

The First Andrew Raven Memorial Weekend at Ardtornish

'Carbon and the Climate: Implications for Rural Land Use'

On the weekend of June 8-10 2007, a gathering was held at Ardtornish in Morvern on the west coast of Scotland to commemorate the life and work of Andrew Raven, the inspirational environmentalist and land manager who died tragically young in 2005. For many years Andrew had worked tirelessly to bring about social, environmental and economic change in rural Scotland. This weekend was conceived as a way of continuing that work, in a way that was in tune with his own vital and inspiring example, taking his central concern with the policies and practicalities of land use, particularly in Scotland, and considering them in the light of the great modern challenge of global warming.

For a brief account of Andrew's life and work see:

www.ardtornish.co.uk/Pages/AndrewRaven.asp

Those attending the weekend were:

Andrew Barbour
Dick Birnie
Will Boyd-Wallis
Robin Callander
George Campbell
Bob Dunsmore
Victoria Edwards
Maggie Gill
Priscilla Gordon-Duff
Andrew Hamilton
Alan Hampson
Jim Hunter
Alan Kennedy
Calum MacDonald
Willie McGhee
Simon Pepper

Jessica Pepper & Graeme Cook
Phil Ratcliffe
Drew Ratter
Amanda Raven
Faith Raven
Hugh Raven & Jane Stuart-Smith
Sarah Raven & Adam Nicolson
Jane Raven & Andrew Wallace
Bill Ritchie
Angus & Jennie Robertson
Pete Smith
Dr Mary-Ann Smyth
Hamish Trench
Camilla Toulmin & Mark Jones
Richard Wakeford

1. In memory of Andrew Raven 1959 - 2005

It was, as Amanda Raven said in welcoming everyone to Ardtornish on the Friday evening, 'a bittersweet occasion.' Ardtornish itself, glowing in June sunshine and basking in warm airs from the south, can rarely have looked so beautiful in its early summer clothes. The house, usually divided up for holiday lets, was here in use as a single organism, providing, as Amanda said, rooms for chats and sit downs, a piano for people to play, spaces in which the 37 ecologists, activists, policy-makers and practitioners could gather and regather in a way that the late 19th-century house, built to entertain a family's many friends and acquaintances, must have dimly remembered in its bones.

A huge amount of preparatory work had gone into the weekend - which was, as a result, apparently effortless, a remarkable integration of the personal, social and political, the local and the global, the serious, the delightful and the intriguing - a gathering, in fact, at which Andrew Raven would have loved to have been, and which would have loved to have had him there. It wasn't so much a commemoration of his memory as an embodying of it, even an animating of it, a continuation of his life, vitality and vigour by other means. He was clearly there in spirit and it was the hope of everyone who was there that this spirit would continue to grow and thrive at Ardtornish in future years and at future weekends. No fixed memorial could have remembered him as well as the noisy, braided stream of talk, argument and discussion which rippled through Ardtornish for two unbroken days. In the words of Angus Robertson, the Ardtornish factor and Andrew's lifelong friend, there was only one all-important person missing. And the key message from Angus was this: good feelings from being at Ardtornish should always be measured as one of its outcomes.

2. Ardtornish: social, economic and environmental coherence + the carbon question

Angus described the ways in which he and Andrew over the last 22 years have steered Ardtornish towards a vision of coherence, an integrated land use policy which aimed, on a relatively small scale, to integrate the three corners of a sometimes divergent triangle — social good, economic vitality and environmental wellbeing. This mutual accommodation of potentially conflicting ideals — central to the idea of sustainable development — was intended to be one of the underlying themes of the weekend.

Ardtornish's 35,000 acres of hill, woodland, river and shore, had been cleared in the 19th century for sheep and had then become a deer forest, which Andrew Raven's grandfather, Owen Hugh Smith, had bought in 1930. In the post-war period, the focus of the estate policy has been on achieving economic viability while contributing to the strength and prosperity of the community and of the natural and cultural riches which the whole peninsula of Morvern has inherited.

The community is a high priority. Ardtornish provides 35% of all employment in the parish of Morvern, a third of which is directly employed by the estate. A quarter of the factor's time is spent on community projects for which the motive is partly ideological, but there is self-interest here too: Ardtornish could not be viable unless the community around it were viable.

