

Chapter 1

Introduction: Islands and human impacts

Overall aim and objectives

The overall aim of this thesis is to examine and understand the extent to which, and the circumstances whereby, people make unsustainable demands on their natural environment, and in doing so to consider why socio-environmental crises may or may not develop. To achieve this, the following research objectives were identified;

1. To develop scale-matching and a focus on common problems as ways of enhancing methodologies for integrated studies of human-environment interactions on islands.
2. To develop the interdisciplinary, scale-matched, focussed approaches through;
 - (i) detailed human-environment research in the Faroe Islands, and
 - (ii) an assessment of site-specific research in the Faroe Islands in the wider context of North Atlantic settlement.

Rationale and overall importance of the research

Environmental degradation resulting from the actions of people is a contemporary issue of global importance and is reflected by increased erosion, desertification, deforestation and species extinction. The outcomes of environmental degradation primarily resulting from short-term impacts may include the decline or extinction of species, a decline in living standards/quality of life, and conflict; however, consequences of longer-term environmental degradation may be that the environment is no longer able to sustain human populations. For example, there are incidences in the past where environmental degradation has caused cultural stress and may have influenced the collapse of societies on different scales from isolated islands, e.g. Easter Island, to complex regional organisations, e.g. the Mayans (Diamond 2005). This thesis is concerned both with the identification of past incidences of environmental change and degradation, and also with the identification of instances where environmental degradation has not been a significant issue. In this case, questioning why human impact is limited is as significant as examining why human impact elsewhere has been acute. The research also aims to examine the form that environmental impact takes, the extent of impact and an understanding of the reasons behind anthropogenically caused environmental degradation, including the conscious or sub-conscious circumstances under which people impact their environment.

One of the most critical issues in historical human-environment research is the extent to which on the one hand climate change has significantly affected the natural environment, or on the other hand, the extent to which people themselves undermine their long-term survival through irrevocable environmental damage. Current historical research emphasises the role of large scale environmental degradation in social collapse (Diamond 2005, Morisson 2006).

The conclusion of the majority of palaeoenvironmental research on Pacific islands is that people have been prominent in radically transforming island environments through species extinction, deforestation, erosion and soil depletion. In the North Atlantic, anthropogenic impact has caused a significant reduction in vegetation cover, destabilisation of slopes and an increase in erosion in Iceland (e.g. Arnalds 1987; 2000, Simpson *et al* 2001, Hallsdóttir 1987), which has been described as “a doomsday scenario for the rest of the world”. Anthropogenically induced environmental impact has also been implicated as a factor in the collapse of Norse Greenland in the 15th century (Fredskild 1978, Jakobsen 1991, Sandgren and Fredskild 1991). In the Faroe Islands, however, research regarding the impact of colonisation and long-term settlement on the landscape and environment has been limited (e.g. Hannon *et al* 1998; 2001; 2005, Hannon and Bradshaw 2000, Edwards *et al* 2005a, Lawson *et al* 2005). The relatively small area available for intensive infield agriculture, the steep slopes, the high relative relief of the outfields, and the overall geographical marginality of the islands, might suggest a high degree of landscape sensitivity to anthropogenic impact, but it is not known how impacts on the Faroes compare with impacts elsewhere in Norse North Atlantic, i.e. Iceland and Greenland.

Although the extent of impact can be questioned, the leading hypothesis, therefore, is that human impact has significantly contributed to environmental and cultural stress on islands. Important points not often considered are *why* people made these unsustainable demands on their environment when the outcomes have been obviously (or perhaps not so obviously to those concerned) devastating.

The importance of an interconnected human-environment approach

Attempts to understand the outcomes of factors leading to environmental or cultural collapse have often resulted in the inference of single, causal mechanisms of change. For example, the adage “it got cold and they died” with relation to the fate of the Greenland Norse implies a direct causal relationship between the onset of the “Little Ice Age” cold phases and the disappearance of the Norse Greenlanders. This is an overly deterministic example, but many other less deterministic although mono-causal, explanations have been suggested in relation to incidences of cultural stress or settlement abandonment. Single-factor explanations, whether deterministic or not, are overly simplistic, yet research frameworks are often

established in a way that directs the focus of research on the causal factors, while neglecting to examine how those factors are interrelated. This research aims to examine the impacts of people on the environment and impacts of environmental change on people through recognition and exploration of these various and interconnected complexities.

