

Case Study I: Degradation of the rainforest in a poor country

Background: Although details are in dispute, the following is generally conceded. Tropical moist forest contains a large proportion of the world's biodiversity (including many species not yet characterised, and many, no doubt, of considerable medicinal importance for humans). It continues to be destroyed at a considerable rate, perhaps as much as 7.5×10^6 hectares yr^{-1} . At such a rate, the forests of certain countries such as Ivory Coast may not survive long into the 21st Century. Forest destruction not only reflects the activity of the logging trade, but also felling by subsistence farmers (often those displaced from their own lands), and more organised clearing to provide land for cattle. Once trees are cleared, the soil rapidly degrades. There is therefore a significant loss both of the CO_2 -absorbing capacity of the trees, and of the bound carbon of the ecosystem. Forest degradation is therefore believed to contribute significantly to global warming. Furthermore, biodiversity and nutritious soils are irreversibly lost in the process. Erosion sometimes leads to severe problems from mudslides, or flooding downstream of the felling. To say this is not to say that there might not be ways in which certain types of forest might be sustainably managed, but very little of this sort of management has been tried in practice, partly no doubt because of the price of the timber has never been geared to the cost of replacing it.

The government of the country wishes to sell further logging licences to a Japanese timber company, which would reduce the extent of its forest by 60%. It is under great pressure to do so to reduce its foreign debt repayments, and so to be able to invest in human infrastructure for its rapidly growing population. **The timber company** need to maximise their profits in a highly competitive market. **The wealthy ranchers** of the country also welcome forest clearance as providing more land for grazing and beef production (the other major source of hard currency). At present there is also considerable felling of young trees by **the subsistence farmers**, who have been edged off the ranchlands into the forest, and live by clearing and farming one section after another. **An indigenous tribe** largely untouched by Western culture live in the forest. The forest is the home of their gods, as well as their foods and their medicines. The concept of ownership is alien to them. The forest is also known to be home to rare primates as well as other endangered flora and fauna.

The only other commercial opportunity available to the Government is an offer from a **trans-national chemical company**, which would give them the rights to the whole forest, for exploration for pharmaceuticals, disease-resistant strains of plants etc. In most cases felling would be very limited, though if a non-synthesisable natural product were found to have powerful medicinal uses there might have to be clearances to extract it. The indigenous people would be asked for their knowledge of the forest plants, and given some payment if their knowledge was used. Such a deal would not be as valuable to the country as the logging deal, though it might yield huge profits for the chemical company.

GROUP TASK:

Suppose there were a 'Global Ecological Authority' which resolved these disputes. A plausible brief for such an Authority would be that it had full international powers to preserve:

- firstly: human survival on the planet
- secondly (where possible): existing human culture
- thirdly (where possible): other species in descending order of importance according to their complexity and rarity.

Just for this afternoon, you are that body and can impose your will! What would such a body decide in the situation described?

Now consider the individual reactions of the human groups listed in bold. How would they react to the GEA decision at which you have arrived? After considering those reactions, do you want to alter the GEA brief, or introduce other measures which would enable more of the parties to accept the situation?

In your discussion, what systems of valuing did you detect in the parties (instrumental, intrinsic, systemic)

Which were you using?

How did you weigh non-human interests against human?

(if time permits) what theory of nature, and of human beings were you using?

Note for teachers on the rainforest case-study:

A roleplay version of this exercise is available in Bryant *et al.* (2002) Ch.4. Science undergraduates may not find it easy to throw themselves into the roleplay – we have had better results in using staff, postgraduates, or students from education or drama. However, the response of the student audience is usually vigorous – particularly if some of them are cast as the world’s media and can choose which paper/journal they are representing. The reason for using an imaginative aid such as a roleplay is that we have found biology students are often good at reproducing information – numbers of hectares lost, numbers of species in danger, but find it less easy to engage with dilemmas in which the interests of different groups clash. Their overall reaction to the situation of the rainforest is sometimes very pessimistic – the difficulties seem so intractable. So it is useful to end by pointing out possible ways forward.

