

SPRING 2017

Wild Land News

Magazine of the Scottish Wild Land Group

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BEAVERS
ARE BACK

**Bringing beavers back
from extinction**

THE MOVING
WOOD

**A poetic response
to the Cairngorms**

BURIED HISTORY
OF LAND

**Adam Watson updates
on soil science**



Spring 2017

WILD LAND NEWS Spring 2017, Issue 90

Magazine of the
Scottish Wild Land Group

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Editorial

We start off this issue with an article responding to the Scottish Government announcement last November that they would recognise the Eurasian beaver as a native species. This has granted protection for the Tay population and paved the way for further increases to the Knapdale population and expansion to other areas across its' natural range. This is the first formal mammal reintroduction to take place in

Britain and so may be looked back on as a watershed moment in the relationship between Scottish society and wild animals. Louise Ramsay, who has been active in the Scottish Wild Beaver Group gives her reaction to the ruling here.

Also this issue, Alec Finlay gives a poetic account of his current project looking at place-names in the Cairngorms and Adam Watson



gives a brief summary of nearly two decades of collaborations with others in the study of soil profiles. We also include, in full, the SWLG's objection to a hydro scheme on East Glen Quoich estate in the NW highlands. The number of hydro scheme applications continues to be of concern and we encourage our readers to be vigilant in monitoring planning applications

and objecting to schemes where appropriate. Finally, we include a sobering review of a sobering book. Peter Wadhams provides an authoritative account of the causes and effects of the loss of arctic sea ice in the recently published *A Farewell to Ice*.

Photo: Beinn Eighe, A. Torode



Louise Ramsay

Bringing Beavers Back from Extinction

Saving the free beavers of the Tay has been our stated aim since 2011 when we set up the Facebook page of that name.

But Scottish Wild Beaver Group, the charity that was established in 2012 has a broader remit: 'to promote, for the benefit of the public; the study, conservation and protection of wild Eurasian beavers and their natural habitats in Scotland.' The campaign has been long and at times exciting, at others it has been intensely frustrating.

I wrote a piece for this publication in 2012 in which I described the campaign up to the point where we persuaded the Scottish government to tolerate and monitor the Tay beavers rather than trap them out. That was a result at the time, since it prevented more attempts to put them in zoos, and given that some of the reasons for trapping the animals were suspicions about their genetic and disease status, it was good to see these fears allayed. The outcome of the study carried out by the Project Officers

working for the Tayside Beaver Study Group (one employed by RZSS and one by SWT) was that the results showed that there were no significant problems on either front. The beavers are Eurasian (and quibbles about exact provenance proved irrelevant as more research came in from Europe) and importantly there is no sign of problematic diseases.

The Tay population has been revealed by genetic studies to descend from three pairs and therefore includes a lot of siblings and first cousins. This fits with our understanding of their origins from escapes around the interconnected catchments of the Earn and Tay and clearly denotes the need for cross-breeding with the Knapdale beavers and probably in due course to bring in more from continental Europe.

In the last four years one of the interesting things that happened was that beavers emerged on the River Otter in Devonshire, with somewhat similarly unclear origins to the Tay beavers. Having been

discovered by some excited wildlife watchers (rather like the Tay beavers) they were then under threat of elimination by DEFRA. (Owen 'badger killer' Patterson no less) A successful campaign resulted in the Devon Wildlife Trust applying for and getting a license to monitor them.

Meanwhile here in Scotland members of Scottish Wild Beaver Group had been giving talks in schools, taking the public out to see beavers, holding stalls at local events and writing letters and articles for the press. This was immensely important because it steadily built understanding and enthusiasm for beavers and their habitats in Scotland. Another activity has been the wrapping of valued garden trees with rabbit wire to prevent beavers cutting them down.

Meanwhile at Aigas Field Centre beavers in Inverness-shire were being kept in large enclosures and visited by many members of the public, proving their worth for ecotourism many times over. Autumnwatch and Springwatch were both recorded at Aigas with beavers in a starring role. And Jim Crumley wrote many inspiring articles about beavers for the Dundee Courier and a book: 'Nature's Architect.' All of this helped to raise the profile of the beaver around Scotland in a positive way.

We produced a proposal for Dr. Aileen MacLeod, MSP, Minister for Land Reform, the Environment, and Climate Change in late 2014 highlighting all these issues and showing a way ahead which included both legal protection for beavers and a

The campaign has been long and at times exciting, at others it has been intensely frustrating.

Photo courtesy of Pixabay



modest government funded beaver management service for farmers. And in March of 2015 we held a conference at the Dunkeld Hilton called 'The Necessary Beaver.' Amongst a splendid line up of speakers, we invited Mike Callahan of Beaver Solutions from Massachusetts and corresponded with him later about ways to reduce the flood impacts of beavers dams in ditches. He designed a special 'ditch leveller' to meet Scottish needs and we made sure that the Head of Wildlife at the Scottish Government was in

Photo courtesy of Pixabay



correspondence with him. The ditch leveller is designed to reduce the impact of a dam in a ditch by creating a permanent leak in it, but at the same time discourage the beaver from building another dam further along the ditch.

Needless to say not all the beaver publicity has been positive. During the last four years in Tayside it has become clear that the real conflict with beavers is not, as anticipated in some quarters, with salmon fishing, but with low ground farming. An animal with the ability to transform whole waterways for the good of ecology and biodiversity is not always the farmer's best friend. The farming that has been carried out in the floodplains of the Tay, Earn, Isla, Dean Water etc. in the last couple of hundred years has involved elaborate drainage and, in the flatter areas, high artificial flood-banks. In some cases the flood-banks are within a few meters of the water's edge with arable fields immediately behind them. Essentially this kind of farming has evolved to harness the fertility of the silt deposited by the river on the floodplain. It is a little like farming on a volcano - highly fertile but risky. Some years go very well, and some years you get flooded and lose your crop. Deeply incised

ditches and a herringbone pattern of field drains can increase the chances of having a good year, but with global warming, and its associated climate chaos, the flood years are on the increase.

Add the beaver to the equation and things can get tricky. Dams in ditches and burrows in flood-banks are both sources of fury to some of the farmers and in many ways understandably so, given the way things are arranged. Any naturalist's vision of a healthy countryside includes a wide wooded riparian corridor rather than a narrow one. In certain places the farmers graze sheep and cattle to the water's edge. This is done to prevent the growth of trees as the farmers in some contexts see it as their job to treat the river like a drain and keep it entirely clear of vegetation - an approach which is bad news for wildlife all sorts - presumably including salmon. It is also a recipe for erosion and pollution. Short of a huge rethink of how best (or whether) to farm these vulnerable landscapes - perhaps something similar to the Dutch 'Room for the River' project of 2006 (following extreme flooding in the 90s) - some sort of compromise between beavers and farmers needs to be found in the meantime.

