MISUNDERSTOOD LANDSCAPES OF THE HIGHLANDS

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1 NATURAL WOODS **ROBIN NOBLE**

1 The natural woods of the Highlands and Islands have often been misunderstood; this has affected how they have been valued and how they have been managed. In some quarters, many of these misunderstandings remain; this short paper hopes to present a more accurate picture of these woods, in particular the West Coast woods, and how they come to be the way they are. The intention is to assist a more realistic appreciation of these woods, and of the light they shed on the lives of the people who lived for centuries in, or close to them. These people did, of course, value the woods as one of the significant natural resources of their surroundings; it was only when the woods lost their value, that historic woodland really began to dwindle and disappear.

2 The idea of endless, coast-to-coast woodland, the 'Great Wood of Caledon', still endures in some quarters. In 'Scottish Woodland History', (edited by T C Smout; Scottish Cultural Press, 1997), Dr David Breeze exposed the shaky evidential basis of what he called the "Great Myth of Caledon'. And the first chapter in this volume, written by Chris Smout himself, entitled: 'Highland Land-use before 1800-Misconceptions, Evidence and Realities' should be required reading before anyone ventures a word on this subject.

3 Frans Vera has, more recently, proposed a very different view of early woodland: it is his belief that as our native trees advanced over the country, so, too, did large herbivores. They would have created open spaces, grazed saplings and bushes heavily, and generally created a very dynamic landscape full of change and biodiversity. For a very readable account of Vera's theory see 'Wilding' by Isabella Tree (Picador, 2018). Highland cattle may have performed the same role in much later woods.

4 Even a coast-to-coast woodland would have been discontinuous, broken up by mountain summits and ridges, freshwater lochs and extensive wetlands. Those who still insist that 'we have cut down all the trees across the Highlands' do so in ignorance of the very important

natural phenomena which would have significantly reduced already islanded woodland. Periods of climatic downturn, particularly from around 2000 BC, altered soils and encouraged the formation of peat over large areas; many stumps found in eroding bogs date from around 4000 years ago. And repeated volcanic eruptions in Iceland (roughly every 500 years) deposited toxic chemicals over areas of Northern Scotland, which must have affected the natural vegetation through time.

5 Farmers from as early as the Neolithic (from 4000 BC to around 2500BC) will, of course, have cleared areas for agriculture, but there is evidence that in places like Northwest Skye, Orkney and Caithness, they moved into a landscape with 'tree-cover' (possibly more like 'scrub') already reduced by climatic factors-especially wind. In any case, prevailing winds from one dominant direction (often the west), effectively move woodland from exposed locations eastwards into shelter. And we cannot assume that these cleared, farmed areas would remain in active agriculture from then on; in the much poorer conditions of the climatic downturn, some western areas appear to have had a much reduced population, which would leave the land to evolve naturally; often this was towards blanket bog, (but it might also be to alder and willow). In later periods, too, individual glens or catchments might well be abandoned, perhaps for a few generations, (as a result of recurrent plague), allowing local regeneration to take over.

6 In a chapter I wrote for Scottish Woodland History, based on my study of Assynt Woodlands, (Noble 2001), I showed that it seemed to be areas which were comparatively remote from human habitation and exploitation which had been most reduced from the time of Home's Survey of Assynt (1775) to the present. Woods close to the pre-Clearance 'farms' such as Drumbeg, Nedd, Glenleraig and Ardvar, remained, showing plenty of evidence of exploitation; some had actually increased in area. And while we have plenty of evidence for the felling of large areas of woodland during this period, (especially during the early years of the Industrial Revolution), in places like Loch Maree-side, Speyside, Glen Affric, Glen Cannich and Strath Farrar, parts of Argyll and Loch Lomond-side, it must be known to everyone that these same areas retain important woodland to this day. Again, it can be

stressed: *use* does not destroy woods, (not even felling), *unless* it is immediately followed by prolonged heavy grazing.

7 Coming more up-to-date, in 1947 Frank Fraser Darling produced his 'Natural History in the Highlands and Islands'. In it, he follows what had become customary, referring to 'Pine Forest, Birch Wood, Oak Wood'; the separation into woodland types based on the most dominant tree. However, he does, elsewhere, note the great *variety* of species in locations such as Dundonnell, at the head of Little Loch Broom. He does not mention the important, natural dynamic in pine woods which is progressively to shade out the deciduous trees like birch and rowan, (leading ultimately to large tracts of one species), unless interrupted by episodes of fire which allows these pioneer species to re-establish for a period.