There are certain limited signs of hope in respect of the rainforest. Park (1992) lists the following:

- research, training and education
- land reform
- ecosystem conservation in designated areas
- reforestation
- marketing non-tree products of the forests
- controls on the timber trade
- consumer pressure in the West
- debt-for-nature swaps, in which a country guarantees to preserve a section of its rainforest in return for some relief from its debt
- changes in aid, debt relief and investment policies by the First World

Case-Study II: the use of nuclear power

Nuclear power was the great hope of research into energy generation after World War II. Its early history, as Jonathan Porritt writes, was “filled with brilliant scientists who cared deeply about humankind and were intensely proud of the ‘incalculable benefits’ that their new technology would bring. Or so they thought. Potential downstream costs and liabilities were promptly dismissed as unsubstantiated scaremongering. But take a long hard look at that nuclear genie lurking in the ruins of Chernobyl, in the psychological aftermath of Three Mile Island, in the terrifying illegal trade in enriched uranium and plutonium that causes security services round the world more sleepless nights than any other single threat to our wellbeing.” (Porritt 2000: 114-5)

However, a switch to the use of nuclear power as the major source of electricity generation (which it already is in France) could give rise to:

- Much less build-up of atmospheric carbon dioxide, with a consequent slowing of climate change
- Longer availability of reserves of fossil fuels
- Lower output of oxides of sulphur leading to less acid rain.

As prominent an environmentalist as James Lovelock, who has written so eloquently about how the surface of the planet functions as though it were one big living organism, ‘Gaia’, is now calling loudly for this switch.

But revival of the nuclear power programme also raises questions about:

- *Safety* – major accidents have been very few. On the International Nuclear Event Scale of 1-7 only Chernobyl has scored 7, and that arose from a design that is no longer used, and which was badly maintained and badly operated. But the consequences of a major accident would be worldwide in their scope
- *The costs and risks of decommissioning and the disposal of waste.* Power plants have relatively short lives, and must then be expensively ‘entombed’. Some waste remains significantly radioactive for over 10^5 years
- There is a risk, hard to quantify or evaluate, that further development of nuclear power could place in the wrong hands the raw materials for *nuclear terrorism* – either for an actual delivered nuclear weapon or for the scattering of highly toxic waste.

On the other hand, if a new nuclear programme is not commissioned immediately, and fossil fuels continue to be our major source of electricity, they will contribute to climate change which may lead to easier climates and better growing conditions in sub-arctic Russia and Canada, but also the submersion of whole islands in the tropics, and other low-lying areas such as Bangladesh. It may also alter the ocean currents leading to very large changes in the climate of (for example) North-West Europe. Beyond a certain point climate changes enter a positive-feedback loop, which could ultimately render the planet uninhabitable.

Two important principles often used in deciding future environmental policy are:

the polluter-pays principle. On this basis, an organisation can damage the environment as much as is necessary to fulfil its purposes (of eg manufacturing a chemical, producing electric power etc.) but must be responsible for the full costs of clean-up. The Principle is consequentialist in essence, but it insists that environmental damage is a consequence implying costs for the damager. Thus, for example, after the sinking of the *Exxon-Valdez* disgorged great quantities of oil into Prince Edward Sound in 1989, the only concern of the international community, on this principle, should have been to ensure that Exxon paid the whole costs of removing the oil. Likewise after the destruction of the nuclear plant at Chernobyl in the Ukraine in 1986, the concern should have been that the Soviet Government fully compensate all concerned (including the sheep farmers in Scotland who found that their lambs were unsaleable because of radioactive fall-out). The value-system implicit in the Principle is entirely instrumentalist; the polluter returns the system to its previous state of human usefulness.

The first problem with this principle is that some elements of the environment are not owned, or convertible into cash value but they can still be damaged by environmental abuse. The soil of part of the Ukraine is damaged on a very long-term basis by the Chernobyl accident in a way that defies effective clean-up or easy costing. Thousands of seabirds died in Prince Edward Sound, but they were not owned, and could not therefore be subject to straightforward compensation of the owner by the polluter.

