Chapter 8

Discussion: The Faroe Islands and the wider North Atlantic context

Introduction

The aim of this chapter is to incorporate the exploration of bold ideas with the focussed research presented in chapter 7. Data collection and analyses from the Faroe Islands has resulted in the presentation of a case study, which although can be interpreted in several ways, is based upon the collection of empirical data. However, a focus solely on the smaller scale limits the appreciation and understanding of the wider context. This chapter builds on the opportunity presented by the thesis to consider a number of bold ideas that are testable, in order to increase our knowledge of regional/inter-island scales and introduce ideas and hypotheses for consideration and debate.

The chapter consists of five parts. Parts one and two outline the importance and rationale behind a wider spatial context and how the natural and cultural landscapes of the Faroes, Iceland and Greenland have developed in different ways. Part three examines and compares the outcomes of colonisation and long-term settlement on Iceland with that of the Faroe Islands and evaluates why these outcomes might have been different using specific examples. Part four compares the outcomes of colonisation and long-term settlement on Greenland with that of the Faroe Islands and again evaluates why these outcomes might have been different using examples from Greenlandic research. Part five concludes the chapter by summarising the comparisons and contrasts between outcomes in the Faroe Islands, Iceland and Greenland and whether or not these were inevitable.

8.1 The importance of a wider spatial context

While research on human-environment interactions in Iceland and Greenland has been forthcoming in the last couple of decades, the Faroe Islands have attracted relatively limited academic research, particularly with regards to its historical ecology. Yet, as the Faroes were the first of the North Atlantic islands to be settled by the Norse, understanding the interactions between landscape and cultural history in the Faroes is important in terms of how the Norse adapted to a changing environmental gradient in the North Atlantic. The discussion in chapter 7 concludes that changes in the environment and subsistence practices of the Faroese have been relatively limited over the course of settlement. It is, however, important to focus on island environments within a wider context (in this case the other North Atlantic islands settled by the Norse). It is particularly important to focus on areas that are considered environmentally “less marginal”, e.g. the Faroe Islands, in order to

understand how thresholds affect what are considered to be environmentally "more marginal" areas, e.g. Greenland. Human-environment research is generally skewed towards understanding cultures and environments that have experienced the most severe threshold crossing events, which is verified by the relative abundance of academic research carried out on Easter Island, for example.

8.2 Summary of trajectories and thresholds in the Faroe Islands, Iceland and Greenland

One way of understanding the trajectories of change and outcomes of settlement on the North Atlantic islands is to consider the dynamic relationship between population and carrying capacity, representative of an environmental threshold, and to speculate how this might change over time. For example, when the population increases over and above the carrying capacity, a population crash or decline may be triggered. If the population is very low to begin with, or is reduced over time, a lowering of the carrying capacity may also be induced, as a shortage of labour hinders the execution of activities and improvements that would otherwise stabilise the carrying capacity. Conversely, improvements in technology or a change in subsistence practices may raise the carrying capacity or threshold. Figure 8.1 illustrates a numerical output of the relationship over time between population and resources based on Easter Island. As the population increases after settlement, after an initial time lag, the resource stock begins to decline to a threshold around 1100 AD, at which point the population exceeds the carrying capacity. With fewer resources available, the population starts to decline rapidly. A smaller population may create less pressure on resources, which conversely begin to increase by 1600 AD, but by then the population has already reached a critical threshold and continues to decline. This model exemplifies a Malthusian relationship, which assumes that a population decline is inevitable. How, then, did population levels and resource stock interact in the North Atlantic islands, and to what extent did the relationship between population and resources differ between the Faroes, Iceland and Greenland?

The relationships between population and resources (and their outcomes) for the North Atlantic islands are hypothesised and are presented in Figures 8.2, 8.3 and 8.4. In the Faroes (Figure 8.2), no significant cultural or environmental thresholds have been crossed within the period of settlement, although plague probably reduced the population in the mid-14th century, and the 16th heralded a general period of decline as a result of Danish monopoly. Overall, the impact on the environment is limited and the population does not decrease at such a rate that the carrying capacity is critically lowered. In Iceland (Figure 8.3), demographic history follows an oscillatory trajectory. Initially the carrying capacity increases, in proportion to population, but a sequence of significant population declines, beginning in

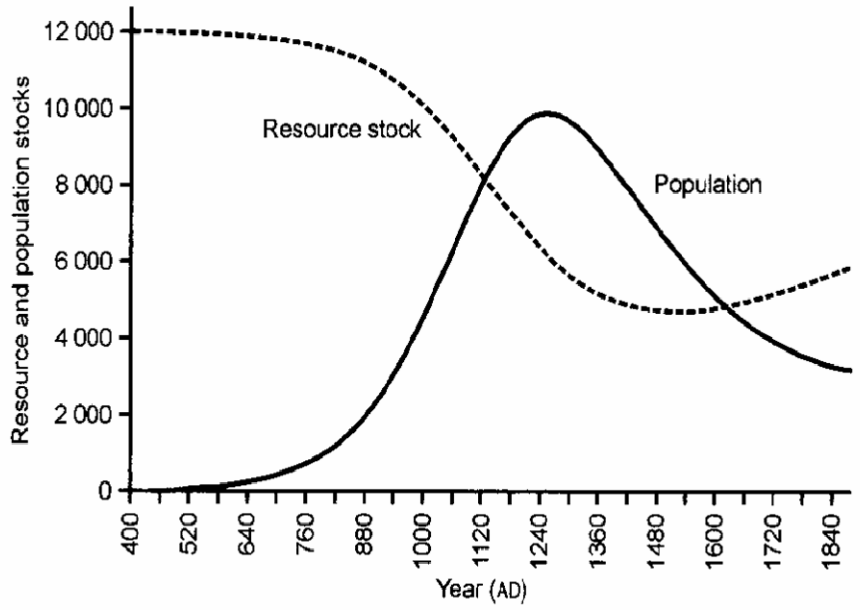


Figure 8.1: A Malthusian numerical model for Easter Island showing the relationship between population and resources, and illustrating that a population decline was inevitable. (After Brander and Taylor 1998).

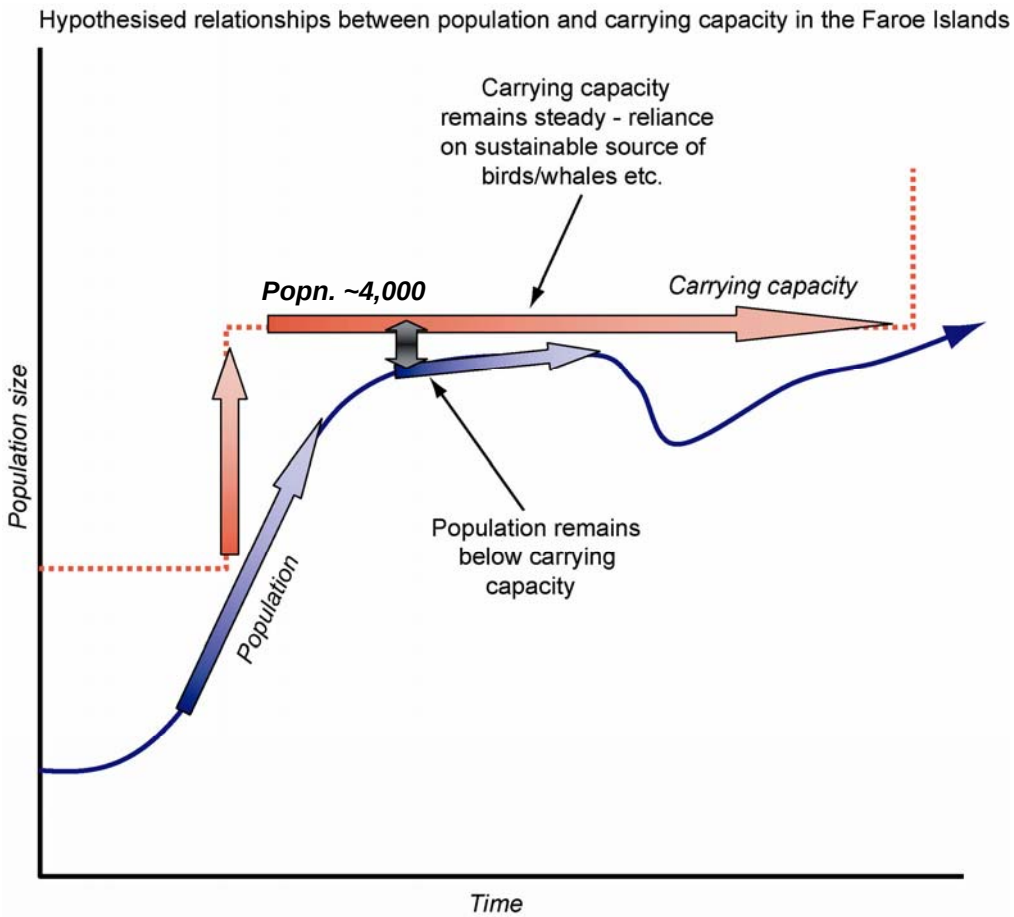


Figure 8.2: A hypothesised dynamic relationship between population and carrying capacity in the Faroe Islands.

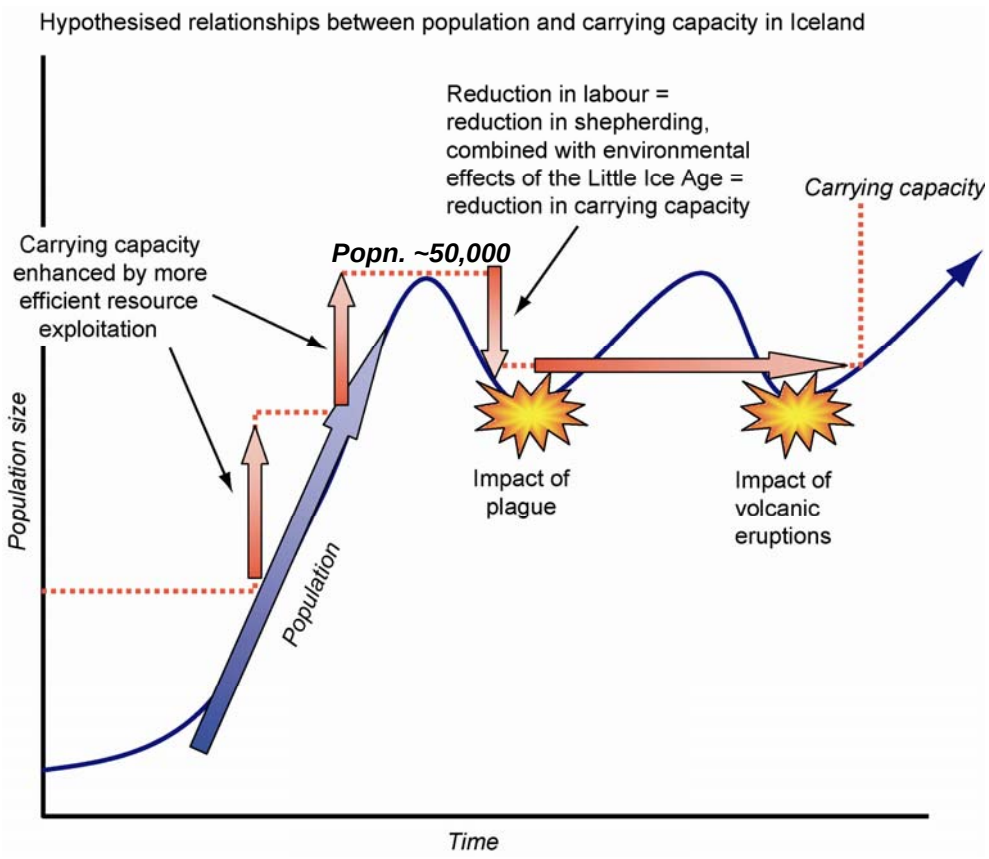


Figure 8.3: A hypothesised dynamic relationship between population and carrying capacity in Iceland.

