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Editorial

We cannot escape the reality that our climate is changing, for its effects are felt every day.

A landowner can only wonder what the consequences will be and think about possible strategies for coping.
This is why ELO in association with Friends of the Countryside, CLA and the University of East Anglia have initiated, under the leadership of Michael Sayer, a study on the role, challenges and opportunities facing the managers of the countryside in a changing climate.

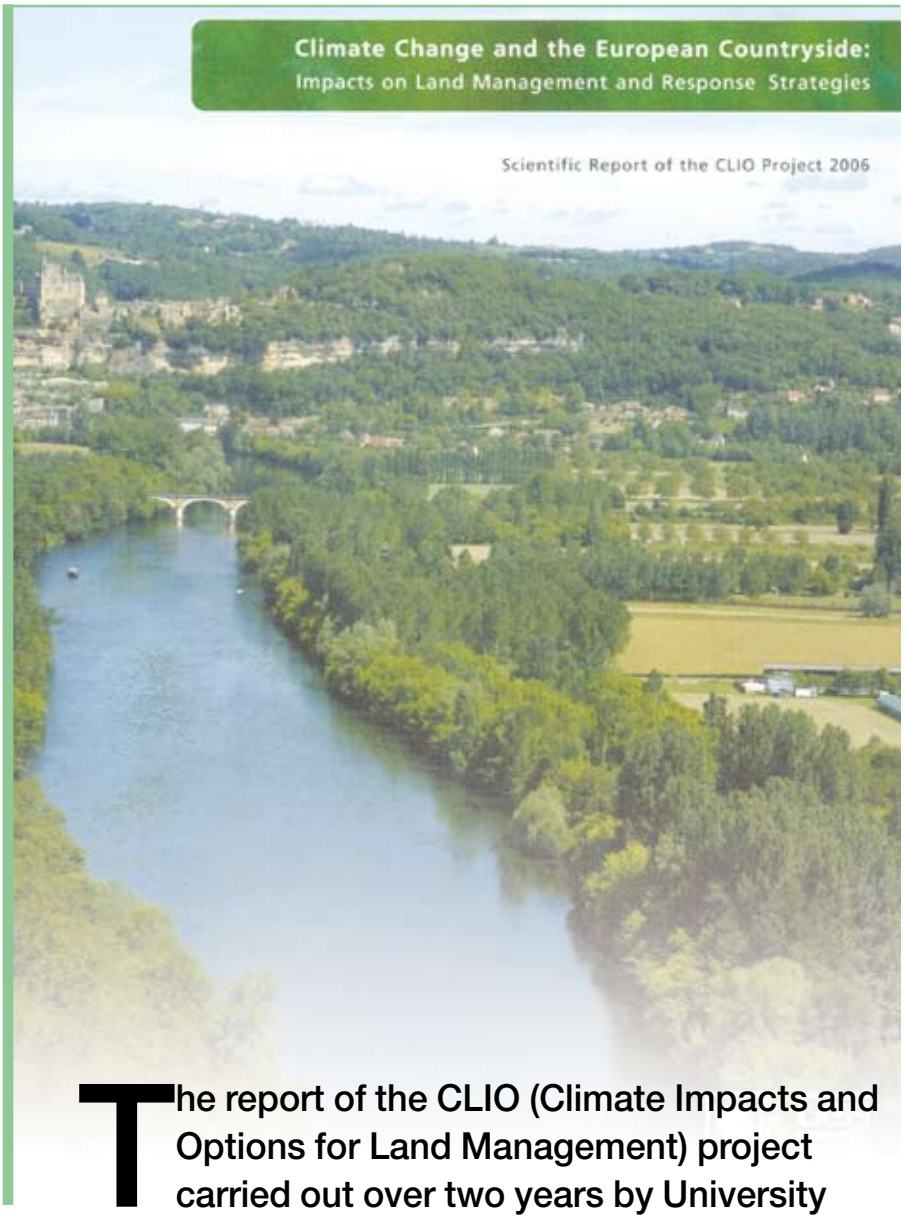
Because of the diversity of Europe there are numerous strategies. This means the legislator must guarantee that landowners have enough flexibility to act, for otherwise adjustments to climate change would be made impossible.
Overprotecting by proclaiming a standstill can have extremely detrimental effects. Condamning today what might be of use tomorrow is foolhardy.

In fact dynamic management which respects sustainable development criteria can make a positive contribution to carbon sequestration. It is time to be proactive rather than fearful, and to do so our politicians must distance themselves from dogma. At a time when European agriculture is being called into question, the environment must be something more than the exclusive territory of do-gooders or the victim of the one-upmanship game played by certain political parties.
Only a scientific, apolitical approach can justify the decisions to be taken.

This is why ELO – which does not hesitate to review its own positions – is committed to this approach and to looking towards the future.

