

Scientists for Global Responsibility

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Special Issue on Climate Change

Slow Progress at Climate Change Negotiations

Stuart Parkinson

You could be forgiven for not noticing the passing of the 5th Conference of the Parties to the Climate Convention (COP-5) which ran from 25th October to 5th November 1999. Whilst much discussion took place and many papers were circulated, few decisions were taken. The USA and the EU had agreed before the meeting that neither would raise the controversial issue of 'hot air' trading (where the emissions that Russia are never going to emit are sold to the West). However, one decision that was taken was that the next meeting, COP-6, would take place in The Hague in November 2000: right in the middle of the US presidential campaign. This is the meeting where the Buenos Aires 'Plan of Action' is to be completed, ie where a number of key decisions about the operation of the 'flexibility mechanisms' (International Emissions Trading, Joint Implementation and the Clean Development Mechanism, or CDM) are due to be agreed.

However, despite the low-key nature of the conference, a number of important discussions took place.

- It was agreed that there should be an extension of the 'Activities Implemented Jointly' (AIJ) phase, ie the pilot of Joint Implementation and the CDM where no credits are awarded, which was due to end this year.

- Saudi Arabia called for compensation for oil-exporting countries who will lose revenue as action is taken to deal with climate change. They argued that Article 3.14 of the Kyoto Protocol allows for this. Unsurprisingly, this was not an argument accepted by most other countries, who argued that this Article applies only to countries who will be damaged by the environmental effects of climate change.

- Reports were given on the progress made by the Intergovernmental Panel on Climate Change (IPCC), the body charged with reviewing the scientific research on climate change (see p4 for more details). In particular, Robert Watson, the chairman, highlighted the 'dire financial state' of the IPCC due to the increasing workload and the decreasing funding by OECD countries.

- Discussions on compliance with emissions targets centred around whether the purchase of permits/credits should be governed by 'seller liability' or 'buyer liability', ie is it the country selling permits/credits (eg Russia) or the country buying (eg USA) that is legally responsible if one of them does not meet its emissions target? Not surprisingly, the USA, backed by business, was pushing for seller liability.

- Discussion concerning the CDM centred on technical issues (eg additionality, baseline determination) and equity matters

(host country acceptance, sustainability indicators). (For more discussion on this issue see the article on p7.) In particular, developing countries called for more capacity building measures to enable them to put in place institutions which can oversee the operation of the CDM in their country.

Since there are still many details to sort out by COP-6, it was agreed that extra technical meetings will be held before November.

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News from SGR

A Few Words from the Chair...

Phil Webber

There have been a number of important developments in SGR over the past few months, in particular, the NCC has managed to secure enough additional funding to enable us to employ a worker (Barry Rubin) for a period of 6 months to work on the 'Careers Which Don't Cost the Earth' project, which is described on page 3. But I must begin with some important news on the organisational front.

Office Move

By the end of April, the Office will have moved out of London and Kate Maloney will be offering us an office service based in Folkestone. Our usual mail address will still be valid for 6 months after that. As soon as we have a definite new office address and phone no / fax we will let everyone know.

AGM and Awayday

We have been busily planning for our Awayday and AGM in London. We delayed this hoping for a grant from the Baring Foundation - but as

yet we have been rejected. As a result of the wait we had to postpone this to Saturday 11th March at Friends' House in London.

As a result of having less funds than we hoped we are also redesigning the event and paring what we need to do down to the bare essentials: member questionnaire, analysis of results, Awayday, development of SGR Plan (core activity of organisation defined, clear statement of objectives understandable to potential members, outreach and recruitment plan). We will still use the same external facilitator and advisor - Tess Woodcraft - whom we have been working with but we will have to engage her help for fewer hours.

Web-site

In addition to his work on the Careers Guide, Barry Rubin has also improved the tagging of the SGR web site and updated it to ensure that we get seen clearly by search engines. This has also included securing our own virtual domain <<http://www.sgr.org.uk>>.

We can now have our very own name@sgr.org.uk addresses too. The real benefit of this is that it should help raise our visibility in virtual world.

Appeal

The Appeal has been very successful. Thank you for the generosity of all those who made donations. We raised nearly £3000 which is excellent in working towards funding the Guide fully and for the Awayday.

External Events

SGR has attended some external events in recent months. Stuart Parkinson gave two presentations at the Shared Planet conference at Warwick University in November, one entitled 'Corporate and Government Influence of Science' and the other on 'Ethical Careers in Science and Technology'. Also, Richard Tregear and Barry Rubin ran a stall at an alternative careers fair in Cambridge in February.

Population, Consumption and Values Study Group

Alan Cottey, PCV Study Group Convenor

The group has 15 full (ie, SGR) members and, in addition, the PCV newsletter is received by a few fellow travellers. The group is in close contact with ECO (Campaign for Political Ecology), OPT (Optimum Population Trust) and PWG-MPMT (Population Working Group in association with Margaret Pyke Memorial trust). Three issues of the occasional newsletter have appeared since PCV was formed in

January. The last of these was timed to be a contribution to the International Week Of Science and Peace, and had as a special theme 'Ecological Footprint and other Measures of Consumption'. A general discussion on this topic was initiated prior to the IWOSP and is continuing. We expect these deliberations to result in a publication in due course.

The group has published an article on 'Orissa and Sustainability' in Issue 7 (29 November) of the electronic journal Sustainability Review. Archived issues can be found by visiting:

<http://www.eeee.net>

If you would like to join the group, or send information for forwarding to the group, please contact me <pcv@sgr.org.uk>

'Careers Which Don't Cost the Earth' Project

Stuart Parkinson, CWDCE Steering Committee

Good progress has been made on the Ethical Careers Project recently. After a large number of funding applications, we secured £19,250 which has allowed us to begin Phase I of the project: namely, the production of a careers guide entitled 'Careers Which Don't Cost the Earth – A Guide to Ethical Employment for Scientists and Engineers'. To this end we have employed Dr Barry Rubin on six-month contract.

Under the direction of a co-ordinating group from the NCC, Barry has begun work on the following tasks:

1. Producing and distributing a questionnaire to gather together the experiences of scientists and engineers in exercising ethical choices during their careers;
2. Based on the results of the questionnaires, carrying out

interviews with selected respondents;

3. Overhauling the SGR web-site to promote SGR in general and the Ethical Careers Project in particular, including the marketing of an electronic version of the questionnaire;

4. Commissioning expert authors to write sections of the Guide on particular issues related to career choice, eg Genetic Engineering, Climate Change, Armaments, Animal Experiments.

5. Editing the Guide, in collaboration with the co-ordinating group.

To date, tasks (1) and (3) have been completed, with the other tasks in progress.

It has become clear during the course of the work that two versions of the guide will be produced: a

short version (around 20 pages) for free distribution to Careers Offices and students; and a more detailed version (around 150 pages) for sale. Further funding is being sort for the Guide's publication.

If you would like to complete the questionnaire, either go to the web-page:

<https://secure.virtuality.net/sgr/SecQuest.htm>

(accessible from the SGR home-page <http://www.sgr.org.uk/>), or phone Barry Rubin for a hard copy on 01327 830999.

For further details of the project, see the SGR web-site, phone Barry Rubin or send an email to:

[<ethicsproject@sgr.org.uk>](mailto:ethicsproject@sgr.org.uk)

14th International Week of Science and Peace, 8 –14th Nov. 1999

Alan Cottey, UK IWOSP Coordinator

Worldwide, there were 42 events, with 13 countries taking part.

Once again the UK had a varied programme, in terms of the topics covered and the type of event. SGR made a contribution through its Population, Consumption and Values study group. For details, see the separate report on PCV's recent activities on page 2.

The Martin Ryle Trust helped IWOSP indirectly, with a grant which supported an exhibition, by the scientists and artists group CRITICAL MASS, on 'Gene Genie: Making Choices About Genetic Engineering'.

Global concerns were a feature of three of the events. One was the Security Studies Network's discussion meeting 'The Multilateral Agreement on Investment ... it may be dead, but vigilance is needed against its offspring'. The other two were the annual lectures of organisations. Campaign Against Arms Trade was addressed by Paul Dunne on 'The globalization of arms production and trade: implications for the UK economy', and Architects and Engineers for Social Responsibility heard Herbert Girardet on 'Cities, People, Planet'.

The fourth Dick Sygne memorial event was, this year, a symposium organised by the Norwich Research Park. The topic was

'Communicating uncertainty - bridging the gap between science and society'.

Finally, there were two vigils. One, organised jointly by ARROW and Voices in the Wilderness, was against sanctions on Iraq; the other was organised by the Campaign to Free Vanunu, in support of Mordechai Vanunu.

