

Chapter 9

Conclusions: Under what circumstances do people put unsustainable demands on island environments?

Summary

The aim of this thesis is to identify the extent to which, and the circumstances whereby people might make unsustainable demands on island environments. This aim has been achieved through the development of the key themes of multi-scale, multi-disciplinary, scale-matching enquiry and a focus on common problems. A table summarising the thesis objectives and how they were achieved is presented as Table 9.1. Firstly, detailed and focussed research in the Faroe Islands was carried out at an appropriate spatial scale, from which details of pre-colonisation landscape change, the initial impacts of colonisers on a “pristine” environment, and longer-term anthropogenic impacts and adaptations, could be understood. Secondly, bold ideas were explored by developing a comparative approach that enabled the thesis to build upon the site-specific research, to a spatial scale encompassing Iceland and Greenland. Assessment of the Faroe Islands in a wider North Atlantic context allowed the understanding of colonisation, adaptation and long-term settlement undertaken by a comparatively well-known population in contrasting environments, to be developed. From this, general principles and patterns regarding human impacts on island environments can be suggested at a potentially global scale.

A fundamental objective of the research was to develop and utilise an approach that allowed data from a combination of environmental and culturally led methodologies to be integrated, so scale-matching is key. For the focussed, Faroe Islands research, a landscape-scale was applicable to both environmental and anthropogenic data, allowing diverse data sets to be compared. Original data was collected from areas of putatively early Norse settlement, specifically the catchment of Hov on Suðuroy and northern Sandoy, using landscape mapping techniques, archaeological survey, interviews, stratigraphic analyses and radiocarbon dating. From the incorporation of these datasets, conclusions regarding the location, timing, extent and causes of human impact could be drawn. Assessment at other scales was incorporated by utilising tephrochronological and sediment accumulation rate data collected from Iceland, and by developing a comparative approach from which the varying impact between the Faroes, Iceland and Greenland could be understood.

The thesis conclusions are outlined below and are structured around the questions raised in the introduction based upon the three principle scales of site specific research, inter-island comparison and of fundamental issues concerning islands and human impact.

Objectives	How objectives were achieved
<p>To develop scale-matching and a focus on common problems as ways of enhancing methodologies for integrated studies of human-environment interactions on islands.</p>	<ul style="list-style-type: none"> - Data from different methodologies (e.g. geomorphic mapping, archaeological survey, stratigraphic recording) evaluated at comparative scales in Hov and north Sandoy. - Integration of data from interviews with present day farmers to enhance historical landscape data. - Development of interviews (and cognitive mapping) as a step towards understanding the 'perception' element of human-environment research.
<p>To develop the interdisciplinary scale-matched, focussed approaches though detailed human-environment research in the Faroe Islands.</p>	<ul style="list-style-type: none"> - The recording over 80 soil profiles to build up a picture of late Holocene development in the southern Faroese landscape. - Undertook comprehensive archaeological walk-over surveys at a catchment scale where none previously existed. - In-depth interviews provided data at a localised scale and at a personal level to complement catchment to regional-scaled data. - Demonstrated importance of research in regions like the Faroes where landscape change has been limited, to compare against areas where landscape change has been significant.
<p>To develop the scale-matched, focussed approaches though an assessment of site-specific research in the Faroe Islands in the wider context of North Atlantic settlement.</p>	<ul style="list-style-type: none"> - Identified a methodology and approach (a landscape-scale based approach utilising different methods) to enable comparison. - Outcomes of landscape change and settlement on the Faroes were compared for the first time with those on Iceland and Greenland - Exploration of similar and contrasting patterns in the Faroes, Iceland and Greenland. - Used specific examples as small-scale analogues of larger scale comparisons between the Faroes and Iceland.

Table 9.1: The thesis objectives and how they were achieved.

Implications of site-specific research in the Faroe Islands

1. *Have natural or human impacts been the major driver of landscape development over the last 5 ka in the southern Faroe Islands?*

Natural processes set in motion prior to colonisation, have been the main factors shaping the contemporary Faroese landscape, out with the infields. The most significant threshold crossing event to affect the Faroe Islands landscape in the Holocene occurred prior to human colonisation at c.2900-2300 cal yr BP. It is proposed that deteriorating climatic conditions at this time, as supported by evidence from many North Atlantic records (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, O'Brien *et al* 1995, Denton and Karlén 1973, Karlén *et al* 1995, Dahl and Nesje 1994), initiated a variety of geomorphological changes resulting in the creation of a more varied landscape surface than existed previously. Several key elements of the present landscape were, therefore, already well established by the time of the arrival of people in the islands and the significant geomorphic changes acted to desensitise the impact of subsequent human impact 500-1000 years later.

