

# Climate change and policy

---

---

## Emerging trends and threats of climate change— implications and amelioration strategies for sustainable protected areas management in Western Africa?

Edem A. Eniang

**Abstract.** Writing policy is relatively easy; implementing it can be much harder for many, especially developing, countries. This article highlights the efforts, achievements and impediments in trying to cope with the impacts of climate change in West Africa.

Using Nigeria, which shares the general socio-ecological trends of most West African nations, as an example the article attempts to draw viable conclusions and recommendations for the region as a whole. The article attempts to examine the likely effects of the climate change paradigm on human populations, socio-economics and in particular on protected areas. It concludes with a series of recommendations directed towards IUCN.

### Introduction

There is currently an overwhelming literature and awareness on the global climate change paradigm and the effects of the biofuel phenomenon which portends a bleak future for developing nations' protected areas. A communiqué of the World Parks Congress (WPC) to the Convention on Biological Diversity (CBD) justifies this article, which aims to highlight efforts, achievements, impediments and paradoxes of the climate change paradigm in West Africa using Nigeria as a focal nation. The communiqué states in part:

- ▷ Biodiversity and ecosystems are essential to sustainable development.
- ▷ The CBD is an indispensable element to ensure sustainable provision of ecosystem services.
- ▷ A representative and effectively managed protected area system is crucial to achieve objectives of CBD and its 2012 targets with salient actions needed to fulfil its obligations and key elements of Millennium Development Goals (MDGs).

### **Environmental and socio-economic context of Africa**

United Nations Environment Programme (UNEP) at its 21<sup>st</sup> session in Kenya<sup>1</sup> declared in its Global Environment Outlook (GEO), that Africa's ecological base was fragile and under various threats, *e.g.*, unsustainable exploitation and degradation of forests, soils, wildlife, fresh-water and other natural resources, which threaten to undermine the region's economic development prospects. It went on to show that most African economies were critically dependent on maintaining ecological integrity and many sectors of these economies were directly dependent on environmental goods and services. It maintained that the causes of Africa's environmental problems are many, complex, interrelated (*e.g.*, Africa lost 39 million hectares of tropical forest during the 1980s and another 10 million hectares by 1995), including drought, pollution, debts-burden and dwindling economies (economic growth in at least half of the region remained below 2 per cent per year, measured in GDP, while human population has grown at an average of 4 per cent per year in the last two decades).

### **Environmental and socio-economic context of West Africa**

West African environment, socio-economics and biodiversity in the last century have been dynamic, with rapidly increasing degradation, conversion of protected areas to agricultural, and rapid urban development being just some of the threats.<sup>2</sup> These trends of environmental perturbations and survivalists' activities are the result of uncontrolled and rapid population growth, increasing poverty and desperation, as well as ambitious but often illegitimate economic policies and priorities of various regimes. Pursuance of livelihoods

activities in parts of West Africa have led to rates of deforestation in excess of 3 per cent per year.<sup>3</sup>

Table 1 shows the land area and basic growth statistics for West African states as of 2004 while Table 2 shows the current forest estimates for each country. What is left of the West African natural forests and habitats are mostly within the territories of many somewhat nominal, plus a few well managed, protected areas. Most of the remaining forests estate is highly fragmented and scattered across national borders without foreseeable possibilities for natural or facilitated amalgamation.

In addition, desertification poses a daunting challenge to the northern portion of West Africa. As an example, Nigeria has experienced enormous rates of desert encroachment in the last quarter of the 20<sup>th</sup> century. The semi-arid zone, which comprises the Sudano-sahelian region, is by its nature and characteristics the most susceptible sector to desertification— a phenomenon which is bound to accelerate with global warming and climate change impacts. The entire zone is particularly vulnerable to climatic and human pressures arising from rapidly increasing pursuits of biofuel, and requires urgent attention so as to ensure the semi-arid zones continue to support the socio-economic aspirations of the region where climate change phenomena are currently largely regarded as 'fairy tale'. Unfortunately, the extent and severity of desertification in West Africa has not been fully established nor the rate of its progression properly documented. Nevertheless, it is estimated that the region is currently losing more than 1.5 million hectares of its landmass to desert conditions annually.

**Table 1.** West Africa Basic statistics

Country	Land Area (1000 ha)	Total population (1000)	Population Density (Population/Km <sup>2</sup> )	Annual Growth Rate (%)	Per capita Income (US\$)	Annual Growth Rate (%)
Benin	11,062	6,890	62.3	2.5	389	2.7
Burkina Fasso	27,360	12,387	45.3	2.3	257	3.9
Cape Verde	403	481	119,4	2.5	1328	5.5
Cote d' Ivoire	31,800	17,142	53.9	1.8	583	-2.3
Gambia	1000	1449	144.9	1.9	344	8.3
Ghana	22,754	21,053	92.5	1.8	285	5.2
Guinea	24,572	8073	32.9	2.1	433	2.6
Guinea Bissau	2812	1533	54.5	2.9	137	4.3
Liberia	9632	3449	35.8	2.2	120	2.0
Mali	122,079	11,937	9.8	2.4	260	2.2
Niger	126,670	12,095	9.6	2.8	174	0.9
Nigeria	91,077	139,824	153.5	2.4	361	3.6
Senegal	19,253	10,455	54.3	2.1	504	6.0
Sierra Leone	7162	5436	75.9	1.9	206	7.4
Togo	5439	4966	91.3	2.1	294	3.0

**Table 2.** Total forest area and area change of West Africa

Country	Forest Area -1000 ha	% of land area	Area per capita (ha)	Forest plantations (1000 ha)	1990-2000 (1000 ha)	2000-05 (1000 ha)
Benin	2351	21.3	0.3	-	-65	-65
Burkina Fasso	6794	29	0.5	76	-24	-24
Cape Verde	84	20.7	0.2	84	2	N.S
Cote d' Ivoire	10405	32.7	0.6	337	11	15
Gambia	471	41.7	0.3	-	2	2
Ghana	5517	24.2	0.3	-	-135	-115
Guinea	6724	27.4	0.8	33	-50	-36
Guinea Bissau	2072	73.7	1.4	-	-10	-10
Liberia	3154	32.7	0.9	-	-60	-60
Mali	12,572	10.3	1.1	-	-100	-100
Niger	1266	1	0.1	-	-62	-12
Nigeria	11,089	12.2	0.1	349	-410	-410
Senegal	8673	45	0.8	365	-45	-45
Sierra Leone	2754	38.5	0.5	-	-19	-19
Togo	386	7.1	0.1	38	-20	-20
<b>Total W.A.</b>	<b>74,312</b>	<b>14.9</b>	<b>0.3</b>		<b>-985</b>	<b>-899</b>
<b>Total Africa</b>	<b>635,412</b>	<b>21.4</b>	<b>0.7</b>		<b>-4375</b>	<b>-4040</b>

West Africa has witnessed political instability and anarchy in recent years, *e.g.*, in Cote d'Ivoire, Gambia, Liberia, Niger and Sierra Leone where millions of people have become displaced as refugees which further exacerbate pressures to threatened natural ecosystems. Ongoing conversion of wetlands by draining or in-filling negatively affects environmental values, *e.g.*, altering hydrological regimes such that they no longer provide desirable ecosystem services. Untreated effluents from domestic and industrial sources have polluted coastal wetlands for example in Lagos, Nigeria.

Furthermore, rapid population growth and urbanisation has created a number of very large cities with over-stretched infrastructures with attendant social problems. A number of West African cities straddle coastal wetlands which have been degraded by unplanned conversion and are thus currently incapable of providing the environmental services suitable for ameliorating or mitigating climate change impacts, *e.g.*, sudden increases in sea levels. West African coasts have witnessed a phenomenal invasion by alien invasive species of plants and wildlife including rodents, insects, birds and fishes. Among the notable invasive plants are Nypa palm (*Nypa fruticans*) and Water Hyacinth (*Eichornia gracipes*) which are threatening the coastal stabilisation functions of mangrove forests in Western Africa.

### **Location, size and biodiversity of Nigeria**

Nigeria is located in West Africa, between latitudes 4°N and 14°N and longitudes 2° 2' and 14° 30' East with a total land area of 923,773 km<sup>2</sup> and a population of over 150 million. Nigeria is bordered by the Republics of Niger and Chad to the north and to the south

by the Atlantic Ocean, whilst the east and west are bordered by the Republics of Cameroon and Benin. By virtue of its spatial extent, Nigeria has various climatic regimes and physiographical units giving rise to a variety of ecological zones. Vegetation ranges from lush forests in the south to Guinea savannahs in the middle-belt; Sudan savannah in the north and Sahelian savannah in the extreme north. Nigeria has a network of protected areas which includes a Biosphere Reserve, eight National Parks, 445 Forest Reserves, 12 Strict Nature Reserves, 28 Game Reserves and a number of yet to be gazetted Wildlife Sanctuaries. Nigerian National Parks cover approximately 2.4 million hectares with rich biodiversity. About 7,895 plant species have been identified in 338 families and 2,215 genera; 22,000 vertebrates and invertebrates species (including about 20,000 insects) have also been described. There are 1,000 birds species, 1,000 fish, 247 mammals and 123 reptiles of which 0.14 per cent are threatened and 0.22 per cent endangered.<sup>4</sup>

In efforts to fulfil several international conventions which she is signatory, Nigeria has established eight national parks which are managed by the Nigerian National Parks Service (NNPS). These have been strategically selected and located to represent the different ecological strata of the country, with the exception of mangrove forests. All are vulnerable to global warming, climatic change, human pressures and their associated impacts, including large-scale coastal erosion, deforestation,

*Nigerian protected areas are unlikely to deliver or fulfil adequately, their ecosystem services in the light of the emerging global warming and climate change paradigm.*

industrial pollution, political instability and failing infrastructures. Under such pressures and threats, Nigerian protected areas are unlikely to deliver or fulfil adequately, their ecosystem services in the light of the emerging global warming and climate change paradigm.

Since Nigeria exhibits the general socio-ecological trends of most West African nations, it can be used to draw conclusions and recommendations for West Africa as a whole. It is obvious that problems of sustainable protected area management need to be addressed in a holistic manner in order to ensure that different ecological zones continue to support human aspirations and natural resources sustainability. The following sections highlight the extent and severity of the problems and national efforts to address them; existing policies as well as proposed strategies for effective delivery of the various international environmental policy mandates arrived at separately in Rio, Kyoto, Durban and Bali with observable high points and associated paradoxes are also discussed.

### **Nigerian national policy on the environment**

In 1989, Nigeria launched a national policy on environment which elaborates sectoral and cross-sectorial policies on control and sustainability and clearly stipulates synergies with other sectors and sub-sectors relating to population, culture, human health, settlements, biodiversity, conservation of natural resources, agriculture, water resources, forestry, wildlife and protected areas, minerals, energy, education, science and technology, and the cross-sectorial issues of public participation and synergy. Since the Earth Summit (WSSD) in Rio de Janeiro, Nigeria has made significant efforts in policy reviews to address environmental and sustainable

development issues, which were identified and agreed upon at the United Nations Conference on Environment and Development (UNCED). Table 3 shows international conventions which Nigeria and other West African nations have ratified in favour of environment, biodiversity and development.

### **Institutional Framework**

To fulfil these conventions a legal framework is needed which will ensure an enabling environment for success. In Nigeria attempts to establish this have been made and relevant legislations and laws enacted. However, the most significant of these laws in relation to environmental protection and control are the Forestry and Protected Areas Laws most of which are ineffective, outdated, ambiguous and require urgent review. Several institutional arrangements have been put in place for the management of matters relating to population, health and environment and many environmental, biodiversity conservation and intergovernmental organisations work in the country. The government has also interacted with civil society organisations such as the Biodiversity Preservation Center (BPC) and the Nigerian Conservation Foundation (NCF), among others.