The importance of a historical perspective

A major (if not the major) current environmental issue is global climate change. There is pressing evidence it exists and that the primary cause is atmospheric impacts caused by industrial activity (IPCC 2007). Yet significant human impact is not confined to the industrialisation of the last 300 years; while the scale of current global issues might seem to overshadow the impacts of indigenous/pre-industrial people on the terrestrial system, many parts of the world have been significantly transformed by long histories of human activity, occasionally resulting in environmental devastation and in some cases cultural collapse. Therefore, in evaluating current human impact, historical perspectives are key, as they enable us to consider not only long term trajectories of change and the causes of human actions, but crucially the consequences and outcomes of those human choices and actions. The extent to which a society approached or crossed critical environmental or cultural thresholds, and the significance of these thresholds (i.e. where a recovery was no longer possible), can therefore be assessed.

The importance of an island focus

There are specific characteristics of many islands, for example, their size, isolation, ecology and the late timing of colonisation by people, that make them exemplary field sites for research into human-environment interactions. Island environments are particularly sensitive to human impact because their generally smaller size means resources are limited, scarce or finite, resulting in increased pressure on those resources. Their often isolated location reduces the options or buffers available to the islanders in times of crisis. For example, in historical island societies it was not always possible to import additional resources in order to alleviate pressure on the islands' existing resources. The late settlement of many islands has meant that island biota has evolved over long periods of time without the influence of people and this makes that biota all the more vulnerable to anthropogenic disturbance when people finally do arrive. Initial rapid human population growth, and the growth of animal introductions, also presents an additional pressure on both the vulnerable biota and on limited resources.

These very same characteristics are what make such islands exemplary locations for researching past human-environment interactions. For example, the relatively recent

colonisation of many islands has created a clear pre-people environmental baseline from which to investigate initial impacts on a previously “pristine” natural environment. Socio-political diversity is also reduced in these island locations by account of their isolation, which allows interconnections between environmental and socio-political change to be more closely examined and increases the visibility of impacts observed in environmental records. Feedbacks, responses to change and thresholds can be investigated at a more manageable level than on continental or landlocked societies where defining geographical, ecological, historic and social boundaries becomes problematic. Furthermore, the islands of the North Atlantic are located at a crucial climatic boundary at the convergence of warm Atlantic and cold Arctic air masses and currents, which render the environments of the North Atlantic islands particularly sensitive to climate changes. The influence of these climatic mechanisms, as well as having a more discernable impact on the people who live there, also contribute to the clearer identification of climatic impacts in the environmental record of the terrestrial landscape, and allow the interactions between people and climate to be investigated.

Scales of research

In investigating the question of under what circumstances people put unsustainable demands on island environments, this research will assess the interconnections between landscape change and human settlement in the Faroe Islands prior to and after Norse colonisation, historically dated to the early 9th century (Arge 1991). In considering the Norse colonisation in its wider context, the research embraces a temporal scale covering pre-settlement from around the mid Holocene (c.5 ka BP), through to the pre-16th century. The specified temporal scale enables an examination of the pre-human environmental trajectory of the islands, while allowing the subsequent processes of colonisation, initial adaptation and longer-term settlement (i.e. the degree of sustainability) to be considered.

The spatial scale envelops not only the Faroe Islands, but also incorporates the other North Atlantic islands colonised by the Norse; Iceland and Greenland (Figure 1.1). This spatial extent covers a wide environmental and climatic range, from the temperate oceanic climate and associated ecology of the eastern North Atlantic, to the Arctic climate and ecology of Greenland in the west. Geologically, this range incorporates one of the youngest countries on earth (Iceland) and one of the oldest (Greenland). Each North Atlantic island would, therefore, have presented a unique environmental challenge to the settlers. This may have been the lack of trees and limited cultivable land in the Faroes, the impacts of volcanic eruptions and the sensitivity of the fine-grained aeolian soil in Iceland or the problems posed by the Arctic climate, where animal husbandry was at its limits in Greenland. Yet the settlers