It is just as true that Morvern would be much less viable without Ardtornish. Estate policies cannot nowadays run at an expensive loss as they did in the past. The estate needs to be economically self-sustaining and runs many various enterprises to make sure it is: an in-hand farming operation with 2,000 Blackface hill ewes (which are not currently profitable) and 250 hill cows (which are making money

and doing well); salmon farming (through Scottish Sea Farms Ltd); 12 self-catering holiday units; sand mining (indirectly through Tarmac (Northern) Ltd, operating the Lochaline Silica Sand Mine); hydro-electric generation, through a 720 kW hydro system on the River Rannoch, selling power into the national grid, with plans for more; stalking (50 stags shot a year); fishing on lochs and rivers, much of which since 1990 has been in a sadly depleted state; 600 hectares of conifer plantations and some 2,000 hectares of semi-natural native woodlands.

Sewn into those many aspects of Ardtornish's commercial and social enterprise is a consistent and overarching objective to sustain and enhance the natural heritage of the estate. Nature conservation, in alliance with like-minded public bodies and grant aiding agencies, is never absent from the planning and operation of the estate. This dimension is just as complicated as the commercial and community side. Over a sixth of the estate (2000 ha) is designated by the EU as a Special Area of Conservation, but in the late 1980s the estate also commissioned a comprehensive conservation audit of its whole surface area. The late Brian Brookes, long-standing friend of the Raven family, walked every part of it on a 50 metre grid, identifying, listing and grading every important habitat, a survey which now provides environmental guidance for all the estate's actions and policies.

Large-scale fencing and livestock control programmes have encouraged woodland regeneration. So far, some 700 ha of regeneration and native woodland planting schemes have been set up, which will result in over 750,000 new trees on Ardtornish. The Scottish Wildlife Trust is managing the conservation of around 600 ha of Ardtornish land, neighbouring their own land and forming a part of their Rahoy Hills Nature reserve. Deer management is in conjunction with the Morvern Deer Management Group which has recently completed a group Deer Management Plan.

Two things are clear from this highly evolved and interlocked structure. The management of Ardtornish has been both exceptionally conscious of the public debate about land, community and the environment in the last twenty years. This is not a picture of drift. Ardtornish has understood the direction in which the world is going (and has been canny about picking the grants that public policy has made available, particularly for energy generation and habitat restoration) but it has also been carefully attentive to its inheritance, natural, cultural and social. The last twenty years at Ardtornish has been a conversation between those things.

On the question of carbon emissions, though, the picture is more mixed. How do Ardtornish's policies look in the light of it? On the deficit side, the estate relies on some 300 car journeys a year from London and back to bring in its tourism revenue. The heating for the big house is oil-fired and the house itself is not particularly well insulated. In its sheep, cows and deer, it has more mouths eating grass than is entirely justifiable in atmospheric terms. Ovine and, even more, bovine emissions of greenhouse gases both contribute to climate warming, and more trees would be better. There are also some signs of erosion of the peat through overgrazing and that too is leaking carbon into the atmosphere. There is a great deal on the credit side. Ardtornish has gone into renewable energy both with a view to reducing emissions and to bring some financial security. There is 6.2 MW of hydro potential on the estate — not unusual for the west coast — and future plans mean that figure is likely to be held down only by concerns at the impact of dams, pipes and reservoirs on the landscape. The Rannoch scheme is bringing in £200,000 a year which gives the factor a good feeling on a wet day. A windfarm has been thoroughly investigated, with some serious community involvement, but is currently on hold. The estate is now also looking at the potential for biomass energy. Morvern produces 50,000 tonnes a year of softwood. Some 5-10,000 tons of it are left as waste on the ground. The timber is currently selling at £15 a ton. But

the energy in that ton is equivalent to £150-worth of oil. There are clearly huge opportunities here, particularly as Morvern is by the sea and the wood, or wood chips or pellets, could leave by ship.

There is one key implication of the Ardtornish story: even on the most well-considered estate, the carbon question has only recently started to become central. It needs to remain there. With any future policy or action, the social-economic-environmental triangle needs to evolve, so that carbon comes to play an even more important role in what we mean by 'environmental'.

3. Pete Smith: 'Carbon and the Climate: Implications for Rural Land Use'.

Professor Pete Smith of Aberdeen University – and he is surely the only senior member of the Intergovernmental Panel on Climate Change who can do a punk number on an acoustic guitar at 1 o'clock on a Sunday morning – gave the group some 15 hours earlier on Saturday morning a masterly walk through the climate change minefield, gradually narrowing his focus from the atmosphere itself to the surface of the earth and to the possibilities and opportunities offered by managing the land in a carbon-friendly way, particularly in Scotland.

Atmosphere

To begin at the beginning, the atmosphere traps solar energy. Visible light comes in from the sun, is reflected off the dark surface of the earth and re-emitted as heat. That heat is trapped by the world's atmosphere.