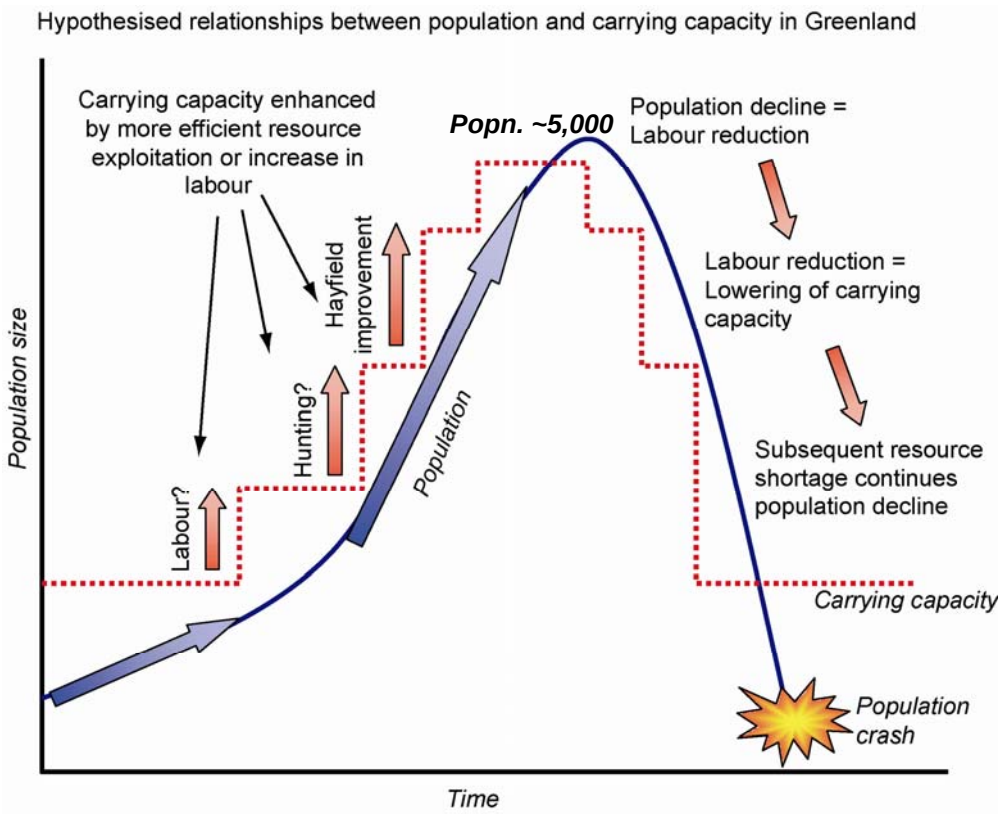


Figure 8.4: A hypothesised dynamic relationship between population and carrying capacity in the Eastern settlement of Norse Greenland.

the 15th century as a result of diseases, followed by volcanic eruptions in the 18th century, in addition to accumulating environmental problems caused by erosion and the cooling impacts of the Little Ice Age, may have increased landscape degradation. The carrying capacity was hence reduced to the extent that a threshold was crossed. In Greenland (Figure 8.4), despite initial increases in the population and carrying capacity as a result of, for example, increasing labour or hayfield improvements, at some point the population begins to decline to a critical level. Below this point, labour is reduced by enough to lower the carrying capacity and the population eventually collapses. What triggers the initial population decline is uncertain but there are several factors that influence when, and if, such a threshold is crossed, and any combination of these might have played a role in the collapse of the Norse Greenland population. These range from climate change, cultural conflict, isolation and disease to the non-sustainable use of the resource base and the inability to tap into available technology or knowledge to utilise available resources efficiently. The goals and aspirations of the settlers are also an important consideration. Table 8.1 outlines the main differences between the Faroes, Iceland and Greenland in terms of a range of natural and cultural factors and some of these differences are discussed in more detail below.

8.3 Comparisons between the Faroe Islands and Iceland

Why are trajectories between the Faroes and Iceland different?

It is important initially to consider comparisons between the North Atlantic islands of the Faroe Islands and Iceland because these were both islands where Norse settlement endured. The present day environments of Iceland and the Faroes appear to be similar in some respects, as both landscapes are dominated by open pasture, yet there have been critical differences in landscape history that have been influenced by the contrasting physical and cultural characteristics of the two islands. Soil erosion, for example, has been more widespread in Iceland than in the Faroe Islands. Iceland has been referred to as the most eroded land in Europe (Bjarnason and Helgason 1990), with anthropogenically triggered erosion suggested as accounting for the removal of approximately half of Iceland's soil (Runólfsson 1978). Although precise patterns and causes of erosion are complex, the environmental trajectory of much of Iceland contrasts with that of the Faroe Islands, which have remained remarkably well vegetated. Differences in the environmental trajectories of the two islands are influenced to some degree by fundamental differences in the pre-colonisation environment, but also by contrasting settlement patterns, population dynamics and variations in subsistence strategies.

Natural factors	Greenland	Iceland	Faroes	Norway
Climate	Arctic/sub-arctic - cool summers, cold winters, sea ice	Maritime – mild windy winters, damp, cool summers	Maritime – mild winters, cool summers, foggy, windy	Temperate along coast, colder interior, wet all year on w. coast
Physiography and topography	Large landmass with large ice mass	Large land mass with ice caps and volcanic systems	Small islands with steep slopes, wet, periglacial	Mountain and fjord topography with ice caps
Biodiversity and tree species	c. 497 vascular plant species. Birch, ash, willow, evergreens, ferns and herb species	c. 485 vascular plant, species. Dwarf birch, willow, heather, grasses and sedges	Mosses, grasses and bog vegetation, dwarf shrubs, no native trees	c. 1715 vascular plant species. Spruce, pine, birch, aspen, rowan
Natural hazards and extreme events	Continuous permafrost, plague?	Volcanic eruptions, catastrophic floods, earthquakes, plague	Plague?	Rockslides, avalanches, plague
Environmental analogies with homeland	Looked similar to homeland in some respects but more environmentally marginal	Looked similar to home (birch forest, shrub, grassland) but wasn't – friable soils, tephras	Looked similar to home except for lack of forest, and was – peaty soils, grassland	Homeland landscape: Forest and grassland, peaty soils
Degrees of change with human impact	Limited change?	Rapid change (in less than 50 years in some cases) from extensive birch forest and scrub to grassland	Limited change – landscape predominantly open grasslands before settlement	Gradual change over c. 10,000 years of human impact
Settlement patterns and location	Extensive settlements, dispersed across fjord and inland locations	Dispersed individual settlements, coastal and inland	Coastal, nucleated settlements, multiple and individual farms	Coastal (fjord) and inland, multiple and individual farms
Environmental resource potential	Peat, driftwood, birch forests, scrub, heath	Peat, driftwood, birch forests, scrub, heath, wet meadow	Peat, driftwood, scrub, heath	Plentiful timber, peat, driftwood, scrub, heath
Wild food availability	Fish, migratory seals, walrus, birds, caribou, berries	Fish, seals, whales, birds, eggs, walrus (early period), berries	Fish, seals, whales, birds, eggs, berries	Fish, seals, whales, birds, eggs? berries
Wild food resource utilisation	No fishing, dependent on hunting, grazing	Reliance on domestic agriculture, grazing, fishing	Varied use of wild resources - whales and birds, grazing, fishing	Animal husbandry, fishing, hunting
Domestic animals	Cattle, sheep, goats, pigs	Cattle, sheep, goats, pigs, horses, geese, limited barley	Cattle, sheep, goats, pigs, horses, geese, limited barley	Cattle, sheep, goats, pigs, horses, geese, hens? barley
Fodder requirements	Require fodder and byres	Require fodder and byres	Less dependent on fodder and byres	Require fodder and byres
Farming system	Infield-outfield, limited shieling system	Infield-outfield, limited shieling system	Infield-outfield (secondary stage?), early shieling system	Infield-outfield and shieling system
Outfield administration	Individually owned, set grazing numbers?	Hreppur system: individually owned, set grazing numbers?	Partir system: community owned, set grazing numbers	Infield-outfield system
Trade, distance and access to trading centres	Trade in luxury goods, distant trading centres, access in summer only	Trade in wool and later fish, limited access in cold years	Trade in wool and later fish, year round access	Trade in fish. Year round access

Cultural factors

Table 8.1: Comparisons and differences in natural and cultural factors between Greenland, Iceland, the Faroe Islands and Norway.

Inherent physical and ecological differences between the Faroe Islands and Iceland

Although some contrasting elements are highly visible in the landscapes of the Faroes and Iceland today, e.g. active volcanoes and glaciers in the Iceland, but not in the Faroes, other divergent elements are apparent from the palaeoenvironmental record, e.g. the greater extent of birch forest in pre-*landnám* Iceland than in pre-*landnám* Faroes. There are several geomorphic and ecological factors in the Icelandic environment that combine to create a landscape more vulnerable to human impact, than at locations such as the Faroe Islands where particular elements are absent. Volcanic eruptions emit tephra, which in Iceland has contributed to the development of andisol soils that have low organic carbon contents and low bulk densities making them highly susceptible to erosion (Arnalds *et al* 1995, Simpson *et al* 1999). The removal of forest has also been a factor in Iceland, but less so in the Faroe Islands. Research has shown Iceland to have been at least 25 % forested at the time of *landnám*, compared with a figure of 1 % today (Arnalds 1987).

The existence of forest, which was substantially utilised for fuel and charcoal production, also contributed to the magnitude of impact illustrated by Icelandic sediment accumulation records. In the early period of settlement, *c*.870-930 AD, there is evidence for rapid woodland clearance in some areas, e.g. south Iceland (Hallsdóttir 1987, Mairs *et al* 2006), as the land was cleared for farms and hayfields. The removal of vegetation acted to expose the volcanic soils to processes of erosion which initiated a long-term trajectory of landscape degradation. This immediate post-*landnám* trajectory contrasts with that of the Faroe Islands which, due to the predominantly open environment, were not subject to the same degree of impact caused by early anthropogenic deforestation. In addition, the geographical location of Iceland results in more substantial winter snow cover than that received in the Faroe Islands. This had substantial consequences concerning the requirement of fodder, for example. In most years in the Faroes, enough grazing was exposed for the sheep to over winter in the outfields. In Iceland, on the other hand, substantial fodder was required to over winter sheep as well as cattle.

Differences in the utilisation of resources in the Faroe Islands and Iceland, and how these develop over time

There are additional factors related to the physical environment that may have influenced the environmental trajectories of the Faroes and Iceland. The Faroe Islands consist of a series of small islands separated by sounds and fjords, with no location on the Faroes further than 5 km from the sea. This underlines the influence of the sea in the history of the Faroe Islands. Iceland, excepting the fjord landscapes in the northwest and east, is dominated by its landscape rather than seascape, and is characterised by wide and expansive sandur plains

in south Iceland and a vast semi-barren interior landscape. As the mountainous topography, sheer cliffs and island dominated geography made land communication in the Faroes difficult, the boat evolved as the principle method of communication. In Iceland, on the other hand, communication between farms and districts was predominantly made by horse.