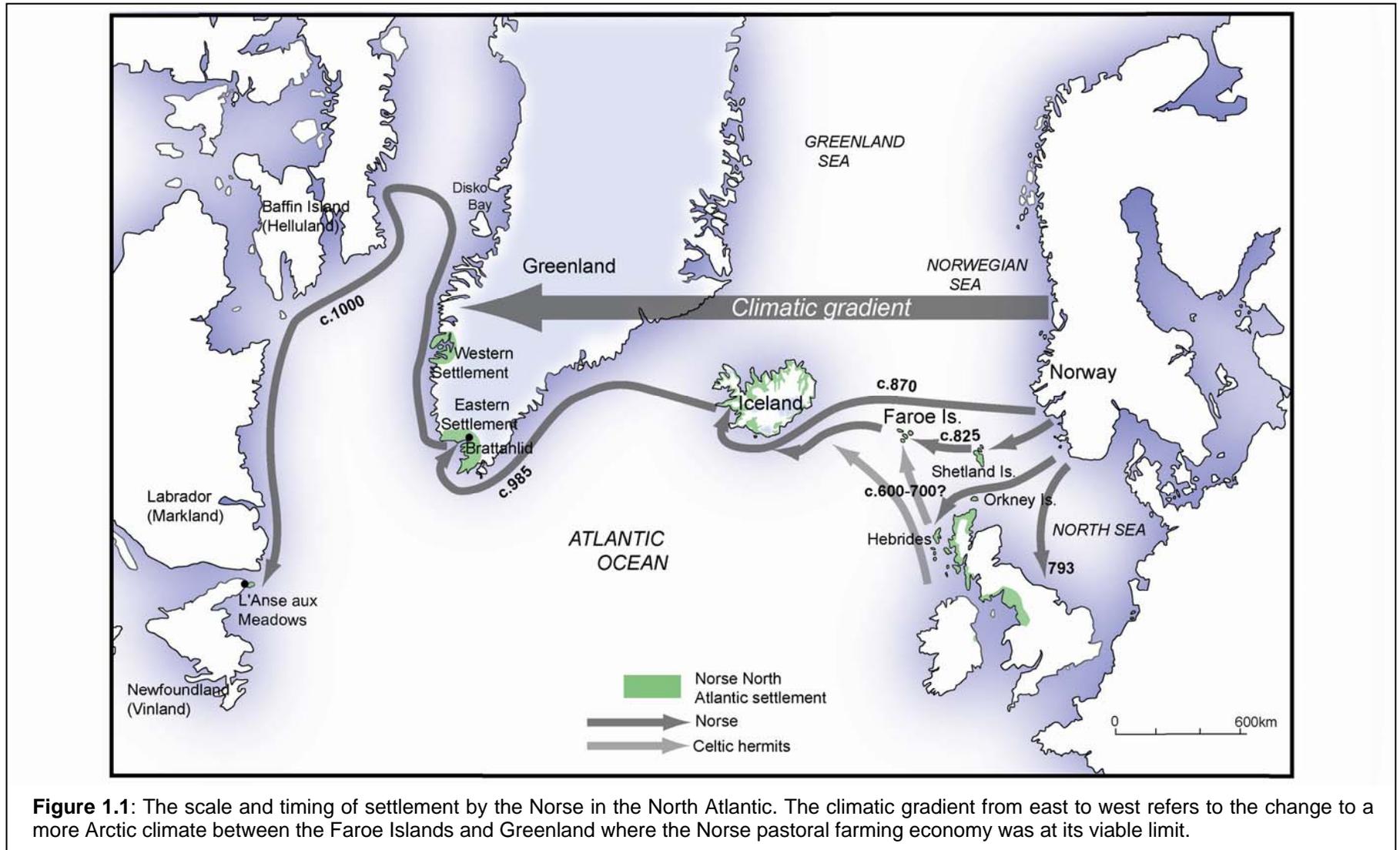


Figure 1.1: The scale and timing of settlement by the Norse in the North Atlantic. The climatic gradient from east to west refers to the change to a more Arctic climate between the Faroe Islands and Greenland where the Norse pastoral farming economy was at its viable limit.

who colonised these islands brought with them a familiar “cultural capital” and similar pre-conceived ideals of pastoral farming that had been passed down through the experiences of generations and had been developed to suit the environment of their Norwegian homelands. The challenge to the Norse when colonising the North Atlantic islands was, therefore, to adapt in turn to these new environments, while maintaining their traditional Norwegian based pastoral economy, which formed the foundation of their experience. In terms of assessing the circumstances under which the Norse might have made unsustainable demands on these North Atlantic environments, it will be questioned to what extent the Norse attempted to play out their Norwegian-based pastoral farming model in the newly colonised North Atlantic islands and to what extent they were successful.

The North Atlantic islands are therefore ideal to test interactions of the human-environment system. Considered together, they permit a comparison of colonisation, adaptation and longer-term settlement undertaken by comparatively well-known populations, in contrasting environments, across a climatic gradient with contrasting climate change. Ideas of adaptation and utilisation of resources can effectively be tested by studying how the landscape of these islands has changed through space and time. The landscape will be explored at a variety of spatial scales; of individual stratigraphic profiles, transects, across catchments and comparisons between islands. This is why the issue of scale-matching at appropriate steps of the research is of fundamental importance. Although impossible to test directly, the role of cultural explanation, such as how the goals and aspirations of the settlers are connected to the evidence of impact illustrated by the landscape record, is also crucial, and will be considered in the thesis discussion.

