Chapter 4

North Atlantic context: environmental trajectories and cultural change

Introduction

This chapter considers the geographical and historical context of the Faroe Islands within the wider North Atlantic region. Part one considers the specific climatic factors that are a consideration in the North Atlantic and examines how climate factors might act at different cultural, temporal and spatial scales. Part two outlines the geographical and ecological contexts of the Faroe Islands and Iceland, where original data was collected. Part three presents a brief synopsis of Faroese history, while parts four and five explore the historical context of North Atlantic colonisation and present an overview of Faroese and Norse subsistence practices over longer-term settlement. Part six concludes the chapter with a summary of recent research regarding human impact on North Atlantic island environments.

Background to North Atlantic research

Research on islands has been predominantly limited to the Pacific islands and island chains like the Aleutians and Caribbean islands and although the archaeology of the Norse North Atlantic has a long scholarly history, the region has only recently emerged as a well-defined area of international interest (McGovern 1990). Iceland has been relatively well researched particularly in relating the archaeology to the Sagas, and more recently using the method of tephrochronology, whereby volcanic ash has been used to date archaeological and environmental contexts. Norse Greenland has been researched relatively extensively (Keller 1989, Albrethsen and Arneborg 2004, Dugmore *at al* 2007b), although there is significant unevenness in emphasis, in terms of areas studied, methods used and when studies were carried out. Despite these limitations, far more has been achieved in terms of Norse Greenland research than in terms of Norse Faroes research (Hannon *et al* 2001; 2005, Hannon and Bradshaw 2000). The Faroes were the first of the North Atlantic islands to be colonised by the Norse and they occupy an important setting from which to model the development and adaptation of Norse colonisation and adaptation westwards. The Faroe Islands represent the first “stepping stone” on an environmental gradient across the Atlantic, and were the first “pristine” landscape to face the Norse settlers on their westwards colonisation. The Faroe Islands, therefore, may pose unique questions with regards to understanding the degrees of success of Norse settlement in the North Atlantic islands.

Although perhaps less seductive than the islands of Remote Oceania, the North Atlantic islands are equally significant in assessing issues of environmental change and impacts of people on the environment. The islands of Shetland, Orkney, Western Isles, Fair Isle, St Kilda and the Isle of Man have human histories spanning back thousands of years to the Mesolithic, with the legacy of a relatively complex multi-cultural history. In the Faroes, Iceland and Norse Greenland, the cultural record is well constrained as the islands have relatively short human histories of *c*.1200 years, approximately coincidental with the timing of settlement of islands in Remote Oceania. Uniquely, the timing of settlement in the North Atlantic islands is alluded to in historical sources; in Iceland contemporary written accounts are available that document some aspects of the North Atlantic society, as well as the societies of the partners they traded with (e.g. Friðriksson 1994, Karlsson 2000, Vasey 1996, Vésteinsson 2000). Although the timing of colonisation of Iceland and Greenland is relatively well known, in the Faroe Islands, as in many Pacific islands, the timing of colonisation is poorly constrained or unknown (Anderson 1995, Newnham *et al* 1998). The position of the North Atlantic islands is also advantageous to assessing the impacts of climate on people, as they lie at the meeting of warm and cold air and ocean masses, and beneath a variable storm track, rendering them particularly sensitive to climatic change. Furthermore, environmental changes such as soil erosion can be well constrained, particularly in Iceland where tephra provides a high resolution chronology, with possibilities for correlation across the North Atlantic region using microtephras in Faroese peat and tephra particles and acidity peaks in Greenland ice cores.

4.1 North Atlantic climate systems

The climate of the Faroes and Iceland is distinctive for its northern latitude. The islands lie close to the Polar Front at the meeting of warm and cold air masses and are also situated at the convergence of warm waters brought north by the North Atlantic drift and cold polar currents moving south off the east of Greenland (Figure 4.1). The Faroes, Iceland and Greenland are affected by the North Atlantic Oscillation (NAO), which is a large-scale mode of natural climate variability that has important impacts on the weather and climate of the North Atlantic region, particularly winter climate variability (Figure 4.2). The NAO is characterised predominantly by cyclical fluctuations of air pressure and changes in storm tracks across the North Atlantic. A Positive NAO index phase shows a stronger than usual subtropical high pressure centre and a deeper than normal Icelandic low, resulting in more and stronger winter storms crossing the Atlantic Ocean on a more northerly track. This results in warm and wet winters in Europe and in cold and dry winters in northern Canada and Greenland. A negative NAO index phase results in a weak subtropical high and a weak Icelandic low, with the reduced pressure gradient resulting in fewer and weaker winter storms crossing on a more west-east pathway, bringing cold air to northern Europe. The oceanic climate of the Faroe Islands produces windy, humid and changeable weather, with cool summers and mild winters. The dominant aspect of the Faroese climate is storminess;

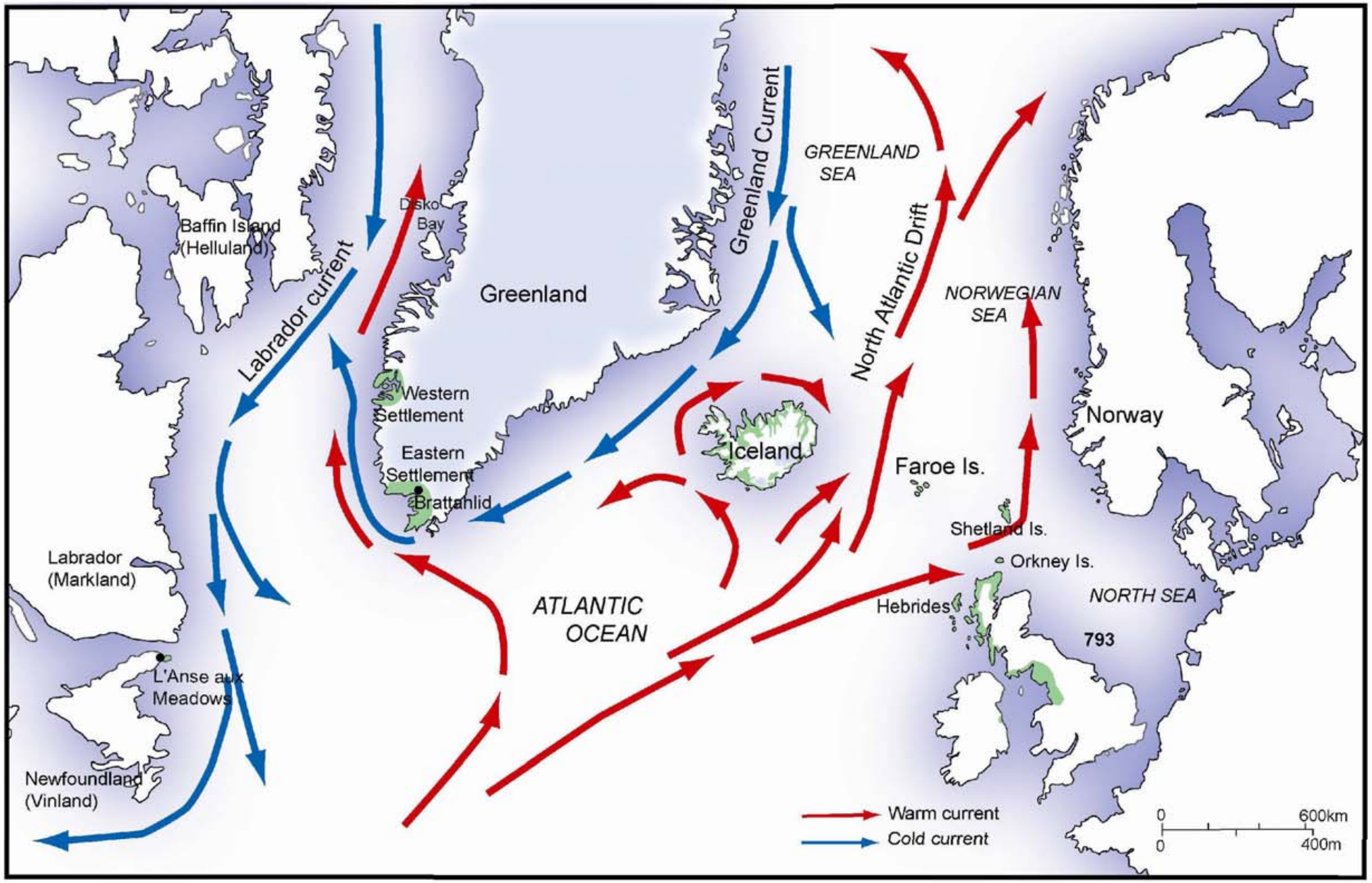


Figure 4.1: The movement of ocean currents in the North Atlantic. After Pinet (1992).

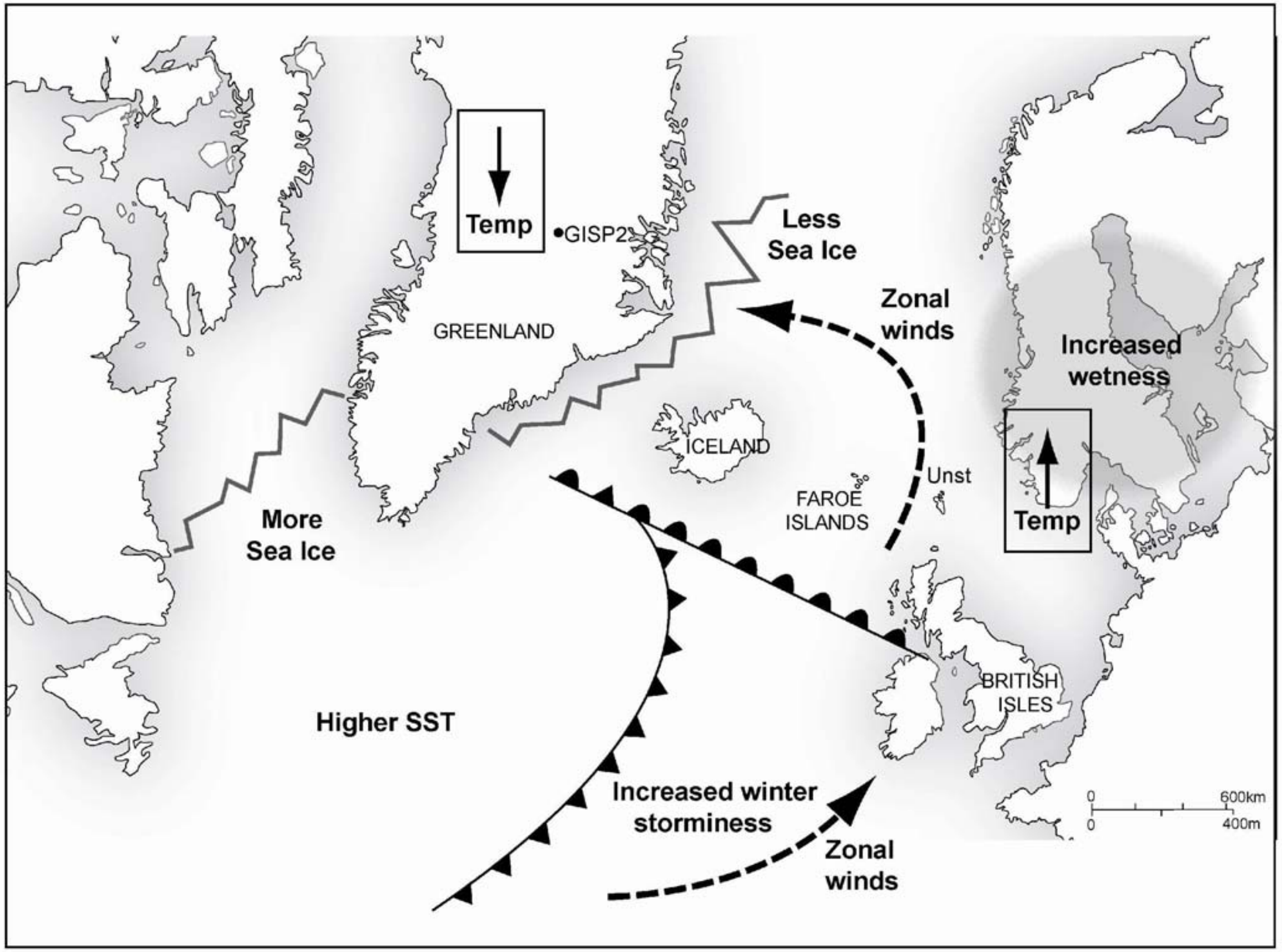


Figure 4.2: Regional variability of winter weather and climate across the North Atlantic during a positive phase of the North Atlantic Oscillation (NAO). After Dugmore *et al* (2007a). Refer to text for a more detailed explanation.