Thierry de l'ESCAILLE

Climate Change and the European Countryside



The report of the CLIO (Climate Impacts and Options for Land Management) project carried out over two years by University of East Anglia, the CLA and the European Landowners' Organisation.

CONTENTS

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The report was written by Dr David VINER, who acted as academic supervisor, Michael SAYER, who acted as project coordinator, Maria CALVO UYARRA, M Sc and Nikki HODGSON, M Sc. Generous sponsorship was provided by the East of England Development Agency, Savills, The Crown Estate, Grant THORNTON and Mr Henry HOARE.

The study looks in detail at 21 European estates to assess the potential impacts of climate change on them, the scope for adaptation, and the potential of land management to mitigate climate change as part of climate policy.

The principal findings, which are summarised in three Key Message tables, are:

1. Local data confirms that the current rate of warming is in excess of that predicted by the higher scenarios. This is illustrated by 13 of the 14 estates for which comparative temperature data is available, indicating that a potential warming above the assumed critical level of 3°C is likely to take place by 2100.

2. Estates are likely to be adversely affected by a range of factors arising from hotter and drier summers, warmer winters and sea-level rise. Pressure on water resources, cropping shifts, effects on forest composition and tree species, greater fire risk, increasing vulnerability to pests and disease, exacerbation of tidal surges, and loss of biodiversity are among those of greatest concern. Adaptation to these threats is likely to provide only temporary relief unless a more effective climate policy is introduced.

3. Estates contribute already both to greenhouse gas emissions and carbon sequestration. The CALM (Carbon Accounting for Land Managers) methodology developed in the report applies simple measures based on the standard good practice used in national greenhouse gas inventories to enable estates and farms to monitor their own performance. The contributions of the individual estates in terms of emissions and sequestration have been estimated, and two examples of simple carbon accounts are published.

4. Although estates can contribute to mitigation of climate change through reducing their emissions and by the management of carbon sinks and stocks, their most effective potential contribution to climate policy would be enabling other sectors to reduce their carbon emissions through energy and material substitution. The report includes tables illustrating the potential savings to be achieved on an area basis from biofuels, and compares bioenergy and carbon sequestration options.

Ratification of the Kyoto Protocol in 2005 was a significant achievement, but climate policy now needs to move forward, as indicated both by the rise in EU emissions since 2003 and by the need to agree targets for climate policy beyond the 2008-2012 commitment period negotiated at Kyoto. The report's discussion of the policy options for land management, and the obstacles to policy, comes at an opportune moment, and I hope that you will find it useful.

■ Michael SAYER

Summary Report of the CLIO Project 2006

Climate Change is a critical matter facing all of us today. All sectors of society have a responsibility to reduce their greenhouse gas emissions and to think carefully about the potential impacts that climate change may have for them and how they may have to adapt.

This report, part of the wider CLIO (Climate Impacts and Options) project, is based on a detailed study of 21 rural estates, representing a broad range of biogeographical regions across Europe. It documents the different ways in which climate change is already affecting each estate, considers strategies to adapt to the changes and looks at ways in which rural estates can use carbon management to mitigate climate change and considers necessary policy actions. The overall impression from the estates studied is that the likely negative impacts of climate change popularly discussed are being, if anything, understated. Although an increase in atmospheric CO2 implies a theoretical increase in crop growth and greater efficiency in water use, in practical terms, these potential advantages are likely to be outweighed by water stress and an increase in extreme weather events. Any increase in crop yields is therefore likely to be associated with northern Europe and to take place only where there is no water limitation.

Considering the opportunities for estate managers to adapt to climate change leads us to conclude that this is going to be more limited and difficult than is often supposed. Adaptation to the changing climate will include increased winter storage of water, earlier sowing of crops, introduction of more heat-tolerant crops, increased vaccination of livestock, development of a more balanced fire, pest and storm resistant forest structure, improved soil cover, more effective coastal management and greater protection of vulnerable species and habitats. The results of our calculations of the carbon accounts on the estates suggest that the best opportunity for estates to help mitigate climate change is by: energy substitution through the provision of more renewable energy, followed by material substitution of wood for concrete, brick and steel in construction, followed by increasing carbon sinks. However, these strategies need coherent government encouragement. The current gaps in the policy framework must be addressed so that rural estates can play a crucial part in a fully integrated climate policy, helping the economy achieve the transition to the low carbon future which is in the best interests of agriculture, forestry, biodiversity and society as a whole.

THE IMPACTS OF CLIMATE CHANGE

Rising temperatures

Average temperatures across the estates are showing a marked increase, with summers getting hotter and drier, and winters milder. Nine out of 14 estates for which average annual temperatures could be compared before and after 1990 showed a decadal rate of increase of between 0.5 and 0.7°C. The speed of these changes is difficult for many plant species to adapt to. Crops and trees, fish in shallower waters and animals kept indoors are all likely to suffer increasing heat stress.