8 Fraser Darling did notice a phase of regeneration in the birchwoods "under the high hill masses of Quinag and Suilven". This is the first reference to the wave of young birches which grew up around me in the late 50s and 60s, and which could be seen in many West Coast locations, particularly growing on the Lewisian Gneiss. It is a shame that F F-D did not try to ascertain what caused this widespread phase of regeneration in an era and locations where sheep were still numerous. Nor did he notice that these belts of dense young birch were masking, in many areas, something much older, very different in character and much more diverse in species.

9 As a result of much work initiated by Peter Quelch, (and many others, including me), we now see that these waves of regeneration often emanated from core woods which, in character, resemble the typical 'wood-pasture', exemplified by Glen Finglas. These tend to be much more open than our usual view of 'woodland', with groups of visibly very different, obviously managed, veteran trees. The woods of this type which I studied in Assynt retained coppices and pollards of many species: ash, alder, birch, holly, oak, rowan, willows, wych elm. Although it is possible, perhaps, to argue about the origins of the coppices, groups of pollards offer unequivocal evidence for management of these trees over centuries. The cuttings from the pollards may have been used as fodder for the stock which no doubt

wandered-or were herded-through these open woods when there was little for them on the hill; this would also, of course, have helped maintain the open character of such woods.

10 There were also in many of these woods, clear areas which were used for agriculture; they were sometimes really quite small. I identified some in Glenleraig by the faint presence of cultivation ridges; they had been listed and mapped in the 1775 Survey of Assynt done for Sutherland Estates by John Home. And in Rassal 'Ashwood', such agricultural areas could be identified by the occasional presence of clearance cairns. (Strangely, SNH subsequently planted rowan on these level open spaces, which will make it even harder to appreciate how this important place actually functioned).

11 The waves of regenerating birch go, relatively quickly, through distinct phases, which we might call: youth, maturity, and senescence. During these, the 'wave' of birch seedlings and saplings thins out as it ages; the later phases may again be quite open. Accordingly, in a natural situation where such a wood, (consisting of the wood-pasture core, surrounded by one or more sequences of birch regeneration), is only limited by natural features such as bogs, rivers and lochs, what we, (or NatureScot), might call a 'wood' will be remarkably mobile along its edges. Topography and wind direction complicate this already rather fugitive picture, which does not lend itself to tidy definition, mapping, classification, or, importantly, *management.* Parts of the periphery, the mostly-birch regeneration, will always be in 'unfavourable condition', while the ancient core will slowly die off, will certainly lose its ancient character, unless traditional management, the coppicing and pollarding, are carefully reintroduced.

12 Even this complex picture is over-simplified; holly and rowan still seem to seed easily, and will form little 'pockets' within the older and newer parts of the whole, while, 'entirely doing its own thing'. aspen clones appear almost anywhere, and thread through birch, or oak, with complete equanimity. Aspen is a bit odd; in places, its shoots seem much grazed and come to nothing, in others they seem to succumb to fungal or other infection. Oliver Rackham talks of aspen in ancient English woodland as 'weakly competitive and living no more than about 50 years', which might seem consistent with my previous observations. But

in Assynt, and in other places in the Highlands, in a wide variety of landscape settings and exposure, it grows strikingly strongly, with many substantial, tall, straight stems, despite grazing pressure.

13 There is a need, too, to recognise other woodland types which may have been historically more evident and important than they are now. I am thinking here particularly of *slope alderwoods*: I found the scanty remains of one in Glenleraig, with one fine, double-pollarded tree, and three, pollards of different ages, at Oldany, also in Assynt. The finest of which I am aware is in Strath Farrar, a much bigger group above Loch a' Mhuillidh. Here there are some very impressive trees, many of which appear also to be pollards. (When I was last there, there was almost no sign of any regeneration of these remarkable trees).

Riparian Woods (often of alder and willow) are crucial in maintaining the health of our rivers and streams, but when they have been lost, pressure of grazing (often by deer) makes re-establishment difficult if not impossible. Deer fences here are undesirable on several counts, but, if they have to be used, they should be removed as soon as possible. (Deer populations and management are considered further in the third paper).

