

Chapter 5

Methodological framework and data collection

Introduction

This chapter begins with an outline of the methodological framework used to direct the collection of data. The implementation of a variety of methodologies was a crucial part of achieving the objective of developing a scale-matched approach, where data from different disciplines can be integrated. Initially, Figure 5.1 is described to illustrate how the results from different approaches used in the thesis may be integrated, and how these contrasting data sets may be used to assess a variety of key questions. Individual methodologies are then described separately as spatial (landscape mapping and archaeological survey), conceptual (interviews) and temporal (stratigraphic profiles and chronology) methods. The selection of the field sites is also discussed.

Methodological framework

The focus of the approach and methodology is at a landscape-scale. Landscape can be viewed as both natural, influenced by geology, impacts of climate and geomorphological processes, and as cultural, as influenced by its archaeology, settlements, resource exploitation and human activity (Figure 5.1). The surface landscape and underlying soft sediment reflects the integration of a combination of these anthropogenic and natural influences and impacts, and thus landscape can be used as a common unit of analysis in a wide range of disciplinary fields, e.g. geomorphology, ecology, archaeology, anthropology. A focus on landscape change allows the incorporation of both quantitative and qualitative information at a scale applicable to most human-environment interactions (Crumley 2000). In order to begin to disentangle these different influences, a wide range of methodologies, targeting a wide range of data sets, needs to be applied, with landscape as a focus. The data sets that illustrate evidence regarding the physical and cultural landscape are considered in this chapter as component parts, although results arising from the data collection need to be considered within an integrated framework if an adequate understanding of human-environmental interactions is to be achieved.

Landscape-scale morphological units and their corresponding boundaries (Figure 5.1: 2) represent one specific dataset, from which boundaries, limits and thresholds can be identified in the environment. For example, changes in landscape unit boundaries are important in relation to the identification of key environmental thresholds including periglaciation limits, slope stability and soil erosion, which can be assessed. At a more

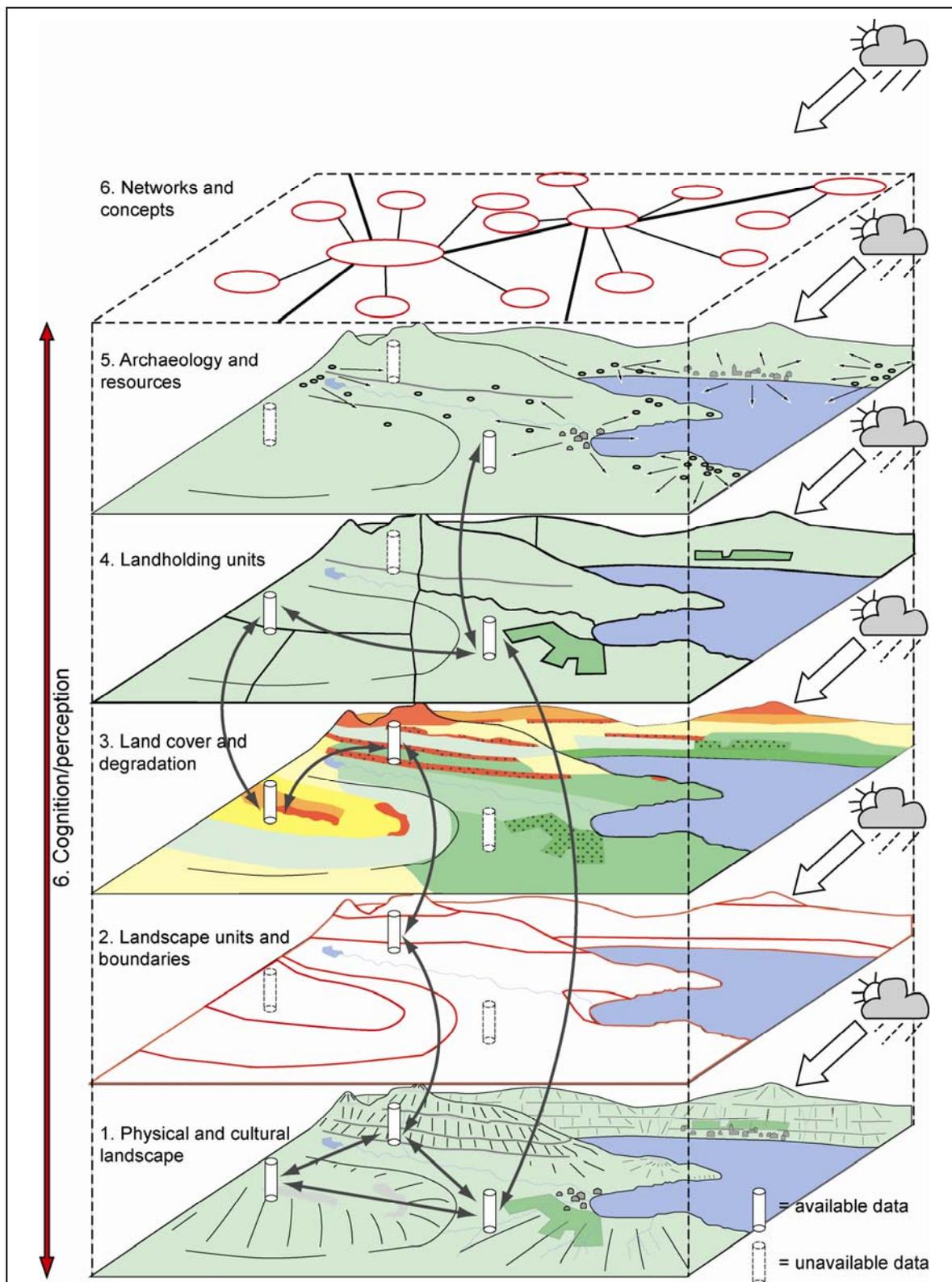


Figure 5.1: Conceptual diagram illustrating the integration of methods used in the research. Available/unavailable data refers to the unavailability of data across the landscape at a specific level of investigation. The diagram highlights that even when data is missing from specific areas at a particular level, by adopting a landscape-scaled approach to several methodologies, different data in diverse areas of the landscape can be connected. See text for detailed description of diagram.

detailed scale, and relating to more subtle effects of human impact, land cover classification based on the percentage of landscape cover across a landscape (Figure 5.1: 3), was an additional method, used to identify key environmental thresholds, and accumulated impact, particularly regarding soil erosion. Landscape units and land cover extent therefore represent the accumulation of a combination of natural and anthropogenic induced impacts up to the present day. A challenge when analysing this data is to be able to determine the timing of significant landscape events, in order to understand their causal factors. It is useful to disentangle those landscape features that were formed prior to the arrival of people, from those that may have been influenced by people. Also, early human impact as people were still adjusting to their new environment, may be different from later impacts that illustrate the degree to which the Norse adapted (or not) to environmental, climatic and cultural conditions over the longer term.