Changes in rainfall

Changing precipitation patterns and their interaction with increasing temperatures will have the most severe effects on estates. Heavy rains are causing increased flooding and erosion. Rivers will reach peak flows earlier or later in the winter, with consequences for winter abstraction. Particularly in southern and eastern Europe, there is likely to be an increase in river basin areas suffering severe stress. At the same time, groundwater recharge rates are falling, particularly in lowlands and areas of low effective rainfall, while recharge in chalk aquifers is likely to be reduced further as the start of the recharge period in late autumn is delayed.

An increase in spring and summer droughts

Spring drought represents the greatest climatic threat to cereal crops on estates that are predominantly arable and will have a serious impact on estates without irrigation, or where irrigation is unlikely to be permitted.

The impact will be exacerbated in seasons when groundwater recharge is inadequate, with a consequent threat to existing irrigation. Summer droughts are likely to become more frequent and start earlier: in France and central Europe the longest dry spells would potentially increase by up to 50%. They will be most severe in the Mediterranean region and the Iberian peninsula.

Threats to forestry

Storm, wind and snow are the biggest source of damage to European forests, with many of the estates having experienced large storms in recent years. The second largest source of damage is pests, which are likely to increase as a result of summer drought and milder winters. Increasing populations of spruce bark beetle are particularly associated with hot summers and consequent damage to stands of Norway Spruce. Another threat is fire; forest fires occur annually in almost all European countries, although most seriously in the Mediterranean region. All the estates in this study contain significant carbon stocks. The forest sinks are of particular importance, and the annual growth in the carbon stock after harvest currently outweighs the estates' agricultural greenhouse gas emissions in many cases. However, rising temperatures are expected to reduce the capacity of soils to store carbon, which, from 2050, could outweigh the effects of increased afforestation in Europe. Peat sinks, with their higher volumes of carbon, are likely to be particularly susceptible to drying out and consequent fire risk.

Late frosts and hail – threats to other crops

The increased frequency of late frosts occurring after mild winters presents a risk to fruit and other growing crops, while the increased intensity of spring and summer hail, combined with an extension of the growing season, is potentially damaging to all crops.

Sea level rise

Sea level rise represents a direct threat to most coastal estates and storm surge levels will increase. There will be an increasing loss of coastal wetlands, with a corresponding need to manage land loss. Where the beach and dune system is currently in equilibrium, its management will come under increasing pressure, while the standard to which adjoining public defences are maintained is often critical.

Biodiversity

Migratory bird species, particularly those reliant on tundra or mountain habitats and coastal wetlands, are likely to be affected by changes on migration routes, as well as in breeding and wintering habitats.

Fish stocks are likely to be adversely impacted, especially Atlantic salmon, whose metabolism is altered by higher sea temperatures, with the result that the fish are often unable to meet an increased need for food. A rise in river temperatures may also adversely affect spawning. An analysis of 1,350 plant species, some 10% of European flora, suggests that by 2080 more than half the species considered could be endangered or extinct.

There is likely to be a continuing increase in invertebrate pests, like ticks, and resultant tick borne diseases with implications for livestock health. The sheep (deer) tick, which transmits the louping ill virus, is expected to impact on northern British Isles estates. As impacts become more severe and unforeseen effects develop, it will be important for estates to monitor a range of environmental measures for management purposes. Monitoring will help estates manage sensitive species in a more consistent manner and also allow for scientific investigation into observable impacts of climate change.

STRATEGIES TO ADAPT TO THE EFFECTS OF CLIMATE CHANGE

Water resources

The building of estate reservoirs offers an obvious means of adapting to reduced water availability. Storage of winter rain is particularly important in areas where the groundwater resource is limited. But the increasing uncertainty of winter

Observed Local Temperature Increase post-1990 compared with 1961-1990

ESTATE (STATION)	INCREASE °C	OVER YEARS	DECADAL AVERAGE °C
Cappoquin (Cork)	0.02	13	0.02
Corti, Le (Pisa)	0.7	13	0.54
Dobříš (Zbiroh)	1.02	14	0.73
Het Loo (Eindhoven)	0.54	15	0.36
Holkham (UKCIP)	0.71	10	0.71
Hverringe (Odense)	0.95	14	0.68
Invercauld (Braemar)	0.6	14	0.43
Oettingen (Fremdingen)	0.77	15	0.51
Reitzenstein (Hof)	1.0	14	0.71
Rushmore (Hurn)	0.70	14	0.50
Tour du Valat	0.59	14	0.42
Veta la Palma (Palacio de Doñana)	0.44	14	0.31
Wehmaan Kartano (Mikkeli)	0.9	15	0.60
Windsor (Wokingham)	0.88	15	0.59

rain in some regions raises concern over any planning policy which would allow additional extraction for the competing domestic or industrial sectors in areas with low groundwater recharge.