However, despite the overwhelming endorsement and ratification of the majority of global environmental mandates by Nigeria and other West African governments, these endorsements have not necessarily been translated into actual implementation of key obligations. As an example, most West African governments having ratified the CBD are yet to implement several obligations contained in it including a clear understanding of objectives 2 (the sustainable use of biodiversity) and 3 (fair and equitable sharing of the benefits). This lack of implementation



**Table 3.** Ratification of international conventions and agreements by West African countries as at 1st January 2007

Country	CBD	UNFCC	KYOTO	CCD	CITES	Ramsar	World Heritage
Benin	Y	Y	Y	Y	Y	Y	Y
Burkina Fasso	Y	Y	Y	Y	Y	Y	Y
Cape Verde	Y	Y	Y	Y	Y	Y	Y
Cote d' Ivoire	Y	Y	N	Y	Y	Y	Y
Gambia	Y	Y	Y	Y	Y	Y	Y
Ghana	Y	Y	Y	Y	Y	Y	Y
Guinea	Y	Y	Y	Y	Y	Y	Y
Guinea Bissau	Y	Y	Y	Y	Y	Y	Y
Liberia	Y	Y	Y	Y	Y	Y	Y
Mali	Y	Y	Y	Y	Y	Y	Y
Niger	Y	Y	Y	Y	Y	Y	Y
Nigeria	Y	Y	Y	Y	Y	Y	Y
Senegal	Y	Y	Y	Y	Y	Y	Y
Sierra Leone	Y	Y	Y	Y	Y	Y	Y
Togo	Y	Y	Y	Y	Y	Y	Y

of international agreements was made clear in the case of Nigeria when, at the 55<sup>th</sup> meeting of the standing committee of CITES held at The Hague,<sup>5</sup> Nigeria was identified as one of the nations yet to make significant progress in developing legislative processes towards establishing national laws for implementation of CITES convention—despite ratifying the convention more than two decades ago.

This situation is largely due to a number of underlying impediments

*This renders the ratification of global environmental policy mandates mere ceremonial obligations that leave much to be desired.*

such as lack of funding, capacity for effective implementation, appropriate technology, an enabling political climate and will— *i.e.* bureaucratic “bottle necks” as well

as endemic corruption. This renders the ratification of global environmental policy mandates mere ceremonial obligations that leave much to be desired, with most countries still on the “drawing board” in pursuance of crucial policy directions.

### **Assessing Nigeria’s drive towards mitigation and adaptation to climate change**

Although implementation of international agreements has been slow, many countries have tried to realign policy directions. In responding to the challenge of global climate change shortly after UNCED, Nigerian government policy focused on protecting the atmosphere included conscious efforts aimed at: phasing out the consumption of ozone depleting substances (ODS); monitoring background atmospheric pollution and total column ozone; data bank automation; a greenhouse gas inventory;



Picture 1. Community consultation in the buffer zones of a national park (Courtesy Nigel Dudley, Equilibrium Research)

climate change research and training; promotion of environmentally friendly energy practices; and participation in Global and regional Earth-system (Atmosphere) Monitoring using Satellite and in-situ data project. The strategy developed aims to single out sources of gaseous emissions and maintain them at levels of full compliance by 2010. These strategies include:

- ▷ Review of existing national guidelines and standards to include vehicles, generators, aircrafts etc.
- ▷ Intensify public enlightenment campaigns at all levels on benefits of adequate maintenance, retrofitting, adopting effective technology, ensuring efficient energy use, and increased cost benefit.
- ▷ Maintain effective databases on industries and their compliance status.
- ▷ Maintain a register of technologies, vehicles, generators, and aircrafts for approval, manufacturing and importation.
- ▷ Introduce and enforce emission control certificates for vehicles, generators, and aircrafts by 1999.
- ▷ Eliminate ozone-depleting substance (ODS) consuming processes.

- ▷ Enforce laws relating to localisation of new industries.
- ▷ Install a minimum of primary treatment for all new industries.
- ▷ Build secondary central treatment facilities in all major industrial estates across Nigeria by 2005.
- ▷ Invoke the polluter pays principles.
- ▷ Ensure 100 per cent waste segregation, recycling and re-use by 1999.
- ▷ Promote research in Best Available Technology Effective for Local Adoption (BATELA).
- ▷ Make eco-labelling compulsory for all products by 2000.
- ▷ Promote commercialisation of sanitary landfill and incinerators.
- ▷ Encourage citizen empowerment in pollution control.
- ▷ Introduce green technologies and promote Environmental Management Systems (EMS) in all industrial facilities.
- ▷ Create an environment fund for soft loans as economic incentives for environmentally friendly industries.
- ▷ Promote tax rebates for industries installing pollution abatement facilities.

As ambitious as the outlined plans appear, implementation has remained largely a mirage. The Nigerian urban and natural environment has witnessed greater pollution than ever before. For example, the amount of greenhouse gases generated has escalated with more sectors depending excessively on generators for electricity since hydro-electricity output has dwindled in recent years. In today's Nigeria, it is not only fashionable to own and run generators but it makes business sense as well as it reduces the stigma of being lower on the economic ladder. Recent years have witnessed massive efforts to reinvigorate the hydro-electric sector but

*The blame for this appalling situation can not be put on Nigeria alone but on all countries, bilateral and multilateral organisations, religions and cultures that have largely refused, or remain complacent, in contributing their quotas or responsibilities in the ecological chain of collective environmental protection.*

efforts have largely been submerged by endemic corruption in high places. The plans to develop and harness solar energy have remained largely elusive. Nigeria also has many "over-aged" second-hand automobiles that have high carbon emissions which are rejected in the west but shipped to Nigeria despite import restrictions. Such "outdated" vehicles emit obnoxious gases such as carbon dioxide, nitrous, and sulphur oxides (CO, NO<sub>x</sub>, SO<sub>x</sub>), volatile organic compounds (VOC), hydrocarbon, ODS, smoke and particulates.

The blame for this appalling situation can not be put on Nigeria alone but on all countries, bilateral and multilateral organisations, religions and cultures that have largely refused, or remain complacent, in contributing their quotas or responsibilities in the ecological chain of collective environmental protection.

A similar trend can be seen in Nigeria's future strategy for the petroleum sector, which aims to:

- ▷ Develop and implement environmental assessment methodologies, taking into account economic, socio-cultural and conservation values of the environment.
- ▷ Develop a comprehensive set of measures to mitigate negative impacts.

- ▷ Ensure strict compliance with Environmental Laws.
- ▷ Implement Health, Safety and Environmental Management Systems and Quality Assurance Control.
- ▷ Establish comprehensive waste management programmes.
- ▷ Implement and continually update fully operational oil spill prevention programmes.
- ▷ Enforce environmental risk assessment, to predict eventual consequences of accidents and take mitigation measures.
- ▷ Design appropriate facility and operational procedures.
- ▷ Implement and continually update the national oil spill contingency plan for control, containment, and cleanup.
- ▷ Review and implement procedures to adequately address in timely manner damage to third parties.
- ▷ Encourage the general public to report emergency incidents to regulatory bodies.
- ▷ Ensure an internal and external market for gas.
- ▷ Stop gas flaring.
- ▷ Create public awareness programmes.
- ▷ Ensure full compliance with legislations, regulations and standards of the Ministry of Environment and Department of Petroleum Resources.
- ▷ Plan long-term rational exploitation of both oil and gas reserves and draw up investment strategies.

To date, reduction in gas flaring has remain a mirage with little hope to attain this dream in the near future. The issue of oil spillages and preparations to contain its associated hazards in the event of such incidents remains highly elusive. It will be absurd for the world to blame



Nigeria alone for failing in this onerous task; rather the blame should go to all nations involved in the oil business (from prospecting to final consumption). Education is fundamental to sustainable development; and no meaningful environmental conservation can be achieved in West Africa except through effective conservation education at all levels.

*No meaningful environmental conservation can be achieved in West Africa except through effective conservation education at all levels.*

### Progress towards a sustainable future

Some progress however has been made, as noted above the phasing out of ODS in Nigeria has been given priority among the programmes being implemented by the Federal Ministry of Environment. On-going activities include: a) preparation of a programme for ODS phase-out with a grant of US\$120,000 from the Multilateral Fund (MF); b) chlorofluorocarbons (CFC) phased-out by targeted companies, with a grant of US\$2,840,598 from the MF; c) CFC phased-out in four flexible and rigid foam industries, with a grant of US\$540,000 from MF; and d) institutional strengthening for the phase-out of ODS with a US\$3,000,000 grant from MF spread over three years to assist Nigeria setting up an effective and lasting institutional mechanism for coordinating national efforts for the protection of the ozone layer.

In 1993, Nigeria established a Regional Environmental Monitoring Station at Oshogbo under the auspices of Global Atmospheric Watch

(GAW) programme of the World Meteorological Organisation (WMO). The station monitors background atmospheric pollution, covering 15 elements including surface ozone carbon dioxide, chemical composition of rain water, dry and wet depositions, dust loading, solar radiation, and other conventional meteorological elements. The station has the potential of being upgraded to a global station capable of monitoring other greenhouse gases, such as nitrous oxides (NO<sub>2</sub>, NO), methane (CH<sub>4</sub>), and sulphur; but the need for capacity remains.

GEMS/Air Nigeria is a component of the Global and regional Earth-system (Atmosphere) Monitoring using Satellite and in-situ data (GEMS) project whose specific goal is to monitor and assess urban air quality. The programme, which commenced in 1995, focuses on: a) air pollution in major cities; b) capacity building through training and provision of laboratory equipment; and c)



Picture 2. Djoudj National Park, Senegal, a low-lying area of wetland close to the border of Mauritania, which will be profoundly affected by climate change. The nearby town of St Louis is one of the places in Africa believed to be more threatened by sea-level rise. (Courtesy Nigel Dudley, Equilibrium Research)

establishment of emission pathways in order to evolve spatial and temporal emission models for urban centres in Nigeria.

Government developed environment friendly technologies in the energy sector includes plans to produce and distribute 15,000 solar water heaters, 450 solar stills, 225 solar dryers, 1,000 village wind energy projects, 11,000 photo-voltaic water pumping stations, 2,000 village solar projects and 20,000 solar powered refrigerators for rural health centres. However, while these are all laudable steps in the right direction they amount to a drop in the ocean given the impending climate change impacts.

### **Sharing responsibilities— the need for a common 'energy' language**

Wood, petroleum, coal, gas and water are the main energy sources in the country. The bulk of Nigeria's population still depends extensively on wood for energy, despite the country's many other resources. The principal mineral resources include fossil fuels (petroleum, natural gas, coal and lignite), metallic minerals (tin, columbite, zinc, gold), radioactive minerals (e.g. uranium and monazite), among others. The oil and gas sector is the backbone of Nigerian economy, contributing over 90 per cent of the nation's foreign exchange earnings and at least 80 per cent of GDP. However, harnessing and trading this mineral wealth has often been to the detriment of Nigeria's agricultural productivity until expelled farmers from Zimbabwe arrived on the scene.

Consequently, food imports worth billions of US dollars have continued to increase with attendant price rises.

Yet Nigeria dived without caution into biofuel production in the guise of pursuing green energy. Many industries promoting biofuels have emerged boasting of creating employment and are converting large areas of natural ecosystems for oil palm plantations, cassava and other commercial farms. Community lands have been taken over by these projects leaving local people with no viable options to survive the increasing cost of food except but to invade protected areas and their buffer zones for survival. Nigerian protected areas are bound to face a major challenge from increasing illegal activities by communities, but the country is in dire need of a system of protected well-managed landscapes to naturally mitigate and adapt to the impending impacts of global climate change.

Apart from the large scale conversion of natural ecosystems, an unpleasant side effect of biofuel industrialisation is the use of arable land for food production, the conversion of potential human food resources to bio-fuel and the waste (liquid, gaseous, noise, heat and solid) generated from industrial processes. Several reports confirm the non-inclusion of waste management provisions in projects and associated industries within Nigeria.<sup>6</sup>

*One cannot sincerely expect Nigeria alone to abandon its quest for national income in the face of environmental challenges.*

One cannot sincerely expect Nigeria alone to abandon its quest for national income in the face of environmental challenges. Thus, the issues highlighted above are likely to continue unchallenged into the future unless all parties involved in the "Energy Chain"

begin to make conscious and practical efforts to speak a common language based on common concerns and understanding.

### Conclusion

Generally speaking, an indepth consideration of Nigeria's preparation and readiness to adapt or mitigate climate change impacts will show that it is strategically disadvantaged and far from ready to fulfil its expected role as a signatory nation to global environmental conventions. However, climate change and its associated negative impacts are

*One way to commence the long arduous journey to climate change mitigation and adaptation is for IUCN to use its 'intellectual musoles' and its connections across the globe to strategically pursue capacity-building, education, training and awareness-raising in a more proactive manner.*

glaring realities in all continents. The need to determine and foster integrated strategies for ameliorating and mitigating its impacts has never been greater than it is today.