14 The effect of all the above is that what we call, simply, 'woods' hides some rather separate entities, of different ages, origins, and tendencies. At least, in the Highlands and Islands, they are often relatively unconfined; free to move around the landscape to some extent. But that very fact makes the management of such 'woods' more difficult, rather than easier. And the pressure of grazing by deer presents added problems. Fencing, whether long- or short-term, will protect regeneration if there are adequate seed sources, but, even with such protection, heavy-seeded trees like hazel and oak seem to find regeneration very difficult under current conditions. It is crucial to maintain the historic diversity of all our surviving native woods, which means that they must all be adequately surveyed, a full species list drawn up, and the regeneration or otherwise of each ascertained. Seedlings and saplings should be protected if progress seems really to be slow. It is good to record that this is at least done in certain places. In, for instance, the 'Caledonian Pine Wood' of Glen Affric there is a very old,

informative, managed oak (above the Coire Loch), whose offspring have been protected and are now growing well.

15 But removing all grazing will mean that many of the old, managed trees, especially hazel and perhaps alder, will spring from the base, and in time their characteristic, big, single trunks will rot…
and the evidence of past use will disappear. It is crucial that where these old relics of wood pasture remain, especially if concealed by subsequent phases of regeneration, the veteran trees are at the very least adequately recorded. If this is not done, much of the visible evidence of how the pre-Clearance population of the Highlands and Islands actually lived, of the care they took with their trees, will disappear, and the misunderstanding of the evolution of our landscapes will grow. Along with wood banks and ditches, clearance cairns and cultivation ridges, the veteran trees are part of cultural landscapes which are still far from being adequately recognised.

16 Areas of old woodland in the Highlands which are in a lowland setting, ie limited by agriculture or housing, for instance, are unfortunate in their inability to move. They will eventually become over-mature, then moribund, and retain little natural history interest. They need room to regenerate internally, so clearings have to be created within the wood to allow for this. This is also required where there are large, dense stands of woodland, as for instance in many parts of Speyside. An effective alternative in deciduous woods is to coppice and pollard compartments; this not only takes the canopy down to an earlier phase, but it helps prolong the life of the tree, sometimes almost indefinitely……..while letting light down to the forest floor, with sometimes spectacular benefits to woodland flowers, butterflies and bees etc. Management of woodland can be very good for biodiversity, but grazing must always be managed too.

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2 MOORLAND

1 There are all shades of what I am going in this short paper to call 'Moorland', from the deep peat/blanket bog of the Flow Country, to peaty soils of varying depth and degrees of wetness. One thing they all have in common is often an almost total absence of trees, even of bushes.

2 The wettest areas, plain bog, used in prehistory to be venerated, as far as we can tell. Offerings, including wooden statues, were made in them for instance in Scotland, while bodies, often apparently human sacrifices, were placed in them in Denmark, as well as other countries.

3 For much of prehistory and history, moorland was appreciated by those who lived by it; it was inhabited by game birds, waterfowl and animals like blue hares, it provided peat for fuel, and, as a recent article in the Geographical magazine has shown (January 2022; 'Cures from the Bog'), was appreciated for the medicinal plants which grow in such environments.

4 Attitudes, however, began to change, particularly after the 1750s when a mania for agricultural improvement began to sweep up through Britain. In the lowlands, whole landscapes were reorganised, and as part of that, most lowland bogs and damp areas were drained. They were not valued in their natural state, but only in that they could, with considerable effort, be turned into something else.

5 It was therefore inevitable that upland moors would be regarded as of equally little value, unless they, too, could be similarly transformed. Grouse-shooting saved the drier moors, particularly of the Eastern Highlands, although repeated burning increased the heather at the expense of combustible tree and bush species, like Scots pine and juniper. Wetter moors, adjacent to higher hills and mountains, became grazing for large flocks of sheep, (then some were incorporated into deer forest), and so escaped attempts at modification at least for a while.

6 But the dislike of open moorland, whether wet or dry, continued. And one rather influential writer, often proclaimed as one of the early Scottish conservationists, really disliked peat bog. Frank Fraser Darling began his working life as an agricultural advisor, was then factor of an estate in Buckinghamshire, before working in animal genetics; it was the lure of hill and island which took him north, and ultimately led to him writing in 1947, the 'Natural History in the Highlands and Islands' , a book for which later conservationists came almost to revere him. But the agriculturalist in Fraser Darling meant that his dislike of peat bog showed very clearly: on page 47; 'deadening peat bog', 'awful blanket of peat'. At intervals, there is mention of the possibilities of 'improvement' of moorland, and finally, the over-gloomy Conclusion which contains the much-repeated phrase 'man-made desert'. It is important to note that there is no mention here of the great expanses of patterned bog which subsequent environmentalists know and value as 'The Flow Country'. (Fraser Darling did not get it all right, and we should simply accept that).