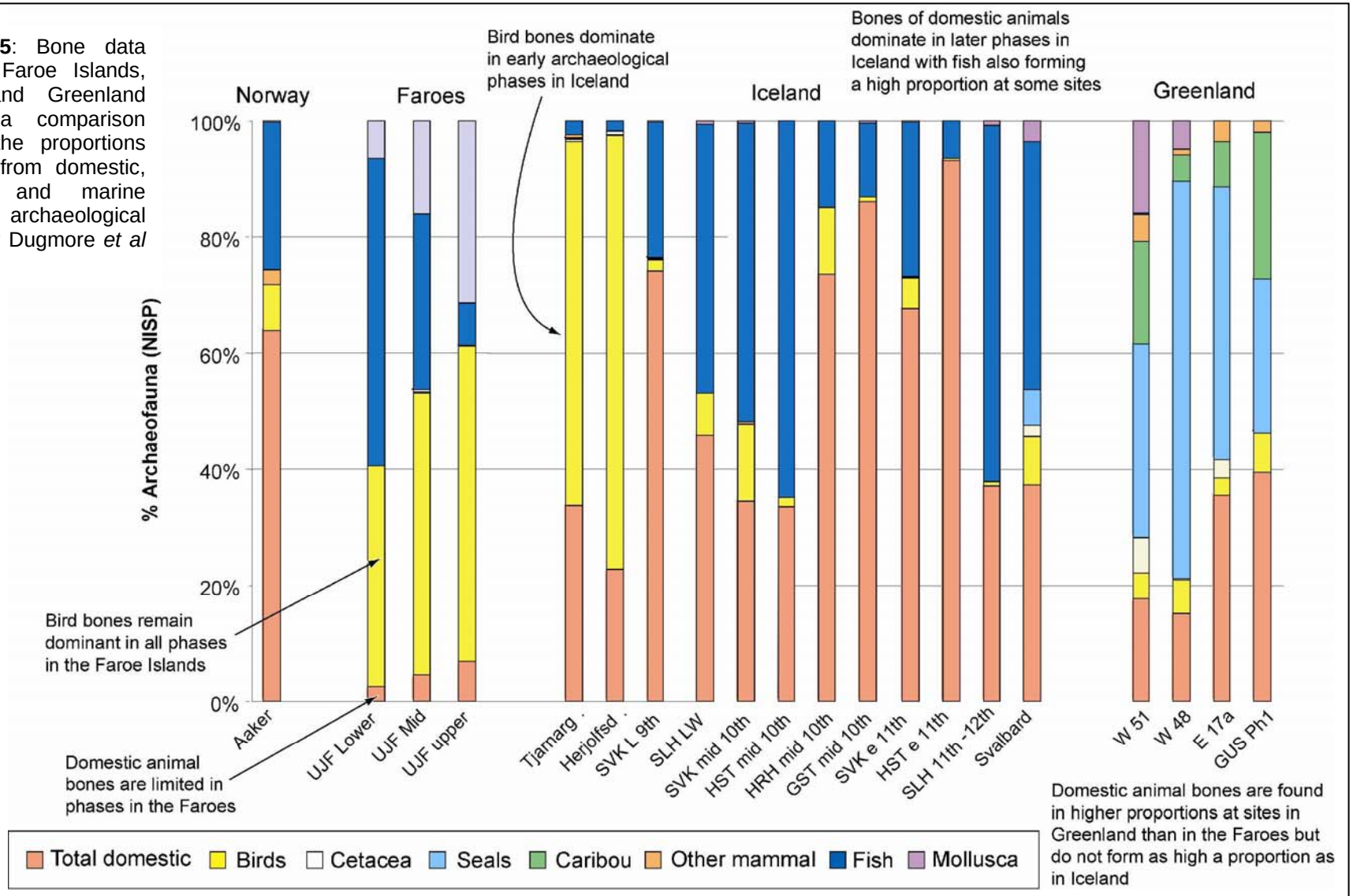
It is possible that the focus towards the sea on the one hand and to the land on the other may have influenced how the two islands approached their subsistence strategies. For example in the early Icelandic settlement period, archaeobotanical collections indicate that locally available wild resources, for example, seabirds were substantially utilised to subsidise the initially limited domestic animal component of the colonists' subsistence economy. However, by the 11th-12th centuries there was a general shift in species exploitation, after which domestic mammals dominate collections (McGovern *et al* 2006) (Figure 8.5). Fishing was carried out extensively in Iceland, from around the 15th century, but this was primarily for trade. In the Faroe Islands, the sea has provided for a more significant and varied proportion of the islander's subsistence, with fish as well as whales and seabirds contributing substantially to the Faroese diet, not just in the initial *landnám* period but more uniformly over longer-term settlement (Church *et al* 2005).

Isolation, contact and disease in the Faroe Islands and Iceland

An important consideration when dealing with island environments, which is especially obvious in Pacific island examples, is their degree of geographic isolation and how isolation might influence the extent to which unsustainable demands are made on environments. The issues of isolation and contact are important with regards to trading networks but also in relation to the spread of disease. In the Pacific, for example, the difference in population structures between the large archipelagos of the western Pacific and those of Remote Oceania corresponds closely to the geographic distribution of malaria in the Pacific (Kirch 2000). The more isolated islands of Remote Oceania lacked the disease causing micro-organisms that affected Near Oceania and as a result a key check to human growth rates was lifted. The lack of epidemiological or environmental constraints (most of the islands were rich in natural food resources and suited to planting food crops) on population increase led to high rates of population growth, which were often unsustainable. Over-population inevitably enhanced environmental impact on the Remote Oceanic islands, and may have been a contributing factor in some incidences of cultural collapse.

The contrasting role and timing of disease (e.g. plague and smallpox) in the Faroe Islands and Iceland, demonstrate how isolation and disease might have contributed to differing cultural and environmental trajectories in the North Atlantic. Although there is no direct evidence, plague is thought to have reached the Faroes *c*.1349-50 (Schei and Moberg 2003,

Figure 8.5: Bone data from the Faroe Islands, Iceland and Greenland showing a comparison between the proportions of bones from domestic, terrestrial and marine sources at archaeological sites. After Dugmore *et al* (2005).



Young 1979) and may have caused the death of about a third of the population. Oral traditions document that several villages suffered from the effects of plague, with some villages almost completely devastated, including Saksun (Streymoy), Husavík (Sandoy), Leirvík (Eysturoy), Hamrabyrgi, Vikarbyrgi and Sandvík (Suðuroy), and all but one of the population of Skúvoy (Schei and Moberg 2003, Young 1979). Apart from a reduction in population, the outbreak of plague must have had other effects, such as a change in the ownership of property. Landscape impacts as a direct consequence of plague or other sudden population reductions are also complex. It might be expected that a reduction in population (individuals or whole communities) would reduce impact on the landscape. Yet, grazing may still continue within a landholding even if cultivation is abandoned. It might be that the arrival of plague in the Faroe Islands *c*.1349-50 and the resulting population control contributed to the avoidance of threshold-crossing terrestrial environmental changes in the islands. As with malaria in the western Pacific islands, plague and subsequent incidences of disease might have provided a control on population growth. The impacts of plague may have also been influenced by regular contact between the Faroes and the mainland.

On islands with small populations, even if the absolute number of deaths is not large, the relative proportion of deaths might be significant, enough to reduce the population to very low numbers. For example, the population of St Kilda, a small island located 40 km off the Western Isles of Scotland, was devastated by an outbreak of smallpox in 1727, resulting in 94 deaths out of 113 people (although a further 11 people escaped as they had been marooned on a remote sea stack over the course of the outbreak) (Harman 1997). On St Kilda, the impact of smallpox was followed by 19th century emigration and an outbreak of infant tetanus. A combination of these factors affected the longer-term population trajectory, which never recovered to its pre-smallpox levels. While a single outbreak of disease might not compromise long-term population, multiple outbreaks, or other multiple events that reduce the population, such as volcanic eruptions or emigration, can affect longer-term population trajectories. Therefore, while the population of the Faroes recovered without any major change to the carrying capacity (refer to Figure 8.2), in Iceland, subsequent factors causing a decrease in population levels may have combined to create a different situation.

In Iceland there were two severe plague epidemics, the first between 1402 and 1404, where an estimated 50-60 % of the population died, and the second between 1494 and 1495 with the estimated death of 30-50 % of the population (Karlsson 1996). A smallpox epidemic occurred later, between 1707 and 1709. As a result of local settlement patterns, the impact of plague in Iceland caused abandonment of individual farm sites rather than whole villages as in the Faroes, although entire valleys may have been devastated. Although a severe period of farm abandonment was attributed to the epidemic by the local inhabitants, it was often shown to be misleading, and many settlements recovered to pre-epidemic levels after

about 60 years (Sveinbjarnardóttir 1992). Although the plague epidemics had a significant immediate effect on population in Iceland, it is difficult to identify the longer-term economic or social consequences. With regards to the environmental record, the late arrival of plague in Iceland comes after threshold crossing environmental changes in the mid-14th century, which have been identified by increases in sediment accumulation rates, and after the start of LIA impacts. Ironically, subsequent exacerbation of environmental impacts may have been influenced by a shortage of labour resulting from the plague. This could have encouraged unsustainable practises of uncontrolled (un-shepherded) grazing, and/or overgrazing in the outfields beyond the growing season due to less labour being available for fodder harvesting. These factors and others may have contributed to the crossing of an environmental threshold in the mid-15th century.

These examples illustrate some of the ways in which population dynamics may relate to cultural and environmental trajectories and carrying capacity. If the population exceeds the carrying capacity (which occurs more readily on islands which are isolated, with a limited spatial area and with limited access to marine resources), increasing demands may be made on the natural environment. Conversely, when the population falls below a critical threshold, environmental impact may also be enhanced by the deliberate adaptation of less than ideal practices as a result of labour shortages, and this may have been a factor in some island environments.

Why might human impacts in the Faroes have been limited? Insights from Iceland

Although a generalised image of environmental change in Iceland has been presented above, by focussing on specific sites, historical landscape change in Iceland is revealed to be locally complex. A focus on two contrasting examples provides analogues, at a smaller and more measurable scale, of the generalised differences identified between Iceland and the Faroes. The first is from the south of Iceland, and illustrates the differences in landscape history between two adjoining farm settlements. The second is from the north of Iceland and links degradation, climatic sensitivity and the utilisation of natural resources. The examples also reiterate some of the arguments for limited environmental impact in the Faroes, specifically that the pre-colonisation environment already resembled a landscape affected by human impact and that the Faroese Norse utilised a wide and varied resource base over long-term settlement.

An example from south Iceland: identifying the differences in environmental trajectories between the farms of Mörk and Dalur

This example of two adjacent farms in the south of Iceland tests the extent to which inherent physical properties of the natural environment might result in increased human impact. The farm landholdings of Dalur and Mörk (Figure 8.6), a few kilometres apart, were assessed and compared in terms of their environmental histories (Mairs 2003, Mairs *et al* 2006). Both holdings were settled relatively early in the colonisation period, are still occupied today and have contemporary landscapes that look outwardly similar; predominantly open hayfields with open and partly eroded heathlands. However, the environmental record of the two holdings illustrates that the farms have had diverse historical environmental trajectories (Figures 8.7 and 8.8). Some of the divergence in environmental histories may be explained by their contrasting natural pre-settlement conditions. For example, the environs of the main farm site of Dalur were probably predominantly un-wooded at the time of settlement. The landholding comprised large expanses of marsh land below 50 m, and heath above 300 m, with a limited area at altitudes suitable for exploitation by birch. The environs of the Mörk farms, on the other hand, were more likely to have been forested at the time of settlement. The landholding is set back from the river on rolling terminal moraines with the slopes of Eyjafjallajökull behind, and much of the landholding is within the threshold altitude for trees. Birch wood pieces, including a trunk measuring *c*.240 mm in diameter, were discovered from a drainage ditch in the Mörk infields and substantial macrofossils preserved in peats below the 920 tephra layer confirmed that this area supported expansive woodland prior to settlement (and before 920 AD) (Mairs 2003, Mairs *et al* 2006). The more open nature of Dalur would have been preferred for initial settlement as the settlers would not have needed to expend labour and time on clearing woodland to grow fodder crops, the landscape already being suited to this purpose. This limited forest clearance at Dalur probably restricted the scale of rapid ecological change following settlement, ensuring the vegetation cover was not breached for some time, and minimising soil erosion until the 16th century. At Mörk, whose pre-settlement environment was more dominated by trees and scrub, widespread clearance would have been required in order to create the hayfields needed for growing fodder, which corresponds with the rapid and significant change in local sediment accumulation rates recorded after 920 AD.

In addition, the landholdings of Dalur and Mörk had differing access to a wide ranging resource base that included sheep grazing rights in locations at a distance from the main farms. This probably also limited the impacts of erosion within the Dalur landholding that would otherwise be expected to have taken place with early settlement. At Mörk, despite considerable erosion and landscape degradation in outfield areas, the major farms survived over a thousand years of settlement, indicating that access to greater resource opportunities acted as a buffer against landscape degradation, which was not available to smaller farms with limited access to additional resources.

