupported and vague.

This is particularly important when dealing with this topic of sustainability and conservation. Their ideas and opinions need to be supported with evidence. They need to create an argument where they persuade through their writing, or giving a talk on the subject. I have been involved in a sixth form conference on biodiversity and conservation where activities culminated in a debate. Activities involved discussing arguments, supporting ideas with evidence. But when it came to the debate all arguments and supporting evidence went out of the window and they talked off the top of their heads with nothing substantial to back up what they were saying.

Being able to support and sustain an argument in a sophisticated way is what we expect them to develop while in higher education, but they should be able to have an opinion, select good evidence to back up that opinion and present the opinion and evidence in a coherent manner. In seminar groups we discuss issues such as 'should resources be used to save the panda'. First year students struggle to develop a clear, well-argued opinion, but often together in groups, following an outline of requirements they manage to complete the task.

This is something I and my colleagues are noticing a lot, that students require a step-by-step outline of instructions. We want to give them a topic and they should go away and research it and write the account or argument themselves. They should not require us to come up with a formula for their response so they effectively fill in boxes. This is particularly relevant to this topic of sustainability and conservation. It appears at first to not have the structure of learning that, for example cells, molecular genetics, physiology, have. It can appear woolly and so demands a degree of self-direction and self-discipline to develop an understanding of the topic and to develop a clear well-formed argument.

To develop these skills I would suggest case studies where the students must explore the topic for themselves, develop and opinion and some supporting evidence. The really difficult bit is to do this without a framework for them to follow. They need to work out this framework for themselves. Perhaps they could have a class session where they work in groups on one topic. There was a case in India recently where they went out to shoot and kill a man-eating tiger that had killed three humans; however, it is estimated that there are only 2000 tigers left in India. So here is a case of humans living alongside animals where humans are not necessarily the top predator. Three people died, but given the size of the human population this is insignificant. Although to the families of these people this is catastrophic. To the tiger population, killing one in 2000 is a huge impact on the whole population of tigers. A similar activity can be done looking at elephant culling and the case for clearing villages in India out of the paths of elephant corridors. We have used this topic in the sixth form biodiversity conference and they tacked it well, coming up with good ideas and using they evidence we gave them to support their opinions.

Having worked on a task in class their homework would be to be given a topic – or to select a topic and to find resources themselves and work it into a persuasive argument to support their opinion. They need to get away from the point, evidence… formula and develop the material in their own way.

Activities

Activity 1 - What humans gain from the forest

This lesson explores the conflict and cooperation that occurs between people who want to exploit and/or conserve the rainforest. This involves looking at the importance/impact of the rainforest to humans then exploring the interactions between people and the forest. The activity is to compare value of the rainforest to indigenous people, people living beside the forest and the world, in the past (50-80 years ago – when grandparents were growing up) and now.

Questions to consider:
What products come from the rainforest?
What was and is the economic impact of industries on rainforest?
What do people need to get from the rainforest to survive?

For people living in rainforest, the tribes that live there, food is of major importance. The forest is their traditional hunting ground from which they get bush meat, they also get plants etc for medicinal and ritual use, berries for dyes. They also have pets from the animals in the forest – which would not be permitted or accepted beyond the forest.

Indigenous people living in the forest fear conservation organisation people coming in. They fear the impact it will have on their lives. This can really affect the speed of a conservation organisation's work.

People who live alongside the forest will use the forest differently, mainly for leisure. They often want to cut the forest down if this makes them more money. Conservation is often around persuading these people that there would be benefits to conserving the forest in terms of potential employment.

In terms of the world, forests were originally a source of wood, sometimes valuable mahogany, but most of the hard wood was pulped for door frames etc. Other products were things such as rubber and fruits which are now grown elsewhere. Rubber needed for car tyres, chewing gum originally came from the forest - we can now synthesise it. Brazil had the monopoly on rubber, then seeds went to Kew from which it was found that rubber could grow in many locations. There was a lot about this around WW2 and the need for a lot of rubber.

Chicken was originally rainforest fowl – someone took them and bred them to what we know now. Coffee is also originally from the rainforest, also chocolate and loads of medicine – they now consider the rites of indigenous people for any discoveries of new medicines etc. Brazil nuts are still a major export, cannot easily be grown elsewhere, too difficult to grow in plantations.