Our view at SWBG is that in some of these situations mitigation would work and beavers and farmers would be able to coexist without conflict and indeed with some mutual benefit. There are almost certainly others where relocation is the only way forward (and ultimately culling once beavers are no longer needed for projects elsewhere). But this whole situation raises interesting and relevant questions about some of the effects of modern farming on the environment. As supporters of rewilding we tend to regard intensive arable farming as, at best an unavoidable necessity. But it is worth asking the question whether this kind of farming (with its hard and thorough drainage, pesticides, herbicides and huge compacting tractors - its highly geared financing which demands that no shaggy corner is spared for wildlife) is really optimal for the wellbeing of the human species itself. The arable crops it produces at such huge environmental cost (to wading birds, bees and other pollinators, river and marine fish and the soil itself) are often used to feed cattle, or for malting for whisky and beer. Much as I'm all for whisky and beer, and much as I like beef, none of these can really be regarded as examples of efficiently feeding the world.

Modern farming is often damaging to the environment (and ultimately self-harming) and beavers have a role to play in mitigating that damage

The government should not just listen to farmers but also to the huge number of Scottish people who wanted to see beavers welcomed back as a native species once again.

(Growing potatoes, I concede is a different story although there must be options there too.) The residues from the herbicides, pesticides and fertilisers that most intensive arable farmers spray on to their crops end up in the run off that enters waterways leading to rivers and then the sea causing harm to riparian and marine life. Beaver wetlands have been shown to have the capacity to absorb and neutralise such run off. In countries like the Netherlands and Switzerland this has been recognised by the government and incorporated into policy. We found ourselves in the position of trying to communicate all this to the Scottish Government - to try and get them to understand that modern farming is often damaging to the environment (and ultimately self-harming) and that beavers have a role to play in mitigating that damage. And that this role will grow as climate change proceeds.

With the massive floods in England and Scotland throughout this period we also emphasised that beavers in the uplands can contribute to holding back floodwater, pointing out that artificial beaver dams were being built for this purpose at Pickering in Yorkshire and in the Eddlestone Water in the Scottish Borders. Then one young farmer tried to turn this argument on its head.

In July 2015 there was a dramatic flood in Alyth. A young farmer went into the town to help out, and found that woody debris in the burn had caught in the foot bridges, making a blockage that caused a standing wave in the square and the street on the other side, floating the cars, and then ultimately causing both iron bridges to be swept away, pulling parts of the stone channel with them. He claimed (and tweeted) that the woody debris in the burn had signs of beaver chew on it and had come from upstream beaver dams. (Upstream from Alyth is Bamff, where we Ramsays and some beavers live). Initially some people in the town believed this but mostly not for long. SNH sent a representative to study the matter and were able to show that upstream beaver dams had held and the woody debris in the burn had not been cut by beavers. Some of it had been cut by chainsaw in fact - which was clear even from photographs in the young farmer's tweets. This caused amusement in Alyth and when the town set up a special Facebook page for supporting victims of the Alyth flood it was illustrated with a picture of a beaver wielding a chainsaw

Since the Tayside Beaver Study Group had finished their survey and the Knapdale Trial had also

reported its results to SNH by May 2015 we hoped by the autumn of 2015 that the Scottish Government would announce the legal protection of Castor fiber. But we were disappointed. Instead we learnt from RZSS that 21 beavers carcasses, shot by farmers had been collected by SNH and handed into RZSS for autopsy. The farmers were within their legal rights to shoot the beavers and handing them in for autopsy helped with the genetic study, but by the time RZSS has to buy a second freezer to store the carcasses they had had enough and news reached the press. Three of the dead beavers had been inappropriately shot (too close range or unsuitable weapons), 4 were pregnant and 2 were lactating. Some of these shooting had clearly happened during the breeding season and we were anxious to prevent a repeat during 2016.

The beaver shooting was widely reported and caused an outcry which was even said to have caused some impact on a well known farmer whose farm-shop was boycotted after angry comments appeared on the shop's Facebook page.

At this point the campaign ran itself. The cause was taken up by Rob Edwards of the Herald who made a freedom of information request (twice) and the Herald even ran a poll showing overwhelming support for the beavers. Numerous petitions were going about gathering thousands of signatures. (A 38 Degrees Petition gained over 35000 signatures). The Scottish Green Party's Alison Johnstone MSP put in Parliamentary Questions late in 2015 . Both Devon Wildlife Trust and Stirling University produced research confirming impressive ecosystem services provided by beavers in

*Photo courtesy
of Pixabay*





*Photo courtesy
of Pixabay*

a UK context, including some work done showing the water slowing activities of the beavers upstream of Alyth, tweeted by Dr. Alan Law after the flood. A decision seemed imminent.

In March 2016, on the eve of ‘purduh’ before the May election Dr. Aileen MacLeod disappointed us deeply by defer the decision to the autumn and announcing an interim compromise which seemed unlikely to deter farmers from shooting beavers in the current breeding season. It also offered the farmers no alternative in the situations

where mitigation would not work. But it was clear that farmers would be less likely to ring up SNH and ask them to collect carcasses from this point.

After the election Dr Aileen MacLeod MSP was replaced by Roseanna Cunningham MSP who, as Cabinet Secretary for the Environment, was responsible for making the promised beaver decision. We made sure she had a copy of our proposal as presented to Dr. Aileen McLeod. Andy Myles, formerly of LINK put in a petition to Parliament which got a favourable reception in



Committee. We discussed the need for a legal challenge, if the decision didn't come before another breeding season. And we waited. We felt at this point that Ms Cunningham just needed time to consider the facts. We had done our lobbying. We had made our case and so had the partners of the Scottish Beaver Trial. We knew the farmers had some difficulties but we did not believe many of them were trying to solve the problem in a non lethal way. We felt that modern farming needed to be seriously reviewed in any case and that the government

should not just listen to farmers but also to the huge number of Scottish people who wanted to see beavers welcomed back as a native species once again, and protected from a second extinction.