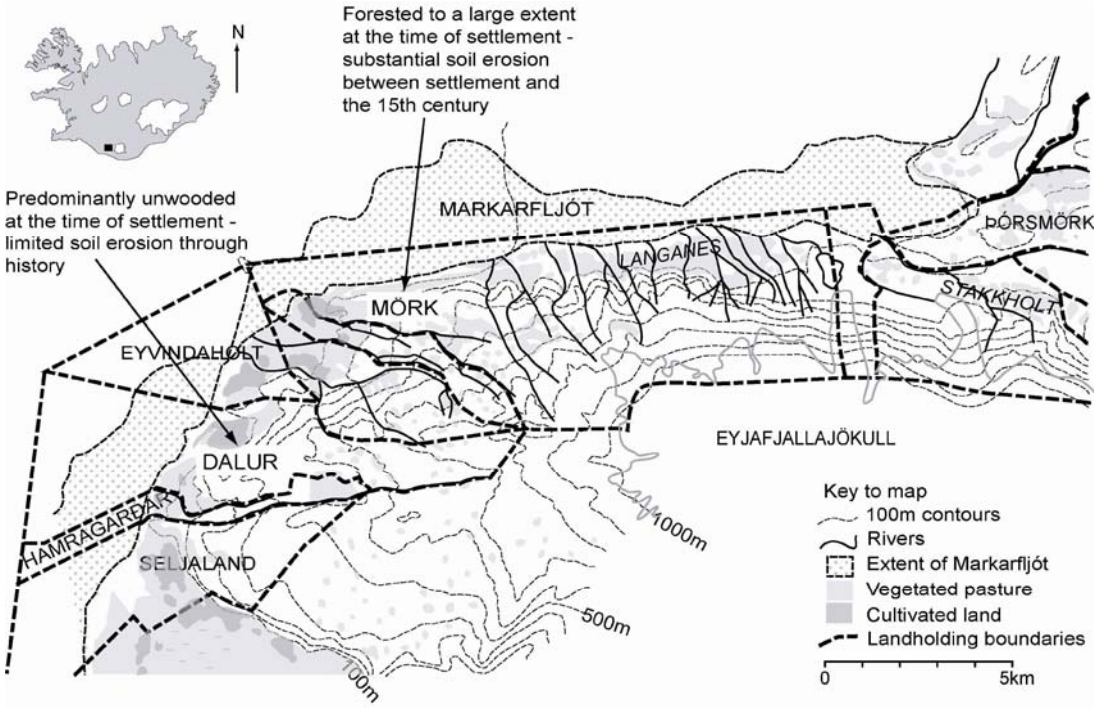


Figure 8.6: Location of the farms Mörk and Dalur, in southern Iceland, within their surrounding environmental context.

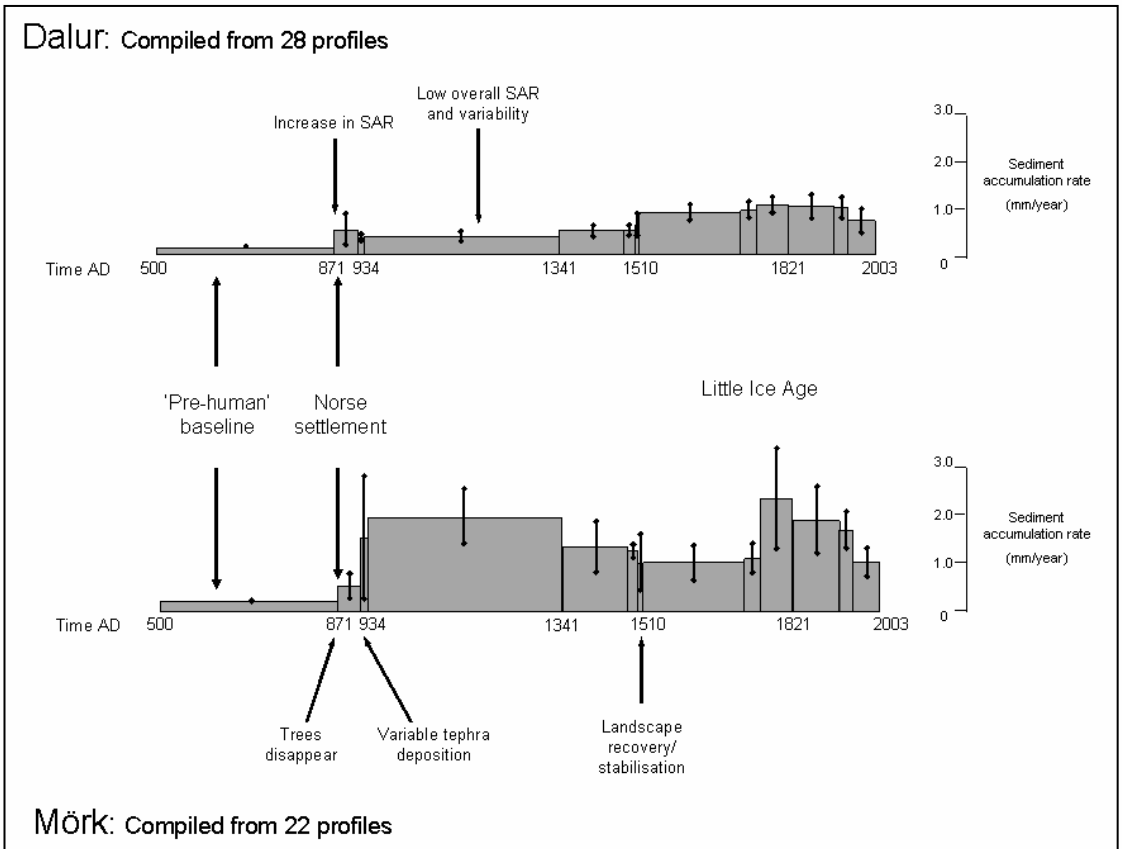


Figure 8.7: Average sediment accumulation rates and variability for the landholdings of Mörk and Dalur, based on 22 and 28 profiles respectively.

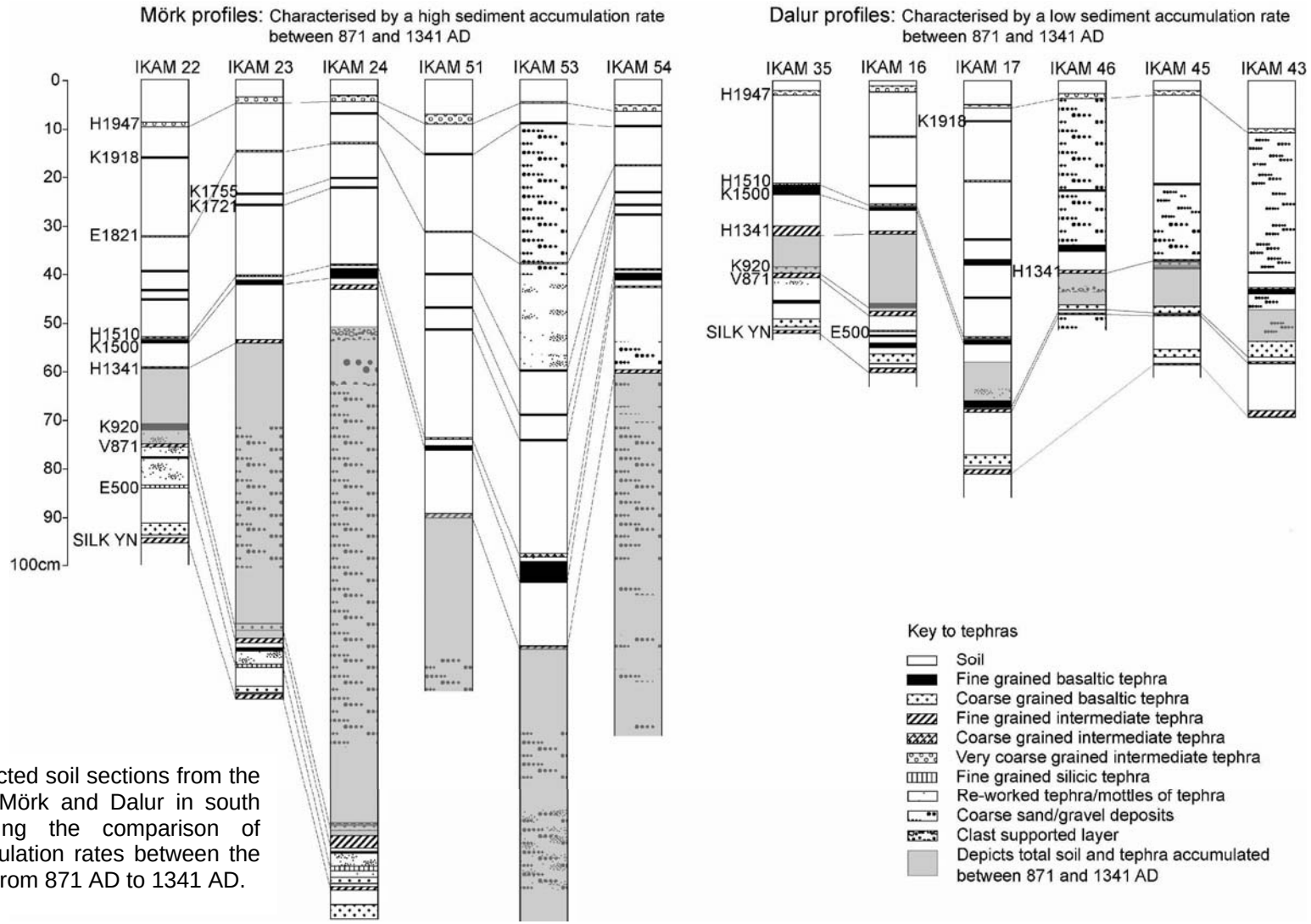


Figure 8.8: Selected soil sections from the landholdings of Mörk and Dalur in south Iceland illustrating the comparison of sediment accumulation rates between the two settlements from 871 AD to 1341 AD.

The difference in landscape histories between the outwardly similar environments of Mörk and Dalur enables the big themes of inter-island differences to be explored at a smaller scale. As with Dalur, the pre-colonisation environment of the Faroe Islands already resembled a landscape affected by anthropogenic impact, as it was predominantly open with few trees, and this must have contributed to the more limited soil erosion identified at both Dalur and in the southern Faroe Islands. Dalur and Mörk were situated only a few kilometres from each other, at the same altitude with the same volcanically derived soils and a similar climate. Yet the two farms still experienced quite divergent environmental trajectories. Applied to a larger, inter-island scale, this example implies that the inherent environmental differences between Iceland and Faroes, particularly the more sensitive soils and cooler climate in Iceland, do not, in isolation, account for the contrasting extent of human impact between the two sites. Although physical factors are likely to have had some influence, cultural factors and decision making are also likely to play a major role in determining trajectories of change.

An example of contrasting environmental trajectories between adjacent farms in the Mývatnsveit region, north Iceland

This example of two farms in the north of Iceland, just 12 kilometres apart, explores the extent to which inherent environmental sensitivity has an influence on the extent of anthropogenic landscape degradation. The Mývatn region in the north of Iceland, at an altitude of 250-300 m (Figure 8.9), represents the largest surviving inland farming community in Iceland but is surrounded to the north and south by heavily eroded desert. Prior to *landnám*, the environs surrounding the lake were covered with a mixed vegetation of birch woodland, heath, grasslands and wetlands. Since human settlement in the 9th century, the region has undergone environmental changes, such as soil erosion and deforestation, although pollen evidence suggests a more gradual deforestation after initial settlement than is evident in south Iceland (Lawson *et al* 2006). Two archaeological sites in this area provide a comparative example to illustrate the effect of subtle differences in environmental sensitivity. The first is Hofstaðir, east of Mývatn, which became a major chieftain's farm in the 10th century, and is still occupied today. The second is Sveigakot, situated 12 km inland from Hofstaðir, permanently abandoned in the 12th century and now located on a gravel plain at the edge of the inland desert (McGovern *et al* 2006). In this example, as in the example of Dalur and Mörk, the environmental and cultural trajectories of Hofstaðir and Sveigakot have been critically different despite their relatively close proximity. Although at both locations there is evidence of an acceleration of soil erosion with settlement through to *c*.1477 AD, at Hofstaðir there was a subsequent reduction in erosion rates to below the regional average, while at Sveigakot, the acceleration that began with initial settlement continued (Simpson *et al* 2004), indicating higher inherent landscape sensitivity. Despite their close proximity, the