cyclones and depressions are common, precipitation is registered on three out of every four days and fog is especially commonplace. Wind strength and exposure are also significant features of the Faroese climate, especially affecting higher altitudes. In Greenland, owing to its situation where the Atlantic meets the Arctic Ocean, cold ocean currents constantly cool the coast. This, together with the radiation of cold from the inland ice, gives Greenland its Arctic climate, which is significantly different from that of Iceland and the Faroes. This climatic variation would have been important to the settlers colonising first the Faroes, then Iceland and Greenland, because as they moved and settled across this climatic gradient, from warmer maritime to cooler continental climates, they would have experienced a corresponding reduction in growing days for crops, fodder and grazing. Therefore, by the time the Norse reached Greenland, their pastoral economy was close to its environmental limit. Because they are environmentally marginal for Norse subsistence agriculture, the North Atlantic islands are ideal locations for demonstrating the impacts of change and thresholds. Less environmentally marginal areas (for pastoral farming) will be largely unaffected by significant climatic changes, but environmentally marginal areas can be affected by relatively minor changes, which are recorded by shifting local thresholds. The North Atlantic islands are also ideal for exploring the circumstances under which adaptations may or may not be made, which relates critically to the question of why people put unsustainable demands on island environments.

North Atlantic pre-colonisation climate trajectories

The Holocene was traditionally regarded as a period of stable climate, but historical and proxy data reflected in forest limits (Briffa 2000), peat profiles (Barber *et al* 1994), isotopic traces from Greenland ice cores (Johnsen *et al* 2001), ice-rafted debris (Bond *et al* 1997; 2001), glacial fluctuations (Matthews *et al* 2000, Barlow 2001), foraminifera and diatom records (Jennings and Weiner 1996, Jiang *et al* 2002, Birks and Koç 2002) as well as historical accounts and wine harvest records, have revealed high-frequency Holocene climate changes on both regional and global scales (e.g. Jensen *et al* 2004). Reconstructions of climate change over the Holocene are presented in Figure 4.3. Although late Holocene climatic fluctuations may be considered minor when viewed in the context of glacial-interglacial cycles (Figure 4.3A), they have had a major impact on the living conditions and cultural decisions of people in the North Atlantic (Ogilvie 1998); changes occurring on multi-decadal and multi-century scales are critical in terms of human colonisation and long-term settlement.

As well as climate changes occurring at these scales during settlement, the identification of climatic shifts occurring prior to colonisation are necessary to establish environmental trajectories upon which subsequent human impacts may be superimposed. Significant

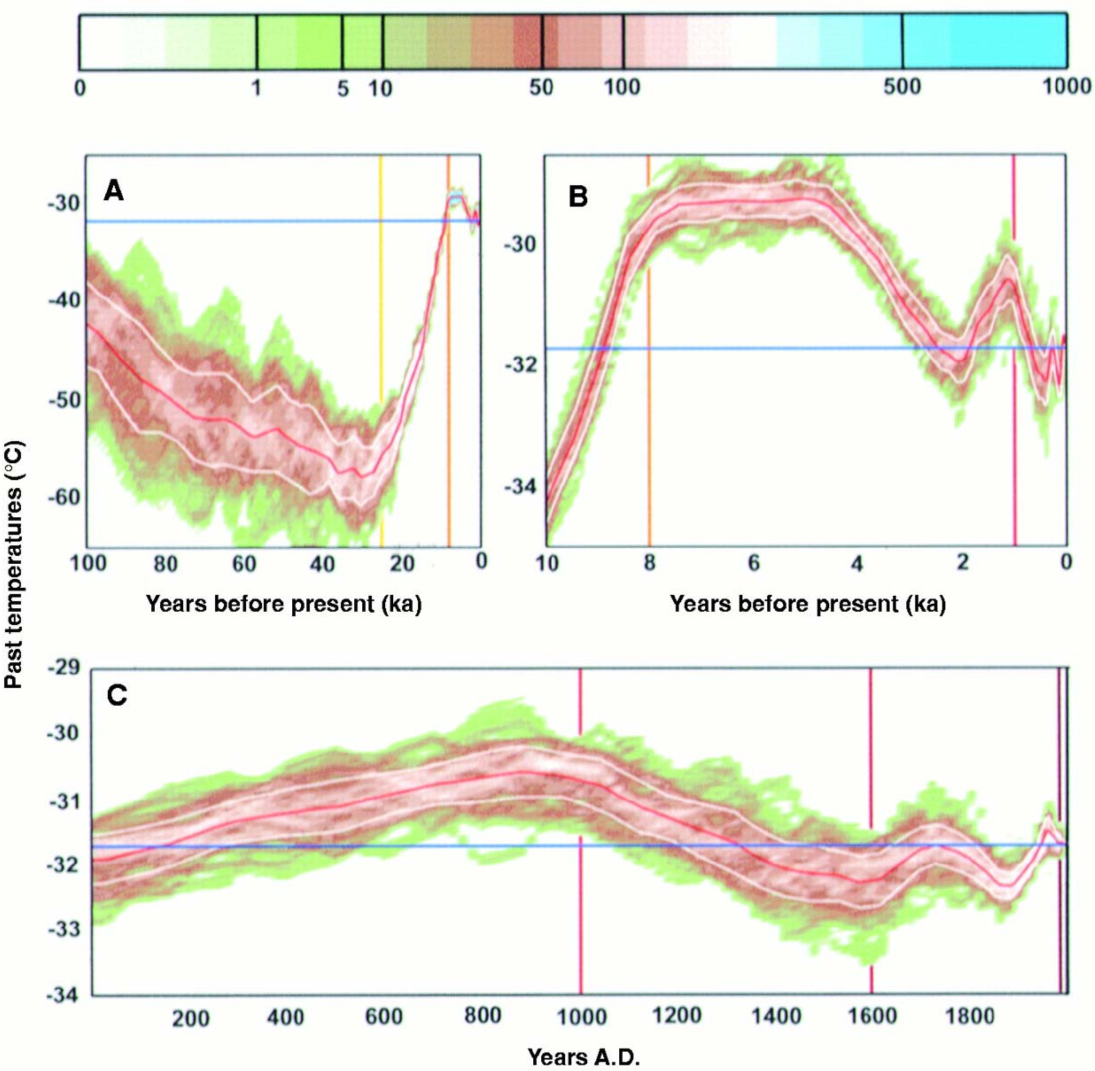


Figure 4.3: The contour plots of all the GRIP temperature histograms as a function of time describes the reconstructed temperature history (red curve) and its uncertainty. The temperature history is the history at the present elevation (3240 m) of the summit of the Greenland Ice Sheet. The white curves are the standard deviations of the reconstruction. The present temperature is shown as a horizontal blue curve. (**A**) The last 100 ka BP. (**B**) The last 10 ka BP. The CO is 2.5 ºC warmer than the present temperature, and at 5 ka the temperature slowly cools toward the cold temperatures found around 2 ka. (**C**) The last 2000 years. The medieval warming (1000 A.D.) is 1 ºC warmer than the present temperature, and the LIA is seen to have two minimums at 1500 and 1850 A.D. After Dahl-Jensen *et al* (1998).

climatic events have been observed during the late Holocene, which may have affected both the pre-settlement environment and the trajectory of settlement itself. In the late Holocene, prior to colonisation of the North Atlantic, fluctuating climatic conditions between *c*.5000 BP and *c*.3000 BP have been identified in northern temperate environments with a gradual deterioration in climate becoming progressively marked between 3000 BP and 2500 BP (e.g. Dahl-Jensen *et al* 1998, Møller *et al* 2006, Fredskild 1983, Funder and Fredskild 1989, Kaplan *et al* 2002, Kerwin *et al* 2004, Bond *et al* 1997, Andersen *et al* 2004, de Jong *et al* 2006, Denton and Karlén 1973, Karlén *et al* 1995, Dahl and Nesje 1994). This period has been identified as a late Holocene deterioration (also known as the Sub-Atlantic cooling) and is generally considered to have been cold and humid, with positive anomalies of annual mean precipitation prevailing in most of the Northern Hemisphere (Klimenko 2004). Although this climatic shift would not have directly affected human populations in the North Atlantic islands, as they had not yet been settled, environmental changes caused by a climatic shift may have altered the landscape on which people consequently settled, and may therefore have influenced the type, rate and extent of change caused by people. In other words, changes in the pre-colonisation environment may determine, or at least constrain, the consequent development of settlement and settlement impacts.

Climate trajectories over the period of settlement

Climate change occurring over the period of settlement that could affect people directly has been a common focus for research strategies seeking possible causal or contributory factors to change or collapse in human landscapes and societies (e.g. deMenocal 2001, Diamond 2005). Temporal links between climate change and cultural change over the period of Norse settlement have frequently been sought, e.g. correlations between Little Ice Age climate fluctuations and the desertion of the Greenland Norse colonies in the 15th century, and the large-scale abandonment of farmsteads in 11th-12th century Iceland (Þórarinsson 1970, Sveinbjarnadóttir 1992). However, despite suggestions of temporal coincidences between cultural shifts and deterministic factors, chronologies are rarely robust enough to allow causal connections to be maintained. Furthermore, human-environment-climate interactions are complex and climate change is unlikely to be the single determining or dominating factor in Norse North Atlantic cultural development. Past populations can not be presumed to have been the “passive victims” of climate variation, and in any response by people to climate change, issues of perception, adaptation and adjustment require consideration, and may be crucial.

Two principal temperature shifts have been identified in proxy sources over the period of historically dated Norse settlement beginning around 800 AD. During the European Medieval period, an unusually mild and stable naturally forced climatic episode known as the Medieval

Warm Period (MWP) or Little Climatic Optimum has been recorded between *c*.700-1300 AD, which affected much of northern Europe (Hughes and Diaz 1994, Esper *et al* 2002). The MWP has been linked to Norse expansion and colonisation in the 9th century (Ogilvie 1991), following the suggestion that the relatively warm air and sea temperatures and stable climate may have encouraged Norse expansion. A warmer climate would have allowed navigation within northern areas previously prohibited by sea ice (Fagan 2000), and enabled the Norse to extend their farming practices to more environmentally marginal areas because of an increased number of growing days for hay, grass and crops such as barley.