While landscape units and land cover extent establish key environmental boundaries, landholding units or farm boundaries (Figure 5.1: 4) define fundamental cultural boundaries between different landholdings, settlements or farms. This is important in terms of questions of land management, and critically, operates at a scale comparable to that of landscape units and land cover classifications. Archaeological survey data operates at a different, but complementary scale, and can indicate sites of cultural activity and concentrations of resource exploitation, such as that relating to peat cutting, drainage or shieling activity (Figure 5.1: 5). The identification of sites where human activity is concentrated can be mapped against geomorphological details. Archaeological and historical data (gained from oral interviews as well as written sources) also provide information regarding cultural thresholds, such as the changes in cultural activities or subsistence methods practiced by the settlers. These various facets of the cultural and natural landscape are bound together by a cognitive framework, viewed in terms of perceptual networks rather than necessarily in terms of the physical landscape (Figure 5.1: 6). Cognitive frameworks are the most difficult aspect of landscape to understand because unlike anthropogenic activities or climatic impact, they do not manifest themselves as physical evidence in the landscape record. Interviews were conducted with present day Faroese farmers who are knowledgeable of traditional farming methods and whose familiarity with oral histories goes back several generations. However, knowledge and oral histories are limited in temporal scale to a few generations previous, and as the interview data represents the farmers' own perceptions or opinions of the past, they are influenced by peripheral factors.

All aspects of the physical and conceptual landscape described by Figure 5.1 are affected by a temporal dimension. The form of the physical landscape changes over time, as do perceptions of that landscape and its natural resources. Figure 5.2 illustrates the temporal dimensions of this research. Comparison between boundaries of similar soil contexts across

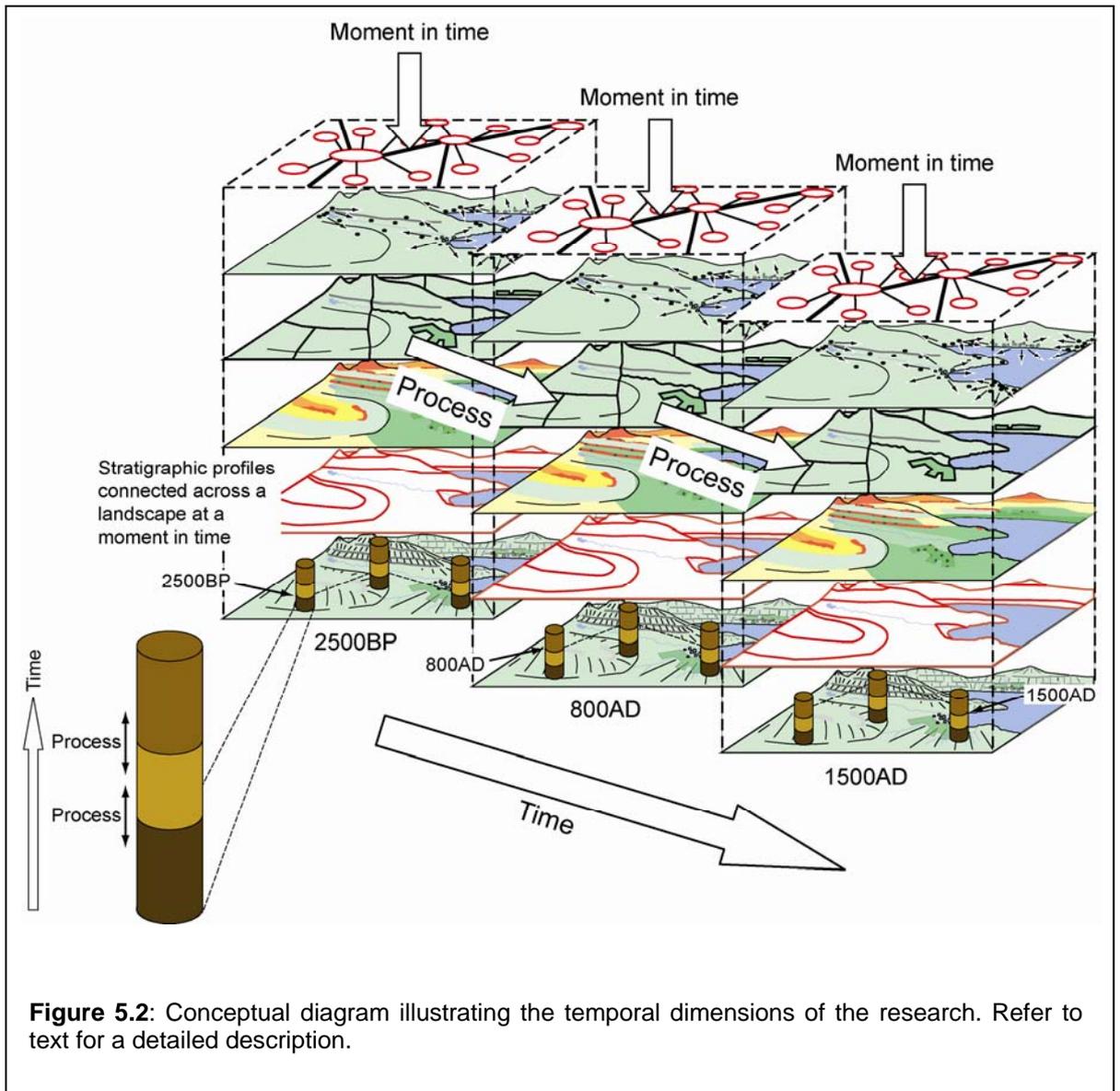


Figure 5.2: Conceptual diagram illustrating the temporal dimensions of the research. Refer to text for a detailed description.

several stratigraphic profiles at different locations in the landscape represent “moments in time”, which may be synchronous or time-transgressive. Processes between those times are represented by the development of sediment contexts. Stratigraphic profiles therefore allow processes of change such as the onset of significant erosion or episodes of landscape stability to be identified and tracked across a catchment and island-wide scale. Understanding the reasons and mechanisms of landscape change requires both accurate and precise dating.