Cropping

Individual estates must either adapt their cultivation practices or change the crops and varieties they grow in response to climate change. In northern Europe, cereals will be harvested earlier, but yields of winter cereals will depend on the scope for early establishment in potentially wetter drilling seasons. The introduction of more heat-tolerant Mediterranean crops will become an option, but expansion of the areas under fruit and vegetables or irrigated maize would have implications for water use, while the movement of arable crops further north in Sweden and Finland would frequently be frustrated by soil types or would require major land-use change from forest to agriculture.

Livestock management

Livestock management will require greater emphasis on prevention of heat stress and disease. Vaccination of domestic livestock, and some wild populations, may become increasingly important because of globalisation.

Soil erosion

The main way to control soil erosion is to maintain vegetation cover, although soils under annual cropping systems will remain vulnerable to heavy rainfall between harvesting and planting. With hotter summers and earlier harvests, the ground may be left bare for longer periods before autumn drilling. In more extreme climate conditions, maintenance of year round vegetation though woodland and permanent pasture may be the only option.

Forestry

Conversion to uneven-aged, mixed species forests with continuous cover, and the replacement of individual tree species by those better suited to the site and climate, will enhance stability and resilience against gale damage and pests. Much of the financial impact of gale damage can be overcome by the provision of storage for potential windblown timber. The substitution of broadleaved species for conifers is already occurring but implies a lengthening of rotations to achieve similar timber volumes. If forestry is to be used as a carbon sink and continuing source of renewable materials, it is essential to minimise fire risk. This can be achieved through a combination of fire breaks, public awareness, regular patrols at times of high risk and the provision of local reservoirs to give fire-fighters ready access to water.

Coastal zones

Greater investment in sea defences and coastal management techniques will be necessary for estates in coastal zones, including dune management, the creation of stable headlands along their frontage and beach nourishment.

Biodiversity

While there is little scope for managing biodiversity in the face of temperature increases, other than enhanced

CARBON BALANCE WEHMAAN KARTANO

Annual Emissions			**Kg CO_2/eq**
CO_2			
Energy use			135,360.00
N_2O			
Livestock	475.03		
Crop residues	1336.02		
	1811.05	x 310	561,425.50
CH_4			
Livestock	10,472.00	x 21	19,912.00
			916,697.50

As tC: **250**

SEQUESTRATION

Carbon stock in woody biomass

Species	Standing Volume (m^3)	Stem Density[1]	Carbon Fraction	tC
Norway Spruce	79,476	0.43	0.5	17,087
Scots Pine	53,522	0.49	0.5	13,113
Birch	13,327	0.67	0.5	4,465
	146,325			34,665
Biomass Expansion Factor[2] x 1.3				**45,065**

ANNUAL SEQUESTRATION

All species	Volume (m^3)	Ave SD[1]	C Fraction	tC
Annual increment	5,700			
Annual harvest	4,000			
	1,700	0.47	0.5	400
Biomass Expansion Factor[2] x 1.3				**519**

Balance of annual sequestration over emissions: **269 tC**.

The soil sink, which is assumed to be currently in equilibrium, has not been calculated.

1. Indicative stem density factors derived from Nabuurs *et al.*, CO2FIX2. Annual increment and harvest are assumed to be in same species proportions as standing volume.
2. Indicative BEF (IPCC).

site protection for plants moving to higher altitudes, there is scope for the management and creation of habitats at lower altitudes, including wetlands, and along migration routes, where coastal zones are likely to be of key significance. Climate change will increase the need for careful management of native biodiversity and effective control of alien invasive species.

Economic and sectoral diversification

Many estates will seek to adapt to climate change through economic diversification, although this indicates the relative inadaptability of their traditional core functions. Tourism is an obvious choice, and most of the participating estates have already taken steps in this direction, driven partly by the historic decline in agricultural and forest income.

How rural estates can use carbon management to mitigate climate change

In order for estates to obtain a standardised measure of their carbon impact, an assessment tool based on current Intergovernmental Panel on Climate Change (IPCC) methodology has been developed: CALM (Carbon Accounting for Land Managers). This makes use of normal data available on most farms of their energy and fertiliser use, the cropping, and livestock production and systems, to calculate the Greenhouse Gas Emissions converting them to carbon dioxide, and then carbon equivalents. The other side of the accounts, the annual carbon stored (or sequestered) in trees and soil is calculated from information on the areas of forestry and the type of trees, their age and other factors. The detailed assumptions and technical coefficients used are reported in detail in the main report. The idea behind the CALM analysis is to enable farmers and land managers to assess what impact their activities are having by constructing a carbon account from readily available data. This then enables them to assess what they can do about the climate impacts of their activities and help to mitigate climate change. The experience of this study is that these calculations are feasible. The data requirements for estimating carbon storage are the more demanding part of the calculation because it needs quite detailed information on the tree inventory. In countries where timber production is a commercial activity this is usually available, but this is not the case in countries, such as the UK where much woodland is under-managed. For farmers to see the relative magnitudes of emissions and sequestration from the activities on their land is in itself a vital part of beginning to think about what, if anything, they can do about it. The results of our study lead us to the broad conclusion that the three main mitigation routes for land managers are: energy substitution, material substitution and then increasing carbon stocks and sinks. These are explained below.