Carbon dioxide contributes 65 % to this global warming, Nitrous oxide 5% and Methane 20%, with another 10% coming from a set of long-lasting industrial pollutants known as halogenated compounds. Through industry, agriculture and changing land use, people have been pumping these gases into the atmosphere at unprecedented rates, which have risen globally by 70% since 1970, are still rising and at a rate which is itself rising. As there have been exponential increases in the three key gases, temperature changes in the 21st century are very likely to be larger than in the 20th century.

The greater the temperature rise, the wider and deeper the impact on environment, climate and people. A 2° C rise carries significant risks to the planet. If the temperature climbs higher than 2° above pre-industrial levels, the possibility emerges of 'large scale discontinuities', or in other words major shifts in oceanic and atmospheric systems with catastrophic impacts on world settlement patterns, food production, sea levels, human survival rates and ecosystems. At present rates of increase, that will happen this century.

So should we just slit our wrists? No. Can anything be done to avert the disaster? Yes, if the response is urgent, large-scale, strongly enforced and swiftly executed. As the UK government's Stern Report concluded, the cost of action (1% of GDP) far outweighs the risks of non-action (5% of GDP). Larger risks (20% of GDP) lurk in the background.

The Intergovernmental Panel on Climate Change (IPCC), of which Professor Smith is a leading member, has concluded that it is technically and economically feasible to avoid these problems but we must be quick. There is only a little time and we need some brave politicians who are prepared to incur short term costs for long term gains.

The scale of the reductions needed is far more alarming than most people realise. There is no question here of nibbling at the edges. Cuts deep into the body of modern industrial society are required if the heating trend is to be stabilised and reversed. Reductions in global emissions of 60-80% are needed by 2050.

The 1997 Kyoto Protocol envisaged a global 5% reduction on the 1990 emissions levels by 2012. The EU signed up to an 8% reduction, the UK to a 12.5% reduction and everyone is struggling with that. A reduction of 60-80% in the next 40 years is not only of another scale, it is of a completely different calibre.

The crucial period is the next 10-15 years. Professor Smith did not want us to dally around. Doing that would simply put the world on a high temperature trajectory when the key task is to get on to a low trajectory early. And to do this, there is a range of policy options at a range of prices. The more carbon-free we want the atmosphere to be, the more it will cost. But there are many things that can be done at no or very little cost and those are the ones on which policy should concentrate at first. Professor Smith reckoned that 5 gigatonnes (5 billion metric tons) of 'CO₂ equivalent' (which roughly equals 1.25 gigatonnes of pure carbon) could be taken out of the atmosphere by good management which would cost nothing at all. A political decision needs to be made on what the target should be. What is the price we are not prepared to pay? On the other hand, what will be the cost of inaction?

There is potential to reduce or mitigate carbon emissions across all sectors of the economy. Energy-conscious buildings have the greatest potential, followed (surprisingly) by a combination of agriculture and forestry. Despite the impression we all might have had from the public debate so far, industry, transport and energy-supply all individually have less mitigation potential than agriculture and forestry combined.

Soils

We need, in Professor Smith's words, to 'tinker with the fluxes.' The carbon flows between the atmosphere and biosphere are broadly in balance over time if human-generated emissions are not added to the equation. Less carbon from earth to atmosphere (lower emissions) and more carbon from atmosphere to earth (higher sequestration) will push the system back towards equilibrium. The arrest of deforestation, restoration of the carbon content of cultivated soils and better management of croplands (less tillage, particularly on organic soils, less fertiliser, less energy use) and an increase in grasslands could together reduce carbon emissions by about 1 gigatonne of carbon a year at under \$20 a tonne. (Better buildings could reduce emissions by 1.25 gigatonnes of carbon a year at the same price per tonne.)

The reduction achievable through agriculture and forestry could address less than a third of the current problem, which is about 10 GT of carbon entering the atmosphere every year, a figure set to rise at current trends to 25 GT of carbon a year. But making changes in agriculture and forestry is worth it, because they will be relatively cheap and something needs to be done now. Taking organic soils out of cultivation, for example, would be a 'no regrets policy.' But there is no magic bullet and that change needs to be part of a portfolio of changes. We can't wait for technology to save us. Nothing is going to arrive on a white charger. We need to throw everything at it now.

Carbon dioxide persists in the atmosphere for many years, so our past misdemeanours are already having their irreversible effect. But how, in particular, will the climate change already under way impact on European soils? If you consider only the climate and its impact on rainfall and temperature, most of Europe looks to as though it will be hotter and drier in the 21st century (except for Aberdeenshire!). As you heat soil, the amount of carbon released to the atmosphere increases due to decomposition and so you might think that Europe is set to lose a great deal of carbon from its soils.