Then on 24th November 2016, to her everlasting credit the Cabinet Secretary for the Environment Roseanna Cunningham MSP announced her decision to allow the Tayside and Knapdale beavers to remain and spread naturally, be listed as native and receive legal protection, but also careful management.

We still have a little time to wait for this to be incorporated into Scottish Law but we are delighted that this fascinating, ingenious and highly beneficial keystone species of wetland habitats is back in Scotland forever after the tragedy of its elimination by our careless ancestors.

I think we can now claim to have done what we set out to do in our Facebook campaign (although the group will continue exist and invite discussion and sharing of information). But the work of Scottish Wild Beaver Group SCIO is just beginning, as it seems clear that the beaver will always be vulnerable to persecution in our countryside, and observation, education and mitigation will continue to be much needed.

Alec Finlay

Some words from Alec Finlay

Alec Finlay is an artist and poet, based in Edinburgh. He collaborated on Sweeney's Bothy, on the Isle of Eigg, and has made similar guides to Isle of Skye and the Cabrach. His next project will be with Trees for Life. He blogs regularly on: <http://alecfinlay-blog.blogspot.co.uk>

Alec Finlay's essay is from Gathering, an eco-poetic mapping of the Cairngorms, commissioned by Hauser & Wirth, for the Fife Arms Hotel, Braemar, due to be published in 2018. The approach is based on place-names, mostly taken from Adam Watson's collections: The Place Names of Upper Deeside (1984) compiled with Elizabeth Allan; the follow-up, Place-names in Much of North-east Scotland (2013); and a recent collaboration with Ian Murray, Place Name Discoveries on Upper Deeside and the far Highlands (2015). That we have so many names available to us for

this fascinating region, where Gaelic, Scots, Pictish and English inter-mingle, is largely down to the diligence of Adam and informants. The collections total over 7,000 names, covering almost every field, ruined croft, shieling, hill, corrie, burn, and wood, making a significant contribution to Scottish folk-culture. In adding a substratum to the Ordnance Survey they offer a radical alternative to Landranger and Explorer maps. Finlay's aim was to combine the usual fixed perspectives – the climber, the sportsman, the ecologist, the land reformer, etc – and create a place-aware guide.



The Moving Wood

A MOVING GREEN THROG :
PINWOOD

EYE OF THE NEEDLE : PINEAL

A WHORL TO SPILL : CONE

POP-UP : SEEDLING

CALEND : CALEDON

SILVER : SILVA

A NOD AMID THE WOOD :
ANENOME

SOFT-HEARTED : PITH

* * *

Jane's Firs, *Jane' Pines*

The world needs more arboreal maps. There's no reason to remember Jane, except for her cluster of 'Granny' pines. The name took root, literally, after she threw away seed collected to sell to the laird, when he refused the asking price. Think of her shaking her empty fists when you

look at the trees, still there, on the ridge between Creag nam Ban, and Sgòr na h-Iolaire. Ian Murray recorded another local woman, Mrs Forbes, who earned money the same way: "*I used tae go to the wid and pull fir cones for Invercauld, I got a pound per bag, this was for seed.*"

Photo: A. Torode



* * *

If you want to learn about the
pine place a cone in your hand

if you want to know what's to
come cast some V-neededles

* * *

Merlin (Myrddin) hid in 'The Forest of Celyddon', where he learnt the gift of prophecy. The far-seeing James VI and I requested seed from the Morimaer of Mar, a green gain for his new kingdom.

'In the Caledonian Forest the Scots fir is the chief tree and it is sad that the forest is yearly decreasing. Great areas were felled during the Second World War. Even in the remote glens of Mar where there was no felling there is now no natural regeneration, not a seedling. The reason for this is that red deer eat each young tree as it appears above the heather. One might have thought that deer were always in the district but in olden time wolves roamed the forest of the Highlands and red deer were less numerous than they are at present. It is not too late to fence in considerable areas in order to allow the young firs to spring up in natural regeneration. If this is not done most of the glens of

Mar Forest in a centry or more will be as treeless as Glen Giusachan. Glen Giusachan is Fir Tree Glen, treeless now, yet one has only to traverse it to realize how appropriate the name must have been once. By the small, clear river are seen the roots and stumps of an ancient forest of Scots firs. Many of the stumps remain upright where the trees grew, others have been carried down the river in times of flood and lie, bleached, on the shingle banks. At one place where the Giusachan River has eaten into a high bank of peat the entire trunk of an old Scots fir is exposed after being buried for at least a thousand years.'

– Seton Gordon

A republic of lichen thrives on the crown of the old pine. Adam praises these trees as uniquely adapted, in genetic terms, to their environment. Alan 'Jock' Carlisle could sense an ancient pinewood by its atmosphere; a mood of patterns of growth, serpentine bark rivulets, needle-beds, weft-mosses, rusty anthills, and blaeberries: *'to stand in them is to feel the past'*. Carlisle carried a shotgun to ping the finest cones off the tops and collect pocketsful of moth-winged seeds. The ancient woodland is memorialized in Cnap na Clais Giubhais, *knob of the fir hollow*, or, *fir-dip button*, in Glen Girnock, where only a few scattered birches remain in nooks

deer cannot reach, and Ceap Mad, *root-bog of the wolf*, who can pad across the swamp. The Gaelic *ceap* is from Latin, *cippus*, block, stump, or tree-trunk; evolving into *ceap*, small, pointed, or lumpy hills protruding from high ground – *kip* in Scots.

Clais Fhearnaig, *Alder Dene*

* * *

there's fault to be found
between scree slips

and the still fluvial field of reeds
and silvered roots

* * *

Clais is hollow, cleft, or ditch, whether natural or man-made, and this cut was meltwater carved between Glen Lui and Glen Quoich – one brief episode in a line of weakness that runs south-west from Glen Tilt to Loch Tay. Originally named for trees, unless you believe Alexander, who says the local pronunciation sounded like robber, *cheatharnaich* (caterans), who may have holed-out here. The gully is scattered with reeds and weathered pine stumps, and Mar Lodge Estate will soon plant an island of Scots pine, connecting the natural regeneration in the glens on

either side. Neil Reid says the lochan is artificial, dammed for fishing; local keepers called it Roger's Pond, though no-one can remember who Roger was.