IUCN can play a role in the development of these strategies. One way to commence the long arduous journey to climate change mitigation and adaptation is for IUCN to use its 'intellectual mus-

cles' and its connections across the globe to strategically pursue capacity-building, education, training and awareness-raising in a more proactive manner, carefully carrying along divergent views, opinions and stakeholders from all nations and peoples.

Specifically, IUCN must work to ensure that biofuels proponents and

collaborating governments come to understand the consequences of using potential human foods and farmlands to produce biofuels at the expense of human nutrition. They should work to encourage biofuel businesses to use non-food plants like the invasive *Nypa palms* (*Nypa fruticans*) and Water

Hyacinth (*Eichornia gracipes*), as well as crop residues, biogas from household and livestock wastes, industrial waste and food company by-products which are cheaper yet yield high quantity and quality biofuel.

Regarding the need to ensure the future of our protected areas, in the face of the many challenges elaborated above, IUCN should shift a 'policy gear' and form a Working Group to develop a "World Protected Area Conservation Barometer", functioning in a similar manner to the Red Data List. It could categorise the world's protected areas in accordance with their functional conservation achievements or values, conservation status, threats and level of management, protection and funding. This publication could be called the "IUCN Red Data List of Threatened Protected Areas" and could be placed at the disposal of governments, donors, NGOs, bilateral and multilateral organisations, all protected areas stakeholders and general public to engender effective and integrated protected area conservation around the world.

*IUCN must work to ensure that biofuels proponents and collaborating governments come to understand the consequences of using potential human foods and farmlands to produce biofuels at the expense of human nutrition.*

With help from the international community, Nigeria, and indeed all West Africa countries, could then become ready before the 6<sup>th</sup> World Parks Congress, to answer daunting questions such as:

- ▷ How can IUCN and its Commissions encourage or facilitate the implementation of key global environmental mandates by nations who ratified them?
- ▷ Who plays what role/s, at whose expense and at what costs?
- ▷ What types of early warning systems are needed to better predict environmentally-linked disasters and to mitigate their most harmful effects?
- ▷ How can environmental restoration be promoted as part of disaster prevention strategies, particularly in the face of climate change?

**Edem A. Eniang** (eniangedem@yahoo.co.uk) is affiliated to the Dept. of Forestry and Wildlife, University of Uyo, Nigeria; the Dept. of Animal, Rangeland and Wildlife Sciences, Mekelle University, Ethiopia and Biodiversity Preservation Center (BPC), Cross River State, Nigeria.

## Notes

- 1 UNEP 2001.
- 2 IUCN 2000.
- 3 FAO 2007.
- 4 IUCN 2004.
- 5 CITES 2007.
- 6 APIC 1996 and ECA 2007.

## References

- Raufu, A. Activists raise alarm against poaching of wildlife in Nigeria's forests land. *The Earth Times*. 2000.
- APIC. *Nigeria. Country profile*. Nigeria page of APIC's strategic action Issue areas. 1996.
- CITES. *Convention on international trade in endangered species of wild fauna and flora. 55<sup>th</sup> meeting of standing committee*. The Hague (Netherlands). 2<sup>nd</sup> June, 2007.

- DFID. *Biodiversity: A crucial Issue for the worlds' poorest*. Issues. URL: [www.dfid.gov.uk/public/what/advisory/group6/rld/rnrr.html](http://www.dfid.gov.uk/public/what/advisory/group6/rld/rnrr.html). 2002.
- ECA. Nigeria. Mainstreaming trade policy into national development strategies. *African trade policy (ATPC) work in progress*. No. 52, pp54. 2007.
- FAO. Forestry Outlook. Study for Africa. *FAO Forestry paper 141*, Rome. 2003.
- FAO. State of the Worlds' Forest 2007. *FAO Reference Document*. 44pp. 2007.
- FEprotected area. *Coastal Profile of Nigeria. FEprotected area - Large Marine Ecosystem Project for the gulf of Guinea*. Centre for Environment and Development in Africa. 1997.
- FEprotected area. *National Biodiversity Report. Federal Environmental Protection Agency*. 42pp. 1999.
- FGN. Combating desertification and mitigating drought in Nigeria. National Report to the UN conference on implementation. A presentation to the third session of the conference of the parties, Recife, Brazil. 36pp. 2007.
- IFAD. *Enabling the rural poor to overcome poverty in Nigeria*. IFAD and Poverty. URL: <http://www.ruralpovertyportal.org>. 2006.
- IUCN. *Protected Areas: Benefits beyond boundaries: WCprotected area in Action*. IUCN Gland, Switzerland and Cambridge, UK. 1-19pp2000.
- IUCN. *Threats to Biodiversity in Western Africa*. Gland, Switzerland. 2000.
- IUCN. *2004 IUCN Red Data List of Threatened Species*, URL: [www.redlist.org](http://www.redlist.org). 2004.
- IUCN. *Benefits beyond boundaries: Proceedings of the 5<sup>th</sup> IUCN World Parks Congress*. Gland, Switzerland and Cambridge, UK, ix+306pp. 2005.
- PRDI. Participatory research and development initiative. Equity and justice working group. January 2008. URL: [www.prdibd.org/](http://www.prdibd.org/) [www.equitybd.org](http://www.equitybd.org). 2008.
- Shamsuddoha Md and R K Chowdhury. *Political economy of Bali climate conference: A roadmap of climate change negotiation held in Bali, Indonesia. December, 2007*. 2008.
- UN. *Nigeria: National implementation of Agenda 21. Review of progress made since the UN conference on environment and development*. 113pp. 1997.
- UNEP. *Policy Issues: Emerging Policy Issues*. A discussion paper. UNEP/GC.21/5. Global Ministerial Forum. 5-9<sup>th</sup> February, 2001, Nairobi, Kenya. 2001.



## Land-use in Wales under a zero-carbon strategy— the role of bioenergy and carbon sequestration

Peter Harper

**Abstract.** 'Decarbonisation' will necessitate a rapid and radical reorganisation of priorities in many aspects of economy and culture, including farming and land-use. But how will this be achieved? The following paper discusses such a change in the context of Wales, a small country in the West of the UK with a relatively low population and large areas of farmland and mountains. It attempts to map out some principles for resolving conflicts, first by seeking synergies, then by a reasoned ranking of priorities. There is also a clarion call for a range of research programmes that should be brought urgently forward as a kind of insurance policy against the possibility that the results are suddenly be needed.

### Introduction

It is increasingly acknowledged that rapid 'decarbonisation' of the world economy is necessary to avoid risks of triggering runaway feedback effects in the global climate system. Less widely acknowledged is the sheer scale and pace of change this would entail for the rich countries, which would have to decarbonise more rapidly than the world average, perhaps by 100 per cent. There is a compelling case for rapid and radical reorganisation of priorities in many aspects of economy and culture, including farming and land-use. In practice of course this is unlikely to happen until some dramatic event convinces everyone that there is no alternative, and precipitates a general realignment of purpose.

Unfortunately, if and when this 'event' occurs, much important information will be missing because research priorities by and large reflect those of the wider community. Poor decisions will be made on account of a lack of reliable data regarding the new methods and systems that will be required in a radically low-carbon economy. The research community has some responsibility to anticipate the likely needs and start exploring the implications of the new

low-carbon world, at least as a kind of insurance policy.

A report from the Centre for Alternative Technology (CAT) in Wales, UK, *ZeroCarbonBritain*, looks at some of the options, looking in particular at the consequences for Wales (a small country in the West of the UK with a relatively low population and large areas of farmland and mountains), where CAT is based.

In particular the report identifies a hugely increased role for bio-energy sources, although paradoxically large sections of the environment movement are now calling for a moratorium on the production of liquid biofuels. Under almost any conceivable economic scenario in the future carbon prices will rise, and there will be financial incentives for low-energy, low-carbon, carbon-displacing or carbon-sequestering activities, and many of these activities have a bearing on agriculture, forestry, land use generally, and the food system.

*Low-energy, low-carbon, carbon-displacing or carbon-sequestering activities, and many of these activities have a bearing on agriculture, forestry, land use generally, and the food system.*



Possibly the most radical and disruptive conclusion to emerge from the *ZeroCarbonBritain* analysis is the need for a major reduction of livestock. The reasons are twofold. First, that the ruminants are net emitters of greenhouse gases (GHGs), particularly the disproportionately powerful pair, methane and nitrous oxide, and there is little prospect of reducing emissions per kg of product by more than 30 per cent, and probably much less. Although their contribution is 'only' between 5 and 10 per cent of current emissions (depending on assumptions and methods of calculation: the Food and Agricultural Organisation of the UN gives >20 per cent at a world level) this proportion will obviously grow as other sources are reduced, and would eventually become a bizarre barrier to the achievement of the zero-carbon state. Second, animals are rather inefficient converters of crops to other products, and the intense demand for land for many purposes will tend to price them out of all but a few special agricultural and economic niches.

Let us hasten to say this will not happen immediately, nor even very quickly. The non-CO<sub>2</sub> GHGs tend to be ignored in international negotiations, and are hard to measure and control (especially in agriculture). Further, animals are so embedded in culture, diet, heritage and farming systems that there would be extreme reluctance to follow the logic. We simply like them too much. And a higher consumption of animal products has historically gone hand in hand with the modernisation process that the majority of humanity is still undergoing. So in accepting (and, in effect, advocating) a major reduction of ruminants we are going against both sentiment and history.

Nevertheless we (the author's research community) feel it necessary to follow

the logic ourselves, or carbon-mitigation policy remains a fatally leaky vessel. Even if, in the event, we (the UK policy-making community) do not have to implement it, **we should plan for an essentially post-livestock**

*we should plan for an essentially post-livestock pattern of land-use in the UK, even in traditionally livestock-specialist areas such as Wales.*

**pattern of land-use in the UK**, even in traditionally livestock-specialist areas such as Wales. In the more extreme low-carbon scenarios, land will have to be used very intensively, probably with the following ranked purposes:

1. Conservation of intact forest and other vulnerable GHG reservoirs
2. Production of low-emission foodstuffs
3. Renewable production of carbon-sequestering raw materials
4. Sequestration in biomass and soils
5. Production of low-carbon materials and energy
6. Habitat creation and conservation of biodiversity
7. Recreation and landscape values

There are many potential synergies here, and they should always be sought through intelligent planning and technology. But there will also be competition for land for different uses. I do not want to over-emphasise the competitive aspect, but I think this slightly provocative approach will better stimulate debate.

The result of following these re-ordered priorities would be a substantial revolution in land-use, in farming practice, in the appearance of the countryside, and in the food system as a whole. It could be driven by regulation, but more likely by an international emissions-pricing system that we might call 'carbonomics'.

There will be a particularly important role for sequestration processes. The reason for this is that achieving zero-

*The only way zero-GHG could be achieved would be through the balancing of sources with sinks.*

GHG emissions is extremely difficult, and many processes would remain net emitters. The only way zero-GHG could be achieved would be through the balancing of sources with sinks.

Natural sinks appear to be declining, and will have to be replaced by engineered or managed sinks. Presently the only effective managed sinks are those based on photosynthesis, and they are primarily terrestrial. The rate of photosynthesis is limited and the generation of products for either energy or sequestration requires large areas (relative to, say wind generators or photovoltaics on the same site). Therefore photosynthesis for sequestration would tend to compete with other demands for photosynthetic products. Nevertheless these managed sinks are mathematically essential and under the new carbonomic regime would be extremely valuable.

Let us review the ranked land uses one by one, considering the broader world picture followed by application to the UK and more specifically Wales.

### **Conservation of forests and other natural reservoirs**

Note the distinction between 'sink' and 'reservoir' in this paper. A reservoir is a natural repository of GHGs, mostly pre-existing. A sink is an active process that absorbs GHGs, becoming also a reservoir.

Release of CO<sub>2</sub> and other GHGs from natural reservoirs through processes such as clearing forests and disturbing peatlands accounts for up to a quarter of current world GHG emissions. In

their intact state they also have important value for biodiversity and might also be active sinks. Further, they play a large and incompletely-known role in local, and possibly global, climate regulation. It is imperative that these reservoirs are conserved, and incentives found for maintaining their integrity.

This is particularly true for the tropics, but temperate forests also have value as reservoirs. There are of course virtually no primary forests in the UK, but there are important areas of peat that need careful consideration. Across Wales we would need to identify the vulnerable reservoirs and take steps to safeguard them.