Resources:

Sites about Chico Mendez – a major campaigner for the forest – gives historical information.
http://news.bbc.co.uk/1/hi/7795175.stm
http://www.theguardian.com/environment/blog/2013/apr/02/chico-mendes-killings-amazon

Products from the rainforest.
http://www.rainforest-alliance.org/work

Cooperation in the rainforest.
http://sierragorda.net/en/participacion-civil/

Interviews with people who work in the rainforest.
http://rainforests.mongabay.com/interviews.html

Interviews with rangers who work in rainforests.
http://www.worldlandtrust.org/projects/keepers-of-the-wild

Some information on ecosystem services – the benefits people can get.
http://www.worldlandtrust.org/eco-services/faq

Destruction of the rainforest.
http://rainforests.mongabay.com/amazon/amazon_destruction.html

Activity 2 - Arguing the case for conservation

Background

People who work in conservation often have to defend decisions to the media. A large part of the job is in putting views and arguments across, supported with evidence, to the public via the media. Interviews in conservation can come out of the blue, media want answers and comments very quickly if a topic suddenly comes into the news.

Suggested preparation before the lesson: students should watch TV interviews – watch the evening news, for example and think about the structure of the interview – what is the beginning, middle and end – how is this influenced by how long the interview is. What questions are being asked, and what information is being put forward – is the interviewee actually answering the question? The interviewee and the interviewer often have different agendas and the interview may involve a conflict of interests.

Activity

The first thing to do is to think about what the interviewer and the interviewees need to know. The interviewer needs a broad knowledge of the topic and an understanding of any contentious issues. They would also have an eye on what would make for an entertaining interview and what their audience might want to hear.

For the interviewee, you need to be really confident in your subject, having the answers, supporting data etc at your fingertips – an interviewee will usually revise well before an interview. They also need to know if there are any key messages they want to get across, irrespective of the questions that will be asked.

The activity involves students working in groups of three. The case to be discussed is the plight of orang-utans in Borneo. One person is the neutral interviewer, one is from a palm oil company and one is from the conservation organisation. The palm oil representative needs information to defend palm oil production. The conservation person needs information on the plight of the orang-utans.

Issues to consider

Palm oil is thought of as a panacea, a great answer to fossil fuel usage. Huge numbers of products use palm oil. Palm oil is often labelled as vegetable oil and you don't know palm oil is in there, and nor do you know how much is from sustainable sites.

Think about the rate of conversion of a site – that is, how quickly the site changes from rainforest to palm oil production, look at what the site provided as a rainforest, and what it provides as a palm oil plantation.

Think about the monoculture of a palm oil plantation against the biodiversity of the rainforest. It is worth considering that some animals can do well in logged rainforest and palm oil fields. Orang-utans for example can eat palm oil fruit, but this brings them into conflict with the farmers and there is pressure from the palm oil companies to remove animals from their crops.

Think of big campaigns run by companies who farm palm oil, and where pressure comes from to change policy. Think about companies that have had to change policy, make statements or promises to appease public pressure – and have they kept promises?

Why do companies have to use palm oil? What is the alternative? This last point is really key to it all.

The students need to understand that facts and figures are really important – evidence is needed to change public opinion. Students need to do the research, collect information and then hold an interview.

After the interview there needs to be an evaluation of the whole scenario - a debrief, as there always would be after a real interview. Did the interview change the minds or attitude of anyone listening, or those taking part? How well did they use evidence?

Resources:

WLT project page for orang-utan conservation.
http://www.worldlandtrust.org/projects/malaysia

Guest blog about the plight of the orang-utan.
http://www.worldlandtrust.org/news/2013/12/working-towards-happy-ending

Palm oil background.
http://www.mongabay.com/borneo/borneo_oil_palm.html

For latest news.
http://www.mongabay.com/

For uses of palm oil.
http://www.greenpalm.org/en/about-palm-oil/what-is-palm-oil

Activity 3 - Deciding which conservation project to fund

Background

Conservation is expensive. In many cases land must be purchased to secure it for future protection and people have to be paid to maintain the site. When potential projects come up for consideration decisions about their needs have to be weighed up against the needs of other projects, because there is a finite pot of money.