I spoke to the roots –
they said to re-grow the wood you must
first find and free the lynx inside
then think through bare hills
playing paths back up the bealach
raising the net aligning with pine
in a spree of needles and enclosing
light pushing pith between calend-
rical rings casting seeds on the winds
into the open spaces beyond
the trunk's whose high air luster
bends heads drifting silence in-
between blue patched canopies

A puffed dove claps wings and pines lift the hills. Trees can walk, carrying a wood and its name with them, thanks to the prevailing wind. Bill Dunlop defines the natural Scottish pinewood as a '*moving forest*'. In the 18th century a legal dispute between Lord Braco and Farquharson of Invercauld Braco's asserted that '*as fir-woods do not spring from the root, but are propagated by the blowing of the seed in the grounds immediately adjacent to the old woods, or in the openings, where they have freedom of air, these highland fir-woods are not fixed to a particular spot, but gradually shift their stances.*' The prophecy that the witches offered MacBeth makes native sense.

Their willingness to walk gave the old woods generous intervals and changing panoramas, like a strobe-lit mirrorball panning a crowd of lanky dancers. In a prediction of what the seedlings that are poking through the heather in Glen Derry will become in three decades time, one expert described a future '*completely chaotic – and delightfully so*'.

The lairds brought in hired axes, choking the Dee and Spey with felled logs. Clearcutting returned with the World Wars. Nowadays ecology is dominated by the dreams of deer-lovers and tree-lovers, each with totemic place-names. The eco-poetic vision blends their dreams into one.

* * *

Cnap na Clais Giubhais, *Pinedip Button*

in my eyes the pine shows how lovely the wood was

take in all the trees north of you,
let them steal your heart

* * *

Shakespeare's "*methought the wood began to move*" is a motto for progressive pinewoods. Below Creag a' Chait there are a dozen small enclosures, the

culmination of a decade-long commitment to regeneration undertaken by an elderly English professor. I call these plots *the pine isles*. They are designed to connect relict pines with regeneration that's proving slow to happen behind the deer fence on Meall Gorm. Professor Machen's fences are low because deer are supposed not to like jumping into confined spaces. They protect seed collected from the hostel in Ballater, and shoots that he strims around by hand.

* * *

The Pine Isles, *Eilean Giubhais*

count the trees in rings on your fingers
until the islands become a sea of pine
exchanging the shattering wind of the moor
for the shuttering light of pines
letting the heather tread murmur
and the pitiful peat coalesce
around roots

* * *

Names are kenmarks of change. The pine isles are near the lost dwellings of Easan Ruighe nan Àiridh. The days of the shieling are over, but the Machen's project is a contemporary form of transhumance. Though it lacks dwelling his practice is care of the

hill, managed metre by metre, on a different scale to mass mass muirburn, foresty plantations, and miles of deer fencing. As Adam says, *'everywhere the most pernicious issue is the human 'herding' of animals beyond what is balanced or sustainable'*, and, without so many browsing deer this proto-wood would move, blowing out from the enclosures over decades, adding niche for species as it goes, complexifying ecology, adding names, asking us to give up some view for trees.

That wood would gradually renew across Balmoral, Mar Lodge, Mar, Invercauld, and Glen Feshie, recreating The Great Dee Pinewood, supporting crossbills, crested tits, golden eagles, wood ants, and scattered with hazel, rowan, aspen, alder, holly, willow, and juniper.

There are other islands beside the pine enclosures – orangey-brown cones that Perry says are shaped like cushions. They are made of needles and filled with ants.

INSURRECTIONARY ALGORITHM : ANTHILL

SUMMER-SCENTS THE MARBLED BRANDS : BIRCH

*Photo:
H. Devereux*





Photo:
H. Devereux

It is not only at Dunsinane that art, or witchcraft, have the knack of transporting a wood through time and space. The sap of the birches around Abergeldie, *bright mouth*, was so sweet it was used to make ‘a generous and agreeable’ wine, which Lightfoot approved as a ‘happy substitute for the poisonous whisky’. Nan Shepherd describes the scent on a warm day as ‘fruity like old brandy’. These birches were toasted in a 17th century dance tune, with lyrics promising a calamanco coat, a yarn of worsted wool. Robert Burns carried the notes tripping south and made them famous as ‘Birks o’ Aberfeldy’, composed by the

Falls of Moness on 30th August
1787.

A travelling air spritzed with clouds
of yellow pollen.

Fàs is gnàths is toradh

life, native growth and fruit

A Gaelic blessing on New Year’s
morning, when a twig was brought
indoors. The species must be
indigenous for, as Tolkein said, ‘the
tree grows best in the land of its
sires.’

the seed doesn't choose where
to fall
needs light and wet to grow at all

Deer cleared rowan from Beinn
a' Chaorainn, *rowan mountain*,
and Beinn a' Chorainn Bheag, it's
wee sister. Being remote these
bens are rarely climbed. There
were always two mountains, but
how many rowans: a wood,
spinney, or only one, stubborn in
a split rock? Could a few trees
name the whole hill? Whether
they were plentiful is doubtful
and, discussing *the burn of the
rowan*, Allt a' Chaoruinn, William
Alexander notes that it is a
mistake to infer an abundance; it
is as likely that '*the opposite was
the case because otherwise the
names concerned would have
been ineffective as markers by
which would could orient oneself
in the landscape.*' Nicolaisen
agrees that the '*individualizing
property*' of a place-name arises
from the ecological blanket that
must stand out against.

Macdonald dispenses with rowan
altogether, reverting to an
ancient name, *cairn mountain*,
Beinn a Chùirn. There are plenty
of stones. The landmark of the
twin-birch outlasted them as a
name, but there are examples
which confound Nicolaisen's
argument, for instance, the
plentiful limestone-loving juniper
on Gairnside, which named

Rineten and Renatton, *juniper
spread*, Allt an Aitinn, *juniper burn*,
Cnocan Aitinn, *juniper knowe*,
Stranetteen, from Sròn Aitinn,
juniper nose, and Bothanyettie,
juniper bothy, a croft on Wester
Morven.

Allt an Da Chraobh Bheath, *Two
Birch Burnie*

when the weather was gentler
the trees were higher

Place-names are an encouragement
to search for woods have
disappeared – rowan on Gairnside,
hazels by East and West Allt
Coultaing, and the twin birches of Allt
an Da Chraobh Bheath, which live
on in name only. Adam says the
burn is unusually high for trees and,
even if birch were to take the
seedlings would be grazed away.

Preas Bad Smeòraich,
Thrush's Thicket

care
of the
wood

Excudes
bird-
song

Who could resist Preas Bad Smeòraich. *Preas* was originally Pictish, for brushwood, while the Gaelic *bad* is a tufted thicket, or scrubby copse, best known in The Baddoch, *place of clumps*, a tributary of the Cluny. The far end of Loch Muick was doubly thicketed, but now a few birch cluster under the cliffs and clamber up the burns.