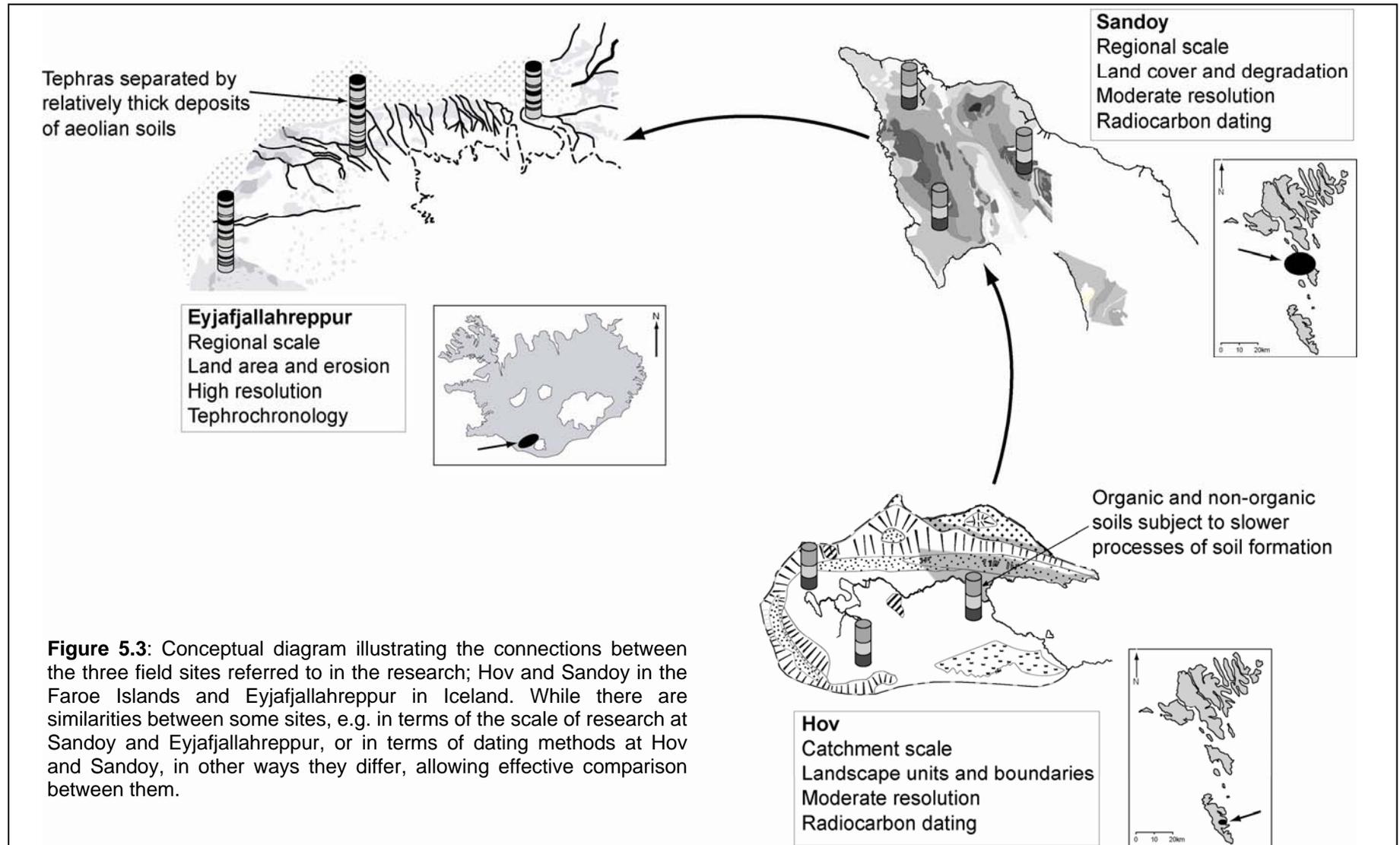
Ideally, the diverse data sets described above would be easily combined and spatially comparable, but records are rarely complete so it is important to combine complementary data sets and consider many sites across many spatial scales. This involved investigation of stratigraphic profiles at scales of transects, catchments, settlements, regions and islands. Figure 5.3 illustrates the overall spatial context of the field sites and how they connect. The field sites themselves are described below.

Field site selection

Hov and Sandoy, the Faroe Islands

Initial research was carried out at Hov, a settlement on the east coast of the most southern island in the Faroese archipelago of Suðuroy (Figures 5.4 and 5.5). For this research, the term “Hov” is used to represent the hydrological catchment of the Hovsá (Hov River), which incorporates the village of Hov and outfield areas belonging to both Hov and the settlement of Porkeri to the south. The Hov catchment area is an ideal site for testing hypotheses of human impact and environmental change because it embodies a microcosm of the archetypal Faroese landscape. The spatial scale of the catchment is manageable in terms of data collection, is physically well constrained by the surrounding topography, and is also of a scale applicable to both cultural and environment changes.