But the question is more complicated than that. There will also be more plant growth as mid latitudes warm and that growth sequesters carbon, to the extent that the loss of soil carbon is entirely neutralised. One can also predict an increase in yield from an improvement in technology. If management and a changed climate are aligned, it is possible to sequester carbon even in a warmer world. With the right policies, European soils (except in Scandinavia) could become a net carbon sink in the next century.

Scotland

As for Scotland, it already has an enormous pool of carbon in its organic soils. 48% of UK soil carbon is in Scotland and changes to the use of organic soils is currently responsible for 15% of Scotland's greenhouse gas emissions. That could easily be reduced, particularly by not cultivating organic soils. If a hectare of grassland on an organic soil is converted to arable, up to 8 tonnes of carbon a year are lost to the atmosphere (the equivalent of the emissions of a single seat on a holiday jet to Barbados and back.). By contrast, the conversion of arable to grassland locks away about one tonne of carbon a year.

In the west of Scotland, whose peaty organic soils have a high organic content, there is a big potential to mess things up. It is clear then in terms of carbon emissions and land-use in Scotland that:

- **possible contributions/damage from agriculture and forestry are large;**
- **organic soils need to be protected;**
- **wet soils need to be kept wet or re-wetted;**
- **any change to land use should be confined to mineral soils;**
- **grassland to arable is bad; arable to grassland is good;**
- **management policies should be designed to add more carbon to mineral soils, which in Scotland are largely concentrated on the east of the country.**

4. Discussion

The discussion afterwards focused on five areas:

- **The urgency of the case and the unexpected importance of land management in addressing it**

The notion of the 5-10 year window needed to be pushed right up the policy agenda. It was important that climate change didn't become just another aspect of policy. It had to be the focus of it. Government had a way of reacting too slowly. If CAP reform only begins in 2015, that would be too late. Make a start now and we can begin to turn the graph. Leave it any longer and the ultimate carbon dioxide stabilisation level will be that much higher.

- **The need to integrate the carbon question with other desirable outcomes**

70% of the agricultural mitigation potential is in developing countries which are disadvantaged by subsidy systems in EU and US. The greatest contribution to climate change would in that case be the abolition of agricultural subsidies in the developed world.

There has been a tendency in environmental NGOs, interested in bio-diversity, to soft-pedal the kind of land use change which global warming needs to be addressed. There are conflicts between desirable aims. Organic farming for example, while massively reducing fossil fuel use in the manufacture of fertiliser is also more dependent on carbon-emitting tillage than herbicide-based, no-tillage systems. Intensive stock raising systems, which may be less attractive on animal welfare grounds, may be more efficient at converting feed to meat, producing less methane than more traditional systems.

The carbon benefits of a meat-based agriculture against a grain-based agriculture remain uncertain. Grassland emits less carbon than arable but animals are inefficient and they and their wastes emit methane, N₂O and CO₂ in quantities. Bio-fuels are also variable in effect. 2/3 of their benefit comes from substituting for fossil fuels, 1/3 from sequestration. Some bio-fuels are net emitters, counterproductive in the carbon stakes. There is also a landscape question. Sitka can lock up more than native trees but a forest is more than a carbon sink. Carbon and climate change shouldn't be the only driver, but it needs to be integrated in solutions that give us benefits on a number of fronts.

A form of multiple benefit calculator for land use decisions is needed in Scotland — not only guidelines on carbon emission mitigation, but also a means of integrating carbon benefits with economic, social and other environmental benefits. And to judge trade-offs between those things.

- **The need to localise policy**

A change on mineral soils in particular from arable to forest would deliver a net increase in carbon returns to the soil as more litter would go into the system — even though the trees would dry out the ground and so the soil would give up more carbon than before. But organic soils need to be undisturbed. Peatlands need to be vigorously protected. Don't plant on uplands. Foresters will know which species to grow and where to grow them.

Products and end use are both critical. Better to use timber in buildings than to burn it (unless for energy where it substitutes for fossil fuel). Timber buildings represent long term sequestration and offset the huge energy (and carbon) costs of other materials such as concrete and steel.

- **The need to communicate the message**

Business wants to know where they can get most bang for their buck, and information needs to be reduced to that level. Shock is needed. New Orleans transformed the US policy environment. Something like the AIDS campaign is needed in this country to shift public opinion. Only then will politicians respond. Social, educational, institutional and political barriers are the ones you have to break through. Or will the market deal with it? Are consumers already ahead of politicians?

- **The mechanisms needed to change the behaviour of land managers**

There needs to be a new CAP with sundry new drivers, including carbon-friendliness. Grants should be cross-compliant with levels of soil carbon sequestration or retention. The CAP was originally devised as a food security mechanism. If global warming is the most devastating threat now facing us, more than terrorism, then a new carbon-based CAP is what's needed.