THIN WOOD NOOK : THICKET

Photo:
H. Devereux



Scientific analysis of pollen records could have been invented for peatlands, where the book of the forest is compressed in chapters, beginning with birch and hazel. Palynology suggests Lochnagar was never heavily wooded and, unlike The Cairngorms, pine didn't predominate. Climate change is upsetting established succession, oak and birch exchanging places.

Place-names are evidence in measuring epochal changes in climate, and averting, or adapting to catastrophes we invited. A tree's ability to perform adaptively in terms of genetic variation is a trick learnt over 10,000 years, so what chance when conditions mutate within the life-span of one generation of their life-cycle. However regrettable the cause, warming temperatures invite trees and flowers to ascend back up to Allt an Da Chraobh Bheath, infringing into the slow stone domain, haven to lichen and rare alpines. It's a doubtful outlook, as the untiring wind will increase, bringing a wicked chill.

References

RA; WA; CB; HB; JHB; GC; JD; JF; MH; AMcD; DM; **IM****; JM; WFHNS; NR; NLR; SS; TCS; HMSAC; AWAF; AWUD; AWIC; AWC; RDW; SMcGW; JF

AW, 'Contested Mountains', John Muir Trust Journal, 2002

Adam Watson, Alexander D Walker and Rodney E Heslop

Research by three biologist colleagues with Ian Shepherd

The paper was published as part of a symposium to celebrate the life and work of the late Ian Shepherd who was regional archaeologist for Grampian and Moray, but whose influence was national. The first part of the paper presents the factual and experimental evidence on the old ideas of Dimbleby and Miles that birch can change an acidic infertile podzol into a brown earth within a few decades. These ideas are firmly refuted by published evidence by Satchell of ITE Merlewood, and by us.

The second part of our paper is about the nearly irreversible long-term changes caused by Bronze age cultivation of freely drained heather moorland overlying acidic bedrocks and far above the altitudes of current and recent upper altitudinal limits of fields and woods. The acidic podzol was not altered, but the surface horizons were radically altered, with expansion of aerated humus and topsoil, earthworms, moles, and several plant species characteristic of base-rich or basic bedrocks. These features have persisted for thousands of years.

The last part of the paper is a personal account of what it was like having Ian Shepherd as a colleague in the field.

Background to our study with Ian Shepherd

The research that eventually involved Ian Shepherd with us began in 1999. We three are retired biologists, Ada-Watson (AW) a research ecologist, Alexander Walker (ADW) and Rodney Heslop (REH) soil surveyors. In 1999, botanist John Miles claimed that birches can change acidic podzol soils to fertile brown earths within a few

decades. ADW was sceptical, for as a surveyor in upper Speyside and Moray he had found birch on both podzol and brown earth. We then looked at Miles' papers. He observed podzols under heather and brown earths under nearby birch-wood, he assumed that birch had colonised heather and changed the soil. He had not studied change at one site, and assumed that the difference between soils under heather and birch was a chrono-sequence in

time ADW thought it more likely represented an inherent difference in site quality. Also he had noticed on heather moorland that soils beside stone-clearance heaps differed from soils nearby. He took AW to see birch-woods near Grantown and moorland with clearance heaps on Knock of Braemoray. We decided to study both aspects and soon asked REH to join us.

The birch study was straightforward, and we have completed it. We studied many sites used by Miles and others, and many others where old maps or records showed long-

established birch. At each site we dug soil pits to study the soil profile (the different 'soil horizons' or layers exposed in a vertical cut) down to the 'parent material' (derived from underlying bedrock or glacial deposits). Also we studied vegetation and noted whether or not earthworms and molehills occurred. More than two decades before Miles began his study, Dimbleby had published (1951) the same claim that birch within a few decades can change podzol to brown earth with earthworms, and Miles cited this (1985) Dimbleby had made the same assumption about a chrono

*From left: Sandy Walker, Ian Shepherd, Rodney Heslop and retired deerstalker John Robertson at a cultivated site in lower Glen Gairn, 4 August 2008
Photo Adam Watson*



-sequence, even though inherent site differences offered an alternative explanation.

Dimbleby and later Miles set up experiments by planting birch into heather, realising that experiments involving a true chrono-sequence would provide a more reliable result.

Dimbleby's experiments were studied many years later by John Satchell (1980). The soil under birch remained a clearly differentiated podzol and too acidic for earthworms. Hence he refuted Dimbleby's claim and the same claim later made by Miles. Our findings from many birch sites including all the Miles sites in northern Scotland are in agreement with Satchell.

In autumn 2004, ADW asked AW if he knew any sites with birch on flat freely drained soils beside heather in Strathspey, and AW mentioned Tulloch Moor. On visiting it, he noticed molehills on the heather and dark crumbly humus in the upper soil horizons. We inspected the site in June 2005, finding anthropogenic soil and vegetation AW read of published work by Kevin Edwards at Braeroddach and Piers Dixon at Pitcarmick. In 2005 at Braeroddach we found anthropogenic soil and vegetation, near stone-clearance heaps and other features of early human activity

Ian Shepherd's contribution to our study

This was when we thought we should consult archaeologists AW phoned Kevin Edwards of Aberdeen University and Piers Dixon of the Royal Commission (RCAHMS), who sent photocopies of relevant publications. Kevin Edwards told AW that Ian Shepherd knew much about archaeology in Deeside and suggested that AW contact him. In 2006, AW did so and received an enthusiastic response.

Despite his peripatetic moves, he listened to AW and gave unstinted enthusiasm. He offered to meet us in the field during summer 2007. By now the three of us had studied several sites with anthropogenic soils on heather moorland and a few in pine-wood. Ex-cultivated podzols are sometimes localised near an archaeological feature such as stone-clearance heaps, hut foundations, or rudimentary field boundaries with stones, sometimes widespread near such features. We have seen them as small as a few square yards at a time. Also they can be widespread almost like a field size with no such feature nearer than a few hundred yards, e.g. if the soil is fairly stone-free. The latter are the ones liable to be missed by the archaeologists .