Reducing greenhouse gas emissions – energy substitution

There are considerable opportunities for estates to reduce greenhouse gas emissions by converting estate use of energy from fossil fuels to renewable energy sources such as biofuels, biogas and biomass, as well as by using energy more efficiently. Estates can also introduce the production of biofuels and biomass crops. Wheat or sugar beet can be used for bioethanol and oilseed rape for biodiesel. Perennial grasses such as miscanthus, and wood, either from specially grown coppice, or in the form of waste from existing timber production, can be used either alone or for co-firing, locally or in power stations. Potential savings in greenhouse gas emissions to other sectors have been estimated ranging from 38 to 61 tonnes carbon equivalent per 100ha for oilseed rape, 72 to 107tC equivalent per 100ha for bioethanol from wheat, 154 to 525tC equivalent per 100ha for bioethanol from sugar beet, 449 to 929tC equivalent per 100ha for miscanthus and 104 to 264tC equivalent per 100ha for short-rotation coppice. Land currently in set-aside is already available for these crops and biofuels can be introduced into existing rotations by substitution for existing root and break crops or by changing the use to which an existing crop is allocated. Sometimes (and most obviously in the case of sugar) the present use is expected to decline following trade agreements and there is an opportunity to integrate trade, energy and climate policy. Other land-based renewable energy sources include wind (which is outside the scope of this report) and hydroelectric power.

Reducing greenhouse gas emissions – material substitution

Another opportunity for reducing greenhouse gas emissions is the use of timber instead of other materials for construction. The emissions avoided by replacing one cubic metre of red brick or heavy concrete with sawn timber have been calculated as 4,000kg CO2 and 2,900kg CO2 respectively. On this basis, annual emissions savings in the range of 4.6tC/ha and 3.3tC/ha could be achieved by the most productive European forests.

There is a considerable surplus of forest available for wood supply as annual fellings are currently estimated to be below increment in temperate and boreal forests. The substitution would mostly occur after maturity in 60 to 80 plus years, with the new forest providing earlier benefits as a carbon sink and a source of biomass and small-scale substitution from thinnings.

Increasing carbon sinks and stocks

The other contribution estates can make to carbon mitigation by source is through the management

of carbon sinks and stocks. Woody biomass offers the greatest possibilities on a per hectare basis, either by afforestation or by better management of existing forest. Most small woodlands in Europe are under-managed and fail to achieve optimal standing volumes of timber.

The importance of government policy

Although adaptation measures will be required to cope with the degree of climate change that is already inevitable, without effective mitigation, adaptation will fail. Adaptation policies will have implications for public funding, while effective mitigation is likely to depend on a combination of societal changes: reducing consumption, greater efficiency in energy use and technology. Policy actions are required to internalise the pollution costs of existing fossil-fuels. A reduction of 66% in 1990 levels of greenhouse gas emissions would be required to stabilise atmospheric carbon by 2150. This would in turn imply a target reduction of 8% to 8.5% for 2013 to 2017 to follow the first commitment period under the Kyoto Protocol. However, for the last two years, EU emissions have actually risen.

Current government incentives

A number of instruments are already in use to promote renewable energy;

- Within the EU, tariffs have been introduced to encourage the supply of renewably generated power to the national grid in Austria, France, Germany and Portugal
- In Denmark, there is a settlement price for energy generated from biomass, biogas, waste or wind
- A number of countries offer tax exemptions
- Investment subsidies are available in Austria, Finland, Germany, Poland, Spain, Sweden and the UK
- Renewable energy certificates are employed in Denmark, coupled with mandatory obligations in Italy, Sweden and the UK
- In Sweden, consumers will be required to buy certificates equivalent to 17% of electricity use by 2010
- In the UK, licensed electricity suppliers are required to source a percentage rising from 4.9% in 2004-05 to 10.4% by 2010-11 by acquiring Renewable Obligation Certificates or paying a buy-out price per megawatt hour.

The opportunity

Current targets for renewables are unambitious. For example, the UK could achieve a 10% biofuels target, based on current land use, simply by employing set-aside and the wheat surplus. But clear policy decisions are required if the necessary levels of investment are to be achieved. In the EU renewable energy from biomass and wastes rose from 40 million tonnes of oil equivalent (Mtoe) in 1992 to 58Mtoe in 2003 (EUROSTAT). In the heat sector, the use of biomass in new combined heat and power and district heating installations has risen by nearly 50% since 1990 in Finland and by nearly 40% in Sweden, where 25% of central heating is now produced by woodchip. Even applying strict environmental constraints on agriculture and forestry, the EU could produce 190Mtoe from bioenergy by 2010, rising to 295Mtoe, or 15% to 16% of the projected energy requirement by 2030. Of this, bioenergy crops from agriculture are estimated to contribute 47Mtoe by 2010, rising to 142Mtoe by 2030, with a more or less constant 40Mtoe from forest waste (European Environment Agency).