All carbon-based damage is currently un-costed as 'external' but we need to internalise the cost of the damage, by establishing a market that recognises environmental friendliness – in effect a Carbon VAT, a pricing mechanism in which the price reflects atmospheric damage. This tax mechanism could be linked to a grant mechanism for land management.

• **Conclusion to the Saturday morning session**

It's the poor, those who can't adapt, who are in most trouble. The people who cop it now are the people who are going to cop it in the future. Central Africa has no money and no elasticity in the system. Low-lying Bangladesh is staring at the prospect of catastrophic floods in the monsoon season for decades to come. The issue is not about saving the planet but saving the poor, probably the poor children and the poor old. Relatively speaking, we are going to be fine – we can at least for a while buy our way out of trouble. And in all probability the planet is going to be fine. But generations of poor Africans and Asians are not going to be fine at all.

This thought was connected to a slide of Professor Smith's which carried a quotation from Noam Chomsky. 'If you assume that there is no hope, you guarantee that there is no hope. If you assume that there is an instinct for freedom, there are opportunities to change things; there's a chance you may contribute to making a better world. That's your choice.'

This contention was thought questionable. Perhaps freedom, and in particular the freedom to buy without responsibility for the impacts had actually destroyed hope. Maybe the dream of economic freedom, the failure to observe the disciplines of nature, was actually the thing which had done so much to destroy the atmospheric balance of the planet. The belief in growth and acquisition had turned out to be the greatest threat to civilisation. Perhaps hope now had to reside in restrictions on freedom.

5. The Arienas woodlands

On Saturday afternoon, most of the party set off in minibuses to spend some time walking around the landscape with Pete Smith's lecture clearly in mind. Armed with midge repellent (despite the bright sun the midges were out in force) we walked through the beautiful native oak woods on the north shore of Loch Arienas, stopping on the way to observe the abundance of wet, organic soils around the loch and on the rain-soaked Morvern hills, slowly but actively sequestering carbon as long as they are fairly waterlogged. Flows of carbon into the woodlands were discussed too. These slow-growing trees can typically capture up to 10 tonnes of carbon per hectare per year.

The woodlands provided clear examples of the social-economic-environmental triangle that had influenced land use policy at Ardtornish, and we could now consider them in the light of carbon.

On the economic side the trees had last been cut down in the early 19th C to provide charcoal for the iron foundry at Bonawe outside Oban and the slope on which the woods now grow is scattered with the discs of the charcoal burners' platforms, some of them later used for lazybeds in which to grow vegetables. It is possible that some of these sites may have re-used much earlier hut platforms of Bronze Age people whose burial cairns can be found down in the valley by the river.

On the social side, the more recent history of population and depopulation were discussed with the memory of the shepherds in the Doirenamast settlement. The story of Mary Cameron, cleared from the shores of the loch, beneath the current woodland, was retold. The small cattle were sold, 'and at length it became necessary to part with the one cow. When shall I forget the plaintive wailing of the children deprived of the milk? The officers of the law came and it was necessary to depart. The hissing of the fire on the flag of the hearth as they were drowning it reached my heart'. This family made their way to Glasgow as the new economic law of big sheep and grasslands came into play in the Highlands.

But the woodlands survived, on the plus side providing winter shelter for cattle although held back from active regeneration by the grazing mouths of sheep and deer.

By the late 20th C the push towards better management of the land, and grants to encourage it, resulted in exclosures that were putting the woodland, in all its diversity (oak trees alone support 250 species) back to the forefront of the landscape. New trees and the invertebrates and birds to accompany them were springing up in the new extension to the wood.

The Arienas woods could be seen as a Gaian response. They had for a while be part of the military-industrial complex that won the battle of Trafalgar and established the 19th century British dominance of the world oceans. The charcoal was burned here; the cannonballs were made at Bonawe; and 40,000 a year went from there to the Woolwich Arsenal. With the end of the Napoleonic wars, the industrial system departed and coppiced oaks sprang back up, re-absorbing the carbon which the furnace had emitted. Wood warblers from tropical Africa, were singing here this summer afternoon in the branches of the 200 year old trees: a long whistling whee whee whee whee followed by a higher, tight, thin and accelerating trilling, a sharp pit pit pit pit pppttppt. It's a common bird of 'least concern' according to the IUCN but wonderful to those of us who had never consciously heard it before.

A working landscape, a complex social, economic, environmental landscape with a role to play in the carbon debate.

6. Responses

Five responses were made on Saturday evening to Pete Smith's talk, from an international, governmental, land management, forestry and historical-community perspective.