7 As I grew up in the Highlands in the 1960s and after, there was a pretty general assault on all types of moorland, except perhaps for the real grouse moors. In Assynt, the young farmer of Ardvar was seen out almost every day on his JCB, a strange sight in the middle of great open sweeps of countryside, digging long ditches in the level flows. Almost everywhere, there was 'reseeding'; moorland was ploughed, drained, fertilised and reseeded. And the blanket bogs of Caithness and Sutherland were also being ploughed, where possible, and planted with conifers which few people can have expected would actually ever produce a timber crop.

8 Most of this failed; the long ditches may have carried away some water, but the vegetation, almost up to their very edge, remained obstinately unchanged. This was not surprising; I frequently saw surface water lying on the peat immediately adjacent to the new drains. Many of the 'reseeds' failed in time, some quicker than others. Most were invaded by soft rush, which rejoiced in the fertilising and damp climate. The high-level, much-vaunted, extensive 'reseeds' at Forsinard also failed, and were then planted with conifers. Conifers, planted on such areas and the deep peat of the Flow Country, (all subsidised with public funds), often

grew to a certain point and then simply stopped; others succumbed to wind-throw, or to the ravages of the pine beauty moth.

9 Eventually, conservationists discovered the great bogs of Caithness and Sutherland; someone coined the evocative name, ‘The Flow Country”, and between 1979 and 1986, ‘a sample of some 19% of moorland in Caithness and Sutherland was surveyed quantitively for its breeding birds’. The waders included golden plover, dunlin, greenshank, curlew, snipe, and common sandpiper, with some local populations of lapwing, oystercatcher, redshank and ringed plover, as well as a few rarer species. Waterfowl included black- and red-throated diver, greylag goose, common scoter, wigeon, teal, mallard and red-breasted merganser. Predators included golden eagle, hen harrier, merlin, peregrine, short-eared owl and raven, as well as arctic skua. An important publication by the Nature Conservancy Council, ‘Birds, Bogs and Forestry’ in 1987 highlighted the international importance of these unique landscapes. Crucially, the ‘man-made desert’ was, here at least, replaced by the authoritative statement: ‘According to evidence from within the peat, the current treeless condition over most of the deep peat area is not due to historical clearance of natural forests by man’.

10 In time, the grants for afforestation of deep peat, and for drainage of hill ground, were removed; the Flow Country was ‘saved’. Some of it is now owned by the RSPB, and money, both public and charitable, has been spent in removing the plantations and blocking the long drains. In addition, and crucially, we now value this huge area of deep peat as one of the great, remaining carbon sinks on Earth; maintaining its integrity is widely recognised as crucial in combatting Climate Change. So far, so good……..you might fairly think.

11 The deep peatlands may have been saved, but the shallower peats and mere peaty soils have not been; in many quarters they remain misunderstood. The ‘man-made desert’ description still appears, but only does so in ignorance of the periods of climatic downturn which the Highlands and Islands have seen, in particular those long centuries from around 2000 BC, when much of the blanket bog and peat transformed the landscape. It is crucial to realise that the changes within the soil profile initiated by much higher rainfall, (the formation of the impermeable ‘iron pan’ and subsequent waterlogging of the upper layers)

were not reversible by natural processes. In subsequent climatic optima, the surface of the peat might dry out, and be colonised by pine, but when the precipitation increased again, the pines would die. In significant support of this view, I quote Dr Richard Tipping, writing a chapter in 'People and Woods in Scotland' (edited by Professor T C Smout, Edinburgh University Press, 2003). 'It is very unlikely that significant parts of the country were converted to permanently altered open ground by human impacts. It is more likely that climate change and soil deterioration were more significant agents, particularly in northern Scotland. Here the catastrophic collapse in pine populations 4000 years ago, opened up entire regions in Sutherland and Caithness which have remained virtually treeless since then'. It is important to note that the long climatic downturn of the Bronze Age will have had a significant effect over much of the Highlands and Islands; it will have been less important in the drier eastern Highlands.