### **Production of low-emission raw materials for food**

By this convoluted phrase I mean to cover both obvious food crops and other inputs to the food industry such as oils and starches. Clearly food has to rank high in the priority list, although in the globalised world of the early 21<sup>st</sup> century that is not a foregone conclusion for every country. For most European countries and Japan, agriculture accounts for such a small percentage of GDP that in strict economic terms it could easily be dispensed with, and all food imported.

If the logic of my argument is accepted there is likely to be strongly increasing pressure on land, with consequent rises in food prices. Tropical systems and soils are often fragile and prone to disruption by extreme weather events. There will be a premium on robust temperate soils, and in the UK it would be as well to look after them.

*There will be a premium on robust temperate soils, and in the UK it would be as well to look after them.*

There probably will be risks to food security in the coming decades, and



Picture 1. Cattle in Snowdonia National Park, Wales (Courtesy Nigel Dudley, Equilibrium Research)

it would be good insurance for the UK to reduce its dependency on imported foods. In fact in some circumstances the UK might become a net exporter.

All this assumes a very substantial reduction in livestock. Animals are not low-emission sources of food, and neither do they use land efficiently, so (assuming that the broad climate change analysis is sound) 'carbonomics' will tend to drive them out of the system. Where might they survive? Here are some suggestions (not ranked):

- ▷ Where stock can be shown to improve overall performance of farms under carbonomic rules. Mixed farming is rightly considered to be a cornerstone of organic practice, and its loss would be one of the harshest consequences of the new carbonomics. We would have to look carefully whether in specific cases rotations that include stock actually improved the overall performance of a farm in carbonomic terms. Sometimes, they might. Another possibility might be non-ruminants in agroforestry systems.
- ▷ Non-ruminant stock fed on by-products. This is more feasible, since pigs and poultry are not high emitters

of methane, although there is still a potential problem of manure management and nitrous oxide. If this latter problem can be solved there is scope for animal production from say press-cake, fermentation wastes, catering wastes etc. A school for instance might have a pig, fed on animal-free food waste, consumed at one almighty annual feast. Backyard poultry might make a comeback. And the dove-cote perhaps. One imagines that under these radically different circumstances legislation such as the UK Animal By-Products Regulations restricting the use of food waste for animal feeds will have been amended or rescinded altogether.

- ▷ Managed grazing of habitats for conservation and other values. The local benefits and non-local disbenefits would have to be evaluated in each case.
- ▷ In marginal areas where absolutely nothing else is feasible. This might be thought to apply to upland sheep, but if (according to carbonomic rules) each livestock unit needs to be balanced by an active sink, even these might not be economically viable. The same argument applies to small numbers of ruminants kept by farmers for domestic use and fed off by-products such as press-cake from fuel crops. In principle, farmers could provide their own balancing sinks on the farm, but these sinks are likely to be so valuable that they would be 'bought out' by other demands.
- ▷ As conserved populations of 'rare breeds'. Perhaps in towns where they could be seen and appreciated, as in 'City Farms'. Paradoxically people might have *more* contact with farm animals under this arrangement.
- ▷ As status symbols for extremely wealthy owners who can afford to buy offsetting sinks.

- ▷ Wild animals. Currently wild animals are not widely used, but if farm animals become rare there is likely to be greater pressure on deer, boar, rabbits, hares and even squirrels. And wild fish of course. Eventually regulation and conservation measures might be necessary, as presently for game birds.

A more food-self-reliant Britain would easily produce enough basic foodstuffs. Presently less than 25 per cent of UK agricultural land is devoted to crops, and of this some is forage for animals. The reduction of livestock would free large areas of land for other uses. In Wales, and the west generally, agriculture is dominated by grass and grazing, and these would be the areas most strongly affected by low-carbon drivers. There would be a question of regional as well as national self-reliance in foods, given that transport fuels would be expensive. New food industries might well emerge to process raw materials into more acceptable forms. High-tech meat-like materials (*in vitro* production of muscle tissue using plant-protein feedstocks for example) are a strong possibility, posing a curious choice for some vegetarians.

Should low-carbon agriculture be organic? It is widely claimed (and assumed as a given in the movement itself) that organic production has lower GHG production than conventional farming. This is disputed, and it is difficult to disentangle the real evidence from the inevitable biases. Broadly, organic practice avoids the energy penalty, and some of the nitrous-oxide emissions, of the production of Haber-Bosch nitrogen, but has lower yields. Therefore although the inputs are lower, so are the outputs, and in consequence emissions per kg of useful product are often little better than conventional levels, and in some cases worse. This needs further study.

We also need further study of the nitrous oxide implications of various manuring processes including animal manures, compost of various kinds, green manures and the use of legumes to fix atmospheric nitrogen. This is urgent for the guidance of sound low-GHG policy.

There is also a suggestion in the available data that organic *plant crops* tend to have lower emissions per kg than their conventional counterparts, whereas organic *animal products* have higher emissions. If this link is robust, it also has policy implications. Again, more research needed.

### **Renewable production of carbon-sequestering raw materials**

This has a high rank for land use because potentially at least, it both displaces high-carbon raw materials *and* locks up photosynthate in a stable solid form. The phrase 'renewable' is used to indicate a continuous process. Thus plant materials are grown, absorbing carbon dioxide, harvested and converted into some stable and useful form, then replaced by further crops on the same land. An obvious example is wood used in building and furniture, but many other fibrous materials can be envisaged such as hemp, cereal straw, oilseed rape straw, miscanthus etc. The new low energy building currently being constructed at CAT for example, is built largely of timber and a hemp-lime composite embodying hundreds of tonnes of CO<sub>2</sub>.

Such materials will be favoured by the new carbonomic rules, and will become profitable crops. Intensive research is called for, in such areas as:

- ▷ Widening the range of potential crops
- ▷ Widening the range of potential uses
- ▷ By-products and other synergies
- ▷ Breeding for higher yields, disease resistance etc



- ▷ 'Organic' or low-input production
- ▷ Risks to, or synergies with, other desiderata such as biodiversity

### Sequestration of carbon in soils

Sequestration is destined to be a crucial part of a low-carbon strategy. It is most commonly spoken of in the context of 'Carbon Capture and Storage' of CO<sub>2</sub> from the combustion of fossil fuels. While this is a step in the right direction, it does no more than cancel out the emissions from the fossil fuels and might be termed 'passive sequestration'. It does not actively withdraw CO<sub>2</sub> from the atmosphere.

Various chemical options (Ca<sub>2</sub>SiO<sub>4</sub> + CO<sub>2</sub> → 2CaCO<sub>3</sub> + SiO<sub>2</sub> for example) have been explored for active CO<sub>2</sub> removal and conversion into stable solids, and justify continuing and vigorous research. For the time being however, the only practical technology we have is natural photosynthesis. This creates carbon-rich molecules in various forms, some of which can be stored permanently, either through practical and industrial processes as discussed above, or in the biosphere itself in the form of standing biomass, litter, or resistant forms of carbon in the soil.

*'Farming for sequestration credits' could become an important part of the agricultural economy.*

A defining feature of organic practice is the addition of organic matter to the soil, and if this results in a permanent increase in soil carbon, should attract a carbonomic credit. In fact 'farming for sequestration cred-

its' could become an important part of the agricultural economy. It could have further benefits in biodiversity, erosion-resistance, plant health and so on.

Strong interest has arisen recently in another resistant form of carbon, elemental carbon in the form of charcoal,

sometimes known as 'biochar'. This is produced in various ways from biomass or certain other waste materials, and can apparently be incorporated in large quantities into natural soils without damaging their fertility or other properties. In fact under some circumstances there might be improvements in soil fertility, and this might render the conversion of grazing land into arable a practical possibility.

Biochar research is only beginning, but it has so many potential properties and synergies that it deserves much greater attention. Through its large cation-exchange capacity it is capable of adsorbing large quantities of other substances, and might be able subsequently to release them to plants via mycorrhizas. This suggests for example, the use of Biochar to absorb potentially polluting nitrogen compounds from sewage and industrial processes, later to provide slow-release nutrients for bioenergy crops while sequestering carbon.

### Production of low-carbon materials and energy

'Biofuels' are much in the news and have attracted a bad press from many sections of the environmental movement. A few simple back-of-the-envelope calculations are enough to show that with current technology the UK could never produce enough liquid fuel for its existing transport fleet. So biofuels are being imported from overseas, possibly with serious consequences for local ecology and livelihoods, and in some cases causing more emissions than they save.

There is a serious and continuing danger. As rich societies strive to escape from the problems posed by climate change, they are doing so— perhaps inadvertently— at the cost of poorer societies. It was partly for these reasons that *ZeroCarbonBritain* postulated self-reliance in both energy and food for the



UK. In practice this is probably an unreasonable constraint. Within Europe for example, the distribution of wind energy and biomass resources are disjunct and complementary; it would make sense to 'exchange' surpluses of wind-electricity for biomass energy in various forms.

Nevertheless it is probably a good principle that each region tries to produce as much bio-energy as it can, within an overall low- or zero-carbon framework. Storable and 'dispatchable' sources such as biomass will play an important role in balancing demand and supply, but cannot simply replace conventional fossil fuel consumption litre for litre. So the framework is vital: within it we can develop a meaningful bio-energy sector in the UK, and especially in areas such as Wales currently dominated by livestock.

There is an important distinction between 'biofuels', generally taken to mean liquid fuels suitable for the transport sector, and 'biomass', generally taken to mean solid energy-rich material typically used for heating. There is a third category of 'wet biomass', usually derived from waste products, used to generate biogas by anaerobic digestion. The gas can be used to generate electricity and heat.

Part of the reason for the brouhaha over biofuels is the mismatch between the enormous and growing demand for transport fuels and the distinctive inefficiencies of trying to produce liquid fuels from arable crops, most commonly biodiesel from oilseed rape and bio-alcohol from wheat and sugar beet. The energy-losses and incidental GHG emissions from preparing, fertilising, harvesting, processing and transporting the crops and fuels are so great that the overall reduction in emissions is small or even non-existent, and rarely more than 30 per cent. At the same

time, the land-take is depressingly high relative to other space-consuming sources of energy, as previously remarked. Critics ask, is it worth all the trouble for such paltry gains?

*It is probably a good principle that each region tries to produce as much bio-energy as it can, within an overall low- or zero-carbon framework.*

In the present circumstances we would surely have to agree with the critics. However we are not trying to deal with the present circumstances, but what we take to be possible, even likely, circumstances between 2012 and 2020. The context would be different in the following ways:

- ▷ There would be continual reductions of livestock
- ▷ Energy of all kinds will be expensive, high-emission energy especially so
- ▷ There would be reductions of demand for liquid fuels
- ▷ There could be considerable technological improvements
- ▷ The so called 'second-generation' biofuel technologies might be increasingly available



Picture 2. A typical hill-farming landscape in mid-Wales (Courtesy Nigel Dudley, Equilibrium Research)

The implications of these changes are worth a brief discussion. The reduction of livestock does free up a lot of land, potentially over 50 per cent, although in general not the best land. High energy costs mean that the economics of alternative sources are favourable, although transporting bulky materials will be relatively expensive. There will be pressure for local supply to meet local needs. The high costs of liquid fuels will curtail private motoring and unnecessary journeys. Technological advance might reduce the production and processing penalties for some biofuels, or for example by allowing raw vegetable oil to be used directly in diesel engines.

More likely, in my view, is that bio-energy production will focus on high-cellulose crops (such as grasses, miscanthus, hemp, trees) used for heating or combined heat and power (CHP). Complementarily, the wet/biogas route deserves re-examination, using dedicated feedstocks such as fresh grasses harvested at different times of the year, as well as non-farm biological wastes. These technologies are twice to three times as efficient as the biofuel crops in terms of land take and offer much larger reductions in GHGs, including possible net sequestration. In an overall low-carbon economy, their efficiency can be further boosted by the addition of hydrogen produced by the expected periodic surpluses of variable renewable energy systems. At the same time the 'second generation' technology of converting cellulose to sugar and thence alcohols will offer a modest but disproportionately useful source of liquid fuels. It is this direction that Wales should principally take.

In *ZeroCarbonBritain* the possibility is discussed of farms producing their own fuels for machinery and processing. If food is given the high priority it deserves, then the modest quantities of energy required to produce the raw

materials should also be favoured, and possibly protected by special incentives, much as red diesel currently is. It would probably be a good idea if farms could produce their own biofuels directly wherever possible, or perhaps one suitable farm could specialise and supply locally. The processing of bio-oils can be done on a small scale. The glycerol generated as a by-product is itself a high-energy product and acts as a highly effective booster in anaerobic digesters. Bioethanol can also be produced locally, as thousands of local distilleries, legal and otherwise, attest.