Carbon trading

Since the changes in carbon stocks will form part of national inventories, it would be logical for the woodland giving rise to the credits under Article 3.3 of the Kyoto Protocol to be eligible for carbon trading, which could be on the basis of five-year certificates, renewable as appropriate.

Summary of Estimates of Carbon Stocks in Woody Biomass in Select Forests

	Carbon Stock (tC)		Est. annual increase net of harvest (tC)	
Estate	Total	per ha	Total	per ha
Blekhem	100,810	27.5	1,121	0.4
Couvet				
Series I	5,709	103.8	59.5	1.1
Series II	8,761	105.6	54.5	0.7
Dobříš				
Dobříš	608,406	69.7	10,642	1.2
Zbiroh	899,733	75.4	4,382	0.4
Mautern				
(wirtschaftswald)	164,092	95.8	equilibrium	
Oettingen				
Oettingen	212,649	67.7	equilibrium	
Reitzenstein				
Reitzenstein	11,519	69.0	263	1.6
Wehmaan Kartano	45,065	39.5	519	0.5

Sustainability

Sustainability is understood as a balance of environmental, economic and social interests. The pressures of globalisation demand a level playing fields in terms of freer trade and basic legal rights, thereby making ever more necessary the internalisation, wherever possible, of social and environmental costs and an effective global climate policy. There is a corresponding need to validate locality, increasingly understood in terms of traceability and, a preference for local food and energy, as well as the need to conserve local communities with their built and cultural heritage, and the local environment.

Towards an integrated climate policy

Adaptation to climate change is local, but mitigation, while the investment is delivered locally, must be global. The landowner, who produces for both world and local markets, is at the fulcrum of these forces, and at the same time fully exposed to climate change as he seeks to plan (and to plant) for his children and grandchildren.

A fully integrated climate policy will harness agriculture, forestry and land use as a single sector, encouraging the production of biofuels, biomass and timber, and the management of carbon sinks and stocks, while liberating land from direct, taxpayer-funded food support as other sectors internalise their environmental costs. The landowner's role is then not only to reduce his own emissions, assuming increasing responsibility for managing water, habitats and biodiversity as he does so, but to help enable the rest of society and the economy achieve the transition to the low carbon future which is in the best interests of agriculture, forestry, biodiversity and society as a whole.

Comparison of Biofuels, Biomass and Land-Use Change Options
Range of carbon benefit based on 100 hectares

	Fossil Fuels used to process	Renewables used to process	Additional sequestration in soil	Additional sequestration in woody biomass
	tCeq/a saved	tCeq/a saved	tC/a	tC/a
Oilseed rape (Biodiesel)	37.9	61.1	x	x
Wheat (Bioethanol)	72.3	107.1	x	x
Sugar beet (Bioethanol)	154.3	525.3	x	x
	tCeq/a saved			
Miscanthus to substitute			x	x
grid electricity	449.3			
coal	928.9			
Short Rotation				
Coppice			x	x
Chips for grid electricity	129.6			
Chips for coal	263.7			
Pellets for grid electricity	104.3			
Pellets for coal	234.2			
Arable to Permanent Grass	25 - 33		70	x
Arable to Woodland	25 - 33		70	180

Sources: Methodology in Annex II (first nine options) and Annex I (last two options).
Notes:
The last two options each save a proportion of existing N_2O emissions based on average N application for the estate and energy emissions from land work pro rata. An indicative allowance has been made of 25 -33 tCeq/a to cover these two sources based on an assumed N application of 150 - 200 kgN/ha and energy emissions in the order of 3 tC/ha.

Both these options assume mineral soils. The last option at maturity would no longer sequester additional soil carbon after 100 years but subject to harvest the carbon stock in woody biomass would increase until maturity.

The vulnerability of historic buildings and stone to air pollution

Although the impact of pollution on our stone architectural heritage has been known for a long time and seems to pre-date even the industrial revolution, recently and especially after the Second World War it has taken on a completely new dimension. Moreover, although scientific research into the causes and mechanisms behind the deterioration of buildings is being stepped up, the assessment of the damage is still a complicated and difficult task.

In 1975 the European year of the protection of historical monuments led to an intensification of scientific research in Europe into the effects of pollution on building stone. Cross-border and interdisciplinary cooperation began covering topics as diverse as architecture, meteorology, microbiology, petrography or even public works.