12 The significance of the carbon locked up in the deep peat of the Flow Country has widely been recognised, but it seems that, strangely, the fact that carbon is also locked up in vegetation, peat and soil generally does not really seem to have been taken on board. The crucial inference is that the covering of peaty soil over huge areas also represents an important carbon sink. Over recent decades large tracts of peaty soil have been planted, both with conifers and native deciduous trees. As planting trees must aerate and oxidise the soil, releasing carbon dioxide and methane to the atmosphere, I have been arguing for some years (for instance in the Reforesting Scotland Journal), that planting of even peaty soils should cease. This argument was based on first principles and simple logic, and has now been supported by experiment and measuring, (done by others). This, too, has appeared in the Reforesting Scotland Journal: (issues 63 and 65, Spring/Summer 2021and 22). From 63, I quote Nina Friggens:'Taken together, these results show that planting trees onto heather moorlands does not lead to net ecosystem carbon sequestration 12-39 years after planting'. On 7th April 2020, Roger Harrabin, BBC environment analyst, had published an article from which I quote one sentence: 'The report comes from the Natural Capital Committee (NCC) which says planting trees into peat bogs would prove a serious mistake'. And an article in the Inverness Courier (11/11/2021) relates the unsettling story of Bunloit Estate above Loch Ness. Although the estate is 86.3% covered by woodland and grassland, ' it is still currently a

net carbon source largely because its peatlands, part of which are under non-native conifer plantation, are leaking carbon to the atmosphere'. (Again, here there is no mention of methane, that other significant greenhouse gas).

13 Despite all this evidence, very briefly summarised above, Simon Hodgson, Chief Executive of Forestry and Land Scotland, in a letter to me (21/6/21) could only confirm that FLS do no longer plant *deep peat, ie peat which is over 50 cms in depth.* In other words FLS are still planting peaty soils. And, tragically, it is clear that the huge disturbance of soils, peaty or otherwise, which comes with clearfell, will continue well into the future. Worryingly, too, Highland estates are now being bought with a view to planting trees, almost always on peaty soil, for carbon-offsetting. The very clear message in the paragraph above is *not* being translated into consistent, sustainable policies, let alone action.

14 I accept *regeneration* of native species onto peaty or other soils; it involves less ground disturbance than cultivation, and is needed in the context of the other crisis which faces us: the loss of biodiversity in our countryside. Our native woods need room to move. (There is still room for *planting* of appropriate species on land covered by rushes or bracken).

15 But it seems clear that we are yet far from a general appreciation of 'moorland' for itself. Moorland varies of course; some areas are more interesting than others, and many need to recover from past abuses like drainage, overgrazing or reseeding. From a distance, moorland can look very uniform and it takes *looking into,* before it can be seen that it is a very specialised environment. Part of the problem is our very vocabulary which has overtones (or undertones!) which are unhelpful: soils may be 'nutrient rich' (sounds good!) or 'nutrient poor' (however hard you try, this sounds bad); the phrases are laden with values which are not truly scientific. We need to rethink the vocabulary used in this context.

16 Looking at an area of 'moorland', it will be seen that many of the damper areas have some specialists which supplement their 'diet' in various ways: the bog myrtle fixes nitrogen from the air in nodules on its roots, while the diminutive sundew and butterwort trap and consume insects. Heathers cope with differing degrees of dampness; the cross-leaved heath does well

in the conditions of the wetter west, with ling and bell heather growing in drier places. When I lived in Assynt, one of my constant walks was in beautiful scenery, under the great western cliffs of Quinag. Everyone would see the spectacular scenery, but they might need to have pointed out the widespread, if small, flowers of the moors under my feet. One is the yellow-to-gold bog asphodel, a diminutive, almost lily-like flower, described in the 'Flora of Assynt', (P A and I M Evans, G P Rothero, 2002), as 'making a sheet of colour in bogs and wet places in summer'. Equally widespread, and rather more significant, perhaps, are the orchids; this particular walk was through expanses of orchids. Among the many species found in Assynt, the most common is the heath-spotted, which, on my walk, was interspersed with the lesser butterfly, and the deep pink, beautifully-scented fragrant orchid on drier patches.

17 The orchids are particularly important, not just because of their beauty, but because of the fact that their minute seeds contain no source of nutrition which would enable them to begin germination. For a detailed discussion of this significant characteristic, see 'Wilding', by Isabella Tree (Picador, 2018), a most readable account of this and other important topics. In this particular context, I will just quote a couple of sentences: ' Germination (of orchids) depends entirely on mycorrhizae which colonise the seeds and supply them with food. The appearance of orchids is visible evidence that creeping underground mycorrhizae …….are spreading their web beneath our fields'. This means, surely, that our once-despised moorland, 'nutrient poor', must be, at least in some contexts, much more evolved than used to be thought; there must be networks of mycorrhizae throughout the areas where orchids bloom. I will not enlarge further on this topic, but in this important chapter Isabella Tree highlights the fact that "science is only just beginning to get to grips with the universe of soil organisms" ; it would seem sensible to include peaty soils in these investigations. 'Nutrient poor' they may be, but just as deserts turn out to be much more complicated and interesting than they appear on the surface, so may the 'dreaded' 'wet desert' yet surprise us. The chapter which includes the mycorrhizae, goes on to explain the crucial connection between the 'underground web' and carbon sequestration.