Between the 14th century and mid-19th century, a significant North Atlantic climatic shift reversed the warm, stable climate of previous centuries, introducing conditions that were colder and wetter than previously, and more unpredictable. Known as the Little Ice Age (LIA), this period has been recognised in several palaeoenvironmental records, and across a wider spatial area than the MWP (Grove 1988, Mann *et al* 1998, Jones *et al* 1998, Bradley and Jones 1993, Hughes and Diaz 1994, Crowley and Lowery 2000, Lassen *et al* 2004). Proxy evidence reveals not only that average temperatures decreased, culminating in a period of prolonged cold between the 18th-19th centuries, but also that relatively short periods of harsh climate occurred periodically alongside an increase in extreme climatic events. Within these years, drift ice extended to the south, reaching the north coast of Iceland, and around the eastern side to Iceland’s southern shore in exceptionally cold years (Fagan 2000, Ogilvie 1992). The impact of decreasing temperatures would have impacted the pastoral farming Norse populations by shortening the growing season and the productivity of fodder and grazing land, and diminishing the ability to feed stock, for example (Parry 1981). The distribution and migration of fish may also have been modified (Grove 1988), diminishing peoples reliance on fishing at a time when farming was becoming more difficult. Reduced temperatures and increases in sea ice in the North Atlantic would also have hindered trade and communication between the islands and the mainland.

Climate-people integration

The actual effect of climatic shifts on a given social unit depends not just on temperature increases or decreases, but on the intensity, spacing and frequency of adverse climatic events (Abel 1980, Jordan 1996, Berkes *et al* 1998). In order to integrate climatic shifts with cultural scales of change, Dugmore *et al* (2007a), have evaluated proxy climate evidence for the period of Norse North Atlantic settlement utilising the cumulative deviations from the mean, calculated from the Greenland ice core storm frequency proxy (GISP2 Na^+) and sea ice proxy (GISP2 chloride excess) (Meeker and Mayewski 2002). Not only are these indicators of more relevance to climatic changes in the Faroe Islands, because they track the polar front that affects the North Atlantic, rather than specific temperature changes that may be more localised, but they are also more relevant to the context of human landscapes, settlement and responses than climate evaluations of deviations from the mean. The cumulative measure is appropriate because cultural memories, which are retained through personal experience, oral histories and written records, guide or influence human-interactions with the environment and are more significant when dealing with impacts on populations and long-tem settlement.

The cumulative record identifies key shifts in the North Atlantic climate in 975 and 980 AD, 1180, 1425 and 1450, 1520 and 1525 AD (Dugmore *et al* 2007a) (Figure 4.4). Perhaps the most significant period is the turnover of the climate trajectory in 1425 AD, when the cumulative record of Na+, mirrored closely by the cumulative sea ice proxy, shows a sharp shift to deteriorating climate conditions, reversing the trend of warm, stable climate that had been established over the previous 200-400 years and encompassing the memories of several generations. The Norse had to anticipate year on year climate according to the climate of past experience and what was known through oral history, so immediately after colonisation of the islands, and for several generations after, the settlers would have adapted their agriculture and economy to the warm, but as far as they were concerned, stable or "normal", pre-1425 conditions. A sudden turnover in the climate system in the 15th century that reversed the warming trend would not have been predictable and would have left the Norse unconscious of the overall trajectory of change.

Therefore, although it is possible for human populations to adjust to a consistent decrease in temperature, the variability of adverse events in the LIA might have made year by year climate changes difficult to predict and to take effective measures against. In this context it is important that although the literature has identified the 18th century as the coldest period of the LIA, the cumulative deviation measure gives most prominence to 15th century climate changes. Although colder, the 18th century occurs within a period of progressive cumulative change, which may have been easier to predict by human populations and possibly have been adapted to. So circumstances by which people make unsustainable demands on island environments may be explained in terms of either/both extreme events and their impacts, or shifts in long-term trajectories of change.

Climate and landforms in the Faroe Islands

Detailed climate data for the Faroe Islands is limited to meteorological observations initiated in Tórshavn in 1867 and analyses of this climate data in relation to geomorphic activity (Humlum and Christiansen 1998a; 1998b), agricultural production (e.g. Guttesen 2001, Haahr 1996) and vegetation dynamics (e.g. Fosaa 2003, Fosaa *et al* 2004). In terms of human-environment research, climate data is important in order to analyse the climatic

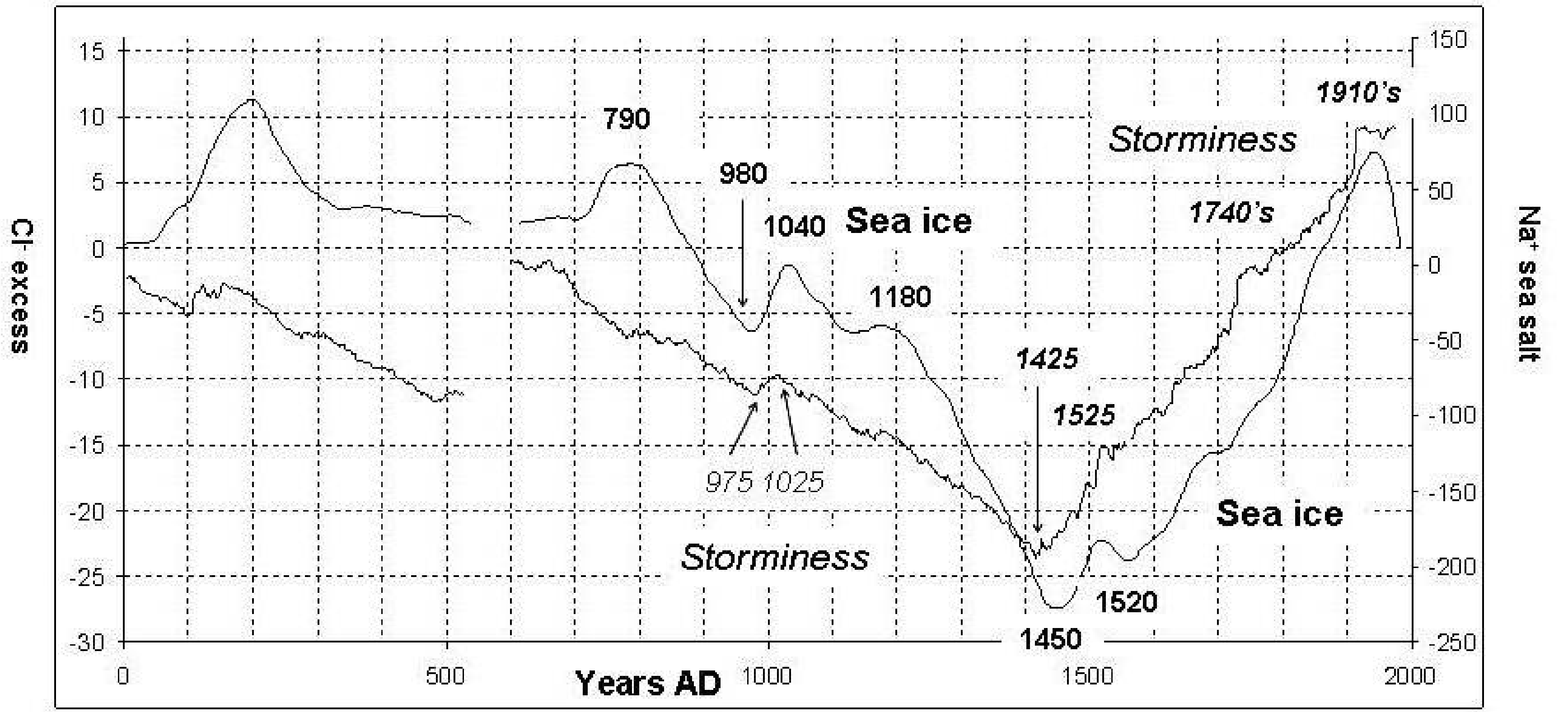


Figure 4.4: Cumulative records of annual deviation from the long-term mean of the time series for proxy records of Greenland Sea/Davis Strait sea ice extent and North Atlantic storminess. The cumulative measure is appropriate, because it details changes in climate that would have been responded to by human populations, at a scale representative of cultural memories and personal experience. After Dugmore *et al* (2007a).

contribution to landscape change and changing soil cover, as in addition to people, climate is a significant driver of change. Therefore, in order to understand the human influence on landscape change, knowledge of the climate and its effects on vegetation and landforms is required. Humlum and Christiansen (1998a; 1998b) have identified a modern lower limit for periglacial activity within an altitudinal range of 250-450 m, corresponding to a mean annual air temperature (MAAT) of 5-3.5ºC. During the cold intervals of the Little Ice Age, assuming a lowering of MAAT of 2-3ºC (Lamb 1989), the lower limit for periglacial activity may have temporarily approached sea level in exposed regions (Humlum and Christiansen 1998b). Humlum and Christiansen (1998b) hypothesise that the number of growing degree days (GDD) and the frequency of freeze-thaw events, in particular, control the lower limit of modern periglacial activity. The presence or absence of a plant cover, which is partially dependent on temperature and GDDs, can control the development of small scale patterned ground (Ballantyne 1996). Periglaciation affects upland areas from 250-450 m, but is modified as a result of vegetation cover. Therefore, the circumstances under which climate can influence the altitudinal limits of periglaciation during the Little Ice Age, for example, is in turn influenced by the extent of vegetation cover. In the absence of grazing mammals, the signal expressed by landforms as a result of climate change is muted, because vegetation exerts a diminishing affect on periglacial processes, inhibiting the impact of climate change. With the additional impact of people and grazing mammals on vegetation, landscapes can be influenced to a greater degree by periglaciation.

With the limited climatic data available for the Faroes, climate modelling can be a useful tool in helping to understand potential temperature changes and impacts on vegetation and landforms (and periglacial limits). A climate model has been produced for the Faroe Islands based on a climate model for Iceland (Casely 2006, Casely and Dugmore in press) and utilising modern meteorological data from weather stations (Danish Meteorological Institute 2007) and specific field research (e.g. Humlum and Christiansen 1998b).

4.2. North Atlantic environmental context

The Faroe Islands

Faroe Islands geography and environment

The Faroe Islands lie in the North Atlantic between 61º 20’ and 62º 24’ N and 6º 15’ and 7º 41’ W, approximately halfway between Scotland 350 km to the south, and Iceland 450 km to the northwest. The archipelago consists of eighteen islands, all but one which have been inhabited, and some small islets, altogether covering 1397 square kilometres (refer to Figure

1.6). Most of the islands have an elongated form, and the islands and the sounds between them generally run in a NNW-SSE direction. The Faroe Islands are mountainous with extensive sea cliffs that provide a good habitat for birds, and the average height of the Faroes above sea level is 300 m, with most of the country lying at an elevation of between 300 m to 700 m. The highlands rise from 400 m to 600 m in the southern part of the islands to almost 900 m in the more mountainous northern islands. The majority of the country lies above an altitude suitable for cultivation, while lower altitudes are dominated by peat moorland. Only a small fraction of the islands has ever been cultivated and only 2.14 % of the land is utilised as arable today (CIA World Factbook 2007).

The Faroe Islands originate as the more mountainous areas of a submarine ridge formed by volcanic action in the Tertiary that connects Scotland with Iceland, Greenland and Svalbard. Successive sheets of lava were laid over one another at long intervals of time, with shallow beds of tuff, derived from volcanic ashes, deposited between them in the interim (Williamson 1948, Rasmussen and Noe-Nygaard 1970, Berthelsen *et al* 1984). The differential resistance to erosion of the lavas and tuffs has resulted in the characteristic “stepped” profile of the Faroese landscape. The exposed edges of the lava flows form rocky walls (*hamar, pl. hamrar)* (Figure 4.5), which alternate with grassy shelves, where less acidic tuff and basalt has been worn down to form a thin, relatively fertile covering of soil that offers well drained grazing land (Williamson 1948, Jóhansen 1985).