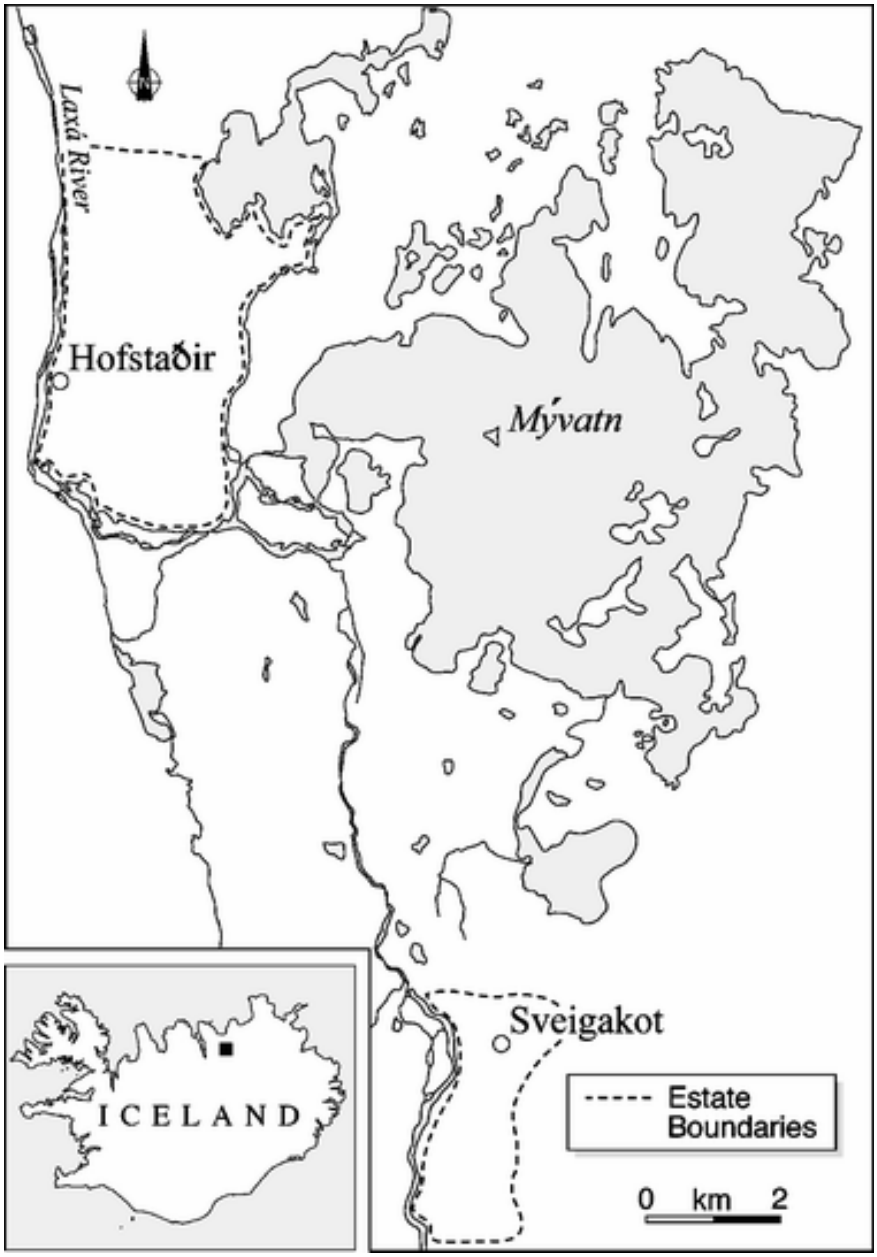
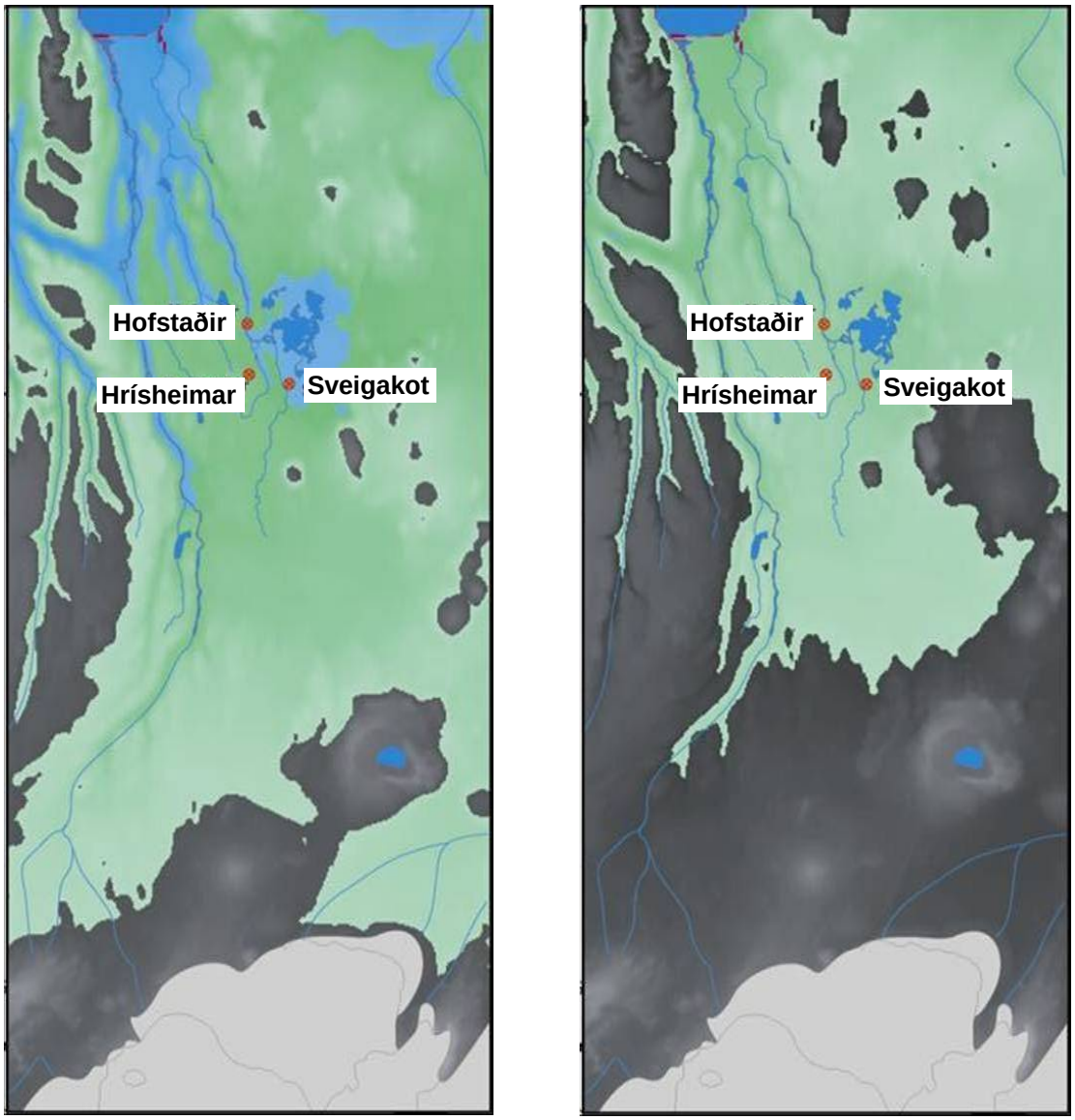


Figure 8.9: Map illustrating the location of the farms and outfields of Hofstaðir and Sveigakot in the north of Iceland. After Thompson and Simpson (2007).

two farms may have been affected by climate differences that, although subtle, were enough to cause a threshold crossing event in one but not the other. The results of high resolution climate modelling and modelled vegetation limits in an area encompassing Sveigakot and Hofstaðir, illustrate that if the temperature is decreased by 1.5°C relative to the present temperature, there may be little change in vegetation limits in the outfields of Hofstaðir. Conversely, in the outfields of Sveigakot, the vegetation limits may be significantly decreased (Casely 2006) (Figure 8.10a). Modelling also illustrates that if the temperature is decreased by 1.5°C relative to the present temperature the end date of the growing season might be brought forward by at least a month at Sveigakot, but would remain the same at Hofstaðir (Casely 2006) (Figure 8.10b). Hofstaðir was therefore buffered by a degree of environmental resilience whereas the outfields of Sveigakot were more sensitive to climatic changes. Also, the location of Hofstaðir, whose landholding and environs were characterised by relatively good grazing land, differs somewhat from that of Sveigakot, which had landholdings bordering the eroded interior. With regards to human impact, these subtle differences are important; with a greater degree of buffering as experienced at Hofstaðir, the outcomes of unfavourable human decision making are not as detrimental to the environment. For example, a decision to keep sheep in the outfields for a fortnight longer than usual may not have any significant environmental consequences. At Sveigakot, however, the outcomes of environmentally unfavourable decisions are more significant. The decision to keep sheep in the outfields for a fortnight longer than usual could result in a threshold crossing environmental change.

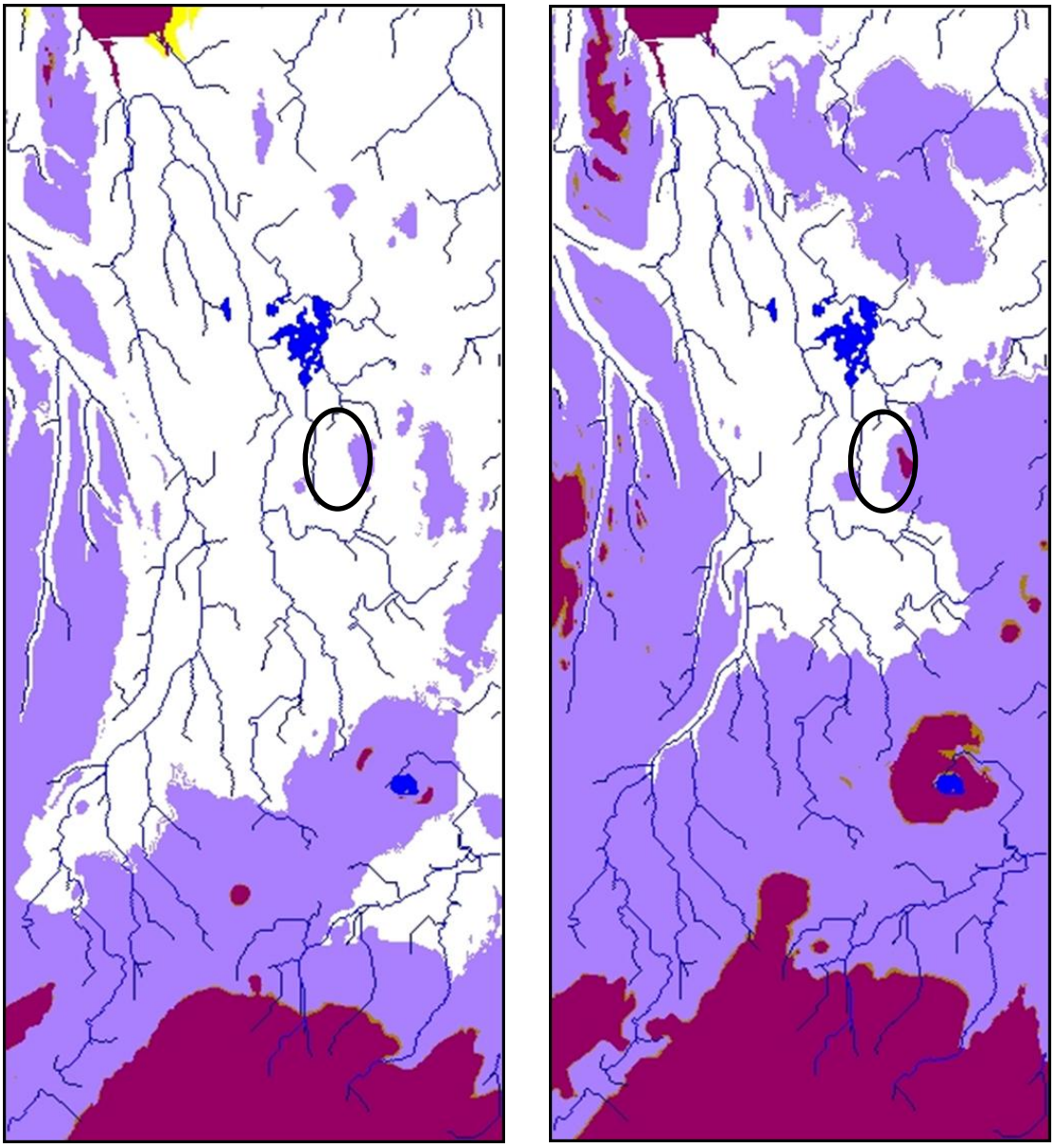
Differences in subsistence strategies between the two landholdings may also have been significant. The pattern of degradation suggests that the continuity of farm management strategies, such as the regulation of fuel resources, may have been an important factor in preserving the productivity of pasture communities around Hofstaðir (Simpson *et al* 2003). Although at Hofstaðir, the usual mix of domestic stock, cattle, pigs, goats and sheep, familiar from Norse settlements in the North Atlantic, was introduced, the importance of additional resources, particularly wild species, is highlighted in the archaeofaunal collections. These include a small (but surprising considering the inland location) number of seal and cetacean bone. In addition, some freshwater and marine fish bones are present and bird bones, mainly ptarmigan are also represented. One of the most interesting findings from recent research are fragments of bird eggshells found in archaeological contexts (McGovern *et al* 2006). This evidence indicates that the successful community management of waterfowl for sustainable egg collection extends as far back as the 9th century. Therefore, while at other Icelandic sites additional wild resources were only primarily utilised in the early centuries of settlement, Hofstaðir is an example where sustainable resources have been utilised for over a millennium, similar to resource utilisation in the Faroe Islands.