International

Climate change – all the indirect consequences of the north's behaviour in the recent past – will impact on poor people and countries. A global increase of 2° - 3° will mean very different things in different places. Central Africa will be 1° to 2° hotter than the mean and that will have a direct impact on temperature, rainwater, crops and health. Malaria will spread into new areas. These are the people and places that will need help to adapt and to reduce their vulnerability to change.

The north also needs to understand the consequences of policies chosen to mitigate global warming. A classic instance of a closed perspective is the current debate about food miles. If all air-freighted fruit and veg were cut out of the UK's shopping basket, the UK's total carbon emissions would be cut by a minimal amount, an annual £200 million would be removed from rural African economies and about 1.5 million Africans would be left destitute. That is not a balanced outcome. The question is how best to cut emissions without damage to developing world economies. Always in the front of your mind there needs to be a balance between cutting back on emissions and the consequences of cutting back.

All decisions – of consumers, of policy makers, and of the food chain businesses – should be based on good information. If environmental harm is to be weighed against developmental gains, it is essential that (1) the degree of harm is quantified and put into the context of other food choices, (2) the degree of harm is put into context of Africa's current use of 'ecological space', and (3) the degree of development gain is quantified, to demonstrate whether this trade really benefits those living in poverty.

The food miles concept needs reform, to include aspects of social and economic development. Pulling up the drawbridge is not good enough.

The EU and US are both pushing for a percentage of transport fuel to take the form of bio-fuel by 2010. People in the developing world are investing in land and growing bio-fuels for that government-created market. Who is winning and losing in this?

In Colombia, Uganda and Cambodia, small farmers have been kicked off their land to make way for highly capitalised bio-fuel enterprises. Changes in demand may have perverse consequences.

Tropical forests have a global role as carbon sinks. There needs to be a fund to compensate developing countries for non-deforestation of tropical areas. The Stern Report suggests \$10 billion pa, a relatively small amount compared to the volume of world aid. And who would get it? There is a need for a restructuring of rights in the developing world so that funds from developed countries do not end up in the hands of a corrupt elite. A consideration of equity and justice, both between nations and within nations, is a crucial dimension of any policy on climate change. We are not preserving the world for 'our children' but other people's children elsewhere.

Governmental

It is important to spend wisely. Which mitigation measures to start with? Which are cost effective? The challenge is immense. We have managed an 8% reduction in emissions over 20 years. We now have to do 80% over 40 years, ten times as much in twice as long. Is it doable?

The first target needs to be consumption because that is the motor of climate change and we need to take responsibility for everything we consume. So should we think of applying 3% of GDP to this problem, not the 1% envisaged by Stern?

In Scotland a spending review is coming up in the autumn, setting the budgets for next three years. It is going to be tight anyway, a real squeeze on public spending, and these demands are going to make it tighter.

Buildings, transport and renewables will all play a big role in carbon mitigation, but it is surprising how significant agriculture and forestry turn out to be. What are going to be the most useful mechanisms in the land sector? Cross-compliance and carbon-conditionality for grants are clearly worth looking at. But this cannot be a pure stick-and-carrot approach. The embedded and even instinctive cultural attitudes of planners, land managers, farmers, the NFU, financiers, economists, even teachers and the media are all limiting factors. Going too far too fast won't work and blunt instruments won't do the job. You can't make it illegal to have the heating on and the window open. Mindsets have to be changed and fast. Effective regulations have to be understood and accepted in advance. There is a huge influencing job to be done and the government will play a leadership role in that.

Land management

It was very pleasant to hear about the new influence that land managers might have on the future of the world. It is important to remember that it is not necessarily money that influences the behaviour of land managers. 'Being seen to do the right thing' is just as important: a precisely worded phrase, which is not the same as doing the right thing. So public awards for good behaviour are real incentives. Perhaps there should be a Queen's Award for Excellent Environmental Practice? Cooler Planet Awards?

That said, many farmers are driven by finance and so the Single Farm Payment is the key mechanism for altering land use. If CAP money is seen to be going to carbon-friendly ends, then it might work

Landowners might be presented as the key to a better future. They could become the local heroes. Every time you plough your field you release carbon, but every time you plant a tree, restore grassland, reduce the stocking density or use the right kind of biofuels, you are healing the planet.

Forestry

It is easier to get people to understand the urgency of this in Africa. People there are closer to the land. The land influences them, they are living in a woodfuel economy and they have sense of moral outrage at what has been done to the climate.

By comparison, we in the north have a soggy and muffled response.