2. *To what extent did people have an impact on the environment of the southern Faroe Islands and how did those impacts change through time and space?*

Although more limited in comparison to pre-colonisation geomorphic changes, human impact is evident at specific spatial scales. A second significant period of late Holocene landscape change, indicated by an influx of silts, gravels and clays in sediment profiles in the Faroe Islands occurred at c.60-660 AD. However, unlike earlier geomorphic changes recorded c.2900-2300 cal yr BP, where evidence of change is seen extensively across the landscapes of both Hov and Sandoy, the later changes vary in their timing and extent. An early phase of landscape change is evident in sediments from Sandoy, c.60-400 AD, but similar changes at Hov are not evident until c.400-660 AD. In the absence of a climatic driver for these changes, and because of their differential spatial and temporal occurrence, the simplest explanation is that the changes resulted from human impact by small-scale and probably episodic occupation of the islands. The spatial scale of these changes, which occur in profiles across both Hov and north Sandoy, implies some limited impact from grazing of introduced domesticates. However, as yet there is no firm evidence of human occupation in the Faroes prior to the 6th century.

Longer-term human impact on the Faroe Islands landscape is characterised by significant localised degradation of the vegetation cover and erosion of the underlying sediments. Grazing impact, and impacts relating to peat cutting have been the most significant causes of

anthropogenic influence in the outfields, post-colonisation. Grazing has undoubtedly affected the landscape to some extent, and has probably contributed to the formation of top silt present in the sediment profiles; however, in comparison to other islands, grazing impacts have been limited. At specific, spatially limited locations, human impact has caused significant landscape degradation (removal of vegetation cover and underlying soft sediments) as a result of peat cutting.

3. *Were unsustainable demands made on the Faroe Islands environment?*

In comparison to other islands, relatively few unsustainable demands have been made on the Faroe Island environment within the timescale of enquiry (pre-16th century). Human impact has been limited by a combination of inherent environmental factors, e.g. relatively robust soils, a predominantly open pre-colonisation landscape, and by the particular long-term subsistence strategy of the settlers, e.g. the regulated utilisation of pseudo-infinite resources and communal approaches to subsistence based activities. By analysing the circumstances whereby catastrophic impact was avoided in the Faroe Islands, assumptions can be made regarding what caused unsustainable demands to be made on island environments elsewhere.

Implications of inter-island comparisons in the North Atlantic

1. *To what extent are outcomes in terms of environmental degradation and resource exploitation between the Faroe Islands and Iceland similar and why?*

Iceland and the Faroe Islands differ in terms of their geography, environmental sensitivity and trajectory of landscape change. The focus towards the sea in the Faroe Islands, and to the land in Iceland may also have influenced how the two islands approached their subsistence strategies. For example, in the early Icelandic settlement period, archaeobotanical collections indicate that locally available pseudo-infinite resources, such as seabirds, were initially substantially utilised. However, after the 11th-12th centuries many collections were dominated by domestic mammals (McGovern *et al* 2006) until the 15th century when fishing increased. In the Faroe Islands, marine resources have provided a more significant and varied proportion of the islands' subsistence, from fish as well as pilot whales and seabirds, not just over the initial colonisation period, but over longer-term settlement.

2. *To what extent are outcomes in terms of environmental degradation and resource exploitation between the Faroe Islands and Greenland similar and why?*

Cultural and environmental factors of settlement in the Faroe Islands have not previously been compared with Greenland, but some aspects e.g. local geography, population density,

anthropogenic landscape impacts and subsistence strategies are strikingly similar (although climate factors, extent of conflict and settlement trajectories differ). In the Faroe Islands, the communal *grind* contributed a significant proportion of the subsistence base in the Faroe Islands, and had an important social function. In Greenland, the exploitation of migratory seals, caribou and seabirds provided a significant proportion of subsistence over the period of settlement. Hunting was carried out communally and, as with hunting in the Faroe Islands, probably had a social as well as subsistence/trade function. The long-term utilisation of pseudo-infinite resources in Greenland is therefore more comparable to that of the Faroes than Iceland.