The examples chosen should make clear the other major objection to the polluter-pays principle as the sole ingredient in an environmental policy. Neither accident should have happened – those responsible had no right to risk the sort of damage that was caused (let alone the loss of human life at Chernobyl). The Principle seems to imply that anything can be permitted which can be paid for, whereas it has been a truism of environmental thinking since Rachel Carson's chilling book *Silent Spring* (1962) that some courses of action cannot be permitted, and that much environmental damage is invisible and may be irremediable.

A natural foil for the polluter-pays principle is ***the precautionary principle.*** This states that no course of action should be undertaken if there is a risk that it could give rise to unacceptable damage. If there is a question as to whether damage might occur from a particular action, the Principle says that the action should not be pursued until it can be shown that it will be safe. In effect it introduces a deontological element into the prevailing consequentialism by which governments and organisations frame environmental decisions. Certain courses of action are excluded from consideration - there is a duty not to do them, because their consequences might be unacceptable¹. A classic case in which the precautionary principle is much invoked at present is that of the proposed commercial growth in the UK of genetically manipulated crops.

At first sight the precautionary principle seems like common sense, but an argument often advanced against it is that no human development of any sort would have taken place had the Principle been rigidly observed. Every new initiative carries elements of risk, and one of the major ingredients in the discussion of GM crops is about risk – not only, what level is acceptable, but also, who should calculate the risk. This in itself represents a realisation that total avoidance of risk is unfeasible. In the light of this, the Principle operates as a reminder of the need to gather as much information about the potential risks of an action as possible, and then to investigate whether it is possible to minimise those risks, or to eliminate the most harmful.

It is interesting that the Rio Declaration, stemming from the 1993 United Nations Conference on Environment and Development, affirmed the importance of free trade *and* of the polluter-pays principle *and* of the precautionary principle. This shows the tensions governments experience in formulating environmental policy within an economic context which sets a very high premium on unfettered operation of global markets, and has very limited mechanisms for costing ecological damage.

¹As often where a deontological element is introduced, the Principle finds itself expressed in legislation, both in the European Union and the US.

GROUP TASK:

Read through the first page of the brief, and share your gut reactions to the thought of a major new nuclear power programme. (Gut reactions are an important element in ethics, though we need to go on from them to examine, and help our students to examine, why our intestines move us in this way, what that says about what we consider important.)

Then skip-read through the second page. Does either the polluter-pays or the precautionary principle help us to decide whether to go for the nuclear option?

Clearly this issue is about evaluating and comparing *risks*, both in the short-term and the long-term. The weakness of our gut reactions (and of the precautionary principle) is that they tend to lead to all-or-nothing responses. After Three Mile Island and Chernobyl it was relatively easy to say – the risk of a nuclear accident, however small, is insupportable. The issue of climate change makes it clear that there are insupportable risks on both sides of the argument. So – what assurances (if any) about the level of risk attached to nuclear power would satisfy your group that it was right to proceed with this option?

Returning to the question of having a theory of nature and of human beings, do you find Lovelock's image of 'Gaia', a set of interlocking homeostatic systems which tend to keep the conditions of the planet's surface and atmosphere constant, helpful? What is humans' proper role in respect of 'Gaia'? Or is there another image which describes our role in respect of the Earth over the lifetime of our nuclear waste?

Note for teachers on the nuclear power case-study:

This sort of issue provides an excellent opportunity to encourage students in the critical use of the World Wide Web. A rapid Google-search on ‘nuclear power climate change’ immediately throws up a document from the Nuclear Energy Agency advocating the nuclear option and one from Greenpeace describing such claims as ‘dangerous and self-serving fantasies’.

The student should visit each site in turn. In each case they should consider:

- i) what point of view the site-owner wishes them to adopt
- ii) how the language and images used tend to reinforce that view and
- iii) what hard information is being presented.

Finally, they should ask themselves whether visiting the sites changed their point of view, and if so why.

This topic appears in Bryant *et al.* (2002) Ch.5. Interestingly, the balance of the argument has shifted significantly since that chapter was written. Figures have been released recently which suggest that anthropogenic changes in the climatic system might already have triggered positive feedback mechanisms.