Messaging is at the core of everything. We need to talk about the loveliness of woods, see the links between the forest and biomass heating, show how something practical can be done, give all schools biomass boilers. People often don't care about trees and hectoring doesn't work. Showing people works. We need to put builders in a bus, and take them to show them district heating.

Historical-community

Economic problems are just economic opportunities seen in the wrong light. One should never believe anything is impossible and global warming provides a perfect opportunity for a community to take the lead on a Scottish and global level. Hydro and windpower, owned by the community, would create revenues which would help that community do other things. It could be here in Morvern: totally green, carbon positive, using woodland for bio-fuel and in new architecture, even banning cars, setting up an effective public transport system, perhaps giving a discount on holiday lets to those who come by public transport or bike. The key is actually to do things which people can see and come to see. Reality opens the floodgates, the idea that people can come and see the possible. That is the great animating idea. Solve and focus and dramatise at a very local level and do it here.

7. Discussion

One voice:

Was this all getting rather complacent, a cosy consensus of right-thinking people having an enjoyable weekend in a comfortable house, dreaming of beautifully coherent local futures while the world went to hell in a handcart? Had we really understood what an 80% reduction in emissions actually meant?

Don't think about saving the planet. The planet is fine. What we were trying to save was a lifestyle, a consuming, burning, luxury lifestyle. And don't talk about educating the community. We are the community. How many people came here alone in their car? (Not many, in fact.) And how many came on public transport all the way? (Not many either.)

We have to stop burning oil. We have to get off oil. The government is about to expand the airport system. The Scottish government is going to dual the A9 and not put money into the railway. The question we have to ask is what are we doing personally. We need to stop pointing the fingers at others.

Another:

What are the big hits? Which policy changes will make a difference? We can't go with too many messages. We've got make our choices and drive them energetically. We have got to enthuse communities. Scotland has seen so many lost opportunities. Why in Denmark are 80% of windfarms operated by municipal or community businesses when in the Highlands and Islands 95% wind-generated cash drains out to distant capital?

8. Conclusions?

Early on Sunday morning, Faith Raven invited us to join her and her family in planting a series of young native oaks in an area of the Ardtornish Garden now designated 'Andrew's Wood' - a delightful, practical gesture to the man and the landscape.

The final session on Sunday morning aimed to capture some of the best ideas and reflections, 'the harvest of benefits.' Inevitably there were both answers and conundrums.

ANSWERS

Land use

Land can make a big contribution to atmospheric carbon and its reduction

Avoid using marginal areas for arable

Conserve and enhance the carbon content of soils

Love the trees; trees count

Grazing is better than cultivation

Don't drain peat; wet it up; block the grips

Protect natural systems; they lead to equilibrium

Grow trees on mineral soils

Livestock suppress woods: reduce mouths

Grow high quality timber for long-lasting, solid end use

Don't do vision; do practical demonstration

The public needs 'a drip on a stone': an iconic National Park project showing the right path, day after day, month after month, consistently ahead of the game

Communities

Global equity and justice needs to be a central part of any climate policy

This crisis is not about saving the planet; it's about saving the poor

Make remote rural communities independent in heat and power

Enhance communities: make carbon heroes out of subsidy pariahs

But there's a danger in that: people think it can all be put down to land managers.

Don't let the others off

Beef up the community sense of legitimacy in ownership of renewables

Community ownership doesn't need to be small

Encourage widespread Energy Descent Action Plans as developed by Transition Towns

Grants and policy

Be urgent: If we fail to do our 3% this year, then it will be 6% next year.

Increasingly, we will find more has to be done in less time. Atmospheric carbon levels are already much worse than the worst case scenario predicted by the IPCC a few years ago

Make the grant system carbon-connected throughout, not as an add-on but as its spine and arteries

Put all policy in carbon terms

The Single Farm Payment needs to be related to carbon footprints. (Scottish farmers' recent good deal on modulation should make them ready to accept carbon cross-compliance)

The Scotland Rural Development Programme foresees a cultural shift from recipient to customer, from the farmer as hoop-jumper to choice-maker and agenda-setter, a shift of emphasis from actions to outcomes. There was some scepticism over this

Don't be too sophisticated or clever: Say 'Do this and we'll give you money'

Attach policies to cheques and attitudes change: it works!