The soil under birch remained a clearly differentiated podzol and too acidic for earthworms

Ian picked AW up at Crathes and then REH, to meet ADW on the Strone near Crathie. We showed him our methods and explained our reasoning. Deeply interested, he said he had enjoyed the trip and was keen to cooperate further. On the way back, AW told him we were satisfied that our birch study would make a worthwhile published contribution. We thought our study of anthropogenic soils on moorland and woodland would be useful for biologists, but did not know enough about archaeology to be sure whether it would be of value for archaeologists. Ian assured AW and later all of us that we were doing something new and exciting. He thought we could give practical advice for archaeologists in the field, as an aid to further their own work.

Thus began the first of many trips including two days at Pitcarmick, where Piers Dixon joined us for a

day. We went to sites found by AW at Morrone, Glen Girnock, Glen Tanar, lower Glen Gairn and broad-rig at Midmar, to one suggested by REH in old pinewood at Abernethy, and a varied set suggested by Ian with cord-rig sites at Ordie and Deskry, broad-rig at Midmar and Aboyne golf-course, and others at Kinord, Tarfside in Glen Esk, Crathie Burn, and Water of Aven in October 2008. We became a good team with many critical discussions and advanced our thinking. With the agreement of ADW and REH, AW asked hi- to be an author. He replied that he felt honoured, which AW thought typified his modesty. There was no doubt in the minds of the original trio of us that he had illuminated our thinking and expertise beyond measure. Also he was tireless in sending archaeological papers that he considered relevant, and we found his immense experience about other archaeological research and researchers to be of great value. With increased interest and awareness of the subject, AW was beginning to send him relevant papers that were being published in the ecological literature, especially in the publications of the Ecological Society of America. By the end of 2008 we all agreed that we had studied enough sites to make a worth-while contribution AW planned one more for summer

Below:
The group
examining a soil
profile



2009, to moorland by the Findhorn, where Scottish Natural Heritage had designated an EU Special Area of Conservation because of the vegetation, and where a glance at large-scale Ordnance Survey maps showed field systems and hut circles. We expected yet another anthropogenic soil. By then he had stopped driving, but he said he would come in the bus to my house, all set for the trip to the Findhorn. Sadly, it was not to be, for we were shocked to hear of Ian's illness and later death.

Our study has lasted 11 years, but Ian was so illuminating for us that our work with him seems to have lasted most of this time. Only when AW checked our notes did he realise that our association in the field with Ian

lasted an all too brief year and a half. We felt a bit lost without him as an expert field colleague and as steersman and author into the archaeological literature. We could write many extra words, but have reached the limit set for us. Let a photograph tell some more of this outstanding man as we remember him in the field. Another, taken by him, illustrates our fieldwork on a site that he suggested to us. He was a great man.

Since then, we cannot praise Moira Greig enough. She has given us help to find another archaeological colleague to join us, now Ian Ralston, and came out to meet AW and then into the field herself to meet all three of us, see what we do and suggest new sites

Ian assured AW and later all of us that we were doing something new and exciting.

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Beryl Leatherland

SWLG's objection to the construction of a hydro scheme on the East Glenquoich Estate on the Allt Fearnna

I am writing on behalf of the Scottish Wild Land Group [SWLG] which is a Scottish Charity that represents the interests of wild land and related matters. We aim to support initiatives that reduce the attrition of wild land, help to promote environmentally sensitive land and wildlife management, and support restoration of degraded habitats and rare species. We are Scotland's only wild land charity.

We have decided to make an **OBJECTION** to planning application 16/04506/FUL. We outline the grounds for this below.

Wild Land Issues: The development proposal is in Wild Land Area [WLA] 18 of the SNH identified and defined areas [the LVIA Interim Summary erroneously states it is in WLA 24, additionally, this essential fact is ignored by the Applicant's submission Design and Access Statement]. As such this puts a

requirement on the Highland Council to consider the intrusiveness of the proposed development and its potential to impact on wild land quality. The Council will be aware that Mr Paul Wheelhouse, former Scottish Government environment minister and now energy minister, has brought WLAs into a consideration for planning purposes. So how would this development fit with the recognition given to Wild Land by the Scottish Government planning system? The Highland Council will have to assess the reputational risk if they consent this development proposal.

In common with comparable documentation from other developers for similar schemes, the LVIA Interim Summary acknowledges that the construction phase will result in adverse visual impacts but suggests that this will reduce after commissioning and with time if the works are built to

achieve this. We are doubtful, from our experience of monitoring such developments all over Scotland, receiving visual and descriptive data from members and site visits, that this will be the case. Construction standards would need to be robust and site specific, with genuine proposals, and delivery on, plans for restoration and reinstatement. The planning authority would need to set conditions as required and to be in a position to monitor these throughout construction, commissioning and maintenance, and to enforce should this prove to be necessary. We appreciate this would be resource demanding.

Of particular concern is the fact that this is not a small run of the river scheme; there is to be a dam built across Loch Fearn at significant altitude at 550 metres, so there will be permanent visual impact in a WLA, especially if there is, and this is inevitable, additional visual impacts due to drawdown as well as a constructed dam, penstock and an access track. The location for the development is overlooked by anyone doing the extremely popular traverse of the Munros Spidean Mialach and Gleouraich and may also be prominent in views from Gairich, another very popular Munro, just to the south west of the site, across Loch

Quoich. The visual impacts of the existing access hydro tracks in views from the latter have been commented on by our members and others, [and can be seen from the Applicant's illustrations] and any further construction will add to this. Loch Quoich is usually unsightly due to drawdown, and this proposed development will further add to the attrition of the WLA. This will make the area less appealing to visitors, especially repeat visitors, so there may be a knock on effect on local tourism which is a significant economic activity in the vicinity.

SWLG objects on the grounds of unacceptable visual impact in, and attrition of, a WLA.

Cumulative Impacts: This proposed scheme will be to the immediate east of two existing hydro schemes, each with its own visually intrusive access track, so there would be a cumulative effect, with this scheme further adding to adverse visual impacts. There are already other unsightly hydro schemes in the vicinity. This is a further reason for our Objection.

Access Track: Such hydro schemes are associated with tracks for access during construction and maintenance. Developers claim that robust access tracks are required to enable heavy machinery to reach

construction sites and that after commissioning the access tracks will be reinstated and any needed for maintenance will be restored to an acceptable standard that blends in with the surroundings. This happens very rarely and all over western Scotland such schemes are associated with permanent landscape scars with little long term effort made to mitigate visual impacts. Indeed, in this case where the construction impact may not be as great in some respects, due to the transport method to be used, the developer still wants a permanent access track – we question whether this is necessary as the only routine maintenance will be for clearing inlet pipes. We would point out that in this location, where there is an oligotrophic loch there will be little blocking of inlets by organic material; for instance, there will be no woodland/forest detritus and if the inlet is well designed and takes account of the settling patterns of suspended particles from stream inflows, sources of detritus will be limited to minor vegetation inputs and perhaps the occasional dead animal.