Modelled vegetation limits: present day

Modelled vegetation limits: 1.5º C below present day

Figure 8.10a: Results of modelling experiments (Casely 2006), illustrating the change in vegetation limits around the farms Hofstaðir and Sveigakot in north Iceland as the temperature is reduced by 1.5º C. Land area coloured in green represents the vegetation limit for grass at 4º C and light blue represents the vegetation limit for tree birch at 7.5º C.



Growing season end date with temperature as present

Growing season end date with temperature 1.5º C below present

Figure 8.10b: Results of modelling experiments (Casely 2006), illustrating the change in growing season end dates around the farms Hofstaðir and Sveigakot in north Iceland as the temperature is reduced by 1.5º C. In the outfields of Sveigakot (in black oval) the end of the growing season is brought forwards by a month while remaining the same at Hofstaðir.

This evidence supports the hypothesis proposed for the Faroe Islands, whereby an emphasis on continuity of alternative resource exploitation, e.g. waterfowl eggs and fish in the case of Hofstaðir; seabirds, eggs, fish and whales in the Faroes, may have been a factor limiting anthropogenic landscape impact. It is also concluded that inherent environmental sensitivity may influence the extent of anthropogenic landscape degradation in cases where there are few buffers to mitigate the effects of human impact. In addition, both of the Icelandic examples reinforce the importance of the spatial context. Comparison between sites at both smaller scales of a few kilometres (as in the case of adjacent farms) and larger scales of inter-island comparison (between the Faroe Islands and Iceland) expose patterns that are concealed beneath the variation in environmental trajectories.

8.4. Comparisons between the Faroe Islands and Greenland

Are there comparisons between the environments and subsistence practices and impacts in the Faroe Islands and Norse Greenland?

Iceland and Greenland have been compared in the North Atlantic research, for example, with regards to settlement patterns and land degradation impacts (e.g. Vésteinsson *et al* 2002). Yet, environmental and cultural factors in Iceland and Greenland are in many ways dissimilar. Conversely, little or no comparison has been made in the research between the Faroe Islands and Greenland, yet, some similarities can be made between the two, while their differences may illustrate a wider context in which to understand the continuity of Faroe Islands society on the one hand and the collapse of Norse Greenland on the other.

Similarities between the scale of settlements and population in the Faroe Islands and Greenland

A close comparison can be made between the size of settlements in the Faroes and Greenland. Despite the overall extent of Greenland in comparison to the Faroes, the Norse settlements were confined to two constrained regions in the south. The extent of land and sea area encompassed by the Eastern Settlement or Østerbygd, which was the largest Norse settlement in Greenland, was *c*.130 km from north to south and *c*.100 km from east to west. In comparison, the land and sea area encompassed by the Faroe Islands is *c*.120 km from north to south and *c*.80 km from east to west. In contrast, Iceland encompasses an area *c*.350 km from north to south and *c*.520 km from east to west. The size of Norse populations in Greenland and the Faroe Islands were likewise similar; estimates of the maximum Norse population in Greenland range from 3000-6000 (Gad 1984, Keller 1989, Berglund 1986, Meldgaard 1965, McGovern 1979), while in the Faroes the population remained in the region of *c*.4000 until the beginning of the 19th century (Schei and Moberg

2003). These figures contrast substantially with the estimates of the medieval population of Iceland at *c*.70,000-80,000 (Vasey 1996). Even accounting for errors in the estimations of the Greenland Norse population, the populations of the Faroes and Greenland are still almost an order of magnitude less than the population of Iceland.

The geography of the Faroe Islands and the Eastern Settlement in Greenland is also comparable, as the Eastern Settlement is characterised by its fjords and sounds, much like the Faroe Island archipelago.

Similarities in the pre-settlement environments of the Faroe Islands and Greenland

Although the vegetation of southern Greenland is affected by a cooler climate and a shorter number of growing days than either Iceland or the Faroe Islands, the absence of significant woodlands and the semi-open grassland and shrub cover that characterises south west Greenland, is similar to the open grass and heath environment that characterised the Faroes prior to settlement. The pre-Norse *landnám* vegetation of Greenland was dominated by its herbaceous component (Fredskild 1973; 1978), with copses of birch and willow woodland present. Recent research suggests that woodland and scrub clearance in the predominantly open Greenlandic landscape has produced subtle rather than major changes in pollen diagrams (Schofield *et al* 2006). This suggests that, as in the Faroe Islands, clearance or modification of woodland in order to create hayfields etc. was relatively limited. Consequently it might be expected that the overall environmental impact of clearance would be restricted.

Some research has suggested that landscape degradation may have played a role in the abandonment of the Norse Greenland settlement (Fredskild 1978, Jakobsen 1991, Sandgren and Fredskild 1991). This, however, is debated as there was a considerable time lag between the first signs of vegetation disturbance and the onset of detectable soil erosion (Sandgren and Fredskild 1991). More recent Greenland research suggests a pattern of vegetation change beginning with the initial clearance of shrubs, an expansion of grassland at the expense of the shrubs, and the appearance of a few weed species. It is concluded, therefore, that the Norse settlers did not have such a devastating impact on the vegetation and soils of Greenland as they did in Iceland (Dugmore *at al* 2005). Although erosion is detectable in south west Greenland today, severe erosion is confined to specific areas affected by glacial winds. Away from these areas the landscape is remarkably well vegetated, even at relatively high altitudes (Dugmore *pers.comm*.). A preliminary study of the marine cores and onshore soil profiles around the Igaliku fjord region in the Eastern Settlement also indicates that soil erosion was not a consequence of Norse farming in this area (Mikkelsen *et al* 2001). An alternative scenario is that the soil erosion is linked to a pronounced increase in the wind stress over south Greenland and the Igaliku fjord region at

the transition from the Medieval Warm Period to the Little Ice Age (Lassen *et al* 2000). Although more research is required to understand the timing, rates and extent of erosion, there is evidence that soil erosion in Greenland was more limited than has been previously asserted. It is concluded that anthropogenic landscape degradation in Norse Greenland may have been limited and is, therefore, more comparable with the Faroe Islands than with Iceland.

A comparison of resource utilisation in the Faroe Islands and Greenland

Certain subsistence practices in Greenland also have a greater similarity with those practiced in the Faroe Islands than those practiced in Iceland. In Greenland, hunting provided important sources of food. For subsistence the settlers hunted seals, especially migratory seals in spring from the outer fjords, caribou mainly in the autumn and some seabirds, mainly guillemots and murres, year round (Orlove 2005). In addition, there is evidence from the Western Settlement that some walrus killed on hunting trips to the *Norðrseter* (Northing Hunting Grounds) was used for meat (Arneborg 2000).

In Iceland, the exploitation of wild foods is generally intensive in the early period of settlement, reducing by the 12th century but increasing again after the 15th century with the exploitation of fish (for trade as well as subsistence). The Faroe Islands and Greenland, on the other hand, are characterised by a relatively continuous, or progressively increasing, exploitation of pseudo-infinite resources over the entire period of settlement. For example, in Greenland, isotopic evidence for human remains (Arneborg *et al* 1999) and the increase of relative percentages of seal bones through time (McGovern *et al* 1996), suggest that exploitation of seals and other marine resources played a progressively more vital role in subsistence (Arneborg *et al* 1999), while in the Faroes, bird bones at archaeological sites suggest their continued utilisation after settlement (Church *et al* 2005). Therefore, although ultimately complex, in general terms, the long-term sustainable utilisation of pseudo-infinite resources for subsistence in the Faroes is more comparable with that of Greenland than Iceland.

Comparisons can also be made between the systems of pseudo-infinite resource acquisition in the Faroe Islands and Greenland. In the Faroes, the whale hunt or *grind*, has not only provided a significant part of the staple diet, but also provided a convenient opportunity for socialising, illustrated by the culmination of the whale hunt by the *grindadansur*, or “pilot whale dance”, a fixed part of the institution of the pilot whale hunt (Joensen 1976). In Greenland, the summer voyages to the *Norðrseter* to hunt walrus, and communal migratory seal hunting may have performed similar functions to that of the *grind*, in terms of both the acquisition of significant food resources that were distributed around entire communities (of

seals, rather than walrus in Greenland), and as a communal gathering with a distinctly social dimension (seals and walrus).

Figure 8.11 explores some of the comparisons and contrasts between exploited and unexploited resources in the Faroes, Iceland and Greenland, and how utilisation of these resources might vary over time.

Why might trajectories in the Faroes and Greenland be different?

Differing patterns of conflict, goals and aspirations between the Greenland and Faroese Norse

Several similarities have been explored between the Faroes and Greenland, both in terms of their natural pre-*landnám* environments and similarities in their extensive subsistence practices. By identifying and comparing environmental and cultural *differences* between the Faroes and Iceland and Greenland, some assumptions can be proposed regarding why people put unsustainable demands on island environments. There are several differences that might have led to diverging trajectories in the Faroes and Greenland. Conflict and goals/aspirations are discussed only briefly here while the implications of climatic differences are considered in more detail below.

Isolation is a factor that may have made a difference to the trajectories experienced by Greenland and the Faroes, both in terms of the spreading of disease as discussed previously, but also in terms of geographical and cultural isolation. Although Greenland was situated furthest away from the European mainland and was the most affected by sea ice in cold years, Iceland and the Faroes also required a comparatively risky sea journey to be reached. Patterns of conflict were also distinct in the Faroes and Greenland. Between the 12th and 15th centuries, there was growing contact between the Norse Greenlanders and the Thule people, ancestors of the modern Inuit Greenlanders. Anthropological and historical evidence indicates some conflict as the Inuit expanded into Norse territory in southwest Greenland. Although the Faroe Islanders suffered abduction and hence fluctuation in population levels at the hands of French, British, Irish and Algerian pirates (Schei and Moberg 2003), these were sporadic visits as opposed to the gradual but consistent encroachment accompanied by low intensity conflict in Greenland. With the additional factor of having to contend with occasional conflict and an encroaching and potentially hostile Inuit population, the seasonal round on which the Greenland Norse depended on for subsistence, and the northern hunting expeditions, were likely to have been disrupted. Disturbance and distraction by conflict with the Inuit could have pressured the Norse Greenlanders into making less than ideal decisions regarding farming and subsistence strategies. With fewer