If you are involved in the planning of an event which you would like to be part of the UK contribution to IWOSP2000 (6th – 12th November), please contact me on 01508-492464 or [<iwosp@sgr.org.uk>](mailto:iwosp@sgr.org.uk). IWOSP's web pages can be reached from <http://www.faessler.at/eos>

The Intergovernmental Panel on Climate Change (IPCC) – An Update

Stuart Parkinson, of the University of Surrey, summarises the latest reports of the IPCC

The IPCC is the international scientific body charged with compiling assessments of the current state of the knowledge on Climate Change. Formed in 1988 by the UN Environment Program (UNEP) and the World Meteorological Organisation (WMO), it produces regular 'Assessment Reports' (at approximately five-year intervals) and 'Special Reports' on particular issues where needed. The aim of this article is to give a short update on the current work.

Special Report on Aviation and the Global Atmosphere

This report has recently been completed and is available from the IPCC (for details see below).

There are a couple of main reasons why aviation has been the first industrial sub-sector to be targeted for a 'Special Report'. The first is the growing evidence that the contribution of aircraft to Climate Change is significantly larger than that due to its emissions of greenhouse gases alone. The second is that, due to the international nature of the industry, aviation fuel is not taxed and hence enjoys an effective subsidy when compared to other modes of transportation (and indeed other industries).

In dealing with the first issue, the report concludes that, due mainly to the creation of condensation trails and ozone in the upper troposphere and lower stratosphere, the radiative forcing (in Watts per square metre) of a subsonic jet aircraft is 2 to 4 times greater than that due to the direct emissions of carbon dioxide alone. They go on to estimate that the radiative forcing by aircraft was about 3.5% of the total radiative forcing by all human activities in 1992. Through the use of a series of emissions scenarios, they project

this to rise to between 3.5% and 15%, with a best estimate of 5%, by 2050 relative to the mid-range IPCC 'IS92a' scenario.

Further, the IPCC concluded that there is a range of options to reduce aviation emissions, including in particular:

- changes in aircraft and engine technology, which could lead to reductions in fuel consumption by 20% over the next 15 years;
- improvements in operational practices, eg air-traffic control practices, which could lead to emissions reductions by about 10% over the next 20 years;
- tighter emissions regulations for aircraft;
- economic measures, such as taxation or, perhaps, emissions trading; and
- modal transfer, ie replacing short-haul flights with high-speed rail links.

Unfortunately, the report includes little discussion on why people travel by plane, or a non-economic assessment of how they may be encouraged to curtail such an activity.

Special Report on Land-use, Land-use Change, and Forestry

This report is currently in draft form and is due for completion by May 2000.

The Special Report on land-use, land-use change, and forestry addresses a number of issues where the Parties to the Kyoto Protocol will need to make key decisions before the relevant Articles of the Protocol can be implemented, particularly with respect to definitions, the accounting system, a monitoring and reporting system, and inventory guidelines. In addition, the Report provides an assessment of the experience to date of land use, land use change and

forestry projects (largely under the 'Activities Implemented Jointly' programme), the future potential to reduce the net emissions of greenhouse gases through the Protocol, and a framework for evaluating the sustainable development implications of such activities.

Other Special Reports

Two other special reports are currently being compiled on:

- The Methodological and Technological Issues in Technology Transfer; and
- Emissions Scenarios.

Both are currently in draft form and are due for completion by March 2000.

The first report examines the flows of knowledge, experience and equipment among the various organisations involved in technology transfer (eg governments, the private sector entities and NGOs). The draft report concludes that the current efforts in this area will not be enough to enable technology transfer to achieve the aim of sustainable development, and that considerable extra effort is needed.

The report on emissions scenarios examines a wide range of plausible futures for greenhouse gas and aerosol precursor emissions over the next 100 years, taking into account key determinants like population growth, economic growth, energy demand, energy prices and the level of research and development.

Third Assessment Report

The first two assessment reports were completed in 1990 and 1996. The Third Assessment Report is due for completion in early 2001.

Each assessment report is compiled in three parts by separate working groups. For the third report, the Working Groups are as follows:

- Working Group I will assess the scientific aspects of the climate system and climate change;
- Working Group II will assess the *impacts* of climate change on humans and the wider environment, from a scientific, technical, environmental, economic & social perspective;
- Working Group III will assess the *mitigation* of climate change, from a scientific, technical, environmental, economic & social perspective.

The philosophy and scope of the Third Assessment Report will:

- emphasize cross-sectoral issues, adaptation and the regional dimensions of climate change;
- place the issue of climate change more centrally within the concept of sustainable development; and
- identify the synergies and trade-offs between local, regional and global environmental issues, in particular the inter-linkages between climate change, biodiversity, water resources and land degradation.

Financial Position

At the recent Climate negotiations (COP-5, see front page), the Chair of the IPCC, Dr Robert Watson, pointed out what he called the 'dire financial situation' of the IPCC. In short he accused a number of unnamed OECD countries of not paying their fair share towards the running costs and warned that the IPCC would not be able to fulfil its advisory function without significantly more funding.

To get copies of the IPCC reports, either phone the IPCC secretariat on +41-22-730-8208 or go to the web-site <http://www.ipcc.ch/>

What Future for Fusion Power?

Jim Woolridge, of Earthwatch (Friends of the Earth Ireland), argues that we could better tackle Climate Change by switching funding from research into fusion power to renewable energy

The story so far: things started to go pear-shaped for nuclear fusion sometime in the 90's. Previously muted murmurs of dissent grew loud enough for awkward questions to be heard: what is fusion – a serious potential energy option or just some scientific research? Why give lavish funding to something that doesn't generate power while starving work on others (renewables) that do? Will fusion ever work, be clean enough, cheap enough or come in time to help with climate change?

The flagship fusion project ITER (International Thermonuclear Experimental Reactor) involved the US and then USSR in partnership with the then EC, Japan, Canada and Switzerland. ITER, circa 2020, was destined (we were told) to give way to DEMO (a demonstration reactor) which, assuming things had worked out more or less according to plan, would be followed by a string of commercial reactors, circa 2050. Meanwhile lots of very silly money would be needed. Eventually, with \$1 billion spent and not even a site picked for the demonstration facility, the whole scheme proved too much for the US Congress so the Americans pulled out of ITER in 1998. Now read on.

The remaining partners have now decided to try to bring in a scaled-down product – 'ITER-lite' – 1GW instead of 2.8GW, \$4-5 billion instead or \$8-9 billion, 2015 instead of the original 2000-5. Yet problems continue to loom: who will host ITER-lite? Canada, Italy and Japan are all candidates; Russia may also offer a site. There should be interesting negotiations (for a taster see ITER Canada Home Page: Q: What happens if another country is chosen as the site? A: Canada is not obliged to provide financial support if it chooses not to participate.)

'Long-Term Scenarios and the Role of Fusion Power'*, commissioned by DG XII, has to be viewed against this background of turmoil in a fusion community now facing up to a sceptical world. It is, however, a community with deep European roots and lots of institutional clout, so it is well able to put up a fight.

Nevertheless, the (fusion-friendly) institutes collaborating in this report have reached a muted conclusion – up to 2070 fusion is forecast to remain more expensive than fission and coal but for 2070-2100 it would

become economically viable given European CO₂ reduction policy.

Given that agendas shape scenarios it is no surprise that this report is barely worth the (soft, strong, absorbent) paper it is written on. In the real world both wind and solar are growing at 25% p.a. and there is room for (as well as rumour of) breakthroughs across a whole range of renewable energy technologies. Oh, and fuel cells exist... Given the growing pressure from climate change, it seems likely that by 2050 renewables will (need to) have obviated any need for fusion.

Climate Network Europe (a coalition of European environmental NGOs which includes Earthwatch) has always opposed fusion and is therefore delighted at the recent transfer of 80M ECU of Joint Research Council funding from fusion to nuclear safety – it is about time things changed for fusion. The only question is will fusion self-destruct, or does it need a helping hand?

Article first published in Climate Network Europe's 'Hotspot' (July 1999). Reprinted by permission.

**Available from ECN, Tel +31 224 564328 or fax +31 224 561156*

The 'Climate Care' Label

Julie Woodroffe of the Carbon Storage Trust (CST) presents a novel approach for enhancing greenhouse gas emissions reduction

The Carbon Storage Trust has recently launched a consumer label for its innovative Climate Care scheme which is a service to companies and consumers to repair the damage made to the planet from global warming caused by their activities or purchases. The label has won a coveted Millennium Products Award from the Design Council which identifies forward thinking, creative products and services.

The Climate Care label assures consumers that the products and services that carry the label will have all the greenhouse gas emissions associated with them 'offset'. The cost premium for Climate Care is minimal: around 1.4p/litre of petrol, 0.12p/kWh of gas, or 0.24p/kWh of electricity (plus VAT).

The Trust offsets the greenhouse gases by spending the money it raises from the Climate Care premium on presently unviable or otherwise blocked investments. These investments include (ranked in priority order for the Trust's carbon offset portfolio): energy efficiency, renewable energy and forest restoration. The investment in these projects will reduce greenhouse gas levels in the atmosphere beyond what would have happened without the investments, thus compensating for the product emissions.