In the case of hilltrack construction, it is increasingly accepted that if the original vegetation is set aside, maintained and reused for the

sides and a central grass strip, and grazing prevented until the vegetation is well re-established, then some degree of concealment can be achieved, but this is only feasible in the case of a minor track just wide enough for one 4X4. The developer would need to provide details of the track construction methods to be used – not merely reiterations of the Highland Council’s own excellent guidance and that of SNH. These must be site-specific and done for different points along the length of the track as the requirements will vary depending on the aspect, incline, substrate, drainage conditions and so on. Tracks and roads built on hills often result in unsightly erosion and environmental damage due to local micro site conditions not being properly assessed and addressed. We note that a significant stretch of the proposed track, just to the south west of the dam, is over very steep ground and careful consideration would need to be given to construction techniques used here in order to avoid visual impact and erosion. The developer needs to provide more information on the precise techniques to be employed throughout the length of the track.

However, despite the comments above, we consider that the

This proposed development will further add to the attrition of the WLA.

permanent access track should NOT be consented and that instead, if the overall scheme is consented, the existing access track to the west to Allt a'Mheil, should be extended and used. Further to this, if alternative maintenance access via this track is a condition of consent, then it should be improved as its erosion scar is currently visually intrusive. This might of course require negotiation and shared costs with the landowner to the west, if different from the landowners of the proposed development site.

Construction and Operational Impacts: In the case of the substrate found in this location it would be essential to address the potential for silt contamination of water courses. SWLG have visited commissioned schemes elsewhere where silt containment and contamination avoidance techniques have been employed to no avail as they have been incorrectly built and incorporated and/or not maintained. The quality of construction and maintenance must be monitored, and we consider that if this scheme is consented that it is a CONDITION that an Ecological Clerk of Works must be appointed to conduct daily inspections to regulatory standards.

In connection with this, we are concerned about the siting of the

proposed borrow pit. This is far too close to the watercourse and there is a strong likelihood that silting will result. This must be re-evaluated and a different location proposed, and relevant documentation re-submitted for consideration by the planning authority. This must include proposals for reinstating the original soil profile [by separating and conserving the layers] and vegetation [by set aside in a single layer and maintenance tending].

Peat: The developer has not provided adequate peat-mapping and accompanying micro-site specific construction details to demonstrate intent to avoid/ effectively mitigate deep peat damage as described in Scottish Government best guidance guidelines.

Reinstatement of Penstock Works: SWLG has observed, in schemes elsewhere, that the maintenance of soil profiles and turves during the construction phase has rarely been adequate to ensure successful reinstatement. In the case of this very visually intrusive and potentially damaging scheme, full and feasible details must be provided and there must be CONDITIONS set that an Ecological Clerk of Works can monitor delivery on, most especially maintenance of soil profiles.

All over western Scotland such schemes are associated with permanent landscape scars

Economic Aspects: We haven't assessed the economic case for this commercial development [but recognise that the construction and carbon costs would be considerable and would take some time to recover] but would point out that in SWLG opinion, the small generation output from such schemes in some locations does not justify the environmental degradation that they almost always cause. This would be unacceptable in a WLA. We are not objectors to hydro electricity generation as such and recognise the contribution large efficient plants can offer in helping to address climate change over their lifetimes, albeit that Scotland as a small nation can make a limited, but still worthwhile, difference to global warming amelioration.

Thus SWLG OBJECTS to this proposed hydro scheme on the grounds of its unacceptable attrition of a Wild Land Area and

its cumulative impact in combination with existing similar visually intrusive schemes and tracks. In addition, some of the Applicant's submissions are inadequate in terms of peat damage avoidance, track construction, restoration and reinstatement, and provisions for silt containment to avoid pollution of watercourses. In order to address these concerns, should this proposal be consented despite our objections and any submitted by others, then appropriate conditions should be set by the planning authority, including the appointment of an Ecological Clerk of Works. There must also be a long term monitoring plan put in place that will evaluate visual and environmental impacts and delivery on agreed outcomes.

Should you have any queries over any points raised in this letter of Objection please do not hesitate to contact me.

Beryl Leatherland

Peter Wadhams

A Farewell to Ice: a report from the Arctic

President Trump should read this book. In fact, all politicians and policy makers need not only to read it thoughtfully but also to act to ensure mankind halts the adverse effects of global warming on our planet as the consequences are rapidly becoming irrevocable.

Peter Wadhams is a leading expert on sea ice, with an impressive research and leadership CV involving decades of work in institutions across the globe. He has visited the polar regions, especially the Arctic, more often than any other living scientist, including six submarine research voyages in RN submarines. This book is informed not only by his observations and extensive records, but also by a programme of thorough painstaking research. Despite now being close to retirement, at the time of writing this review he is continuing his research from a base in northern Greenland.

Why sea ice, which is largely a seasonal phenomenon? Surely

the polar glaciers and ice caps are more important? The main thrust of the book is to show that the loss of Arctic ice threatens the whole planet; it is not merely a curious change, interesting to a few specialist scientists, that is happening in a remote area. Read Chapter 7 and you will appreciate the dangers of underestimating changes in sea ice cover!

There is much science in this book but it is all written in an accessible way, although the start of Chapter 5 which deals with the physics [and equations] behind the greenhouse effect does need some concentration on the part of the reader. I felt that a few of the graphs used could have benefitted from a little more annotation or explanatory text. Having a background in marine biology I would have liked more detail around acidification of the oceans and the already recorded damaging consequences of that. There is a fascinating history of ice ages through geological time

Wadhams estimates that this year or next will see the first ice free Arctic summer

and a description of the research behind the knowledge. The book is written for the interested and concerned layman, but if you want to delve more deeply into the research evidence quoted in the text, each chapter has its own list of scientific papers and articles in the Reference section.

2016 was the warmest year on record and, more importantly, this is part of a long term trend. Wadhams estimates that this year or next will see the first ice free Arctic summer; so that ships will be able to traverse the North Pole. By the end of 1970 only 9

ships had done a transit of the North West passage; by the end of 2015 238 ships had been through. This year even some cruise ships may be making the attempt.