Many studies and investigations into the degradation of monuments due to pollution have confirmed the overriding role of air pollution in the blackening, corrosion and sulphation of façades. However it is not easy to attribute a single cause to a particular type of deterioration. As well as the damage caused by pollution there is that caused by natural, unavoidable ageing of the stone and other factors such as temperature variation and damp, water or frost for example. Moreover, each stone has its own reactivity to atmospheric agents depending on its properties and exposure. The assessment is all the more complex because there are differences of opinion on the mechanisms of damage and the extent of the environment's impact on stone.

As a construction material natural stone exposed to variable climate conditions in contact with the ground is subject to physical, chemical and biological reactions which modify the visible surface. Although the patina which is formed over time can temporarily improve its qualities due to the changes in texture it provokes, the stone slowly deteriorates leading to irreparable damage. The massive increase of the production and consumption of energy due to the development of industry, heating and transport have led to major atmospheric emissions of sulphur compounds which have considerably increased the process of disintegration. An exemplary heritage such as the city of Athens has deteriorated more over the last 25 years than during the previous 24 centuries.

Types of air pollution vary, leading either to the dissolving of the rock due to air acidity or to blackening producing cavities, crumbling sand, flaking, efflorescence or crusts. The risk of bacteriological cultures closely linked to chemical pollution also causes particular degradation phenomena.

Generally speaking the parts sheltered from rain and runoff are darker and develop a blackish crust composed of gypsum - linked to the transformation of calcium carbonate into calcium sulphate - and of polluting particles essentially emitted by heating, incinerators and the catalytic converters of cars. When the crust is thin the original relief of the stone is conserved but when it grows to several centimeters and becomes uneven it completely changes the surface appearance and can come off in sheets. The parts exposed to rain are lighter. Constantly rinsed by water which washes off deposited particles, they are stripped or even eroded which leads to a loss of material.

So far the research done into the main vectors of deterioration linked to air pollution have provided indispensable data for the maintenance and restoration of monuments, but the work remaining to be done on the subject is extensive and complicated as it is constantly evolving. Although in recent years the tightening up of legislation on air-borne emissions has reduced sulphur dioxide and flue dust, soot content and fine particulates have not diminished. As LISA is currently wondering, is the fine, black, smooth and compact film which has begun to appear on recently cleaned buildings early gypsum crust or a new type of crust linked to changing air pollution conditions?

■ Donatienne de SÉJOURNET

THE INSTITUTIONAL ECHO

EU encourages micro-level carbon management

The EU has recently embarked upon a number of projects aimed at reducing the everyday contribution Europeans make to global warming. The focus on micro-level measures to moderate carbon consumption follows the broader commitments made in the Kyoto Protocol and the Emissions Trading Scheme (ETS) by Member States and industry.

Central to the initiatives is raising awareness of the climate costs of various everyday activities, encouraging people and companies to incorporate a carbon-quotient into cost calculations from which it has thus far been absent. These kinds of incentives to compel "full cost internalisation" at the European micro-level are a logical application of the oft-repeated principles of "polluter pays" and sustainable development, where consumed resources are replaced to a maximum degree.

One year after its 2005 Green Week focused on climate change, the Commission recently launched a new climate change campaign due to run from 29 May 2006 to 7 February 2007 (www.climatechange.eu.com). As the Commission states, "the main message of the campaign is that simple daily choices, like turning up the air conditioning, recycling, using public transports as often as possible have a direct impact on climate change."

EU Member States meanwhile are embarking on their own endeavours. A recent report by UK scientists on the most pressing environmental questions included: "How can we measure natural capital (renewable and non renewable resources) and integrate such a measure into GDP?" Old measures of capital and GDP will need to be reassessed to take into account what have until now been considered external costs. Or as a discussion paper for the July 2006 Council of EU Environment Ministers stated, "in addition to traditional environmental protection measures such as reductions in direct emissions, new comprehensive ways of thinking are needed: we must learn how to use natural resources and still be able to return them into natural cycles - as suitably processed wastes, for instance."

The Finnish presidency of the EU has incorporated the idea of carbon management into its planning of meetings. In an effort to partially offset the carbon emissions from air travel, instead of offering the traditional local souvenirs to conference participants during its presidency, Finland contributes a gift in the attendee's name to renewable energy projects in the third world. In this way, air travellers "remove an equivalent amount of carbon dioxide from the atmosphere by paying for measures to reduce green-house gas emissions" in another part of the world.

Aviation has also featured elsewhere in the climate change debate recently. A Commission communication from late 2005 proposed, among other things, taxes on airline kerosene, more efficient air traffic planning in Europe's single skies, and including the airline industry in the ETS or some parallel scheme. The Parliament welcomed the measures and suggested promoting biofuels for the industry as well. All are likely to add to the price of flying, at least in the short term. Full cost internalisation concerns short term investments and savings for long-term gain. All need to pay their share. Governments can regulate, subsidise and provide incentives, but they cannot alone make all the required investments. At the EU-level, the Seventh R&D Framework Programme will significantly increase EU funds for research into renewable energy and efficiency (although a call for a fixed share by the Parliament was rejected), but the critical momentum for a more eco-efficient future will need to come from below.