The cirques and fjords that typify much of the Faroe Islands have been formed by erosional processes during the last glaciation (Humlum 1996). Several local ice caps accumulated in the Faroes, covering the landscape to about 700 m in the north central part of the islands, with the tops of the mountains remaining ice free (Warming 1901-1908, Jørgensen and Rasmussen 1986). Conventional dating of moraine systems in the Faroes has not been successful and the date when the Faroe Islands became ice-free is unknown. On human time-scales, Holocene landscape processes, such as solifluction and frost shattering, are more important, especially in connection with feedbacks between vegetation and geomorphological processes, particularly at higher altitudes that might be used for sheep grazing. Over the Holocene, impacts of frost action and post-glacial erosion have been widespread and high plateaux are today characterised by block fields of frost-shattered stones and rocks. Steep slopes are characterised by irregular, unsorted accumulations of talus and scree with tongues of solifluction material typifying gentler slopes (Humlum 1996). River erosion is significant at lower altitudes, and in some places has been powerful enough to expose the underlying basalt bedrock, re-deposit glacial and sub-aerial debris cover and form gullies and channels (Humlum 1996). Although streams in the Faroes are small in size and cover only short distances, the narrow physiography of the islands and excessive rainfall equips even the small streams as powerful drivers of geomorphological change (Geikie

Figure 4.5: *Hamrar,* or basalt rock ledges/exposures, separated by grassy slopes formed by the breakdown of tuff.

1880).

Faroe Islands biogeography

The Faroese soils have originated from the weathered and eroded basalt bedrock and are fine and reddish brown in colour and strongly acid, with a mineral portion high in silt and low in clay-sized particles. Upland soils are more minerogenic due to the more rapid erosion at high altitudes where vegetation is limited (Højgaard *et al* 1989). Lowland soils are mostly organic, with the development of peaty soil aided by excessive moisture, low temperatures and a close covering of plants with interwoven roots, which hinders the access of air (Warming 1901-1908). Peat deposits can extend several hundred meters upslope, but are generally thin, less than 1-1.5 m. Prior to the onset of peat growth, in the early Holocene (10-9 ka BP), plant species such as *Betula nana* (birch) flourished under a more Arctic to Sub-arctic climate (Jóhansen 1985), but the onset of more oceanic conditions between 9-8 ka BP, led to the expansion of plant species including *Juniperus* (juniper) and *Salix* (willow) together with tall herb vegetation and grass heaths over the lowlands (Humlum and Christiansen 1998b). The accumulation of peat began around 8 ka BP and intensified between 5-2.5 ka BP as conditions became cooler and wetter, reducing the frequency of *Juniperus* and *Salix* (Humlum and Christiansen 1998b). The arrival of the Norse and grazing mammals in the 9th century initiated a general change in vegetation (Jóhansen 1985); shrub vegetation and tall herbs disappeared and cereals and weeds were introduced (Malmros 1990).

Tree growth in the Faroes is insignificant, partly as a combined result of relatively low summer temperatures, fog, rain, limited sunshine, strong winds and salty air, and partly as a result of the limited nature of biota due to glaciation and isolation (Cronk 1996, refer to Tables 3.1 and 3.2). Shrub cover is restricted to *Juniperus*, *Salix*, and dwarf shrubs including *Calluna vulgaris* (ling heather) and *Empetrum nigrum* (crowberry). The suggestion that woodland cover was more extensive immediately prior to settlement is, however, debated. Mahler (1991) and Jóhansen (1985) dismiss pollen in peat and lake-sediment sequences as a product of long-distance transport and suggest that prior to the arrival of people, the Faroes had little forest cover apart from willow, with birch probably being restricted to some sheltered areas away from salt spray. Hannon and Bradshaw (2000) alternatively suggest that *Juniperus*, *Betula* and *Salix* were more common prior to settlement, citing the discovery of macrofossil evidence of *Betula pubescens* at Eiðisvatn on Eysturoy dated to *c*.2300 BC (Højgaard *et al* 1989, Geikie 1880), and beneath the Viking site of Argisbrekka dated to between 2460 BC and 770 AD (Malmros 1990). If birch and juniper were once more abundant, it is queried as to what caused their subsequent decline. Højgaard *et al* (1989) suggest that birch might have persisted up until the timing of colonisation, implying that settlement, particularly sheep grazing, led to its disappearance. Hannon *et al* (2001) assert that pollen records of primarily non-forested landscapes can be difficult to interpret, establishing through macrofossil evidence that *Betula*, *Salix* and *Juniperus* woodland was already degenerating into peatland and heathland prior to 9th century Norse settlement. Results from Gróthúsvatn on Sandoy also show that shrub woodland decreased in the late Holocene, as conditions became wetter, suggesting climate change as an alternative explanation to human intervention (Hannon *et al* 2001). It seems likely that prior to settlement, there were at least scattered woodland communities in favourable, protected sites, but that no forest dominated landscapes existed in the Faroe Islands as they did, for example, in Iceland (Hannon and Bradshaw 2000, Lawson *et al* 2005).

Most terrestrial fauna of the Faroe Islands has been introduced by humans, as prior to colonisation there were no indigenous terrestrial mammals as a result of the impact of glacial cycles, the isolation of the islands and the lack of natural habitats. Cattle, sheep, goats, pigs, horses and dogs were brought to the islands with the initial Norse settlers, while rats, mice and hares were introduced later. Like many remote islands, fauna in the Faroes is dominated by birds, predominantly sea birds, including puffins, guillemots, razorbills and gulls. Seabirds were utilised by the Norse for their meat, oil and feathers, with fowling playing an important part in Faroese subsistence and to some extent, economy. Marine mammals including pilot, bottlenose, fin and orca whales, dolphins, porpoises and non-migratory grey seals, are also common around the Faroes. Pilot whales have played a particularly valuable role in terms of Faroese subsistence. The first description of a Faroese *grindadráp* (pilot whale drive) dates back to 1584 AD (Bloch 1994, Schei and Moberg 2003), although the practice probably began much earlier (Joensen 1976). Seal oil was a valuable source of revenue for some Faroe Island communities. Fish and shellfish have been plentiful around the Faroes and although fishing did not become a commercially driven enterprise until the nineteenth century, fish has provided an additional subsistence food resource since Norse colonisation (Lawson *et al* 2005, Church *et al* 2005).

Iceland

Icelandic geography and environment

Iceland is located between latitude 63° 23’ to 66° 32’ N and longitude 13° 30’ and 24° 32’ W with Greenland lying 286 km to the northwest and Norway 950 km to the east. At 103,000 square kilometres, Iceland is the second largest island in Europe with a total land area nearly 75 times that of the Faroe Islands. Only 24 % of Iceland’s land area is at an altitude less than 200 m and suitable for habitation (CIA world Factbook 2007). Over 50 % of the land is higher than 400 m, some of which is covered by large ice caps, with the remainder forming inland deserts and mountain ranges. The inhabitable lowland areas are principally located along the coast and on a number of small plains and valley systems that stretch into the interior (Vésteinsson 2000).

Apart from the geologically older areas of Iceland in the east and northwest, where the stepped profile and deep fjords and bays that characterise much of the Faroes can be observed, the geology of Iceland contrasts with that of the Faroes as one of the youngest and most volcanically active landscapes in the world (Saemundsson 1979). This is a result of Iceland’s position on the Mid-Atlantic Ridge, where the American and Eurasian continental plates diverge to produce a relatively high degree of volcanic and earthquake activity. Volcanic eruptions occur once in every five years, on average, and shape the environment and people not only through direct effects of their eruptions, but indirectly by depositing large quantities of tephra, which impacts the soil cover.

As well as impacts caused by volcanic action, Iceland’s geomorphology is also heavily influenced by past and present glacial activity. The disintegration of the last inland Icelandic ice sheet began some time prior to 13 ka BP, followed by a standstill or even advance caused by a colder period around 9.7 ka BP (Ingólfson and Norddahl 1994), and termination of the ice sheet in the central highlands by around 7.8 ka BP (Kaldal and Víkingsson 1991). Since then, more limited glacial advances and retreats have continued to modify the Icelandic landscape. Eruptions of volcanoes that lie beneath glaciers are particularly destructive, causing *jökulhlaups* (large glacial outburst floods), which cause catastrophic environmental change. Permafrost activity, rock avalanche activity, landslides, tephra deposition and soil erosion are significant processes which have affected the late Holocene Icelandic landscape.

Icelandic biogeography

Soils in Iceland are predominantly silty andisols, although peat is present in some lowland areas. Most of Iceland’s soil cover was formed on glacial deposits, with a large input from aeolian deposition. Today, aeolian soils in Iceland are rich in volcanic glass, derived from both primary and re-worked airfall tephra deposits and fines winnowed from sandur plains and proglacial areas (Einarsson 1991, Arnalds 1984; 2004, Arnalds *et al* 1987). This makes them light, friable and sensitive to disturbance and erosion by wind, water and people. Pre-*landnám* upland soils have developed in association with shallow soil profiles and generally lack thick tephra deposits (Dugmore 1987). These soils are more susceptible to erosion and reworking, especially on steep slopes. In comparison, lowland soils develop in more ecologically favourable zones and are more organic, contain thicker tephra layers and are more stable largely due to the existence of woodland scrub vegetation, which stabilises thicker fallout deposits (Dugmore *et al* 2000). Prior to human colonisation, the soil was kept relatively stable by an extensive vegetation cover. *Betula* woodland began to spread initially around 9 ka BP as the climate became warmer and drier. Between 7-5 ka BP, mire vegetation, with increasing values of *Gramineae* and *Cyperaceae*, expanded, corresponding with a cooler and wetter climate, with birch trees colonising the peat landscape between 5-2.5 ka BP. At around 2.5 ka BP the mires expanded again as birch pollen declined (Einarsson 1968, Hallsdóttir 1987). Birch enjoyed a short-lived period of expansion prior to *landnám* (Hallsdóttir 1987), greeting the new colonisers with a largely forested lowland landscape with extensive vegetation cover in the interior (Ólafsdóttir and Guðmundsson 2002).

Unlike the Faroe Islands, where birch and juniper were probably confined to small stands, forest cover in pre-*landnám* Icelandic lowlands is thought to have been ubiquitous, with birch present at low elevations, and willow and other dwarf shrubs dominant up to an altitude of 300-400 m (Arnalds 1987). Evidence of a forest cover is suggested by remnants of former vegetation, written and historical sources, place-name evidence, palaeoecological evidence and modelling studies (Ashwell and Jackson 1970, Hallsdóttir 1987, Arnalds *et al* 1987, Ólafsdóttir *et al* 2001). An often repeated quote from Ari the Wise in *Íslendingabók* states that Iceland was “covered with forest between mountain and sea-shore” at the time of settlement. However, birch woodland has decreased since the arrival of people from an estimated 25 % to 1 % (Arnalds 1987) and was replaced by grass heaths, meadows and hayfields (Hallsdóttir 1987). Although this change is a rational response to the need to provide grazing land for the pastoralist subsistence base, not all evidence suggests that the decline in birch was primarily initiated by people. Ólafsdóttir *et al* (2001) propose that forest cover began to diminish from 3000 BP onwards, implicating changing climate as opposed to human factors as the primary agent of change, with human impact at *landnám* simply exacerbating an existing trajectory of change. Recent evidence alludes to a sustained, progressive pattern of clearance over centuries connected with the deliberate management and conservation of necessary woodland resources during Norse and early medieval periods (Dugmore *et al* 2006, Mairs *et al* 2006, Lawson *et al* 2005), as opposed to a uniformly widespread, rapid decline after *landnám* (Hallsdóttir 1987). The temporal and spatial patterns of deforestation are important both in terms of understanding the interactions between people and deforestation, and between the timing and significance of soil erosion that is caused in part by deforestation.