Mountains in the west, up to 574 m in altitude, form a steep-sided cirque valley that defines and constrains the catchment. In the west of the catchment, and extending for several kilometres, is a scoured out area characterised by lakes and rivers, which has formed a characteristic outfield of open heath for grazing, and provision of peat that was utilised for fuel and construction. The settlement (*bygd*) of Hov lies to the east and is bounded by slopes up to 424 m to the north and by the bay of Hovsfjørður to the south. Hov *bygd* itself is situated on a south facing slope composed of deep sediment that has proved relatively productive for cultivation. The sheltered bay of Hovsfjørður, south of the village, provides a suitable location for boat landings and convenient access to marine resources. On the south side of the bay, directly across from Hov, is a well vegetated coastal strip and low altitude



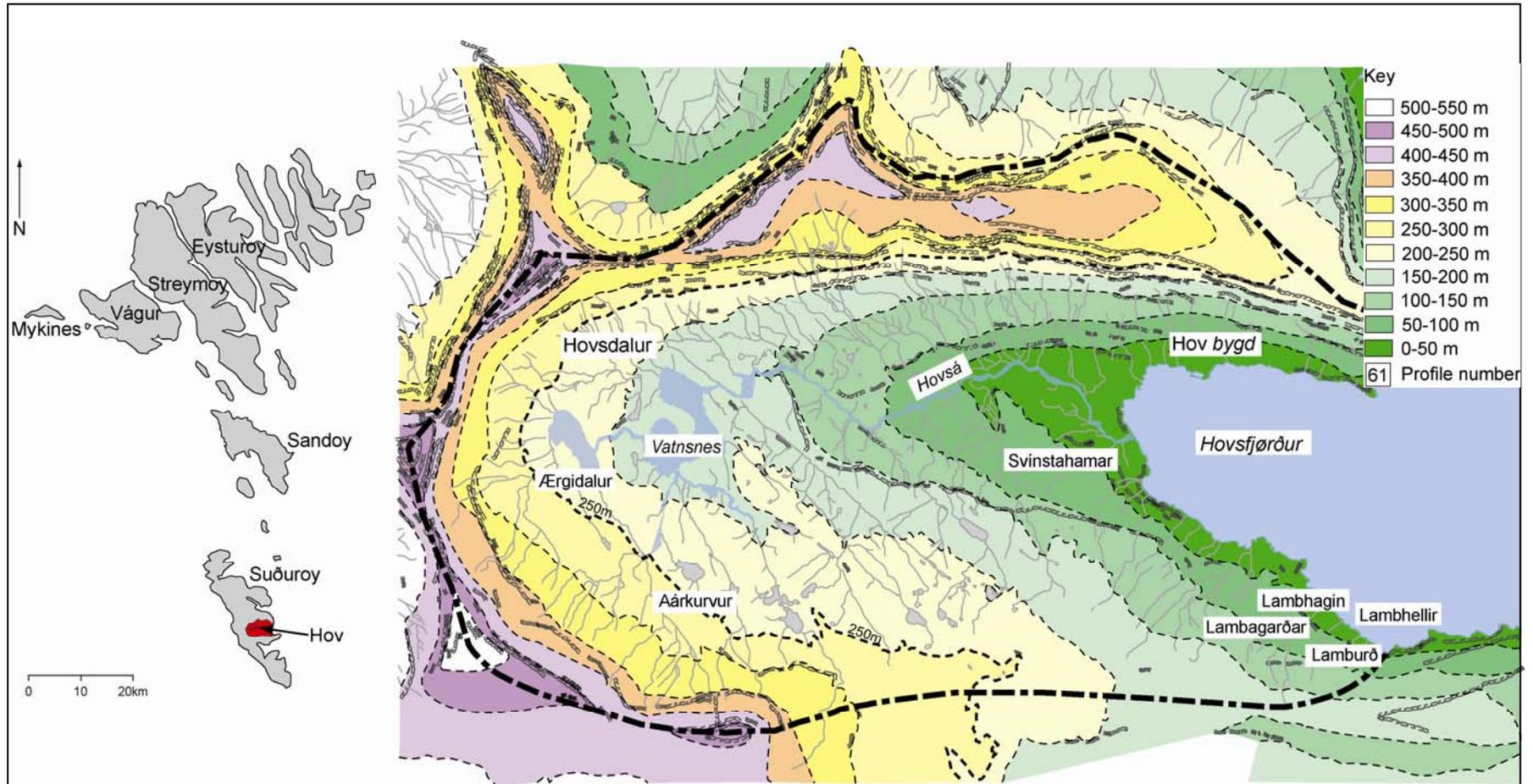


Figure 5.4: Relief map of the Hov catchment with place-names mentioned in the thesis.



Figure 5.5a (above): Hov catchment and *bygd* looking west to Hovsdalur.
Figure 5.5b (below): Hov catchment looking east to Hovsfjørður.

peat landscape, characterised by a high density of archaeological structures. The Hov landscape, therefore, contains records of a spectrum of human and environmental impacts, which can be tested in terms of the development of vegetation, soils, peat, slopes, river systems and archaeology. An additional reason for selecting Hov was that according to *Færeyinga Saga* (the Faroese Saga), Hov was one of the first settlements to be established in the Faroe Islands. In addition to the original farm, which is thought to be located upslope of the present day settlement, there are several farm names within the village and an inland summer shieling site that also testify to early Norse settlement. Evidence of both early and significant human impacts would therefore be assumed to be discernible within the landscape.

The Sandoy field site (Figures 5.6 and 5.7) targeted a larger geographical area than that of Hov in order to represent a wider spectrum of spatial scales. North Sandoy is extensive enough to identify a significant regional environmental signal, but constrained enough to enable comprehensive analyses of human interaction, and also providing a more substantial area to re-assess the initial hypotheses developed from environmental data collection at Hov. Sandoy is the second largest of the southern islands of the Faroes and is distinctive within the archipelago, not only for its sand dune system which gives the island its name, but also because of its relatively subdued topography and extent of land suitable for cultivation. Although a mountain ridge runs down the centre of the island and the west coast and west-facing hillsides are generally rugged with high cliffs, two major valleys that run from Sandur northwards to Skopun and eastwards to Húsavík (refer to Figure 5.6) have been scoured smooth by ice and give the island an overall more gentle topographic form. Within the valleys, a number of small lakes have developed, and extensive areas of blanket peat would have supplied the settlers with a source of fuel and building material.

The most prominent, and once the largest *bygd* on the island, is Sandur, which is believed to have been settled early and is probably the site of a farm mentioned in *Færeyinga Saga*. Excavations are ongoing at one of the primary holdings and the corresponding radiocarbon dates are currently some of the earliest in the Faroes (Lawson *et al* 2005). The Sandur infields are located on the isthmus between the lakes Sandsvatn and Gróthúsvatn and provide an extensive area for hay growing for winter fodder that is relatively well drained because of the sandy soil. Sandsvatn is a long shallow lake, rich in trout, and attracts a wide range of migrating birds and geese. The cliffs on the west coast offer considerable breeding opportunities for sea birds, particularly puffins and guillemots. Another characteristic of Sandoy is the relative abundance of pig-related place names, of which 22 have been identified (Arge *pers. comm.*), which combined with results from the ongoing archaeological excavations, demonstrates the use of pigs on the islands for centuries after initial settlement.