■ Hannes HUHTANIEMI

Young Friends at the 4 corners of Europe : Belgium

Since its creation in 2005 Young Friends has endeavoured to network as efficiently as possible to develop and become more representative. The European network is based on two fundamental pillars of private property - the management of a family business and the management of historic property such as historic houses and listed buildings. Taking over the management of a property is no easy matter and it is therefore advisable to show an interest well before the actual take-over occurs.

For this reason and in cooperation with the Union of European Historic Houses Associations (UEHHA), Young Friends intends to support the action of the Belgian Royal Association of Historic Houses and Gardens (HH & G) whose members already want to start involving the future generation of potential owners of historic real estate in its activities and therefore awaken their interest sufficiently early on.

With this in mind, this year HH & G are launching a 'young people' section for Historic Homes. This type of section currently exists in various countries of the Union under the name « Young Successors ». We wish to reinforce this network and associate it with HH&G.

This initiative was proposed at the last General Assembly of Belgian Historic Houses and Gardens on 17 June this year. Daniel Cardon de Lichtbuer, chairman of HH & G, clearly expressed a desire for a dialogue between generations. Young Friends shares and supports this idea.

The objective is to raise the awareness of the future generation of property owners about property transfer mechanisms both in practical, legal, financial and psychological terms. Emphasis will be given to the need to bring the generations closer together in order to enable the creation of efficient strategies of succession.

Aspects such as maintenance and renovation costs, current and potential sources of income and understanding the way the property is run or management systems currently in use are of vital importance. The preservation of our heritage over time has become one of the major questions now being asked in management terms.

To achieve this necessary sources of income need to be secured and various solutions are possible. Sometimes they require the owner to dig into a part of the property's private value. The transformation of a part of the estate to rent out offices, to offer bed and breakfast or to host receptions, seminars or weddings are all part of these solutions. These concepts have spreadly widely over the past few years. Opening up parks and gardens and a part of the stately home to the public are also possibilities.

Banks and associations of property owners can avail themselves of invaluable help in seeking these solutions. It is always beneficial to exchange experience and ideas. Finding out about the initiatives or management and succession systems of our European neighbours can also turn out to be useful and instructive.

Every quarter HH& G publishes a journal entitled « Demeures Historiques et Jardins » containing historic information, cultural events or other items about the management of historic buildings.

For further information contact the Young Friends secretariat in Bruxelles.

■ Robin du PARC
Secrétaire Général

BOOK OF THE MONTH

Wald Menschen

By Friederun PLETERSKI and Nora SCHUSTER

The book Wald Menschen, by Friederun PLETERSKI and Nora SCHUSTER with contributions form several other authors, discusses the relationship between humans and forests. Through the individual stories of over a dozen people, the detailed histories of land use and related perceptions of forests and their value are described. In particular, the stories portray humans and land managers as stewards of the land, who as sensitive creatures are also capable of being in tune with the forests' intrinsic worth. Indeed, the stories show not only the sensitivities that humans, landowners and managers have towards forests, but also the influence that people and family members have on shaping the sensitivities of future generations. Although several stories focus on forests and people in Austria, a country rich in forests, the messages and principles portrayed are also applicable in a wider context.

Diary Dates 2006

25 October, London
Conference, 'Chocolate and confectionary 2006', on discovering new markets for traditional products such as chocolate.
http://www.agra-net.com/portal/

7-9 November, Amsterdam
'FO Licht's World Ethanol 2006' conference, organized by businesses representing the ethanol sector.
http://www.agra-net.com/portal/

7-9 November, The Hague
Conference on 'Sustainable Development of the Agri-Food Chain' organized by the European Federation of Food Sciences and Technologies.

13-15 November, Brussels
Conference on 'The Baltic Sea and the European Maritime Strategy,' organized by the Finnish Presidency.
http://www.eu2006;fi/en_GB/

14-15 November, London
4th annual conference on sustainable development in Europe, "Regulations on applied rural sustainable development,' with speakers Dirk AHNER, DG AGRI and Mark THOMASIN-FOSTER, ELO chairman.

20-21 November, Brussels
Conference on 'Contribution of territorial managers and anglers to the conservation of aquatic habitats," summarizing 3 regional seminars (Baltic, Mediterranean and Atlantic).

22 November, Brussels
Conference on 'the Future of Horticultural Sciences from a European Perspective," organized by the Society of Horticultural Sciences of the Benelux and by the Economic and Social Committee. Fons. werrij@wur.nl

27-28 November, Berlin
ELO General Assembly

REQUEST FORM

Please fill in this form (in capital letters) and send it to : European LAndowners' Organization asbl- 67, rue de Trèves- B-1040 Bruxelles, Belgique. Tel/ 0032 (0)2 234 30 00- Fax : 0032 (0)2 234 30 09- e-mail : elo@elo.org- web site www.elo.org .
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