Prior to colonisation, the arctic fox and the polar bear were likely to be the only land mammals in Iceland, with all other mammals having been introduced by people, either knowingly or inadvertently. As in the Faroe Islands, early settlers introduced cattle, sheep, goats, horses, pigs and dogs. The lack of predators meant that from the beginning the settlers could let their stock roam the highlands, although disputes about grazing are a common feature of later Saga Age literature. Birds are, and probably were, numerous and the marine fauna is exceptionally rich compared with northern Europe, with harbour and grey seals, whales such as the minke, and dolphins and porpoise. In contrast to the Faroe Islands, where sea bird colonies were an accessible resource to most farms and villages, the importance of bird colonies in Iceland would have been variable from settlement to settlement because of contrasting geographies and access. This may have been a stimulus to the early development of exchange networks, but also a potential source of conflict and competition. Aside from strandings, whales were also of less importance to Icelandic subsistence than in the Faroes. In the Faroe Islands, pilot whale migration occurs through the inter-island channels giving opportunities to the Faroe Islanders drive them into bays; in Iceland there is a lack of suitable bays for driving. Fish were however a critical resource; marine (especially cod) and freshwater fish (salmon, brown trout and arctic char) are abundant and were utilised by the settlers for subsistence and later, trade.

4.3 North Atlantic (Faroe Islands) human context: Overview

The histories of the Faroes, Iceland and Greenland are interconnected, but also have connections with rest of the Nordic world and north-west Europe. As a context for later discussions, the major events in Faroese history and some connections with the rest of Scandinavia (and Europe) from the settlement period to the beginning of the 18th century are summarised below (Young 1979, Schei and Moburg 2003);

***c.*600-725**: Christian Gaels first go to the Faroe Islands?

825: Dicuil states that the Faroes (?) are uninhabited apart from sheep and sea birds.

***c.*825**: Grímur Kamban is said to be the first Norse settler in the Faroes.

***c.*885-890**: Further settlements of the Faroes under King Harald Hårfagre of Norway. Most of the settlers come from western Norway, but also many from Ireland and Scotland.

***c.*900**: The Faroese *Althing* or parliament is assumed to be founded.

***c.*999**: The Faroese *Althing* adopts Christianity.

1026 - King Olaf II of Norway tries to impose Norwegian laws and taxes in the Faroes but fails.

1035: End of the Viking era in the Faroe Islands as Tróndur í Gøtu, the last Viking chieftain of the Faroes, dies. Leivur Øssursson becomes a Christian autocrat over the Faroes as feud under Norwegian government.

***c*.1100**: The Faroe Islands become a diocese under the archbishopric of Hamburg-Bremen. The Faroese bishop has his seat in Kirkjubøur until 1538.

***c*.1104**: The Faroes are transferred from the Archbishopric of Hamburg-Bremen to Lund.

1152/53: The Faroes are transferred to the archbishopric of Nidaros (today Trondheim).

***c*.1200**: Slavery in the Faroes is abolished.

1269: Canon Erlend of Bergen becomes Bishop of the Faroes.

1271: A decree is enacted that extends the old *Gulating* law to the Faroes and from this time onwards the Faroese Alting changes from a legislative into a consultative body. The Decree also sets up a trade monopoly between Norway and the Faroes.

1280: The first known map (the Hereford map) mentions the Faroes which are called the “Farei”.

1294: The Hanseatic League is forbidden to trade with the Faroes after which all Faroese commerce had to pass through Bergen, Norway.

1298: The Sheep Letter (*Seyðabrævið*) becomes law in the Faroe Islands. Slavery may have been reintroduced, for the sheep letter regulates, among other things, the exposure to slaves.

1302: The Hanseatics are again prohibited from trading with the Faroes.

***c*.1303**: Bishop Erlend is forced to leave the Faroes and later dies in 1308.

***c*.1349**: The plague reaches Europe including Norway and the Faroes. The plague kills between one and two thirds of the population of Norway. In the Faroes the effects of the plague are less well documented but is have thought to have wiped out entire Faroese settlements (Stumann-Hansen 2003).

1350: The Dog Letter (*Hundabrævið*) becomes law.

1361: The Hanseatic League acquires trading rights with the Faroes, as plague had severely impacted Norway's population.

1397: The Faroes come under Denmark with the Union of Denmark, Norway and Sweden, but continued to be ruled as a province of Norway.

***c*.1400**: The *Althing* is renamed *Løgting*.

***c*.1447**: Bishop Goswin of Iceland, tries to bring the Faroes into his diocese but does not succeed.

***c*.1490**: Dutch tradesmen get the same privileges in the Faroe business as the Hanseatic traders.

***c*.1500** onwards: The Faroes are exposed to pirate raids from the British Isles and western France.

***c*.1520**: Joachim Wullewever from Hamburg becomes baliff over the Faroes on behalf of King Christian II of Denmark.

1524: After going into exile, Christian II offers the Faroes and Iceland to Henry VIII of England as collateral for a loan which Henry denies.

1538: The reformation reaches the Faroe Islands.

1710: The Royal Trade Monopoly is founded.

1720: The Faroe Islands become a county of Denmark.

4.4 North Atlantic human context: Colonisation

The Viking expansion

The expansion of the Norse across the North Atlantic was the most extensive exploration of western European travellers during the Dark Age period, occurring at a time when elsewhere in north western Europe the population was probably in decline, coinciding with the fall of the western Roman Empire and a contraction of agriculture (Phillips 1988, McEvedy 1992).

There are a variety of explanations as to what caused the Norse expansion and consensus over the causes of expansion has changed over time (McGrail 1980, Haywood 1995, Karlsson 2000, Ólafsson 2000, Batey and Sheehan 2000).

In proceeding west, it is not certain whether the Faroes and Iceland were settled by accident, by ships being blown off course, or by a deliberate strategy of exploration in search of trade goods, made possible by following signs such as bird migration routes, or in pursuit of personal prestige. In the course of voyages to the north and west of Scotland and Ireland, ships were probably blown off course reaching as far as the Faroes and Iceland, and it is possible that the Vikings were already aware of the lands in the northwest prior to colonisation. Evidence that the islands were known is presented by *De mensura orbis terrae* (On measuring the earth), written by the Irish ecclesiastic Ducuil in around 825 AD, where islands located two days sailing north of Britain are described as separated by narrow stretches of water, bearing resemblance to the straits and islands of the Faroes. It is also stated that the latter were occupied by hermits from Ireland from around 725 AD, but were subsequently driven away by “Northmen” around 100 years later, abandoning the islands to sheep and seabirds (Tierney 1967).

Pre-Norse colonisation of the Faroe Islands

The Faroe Islands, lying only *c*.300 km beyond the Shetland Islands, were potentially within reach of sea-faring peoples from northwest Europe for centuries prior to the Viking Age and historically dated Norse *landnám*, and whether the Norse were the first settlers in the islands is debated. Table 4.1, for example, illustrates the timing of human impacts on other landscapes in the North Atlantic region, which by comparison, the Faroe Islands were settled surprisingly late. Christian Gaels as Irish monks or hermits, probably had both the means and the motivation to seek out these offshore islands, and their presence in the Faroes and Iceland has attracted speculation. As yet, no archaeological evidence for a Christian Gaelic settlement in the islands exists, although written sources and place names argue for their presence. Christian Gaelic settlers are referred to both by Ducuil and *Íslendingabók (Book of the Icelanders)*. Place names have also been used to suggest a Christian Gaelic presence (Matras 1965), particularly those with the *papa*-element such as *Paparøkur* and *Papurshálsur* in the Faroes (Matras 1965) and *Papey, Papafjörður*, *Papafell* and others in Iceland (Eldjarn 1989, Buckland *et al* 1995, Sveinbjarnardóttir 2001). The earliest mention of *papa* place-names in the written sources is not, however, contemporary with the alleged presence of *papa* in the country, so it is possible that the Scandinavians who had settled elsewhere in the North Atlantic, such as Ireland and western Scotland, brought the place-names to the Faroes and Iceland in the Norse settlement period (Sveinbjarnardóttir 2001). Furthermore, in the Faroes, the locations connected with *papa* place names are generally in inhospitable areas, situated many meters above sea level, on sheer cliffs facing the open North Atlantic, which has led some to question the theory of early Christian Gaelic settlements (Arge 1991).

Region	*First human impact*	*References*
Norway (North Cape)	c. 10000 BC	Bjerck 1995
Ireland	c. 8030 BC	Woodman 1985, Waddell 1998
Scotland	c. 8030 BC	Saville 1996, Edwards and Whittington 1997
Hebrides	c. 7000 BC	Edwards 1996, Fossitt 1996
Shetland	c. 6300 BC	Bennett *et al* 1992, Barclay 1997
Labrador	c. 4300 BC	Tuck 1975
Newfoundland	c. 3000-2000 BC	Tuck 1975
Greenland	c. 2500 BC	Grønnow *et al* 1983
Faroe Islands	**c. 500-700 AD**	Jóhansen 1985, Hannon and Bradshaw 2000
Iceland	c. 700-800 AD	Hallsdóttir 1987, Nordahl 1988, Hermanns-Auðardóttir 1989 - but cf. Crawford 1991, Kaland 1991, Mahler and Malmros 1991, Morris 1991, Sigurdsson 1991

Table 4.1: General dates for human impact on the landscapes of the North Atlantic region. Adapted from Hannon *et al* (2001).

In the Faroe Islands, there are “fields” with raised parallel ridges of stone and earth which are traditionally connected and popularly assumed to represent traces of pre-Norse settlement (Brandt and Guttesen 1981, Jóhansen 1979, Arge 1991, Edwards *et al* 2005b). There may be up to twelve “cultivated field” sites across the Faroe Islands, characteristically found on steep (up to 60°), inaccessible slopes less than 100 m above sea level, facing to the south, east or west. Aside from cultivation, the fields may have been used for a variety of functions over time, such as turf stripping, but their location in distinctive topographic settings argues for a common function. It is also possible that rather than representing core areas of Christian Gaelic settlement, the fields represent peripheral remnants of a once more widespread Norse settlement. Their antiquity is, however, uncertain and dating the fields has been problematic. Jóhansen (1979) discovered evidence for oats, and later, barley cultivation at one of the “fields” on Mykines, radiocarbon dated to 600 AD, although this date has been applied with caution, as a result of the difficulties involved in sampling (Arge 1991, Buckland *et al* 1998). In terms of this research, however, what crucially matters is not the timing or origins of the first settlers, but the timing of the first significant environmental impact and whether this is contemporaneous with early settlement or begins later (cf. controversies in New Zealand and Easter Island).

Norse *landnám* in the Faroes

Evidence for the Norse colonisation of the Faroes and Iceland or *landnám* (Old Norse meaning "land-taking") comes from both documentary and palaeoenvironmental evidence (Arge 1991; 1993, Debes 1993). The principle literary work on the Norse history of the Faroe Islands is *Færeyinga Saga* (The Faroese Saga), a collection of various texts compiled from the Icelandic Sagas. *Færeyinga Saga* was composed in the 13th century, but describes events following settlement in both the Faroes and Norway, focusing on the struggle for power among chiefs and events that are connected with the introduction of Christianity to the islands, rather than the settlement itself (Arge 1991). Grímur Kamban is described as the first Viking settler, arriving *c*.800 AD, although it is generally considered that Grímur, like many other colonists, did not arrive in the Faroes directly from Norway but came via the Hebrides, Ireland or the Isle of Man. *Landnám* has traditionally been dated by historical records to *c*.825 AD in the Faroe Islands and a 9th century date for the Faroese *landnám* has been confirmed by archaeological research (Hansen 1991). Accounts of initial settlement in Iceland are more comprehensive; *Landnamabók (The Book of Settlements)*, is an Icelandic account of the country's colonisation written around the 12th century and describes the arrival of the first Scandinavian visitors and settlers on Iceland.