In addition to energy, dedicated crops can provide useful industrial feedstocks that displace those from high carbon (principally petrochemical) sources. At present of course biological sources are not competitive, but all this would change in a low-carbon dispensation.

The foregoing discussion suggests great challenges, but also enormous new opportunities, for farmers in Wales. And, as always, there is lot of research to be done.

### **Habitat creation and the protection of biodiversity**

It might seem odd that this is given a relatively low rank in my priority list, since biodiversity is certainly threatened by the climate change situation, and shares with it an obvious element of irreversibility. I assume however that most land in Britain will continue to be 'useful' and that wildlife of all kinds will be expected to fit in wherever it can, while certain special areas and habitats remain protected.

My general assumption is that there will be much more pressure on land. *Prima facie* this is bad news for wildlife. But human activities, even farming, do not seem to be intrinsically inimical to biodiversity, and with careful design

we could probably ensure that habitats are created and diversified rather than destroyed. In other words, there might well be synergies between biodiversity and low-carbon desiderata if we work at them. If biodiversity is recognised as important it should attract financial support and become another income stream for farmers and local communities. A lot of diligent research work of a generic kind is urgently needed here, because a rapid transition might not leave enough time for investigations in every specific case.

We also need to think about conserving cultivated crop varieties, especially in view of climatic uncertainties.

### Recreation and landscape values

For most city people and those with second homes in rural areas, the scenic and amenity value of the countryside is paramount. The detailed aesthetics are usually arbitrary: for example the industrial structures of a century ago are regarded as charming, while those of more recent vintage are an abomination. Nevertheless these voices speak loudly, and the money in their pockets louder still.

Under the 'new rules' of carbonomics attention is inevitably focussed on coarser values, and bourgeois canons of

*Under the 'new rules' of carbonomics attention is inevitably focussed on coarser values, and bourgeois canons of rural taste are likely to be transformed.*

rural taste are likely to be transformed. The countryside would look different. There would be more trees, more crops, and relatively few animals. It would be less 'open'. Many views would be cluttered. There would be energy processing going on, power lines, wind

generators, chippers, biogas digesters, distilleries, more tanks and silos, trucks hauling bulky materials, and so on.

The change of aesthetic required is similar to that which obtained in war-time, when it was considered bad form to complain about airfields on farmland or barbed wire on the beaches. These were— and would be— temporary states of affairs to address a pressing emergency, with a hope of return to 'normality' at some future date. In the zero-carbon world, NIMBYism ("Not in My Back Yard") will be a thought-crime.

### Concluding remarks

Most of us who worry about the 'environment' like to think of ourselves as having sophisticated and consistent values. But the climate change situation forces us to recognise that there

are many different values masquerading under the environmental rubric, and they can conflict. This paper has attempted to map out some principles for resolving conflicts, first by seeking synergies,

*Climate change situation forces us to recognise that there are many different values masquerading under the environmental rubric, and they can conflict.*

then by a reasoned ranking of priorities. Between the lines there are implications for research programmes that should be brought forward as a kind of insurance policy against the possibility that the results would suddenly be needed. Many of these issues require further debate.

**Peter Harper** (Peter.Harper@cat.org.uk) is Director of Research and Innovation at the Centre for Alternative Technology, a community based project in Wales researching renewable energy and sustainable agriculture that has been in existence since 1974.



## Time to replace globalisation with localisation

Colin Hines

**Abstract.** Current trade patterns are predicated on the fast and efficient movement of goods around the world. Do we need a fundamental change in approach? Instead of globalisation, should we be looking at a conscious move towards localisation for many products currently traded internationally. A set of seven policy steps are outlined that together would help to develop more localised production systems to address global trade inequality, fuel shortages and environmental degradation.

Economic globalisation has a clear end goal: maximum trade and money flows for maximum profit. From this goal comes a clear set of policies and trade rules supporting this approach. The adverse effects of this economic priority have become increasingly evident and include growing global inequality, job insecurity and adverse environmental effects.<sup>1</sup>

There is now growing support for a radical alternative, that of **localisation**.<sup>2</sup> This has at its heart the protection and rebuilding of local economies rather than gearing them to ruthlessly out-compete each other internationally. Depending on the context, the 'local' is predominantly defined as part of the nation state, although it can be the nation state itself or occasionally a regional grouping of nation states. Everything that can sensibly be produced within a nation or a region should be. Long-distance trade is then reduced to supplying what could not come from within one country or



Picture 1. Can we achieve a re-localisation of the world economy? (Courtesy Nigel Dudley, Equilibrium Research)

geographical grouping of countries; the historic role of such trade.

Localisation is not about restricting the flow of information, technology, management and legal structures, but it is about a different end goal for such activities. Localisation could help to ensure a more just, secure, environmentally sustainable future.

The route to localisation consists of a set of seven interrelated and self-reinforcing policy areas. The basic steps are:

- ▷ Reintroduction of protective safeguards such as tariffs and quotas for domestic economies;
- ▷ A site-here-to-sell-here policy for manufacturing and services domestically or regionally;
- ▷ Localising money such that the majority stays within its place of origin;
- ▷ Local competition policy to eliminate monopolies from the more protected economies;
- ▷ Introduction of resource taxes to increase environmental improvements and help fund the transition to localisation;
- ▷ Increased democratic involvement both politically and economically to ensure the effectiveness and equity of the movement to more diverse local economies;
- ▷ Reorientation of the end goals of aid and trade rules such that they contribute to the rebuilding of local economies and local control.

The prerequisite for achieving such a re-localisation of the world economy is to replace globalisation with a plausible alternative. The policies involved must reverse the instability and insecurity created by trade liberalisation. Their essence should be to allow nations, local governments and communities to reclaim control over their local economies; to make them as diverse as possible; and to rebuild stability into community life.

This does not mean a return to overpowering state control, merely that governments provide the policy framework which allows people and businesses to re-diversify their own local economies. It would ensure a transition from the present situation to one where goods and services are provided locally wherever possible. Reducing product or service miles is also an environmental goal. In short, there is a positive discrimination in favour of the local.<sup>3</sup>

*Localisation has at its heart the protection and rebuilding of local economies rather than gearing them to ruthlessly out-compete each other internationally... The prerequisite for achieving re-localisation is to replace globalisation with a plausible alternative... that allows nations, local governments and communities to reclaim control over their local economies; to make them as diverse as possible; and to rebuild stability into community life.*



Picture 2. Reducing product or service miles is an environmental goal  
(Courtesy Nigel Dudley, Equilibrium Research)



Under these circumstances, beggar-your-neighbour globalisation gives way to the potentially more cooperative better-your-neighbour localisation.

In response to their restive and increasingly insecure populations, governments will have no choice but to return to protective barriers. A catalyst for this change could be the collapse of the colonial delusion that the future for jobs in rich countries lies in their dominance in the global high tech sector. This ignores the fact that China and India are fast developing their own highly-skilled but low cost expertise in the high value added areas that the west is supposed to dominate in the future.

At present the localisation alternative features nowhere in the thinking of most leading politicians. However globalisation's increasingly adverse effects are likely eventually to result in massive public support for political parties that offer protection and security from this process and replace it with the protection and rebuilding of local economies. It is time that those wanting a fairer, more environmentally sustainable world, where everyone's basic hopes are met, had a radical rethink.

They must stop pinning their hopes of campaign success on tweaking the direction of globalisation or acting as if trade rules were governed by some kind of Olympian logic that comes down from on high. Instead,

trade rules should be seen for what they are: a grubby set of global guidelines drawn up at the behest of the powerful for the benefit of the powerful. It is time for a radical change.

**Colin Hines** is an Associate of the International Forum on Globalisation and an advisor to the UK Green MEP.

### Notes

- 1 Lang, T. and C. Hines, 1993.
- 2 Hines, C., 2000.
- 3 Hines, C., 2003.

### References

- Hines, C., *Localization: A global manifesto*, Earthscan, London, 2000.
- Hines, C., *A Global Look at the Local: Replacing economic globalisation with democratic localisation*, Institutionalising Participation Series (ed. M. Pimbert), International Institute for Environment and Development, London, 2003.
- Lang, T. and C. Hines, *The New Protectionism: protecting the future against free trade*. Earthscan, London, 1993.

## A green new deal

Colin Hines and Caroline Lucas

**Abstract.** The global economy is facing a 'triple crunch'; a combination of a credit-fuelled financial crisis, accelerating climate change and soaring energy prices underpinned by an encroaching peak in oil production. These three overlapping events threaten to develop into a perfect storm, the like of which has not been seen since the Great Depression. Addressing climate change and changing energy futures will both cost money. At a time when economists are gloomier about the future than they have been for decades, perhaps lessons can be drawn from responses to the Depression in the twentieth century, updated to create a Green New Deal.

### Introduction

Joseph Stiglitz was right when he wrote at the present economic downturn could be the worst since the Depression. In the coverage of the causes and likely future effects of the credit crunch, such grim parallels are becoming commonplace. But it is time to move from problems to solutions, and here too the Depression can form a useful reference point. Franklin Roosevelt's action programme for dealing with the aftermath of the late 1920s credit crunch was threefold. First, strictly regulate the cause of the problem—the greedy and feckless finance sector. Second, get people back to work, and generate business opportunities by a New Deal. This invested billions of dollars in training, better working conditions and a huge range of infrastructural projects such as highways, dams and bridges. Finally, fund this in part by an increase in taxes on big business and the rich—a measure which also had the positive effect of dramatically decreasing inequality.

### A Green New Deal for the UK

Today the re-regulation of finance is even being discussed in the columns of the *Financial Times*. The concept of a Green New Deal<sup>1</sup> which could

help re-boot the economy after a credit crash, while putting serious money into addressing climate change, is now being seriously discussed. Given that the reduction of carbon emissions will become an ever more urgent international priority, investing in such programmes will also provide a safer haven for pensions and savings.

*The concept of a Green New Deal which could help re-boot the economy after a credit crash, while putting serious money into addressing climate change, is now being seriously discussed.*

As in the Roosevelt case, this too would be partly paid for by increased taxation of big business and the rich, but would today also require the elimination of tax havens.

In addition to state money, the Green New Deal would encourage the use of savings in banks and building societies to fund measures to cut carbon emissions. These savings are at present guaranteed up to £35,000 in the UK, and such a guarantee could be extended to a Green New Deal investment. This would carry the proviso that such funds would be earmarked solely for investments that

reduce carbon use through energy efficiency and renewable energy sources. Savers could also be exempt from taxes on gains for investment in carbon-reducing infrastructure, as is the case for infrastructural investment in the US municipal bonds market.

Governments like to steer clear of the constraints put upon them by such hypothecation, but the Stern Report showed the level of serious economic constraints that inadequately-checked climate change will pose for the economy. There is a significant amount of money in pensions and other savings, plus a recognised need by the government for people to save much more. Guaranteed investments via a Green New Deal programme will help provide the upfront funding needed for the low-carbon future, and should therefore be the way to square this circle.

Local authority bonds could be the major vehicle for the funds raised for this programme. In the US there is a trillion dollar Municipal Bond market. In the UK, Transport for London's recently successful £600 million bond issues for improving the capital's transport infrastructure is another

*Floating of bonds initially to improve the energy efficiency of the more than 80,000 council dwellings in need of refurbishment.*

example. This source of funding— and local democracy— could be promoted relatively easily if the net returns on the money saved from the low-carbon investments were used to repay the bonds.



Picture 1. Local food will be part of a New Green Deal (Courtesy Nigel Dudley, Equilibrium Research)

Such an approach is being called for in the UK by the Birmingham-based group, Localise West Midlands. It has proposed the floating of bonds initially to improve the energy efficiency of the more than 80,000 council dwellings in need of refurbishment. The city is the biggest public sector landlord in Europe, but has a housing stock that requires major investment and energy efficiency measures to comply with UK and EU law and combat fuel poverty. Part of such a programme would ensure both high standards of insulation and extensive use of combined heat and power programmes, and encourage the use of renewable energy sources to meet a new goal of "every building a power station".