18 All this means that our areas of moorland should be maintained in 'favourable condition'. This indicates, for a start, that overgrazing and trampling must be avoided; the living surface

of mosses, lichens, liverworts, coarse grasses, heathers, and whatever else, must be kept healthy, or carbon dioxide will escape to the atmosphere. In this particular context, the vexed question of burning must be addressed. This is too big a topic to be covered adequately in a short paper; I did touch on it in 'Castles in the Mist' (Saraband, 2016). Burning is, in almost every way, hard to control, but suffice it to say here that high-temperature burns can blanch, char and kill some sphagnum mosses. Frequently repeated burns, as for instance on grouse moors, can certainly do the same, and visibly char the thin, peaty soil, encouraging erosion. While repeated 'east coast' burns may be restricted in area compared to intermittent, extensive 'west coast' burns, the latter may possibly be less harmful in terms, at least, of the escape of carbon dioxide and methane. A fundamental problem remains; if all burning ceases, the build-up of combustible material can eventually lead to accidental but catastrophic fires. And, with an increase in wild-camping, fires and litter, those will happen.

19 As Climate Change progresses, Scottish moorland will continue to evolve. Most of it may become significantly wetter, (which may increase erosion but encourage the sphagnum moss), and as more acid rain falls on an already acid environment, there are likely to be significant changes at all levels; perhaps particularly involving the critical, but largely unseen, microscopic within-soil level? All this will make large areas even less suitable for planting trees, and further limit the capacity of native woods to regenerate.

20 Anthropogenic alteration of Highland landscapes is often still cited as a reason for their treeless state. There is, however, an obligation on those taking this view to examine the archaeological and historical record before adopting this attitude. (What evidence is there for the existence of a population at any chosen period, how substantial was it, how far is it reasonable to assume that its influence (animals, harvesting of wood etc.,) actually extended, how long did it last?) And an understanding of geology, and its interaction with a changing climate, is fundamental in working out the evolution of our landscapes. Exploring our environmental history may be eye-opening; the depth of peat which has formed on the porous limestone in Assynt, or the very *existence* of the 'Flow Country' (' a northern tundra-type ecosystem in a southern geographical and climatic location'-NCC,) means that the influence of climate is difficult to over-state in Northern and Western Scotland. RN.

3 DISCUSSION

1 I began to write these two papers on 'Misunderstood Landscapes of the Highlands' because I genuinely believe that both are still, widely and sadly, misunderstood. But, as I write, I am reminded that, strangely, these two landscapes, the woodland and what I have, for convenience, simply called the moorland, now frequently seem to be opposed; commentators on the Highlands and Islands seem to favour one or the other. It is fair to suggest that there are rather more proponents of the woodlands, than there are of moorland, but, it has to be said, this may be partly because there are still few commentators who began their lives and study in the Highlands. Most, like Frank Fraser Darling, began somewhere very different and carried some of that background with them when they came to the Highlands. Since then, the 'natural versus man-made' debate has been somewhat over-simplified. In particular, a lack of attention to archaeology, (which tells us where people were and what they actually did) and the implications for soils of historic climate change, mean both that the *limits* of the anthropogenic contribution, and the *scale* of the largely natural processes which shaped our moors, have not been adequately assessed.

2 But it seems strange to me that there should be this division at all; on most objective assessments, it is simply *wrong.* (Surely we have enough space for both?) Our woods and moors are both ancient; peat began to form in some locations soon after the Ice Age relinquished its hold, and, very roughly, trees began to arrive in the landscape soon after, (perhaps from some refugia in the west, as much as from the south?). And this division of loyalties is most certainly misplaced when you remember that our Planet faces *not one, but two* linked, real crises: one of Climate Change and one of Biodiversity; Global Warming and Global Extinction, if you prefer. In the context of the Biodiversity Crisis, in particular, there can be no argument; we need both the woodlands and the moorlands. If anyone doubts the richness of the biodiversity in landscapes which have both woods and moors, I suggest that they read the 'Flora of Assynt' (P A and I M Evans, G P Rothero, 2002). This beautiful and invaluable book highlights the considerable biodiversity to be found in the whole range of habitats which I have, perhaps rather cavalierly, simply called 'woodland' and 'moorland'.