3. *Why does impact between the North Atlantic islands vary?*

Based upon analyses of the data collected from the Faroe Islands, combined with an exploration of comparisons with Iceland and Greenland, the following factors are concluded to explain some of the variance in outcomes of human impact in the North Atlantic islands;

- *The inherent natural environment.* The inherent natural environment influences the extent to which people might have an impact on their environment, but rather than a deterministic force, matters specifically in combination with other factors. At a regional scale, this is demonstrated by comparisons between the farms and landholdings of Hofstaðir and Sveigakot in northern Iceland. There is greater degree of buffering at Hofstaðir, whose landholding and environs are characterised by relatively good grazing land. Therefore, human impact, as a result of climate changes or unfavourable human decision making, may be offset to some degree. At an inter-island scale, the significance of the inherent natural environment is demonstrated by comparisons between the vegetation and soils of the Faroe Islands and Iceland. The predominantly open nature of the pre-colonisation Faroese environment, combined with the relatively robust vegetation and soils, lessened human impact caused by deforestation and soil erosion. Some aspects of this argument are, however, only significant with regards to the particular way in which people decide to utilise that environment. For example, if the Norse Icelanders had not pursued a strategy of extensive deforestation, the issue of vulnerable soil would have been less significant (but a pastoral base to subsistence farming would have been impossible).
- *The pre-settlement development of the natural environment.* Whether or not people make unsustainable demands on their environment is influenced by the direction of the pre-colonisation environmental trajectory. At a regional scale, this is demonstrated by differences in the post-settlement trajectories of the farms and landholdings of Mörk and Dalur in southern Iceland. Dalur and Mörk are (and were) situated only a few kilometres from each other, at similar altitudes with identical soils and and climate. Yet the two farms

experienced divergent environmental trajectories; soil erosion has been of much greater significance at Mörk than Dalur. The pre-colonisation environment of Dalur already resembled a landscape affected by anthropogenic impact (predominantly open, with few trees), and limited scales of landscape transformation probably contributed to the more limited soil erosion. At an inter-island scale, the significance of the pre-settlement environmental trajectory is illustrated by sediment profiles in the Faroe Islands. c.2900-2300 cal yr BP, the Faroese landscape underwent a significant change from a peat dominated to a more variegated landscape, which may have acted to desensitise the island landscapes from the impact of people following settlement c.500-1000 years later. Therefore as the Faroe Island landscape underwent significant environmental changes prior to occupation, the impact of settlement is not as significant in the environmental record as, for example, in Iceland.

- *Emphasis on a diversity of subsistence, especially utilisation and access to pseudo-infinite resources.* Although the robustness or sensitivity of the inherent natural environment is crucial, the inappropriate or ineffectual use of available resources or technology also influences the impact of people on the environment. At a regional scale this is demonstrated by the example of Mörk in southern Iceland. Although the vegetation had changed, causing considerable erosion and landscape degradation, alternative resources and landholdings outside the contiguous farm provided Mörk with greater opportunities and buffers, which ensured that the degradation could be managed and that the farm site survived. At an inter-island scale, the importance of pseudo-infinite resources is illustrated by subsistence strategies in the Faroe Islands, which were based on a diverse range of practices including both domestic pastoralism and the continuity of the substantial utilisation of pilot whales, seabird colonies and fish. Effective utilisation of these resources, however, depends on factors other than simply their availability. For example, to exploit marine resources, suitable boats and harbours were needed. In addition, a pool of labour that could be quickly mobilised was required for hunts or expeditions. For example, the success of the *grind* depended on the fast mobilisation of villagers and boats in addition to a well-developed system of alerting other villages through use of the *grindaboð* (a message that a grind had been located) and *grindaglaða* (a beacon lighted to transmit the *grindaboð*).
- *Emphasis on communal decision making and activities.* The effective utilisation and regulation of resources appears to have been accomplished in the Faroe Islands by an emphasis on communal activity and decision making. Decisions regarding both pastoral subsistence activities and resource exploitation were implemented at the scale of a collection of farms or the village. For example, while each farmer owns certain sheep and feeds them through the winter, in the summer sheep graze in jointly owned and demarcated sections of the outfields. The success of a *grind* was also dependent on

collaboration amongst the local population, and the importance of community relations is demonstrated by the sharing of the catch of the *grind*, which was distributed amongst all inhabitants of the village, regardless of their extent of landownership. Regulating the exploitation of pseudo-infinite resources also appears to have been successful in the Faroe Islands. Regulations to prevent overexploitation were in many cases implemented at a community/village scale by the *grannastevna*. In Greenland, communal activities also featured highly in the seasonal round, including seal drives, guillemot harvesting and autumn caribou hunts. Communal led activities assume a different importance in Iceland, on the other hand, where key subsistence activities were carried out on a more independent basis. This probably reflects differing access to the sea (and distances from it), the availability of boats, the lack of major whale/seal migrations and more limited bird colonies.