Any CO₂ offset programme such as Climate Care is open to the charge that it simply offers consumers an unsustainable way to pay their way out of making changes to their behaviour and purchasing habits. It is clear that to counter this the Trust must develop an offset programme which itself makes a sustainable change in the CO₂ content of products consumers buy. To do this

the Trust will aim to create as much of its offset portfolio as possible in 'front of pipe' renewable energy and energy efficiency projects, with a special emphasis on projects which help develop new technologies and make them economic. By this means the Trust will provide consumers with what they want - environmental performance from the products they choose - whilst providing society with what it needs - a shift away from the carbon economy onto a trajectory which leads eventually to sustainable energy generation.



With regard to reforestation, the Climate Care position is that trees on their own do not offer a genuine contribution to solving the problem of climate change. Trees soak up CO₂ whilst they are growing - so it is frequently inferred that planting trees is a cure for global warming. However, if they are to act as a real cure for the problem they must not only soak up the CO₂ but also store it for a very long time - in effect forever. Unfortunately, once they are fully grown they stop absorbing and once they die they emit all the CO₂ again. Individual trees therefore cannot act as long term stores of carbon, and cannot provide a cure to the problem.

One approach is to create forests, rather than plant trees, and to preserve them forever as both carbon stores and wildlife and conservation assets. Forests are a mix of trees of different ages, with growing and dying trees in equilibrium, so they make effective carbon stores that are capable of indefinite renewal.

One major problem with creating forests is that of scale as the land that the forests take up is no longer available for other uses - forever. To put this into context; if the UK were to offset only one year of its CO₂ emissions by planting forests it would have to set aside an area equivalent to Devon and Cornwall. The next year it would need another two counties, and so on. Thus planting forests may do some good, but it doesn't provide a significant part of the long-term solution. It may even do harm - if planting forests is seen as a panacea to global warming it could act as a lightning conductor, leading funds away from the from the real solution of improving energy efficiency and developing renewable energy.

This is not to say that forests have no role - they do. The Climate Care website sets out how CST believes they can be used as a catalyst for accelerating the development of energy efficiency and renewables. It is, however, important to inject a strong note of caution into the debate and ask whether any particular tree planting proposal will speed up or slow down the development of these long term solutions and whether the trees will genuinely act as carbon stores for the indefinite future.

Further information can be found on the Climate Care website at <http://www.co2.org>

The Clean Development Mechanism – Opportunity or Loophole?

Stuart Parkinson, of the University of Surrey, looks at one of the most controversial aspects of the Kyoto Protocol and examines how it may work

The Clean Development Mechanism (CDM) was one of the international policy instruments agreed as part of the Kyoto Protocol in 1997 to aid in the net reduction of global greenhouse gas emissions. It is one of a group of 'flexibility mechanisms' introduced in order to help reduce the cost of emissions reduction measures. It is these flexibility mechanisms, and the CDM in particular, that are the most controversial aspects of the Kyoto Protocol.

Proponents argue that only through the use of these mechanisms can the cost of greenhouse gas (GHG) abatement be brought down to levels acceptable to society. Further, they argue, flexibility mechanisms can be used to facilitate the transfer of environmentally friendly technology to poorer countries. Opponents argue that they allow industrialised countries to maintain high (and unsustainable) levels of emissions at home, and that technology transfer will simply follow the exploitative routes of global trade. Further, they argue that the complexities of the various mechanisms will lead to loopholes, meaning that reductions in GHG emissions will not, in fact, be 'real'. It is these issues with which this article will deal.

Definitions

First of all, however, I should give some definitions. Under the Kyoto Protocol, there are three flexibility mechanisms. The first is International Emissions Trading (IET, Article 17). This is where fractions of each country's emissions target can be bought and sold. Economic theory dictates that countries with high costs of emissions abatement will save money by buying extra 'credits' from countries with low costs.

Since only industrialised countries (including former Eastern Bloc countries) have emissions targets under the Kyoto Protocol, only they can take part in IET. The final two mechanisms also follow this rationale of economic efficiency. Joint Implementation (JI, Article 6) is where 'donor' countries can fund individual projects which lead to emissions abatement in 'host' countries in return for credits. The CDM (Article 12) is very similar except for two differences:

- JI can take place only between industrialised countries (ie where both have targets), whereas the CDM takes place between industrialised and developing countries; and
- the CDM must contribute towards sustainable development in the host developing country.

History

It is useful to briefly look at the historical development of the CDM and the other flexibility mechanisms in order to appreciate why they were included.

The roots of these instruments lie in the wording of UN Framework Convention on Climate Change agreed at the Earth Summit in 1992. Article 3.3 states that 'policies and measures to deal with climate change should... ensure global benefits at the lowest possible cost.' Hence, cost-efficiency was agreed as a criterion for action.

The next critical point came when the 'Berlin Mandate' was agreed in 1995. This committed industrialised countries to taking on emissions targets first. The justification was on the grounds of equity: that climate change is mainly due to the historical actions of industrialised countries and, since they are richer, they should act first. The Berlin Mandate also started an 'Activities

Implemented Jointly' (AIJ) pilot phase, which was the pre-cursor to JI and the CDM.

As the negotiations progressed towards Kyoto, the USA argued that cost-efficiency combined with emissions targets for industrialised nations meant that measures such as IET and JI had to be included. Further, their Senate called for 'meaningful participation by developing countries' over fears of negative economic effects. This meant that a mechanism which allowed for action in developing countries (what eventually became the CDM) was a condition of US agreement. In return, the US agreed to have a 'demanding' target (7% cut from 1990 levels).

Despite the reservations of many developing countries and outright opposition from most environmental groups, the USA got their way and these measures were included in the Kyoto Protocol.

Problems

But that is not the end of the story. The details of exactly how the mechanisms would work was not agreed at Kyoto. These details were left for a later date. And it is in agreeing these details that many of the problems of the CDM need to be addressed.

The main criticisms that I look at in this article are:

- emissions reduction from CDM projects will not be real, since they will be measured against unmeasurable and arbitrary 'baselines';
- the trade priorities of the 'donor' (industrialised) countries will dominate the needs of the 'host' (developing) countries;

- the criterion that CDM projects should 'contribute to sustainable development' will be fudged;
- inclusion of 'sink' projects (eg forestry) in the CDM will undermine efforts to reduce emissions;
- unethical projects (eg nuclear power) will be funded;
- provisions for 'early crediting' of CDM projects will 'relax' emissions targets.

1. Emissions Reduction will not be 'real'

In order to calculate the number of credits to award a project under the CDM (or JI), an estimation of the 'baseline' of the project must be made. This is a projection of the emissions 'if the project had not been carried out'. Obviously this can never be measured, and so the environmental lobby has argued that such reductions are speculative. They further point out that there is an incentive to 'talk up' the baseline for both the donor country (who would get more credits from a high emissions baseline) and the host country (who would attract more investment if large numbers of credits are available from their CDM projects). Many economists, on the other hand, argue that by the use of techno-economic models such emissions can be estimated with reasonable accuracy. So who is right?

To date, there has been little research to estimate the uncertainty in baselines for the CDM. The main exception is work undertaken by myself and colleagues co-ordinated at the University of Surrey (Begg et al, 1999). We estimated that the uncertainty associated with the total emissions reduction (over the technical lifetime) from projects in the energy sector is at least $\pm 45\%$ and often more: an order of magnitude higher than that from measurement alone. Further, we concluded that use of techno-economic models could not significantly improve on this due to high uncertainty in the data and assumptions on which such models are based. For example, these

models depend on accurate projections of economic growth rate, fuel prices, technology costs: which are all very uncertain. Further, they assume that markets are working efficiently, something that is highly questionable in developing countries.

So are the environmentalists right? Well, not entirely. There are a number of measures that can be taken to deal with or reduce the uncertainty.

Obviously it is easier to estimate what the CDM project will displace one year after it begins operation than after twenty years. The uncertainty grows with time, leading to the high uncertainty over the 20-25y technical lifetime of the average energy supply project. Hence, the most important measure is to only issue credits for a fraction of the projects' technical lifetime. Hence the project should have a 'limited crediting lifetime'.

The second measure is the standardisation of baselines for particular project types, countries etc. Such standardisation would prevent project partners 'talking up' the baselines in their favour. It could be carried out by having independent researchers assessing a pilot project of a given type/country (eg solar pv in Kenya) and then estimating a conservative baseline based on an estimate of the range of reasonable baselines in that case. The baseline would then be used for all projects in that category.

If certain CDM projects are particularly uncertain, eg forestry, then 'partial crediting' could be used. This involves only issuing credits for a fraction of the emissions reduction calculated.

2. The CDM will maintain the trade dominance of industrialised countries

It has been argued that flexibility mechanisms will allow greater flexibility for industrialised countries but less flexibility for developing nations. And it is easy to see that, if it is left to the industrialised world to implement CDM projects, it is likely that this will happen.