In the Faroes, human colonisation has also been identified in palaeoenvironmental records from several islands, based on the appearance of cultivated crops and reductions in birch and other tree pollen (Jóhansen 1971; 1975; 1982; 1985, Hannon *et al* 1998, Hannon and Bradshaw 2000), plant macrofossils (Bennike *et al* 1998), insects (Buckland 1990, Buckland and Dinnin 1998), increases in minerogenic inputs (Hannon et al 2001, Hannon and Bradshaw 2000) and multi-proxy studies (Buckland *et al* 1998, Hannon *et al* 1998; 2001) (Figure 4.6). Although there is a variance in dates from the palaeoenvironmental research, there is evidence to suggest that human impact occurred at least two centuries earlier than the historically accepted date of 825 AD. Early palynological studies from Tjørnuvík in northern Streymoy suggest a possible early *landnám* beginning *c*.600 AD (Jóhansen 1985) and later research has since confirmed these ideas (Hannon *et al* 1998, Hannon and Bradshaw 2000). Recent research from Hov on the island of Suðuroy, estimates a relatively consistent presence of cereal type pollen grains and an expansion of microscopic charcoal from *c*.680 AD (Edwards *et al* 2005a), and Hannon *et al* (2005) have estimated the appearance of charcoal and plant macrofossils to *c*.570 AD. As this evidence for a human presence comes from sites across the Faroes, and is geographically extensive, it seems probable that human-interactions on a small scale had begun by at least the 6^{th} century onwards. The nature and timing of settlement in the Faroe Islands is considered in Figure 4.6 along with the dating of other palaeoenvironmental data.

4.5 North Atlantic human context: Long-term settlement and adaptation

Norse "cultural capital"

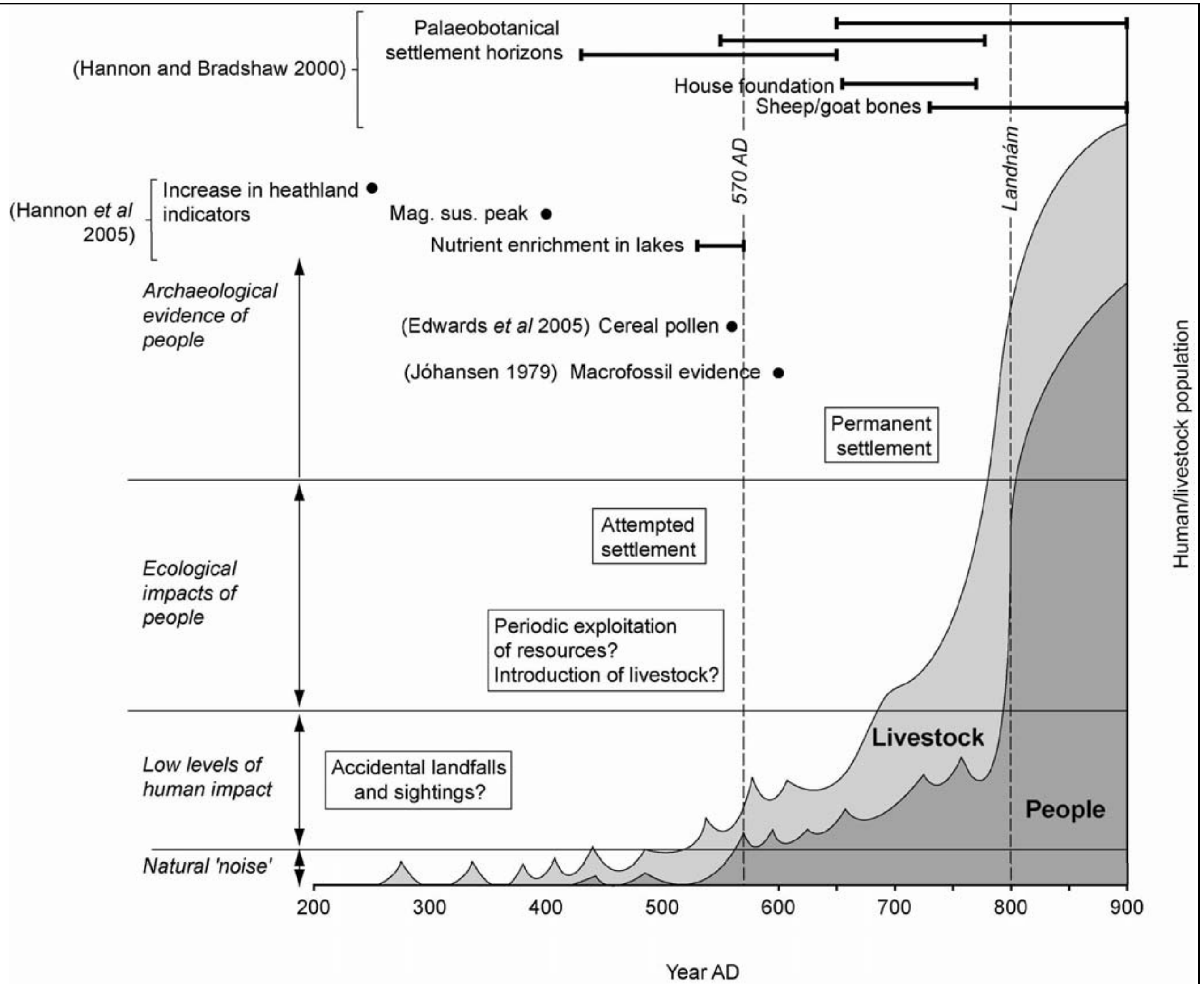
When immigrants colonise a new homeland, the lifestyle they establish there, usually integrates features of the lifestyle that they practiced in their homeland. This has been described variously as a "transported landscape", "portmanteau biota" and "cultural capital", and incorporates the knowledge, beliefs, subsistence methods and social organisation accumulated in the homeland (Diamond 2005, Amorosi 1991, Thorsteinsson 1991). The transportation of known capital is especially important for settlers occupying land that is either originally uninhabited, e.g. the Faroes and Iceland, or else inhabited by people with whom the new colonists have little contact, e.g. Greenland. The Norse settlers in the Faroes and Iceland had no possibility of learning anything from indigenous people who had adapted to the environment over time. Instead, the societies that the Norse created on the North Atlantic islands were modelled on mainland Norse Late Iron Age society, incorporating the Iron Age Norse principles of agriculture, iron production, class structure and religion. On arrival, the Norse would have been especially attracted to the grassland and forest landscapes which resembled their homelands, and where their accumulated knowledge of subsistence pastoral farming could be practised. Perhaps because they comprised a mixed cultural group of Norse, slaves and exiles, the Norse may have gone out of their way to re-create their own myths of the idealised west Norwegian lifestyle.

Landscapes covered by birch forest would have been attractive, as birch was a particularly important commodity, which became a well-controlled asset as woodland began to decline, e.g. in Iceland (Mairs *et al* 2006, Dugmore *et al* 2006). Wood was required not only for building, cooking and heating purposes, but was crucial to make charcoal to create iron from low-grade bog ore for creating and maintaining the sharp edges on the tools needed to cut fodder. In the Faroes, there is limited evidence of iron-working and due to the lack of woodland, the use of peat was widespread and used for both cooking and heating purposes.

In a Norse pastoral farming economy, the mix of livestock preferred by Late Iron Age Norwegian chiefs included predominantly cows (~50 %) and pigs (~25 %), with fewer sheep and goats (~20 % caprines [undifferentiated sheep and goats]), horses (5 %) and a small number of ducks, geese and dogs (Vésteinsson *et al* 2002). Cows were the most favoured

Figure 4.6: A model of human occupation for the Faroes, combined with dating of published palaeoecological evidence. Note that spot dates are approximate.

Four possible phases of pre-Norse settlement are proposed. *i) Accidental landfalls and sightings* when people became aware of the islands, but no occupation resulted. *ii) Periodic exploitation of resources-Introduction of livestock.* I.e. short-lived visits to exploit natural resources such as birds and marine mammals. During this phase new species may have been introduced, as, for example, part of a deliberate provisioning strategy. Livestock impacts could therefore develop in the absence of people. *iii) Attempted settlement.* A possible phase of temporary or unsuccessful settlement that could have seen impacts spread between islands. This phase could also encompass deliberate preparation phases of livestock introduction that proceeded successful permanent settlement. *iv) Permanent settlement.* Permanent occupation involving cultivation and significant landscape modification by a substantial human population (hundreds rather than dozens of people).



animal commodity, both for beef and as prized status symbols although pigs were also highly esteemed. Sheep were kept for wool, milk and mutton, and goats also provided milk. Horses were kept for meat as well as for riding and as draft animals. Limited barley was grown and formed the most common grain, although wheat, oats and rye could be grown in certain favourable areas along with vegetables such as cabbage, onions, peas and beans (Kaland and Martens 2000). Archaeofaunal evidence from the Faroes, Iceland and Greenland (Church *et al* 2005, McGovern 2000) illustrates that although cattle are favoured in the early years of settlement, they decline relative to the proportion of caprines one or two centuries later, and although pigs are favoured initially, as they both breed rapidly and are used to uproot trees and clear areas for grazing, they are phased out soon after settlement.

Cows, which were highly prized by the Norse, required over-wintering in byres and needed to be fed large quantities of hay and other fodder. Sheep could remain outdoors all year in the Faroes and in milder coastal areas in Iceland, but elsewhere in Iceland and in Greenland they also required some winter fodder. Fodder acquisition was therefore of crucial importance on the Norse farm, so the colonists would have sought occupation sites most suitable to fodder cultivation. In Iceland, wetland meadows made good settlement locations as they produced sedges and grasses that made good fodder and were free from birch forest at the time of settlement (Vésteinsson *et al* 2002). In the Faroes, good fodder producing land was restricted, although the need for it was probably less; because of the longer length of growing season compared to Iceland and Greenland, because sheep and goats could be over-wintered outside, and because of the utilisation of other sources of food besides domesticated animals.

Farm produced food was supplemented by wild food resources in the early years of settlement, which would have provided settlers with a much needed resource while livestock numbers were being built up. In the Faroes this included sea birds, bird eggs, fresh and saltwater fish and probably whales; in Iceland, initially walrus, seals, fresh and saltwater fish, some sea birds, bird eggs and berries; in Greenland, caribou, harbour and the migratory harp and hooded seals, small mammals such as hares, sea birds, ptarmigans, swans, eider ducks and mussels. Although remains of fresh and saltwater fish are abundant in the Faroes and Iceland, and would have been available to the Greenlanders in abundant supply, fish bones account for less than 0.1 % of animal bones recovered at Greenland Norse archaeological sites, compared to between 50 % and 95 % at most sites in Iceland and north Norway (McGovern 1983).

Faroese "cultural capital" developments

A critical aspect of the traditional Faroese subsistence economy in particular, not just in the early period of settlement, was that it was highly diversified with wild foods, or pseudo-infinite resources. According to archaeofaunal evidence, birds formed a proportionately high percentage of food consumed in the Faroes (Church *et al* 2005). Although the initially high percentage of bird bones had parallels with that of sites in Iceland (McGovern *et al* 2001), after the initial settlement, birds provided only a minor supplement to fish and domestic mammals. In contrast, at Undir Junkarinsfløtti on Sandoy, there is evidence of a sustained use of wild bird colonies, especially puffins, suggesting that the Faroese remained dependent on bird resources far longer and to a greater degree than any of the other Viking Age settlers of the North Atlantic islands (Church *et al* 2005). Pig keeping also remained active in the Faroes until at least 200 years after settlement, long after pig bones had disappeared from archaeofaunal records in Iceland and Greenland (Church *et al* 2005). The importance of pig-keeping to the Faroese is also attested to by the existence of some fifty place-names in the Faroes referring to the practice (Arge *et al* 2005) (Figure 4.7). Pigs would have required extensive feeding and can be destructive of birch woodland and other vegetation, which is probably while they disappeared early from Iceland and Greenland; after being used initially to clear land for grazing, they were no longer needed. It is not known how they would have been kept and fed in the Faroes, but the input of labour required for pig-keeping might have been more readily available in the Faroe Islands.