4. *Are the consequences of human actions taken on the Faroes applicable to understanding human-environment interactions in Iceland, Greenland or even more distant islands?*

This thesis highlights the limited significance of human impact on the Faroe Islands environment in comparison to that on islands elsewhere, in both the North Atlantic and Pacific. In much research on human impacts on islands, investigations are biased towards those farms, landholdings or islands where impacts have been most significant, even catastrophic. However, by understanding why the Faroe Islands *have not* undergone significant human impact, assumptions can be made, and new hypotheses tested regarding why human impact has been more significant on some islands, e.g. Iceland, or why the outcomes of settlement were different, e.g. Greenland.

Therefore, the subject of under what circumstances people put unsustainable demands on island environments may be alternatively approached through evaluation of farms, landholdings, regions or islands whereby human impacts on the environment were *less* significant.

Implications of the thesis for the fundamental issues of islands and human impact

1. *What causes "threshold crossing events" to occur in island environments?*

The focussed Faroe Islands research has demonstrated that people do not always cause threshold crossing impacts on islands that are analogous to that of Easter Island or Iceland, and that the degree of human impact can be different, even on islands that look superficially similar today. Comparisons of the Faroes with other North Atlantic islands has shown that threshold crossing events in the Faroes were limited by many factors including landscape transformation prior to colonisation, relatively robust vegetation and soils, the regulated

utilisation of pseudo-infinite resources in combination with pastoral farming and an emphasis on communal resource acquisition and decision making. These factors would also seem to apply at much larger scales, to islands out with the North Atlantic. The wider implication is that human impact would be more significant on islands where there has been a limited breadth of landscape transformation, environmental sensitivity in terms of biota or soils, limited access to pseudo-infinite resources, an emphasis on bounded resources and emphasis on independent decision making and activities.

Despite the differences in island locations, environments, climates and the cultural backgrounds of the settlers, there are recurring themes that are applicable to most island colonisations and, which ultimately influence the circumstances whereby people put unsustainable demands on island environments. These are;

- the breadth of landscape transformation prior to human settlement,
- the fundamental sensitivity or resilience of the environment, biota or soils,
- the balance between cash/trade and subsistence activities,
- the balance between reliance on bounded and pseudo-infinite resources,
- the importance of communal organisation in terms of labour.

2. *Is it the degree and extent of human impact or the inherent sensitivity of an island environment that matters more in terms of environmental change and cultural collapse?*

The extent of human impact is influenced by varying degrees by both the inherent sensitivity of an island environment and by how populations utilise their resources. However, human impact is likely to be more significant if the environment is highly sensitive and if there is access only to a narrow range of resources. Environments of islands with a more diverse range and greater depth of resources and a more robust environment are buffered to some degree from experimentations, mistakes or environmentally unfavourable decisions made by colonising populations. Therefore, even if people make mistakes, the landscape can cope (although an impact will still be seen in environmental records). Where outcomes are buffered, an additional problem lies in the timing and unpredictability of perturbations or change, which determines how long people have to respond/adapt. Even with buffers in place, cultural collapse may occur in societies that don't respond quickly or effectively to change.

3. *At what scales can we understand human-environment interactions on islands?*

Human-environment interactions need to be understood at many different spatial scales (Figure 9.1), in order to both integrate cultural and environmental data, and to explore the many facets of a common problem. A focussed, hypotheses-led approach based on the

collection of datasets from different disciplines and utilising different methods, needs to be balanced with comparative research at a range of spatial scales, e.g. comparison between individual sediment stratigraphies within a catchment, comparison between catchments on neighbouring islands, and comparison between the outcomes of settlement on diverse islands. As Kirch (2000: 323) states with reference to Pacific island archaeology and historical anthropology;

...for through comparison we move beyond the particular, the local, and the time-bound, to what is generalising and sometimes global. Comparison reveals similarity as well as difference, exposing patterns that lurk beneath variation. Ultimately, comparison yields general principles (not "laws"), and it is these which allow us to make of our historical narratives not merely "just so stories" but robust explanations of historical phenomena (Kirch 2000).