The obvious conclusion is that it is developing countries that should control how the CDM works for them. Since it is a condition of the CDM that all projects should be approved by the host country, some control already exists. However, it need not stop there. Host countries could be pro-active by specifying which types of projects they would like to see donors propose. Or they could conduct an assessment of their current development projects, identify which contribute towards GHG emissions abatement and seek funding for an expansion of those programmes. For example, Kenya has a successful development programme supplying fuel-efficient wood burning stoves to the poor. Not only could this be expanded through funding from the CDM, but it could be modified to provide greater benefits. For example, if the project involved sustainable forestry, not only would the emissions reduction be higher, but there would be other benefits such as the prevention of soil erosion.

And this is not just idealistic theory. Costa Rica has been applying these ideas in practice. During the AII pilot phase, it has obtained funding for a series of renewable energy projects (mainly wind) that contribute to its drive to phase out fossil fuels. Moreover, it has attracted funding for forestry protection projects to help expand its national parks. It has been very careful to ensure projects are in its national interest, and often has undertaken the projects itself using the overseas funding.

3. Contributing to Sustainable Development?

Since 'sustainable development' is a widely used but ill-defined term, the insistence that CDM projects should contribute to it could simply be dismissed as 'greenwash'. However, here lies an opportunity to ensure that CDM projects really do offer an alternative to conventional development.

Through the use of simple 'sustainability indicators', developed for each project type, thorough assessment of CDM projects could be carried out. And if host country officials, local community and environmental groups were involved, both in the development of the indicators and their application, projects would truly be positive for local people and the environment.

Clearly, it is important that such assessment is not so bureaucratic or time-consuming that it kills off good projects, but at same time is not reduced to a rubber-stamping exercise.

4. Sink projects will undermine emissions reduction

One of the loudest arguments from the environmental lobby has been that 'sink projects' such as forestry should not be included, either in national inventories of GHG activities or as CDM projects (see Forestry article, p11). The main rationale has been that industrialised countries will fund such projects instead of moving towards a lifestyle that is less dependent of fossil fuel combustion.

While there is a lot of truth in such statements, there is also the issue that large-scale deforestation in developing countries is a huge problem, not only in terms of CO₂ emissions, but also in terms of biodiversity loss and soil erosion etc. A major reason for such loss is the lack of value placed on standing forests compared with the value of

the land if it is used, eg, for timber or beef production. Whilst the underlying problem here is the uncontrolled globalisation of the economy, by allowing the CDM to fund forestry projects, protection could be provided much quicker than through negotiations at the World Trade Organisation (although this avenue must not be neglected). And given the rate of destruction, this speed is essential.

But, of course, emissions reduction must not be neglected. Hence, limits should be placed on the degree to which sink projects could contribute to emissions targets, so that technological innovation and lifestyle changes in industrialised countries will still occur.

5. Unethical projects will be funded

Of course, there exist projects which, although they may contribute to reductions of GHG emissions, would not be considered acceptable on other grounds. A particular example is nuclear power. Whether it is fears over the proliferation of nuclear weapons, concerns about reactor safety, or safe disposal of waste, it is clear that nuclear power is not acceptable for the CDM. And if the criterion of 'contributing to sustainable development' is properly applied, such projects would not be approved.

However, the USA has been pressing for no restrictions on project types under the CDM, and speculation is rife that one of the reasons why their Senate refused to ratify the recent Test Ban treaty is so that they could sell nuclear power through the CDM.

6. Early crediting will relax emissions targets

One little discussed issue concerning the CDM is the loophole of 'early crediting'. Under Article 12.10 of the Kyoto Protocol, CDM projects will qualify for

credits from 2000. The justification for this is that incentives must be provided for action before the target period (2008-2012). However, this leads to the situation where extra emissions reduction action is rewarded, but inaction is not penalised. Analysis of this situation leads to the conclusion that the emissions targets in the Kyoto Protocol will be 'relaxed'. One estimate for the USA (Parkinson et al, 1999) puts the relaxation at 2%, ie from the stated target of -7% to -5%. Partial crediting is a way of dealing with this problem.

Conclusion

It is clear that the Clean Development Mechanism has the potential both to undermine GHG emissions reduction efforts or enhance them. Which it does will depend on the operating details and many of these are due to be worked out at the next round of climate negotiations in The Hague in November 2000. It is essential that proper safeguards, like those detailed above, are put in place. Crucial in this is input from natural and social scientists, particularly in areas such as verifying contribution to sustainable development and baseline determination. Much of the discussion on the CDM thus far has been dominated by economic arguments, and it is important that other areas are not sidelined. If they are, the CDM will do little either to reduce GHG emissions or contribute to sustainable development.

Dr Stuart Parkinson is a Research Fellow at the Centre for Environmental Strategy, University of Surrey.

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Information Technology, Transport and the Environment

Alan Mayne describes how information technology could help reduce the greenhouse gas emissions and other environmental impacts of transport

Information technology (IT) has tremendous potential for reducing the environmental impact of transport in several ways. Its continuing very rapid advances are steadily bringing together the previously separate fields of computing, telecommunications, and broadcasting. In both home and office, the personal computer (PC), Internet, telephone, fax, copier, radio, and TV set are beginning to converge, and mobile versions of most of these systems are rapidly emerging. For some years, there has been considerable interest in how far this IT revolution could also revolutionise work, and in particular lead to the widespread adoption of 'teleworking' or 'telecommuting', where the need for long-distance journeys to and from work could be drastically reduced. Teleworking is not only a leading edge of the information society, but can also assist the transition to a knowledge society. Surprisingly, it has so far aroused relatively little interest among transport experts.

Before discussing the potentiality of telecommuting, I will first outline some more direct applications of IT to transport, which are also helping to reduce the environmental impacts of transport, though in less dramatic ways. One of the most notable applications of computing a few decades ago was to *area traffic control*, where central computers using sophisticated signal-setting programs coordinated the settings of dozens or even hundreds of traffic signals throughout a large part of an urban area. Today, this concept has broadened to a combination of Intelligent Transport Systems (ITS) and coordinated traffic management policies. ITS systems cover not only traffic signals, but advanced vehicle detectors, variable message signs (VMS), intelligent in-vehicle equipment, automatic vehicle identification and location, driver

and passenger information systems, and systems for increased automation of the driving of aircraft, trains, and even road vehicles. All the innovations have had the effect of reducing the rate of increase of traffic congestion, so that they also reduce the rate of increase of air pollution and noise caused by transport; they actually decrease the road accident rate in industrialised countries. However, the problem is that the total growth rate of road, rail, and air traffic and travel are still so high that there tend to be net increases in traffic congestion and in various forms of pollution caused by transport.

It is here that 'teleworking' is potentially so important, because its wide adoption could at last enable total transport demand to decrease, which is really what needs to be achieved, and it could do this without reducing people's quality of life. Teleworking could already drastically reduce commuting, especially if combined with good town and country planning, and its ability to do this will steady increase as IT advances and as local communities are renewed. For example, appropriately designed local communities could put most destinations within walking or cycling distance, while telecommunications, computers, and other technologies could allow many people to work from their homes or from community offices nearby. As a result, there could be enormous savings in time, energy, natural resources, and psychological stress. A small but influential group of 'new urbanist' planners and architects in the USA is working on how to recreate the pedestrian-friendly towns of earlier decades, which have lively central cores near most of their homes. These cores could have IT centres communicating with homes, the Internet, local intranets, and other computer networks, thus enabling homes themselves to have more

effective telecommunications all round.

Continuing IT advances are now starting to bring some of this self-sufficiency to wider regions, because of increasing capabilities for effective telecommunications between offices located far apart. A fortunate minority, including software specialists, independent consultants, and writers can already do most of their work from home and live wherever they choose. For some years ahead, most teleworkers would still need to attend their remote workplace in person between one and three days per week, but this would nevertheless be a very significant reduction from the current average of nearly five days of commuting per week. Such a reduction itself would *enormously reduce* the demand for journeys to work and mean that such journeys would usually no longer occur in congested road traffic or public transport conditions; there would also be corresponding reductions in pollution and energy consumption.

Opinions differ on how rapidly a move towards really widespread teleworking would occur and on how effectively it would reduce total transport and travel demand. Firstly, there are some formidable obstacles to be overcome before teleworking becomes extensive. There are many psychological barriers to be overcome, both by many of those who could become teleworkers and, perhaps even more, by many if not most of those who manage their work. Substantial improvements are still needed in the IT associated with teleworking. For example, working with the Internet tends to be painfully slow, PC operations tend to be somewhat capricious, and the user-friendliness of IT systems still needs to be improved substantially, even though it has already made some remarkable advances.