Thesis structure and summary of research approach

The thesis structure is outlined by Figure 1.2. There are very few scenarios where the interactions between environment and people are simple enough to be regarded as evidence of linear causality. Such relationships are inevitably more complex and therefore a variety of methodologies that aim to tackle this complexity is desired, and scale-matching at different stages is key. To encompass such a range, a combination of methodologies has been applied. The aim is to link environmental data based on mapping of geomorphology and stratigraphic sediment analyses with cultural data based on archaeological survey and participant interviews. Each of these single methodologies alone yields interesting and informative data, but the real challenge is to begin to incorporate the data and results of multiple approaches, in order to offer a new perspective on the settlement and environment of the North Atlantic. This research develops a historical ecology and multidisciplinary approach that recognises the complex and non-deterministic nature of the relationship

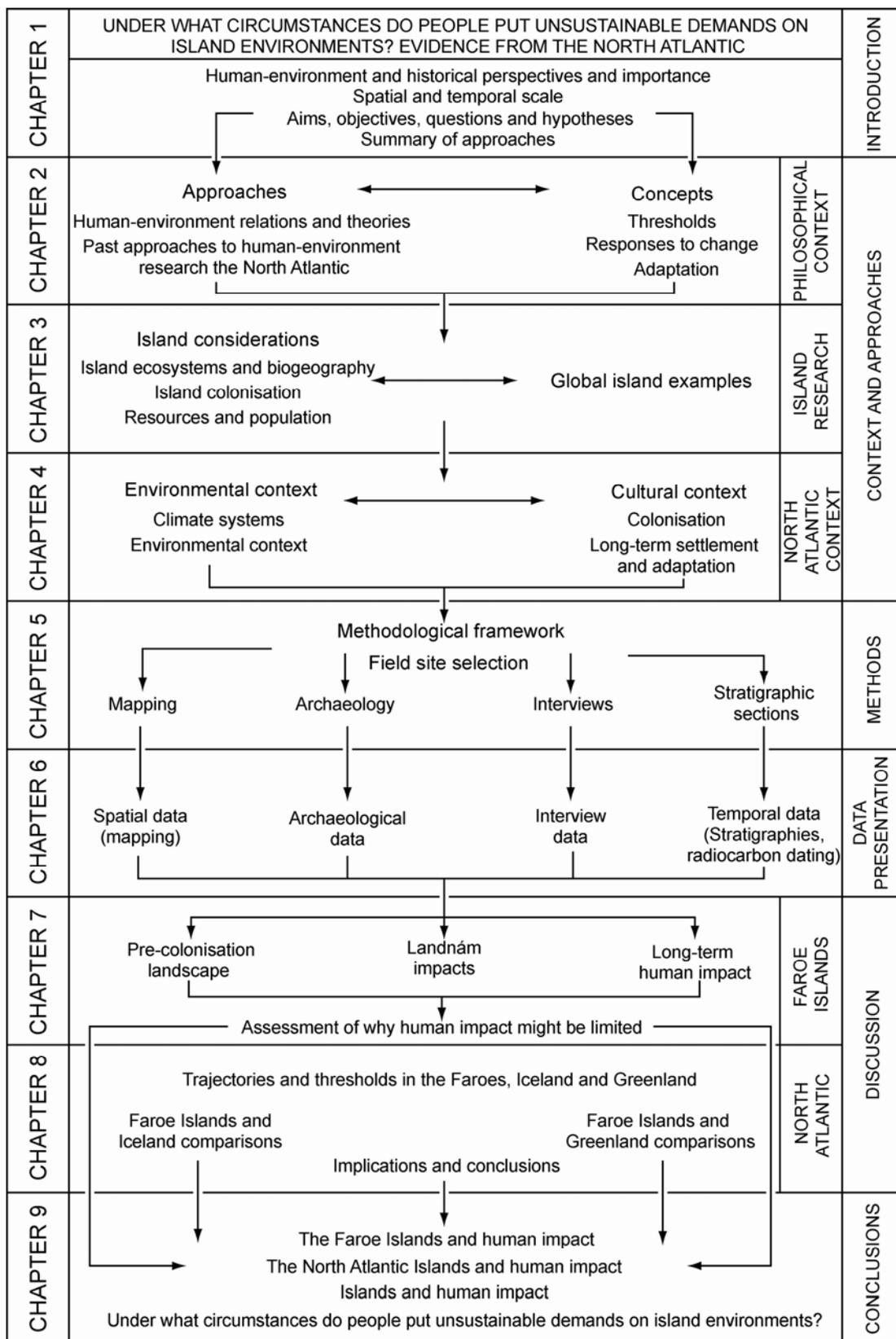


Figure 1.2: Thesis structure

between people and their environment, and seeks to link humans and the environment through the manifestations of both in the landscape (Crumley 1994). This approach is emphasised through the collection of data with overlapping temporal frameworks, and from spatial contexts that encompass a range of scales (Figure 1.3). The multi-scale approach initially focussed on the Faroe Islands as a principle source of original data. The assessment of fundamental issues then required a switch of scales to an assessment of the original Faroe Island case studies in the context of the wider North Atlantic area, and in comparison with island colonisations elsewhere.