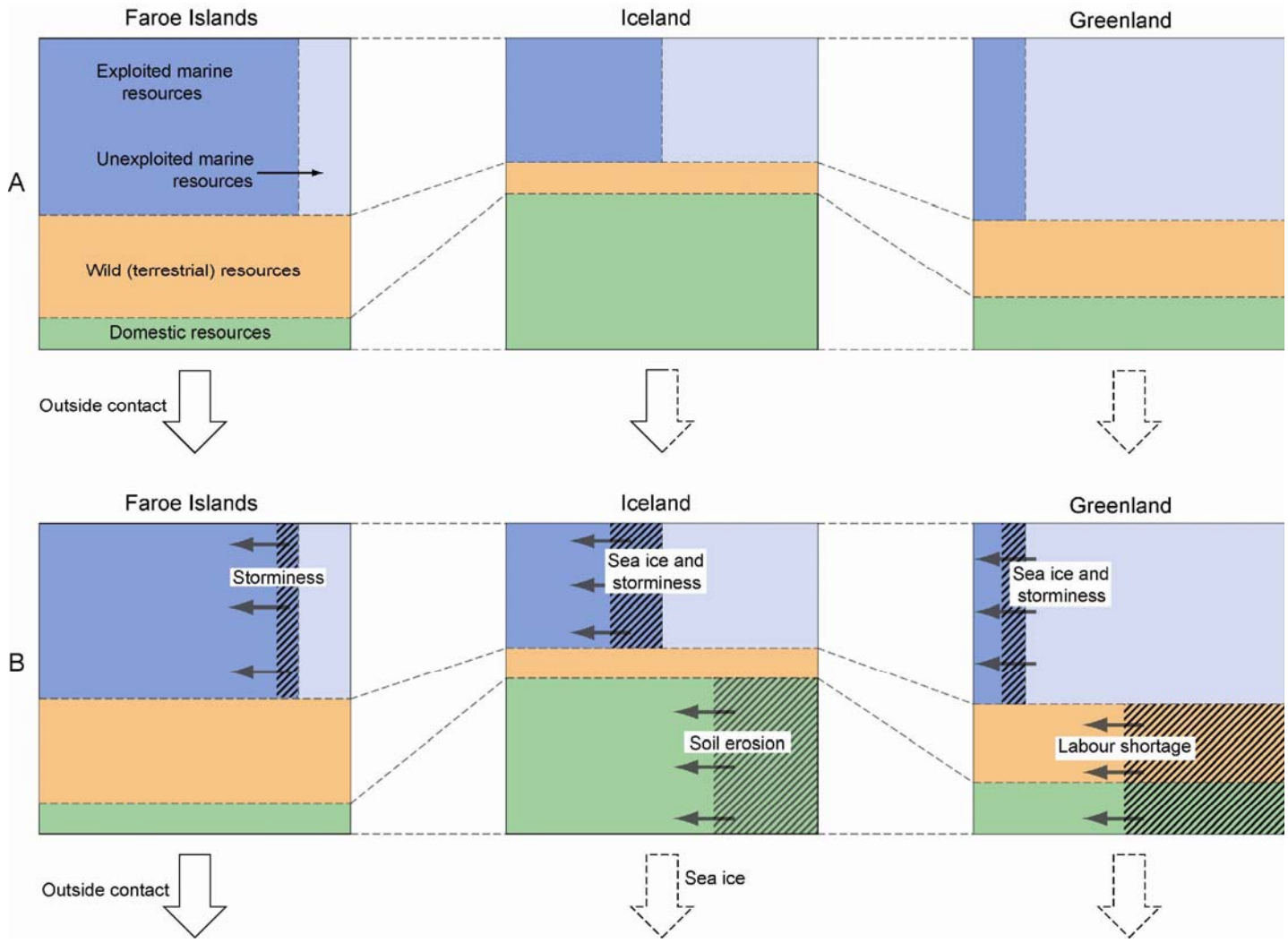


Figure 8.11: Conceptual figures illustrating the proportions of exploitable domestic, wild (terrestrial) and marine resources available to the Faroese, Icelandic and Greenlandic Norse. Figure A represents the resources available/ exploitable at the time of settlement and Figure B illustrates how these might change in the case of climatic deterioration.

buffers to mitigate the effects of any bad decision making, increasing demands may have been made on the Norse settlement.

A crucial factor, but one difficult to evaluate, is the extent to which the goals and anticipations of the settlers directly influenced the direction of trajectories in the Faroes and Greenland. This is important to address because if the goals and aspirations of a society are misunderstood there are implications for how researchers perceive or understand the importance of threshold crossing events and why people might make unsustainable demands on their environment. In Iceland, for example, it is suggested that the Norse initiated a threshold crossing event by inducing severe environmental degradation as a result of deforestation and overgrazing. However, if the goal of the Norse was to create a suitable landscape on which to carry out a sheep-rearing economy, to what extent did the settlers create a landscape that is "fit for purpose" as opposed to instigating a threshold crossing event that compromised long-term settlement? Ironically without the changes that caused erosion, a pastoral base for subsistence would not have been possible. Similarly, whether the aspiration of the Greenland Norse was to create a successful long-term subsistence society, or to exploit what natural resources were available and take advantage of trading in luxury commodities that were in demand in Europe, has different implications for how their society is perceived. The disappearance of the Norse was a threshold crossing "cultural collapse", but it could be argued that it was caused by a failure to create a sustainable cash crop economy as much as by a failure to create a sustainable subsistence economy. This would furthermore account for some of the differences in trajectories between the North Atlantic islands.

To what extent does climate matter with regards to differences in cultural and environmental trajectories in the North Atlantic?

Climate is consistently identified as a factor influencing settlement in the North Atlantic islands, particularly in Greenland where the climate is more Arctic in character and where the Norse were at the limits of their west Norwegian-based agricultural system. Variability in weather and climate systems rather than absolute temperature changes may have had more significant impact on human settlement. Even so, northern societies are broadly competent to deal with considerable environmental variability, and most have well articulated multi-layered coping strategies that can be successfully invoked to buffer extreme events (Berkes *et al* 1998). Therefore, it is not simply that a changing climate or an increasingly variable climate affects people detrimentally, or in a way that puts pressure on the landscape. Difficulties for human populations arise when the climate switches from one trajectory to another so that generations of past experience of, for example, the timing of bringing sheep down from, and returning them to highland pasture, becomes misleading. The ability of

human systems to accommodate or adapt to bad seasons may, therefore, be primarily constrained by their predictability on the decadal scale (Dugmore *at al* 2007a).

Recent research that has investigated measures of cumulative deviation to identify the most important timings of climate change with regards to human impact, identifies a turnover or sharp change of climatic trajectory at 1425 AD, using a cumulative CuDe measure as an indicator of storminess. Correspondingly, a turnover is identified in the cumulative sea ice record around 1450 AD (refer to Figure 4.4). These abrupt changes mark reversals of two long-term climate trends that would have accumulated in the memories of the North Atlantic settlers and had formed the basis of generations of experience. The chronology of these turnover changes coincides with the disappearance of the Norse Greenland settlements, the end of the Eastern settlement dated to no later than around 1450 AD (McGovern 2000). This does not imply that a deteriorating climate caused the abandonment of the Norse Greenland settlement, however. Sudden turnovers and unpredictable climate changes could have potentially affected populations on all North Atlantic islands, regardless of the absolute temperature difference between Greenland and the Faroe Islands. Mitigation of climate impacts would be dependent on to what extent the islanders had created a system of buffering strategies to defend against unpredictable events, as well as buffers existing (or not) in the natural environment. The Faroe Islands may, therefore, have been less impacted by climate changes in historical time than Greenland because they had more buffers to cope with unpredictability, for example, pastoral farming was less marginal and they could rely on their closer and more dependable and pack ice-free connections with mainland Europe and more labour was channelled to communal subsistence than trading expeditions.

With regards to the question of whether climate increases the demands people made on North Atlantic environments, absolute climate changes, for example a decrease in temperature does not appear to have a direct or significant impact. Greenland, although more environmentally marginal in terms of climate, does not appear to have suffered from adverse anthropogenic soil erosion as recent research suggests that human-induced erosion around the Eastern Settlement was not significant (Mikkelson *et al* 2001). Therefore, it is concluded that climate is not the key factor in influencing the demands people make on their island environments, at least with regards to the degree of environmental degradation. Climate does of course matter, but in an indirect way; Greenland was disadvantaged because of the particular subsistence methods employed by the Norse and because there were fewer buffers against unpredictable climate changes.

When climate doesn't matter: a comparative example of environmental and cultural stress from south east Polynesia

Although climate is one of many factors that might influence settlement in the North Atlantic, there are examples where environmental and cultural stress has occurred in the absence of climatic change, e.g. the Pitcairn Island grouping in south east Polynesia. The populations of Pitcairn and nearby Henderson Island suffered a population collapse, although on the nearest adjacent island of Mangareva, the population endured. As with the North Atlantic islands, factors such as environmental degradation, the over-exploitation of resources and conflict may have caused cultural stress, but unlike in the North Atlantic, on Pitcairn and Henderson climatic factors are more or less irrelevant.

The Pitcairn Islands encompass both Pitcairn and Henderson Island, 160 km apart, while the nearest neighbouring island, Mangareva, lies 640 km to the east of Henderson (Figure 8.12). Henderson and Pitcairn are two of twelve generally small islands in Polynesia, where there are archaeological traces of Polynesian habitation but which had become unoccupied by the time of European exploration in the 16th century. Extensive archaeological survey and excavation has been carried out on Henderson Island (Weisler 1994; 1995), which is considered the most environmentally marginal of the island group, and tenuous for human settlement because of a lack of specific resources required for Polynesian subsistence. Despite the barriers to human settlement, well-stratified deposits in rock shelters and a beach site testify to a continuous Polynesian presence on the island from around 900 AD to 1500 AD, which is comparable to the length of the Norse occupation of Greenland. As questions regarding the disappearance of the Norse in Greenland are posed by North Atlantic scholars, similar questions regarding population collapse on Henderson and Pitcairn have been addressed by archaeological research in southeast Polynesia.

Despite the large distances between the Pitcairn Island group and Mangareva, archaeological evidence highlights a substantial and complex trading network that existed between Pitcairn, Henderson and Mangareva, in food, natural resources and luxury/prestige items. Mangareva was largely self-sufficient in food, and exported surplus foodstuffs to the Pitcairn Islands. Basalt and obsidian available on Pitcairn were traded in return. Henderson, although deficient in crop producing soils and basalt harvested a surplus of what would have been prestige items, particularly sea turtles and bird feathers (refer to figure 8.12). In the archaeological record exotic imports are recorded on Henderson up until 1450, but after this disappear, and are replaced by distinctive artefacts utilising locally available materials. Soon after this the sites are abandoned. With climatic factors being insignificant it could be suggested that the abandonment of Henderson is an example of over-exploitation of natural resources leading to a cultural collapse. However, archaeologists have now turned to Mangareva, and the perspective of a wider context has highlighted some interesting results. Although archaeological work is ongoing, there is evidence that the break down in trade between Mangareva and the Pitcairn Islands may have been a result of social upheavals in

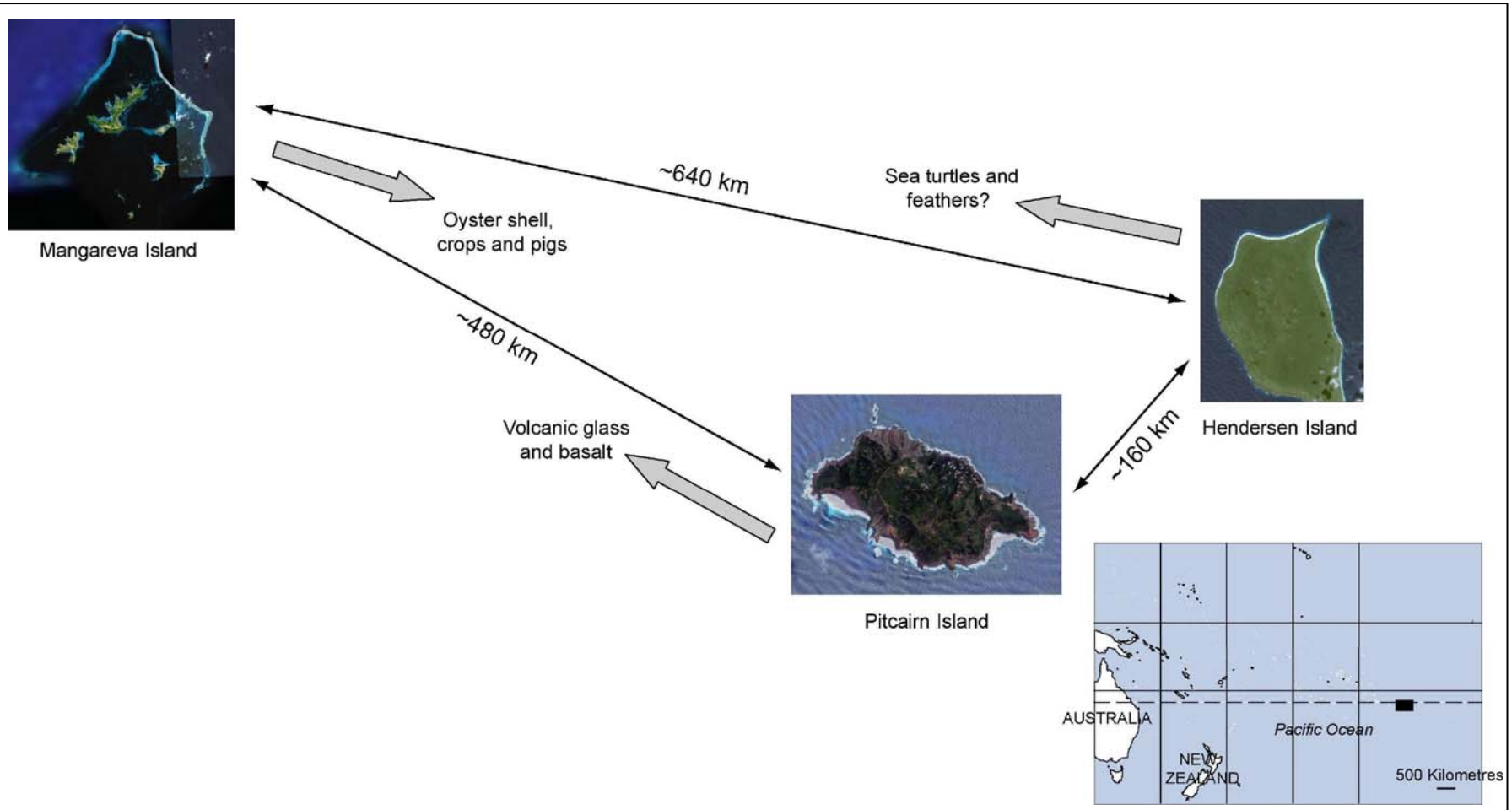


Figure 8.12: Location and trading activities of the Pitcairn Island group, in relation to the islands of Henderson and Mangareva.