One American researcher, Professor Patricia Mokhtarian, is now more sceptical about the prospects for telecommuting than when she began to research it 15 years ago. She estimates that, even today, only about 16% of the whole US workforce can even consider telecommuting; for various reasons, probably no more than 2% telecommutes on any given day (Mokhtarian, 1997). In her view, the long-term effects of telecommuting are not well understood, and even extensive telecommuting might be accompanied by relatively little reduction in travel demand and traffic. Nevertheless, she thinks, telecommuting has benefits and is

well worth promoting. Much more research will be needed to find out who is right: enthusiastic optimists like me or pessimistic sceptics like her.

Transport systems and information-telecommunication systems are those parts of the wider human system with most potentiality for achieving a rapid change to sustainability; such a change needs to be guided by new attitudes and visions, not driven by crises. Advances in information technology need to be complemented by appropriate transport policies - with more emphasis on public transport,

walking, and cycling - and by better town and country planning to restore true community to the areas in which we live and work.

Alan Mayne is a freelance author and consultant. Some of his work has been funded by the Transport Research Laboratory (TRL).

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Forests and climate change – untangling a complex relationship

Ute Collier, of WWF-UK, discusses the benefits and problems of using forestry to help tackle climate change

Introduction

The relationship between forests and climate change is extremely complex. On the one hand, deforestation is a major contributor to global climate change. On the other hand, forests can play a role in climate change abatement through their function as carbon sinks. Yet, at the same time, climate change threatens to emerge as a major factor that drives forest loss in the next century, leading in turn to even greater emissions. A recent study by the Hadley Centre (Hadley Centre, 1999) highlights the threat of large-scale forest-dieback due to various effects of climate change such as water shortages and forest fires. Forest loss is expected to be particularly marked in the Amazon, southern Europe, parts of India and south-east Asia. This could have devastating consequences not only in terms of further exacerbating climate change, but also in terms of increased soil erosion and run-off. Some of the poorest regions of the globe would be worst hit.

Kyoto and forests

These complexities are rarely acknowledged when politicians

discuss how to use forests and other land-use activities as a means of meeting their obligations under the Kyoto Protocol. The Kyoto Protocol's Article 3 requires countries to take into account emission sources and removals from afforestation, reforestation and deforestation activities. In principle, this makes sense and the commitment to protect and enhance global forest resources should be welcomed. Yet in reality, Article 3 could be one of the largest loopholes of the Protocol, potentially allowing countries to offset their emissions through a range of dubious sink projects. A Dutch study, presented at the Fifth Conference of the Parties to the Climate Convention in Bonn in 1999, showed that if the proposals of some countries are followed, we may end up with a loophole in the order of magnitude of 15% of Annex B 1990 emissions, turning the Protocol into a license to increase emissions. There are numerous problems, including varying definitions of what constitutes a forest, unclear baselines, doubts about the longevity of projects and scientific uncertainties about absorption rates. Finally, the opening up of a variety of other sink categories could allow

plenty of scope for creative emissions accounting.

Sink projects and conservation

Meanwhile, companies (and even pop groups – the UK group B*witched is paying Future Forests to plant trees to make its forthcoming album and tour supposedly carbon neutral!) are looking to tree planting projects as a means of improving their green credentials. However, action to reduce emissions at source is still thin on the ground and the environmental consequences of many projects remain far from clear. In a best case scenario, forest management can be a low-cost approach to climate change mitigation, providing, almost as a side benefit, significant new financial resources for biodiversity conservation. But in an equally plausible scenario, forest projects will diminish the impetus to find a long-term solution to climate change, delaying an essential transition to renewable energy sources, while creating incentives to establish tree plantations that may actually accelerate the loss of natural forest.

Which of these scenarios comes to predominate will depend both on broad policy guidance developed under the Kyoto Protocol, and the details and definitions that govern the use of forest-based carbon offsets. In either outcome, the conservation stakes are high. The linkages between forests and climate change are thus of utmost interest to conservation organisations like WWF.

WWF's position on climate and forests can be stated simply:

- First, forest management activities undertaken for climate mitigation purposes should not compromise broader efforts to address climate change under the Kyoto Protocol or create new risks to existing forests.
- Second, forests should be managed to increase their ability to adapt to climate change, and should strongly favour the protection or enhancement of ecologically valuable, *existing* forest landscapes over creation of tree plantations.

A way forward

Forests can undoubtedly play a role in protecting our climate. However, efforts are needed to ensure that forest activities by countries and companies enhance rather than undermine the effectiveness of the Kyoto Protocol. To ensure this, three measures are key in WWF's view.

Firstly, we require a more precise definition of "forests" and forest-related activities under the Kyoto Protocol to ensure priority is given to maintaining and enhancing existing carbon sinks, rather than creating tree plantations. Additionally, there is a need for guarding against incentives that may lead to destruction or conversion of existing forests.

Secondly, parties to the Protocol should agree a "cap" to limit the portion of climate commitments that can be met using forest and land-use activities.

Thirdly, the concept of "discounting" or "price adjustment" credit for sequestration activities needs to be introduced to reflect their uncertainty in terms of amount, insecurity over time, and inherent limitations in meeting long-term climate objectives.

Additionally, WWF believes that the threat climate change poses to the world's forests can be at least partially countered by increasing forest resilience. By addressing the anthropogenic causes of forest loss and degradation at a landscape level, we can act now to reduce the likelihood that forests will succumb to longer and more intense dry seasons. WWF will work to ensure that forest resilience is enhanced through minimising forest fragmentation, especially in protected areas, encouraging governments to develop proactive fire management strategies and promoting forest restoration

activities to enhance and protect ecologically important forest landscapes.

Conclusion

WWF has urged that forest-based carbon sequestration activities not be pursued for the purpose of generating credit for compliance with the Kyoto Protocol until the key issues above have been settled and a sound scientific basis has been provided by the Special Report currently under preparation by the Intergovernmental Panel on Climate Change (see page 4). In the meantime, however, an increasing number of voluntary, business initiatives are proposing forest-based carbon storage and sequestration activities, outside the climate convention and Kyoto Protocol, and not intended for the purpose of generating credits for an eventual regulatory framework. WWF believes such initiatives may be helpful by informing the ongoing scientific and methodological debates concerning carbon sequestration.

Dr. Ute Collier is Head of the Climate Change Programme, WWF-UK

Reference

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http://www.met-office.gov.uk/sec5/CR_div/CoP5/

SGR online

SGR now has a set of specialist email addresses to help facilitate easy electronic communication (see also page 19)

Phil Webber (Chair)	PhilW@sgr.org.uk	Jenny Nelson (Treasurer)	JennyN@sgr.org.uk
Dani Kaye (Secretary)	DaniK@sgr.org.uk	Kate Maloney (Administrator)	KateM@sgr.org.uk
Stuart Parkinson (NCC member)	StuartP@sgr.org.uk	Alan Mayne (NCC member)	AlanM@sgr.org.uk
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Nuclear Reprocessing at Sellafield

Helen Wallace, of Greenpeace UK, presents the second in a series of three articles on the Sellafield Nuclear facility, this time focusing on its radioactive discharges

The Sellafield nuclear site in Cumbria is notorious for its pollution of the sea, its history of accidents, and its growing stockpiles of nuclear waste - including enough "civil" plutonium to make some 10,000 nuclear weapons.

The first in this series of 3 articles considered Sellafield's role at the heart of the world plutonium trade. The question asked, "Will Sellafield's reprocessing business soon be consigned to history?" has, at the time of writing, already become more pertinent. Revelations that Sellafield's operators BNFL faked safety checks on the first shipment of plutonium fuel (MOX) sent this summer to Japan are having major political repercussions. The fuel, which arrived on the second day of Japan's infamous criticality accident at Tokai-Mura, has still not yet been loaded due to local safety fears. BNFL's new Sellafield MOX Plant is entirely dependent on winning contracts in Japan before the Government can legally approve its start-up. The chances of approval, and hence the future of the whole plutonium trade, currently hang in the balance.

In addition, plutonium separation at Sellafield has other implications for the environment and human health. This article considers Sellafield's radioactive discharges and looks at the implications of the Government's commitment to eliminate marine pollution for the future of BNFL.

Sellafield's radioactive discharges

Sellafield discharges some 8 million litres of nuclear waste daily into the

Irish Sea. Last year Greenpeace divers found the seabed was more contaminated than a Russian underwater nuclear test site. Plutonium accumulates in sediments and has spread as far north as Norway. Other more soluble radionuclides contaminate coastlines and the marine environment as far north as the Arctic. Local estuaries contain levels of radioactivity that are higher in some public areas than those in the Chernobyl Exclusion Zone. Lobsters have been found with levels of contamination up to 42 times the European warning level for food after a nuclear accident.

There is no known safe dose of radiation and cancers and hereditary defects are officially expected to result from Sellafield's discharges. In addition, controversy continues to surround the leukaemia clusters found at all 3 of Europe's reprocessing plants (Sellafield, Dounreay and La Hague). The official view is that radioactive discharges are insufficient to cause the childhood cancers found near the plants, but there has never been another credible explanation. A recent paper found a statistical link between stillbirths and the doses of radiation the fathers had received whilst working at Sellafield.