Over the last two centuries, since the Industrial Revolution got under way, we have been altering the composition of the atmosphere which maintains the planet's balance between heat absorption and radiation, which served to keep the average temperature of the earth to around 15 degrees C. The anthropogenic impacts resulting from the development of technologies over 200 years that are over-reliant on fossil fuels and our dependency on them for transport and heating, together with the rises in demands from a rampantly increasing global population with a growing voracious appetite for consumer products, have disrupted the atmospheric balance of the planet. During this time we have been relentlessly adding carbon dioxide [and other gases] to the atmosphere to what are now at levels which threaten to impact this balance.

The book explains the basic physics behind the way by which adding carbon dioxide to the atmosphere reduces radiation emissions from the earth and hence leads to warming.

A Farewell to Ice
by P Wadhams,
Published by Allen
Lane, 2016,
256pp, 29 colour
plates, £20.00
ISBN:
9780241009413

A FAREWELL TO ICE

A REPORT FROM THE ARCTIC

PETER
WADHAMS

This is evidenced by research accumulated since 1884. The more CO₂ that is added, the greater the rise in temperature. The Arctic sea ice melts as a consequence, reducing the waters reflectivity (albedo), and increasing solar heat absorption, and the cycle is perpetuated. As the ice cover declines then this allows the surface temperatures of the Arctic seas to rise above 0°C. This induces instability in the water column and wind induced mixing can then extend this heat down to the seabed on the shallow continental shelves. This thaws the sediment layers of the offshore permafrost, causing the release of plumes of previously trapped methane gas, as illustrated in Plates 20 and 21. This adds to the extensive thawing of land permafrost which has already contributed to higher methane atmospheric concentrations and is continuing to do so. Methane has a greenhouse warming effect 23 times greater per molecule than CO₂, so increasing methane levels also boosts global warming.

Not only is the area of sea ice declining, but its thickness is diminishing too, as evidenced by an average thinning of 40% between the 1970s and 1990s. Multi-year sea ice can be as much as several tens of metres thick, especially where pressure ridges form, and it relies on

sustained cold temperatures to enable this thickness to build up. Loss is damaging because we rely for global climate stability on multi-year sea ice which is several years old. Now we are in the situation where the sea ice has to be reformed each autumn, but as it is now undergoing considerable melting in the spring, there is little first year ice surviving to become multi-year ice. We are near the tipping point when the summer melt rate versus winter growth rate becomes such that all the first year ice melts during summer, so there will only be seasonal ice cover.

Wadhams has more bad news. "Arctic sea ice retreat, directly induced by greenhouse gas warming, has impacts of its own which enhance global change effects on the planet and will cause disastrous consequences out of all proportion to the original change. These feedbacks and connections exist throughout the climate system". The alarming decrease in the extent of sea ice cover over the last 30 year period, especially in the Arctic, has enabled feedback mechanisms to become established which further accelerate the decline. Wadhams indicates about 8 feedback mechanisms, with perhaps the most serious being the potential for an offshore methane pulse.

Not only is the area of sea ice declining, but its thickness is diminishing too, as evidenced by an average thinning of 40% between the 1970s and 1990s

We are already experiencing some effects in Scotland, with impacts of seasonal changes in food resource availability starting to have impacts on species, especially in the marine environment.

He thus illustrates that the retreat of the Arctic sea ice at current levels is not only a response to climate change, but is also a driver of climate change.

The consequences of these changes are described, both immediate and long term. An example of an immediate effect may be oil exploration in relatively pristine Arctic waters, which could result in disputes over territory among northern countries. We have already seen the placing of the Russian flag on the sea bed under the north pole, a symbolic gesture perhaps but one associated with intent. Longer-term rises in sea level will increase the risk of flood events, cause coastal inundation of cities and ports and loss of agricultural land. These will result in famine, migration to avoid harsh conditions and possibly unrest and conflict; and the poorest countries of the world will be the most affected.

Climate change scientists emphasise that oil and coal reserves should be left in the ground for future alternative beneficial uses, and that we have already exceeded the acceptable carbon load for the earth's atmosphere. However, oil companies and unscrupulous politicians from Putin to Trump want more tax revenues and an easy life for current electorates –

short termism at its most extreme. Others propose adaptation strategies – these may offer some amelioration but are at best merely a sticking plaster equivalent; what is urgently needed is effective mitigation. Wadhams suggests what the world should be doing in order to effectively reduce emissions and avoid the worst consequences of global warming, from embracing development of renewables and less damaging nuclear power technologies to more innovative strategies. These might involve developing geoengineering methods to achieve solar radiation management and carbon removal techniques on a massive scale. These solutions will be expensive, challenging to engineer and deliver, and will require committed international collaboration.

Wadhams reminds us that Sir David King, a former UK chief scientific adviser on energy and climate change said “If everyone does a little, we will only achieve a little”. There is certainly a place for individual effort but what is needed is the global political will to address this major problem.

What I like most about this book is the author's outspokenness in his final chapter, A Call to Arms, building on the book's title. He discusses the political and policy

background – much of which is compounding the problem. He bemoans the persistent international inertia and lack of political conviction and leadership. He speaks freely about the failings of governments, government scientists, computer modellers and statisticians, fossil fuel supporters and even the Intergovernmental Panel on Climate Change [IPCC]. He is scathing in his comments on US presidents [and Trump wasn't even elected when this book was written remember!] and British prime ministers – except for Mrs Thatcher who, being a scientist, immediately grasped the seriousness of the matter and its potential consequences but unfortunately at too late a stage in her premiership to do much about it. He enlightens us on the denial movement and the various bodies that have been set up, including Lord Lawson's Global Way Policy Foundation which largely seemingly exists to discredit climate scientists – and was apparently responsible for the Cameron government changing their position on vowing to be the greenest government ever to one talking of "green crap". No stone is left unturned, from global populations and consumerism to the economics and industry of India and China, to the passivism

and inaction in society, from Kyoto via Rio, Copenhagen and Durban to Paris. He tells many inconvenient truths and we need to listen and crucially, to act.

You may ask why we have reviewed this book, after all there are no wild land matters raised in it. We think, however, that you will certainly appreciate the long term impacts of global warming and climate change and the implications for future generations, wild land and species. We are already experiencing some effects in Scotland, with impacts of seasonal changes in food resource availability starting to have impacts on species, especially in the marine environment.

Read this book and be prepared to lose any complacency you may have about our mitigation efforts to date and our ability to address global warming.



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Photo: Torridon, A. Torode

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