This thesis has incorporated focussed research, based upon the collection of empirical data and has applied to the North Atlantic islands, a comparative approach supported by Kirch. Several bold ideas have been introduced, and it remains for these to be further explored and tested with more site-specific focussed research at appropriate scales.

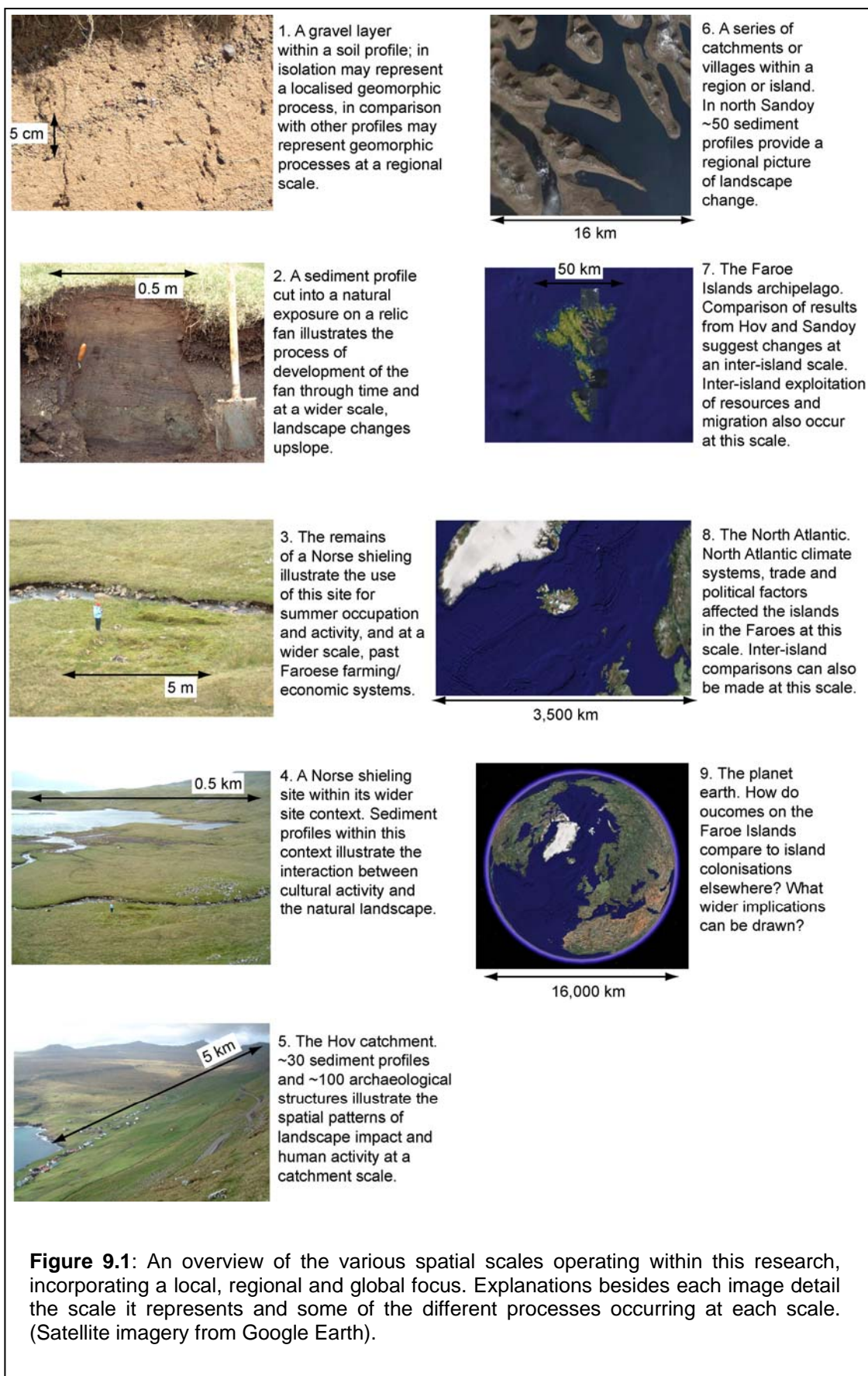


Figure 9.1: An overview of the various spatial scales operating within this research, incorporating a local, regional and global focus. Explanations besides each image detail the scale it represents and some of the different processes occurring at each scale. (Satellite imagery from Google Earth).