Discharges of radioactive gases from Sellafield's chimneys also contaminate the environment, including local fruit, vegetables and milk. Last year Greenpeace found that some pigeons near Sellafield were so contaminated they should have been classified as flying nuclear waste.

The evidence of marine pollution led fifteen governments to sign a historic agreement last summer at the ministerial meeting of the OSPAR Convention on Marine Pollution in Sintra, Portugal. The agreement promised substantial reductions or elimination of radioactive discharges by 2000, in order to reach "close to zero" concentrations in the marine environment by 2020. The biggest sources of these discharges are the reprocessing plants at Sellafield and at La Hague in France.

At next year's OSPAR meeting in Copenhagen in June, the Government will have to account for lack of action to implement the agreement it has signed. Also on the table will be an official report comparing discharges from reprocessing spent fuel with the alternative of dry storing it. No prizes for working out that managed, monitored containment produces virtually zero discharges compared to dissolving fuel in acid and separating out plutonium. But it has taken the Nuclear Energy Agency 6 years to produce the report. It is difficult to see how OSPAR, faced simultaneously with a commitment to stop discharges and a method to do it - stopping nuclear reprocessing - will be able to justify continued failure to act. Greenpeace will be demanding an immediate end to all nuclear reprocessing in Europe.

The next in this series of articles will consider Britain's nuclear waste crisis and the implications for the future of BNFL's business.

Dr Helen Wallace is a Senior Scientist at the Science Unit at Greenpeace UK.

Nuclear arms reductions – a glimmer of hope?

John Moore discusses the prospects of new negotiations between the USA and Russia on reducing the numbers of nuclear weapons

In the last year or two, prospects for nuclear arms control have seemed to become increasingly gloomy. Following the recent spying revelations, there has been heightened American concern about China's nuclear capabilities and intentions. The 1998 Indian and Pakistani tests dealt a severe blow to the norm of nuclear non-proliferation. IAEA inspectors have been unable to verify the situations in North Korea and Iraq; and the Geneva Conference on Disarmament remains deadlocked over the issue of nuclear disarmament.

Most disturbingly, nuclear relations between America and Russia have steadily deteriorated since the euphoria following the end of the Cold War. Russians are especially concerned about a renewed American determination to install a ballistic missile defence (BMD) system, which would contravene the 1972 ABM treaty and could give the U.S. a decisive advantage of a first-strike capability. The Russian Duma has still not ratified the START II treaty, under which each side is due to reduce its number of deployed strategic warheads to 3000-3500 by the year 2007; and NATO enlargement has meant that more of Russia's neighbours are involved in NATO nuclear planning. Relations between Washington and Moscow became particularly tense in the first half of 1999, during the NATO bombing campaign against Serbia.

Now, following the end of the Kosovo conflict, a chink of light has at last appeared. In June, Presidents Clinton and Yeltsin agreed a 'Statement on Disarmament', under which discussions are to start between the two sides on both a START III

treaty and an agreed amendment to the ABM treaty.

In 1997, in Helsinki, Yeltsin and Clinton had agreed that, under a proposed START III treaty, both sides would reduce the number of deployed strategic warheads to 2000-2500 each; but START III negotiations were subsequently stalled, pending ratification of START II by the Russian Duma. They have now agreed to expedite preliminary discussions on a START III treaty.

In any case, as pointed out in recent issues of both the Bulletin of Arms Control (March 1999) and Pugwash Newsletter (April 1999), because many of its missiles have already surpassed their original service lives and are too costly to maintain, the number of Russia's deployed strategic warheads is likely to be reduced below the projected START III levels by 2007, when that treaty is due to come into force. The Russians therefore have an incentive to try and persuade the Americans to reduce the number of *their* deployed warheads below 2000.

In January 1999, against this background and anticipating the June Statement on Disarmament, experts from the Federation of American Scientists made the following recommendation:

"As part of a resolution of differences over anti-ballistic missile systems and the ABM treaty, we urge the Administration to begin negotiations with the Russians on START III – without awaiting Russian ratification of START II – and to offer, in those negotiations,

START III limits of 1000 deployed strategic warheads"

[FAS Public Interest Report, March/April 1999, p.1.]

The thinking behind this FAS proposal was that such a reduction might well impel a change in America's posture, which requires a pre-emptive first-strike capability and keeping its nuclear forces on high hair-trigger alert. This change, in turn, would mean that any proposed ballistic missile defence system (which, in any case, would be aimed primarily at the North Koreans and may not work) would not significantly destabilise the US-Russian strategic balance. In other words, from Russia's standpoint and in the view of many Western arms control experts, a relatively minor modification to the ABM treaty (however unnecessary and undesirable) may be a small price to pay for a START III agreement which would limit both parties to 1000 strategic warheads. In the words of an FAS Council statement:

".....it appears that US agreement to START III limits of 1000 would move us far towards the end of an era of first strike threats. As a symbol of that change, Trident submarines, now on 15 minute alert in the North Atlantic, should be taken off this very high, and totally unnecessary, peace-time alert which only helps keep the Russian forces on a relatively higher alert"

[FAS Public Interest Report, March/April 1999, p.2]

John Moore is a Lecturer in Mathematics at Leeds College of Technology.

Conference Reviews

Hague Appeal for Peace Conference

Steve Wright

Organised and supported by scores of international NGOs including INES and SGR, the Hague Appeal for Peace conference was an amazing gathering of the world's peace clans. Held in May 1999 a century after the historic first international peace conference to attempt to restrict war, this event exceeded even the organisers optimistic expectations with over 10,000 delegates arriving instead of the anticipated 3-4,000.

Formally, the conference consisted of a testing agenda of plenary sessions and a dizzying array of parallel session panels and workshops with 450 programs, 300 exhibits, two film festivals and dozens of concerts, plays and special events. Informally, the conference was a tremendous celebration of our diversity – from the Nobel Laureates, the UN Secretary General, Prime Ministers and the Queen of Jordan to an unbelievable gathering of indigenous peoples, a wide variety of religious faiths, human rights activists, environmentalists, lawyers, feminists, youth, disarmament activists and the dance beat of a plethora of artists and musicians.

The formal outcome of the conference was the agreement of the Hague Agenda for Peace and Justice for the 21st Century – a 50 step holistic plan, now an official UN document which has been sent to all the world's head of state. Thankfully, the event was not a one-off climax but the creation of an ongoing network of co-operation to achieve our collective vision of peace goals. (You can find the full text on <http://www.haguepeace.org>)

For example, the conference launched twelve initiatives, all of which are calling for NGO involvement and assistance. These include a call for an end to child soldiers (www.childsoldiers.org), a Hague Peace education initiative (www.haguepeace.org), the creation of the International Action Network on Small Arms (IANSA, www.IANSA.org), the International Poor People's Campaign for Economic Justice (www.libertynet.org/kwru), the Campaign to End Genocide Forever (www.endgenocide.org).

The conference also devoted substantial efforts towards searching for peace in more current conflicts such as Kosovo and in East Timor where the issue was powerfully addressed by Nobel Laureate Jose Ramos Horta decrying the involvement of western arms companies colluding with the slaughter which has followed.

My own interest in attending Hague was caught up in this issue – the dynamics of human-inhumane weapons which fuelled the creation of new international law at the first Hague conference. (The British press carried very little on the Hague conference but the Guardian did print a story I wrote on the irony that dum-dum bullets, whose use against a foreign enemy were banned by the first Hague conference in 1899, are now more prevalent than ever – for internal security purposes, Guardian online 13th May 1999). I was invited to speak at the core session on New Military Technologies and their Future Impact on Peace and Security jointly organised by SGR and INES.

My presentation covered the theme of a new technology of political control, a subject I had written a policy document on for the European Parliament's Scientific

and Technological Options Panel (<http://jya.com/stoa-atpc.htm>). This subject gained quite a high profile last year when it was revealed that the US National Security Agency operating via the UK's Menwith Hill site was intercepting the world's email and telecommunications traffic at over 2 million taps per hour. The data was being used to intercept the work on NGOs as well as passing sensitive economic intelligence, for example concerning lucrative arms deals to US competitors. However, the main core of my talk was on the diversification of US atomic laboratories such as Los Alamos into generating a new form of sub-lethal or pre-lethal weaponry. The Omega Foundation has subsequently won a new STOA contract to examine the political implications of new generations of crowd control weapons using paralyzing and disabling technologies. The International Red Cross attended this seminar and reported on their SiRIUS programme to halt weapons which by their design are built to cause inhumane suffering or superfluous injuries and we will co-operate with them in recommending new possibilities of banning certain types of disabling weapons when the report is finalised.

In short – Hague constituted a tremendously exciting beginning and Bruce Kent and colleagues are already helping to co-ordinate a wide range of follow-up events.