We cannot let either go, which does mean that we must allow the native woods to regenerate as they would naturally, into adjacent, drier, open spaces.

3 That is very different from allowing extensive planting on the open hill, of any species. In paper 2, I have made it clear why planting should no longer be initiated on any peaty soils. There is, however, another reason for arresting this trend towards planting new native woods; that is simply because it is very often *done badly.* Having spent around a decade looking at new planting, I am appalled at what I most often have seen. Planting is generally done on a landscape scale, lines drawn blithely on a map, with little evidence of looking around the locality to see where trees *actually grow.* Mounding should clearly be forbidden immediately (it leaks carbon dioxide and methane to the atmosphere), but failed mounding can be seen in many places, up boggy flows and over exposed ridges. In general, tree stock is bought on price, with little or no reference to what actually grows locally; few people seem to see beyond the birch or Scots pine. Some more interesting species, like hazel, holly and oak may be placed close to paths and other locations from where they will be seen, but the general planting will be of birch, alder (stuck wherever), rowan-and, with no regard to whether it grows now locally- Scots pine. No attention is paid to how, or where, these species regenerate in nature. Planting of native trees, in the western parts of the Highlands especially, should almost be gardening, a slow and careful process, looking thoroughly at the lie of the land (in essence, the underlying geology), and the local mix of species, which is often much more diverse than the superficial glance will elicit. And reintroducing management into existing natural woods will be at least as beneficial to biodiversity as planting new woods would be, as all the desired species will already be present.

4 I do, however, see the advantage to biodiversity of creating ‘habitat networks’, corridors linking similar, now islanded, habitats. This seems normally only to be considered in the context of woodland areas, but should also, importantly, include wetland and natural meadows, for instance. These, too, should be carefully planned; they should lead through the landscape, not be blocks imposed on it.

5 In the context of this dichotomy-moors or woods-there is often, or always, another topic; the deer population, and what to do with it. It is my view that this discussion is only valid if it takes as its starting-point, the undeniable fact that the open moorland, despite its more natural-than-not origins, has changed dramatically since around the early 1800s. This is a big topic, and elucidated in publications like 'Nature Contested' (T C Smout, Edinburgh University Press, 2000), and my own 'Castles in the Mist', (Saraband, 2016), to which the interested reader is advised to turn. Suffice it here to say that there is ample evidence that since the early decades of the 19th century, *the hill ground* of the Highlands has seen a considerable decline in productivity, in overall biodiversity. Some will immediately blame the killing spree of the Victorian sportsmen, but that is far too simplistic. If the sporting estate at its height were responsible for the *overall decline in biodiversity,* since its heyday, then, as its impact has dwindled, (especially with two World Wars), there should have been a recovery. Instead, we have seen a continuing decline overall. The wealth of small mammals and birds which must have underpinned the enormous bags of 'vermin' which the Victorian gamekeepers achieved (and which are well documented), has not recovered as the gamekeeping has declined. (It would appear then that there are three likely causes for the significant loss of biodiversity during this period: prolonged acidification (from the skies), overgrazing at first by sheep, then by deer, and afforestation- can anyone think of any others?).

6 The question of deer numbers through history really has to be considered in the above, significant context. It seems reasonably clear, if imprecise, that the deer population has been restricted in its range throughout much of our history. The well-documented existence of deer parks and deer forests makes this absolutely clear. Deer *had to be restricted* in order that agriculture could continue to feed the population. The Victorian sporting culture encouraged an increase in overall numbers, so it seems fair to suggest that the population of 150,000 red deer in 1947 would be significantly higher than it had been through much of our earlier history. *Our current biodiversity derives from this history.* Given this, and the imperative to preserve as much as possible of this current biodiversity, I cannot see that talk of a 'natural deer population', nor a 'natural carrying capacity' is relevant to where we are now. And the implications of continuing the present-day red deer population of around 500,000, go far

beyond simply killing off regenerating woodlands. The main grazing problem tends to be when there is a late spring, after a long, cold, wet winter. There is virtually nothing, anywhere, to eat and the deer are desperate, and eat anything that shows green. Under these conditions, I have seen them eat rhododendron, soft rush, alder, Japanese knotweed, (none of which are supposed to be palatable to them) and this is when holly tends to be attacked. Many woodland plants, growing low in sheltered conditions, are already visible, which makes them very vulnerable.