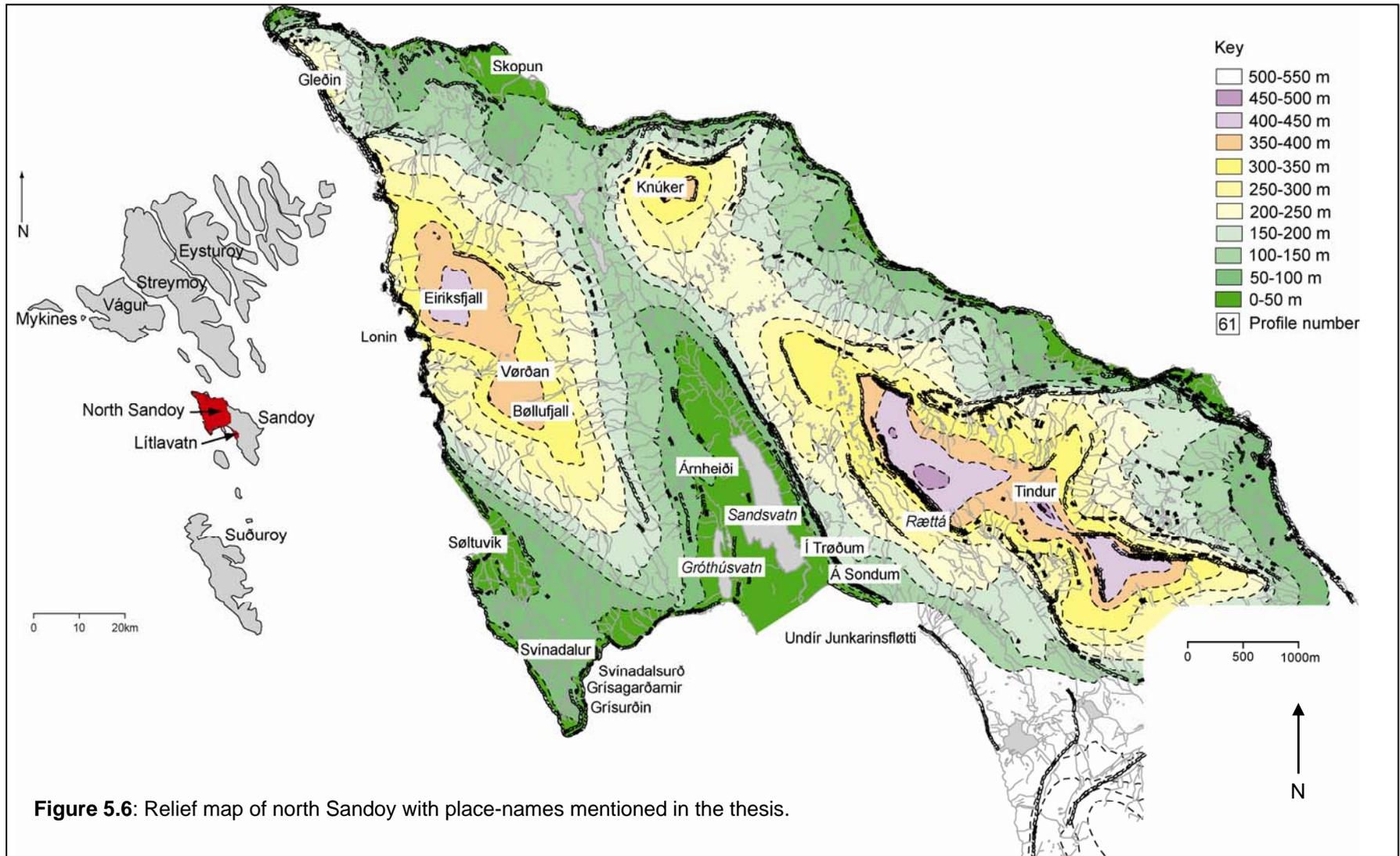




Figure 5.7a (above): Looking east across Gróthúsvatn and Sandsvatn to the Í Trøðum farms.

Figure 5.7b (below): Looking west from Knúker towards Eiriksfall.

In view of these characteristics and recent investigations, it is assumed that Sandoy was colonised relatively early in the Norse settlement period, by a significant number of settlers, and was therefore subjected to a wide range of human impacts. It is also assumed that human impacts display a stronger and more recognisable signal in the landscape records from Sandoy than is, for example, apparent in the landscape record of the northern islands. Many of the northern islands have steeper gradients and higher altitudes and, therefore, natural processes may dominate even where human impact has been significant.

Eyjafjallahreppur, Iceland

Eyjafjallahreppur is a region located in the south of Iceland and encompasses the valley to the north and the sandur plain to the south of Eyjafjallajökull (Figure 5.8). Although the hreppur (district) extends along the south coast sandur, the field area comprised only the strip of land between Eyjafjallajökull to the south and the Markarfljót to the north. On the slopes between these margins, nearly 40 farms, both settled and abandoned, and the continuous settlement of some farms since the early days of settlement, testifies to the utilisation of the landscape by people for a significant period of time. Although the present-day farm infields and their environs are well vegetated, and the inland area of Þórsmörk is forested by birch and willow, extensive upland areas are degraded, having suffered from increased soil erosion since human settlement. The extensive erosion of upland soils has led to the deposition of thick aeolian sediments in the lowlands, which are divided by layers of tephra that mark the instant in time at which the volcano erupted. This area of Iceland has a particularly well-established tephrochronology and most identifiable historical tephra layers in the region have been dated (Þórarinnsson 1944; 1967; 1981, Larsen 1981; 1982; 1984, Dugmore 1987; 1989, Dugmore *et al* 2000, Larsen *et al* 1999). The combination of rapid soil accumulation and continuous volcanism in the area throughout the historic period, has resulted in the formation of high resolution soil stratigraphic profiles, which can be utilised in testing hypotheses of human-environment processes and interactions. These contrast with processes of soil formation in the Faroe Islands, which have been less rapid and have formed shallower profiles (refer to Figure 5.3). The lower resolution soil stratigraphies from the Faroe Islands, therefore, make historical mechanisms of landscape change and human impacts more challenging to identify in comparison to south Iceland, where high resolution records and more precise chronological data are available. Although some micro-tephras have been identified in Faroese soils, the identification and significance of these are hard to determine and the Faroese profiles lack the chronological precision provided by tephrochronology in Iceland (Dugmore and Newton 1998).