Specific research questions and hypotheses

Figure 1.4 outlines the framework and relationships between the overall aim, the thesis objectives, research questions and the specific hypotheses. The overall aim is approached through the thesis objectives that focus on the wider philosophical and methodological context of the research, through research questions that focus more explicitly on particular themes, and by research hypotheses that focus on the site-specific aspects of the research. These are outlined in more detail below.

The overall aim requires investigation at a range of scales that are explored within the framework of research questions below (Figure 1.5). The development of the initial research agenda is focussed towards a global context of island research and targets wider issues of island systems, colonisation, human impact on the environment and adaptation to new environments. In order to form testable hypotheses with which to resolve these fundamental issues, a framework of research questions was developed at a detailed and appropriate scale, focussed on specific catchments in the southern Faroese islands of Suðuroy and Sandoy whose location is illustrated by Figure 1.6. In order to target the wider issues encompassed by the specific and detailed data, and to understand the extent to which these results were applicable only to specific field sites or whether the results could be applied within a more generalised perspective, it was necessary to relate the results from specific catchments in the Faroe Islands back to the wider context. This is achieved through a comparison of the outcomes of human settlement on the Faroe Islands with that of other North Atlantic islands settled by the Norse, specifically Iceland and Greenland.

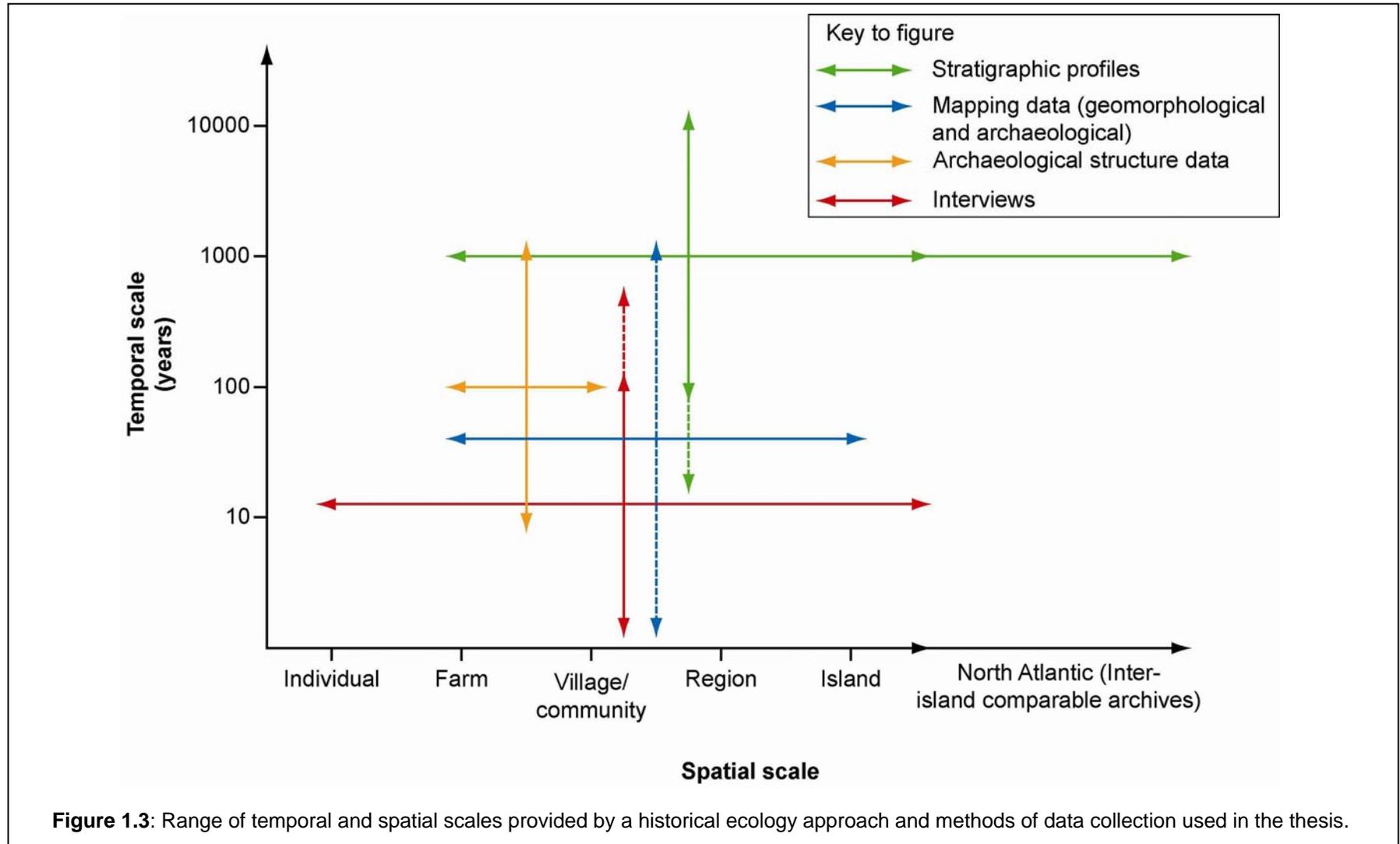
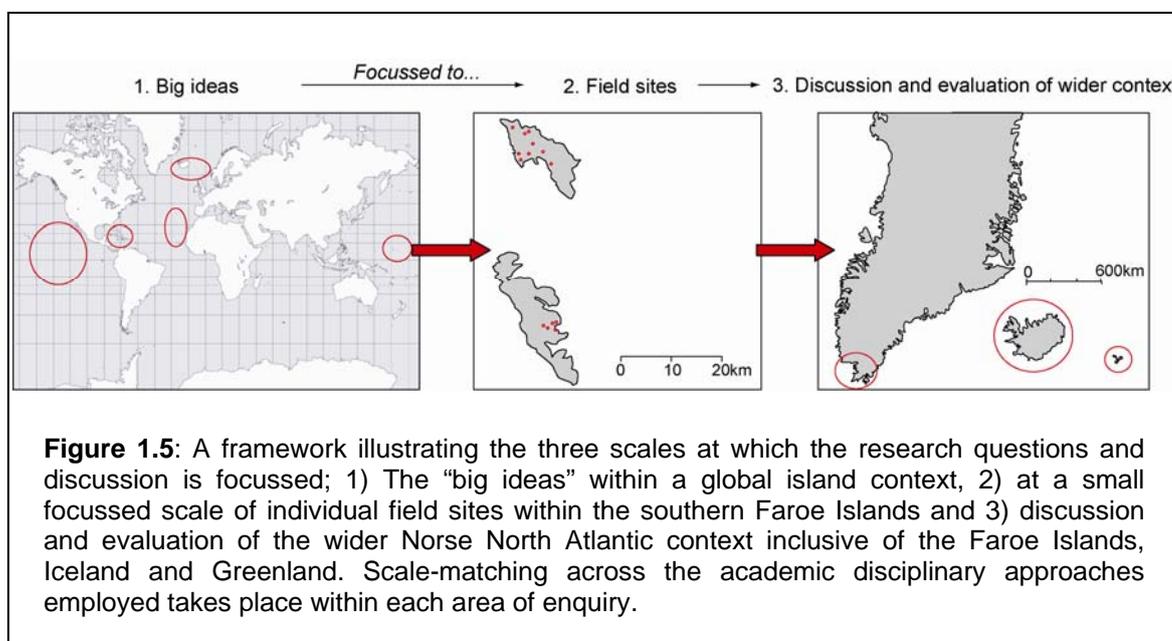
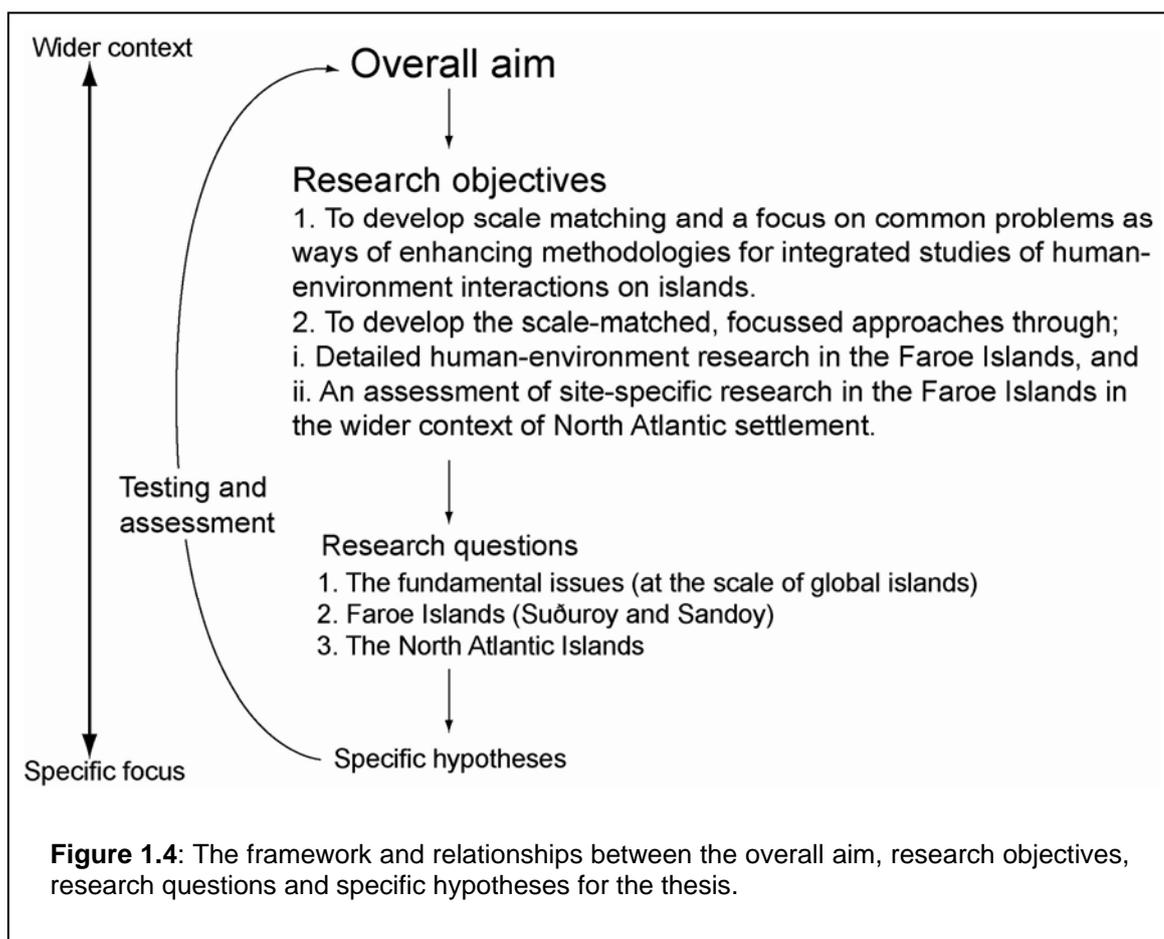
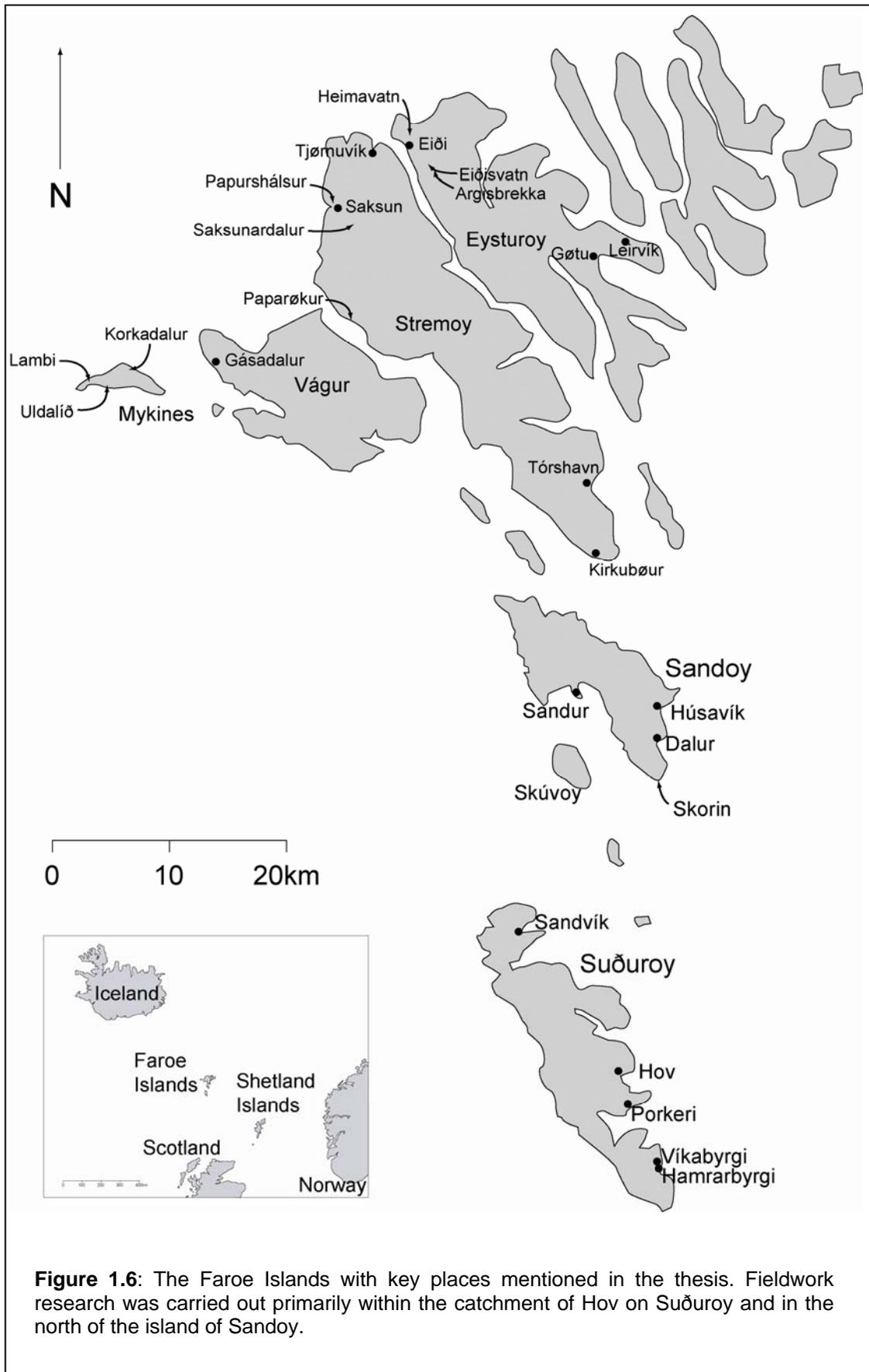