Another important advantage emphasised by Localise West Midlands is that the vast

*A "carbon army", recruited from those in the region who are at present unemployed or wanting to improve their existing skills, could be trained for the low to high skilled jobs required.*



majority of jobs created will be located where people actually live. Bonds could therefore help develop the local skills, technologies and enterprises that will be needed for the new, low-carbon economy. A "carbon army", recruited from those in the region who are at present unemployed or wanting to improve their existing skills, could be trained for the low to high skilled jobs required. To reduce carbon dramatically will require skills ranging from energy analysis, design and production of hi-tech renewable alternatives, large-scale engineering projects such as combined heat and power and offshore wind, through to work in making every building "energy tight", fitting more efficient energy systems in homes, offices and factories.

For recently laid-off bankers, a carbon finance sector will also be needed to publicise, to advise and to put into practice the range of funding packages inherent in the Green New Deal. The immediate economic advantages of this energy transition will be that hundreds of thousands of jobs can be created, a large number of new and existing businesses and services can benefit, and a large increase in tax revenue can be generated from this new economic activity.

## A new Green New Deal for everyone

Stiglitz is also right that there is at present, a leadership deficit in the US, unlike the case in the 1930s. However, as Europe's economy slows in the wake of the US-initiated credit crunch, the EU could take a much-needed lead. The NGO The Green Alliance recently proposed a European budget for climate

security that would involve Brussels re-orienting its public investment programme to set up a dedicated low-carbon fund for energy and transport infrastructure, an investment fund to help move China and India towards low-carbon economies, and a budget to help the poorest countries adapt to climate change.

*The focus should be on smart investments that not only finance the development of new, efficient energy infrastructure but also help reduce demand for energy.*

A consolidated approach would involve some or all of the following:

- ▷ Executing a bold new vision for a low-carbon energy system that will include making "every building a power station", by maximizing their energy efficiency and using renewable wherever possible to generate electricity.
- ▷ Creating and training a "carbon army" of workers to provide the human resources for a vast environmental reconstruction programme. This will be part of a



Picture 2. Every building can be a power station (Courtesy Nigel Dudley, Equilibrium Research)



- wider shift from an economy narrowly focused on financial services and shopping to one that is an engine of environmental transformation.
- ▷ Ensuring more realistic fossil fuel prices that include the cost to the environment, and are high enough to tackle climate change effectively by creating the economic incentive to drive efficiency and bring alternative fuels to market.
  - ▷ Developing a wide-ranging package of other financial innovations and incentives to assemble the tens of billions of pounds that need to be spent: the focus should be on smart investments that not only finance the development of new, efficient energy infrastructure but also help reduce demand for energy, particularly among low-income groups.
  - ▷ Re-regulating domestic financial systems to ensure that the creation of money at low rates of interest is consistent with democratic aims, financial stability, social justice and environmental sustainability. Our proposals for financial renewal are inspired by those implemented in the 1930s.
  - ▷ Breaking up the discredited financial institutions that have needed so much public money to prop them up in the latest credit crunch, including for the forced demerger of large banking and finance groups. Retail banking should be split from both corporate finance (merchant banking) and from securities dealing. Instead of institutions that are "too big to fail", we need institutions that are small enough to fail without creating problems for depositors and the wider public.
  - ▷ Re-regulating and restricting the international finance sector to transform national economies and the global economy. Regulation of finance, and the restoration of policy autonomy to democratic government, implies the re-introduction of capital controls.
  - ▷ Subjecting all derivative products and other exotic instruments to official inspection. Only those approved should be permitted to be traded.
  - ▷ Minimising corporate tax evasion by clamping down on tax havens and corporate financial reporting. Tax should be deducted at source (*i.e.* from the country from which payment is made) for all income paid to financial institutions in tax havens.

As the credit crunch fells the Anglo-American economic model, it's time to champion a Green New Deal for everyone.

**Colin Hines** (chines@dial.pipex.com) is an independent researcher working on policies encouraging localisation of the economy. He formerly worked for Greenpeace in the UK. **Caroline Lucas** is a green Member of the European Parliament.

A shorter version of this paper appeared on the Guardian Website *Comment is Free*.

### Notes

- 1 Elliott *et al.* 2008

### Reference

Elliott, L, C Hines, T Juniper, J Leggett, C Lucas, R Murphy, A Pettifor, C Secrett and A Simms. *A Green New Deal: Joined up policies to solve the triple crisis of the credit crunch, climate change and high oil prices*, New Economics Foundation, Bath UK, 2008 <http://www.neweconomics.org/gen/greennewdealneededforuk210708.aspx>

## Energy/Climate security— 2050 goal

Richard Steiner

**Abstract.** What are the key priorities in addressing climate change? How should IUCN react? The following paper summarises some policy options as was presented by Richard Steiner to the IUCN council on behalf of CEESP in 2007, looking at issues relating to energy efficiency, some energy alternatives to avoid, the role of NGOs and finally a proposal that IUCN establish a special commission on climate change.

### A proposed goal for 2050

Some clear and necessary goals emerge from our current understanding about the extent and speed of climate change, which mean that we need to:

- ▷ Stabilise atmospheric temperatures at less than 2° C above historic baseline
- ▷ Hold atmospheric CO<sub>2</sub> levels below 450-500 ppm
- ▷ Reduce global anthropogenic greenhouse gas emissions by 80 per cent below 1990 levels by 2050
- ▷ Cap carbon emissions by 2010, reduce by 2 per cent per year between 2010 and 2020 and then reduce by 5 per cent per year after 2020, to a total reduction of 80 per cent below 1990 level
- ▷ Reduce global carbon emissions from current 8 billion tons per year to 2 billion tons per year by 2050.

This means that we need to “de-carbonise” the energy economy with an aggressive initiative in energy efficiency, substantial increase in low/no carbon energy alternatives, eliminating deforestation, reducing or eliminating livestock agriculture, and enhancing carbon capture / sequestration.

### Energy efficiency

The most immediate goal should be a *5-fold increase in energy efficiency (i.e. a 5-fold reduction in energy intensity of GDP) in all sectors of economy:*

including automobiles (subsidise hybrid-electric vehicles, high-efficiency vehicles); airline efficiency; mass transit systems in urban and rural areas; power utility efficiency; commercial and residential building energy efficiency; efficiency of appliances; efficiency of manufacturing processes; etc.

*The most immediate goal should be a 5-fold increase in energy efficiency in all sectors of economy.*

### Policy approach

Five areas of policy change will be critical to success:

1. *Transfer all government subsidies currently paid to industries contributing carbon emissions— coal, oil, inefficient automobile, road building and other auto infrastructure, power generation, livestock agriculture, forestry, etc.— currently about US\$1 trillion per year, to energy efficiency and low carbon alternative*

*Transfer all government subsidies currently paid to industries contributing carbon emissions to energy efficiency and low carbon alternative energy industries.*

*energy industries* such as wind, solar, nuclear fusion research and development, forest sustenance (reforestation, product substitution, etc.), low-emission agricultural practices

- (no-till, grass planting, etc.); and landfill methane collection, etc.
2. *Impose substantial new taxes / royalties* on all fossil energy production and use; at minimum governments should immediately impose an additional *10 per cent tax/royalty* on all coal, oil, fossil-energy power generation, and/or additional end-use taxes.
  3. Apply all revenues obtained from subsidy transfer and new taxes/royalties (target at least 5 per cent of total annual federal budget) toward aggressive *investment in energy efficiency, low/no carbon energy alternatives, forest conservation and restoration, non-livestock agriculture, carbon capture/storage initiatives*.
  4. Impose substantial *economic/trade sanctions* (import duties / quotas, etc.) on countries that do not comply
  5. Enhance *population stabilisation* initiatives, as this will better enable energy sufficiency of the global economy (e.g. it will be easier to provide energy/climate security for 7 billion people than for 10 billion).

### Energy alternatives to avoid

Mounting concern about energy shortfalls will drive governments and others to grab at anything that looks like a possible alternative to oil. But some options carry high costs of their own. Some of the issues include:

- ▷ Avoid large-scale investment in *hydroelectric* generation, as it degrades river ecosystem function and causes significant habitat loss
- ▷ Avoid large-scale investment in *bio-fuel* production, as it contributes to extensive loss of biodiversity-rich habitat, often uses untested genetically modified (GM) crops, and is intensive in water / chemical use.
- ▷ Avoid large-scale investment in *nuclear fission*, as the technology is too un-forgiving of error, generates too much unmanageable high-level waste, and is terror-prone.
- ▷ Avoid any further investment in high-carbon energy resource production, particularly *coal, oil, tar sands, oil shale*.
- ▷ Avoid investment in large-scale *tidal* (near-shore) generation, as damming estuaries and bays is disruptive to coastal ecosystems.

*Mounting concern about energy shortfalls will drive governments and others to grab at anything that looks like a possible alternative to oil.*

### NGO role

Non governmental organisations need to engage aggressively with the *private sector* and *governments* to achieve above energy/climate security goals:

- ▷ *Private Sector:* Target businesses on Global 500 list that contribute most greenhouse gas (GHG) emissions, coal, oil, auto, airline, power utilities, cement, forest products, agriculture, etc., write letters to and/or meet with CEO/Directors asserting the above principles for energy/climate stabilisation. *Reward* those that meet established reduction targets, certify the company as sustainable, etc; *impose punitive consequences* on those who don't meet reduction targets, i.e. withhold partnership arrangements, "black-list", publish company progress on reduction targets, boycotts, etc.

*Non governmental organisations need to engage aggressively with the private sector and governments to achieve above energy/climate security goals*

▷ *Governments*: Aggressively advocate restructuring of economic policies to provide energy/climate stabilisation goals expressed above. Meet with administration and legislative officials. *Reward* those who achieve targets; *impose punitive consequences* (economic trade sanctions, tourism boycotts, etc.) on those that do not. Recommend parliamentary acts to achieve emission reduction targets. Recommend establishment of National Climate Change Commissions to advise government and industry on energy and climate stabilisation, and Citizens Advisory Councils to advise government and industry on climate change issues.

### Establishing *Climate Change Commissions*: A Role for IUCN?

As noted in the summary recommendations above, it is necessary to

*Climate Change Commissions should be formally constituted to advise government, industry, and civil society on all aspects of climate change.*

restructure the architecture of governance to be responsive to threat of climate change. One approach is for governments to establish *Climate Change Commissions* (CCCs), which may

be something that IUCN regional offices can help facilitate.

The National *Climate Change Commissions* (task force, working group, committee, etc.) should be formally constituted to advise government, industry, and civil society on all aspects of climate change— impacts, costs, adaptation, mitigation, etc. They should comprise representatives of all main stakeholder groups, including government, private sector (agricultural, forestry, fisheries,

health care, etc.) and citizens' organisations (indigenous, NGOs, etc.) (I proposed the establishment of such a Commission in Alaska in 2006, and even with a state politic dominated by oil and conservative interests, the proposal received unanimous consent from our State legislature and the Alaska CCC is now established and operating.)

Such Commissions could be established for each nation, as well as inter-regionally. For instance, there could be a CCC for each country in South Asia as well as a *South Asia Climate Change Commission*. Similarly there should be an Africa CCC, as well as more discreet geographic regions (west Africa CCC, northern Africa CCC, etc.), and they could be organised within the African Union; an Amazonian CCC, Pacific Islands CCC, Southeast Asia CCC, etc. The regional CCCs should provide coordination on climate change issues that are common to all states within the region— such things as agricultural policy, water, coastal erosion, storm protection, etc. The CCC should develop a *Climate Action Plan* to guide government climate change policy.

The CCCs should propose administrative and legislative actions that can be taken by governments, work with business, and so on. And, the Commissions could either be established as short-term bodies (e.g., 2-years), or as permanent advisory bodies. The CCCs should meet at least annually, but preferably quarterly; should discuss, analyze, and respond to current information on climate change internationally and locally; and should have a sufficient budget with which to conduct their operations.

**Rick Steiner** ([afrgs@uaa.alaska.edu](mailto:afrgs@uaa.alaska.edu)) is a professor and environmental specialist at the University of Alaska, and a member of CEESP.



## Fairtrade, air miles and climate change

The Fairtrade Foundation

**Abstract.** The issue of climate change is rising up the public agenda and consumers are increasingly considering how their behaviour can impact on the environment. An issue of growing importance relates to the impact of food miles (how far a product has travelled before it reaches the consumer) and air miles (whether and how far a product has been air freighted) upon the production of greenhouse gases. This attracts particular attention with respect to "fair trade" goods; consumers are choosing to buy these because of their perceived social and environmental benefits but how do these benefits balance against having them transported around the world? The Fairtrade Foundation in the UK summarises some common questions and supplies some answers.