Faroese settlement patterns in a North Atlantic context

On arrival in the Faroes, Iceland and Greenland, the Norse settlers would have sought out locations that allowed the transferral of their “cultural capital”, such as lowland and/or wetland areas suitable for growing or acquiring fodder, large outfields with south facing slopes for growing additional fodder and for sheep grazing, access to abundant fresh water, reasonable access to coastal resources and close proximity to fuel resources such as birch forests or peat resources.

Lowland areas suitable for cultivation are relatively scarce in the Faroes but exist predominantly along the coasts and mainly in the bays where the original farms were established (Arge *et al* 2005). Most settlements occupy a location with both convenient access to the sea and marine resources, and access to lowland sites suitable for animal husbandry and cereal cultivation. There are some villages which are an exception to this, such as Gásadalur on the island of Vágoy, which is not easily accessed from the sea. These settlements may represent an expansion of settlement after the initial favoured coastal sites had been taken (Arge *et al* 2005). A small number of farms have also existed which were more than 2 km from the sea, although many of these were former shieling sites exploiting productive summer pastures, prior to the extensive development of grazing lands or outfields

Figure 4.7a

Figure 4.7b

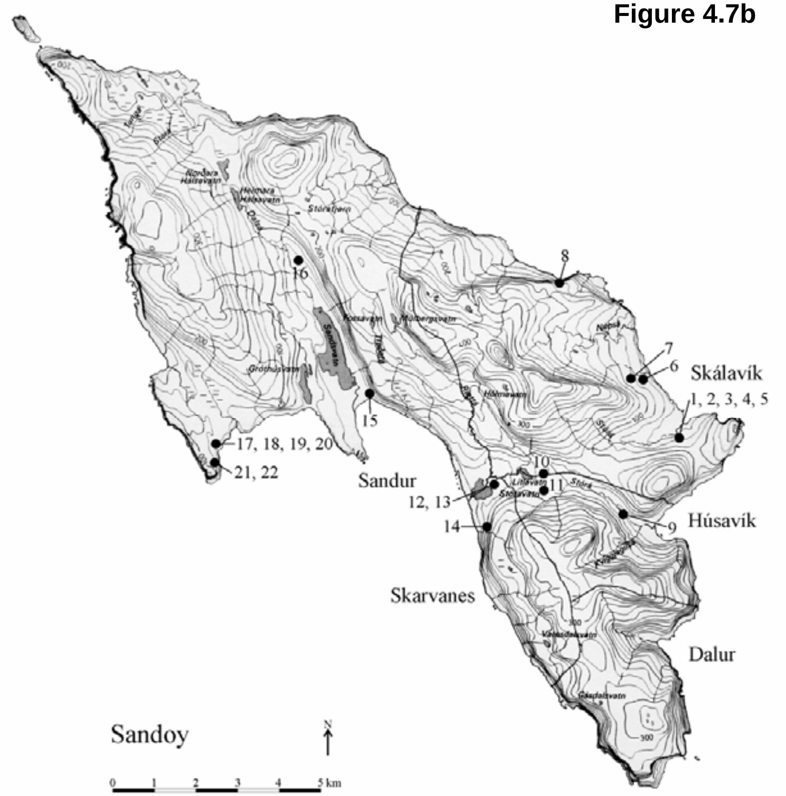


Figure 4.7a (left): The location of place-names related to pigs or swine in the Faroe Islands. After Arge *et al* (2005).

Figure 4.7b (right): The location of place-names related to pigs or swine on the island of Sandoy, Faroe Islands. After Arge *et al* (2005).

beyond the coastal infield areas from around the 11th-12th centuries (Edwards 2005). As only a small land area of the Faroes is suitable for settlement and cultivation, settlements are unlikely to have changed much since colonisation. This may also be a factor in explaining why a lack of archaeological remains have been found from the earlier settlements, as many earlier farmsteads have probably been built over or re-used.

The Faroese live in *bygdir,* or settlements, whose form may have changed little since the Viking Age, which is supported by the appearance of many still occupied sites in documents and written sources, demonstrating a notable continuity of settlement (Figure 4.8). After the initial establishment of several large farms, secondary settlements may have been established as tenancies inside the larger farms, forming the basis for larger divisions. The establishment of *bygdir* as separate farms continued during the early Middle Ages and it was only after this that a number of new farms were established in isolated spots (Thorsteinsson 1991). The Faroese settlement pattern, characterised by villages that developed soon after initial settlement, contrasts with settlement patterns in Iceland and Greenland, where towns and villages only developed in the 20th century. In Iceland, for example, subsistence based farms were more independent, isolated and widely scattered, with the distance between two farmsteads determined by the fodder producing capabilities of the intervening tracts of land (Vésteinsson 2000). The majority of settlements were located near the coast where boats could be landed, and in some sheltered inland valley systems.

Faroese farming systems in a North Atlantic context

The Faroese farming system probably originates from the 11th or 12th century and is outlined by *Seyðabrevið* or the "Sheep Letter" of 1298, the first medieval law code concerning the Faroe Islands, which has more or less remained in effect to the present day. The farming system in use since at least 1298 can be described as an infield-outfield system, similar to that established in Western Norway in the early Iron Age and which is substantiated in most of the Norse colonised areas (Øye 2005). The infields, (*bøur*), were walled or fenced from the farm to prevent trampling by cattle and were intensively cultivated, while the outfields (*hagi*) were extensively used, primarily as grazing pasture, but also to grow additional fodder and to gather resources such as peat.

The farming system used prior to 1298 has not been unequivocally established, but place-name (Matras 1956) and archaeological evidence (Dahl 1970a; Mahler 1990; 1991; 1996; 1998) suggests that an older decentralised farming system might have been in use, known as the shieling system, which was also widely practiced in Norway and Scotland. The shieling system was probably superseded by the instigation of the infield-outfield system and establishment of property rights as detailed by *Seyðabrevið*, by which time shielings are not

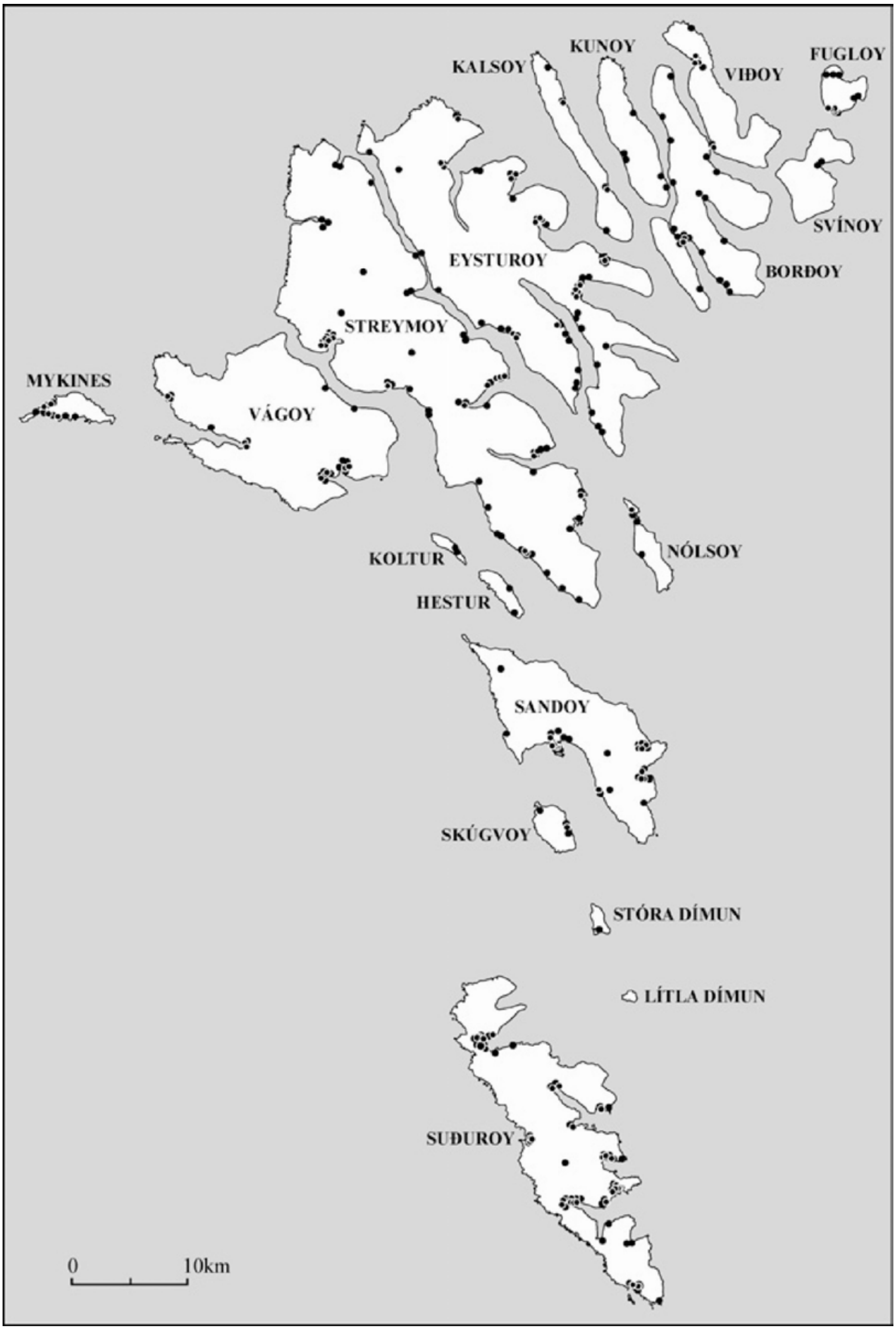


Figure 4.8: Inferred locations of Norse settlements in the Faroe Islands based on archaeological and historical evidence. After Arge *et al* (2005).

mentioned. Summer farms or shielings (*ærgi*) existed in higher altitude and inland areas of the Faroes, allowing the exploitation of more remote pastures. Details of the nine shielings suspected in the Faroe Islands are presented in Table 4.2. In a shieling economy, inhabitants from permanent farms herd their cattle and sheep to more remote pastures for certain seasons of the year, allowing livestock to be removed from the main farm early in the spring to avoid summer exploitation of the coming winter fodder. Related activities such as the milking of cows, sheep and goats, processing and preparation of dairy products, collection of additional winter fodder and winter fuel, peat cutting, charcoal and iron production, fishing and wool working may also be carried out at some shielings sites, particularly in Iceland and Greenland, but probably less so in the Faroe Islands.

The shieling economy in the Faroes appears to have evolved differently compared to those of Iceland and Greenland, which are more closely aligned with the Norwegian shieling system. In the Faroes, distances between the shieling and the main farm are very short, within 4-5 km, and there is little variation in vegetation between the home farm and the shieling (Arge 2006). In addition, while the average altitude of Faroese shielings is approximately 75 m (Mahler 1993), shielings in Iceland, Greenland and Norway are frequently located above 200 m. The shieling system in the Faroes has therefore been implemented and adapted to the local topography, indigenous cultural influences and internal economic development. The decline in the shieling system in the Faroes may have been for similarly regionally relevant reasons, such as a shift in the economy, driven by increased trade that placed more emphasis on sheep rearing and wool production as opposed to cattle (Mahler 1998). Alternatively, a low number of livestock relative to rangeland carrying capacity may also explain the demise of the shieling system in the Faroes by the 13th century. Model evidence suggests there was sufficient biomass for the number of livestock likely to have been utilising the rangeland areas, in which case the shieling areas would have become less important (Thompson *et al* 2005). Additionally, a population decrease or shift in economy could have led to a decline in the labour available to operate a shieling system. This may have been the case in Iceland where documentary records suggest that a shortage of labour often led to the discontinuation of shieling practices (Sveinbjarnardóttir 1990). In Iceland, as in Norway and Greenland, shielings were located in inland areas, which permitted access to pastures at a considerable distance from the home farm, and allowed exploitation of a wide spectrum of ecological variation, with the distribution of resources dictating the choice of shieling location (Keller 1989, Sveinbjarnardóttir 1990). In Iceland and Greenland, the distribution of shielings may have been adapted to a differentiated economic strategy, where the distribution of different types of shielings was well adjusted to the distribution of resources in different areas (Keller 1989).