Mangareva. With increased conflict between communities and tribes it became more imperative to stay at home and protect subsistence resources than to embark on long-distance trading and socially orientated voyages to the Pitcairns.

Climatic change is a more or less irrelevant factor with regards to the cultural collapses on Henderson and Pitcairn, as most Oceanic islands lie within the tropical to subtropical zone and receive sufficient rainfall for feasible agriculture. Therefore, even where climatic factors are largely irrelevant, threshold crossing events can still occur. This example highlights not only the significance of inter-island trade networks but also the importance of evaluating outcomes on "marginal" islands in the context of those larger social and environmental networks. Although archaeological research on Henderson Island has been invaluable in understanding aspects of its cultural and environmental history, the cause of its abandonment has only become clearer with regards to research in Mangareva. This example once again demonstrates the importance of understanding individual island trajectories from a multi-scaled approach.

8.5. Chapter conclusions

Comparison of approaches to adaptation on the North Atlantic Islands

The Faroe Islands were the first of the North Atlantic islands to be colonised by the Norse and were the first "pristine", previously uninhabited landscape to face the Norse settlers on their westwards colonisation. The challenge for the Norse was to adapt to these new environments, while implementing a traditional Norwegian based pastoral economy. Over the course of settlement the population of the Faroe Islands remained remarkably consistent (aside from the impact of plague *c*.1350), in Iceland it was more oscillatory, and in Greenland it declined, leading to a cultural collapse. It could therefore be alleged that adaptation to the environment was achieved more effectively in the Faroes than in Iceland or Greenland. However, adaptations from a Norwegian-based experience to a new environment are evident in archaeological sites in the Faroes, Iceland and Greenland. For example, archaeobotanical evidence illustrates the changing mix of domestic animals across the North Atlantic from a mixed Norwegian-based ideal to one dominated by sheep. When colonisers settled Iceland they referred back to this Norse ideal rather than utilising experiences learned from the Faroe Islands, and similarly evidence from the Greenland settlements indicates an initial mix of domesticates, including a significant number of pigs, based on the Norwegian model, as opposed to one based on the mix of domesticates from a 10th century Icelandic farm which had already begun to adapt to a new environment (McGovern 2000).

Although evidence does indicate that in many cases the Norse were able to adapt, there are also examples whereby the Norse could have adapted but didn't, such as by not engaging with the application of Inuit clothing and technology in Norse Greenland. In this case, however, the Norse *chose* not to utilise Inuit approaches to subsistence, opting instead to elaborate and emphasize their own European based traditions and ideology. In Norse Greenland, one such tradition, of importance primarily for trade (and probably also with a social function), was the annual communal hunting expedition to the *Norðrsetur* in the Disko Bay area. These organised hunts demonstrate an approach that may have been influenced by earlier communally based activities (e.g. 8th-9th century Viking raids). In both the Faroes and Greenland, the Norse adopted communally-based approaches to certain tasks, illustrated in the Faroes by the importance of the communal whale hunt and bird hunting expeditions, and in Greenland by caribou and seal hunts in addition to the trade-driven *Norðrsetur* expeditions. In Iceland, despite the complex exchange and kin networks between farms, and gatherings of people for fishing expeditions, there may have been less emphasis on communal hunts at scales involving entire communities (e.g. at the scale of whole villages in the Faroes) (Figure 8.13). Despite the ultimate collapse of Norse Greenland, which involves complex suite of causes, the emphasis on community driven subsistence and sustainable utilisation of pseudo-infinite resources, may at least be a factor in explaining the significant similarity between the limited extent of landscape degradation in the Faroes and Greenland, in addition to inherent environmental factors.

Were outcomes on the Faroe Islands, Iceland and Greenland inevitable?

To understand the trajectories and causes of change in settlements in the Faroe Islands, Iceland and Greenland, it is important to question whether outcomes on the three islands were to some extent inevitable, based on the scale of the islands, the size of population, the available resources, the distance from mainland Europe and the differences in climate. A key question throughout this research has been whether differences in the outcomes on islands is a function of diverse inherent natural environments and climate, or something else. By examining the outcomes of settlement on the Faroe Islands in a wider North Atlantic context, and by utilising examples on scales ranging from adjacent farms to adjacent islands, the following reflections can be made.

It is concluded that to some degree natural factors influence the extent to which people in the North Atlantic put unsustainable demands on their environment, but that the relationship is complex. The extent of woodland in the pre-colonisation environment, for example, is a factor that increases the sensitivity of a landscape to human impact. However, this factor is only significant in relation to the actions, mindsets and experiences of the inhabitants. The degree of soil erosion is dependent on the nature of subsistence practices that people were

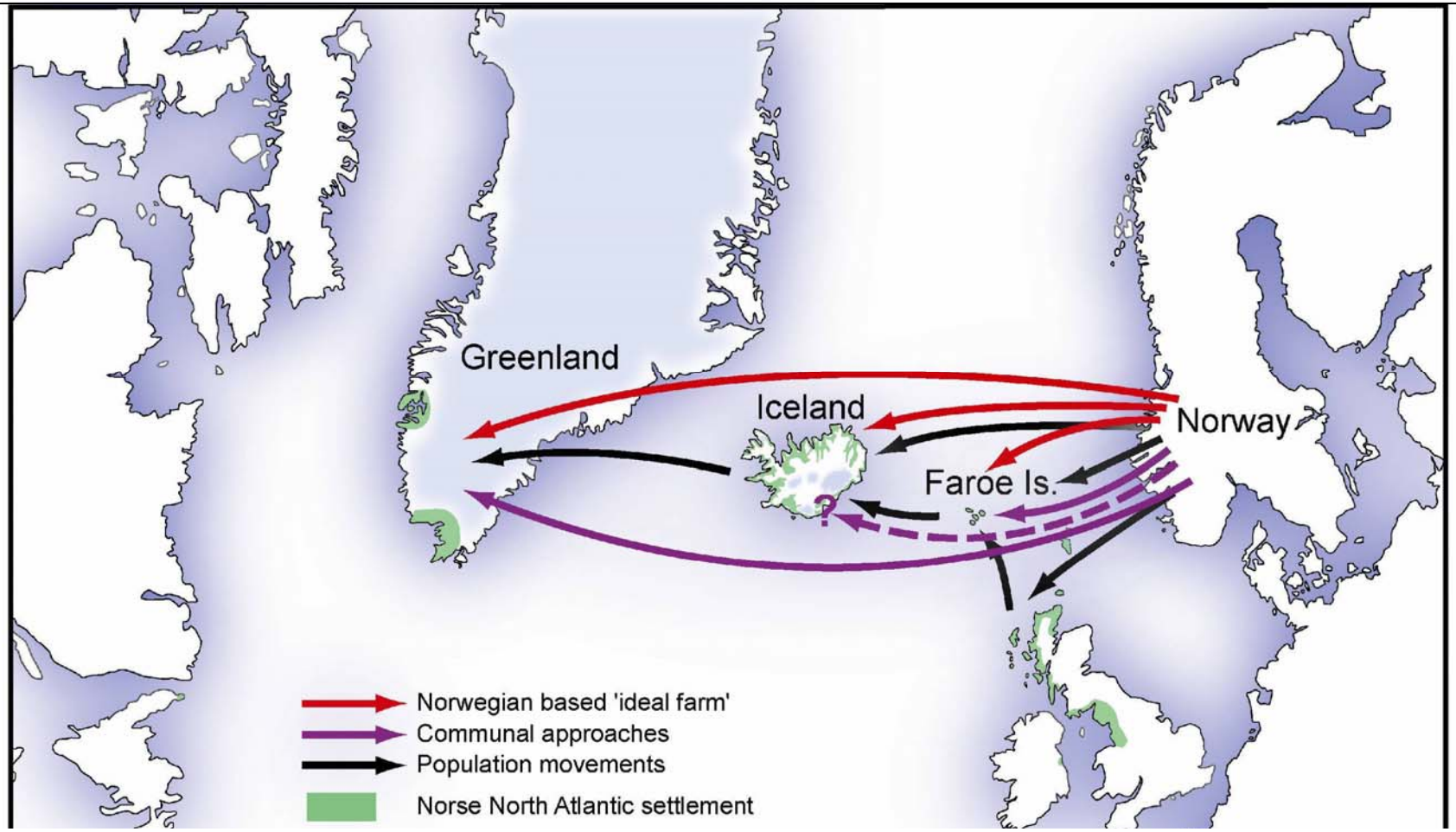


Figure 8.13: Summary of links between the Faroe Islands, Iceland and Greenland in terms of subsistence based approaches. A Norwegian based "cultural capital" is transferred with settlers to the Faroes, Iceland and Greenland with little change or adaptation between settlements. Communal approaches are a feature of subsistence practices and hunts in the Faroe Islands and Greenland, but less so in Iceland.

carrying out and also on the extent of buffers to cope with landscape erosion, such as having access to varied resources (as much a question of political or social access as the actual existence of such resources), as well as the type of soil. Similarly, environmentally deterministic arguments, e.g. that a cooling climate causes increased environmental pressure, are simplistic and misleading. Climate does matter in terms of anthropogenic impact on North Atlantic environments, but in a complex way where long-term trajectories of change, memories and the extent of cultural as well as environmental buffers need to be considered.

Outcomes on the Faroe Islands, Iceland and Greenland were therefore not inevitable or entirely determined by environmental factors although these play a significant role, especially regarding the pre-colonisation landscape and inherent environmental characteristics. Alternative options were available to the settlers that would have resulted in different outcomes, although in areas more environmentally sensitive, certain decisions will have more serious implications than in less environmentally sensitive areas. What might be considered “good” or “bad” decisions are also dependent on the goals, aspirations and mindsets of the settlement communities. Therefore, although outcomes are *influenced* by climate and natural factors, this is in an indirect and more complex way, that in many cases could be mitigated or adapted to by people *if they so wished*. A contemporary analogue is presented with regards to attitudes to global warming. People *are* able to act to reduce carbon emissions and therefore mitigate the impacts of global warming, but in some cases they *choose* not to in order to, for example, protect economic or ideological values.

Chapter summary

Comparisons between the North Atlantic islands indicate that human impact in the Faroe Islands was less significant, and the outcomes of settlement less distinct in the environmental record, from either Iceland or Greenland. Yet the Norse colonisers brought a similar “cultural capital” to all three islands, which were settled in relatively quick succession over the course of less than a few hundred years. The specific outcomes on the Faroes are therefore of considerable interest when placed in a North Atlantic perspective. This chapter has integrated research from Iceland and Greenland with that of the Faroe Islands, and in doing so has both highlighted the importance of research conducted in the Faroe Islands to North Atlantic human-environment research, and emphasised some of the circumstances whereby people might make unsustainable demands on island environments. Human impact in Iceland appears to have been particularly significant, as a result of a combination of diverse environmental and cultural factors. Human impact on the Greenland environment appears to have been less significant for reasons that are closely identified with those of the Faroe Islands.