Contact details:

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If you wish to get involved or just stay informed about the Hague Appeal for Peace activities, campaigns and initiatives, sign up via email to hapnews-list-subscribe@igc.topica.com with the text 'subscribe hapnews-list' in the body of the message.

BAAS Festival of Science 1999

Alan Mayne

The BAAS Festival of Science 1999 was held at the University of Sheffield on 13-17 September. Its theme and that of the Presidential Address by Sir Richard Sykes was "Prospering Through Science". The Presidential Address looked at some key issues to be faced, and measures to be implemented, to ensure that the UK would prosper through science and remain competitive in the future. The six key building blocks required were: (1) the education system - primary, secondary and tertiary; (2) a strong research base in science and technology; (3) a receptive industry sector, prepared to take up new ideas and technologies, seek new opportunities, and invest in research; (4) the development of an entrepreneurial spirit in society; (5) a wider role for government; and (6) a well informed and supportive public. On the last point, he commented that genetically modified (GM) foods is an example of an issue that rightly concerned the public, but that the debate on them must be balanced; he felt that the potential benefits of genetic engineering (GE) technology had not been properly emphasised and

were thus not understood by the public.

To help remedy this situation, there was a long session on Tuesday, 14 September, about possible agricultural developments for the 21st century, including GM crops; I asked some searching questions there, and I was *not wholly* satisfied by the answers from experts that I received. This was followed by a simulated shareholders' meeting of a hypothetical company on whether and how it could recover its multibillion pound investment in GM technology while protecting the environment and reassuring wary customers. On Wednesday, 15 September, there were presentations on the patenting of life and a debate on the challenges to society and ourselves as individuals, posed by the new genetics; where three experts presented their views.

The British Government was very well represented. Lord Sainsbury, who had recently been appointed Science Minister, gave two presentations. In the first, he urged scientists to improve their communication with the public, so that they could inform people about the benefits of their work; he congratulated that BAAS on its theme for this Festival. In the second, at the Science Communicators Forum, he urged

science communicators to understand public concerns; he said that their real challenges were to debate openly with the public about new technologies, and to convince them that the benefits outweighed the risks, and that the regulatory system properly controlled the risks. Stephen Byers, the new Secretary of State for Trade and Industry, emphasised the Government's commitment to science and technology. He announced two special projects to forge links between business and the science and technology community, by setting up eight world-class Centres of Enterprise and four Faraday Partnerships. A session on the social objectives of economic prosperity included a presentation by David Miliband, of the Prime Minister's Policy Unit, on how to reduce social injustice in a global economy.

Topics of the many other sessions included: understanding the cosmos, human nature, applied geology, urban ecology, global environmental change, energy for the 21st century, protecting the environment, quantum computing, and globalisation and social policy. In an evening session, Lord Winston answered questions about current progress in reproductive medicine.

Conference Announcement

CHALLENGES FOR SCIENCE AND ENGINEERING in the 21st century

Stockholm, Sweden, 14-18 June 2000

The conference will be centred on themes in four distinct areas:

- A. Developing the culture of science and engineering;
- B. Science and engineering for a finite world;
- C. Humanising the economy in a global context;
- D. Steps towards comprehensive security and lasting peace.

Organised by:

International Network of Engineers and Scientists for Global Responsibility (INES)

For details of registration and submissions of papers, please see the conference web-site: <http://www.ines2000.org>

Tel: +49 231 575218; Fax +49 231 575210, email: INES2000@t-online.de

Book Reviews

Alan Mayne reviews a selection of publications on the subjects of genetic engineering and ecological economics

GE: Genetic Engineering and You

Moyra Bremner

HarperCollinsPublishers, London
(1999) ISBN 0-00-653190-3 (pb),
xxi + 437 pp, £6.99.

Moyra Bremner is a best-selling author, TV presenter, and science writer, who has become increasingly concerned about the dangers of genetic engineering (GE). As an admirer of science, she first thought that it was wonderful; then she saw how it was done and how it could affect us and the rest of the world. It became obvious to her that its claims to be safe were based on out-of-date biological theories, and that much of it was madness. This book is written in a readable, popular style, so that it can easily be understood by the general reader. At the same time, it is a gold mine of facts about ALL aspects of GE from food to animal engineering. Based on a broad coverage of worldwide research, it looks at potential benefits as well as possible hazards. Especially helpful are the three myths about GE that she exposes at the beginning of each chapter, the extensive quotations from the many international scientists who are very concerned about GE (including Professor Sir Joseph Rotblat and America's Professor John Sagan), the chapter notes, bibliography and glossary, and the text boxes where she states compactly some of her most important points.

It brings home to the reader how GE is rapidly invading more and more areas of our everyday lives, very often in ways that are far from obvious to us. For example, it shows that genetic testing could prevent people from obtaining

mortgages, and that the GE of fish could devastate fish stocks and the market for fish. The book also explains the problems of labelling GE food, cross-contamination, and consumer choice. These issues arise in connection with maize and soya, which are included in very wide ranges of foods. Besides foods based on vegetable crops and on animal products, the book discusses the impact on farming practices. It has important chapters on medical applications and the issues and ethics involved in work on animals. In addition, it discusses the sometimes terrible impacts of biotechnology on people in the Third World, the iniquities of patenting, and the coming threat of GE seeds engineered to be chemically dependent, which could be used for 'siege warfare'.

Throughout, the book gives many examples of undesirable, even unethical practices of biotechnology companies, especially the largest multinational GE corporations, which she calls the 'gene giants'. Each of these practices has its own potential - or actual - threats. In her last chapter, she warns us of some extreme threats to humanity *if* some really unscrupulous, even evil, people were to take over the gene giants. There is nothing in the present global power structure that could stop their devastating damage. At the same time, too many governments, especially that of the USA but also the British Government and the European Commission, are insufficiently aware of the threats of GE and the gene giants, so that they take little or no effective action to stop them. If anything, the activities of the World Trade Organisation, which sometimes imposes sanctions on national governments wishing to resist threats, hinder rather than help.

Very significantly, Moyra looks beyond the immediate events and

trends to their root causes. For example, most GE researchers and most of the executives running the gene giants may be 'nice people', working for what they genuinely feel are the best interests of humanity, but their attitudes are too often dominated by outdated paradigms and over-specialist approaches. For example, specialist scientists and those whom they advise may both be insufficiently aware of other fields of knowledge intricately interacting with theirs, and adopt predominantly *reductionist* attitudes instead of the *holistic* approach that is needed. Moyra concludes that GE is a symptom of a society which has lost its way; that we need to create a more balanced relationship with big business and rediscover the wholeness of the natural world.

A very important part of the book is its epilogue "Actions that Make a Difference", where she outlines a wide range of what we can do as concerned and responsible citizens. For example, we can write to our MPs, Euro MPs, even our governments. We can tell our shops that we expect them to provide non-GE products, as far as possible, and we can boycott them if they ignore or oppose our requests. We can spread the message far and wide among ALL people whom we know. SGR has been in the forefront of the debate about GE for several years now, and its activities here will continue vigorously. Also very significant is Moyra's quotation (pp 305 to 306) of a widespread statement of the *precautionary principle* at an international meeting in Wingspread, WI, USA in January 1998; it was signed by scientists, government officials, lawyers, and activists from the UK, the USA, Canada, Germany, and Sweden. A principle which Moyra and I believe that it is vital to apply.

Re-Thinking GM Food Policy - and Beyond

ESRC Global Environment Change Programme, October 1999

This report is an assessment of the debate about genetically engineered (GE) foods. It does not attempt to form a judgement about the scientific and technical merits, or otherwise, but instead presents a commentary and hypothesis on why this whole issue has caused such political difficulties. It states that the public are right to be sceptical, and comments on the narrow remit of the regulators. Many of its insights apply not only to the GE debate but also to the more general handling of new technologies. The report was launched to an audience of MPs, their advisers, peers, and civil servants, and was a media hit. Both pro- and anti-GE people have welcomed the report.

For details of its full text, coverage achieved, and many of its supporting documents, see the programme's new web site <http://www.gecko.ac.uk/>

This review is a summary of the review given in **GECKO**, the newsletter of the ESRC Global Environmental Change Programme, No. 21 (Autumn 1999) pp 1-2.

A Question of Genes: Understanding Life in Context

Craig Holdrege

Lindisfarne Press, Hudson, NY & Floris Books, Edinburgh (1996) ISBN 0-86315-239-2 (pb), 192 pp.

This book presents a holistic approach to genetics and living organisms. It treats organisms as processes, not objects, and shows

how context always qualifies the effects of genes. Most of its chapters are on genetics and heredity, but Chapter 5 specifically covers genetic manipulation in the context of life, ending with a section on the need for us to take responsibility for our points of view. While engaged in 'object thinking', scientists attend to the object alone, and ethical questions do not arise. While they are totally immersed in their own science, they leave ethical questions to outsiders. When they do express ethical concerns, they have left object thinking behind. Responsibility begins with awareness of our viewpoints, and should also take account of other viewpoints. In his "Conclusions" chapter, the author observes that genetics, as usually conducted, has too narrow a base, and ignores its wider context and the relationships in which we should participate. Responsibility needs to be based on a holistic, contextual approach.