To get carbon-friendly transport in Scotland you have to change 5 million people's minds

To get carbon-friendly agriculture you only have to change 25,000 people's minds

Research

Document and record carbon sinks

Develop the Carbon Code

For good local responses to global change, find out attitudes of farmers

Attend to local demographics

Understand peer pressures and the ways land managers get their sense of worth from people around them

Feed global priorities through local expectations

Persuasion campaign

Take **responsibility** for what we already have in store: it's precious

Tell the country that land can help solve the problem

Differentiate between the virtues and drawbacks of different biomass fuels

Do for 'carbon-friendly' what the Soil Association has done for 'organic'

Develop the 'Cooler Planet' brand

The meaning of 'efficiency' needs to incorporate a carbon element

Don't allow retirees in search of 'peace and quiet' to dictate community actions

Transform farmer culture into one which is proud of delivering carbon results, the modern equivalent of the pride taken in growing crops that could feed the world

Promote the idea of 'biological capital'

Don't lay down the law from on high

Understand that the very poor can be leaders

Abandon the phrase 'We are doing you good', whether spoken or unspoken

Put some key facts on the Ardtornish website (or maybe on coolerplanet.com for which the domain name still available)

Compile a guide to carbon efficiency for land managers; include in it methods for trade-off calculations between social, economic, local environmental and global, carbon-conscious benefits

Set up a website on which land managers can be led through the carbon minefield

Where better to be inspirational than in a national park?
Move from a set of instructions to a way of thinking
All individual actions last beyond our individual lifetimes
We are none of us getting any younger
Become a Climate champion
And join the carbon enlightenment – get carbon-conscious
This is not for our children's children but our children
Act local, influence global
With opportunity goes responsibility

CONUNDRUMS

How to accommodate the coming conflicts between carbon and bio-diversity?
Trees are good: as carbon sinks, for employment and the rural economy. But people don't like the afforestation of open ground. Do trees trash Scotland's landscape heritage? If the Cairngorms can say that in expanding woodland they are also sequestering carbon, will that assuage the traditionalists?

Numbers of sheep and deer should be reduced; but what is the social cost of that to shepherding and stalking families?

Does the income from those animal sources, and the employment and social benefits that come from them, outweigh the carbon impact?

The afforestation of mineral soils in Buchan for example would enhance Scotland's carbon storage but there is deep pride and deep cultural attachment to the 'improved' state of the cleared rockfields and bog.

Muirburn chucks carbon into the atmosphere but no muirburn builds up the fuel load and the potential for larger wildfires which then burn down into the peat. Regular small fires or rare big ones? See the catastrophic fire history of Yellowstone.

9. Afterword

Ardtornish glowed for its visitors and encouraged clear and open thinking. It had put aspirational targets into everyone's minds and that sense of aspiration, if it survives, is what will bring about change. What is most interesting about the life of a meeting like this, of what felt like its magically animated temporary community, exists most vividly in the gaps between what can be heard and recorded, in the tens and hundreds of little capillary flows that run between people at these events, the constant gathering and separating of small knots of people, with the river of conviviality flowing between them. This account is merely a surface map of a many-veined body.

The only doubt is whether the urgency and seriousness of this problem was felt in a really visceral way. We are insulated by the way we live from many root realities and the irony is that the thing which is insulating us – an energy-consuming, urban or quasi-urban existence, a vast and sophisticated global supply chain, fossil-fuel-driven transport, the availability of goods at extraordinarily low prices compared with our incomes – is the very thing which is threatening us. We are living in a kind of comfort bubble whose outer, unfelt edges are eating away at the world beyond our knowing. It's as if the consuming north is one of those walled and gated holiday resorts on the Indian Ocean. Outside: poverty, degradation, disease, and early death. Inside: riches, comfort, ignorance and an occasional flutter of concern. That is the bubble which has to be popped.

Was our reaction at Ardtornish really urgent enough? Was it possible to look at an 80% reduction in emissions in the next 40 years squarely in the face? The wonderful, warm and friendly gathering in some ways militated against that level of seriousness. There may be more pain and difficulty in store here than most of us wanted to contemplate in the beautiful sunshine and in the comfort of a shared agenda: the prospect of many tens of millions of children and old people in Africa

and SE Asia dying horrible deaths. There is also, at a slightly more distant level, the prospect of a resource war stoked by climate suffering. An expansive China, even now moving into a strategic role in Africa, a newly assertive-defensive Russia, a middle America prepared to attack ideological enemies and defend control of oil resources, a Europe whose *bien-pensant* liberalism looks as inadequate now as it did in the 1930s: this is the biggest of political questions facing the world. Is climate change not in fact an environmental issue but the pre-condition for a world war in, say, the 2030s which is likely to be at least as terrible as anything a century before?

The interesting and troubling set of ideas with which this meeting concluded were full of such swooping perspectives between the global political challenge and the intimately local actions which are needed to address it. The target of reducing emissions by 3% a year (=80% by 2050) is not impossible, but only if we start now. And it is our own lives that have to change. Be the change. For many of us, that was an eye-opening challenge. The task now is to continue to keep those eyes looking clearly ahead.