Figure 1.3: Range of temporal and spatial scales provided by a historical ecology approach and methods of data collection used in the thesis.





Specific research questions applicable to the “fundamental issues” (at the scale of global islands)

- 1. What causes “threshold crossing events” to occur in island environments?**
- 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?**
- 3. At what scales can we understand human-environment interactions on islands?**

Site-specific research questions applicable to 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?**
- 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?**
- 3. Were unsustainable demands made on the Faroe Islands environment?**

Research questions applicable to the wider context (at the scale of the North Atlantic islands)

- 1. To what extent are outcomes in terms of environmental degradation and resource exploitation between the Faroe Islands and Iceland similar and why?**
- 2. To what extent are outcomes in terms of environmental degradation and resource exploitation between the Faroe Islands and Greenland similar and why?**
- 3. Why does impact between the North Atlantic islands vary?**
- 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?**

Hypotheses

In order to respond to these questions, six principal hypotheses were developed to be tested in the Faroe Islands. These hypotheses are outlined in detail in Table 1.1 and are also examined in relevant sections in Chapters 7 and 8.

Chapter summary

In this chapter, the aims, objectives, research questions and hypotheses that have directed the thesis have been presented and the main structure of the thesis has been outlined. Some of the major themes regarding human-environment research, which form a backdrop to the thesis, have also been introduced.

The following chapter expands on some of these themes with an introduction to some of the principle concepts of human-environment research and a discussion of how theories of human-environment research have developed over time.

Hypotheses	Alternative hypotheses
1. Mid-late Holocene environmental trajectory	
<i>The major landscape threshold in the Faroese Holocene environment was crossed at the time of settlement, i.e. Settlement and subsequent human impacts have been the major determinants of the present day surface landscape.</i>	A significant threshold was crossed some time prior to <i>landnám</i> and hence major landscape change was initiated by an external perturbation not related to people, i.e. Natural impacts have been the major determinants of the present day surface landscape.
2. Formation of top silt	
<i>Deposition of gravels and high-altitude silts is triggered by a single geomorphic event, whereby the silt has to be eroded first from mountaintops/ plateaux followed by the underlying gravel.</i>	The influx of gravel and later silt are the result of two separate processes, the first, whereby peat is eroded, exposing underlying gravels which are washed down slope, the second, resulting in the erosion of silts.
3. The impact of landnám	
<i>The settlement of the Faroe Islands by the Norse around A.D. 800 caused significant landscape changes including a reduction in vegetation cover, destabilisation of slopes and an increase in erosion.</i>	Settlement of the Faroe islands has not caused significant changes to the landscape.
4. Relationship between archaeological structure density and landscape degradation	
<i>Areas with a distinctly high density of archaeological features correspond with areas of higher landscape degradation.</i>	Areas with a distinctly high density of archaeological features do not correspond with areas of higher landscape degradation.
5. Development of human impact over time	
<i>Human impacts diminish through time as people adapt their subsistence practices to the specific landscape, geographical and climate conditions.</i>	Human impact increases through time because people continue to carry out activities that may be environmentally unsustainable over millennial scales or because natural factors, such as climate, exemplify human impacts unless subsistence strategies are amended.
6. Adaptation to the environment	
<i>There is evidence that the settlers did not always adapt to their environment, which resulted in long-term environmental instability and a reduction in natural resources.</i>	There is evidence that the settlers made adaptations to their environment which prevented long-term environmental instability and a reduction in natural resources.

Table 1.1: Specific hypotheses tested at field sites in the Faroe Islands.