Spatial methods

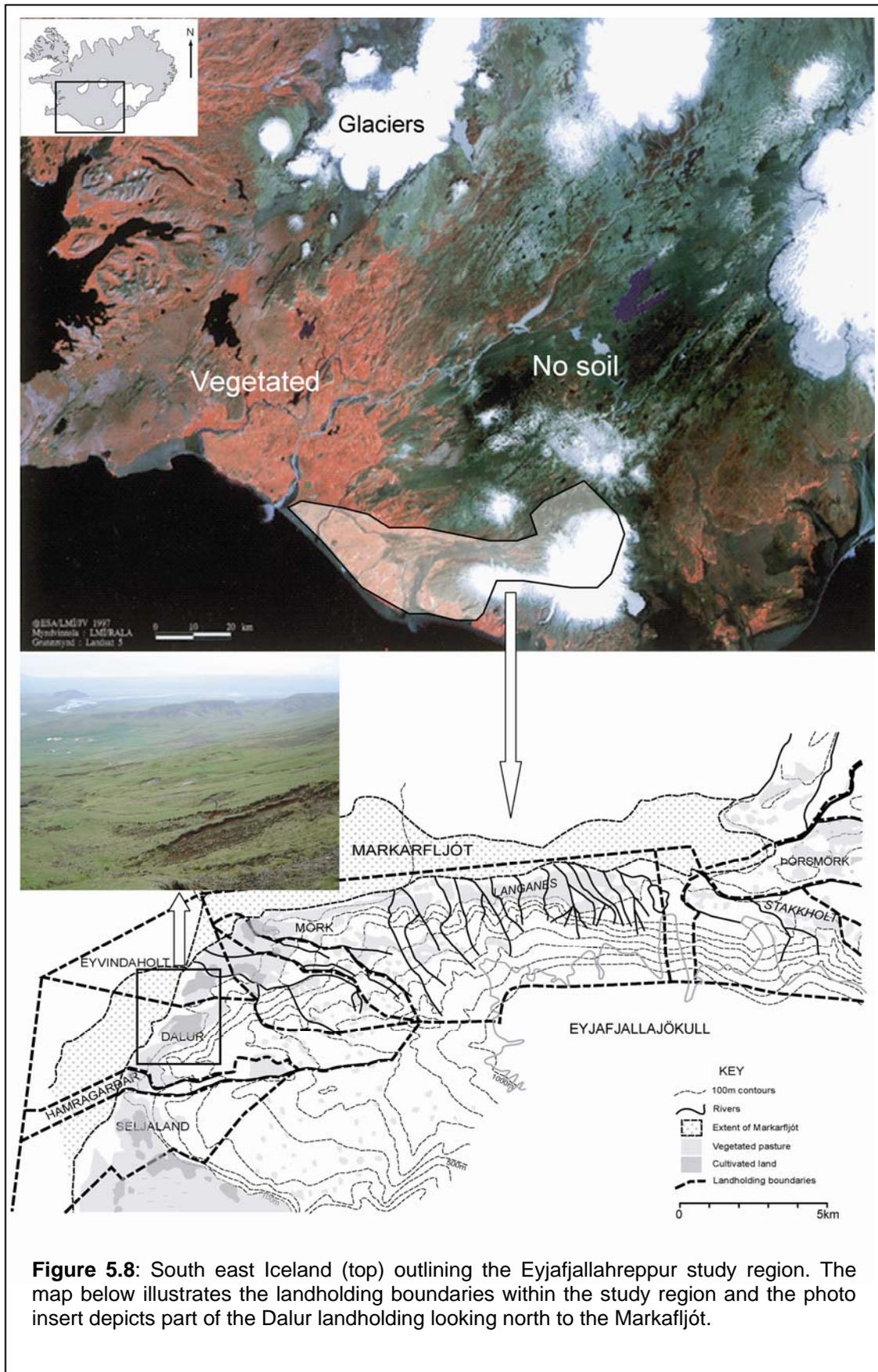


Figure 5.8: South east Iceland (top) outlining the Eyjafjallahreppur study region. The map below illustrates the landholding boundaries within the study region and the photo insert depicts part of the Dalur landholding looking north to the Markaflljót.

Landscape mapping

Identification of landscape-scale morphological units, and mapping of the extent of landscape surface degradation, was carried out at Hov and Sandoy respectively, with the aim of defining boundaries, limits and thresholds within the environment, and understanding how these have changed through time. The aim of the landscape mapping was firstly to assess to what degree landforms, and the boundaries between them, have changed since colonisation (thus indicating the extent of human impact), or to assess whether the landscape seen today is essentially similar to that which existed prior to settlement. It is important to investigate if the present landscape has been predominantly influenced by processes occurring prior to settlement or by geomorphological changes that were initiated by human activity.

Landscape mapping can also be directly compared with other data sets, such as stratigraphic profile records, archaeological survey data and interviews. For example, degraded landscape surfaces can be compared with periods of increased mineralization and erosion observed in the underlying stratigraphy, and by dating the unit transition in the profiles, dating for the onset of erosion might also be proposed. Selected profiles were sampled at high elevations on the threshold of degraded and vegetated land (as determined from the landscape mapping) to secure dating of these major destabilisation events. Comparisons between degraded areas on Sandoy and in Hov, and patterns of human settlement and known areas of resource use as determined from archaeological survey and interviews, can also be made, in order to determine to what extent there is a correlation between human activity and soil surface degradation.

Mapping of both landscape units and surface degradation was based initially on the interpretation of aerial photographs and topographic maps. Desk-based work was supported by extensive ground surveys of Hov and north Sandoy that utilised GPS. A multi-stage approach was adopted for the mapping; stage 1 (Hov) utilised geomorphic mapping of landscape units combined with selective stratigraphic analyses. Stage 2 developed this approach on Sandoy and switched emphasis to detailed stratigraphic studies and land cover classifications relating to the more subtle effects of human impact, which were found not to be affecting fundamental landform units. Stage 3 involved a return to Hov to reassess the geomorphology and add the same land cover classifications used in stage 2. Archaeological studies were nested within the geomorphic mapping exercise.