The public concern around climate change and carbon emissions has been growing rapidly and there is no doubt that far-reaching global action has to be taken now to deal with global warming. However if the debate becomes overly obsessed with the question of food miles, this could severely damage opportunities for sustainable forms of export agriculture to contribute to the economic and social development of poor producers.

Agriculture can play a critical role in the economic and social development of developing countries. Increased agricultural growth is thought to be the most likely source of economic growth in Africa given that 70 per cent of the rural poor work on the land. Fairtrade certification ensures that the benefits of agriculture accrue to marginalised and disadvantaged producers.

▷ **I want to help people in developing countries, but I'm also worried about climate change. Should we buy products like green beans or flowers from Africa that are more likely to be air freighted?**

Whether or not a product has been air freighted is not an indicator of its overall sustainability and to reject products on this basis is to ignore the huge developmental and poverty reduction benefits

that export agriculture and horticulture can bring to the continent of Africa and other developing nations. Over 1 million people in rural Africa are supported by the export of fresh fruit and vegetables to the UK, injecting an estimated £200m into rural economies in Africa as a result.<sup>1</sup> Further, air freight-  
*All fruit and vegetables from Sub-Saharan Africa represents less than 0.1 per cent of all UK carbon emissions.*  
 ing of all fruit and vegetables from Sub-Saharan Africa represents less than 0.1 per cent of all UK carbon emissions.

Those concerned about climate change should take a broad perspective that looks at the 'carbon footprint' of a product from plough to plate and beyond. This should take into account energy and water consumption required for farming processes, soil cultivation and agricultural inputs, packaging, UK transport, preparation and waste disposal. They should also weigh this carbon footprint against the economic, employment and livelihood benefits resulting from these activities.

Balancing all of these factors provides a much more accurate picture of the true sustainability of a product rather than a narrow focus on 'air miles.'

So before we consider stopping purchasing produce from Africa, we should ensure we have taken all other possible steps towards reducing our own emissions.

▷ **Is it true that a flower grown naturally in Africa has a lower carbon impact than a flower grown in a European greenhouse?**

Yes. There have been a number of studies which show that this is indeed the case. A 2005 study conducted by the University of Utrecht indicated that the energy required to grow a rose under glass in the Netherlands is around 9 MJ compared to around 2-3 MJ used to produce a rose in Kenya and air freight it to the UK.<sup>2</sup> A more recent study by the University of Cranfield, which compared

*Emissions from the Dutch roses were higher than the Kenyan emissions even taking air freight into account.*

the production and transportation of 12,000 roses from Kenya and Holland, demonstrated that the emissions from the Dutch roses were higher than the Kenyan emissions even taking air freight into account. This study found

Kenyan emissions to be 5.8 times less than those of the Dutch roses.<sup>3</sup>

▷ **How can buying Fairtrade products help to tackle climate change?**

All Fairtrade certified producers are required to comply with the international Fairtrade environmental standard as part of the requirements of certification. The standard requires producers to ensure that they protect the natural environment and make environmental protection a part of farm management. Producers are also encouraged to minimise the use of energy, especially energy from non-renewable sources.

By purchasing Fairtrade products, shoppers are ensuring that disadvantaged producers and workers receive a Fairtrade premium for investment in economic, social and environmental products. These premiums can enable farmers to implement a range of environmental protection programmes which will contribute to the range of solutions needed to address climate change and ultimately benefit all of us. To give two examples, tea workers in India have invested some of their Fairtrade premium into replacing the traditional wood-burning heating with a solar-panelled system. Coffee farmers in Costa Rica have used the premium to replant trees to prevent soil erosion and have invested in environmentally friendly ovens, fuelled by recycled coffee hulls and the dried shells of macadamia nuts. This means that they no longer need to cut forest trees and so can preserve the rainforest and the oxygen they produce

▷ **Should the Fairtrade Foundation refuse to certify products that have been air freighted? Should Fairtrade products carry additional labels to show whether or not they've been air freighted, as some supermarkets are now suggesting?**

We believe that it would be unfair and inappropriate to penalise poor producers and workers who depend upon exporting their produce to international markets by withholding the FAIRTRADE Mark on the basis of incomplete evidence, particularly when they have made the effort of putting in place necessary changes to comply with the international Fairtrade standards.

There is also the issue of equity for developing countries. Annual carbon emissions per person are 200kg in Kenya and 172kg in Bangladesh compared to

21,000 kg in the US and 9,000kg in the UK. Under these circumstances to deny

*To deny poorer countries and people the opportunity to develop when their overall carbon footprint is so low is simply morally unfair and politically unsustainable.*

poorer countries and people the opportunity to develop when their overall carbon footprint is so low is simply morally unfair and politically unsustainable. As those most to blame, rich countries have the responsibility to demonstrate leadership and cut their own emissions before expecting poorer nations to bear the brunt of change by

reducing their relatively small emissions.

▷ **Some people say 'buy local' rather than 'buy Fairtrade'. What is the Fairtrade Foundation's response?**

Fairtrade focuses by and large on tropical agricultural products such as coffee and bananas that can't be grown in temperate climates or products that can't be grown in sufficient quantities in the EU, e.g. grapes and oranges. For some items such as honey and flowers, local supply is not able to meet the total demand— it has been estimated that both UK flowers and honey account for less than one-third of the UK market— and so imports are necessary to keep up with consumers' shopping preferences. Other products, such as apples, are seasonal in both the UK and places like South Africa, and for as long as shoppers want to buy apples out of season, there is a demand for fruit from other countries.

▷ **Shouldn't people in Africa be growing food for themselves rather than be encouraged to grow products like flowers for export?**

The livelihoods of 2.6 billion people worldwide depend on agriculture. Most of them are poor farming families in the developing world and strengthening

small-scale agriculture and related rural industries can bring vital benefits to their communities and the wider economy. Under the right conditions, agricultural exports can act as a dynamic force for poverty reduction, providing small farmers with opportunities to generate

*In parts of East Africa and Central America, small farmers have succeeded in entering markets for high-value-added fruit and vegetable exports.*

income, diversify their livelihoods, provide work for others in the community and reduce vulnerability. It also means that small farmers and their families are less likely to be

forced to leave their land and migrate to urban centres in search of employment.

In parts of East Africa and Central America, small farmers have succeeded in entering markets for high-value-added fruit and vegetable exports. Research shows that export agriculture has played a critical role in reducing rural poverty in Uganda and Vietnam. Far from displacing food production, export success in both countries has gone hand in hand with an increase in output of basic food staples. This doesn't mean that agricultural trade automatically generates



Picture 1. Small-scale agricultural producers in Kenya (Courtesy Sue Stolton, Equilibrium Research)

poverty reduction benefits. Small farmers often lack access to the land, capital, information, and marketing infrastructure needed to take advantage of export opportunities and this is where Fairtrade can provide a vital lifeline for marginalised farmers and their families. Once they are selling to Fairtrade markets, the increased stability, better price and support to farmers' organisations means they can implement their own projects to improve food security and nutrition for their own families and the wider community. As just one example, women cotton farmers in Mali have described how the better price they receive for their cotton has enabled them to buy vegetable seeds to feed their families. They have also used the Fairtrade premium to build a warehouse to store not just cotton but also maize and sorghum seeds for their own consumption and sale to local markets. The warehouse also acts as a food bank for families between harvest times when cash income is scarce to mitigate food security worries.

▷ **Aren't large-scale horticultural farms in Africa all owned by big foreign companies? Are Africans benefiting at all from this? Should we only buy the produce from Africa that carries the Fairtrade label?**

Fairtrade is about getting a better deal for producers and workers at the bottom of supply chains who are marginalised by international trading rules. While primarily known for supporting small farmers, Fairtrade has for many years engaged with plantations such as tea estates, whether foreign-owned or not, to bring benefits to the hired workforce. The reality is that these farms can provide much-needed employment opportunities for workers who have few or no other options open to them. Many of the flower workers on Kenyan flower farms

for example have migrated specifically to the areas where the farms are located to find work and have limited alternative employment options. However it is also clear that workers on many plantations are amongst the most powerless people in global supply chains and so they also need the benefits that Fairtrade can bring such as

*Fairtrade is about getting a better deal for producers and workers at the bottom of supply chains who are marginalised by international trading rules.*

decent working conditions, health and safety provision and access to trade unions. The Fairtrade standards for these types of farms are aimed at reinforcing international labour standards, as well as ensuring additional resources that the workers themselves can invest in projects to improve their own situation and services available to them. The Fairtrade premium has been used by farm workers to set up revolving loan schemes to fund small businesses, improve education and healthcare and build community centres.

This article was extracted from a longer piece by Fairtrade produced in response to concern about climate change. See <http://www.fairtrade.org.uk/> for more information.

#### Notes

- 1 Vringer and Blok 2000.
- 2 Vringer and Blok 2000.
- 3 Williams 2007.

#### References

- Vringer, K. and K. Blok, The Energy Requirement of Cut Flowers and Consumer Options to Reduce It, *Resources, Conservation and Recycling* **28**, 2000: 3-28.
- Williams, A., *Comparative study of cut roses for the British market produced in Kenya and the Netherlands*, Cranfield University, 2007



# Getting to zero— defining corporate carbon neutrality

Clean Air-Cool Planet and Forum for the Future

**Abstract.** The concept of carbon neutrality is surrounded by controversy. But according to the two NGOs, Clean Air-Cool Planet and Forum for the Future, it remains a worthwhile goal for companies that seek to demonstrate climate leadership. For carbon neutrality claims to have any credence however, greater consensus is needed about the basis of such claims, along with more consistent approaches to application. This article comprises an excerpt from a recent report from the two organisations, *Getting to Zero: Defining Corporate Carbon Neutrality*, which tried to move towards such a consensus. Through exploration of a number of the claims that have been made so far, the organisations make a series of recommendations about what should lie behind any declaration of neutrality. It is intended to serve as a guide both to companies that have used— or are considering using— the language of neutrality; and to stakeholders that are trying to evaluate whether a particular claim is justified or not.

## The concept of “carbon neutrality”

As concerns about climate change grow, the concept of “carbon neutrality” has captured the corporate imagination, being embraced by organisations as diverse as airlines, ice-cream makers and reinsurance giants. But this apparently simple concept— that a company, or one of its products or services, can have no net impact on climate— is surrounded by controversy, and a wide range of assumptions and actions lie behind the claims that have been made.

*The concept of “carbon neutrality” has captured the corporate imagination, being embraced by organisations as diverse as airlines, ice-cream makers and reinsurance giants.*

The ambition to have zero net impact on climate is a powerful one, and a goal of neutrality has the potential to drive ongoing change within an organisation— while also promoting shared responsibility with suppliers and customers for emissions beyond the organisation’s immediate control. Greater consensus about what should lie behind any claim of neutrality, and more consistent

application by those companies that have made claims, is, however, required for it to reach its potential.

Two key questions frame the debate about neutrality. Firstly, which emissions should an organisation accept responsibility for (the “boundary” question)? Should the organisation focus simply on the direct emissions caused by its operations? Or is it also responsible for neutralizing some or all of the emissions that arise in its supply chain or from the use of its products? Secondly, what strategy should an organisation use to achieve neutrality? How far must a company go in actually reducing its emissions baseline? And to what extent can neutrality be achieved through the purchase of carbon offsets or “green” energy?

Related to these are further questions about if and how any claim of neutrality should be linked to the organisation’s broader performance on climate. A claim of climate neutrality is, after all, a statement of climate leadership. Should we therefore expect organisations that

*A claim of climate neutrality is, after all, a statement of climate leadership.*

claim neutrality to demonstrate broader climate leadership? As more and more companies make claims of neutrality we can expect increasing scrutiny to be paid to all these questions. Transparency, therefore, becomes an overarching issue in determining the credibility of any statement regarding neutrality.

### Setting boundaries

Determining where exactly a company's carbon responsibilities begin and end is not easy. Regulated emission reduction schemes offer some guidance, but these tend to set boundaries as narrowly as possible, typically covering only Scope 1 and 2 emissions (see box 1) as defined

by the Greenhouse Gas Protocol. The very nature of a claim of neutrality however— as an absolute assertion of zero net impact— implies that a broad boundary has been embraced. The boundary setting process for a neutrality claim is, therefore, better informed by that used in corporate sustainability reporting— where companies consider their broader indirect (or Scope 3) emissions alongside their more direct emissions. There might even be some legal risk to embracing a narrow boundary, with regulatory bodies such as the Advertising Standards Authority in the UK advising against companies making absolute claims of any kind.