The activity here is to look at two projects, both aiming to save Atlantic rainforest, and deciding which is better value for money. The two countries requesting money are Brazil and Ecuador.

Suggest as preparation work students check where Brazil and Ecuador are and research what Atlantic rainforest is.

Activity

Split class in two; each half of the class has to represent a project.

For each project think about biodiversity value, might there be communities living on the site? Have they rights or are they squatting? How threatened is the habitat?

Why might the forest be in danger of being destroyed?

- Possibly to build housing – holiday weekend homes.
- Growing crops to feed animals to live where there was rainforest.
- Plantations and crops – eucalyptus.
- Historically cleared for timber production – not the biggest issue these days, and wetlands were drained by the government – government policies to reduce malaria (didn't make any difference so areas being returned to wetland status).

What would be done with the money?

Can you replant the forest?

Can you put the money into the local community – instead of cutting down trees and hunting/poaching animals they could have other resources – eg to employ local community in conservation work?

Could they provide volunteering opportunities, ecotourism? Site accessibility? Can affect destruction rate and issues around saving it, eg a road could destroy a section of forest but could bring tourists in to save the forest.

So they would have to look at why the forest should be saved, why it was destroyed in the first place and what would be done with the money.

Skills are in thinking about the questions around each site for conservation. Questioning the value of the site to be conserved and what the future might be. Engaging in persuasive discussion with points supported by evidence.

At the end of the lesson. Can the class come to a decision about which project will be funded and why?

Resources:

Brazil
http://www.regua.co.uk/ and http://www.worldlandtrust.org/projects/brazil

Ecuador
NCI Nature and Culture international http://natureandculture.org/
Ecuador http://www.worldlandtrust.org/projects/ecuador

Checkpoint Task

The main issue with conservation and looking at the conflict between human needs and conserving habitats and species, is in being able to argue a point with evidence. It isn't a case of learning key facts or vocabulary. It is more about understanding the need for evidence to persuade others, whatever your own stance and opinion. In this topic many have an opinion but are unable to back up their ideas and support what they say with evidence, so that it does hold weight and persuade. It tends to break down in to uninformed argument – and this is what the teacher needs to be very aware of and stop the discussion if this is what is happening. The activities should provide the chance for students to gain experience of this and see some scenarios where this skill is important.

So the idea of this checkpoint task is to see if they can be critical of someone else putting forward an argument – look at where they use skills that the activity has addressed. See if they can identify a point and evidence to back it up. See if they understand the message which the interviewee is trying to make and what the interviewer's agenda might be.

Checkpoint task:

http://www.ocr.org.uk/Images/163773-sustainability-checkpoint-task.pdf

Activities

The point of this activity is to allow students to explore and research their own topic of choice. They need to decide on the message they want to get across to their reader – what is the newsletter's stance on a topic? They then need to build up information and evidence to demonstrate a particular aspect of humans in conflict with their environment. They need to think about the lessons they have learnt from the main activities. Perhaps they might want to go and interview someone working in conservation. All counties will have wildlife trusts where they work with the needs of the environment, with limited resources and with the needs of the human population. They might wish to explore a local conservation issue and interview people on either side of the debate, or on one side, depending on the stance of their newsletter.

Activity

Create a newsletter which outlines the conservation issues of a particular topic:

- How are you going to use images to make a point?
- What main points are you going to address?
- What evidence are you going to use to get across the arguments you want to make?

Students to pick a place and project from this page:

http://www.worldlandtrust.org/projects/where-we-work

Think about the geography of the place, the problems people are facing, the threats to biodiversity. Highlight issues relating to human conflict and conservation.

Suggested reading:

Davies N. (2009) Gaia Warriors. Walker Books Ltd

For extra resources, videos, interviews from supporters, patrons, those who WLT works with, camera trap videos.

http://www.youtube.com/user/WorldLandTrust

Resources, links and support

Science Spotlight – Our termly update Science Spotlight provides useful information and helps to support our Science teaching community. Science Spotlight is designed to keep you up-to-date with Science here at OCR, as well as to share information, news and resources. Each issue is packed full with a series of exciting articles across the whole range of our Science qualifications: www.ocr.org.uk/qualifications/by-subject/science/science-spotlight/

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