In stage 1 (Hov), 8 categories were assigned to landscape units, ranging from nunatak areas with active cryoturbation, bedcrop outcrops, scree slopes of deep sediment and lowland peat cover. Figure 5.9 illustrates the identification of landscape units in a characteristic catchment

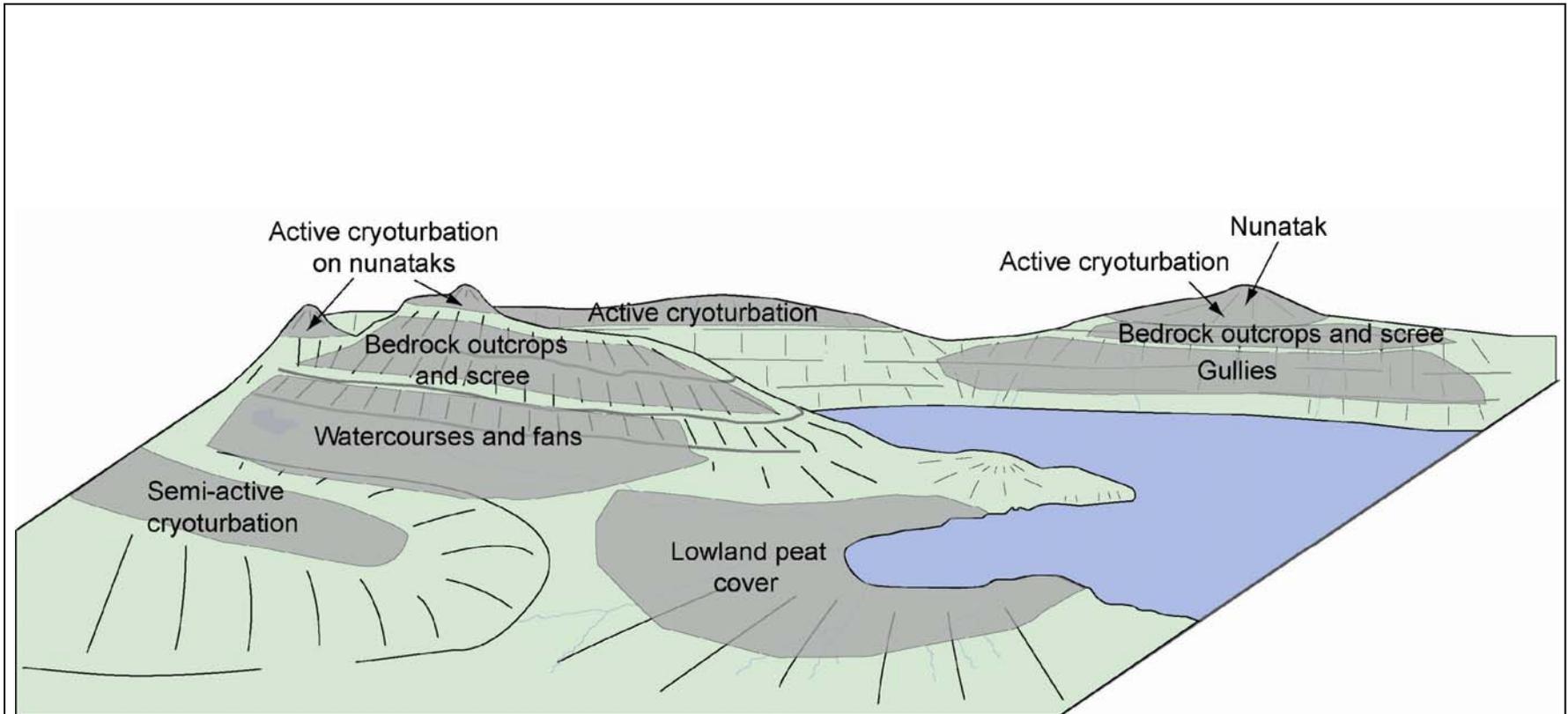


Figure 5.9: A typical Faroese landscape divided into “landscape units” that were used to define boundaries when mapping the Hov catchment.

that were used to define boundaries when mapping the Hov catchment. Key areas of geomorphological interest were comprehensively recorded and illustrated by more detailed recording and mapping. Key features identified and mapped included a series of box gullies on slopes on close proximity to Hov *bygd*, post-settlement gullying in peat on north facing slopes south of Hovsfjørður, the development of a high altitude inactive fan in Hovsdalur and a lower altitude active fan and river system further down the Hovsá valley.

For stage 2 and 3 (north Sandoy and Hov), levels of surface degradation were classified into 11 categories, ranging from completely degraded (0 %), to completely vegetated (100 %), according to the estimated extent of surface vegetation and soil cover. The mapping of these surface degradation categories makes it clear to identify, for example, degraded areas which may not be explained by a climate-altitude relationship.

Archaeological survey

In order to integrate the analyses of stratigraphic profiles and landscape mapping of the outfield area with evidence of land and resource use, archaeological field surveys were carried out at the two Faroese field sites of Hov and north Sandoy. Archaeological and palaeobotanic excavations have been conducted in and around infield sites, which has yielded insights into the life and farming practices of the first settlers (Stummann Hansen 1990, Dahl 1970b, Matras 2005, Arge 2001, Church *et al* 2005). There has, however, been a lack of systematic surveys of the outfields, and at present, very little, or nothing at all is known about the traces and remains of the Faroese cultural landscape (Arge 2006). While the current record of structures in the infield have been selectively destroyed or are obscured by near continuous settlement and agricultural activity, the outfields have a rich archaeology that remains visible in the surface landscape. Physical remains in the outfield are abundant, but ironically, due to this abundance have been considered insignificant. However, when their spatial patterns are analysed, they may clarify economic and social elements in a period where few other contributory sources to our knowledge exist (Arge 2006). The aim of the archaeological surveys in this research was to address the spatial patterns of archaeological structures within the landscape, and to assess possible functions and forms of anthropogenic activities through the outfield archaeology. In particular, specific locations or nodes of activity were identified where particular anthropogenic activities must have been prolific.