#### Box 1. Greenhouse Gas Protocol Scopes

The concept of "scopes" is outlined in the Greenhouse Gas Protocol (GHG Protocol)<sup>1</sup>. This protocol, developed by the World Resources Institute and the World Business Council for Sustainable Development, has become the most widely used tool for quantifying greenhouse gas emissions. It classifies emissions as follows:

**Scope 1:** direct greenhouse gas emissions, from sources owned or controlled by the company;

**Scope 2:** indirect emissions, caused by the generation of purchased electricity consumed by the company;

**Scope 3:** other indirect emissions that are a consequence of the company's activities, but are from sources neither owned nor controlled by the company. These include business travel, outsourced activities, the extraction and processing of purchased materials, and the use of sold products and services.

Embracing a broad boundary poses a number of practical problems however.

*Attempting to trace every last gram of carbon uses up time and resources more valuably spent understanding— and reducing— a company's most significant emissions.*

Measuring emissions up and down the value-chain remains an inexact science, and attempting to trace every last gram of carbon uses up time and resources more valuably spent understanding— and reducing— a

company's most significant emissions.

One company's Scope 3 emissions are also inevitably another company's Scope 1 emissions, and questions can be raised about the appropriateness of one company taking on responsibility for another company's direct emissions. Unfortunately, there is no clear boundary-setting precedent to be found in the claims that have been made so far. Most companies that have embraced the concept have adopted relatively narrow boundaries (focused on Scope 1 and 2 emissions, along with business travel from Scope 3), but some have accepted responsibility for a variety of indirect emissions.

Expectations are also likely to change over time as our understanding of emissions throughout the value-chain improves and carbon footprinting methodologies develop. Rather than representing a fixed goal, therefore, it seems more sensible to view achieving carbon neutrality as a dynamic, ongoing process. Transparency about what is, and what is not, covered by any claim is, therefore, absolutely essential.

*It seems sensible to view achieving carbon neutrality as a dynamic, ongoing process.*

### A credible strategy

Once an organisation has established an inventory of emissions and set an appropriate boundary, the next key question surrounds the strategy that should be used to achieve neutrality. Many companies have embraced the concept of a hierarchy of carbon reduction options in developing their neutrality strategies. Forum for the Future's own hierarchy prioritises the avoidance of emissions, their reduction through energy efficiency, the replacement of high-carbon energy sources with low- or zero-carbon alternatives, and then the use of high quality carbon offsets, as the preferred means for an organisation to address its contribution to climate change.

Offsetting will play an important role in any neutrality strategy— if only for the simple fact that it is currently impossible to become carbon neutral without it. Clean Air-Cool Planet and Forum for the Future believe that high-quality offsets do result in genuine emissions reductions. However, the emphasis of any neutrality strategy must be to reduce baseline emissions, and organisations should, therefore, look for permanent emissions reduction options higher up the hierarchy.

Because a claim of neutrality is essential by an assertion of leadership, companies

that make such claims should be able to demonstrate broad climate leadership.

While it would be counterproductive to insist that only those companies that can demonstrate best-in-sector emissions relative to their peers can declare themselves carbon neutral, claims from energy inefficient companies— or from companies that are inherently carbon-intensive— will inevitably engender scepticism. Claims of neutrality should meet the spirit, as well as the letter, of the claim.

*Offsetting will play an important role in any neutrality strategy— if only for the simple fact that it is currently impossible to become carbon neutral without it.*

### A Definition

After careful consideration of the concept of carbon neutrality, we believe that:

*True corporate carbon neutrality means there is no net increase of atmospheric greenhouse gases from the existence of the company – or from a clearly-defined part of the company that accounts for a significant portion of the company's overall climate impact. If a company makes a claim regarding a specific product, then there should be no net increase of atmospheric greenhouse gases from the existence of that product.*

*The process for achieving neutrality should begin with an inventory of the company's entire carbon footprint (or a full life-cycle analysis of a particular product) and the setting of a clear boundary. The company should then embrace a neutralisation strategy that prioritises the avoidance of emissions, their reduction through energy efficiency, the replacement of high-carbon energy sources with low- or zero-carbon alternatives, and then the use of high-quality carbon offsets.*

*Every claim must be backed up by easily accessible, clearly communicated*

information regarding the company's full carbon footprint; the boundaries it has applied; and the strategy that has been embraced to achieve neutrality.

## Recommendations

The many questions raised above, and

*Every claim must be backed up by easily accessible, clearly communicated information regarding the company's full carbon footprint; the boundaries it has applied; and the strategy that has been embraced to achieve neutrality.*

the variety of approaches adopted by different companies, make it difficult to set out definitive guidance as to what should lie behind a claim of neutrality. Nevertheless, in an attempt to highlight best practice, we offer the following advice to companies that have made claims— or who are considering making claims.

### 1. Embrace a stretching boundary

The key tension surrounding any claim of neutrality remains reconciling the absolute nature of the claim— implying zero net impact— with a practical boundary-setting process. In the spirit of the term, we recommend that companies accept that claiming neutrality implies some responsibility to consider and address broader value-chain emissions. This is not to suggest that companies accept legal responsibility for the direct emissions of others, but rather that indirect emissions be explicitly considered as part of the neutrality process.

### 2. Demonstrate a broad understanding of your entire carbon footprint prior to making any claim of neutrality— and ensure that your claim covers a relatively significant set of emissions

A transparent understanding of the company's full carbon footprint is essential as

a prerequisite for any claim of neutrality, regardless of what boundary is set. This does not mean that companies should chase every gram of carbon in their value-chain, but rather that they are able to broadly disclose and discuss where their biggest indirect emissions lie. Questions remain about the appropriateness of a company making a limited claim of neutrality (*i.e.*, regarding its "manufacturing operations") when the associated emissions are relatively trivial compared to other emissions in its value-chain. If companies claim neutrality for relatively insignificant sets of emissions, the concept risks losing its legitimacy.

### 3. Exhibit caution in making blanket corporate-wide claims of neutrality

Any claim of neutrality brings with it some risk, but unqualified claims are riskier than others. Unless the company in question can clearly demonstrate a full understanding and subsequent "neutralisation" of its entire climate footprint, blanket claims are likely to mislead and should not be made.



Picture 1. Marks & Spencer has goals to achieve a 20 percent improvement in fuel efficiency and in energy use in its UK warehouses (Courtesy Nigel Dudley, Equilibrium Research)



#### **4. Consider whether a claim of neutrality will resonate with your stakeholders**

Some companies will always find it difficult to convince stakeholders of the sincerity of any neutrality claim— either because the use of their product or service leads to emissions that dwarf their direct emissions, or because they are seen as fundamentally unsustainable. For those companies, we recommend that they avoid the use of the language of carbon neutrality, and instead seek to show climate change leadership in other ways.

#### **5. Use the carbon management hierarchy to inform your neutralisation strategy**

The strategy used to achieve neutrality should be informed by a hierarchy that prioritises the avoidance of emissions, their reduction through energy efficiency, the replacement of high-carbon energy sources with low- or zero-carbon alternatives, and then the use of high-quality carbon offsets. Offsetting will play an important role in any neutrality strategy, but a claim of neutrality will ultimately be judged on the company in question being able to demonstrate a declining emissions baseline.

#### **6. Be completely transparent**

Given the complexity of the issues and assumptions surrounding any claim of neutrality, absolute transparency regarding all aspects of the claim is essential. Every claim should be backed up by easily accessible information regarding the company's full carbon footprint; the boundaries it has applied; and the strategy that has been embraced to achieve neutrality.

#### **7. Exhibit and sustain broad leadership on climate change**

While it would be technically feasible for a company to achieve neutrality through a strategy of 100 percent offsetting, this

would not represent the spirit of leadership embedded in the term. True climate leadership is indicated by companies rethinking their business strategy; engaging deeply with their suppliers, customers and peers; and developing products and services that will thrive in, and help bring about, a low-carbon economy. While linking such actions directly to a claim of neutrality remains problematic, any company that wishes to position itself as a leader on climate change needs to embrace them.

*True climate leadership is indicated by companies rethinking their business strategy; engaging deeply with their suppliers, customers and peers; and developing products and services that will thrive in, and help bring about, a low-carbon economy.*

#### **8. Treat neutrality as a long-term commitment— and an ongoing, dynamic challenge**

As stakeholder interest in full life-cycle emissions grows— and methodologies for measuring and allocating responsibility for such emissions develop— we can expect the rules of the game for claims of neutrality to change. Companies should embrace this challenge and use any commitment, or aspiration, to neutrality to drive ongoing change. A commitment to neutrality must therefore be a long-term commitment.

**Bill Burtis** (bburtis@cleanair-coolplanet.org) is Manager of Communications and Special Projects for US NGO the Clean Air-Cool Planet (CA-CP) whose Climate Policy Center develops and promotes economically efficient and innovative climate policies.

**Iain Watt** (i.watt@forumforthefuture.org.uk) is Principal Sustainability Advisor at Forum for the Future and coordinates the Forum Business Programme's activity on climate change.

#### **Notes**

- 1 [www.ghgprotocol.org](http://www.ghgprotocol.org)

**Box 2. Company Case Studies**

**Marks & Spencer's**

Climate change is one of the "Five Pillars" in Plan A— Marks & Spencer's five-year, 100-point "eco" plan to tackle "some of the biggest challenges facing our business and our world." As part of this plan, Marks & Spencer has a goal to make its UK and Irish operations carbon neutral by 2012. The company also identifies developing "plans to reduce the carbon footprint of our supply chains; and to continue finding ways to engage our customers in tackling climate change" as main challenges for 2008.

Marks & Spencer has developed a carbon footprint of its entire food business. This quantifies the emissions generated by the production of raw materials, manufacturing, transport, sale, use and final disposal of the food the company sells. The company has announced it will set targets to reduce this footprint— and has committed to doubling regional food sourcing, and offsetting the CO<sub>2</sub> emissions from air-freighted food within 12 months.

To meet its specific carbon neutral goal, the company has prioritised reducing its energy consumption and increasing its use of renewable energy, and states it will only use offsetting as a "last resort." In the last four years, the company has reduced CO<sub>2</sub> emissions from its UK and Irish stores by 30 percent per square foot. It has also reduced emissions from its lorries by 25 percent, despite opening 130 new stores.

Marks & Spencer has goals to achieve a 20 percent improvement in fuel efficiency and in energy use in its UK warehouses; to reduce the amount of energy used in UK and Irish stores by a further 25 percent; and to buy or generate 100 percent "green" electricity for its stores, offices and distribution centres. The company also plans to open a model "green" clothing factory.

As well as tackling its supply chain emissions, Marks & Spencer states its intent to help its customers reduce their emissions. It has committed to developing low carbon products and encourages customers to wash clothing at 30°C by printing the message "Think Climate - Wash at 30°C" on the garment care labels of its clothing.

**Ben & Jerry's**

Ben & Jerry's bid to "Lick Global Warming" began in the USA in 2002, with a target to reduce carbon dioxide emissions from manufacturing operations by 10 percent by 2007. Its operations there now produce 32 percent less carbon dioxide emissions per gallon of ice cream than in 2002. In Europe the company has achieved a 26 percent improvement in energy efficiency during production since 2004, and an 89 percent reduction of climate impact during production as a result of a switch to "green" electricity.

In April 2007, Ben & Jerry's went "Climate Neutral from cow to cone on all our flavours produced in Europe." In analyzing its associated climate "hoofprint," Ben & Jerry's includes emissions from dairy farming; the sourcing of ingredients; factory production; packaging; transport; and freezers with a range of reduction projects across each part of the supply chain.

The company's methodology for achieving neutrality uses a three step approach focused on maximizing energy efficiency, moving to renewable energy sources and offsetting unavoidable climate impact by investing in Gold Standard Verified Emission Reduction certificates. Having already reduced its climate impact by 10 percent, Ben & Jerry's is committing 2.4 million euros over five years to reduce it by a further 10 percent.

Ben & Jerry's has a "Sustainable Dairy" program that actively works to reduce the climate impact of dairy farming by reducing the use of fertilisers, concentrate and energy used on farms, as well as converting farmers to green energy. The company has also established the Ben & Jerry's Climate Change College to support young environmental entrepreneurs.