7 It also needs to be remembered that deer numbers are not spread uniformly over the country. As the population increases in established deer forests, (as for instance, Inchnadamph and neighbouring areas in inland Assynt) it then spreads out into the surrounding country, which is often now empty of sheep. But the old core area will often, by then, have seriously overgrazed places. I have seen once idyllic, high-level 'alps' now eaten down to nothing, and badly trampled, with the very thin mountain soil beginning to erode away. And on many long-established forests, the old peat hags were all rapidly increasing in area, their edges showing the imprint of innumerable, sharp, cloven hooves. These may take at least decades to recover any vegetation cover; in the meantime, we are again leaking carbon dioxide and methane to the atmosphere.

8 In this context, I cannot believe that Assynt, for instance, would have its current level, (well-recorded) of biodiversity if the deer population at the time of Fraser Darling's 'Natural History in the Highlands and Islands' had been the current 500,000. And the regeneration he saw, and I lived through, would almost certainly not have happened. It should also be remembered that with the almost complete disappearance of small-scale agriculture from the Highlands and Islands, there has already been a very significant reduction in the biodiversity of our landscapes. We really cannot afford to lose more. (NB: Unmanaged pasture -always a few sheep and/or cattle, probably lots of deer every night, as in almost every Highland glen- effectively deprives us, too, of a great deal of potential biodiversity).

9 Finally, as there is almost always a hysterical reaction to the notion that we must significantly cull our current deer population, I would point out some very obvious matters.

There were plenty of keepers employed when Fraser Darling estimated a population of 150,000, so any claim that we mean to 'empty the glens' of people is nonsense. Everyone knows that to achieve a significant cull (*providing it is done in traditional fashion, with perhaps slightly extended seasons)* is actually very difficult, and requires manpower, probably more than sporting estate owners currently employ. The need for deer management will never leave us, so the need for keepers is guaranteed for ever. Proprietors have the responsibility to manage a truly sustainable (in the above contexts) deer population, and it is up to them to employ the number of people required for the task. As one who grew up among a genuinely rural population of crofters, shepherds and keepers, I must make it clear that empty glens appal me. (And I most certainly do not advocate the return of wolves; proponents never dare talk about the numbers which would be needed to manage our deer populations, and, in any case, our two-legged predators have the enormous advantage of flexibility; they can choose which deer to cull, how many, where and when).

10 The one other outstanding problem (which in places links our two misunderstood landscape types) is the huge area of mostly-conifer plantation, largely owned/managed/ regulated by Forestry and Land Scotland. This is an enormous problem. As in the very different context of agriculture, I accept (and would remind others) that it is important that we retain the ability to supply a considerable proportion of our own needs into the future. Clearly a major part of the forestry estate will be required for this. Again like agriculture, this will probably have to remain an intensive and mechanised operation; those involved need to look at what they do, in order to see where their activity may be made more sustainable, as well as more 'nature-friendly'. Can we have 'regenerative forestry' as well as 'regenerative farming?

11 Areas which are not required for the long-term production of the nation's timber need to be overhauled in order to ensure that they assist us in combatting both crises. The major concerns throughout the forestry estate are in cultivation and harvesting: mounding and clear-fell are now pretty well ubiquitous. Apart from ruining the look of the landscape, both operations leak carbon dioxide and methane to the atmosphere, presumably in really significant quantities. While I recognise that this represents a major challenge, it is one that *must* be addressed and remedied; in the meantime, no new land should be planted, with the

possible exception of formerly cultivated land and reseeds. Both are often reverting to rushes, which could be planted with alder and the rather neglected willow species and hybrids.

12 In conclusion, I would say that a much wider, deeper and more accurate appreciation of the environmental history of the Highlands and Islands is required by all who are involved in the management of these landscapes. Otherwise some really bad decisions will be made, which may look quite good at first glance. If, for instance, trees are planted in the wrong place, not only will those doing the planting be trying to fight the results of the climate change of centuries ago, but valuable tree stock and much human time and effort will be wasted in the process. And, all the while, they will be adding to the greenhouse gases which are driving Global Warming. The **Precautionary Principle** *should always be remembered.*

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NORTH AND WEST: (Scottish Cultural Press, 2003).
A general introduction to the North and West Highlands and Islands of Scotland.
CASTLES IN THE MIST: (Saraband, 2016).
Exploring the Victorian Transformation of the Highlands.
SAGAS OF SALT AND STONE; (Saraband, 2018).
Described as his ‘love letter to Orkney and its people’.
Castles in the Mist was shortlisted for the Saltire Society ‘History Book of the Year’.
More books are firmly in the pipeline…….(January 2022).