Engineering Genesis: The Ethics of Genetic Engineering in Non-Human Species

Donald Bruce & Ann Bruce (Eds)

Earthscan, London (1998) ISBN 1-85383-570-6 (hb) & 1-85383-571-4 (pb), xiv + 337 pp, £12.99.

This book presents the findings of a working group on genetic engineering (GE), convened in December 1993 by the Science, Religion and Technology (SRT) Project of the Church of Scotland. It was set up as a multidisciplinary working group to look at ethical issues in the GE of non-human species. Its members were chosen for their expertise in several relevant fields, including the genetics of living organisms, animal welfare, the environment, Third World applications, sociology, risk and public perception of risk, and ethics. The group examined many of the complex issues which

advances in GE are bringing to light; the book gives the results of an iterative process of this diverse group, whose members have all contributed the insights of their different disciplines about the issues that they discussed. Their aim has been to strike a balance between the extremes of optimism and pessimism about GE. The book has been written for a general, non-expert readership, but provides enough technical content to appreciate the science without too much detail. Its first chapter explains GE and its uses. Its second chapter presents eleven case studies of medical and agricultural applications, for each of which it presents the main ethical issues raised. The other chapters cover: ethics, GE and animal welfare, animal ethics and human benefit, transgenic food, environmental risk and regulation, patenting life, GE and developing countries, and GE's social context. The final chapter identifies common threads running through the issues, summarises the key themes, lists specific questions to explore, and reflects on future prospects. There are also a glossary, three other appendices, chapter notes and references, and a list of further reading.

Natural Capitalism: The Next Industrial Revolution

Paul Hawken, Amory B Lovins, & L Hunter Lovins

Earthscan, London (1999) ISBN 1-85383-61-0 (hb), 396 pp, £18.99.

This book presents a revolutionary paradigm for the capitalist economy. Its three authors are leading American business visionaries, who explain how the world is on the verge of a new industrial revolution that promises to transform our fundamental ideas about how to conduct business. They show how the remarkable opportunities, that farsighted companies are beginning to

discover, synthesise into a practical set of sustainable but remarkably profitable operating principles, which are the foundations of 'natural capitalism'. This new type of economic system will draw on economic logic, various intelligent technologies, and the best of contemporary design to increase resource productivity by up to a hundred times, and redesign industry on biological models where everything is recycled. It will move the economy away from the

acquisition of goods towards the continual flow of value and service, supported by prudent investment in sustaining and expanding natural capital. The book thus provides the overall biological and social framework that business, industry, and government need to achieve and practice the transformation of commerce.

Most 'top people' seem to be enslaved by the current global

capitalist model, which is actually a gross distortion of what true capitalism should be, because it is largely unregulated by civil society and treats the market as a dominating, bad master, not as a helpful servant. The books reviewed here explain well some of the undesirable, even dangerous, consequences of this slavery, but also point the way to much better and positive alternatives.

Letters & Communications

Letters

Letters for inclusion in the Newsletter should be sent either by conventional mail to 'The Newsletter Editor' at the SGR address given on the back-page, or by email to newsletter@sgr.org.uk with 'SGR Letters page' in the title. Letters may be edited in the interests of brevity or clarity.

Tree-Planting?

Dear Friend,

The subject of Global Warming is always with us and it appears probable that the increased severity of hurricanes and tornadoes are caused by global warming because it only requires a slight increase in temperature to increase evaporation from tropical or near-tropical seas. The increased water vapour in the atmosphere then produces a heavy storm down-wind.

It is generally agreed that global warming is caused by increased carbon dioxide in the atmosphere from the burning of fossil fuels.

I ask the question, surely it is not enough to reduce the use of fossil fuels? Is it not necessary to REDUCE the amount of carbon dioxide in the atmosphere?

Therefore it seems to me what is required is a massive campaign to grow forests and vegetation in many parts of the world.

I appeal to experts in botany and forestry in Scientists for Global Responsibility to apply their expertise to suggest ways of growing vegetation in places like the Sahara Desert. I am told that it is already known how to fix sand dunes by special grasses and that once the process is started one can gradually introduce more vegetation. Presumably one starts at the fringes of the desert and at the oases and then work inwards. Is this kind of approach completely impracticable or should we develop this idea? Even if the Sahara Desert is a non-starter, there must be other parts of the world where more forests could be grown.

Another aspect of the argument is that a large programme of forestation would be economically beneficial – compared with massive cost in clearing up after a hurricane.

Bernard R. Bligh
Middlesex

For further discussion of this issue see the articles 'Forestry and Climate Change' (p11) and 'The Climate Care Label' (p6). As discussed on p4, the IPCC will be

bringing out their Special Report on Land-Use, Land-Use Change and Forestry in May, which will discuss these issues in considerable depth.

Electronic Communications

sgrforum

Remember, you can correspond directly with the 200 or so SGR members who are online through 'sgrforum', our email discussion list, by sending an email to:

sgrforum@gn.apc.org

If you are not already on the list, you will first need to subscribe. To do this, send an e-mail to:

listproc@gn.apc.org

with the following text:

```
subscribe sgrforum <firstname>  
<lastname>  
End
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The subject line should be left blank.

Other email contact

SGR now has a number of specialist email addresses to use to contact particular people within SGR or for particular issues. These have been given on page 12.

Events

11 March 2000

SGR AGM and Awayday

Friends House, London NW1.
For further info., contact Kate Maloney at the SGR Office.

17 - 26 March 2000

National Science Week

Organised by the British Association for the Advancement of Science (BAAS). For further info., contact Maria Roy on 020 7973 3074.
E-mail: maria.roy@britassoc.org.uk
Web site: <http://www.britassoc.org.uk>

21 March 2000

One World Day Event

University of Nottingham.
SGR has been invited to participate. If you can help, or for further info., contact Kate Maloney at the SGR Office.

24 - 26 March 2000

The Monitoring and Verification of Peace Agreements.

597th Wilton Park Conference organised in association with the Verification Research Training and Information Centre (VERTIC). For further info., contact Heather Ingrey on 01903 817764. E-mail: heather.ingrey@wiltonpark.org.uk

25 March 2000

Engineering in the New Millennium

Convention at the Institution of Electrical Engineers (IEE), London WC2. Fee: £35. For further info., contact Katharine Hardman
Tel: 020 7344 5426.
E-mail: khardman@iee.org.uk

3 - 5 April 2000

Green-Tech

International Conference and Exhibition on Sustainable and

Renewable Raw Materials in Utrecht, The Netherlands.

Organised by and further info. from Europoint.

Tel: + 31 30 6933489
E-mail: info@europoint-bv.com
Web site: <http://www.europoint-bv.com>

30 April - 19 May 2000

Coming Home to the Land

Course at the Schumacher College, Dartington, Devon.
Fees: £1,350. For further info., contact Hilary Nicholson on 01803 865934.
E-mail: schumcoll@gn.apc.org
Web site: <http://www.gn.apc.org/schumachercollege/>

21 May - 9 June 2000

Ecological Design: Context, Theory & Practice

Course at the Schumacher College - details as above.

14 - 18 June 2000

Challenges for Science and Engineering in the 21st Century

International conference in Stockholm, Sweden, organised by the International Network of Engineers and Scientists for Global Responsibility (INES). For further details, see p.16

14 - 16 July 2000

The Primacy of Public and Environmental Health

Leighton Park, Reading.
15th in a series of Annual Conferences on Low Level Radiation.
Tel: 0118-978 0148
E-mail: nis@gn.apc.org

16 - 20 July 2001

Detecting Environmental Change: Science and Society

Conference at Senate House, London WC1 organised by NERC Centre for Ecology and Hydrology et al. Further info. from Catherine Stickley on 020 7679 5562.
E-mail: c.stickley@ucl.ac.uk
Web site: <http://www.nmw.ac.uk/change2001>

Every Saturday

Vigil calling for the Release of Mordechai Vanunu

Noon - 2.00 p.m., Kensington High Street/Palace Green, London W8.
Organised by and further info. from the Campaign to Free Vanunu and for a Nuclear Free Middle East.
Tel.: 0171-378 9324.
E-mail: campaign@vanunu.freereserve.co.uk

If you are attending any of these events, don't forget to take along a few SGR leaflets etc.

This edition of the Newsletter was edited by Stuart Parkinson with help from Kate Maloney and Karl Lam. The opinions expressed do not necessarily represent those of SGR.

The next newsletter will be a special issue on Information Technology. Articles are welcomed from both members and non-members. Please send any articles (preferably in Word 97 format) to newsletter@sgr.org.uk or the postal address below.

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