Location	Number of ruins (number of divisions visible)	Type of ærgir	Location in supposed catchment area	Water supply	Accessibility	Communication by boat	Distance overland from supposed farm (km)	Location of presumed head farm	Altitude (m)
Argisbrekka, Eiði	>17	Complex/simple	Central	Ample and steady	Easy	By fresh water	3.1	Eiði	130-136
Argisá, Skúvoy	>1	Simple	Central	Ample and steady	Easy	No	1.8	Skúvoy	180
Argisgjógv, Selatrað	>2	Simple	Central	Medium	Easy	By sea	1.6	Selatrað	40-60
Ergidalur, Hov	>2 (2)	Simple	Periphery	Ample and steady	Easy	?	3.7	Hov	180
Ergibyrgi, Sumba	>5	Simple	Periphery	Unknown	Medium	No	2.4	Vikabyrgi	30-50
Argisá, Havnabøur	>1 (5)	Complex	Central	Ample and steady	Easy/ Difficult	By sea	2.3/ 3.6	Oyndafjøður/ Fuglafjøður	15-20
Argisfossar, Kvívík	>1 (2)	Complex	Central	Ample and steady	Medium	By fresh water	4.7	Kvívík	80
Kvíngadalur, Klaksvík	>4 (2-3)	Complex	Central	Ample and steady	Difficult	By sea	4.0	Gerðar	20-30
Í Hópinum Norðoyrar	>2 (2)	Complex	Periphery	Unknown	Medium	By sea	3.0	Norðoyrar	10
Borðoyavík Klaksvík	>1 (2)	Complex	Periphery	Unknown	Medium	No	4.5	Uppsalar	60
Borðoyavík Klaksvík	>1 (3)	Complex	Central	Unknown	Medium	No	4.1	Uppsalar	60

Table 4.2: Ærgir (shieling) sites and presumed ærgir sites surveyed during 1989. Adapted from Mahler (1993).

Land and resource ownership in the Faroe Islands in a North Atlantic context

A Faroese village or *bygd* consists of a number of houses standing on *almenningur* (land which is free and common property). Around the houses lays the *bøur* (infield), demarcated from the *hagi* (outfield) by a stone fence (Figure 4.9). In the Faroe Islands, land ownership is regulated within this infield-outfield system by the traditional land measurement system of *markatal*, outlined in *Seyðabrevið*, whereby the *markatal* is not a fixed area of land, but acts as an indication of production value. Although a few villages have undivided *hagi* or outfields, in most villages it is divided into a number of *hagapartur*, or outfield parts. The main resources of the *hagi* are the property of the community (as opposed to the individual) and are fairly distributed to each farmer according to his degree of ownership of the *bøur*, which is divided into as many as 92 units called *mørk* (pl. *merkur*). In contemporary villages each unit is subdivided into minor lots, each lot of which owns part of a *hagapartur* (Nørrevang 1979). The lot is cultivated by its owner, while the *hagapartur* are tended by all owners in common. Each farmer owns certain sheep and feeds them through the winter, although one farmer's sheep can roam anywhere in the village. In the summer, sheep graze in jointly owned and demarcated sections of the *hagi*. The shepherds elect a *seyðamaður* (sheep-man) whose leadership is rotated and who acts as the primary caretaker of the sheep and of fencing for their area (Gaffin 1996). As well as the sheep output from the *hagi*, summer grazing in the *húshagi* (the lower altitude outfields), geese ownership, and a percentage share of other resources, such as peat (*torv*), fowling cliffs, pilot whales (*grind*), driftwood and seaweed are also community owned. The *markatal* system of ownership therefore contrasts with the *hreppur* or commune system that characterises settlement and farming in Iceland. In north Iceland especially, pastures were private property, belonging to individual farmsteads or churches, while in south Iceland, although pastures were often communally owned, individual sheep were still the property of individual farms. Additional resources were held privately by particular farms as opposed to being property of the community.

4.6 Human impacts and environmental change in the North Atlantic islands

As with documented human impact in the Pacific islands, there is evidence to suggest that human impacts in the North Atlantic were widespread, and in some cases catastrophic. The causes of human impact in the North Atlantic are similar to those affecting remote Pacific islands, principally in relation to impacts of deforestation and the introduction of domestic mammals which either instigates or enhances soil erosion and landscape degradation. Research has been carried out with regards to soil erosion in Iceland (Þórarinsson 1961, Haraldsson 1981, Dugmore and Erskine 1994, Dugmore *et al* 2000) and cultural collapse in

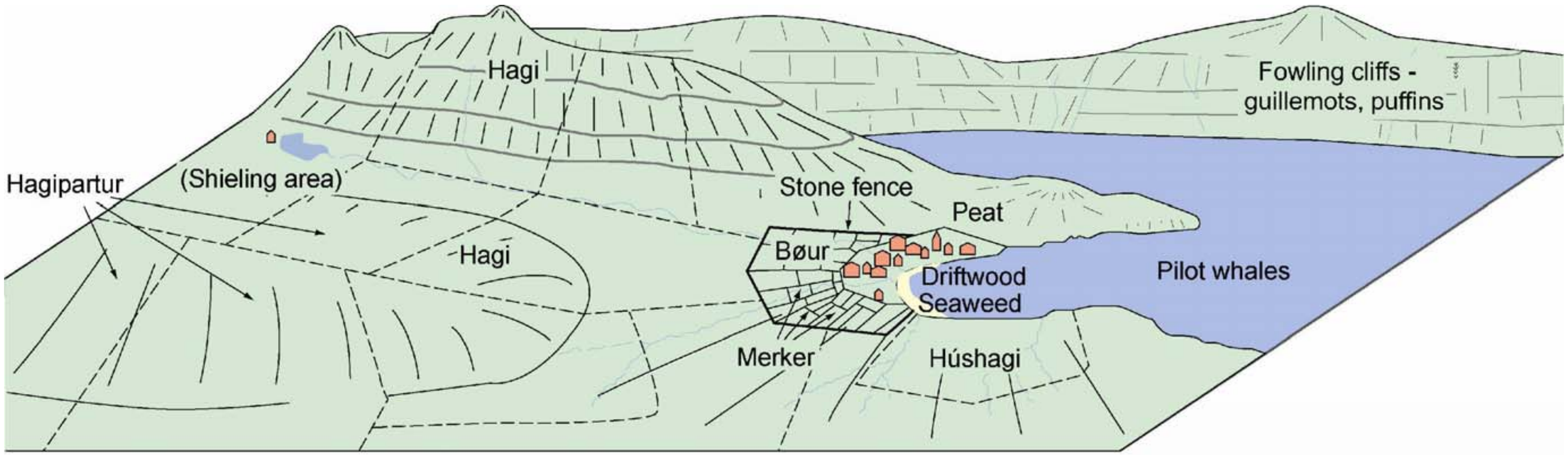


Figure 4.9: A simplified representation of the geographical distribution of resources and system of land ownership in the Faroe Islands. *Merker* are subdivided into 'lots' with each lot cultivated by the owner. *Hagipartur* are tended by owners in common and a percentage share of peat, driftwood, seaweed, pilot whales and fowling cliffs are communally owned. The shieling area is part of the shieling system that probably preceded the *bøur-hagi* system.

Greenland (Jacobsen 1987; 1989, Jacobsen and Jakobsen 1986, Jakobsen 1989, Fredskild *et al* 1988). In Iceland, the evidence for widespread soil instability associated with the arrival of people is relatively comprehensive and convincing, with research aided by the application of tephrochronology and the existence of the *landnám* tephra layer (Þórarinsson 1961, Runólfson 1978, Þórarinsson 1981, Haraldsson 1981, Dugmore and Erskine 1994, Dugmore *et al* 2000). In south Iceland, it has been demonstrated that the rate of sediment accumulation over the settlement period increased by more than an order of magnitude (Arnalds 1987). It has been estimated that between 60 % and 90 % of the surface soil cover was stripped from the Eyjafjallahreppur area of south Iceland by 1985 (Dugmore and Buckland 1991). The massive extent of soil erosion was most likely caused by a combination of deforestation (Hallsdóttir 1987) and impacts of grazing animals (Einarsson 1963), although as with some Pacific island research, the observed environmental impacts have also been attributed to natural climatic changes (Ólafsdóttir and Júliusson 2000, Ólafsdóttir and Guðmunsson 2002). In Greenland, a record of sedimentation in a lake core from near the chieftain's seat, Brattahlíð, in the Eastern settlement, illustrates a threefold increase in sedimentation rates over the period of Norse settlement, which ceased suddenly after the farm was abandoned (Krogh 1982). This has prompted suggestions that the impacts people had on vegetation and that the resulting soil erosion, in combination with other factors, may have been considerable enough to result in cultural collapse (Jacobsen 1987; 1989, Jacobsen and Jakobsen 1986, Jakobsen 1989, Fredskild *et al* 1988).

Only limited research of human impact has been carried out in the Faroes (e.g. Hannon *et al* 1998, Hannon and Bradshaw 2000, Hannon *et al* 2001, Wastegård *et al* 2003). Recent research on Holocene landscape change in the Faroe Islands has predominantly focussed on either a palaeoecological approach that has sought to assess the impact of people on landscape, or on a geomorphological approach that has considered to a lesser degree the role of people in those landscape changes. Yet there has been no attempt to consolidate the results from these apparently diverse studies. Detailed geomorphologhical research that has been carried out, particularly in relation to past and present periglacial processes and landforms, and associated climatic controls (Humlum and Christiansen 1998a; 1998b), the geomorphology of highland aeolian deposits (Christiansen 1998) and relict rock glaciers and climatic implications (Humlum 1996) tends to underplay the influence of people on the Holocene landscape of the Faroes. Palaeoecologically orientated research has focussed more explicitly on the impact of human settlement in the late Holocene (Hannon *et al* 2001; 2005, Hannon and Bradshaw 2000) and this research does record significant anthropogenic impact on vegetation. The results from the two research approaches might therefore appear to be at odds with each other, even though consistent links between vegetation and geomorphic controls would be expected because of the interconnected relationship between periglacial activity, vegetation disturbance and soil erosion. Data from geomorphic and palaeoecological research may, however, appear inconsistent if the research approaches are operating on different temporal and spatial scales and therefore identifying subtly distinct landscape changes. In order to resolve this apparent incompatibility between results, a suitable approach, methodology, and field site selection is required, which is the focus of the following chapter.

Chapter summary

This chapter has provided a geographical and historical context to the research that follows, in terms of both the natural environment and climate, and the development of North Atlantic island colonisation and settlement. Concepts introduced above will be re-evaluated in the discussion in chapters 7 and 8. Research regarding human impact on the environment in the Faroe Islands appears to be both contradictory and limited and therefore human-environment interactions in the wider North Atlantic provided the conceptual and methodological framework for this thesis.

The following chapter details the selection of the specific field sites from which data was recorded and outlines the methodological framework used to direct the collection of data.