The field survey was conducted at the same spatial resolution as the environmental fieldwork, allowing comparisons to be made between areas of more or less intensive human activity and areas of heavily degraded or vegetated land. The hypothesis was that a positive spatial correlation between degradation and structure density would indicate a dominance of

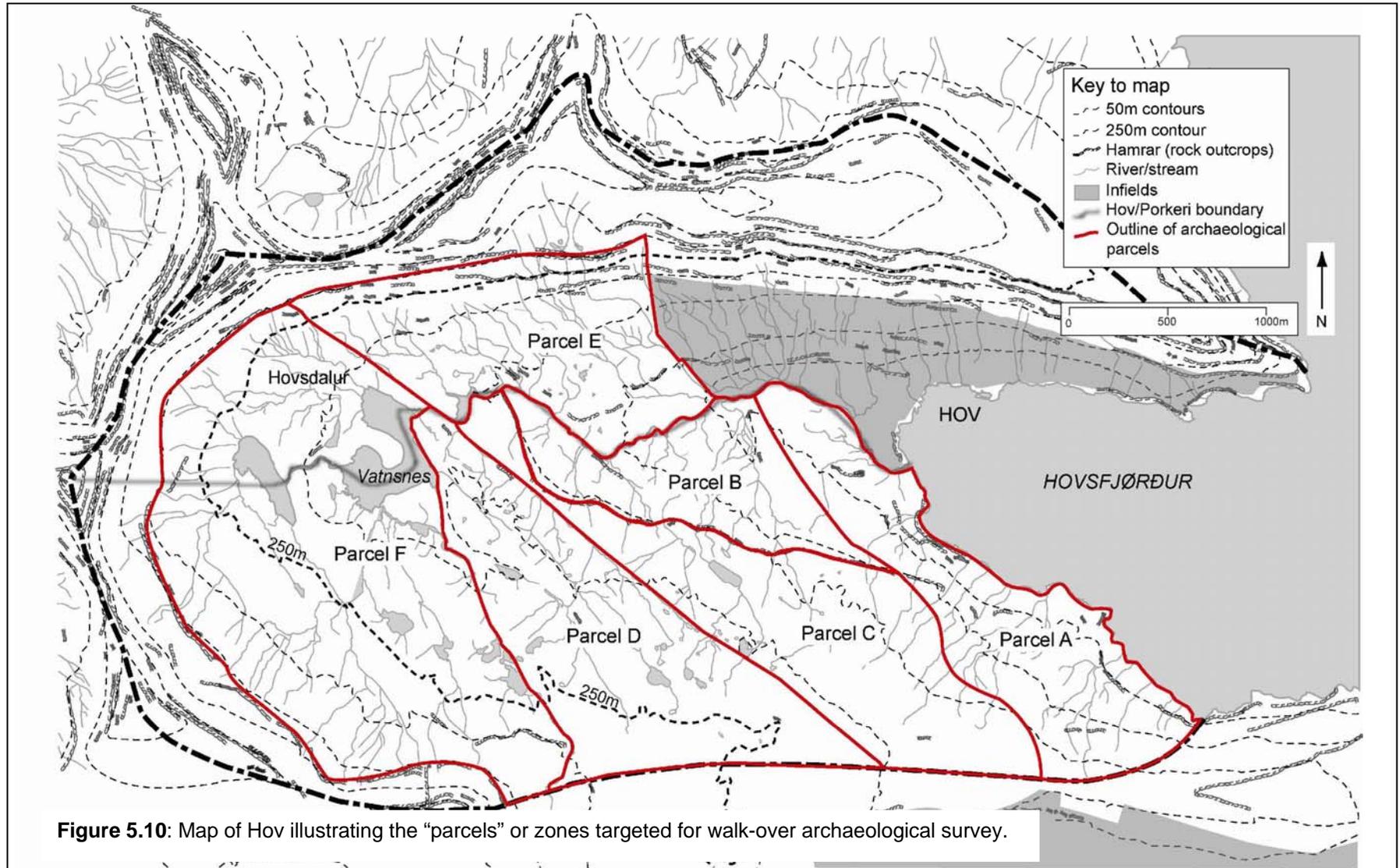
human impact, while a negative spatial correlation between degradation and structure density might imply that people had chosen the environmentally best sites on arrival. This would infer that human impact was negligible and that degradation was predominantly caused by natural impacts (refer to Table 1.1, hypothesis 4). Locations of anthropogenic activity, inferred by the location of archaeological remains, were also compared with information on the location of more recent anthropogenic activity according to interviewees from Sandoy.

The locations and spatial pattern of the archaeological structures at Hov acted as a preliminary study prior to a more extensive survey of three archaeologically rich areas (zones) in north Sandoy. In addition, a general survey over the entire north Sandoy region was carried out to gauge areas of archaeological concentration and ensure representivity of the surveyed areas. For each zone, an initial desk-based survey was carried out, with the defined area split into "parcels" on the basis of the proposed density of archaeological remains as gathered initially from the maps (Figures 5.10 and 5.11) (some, but not all, features, such as sheep folds and shelters are located on Faroese 1:20,000 topographic maps). The parcels were walked over in detail and locations of the observed structures were recorded either directly onto the map (in Hov) or using a GPS (in Sandoy). Using a monument form (e.g. Figure 5.12), the structure and its environmental context were photographed and sketched, and the structures were classified in the field according to size, orientation, form, building structure and material, possible purpose, current condition and environmental context.

Settlement and landholding data

The reconstruction of Viking Age settlement patterns has been carried out by Arge *et al* (2005) based on archaeological and documentary evidence, which provides an interesting comparison to modern day settlement patterns (refer to Figure 4.13). Settlement pattern data may be compared, or incorporated, with information acquired from the interviews and the natural landscape data sets, as these other sources of data may assist in understanding the development of Faroese settlement patterns. Settlement patterns in the Faroe Islands are different from those in Iceland and Greenland, so a key question is whether settlement patterns in the Faroes developed in response to the local topography or because different subsistence practices evolved on each of the North Atlantic islands that demanded a different settlement arrangement.

Data concerning the distribution of landholdings is also valuable in order to make cultural scale analyses of environmental change. Landholding units are comparable at a landscape-



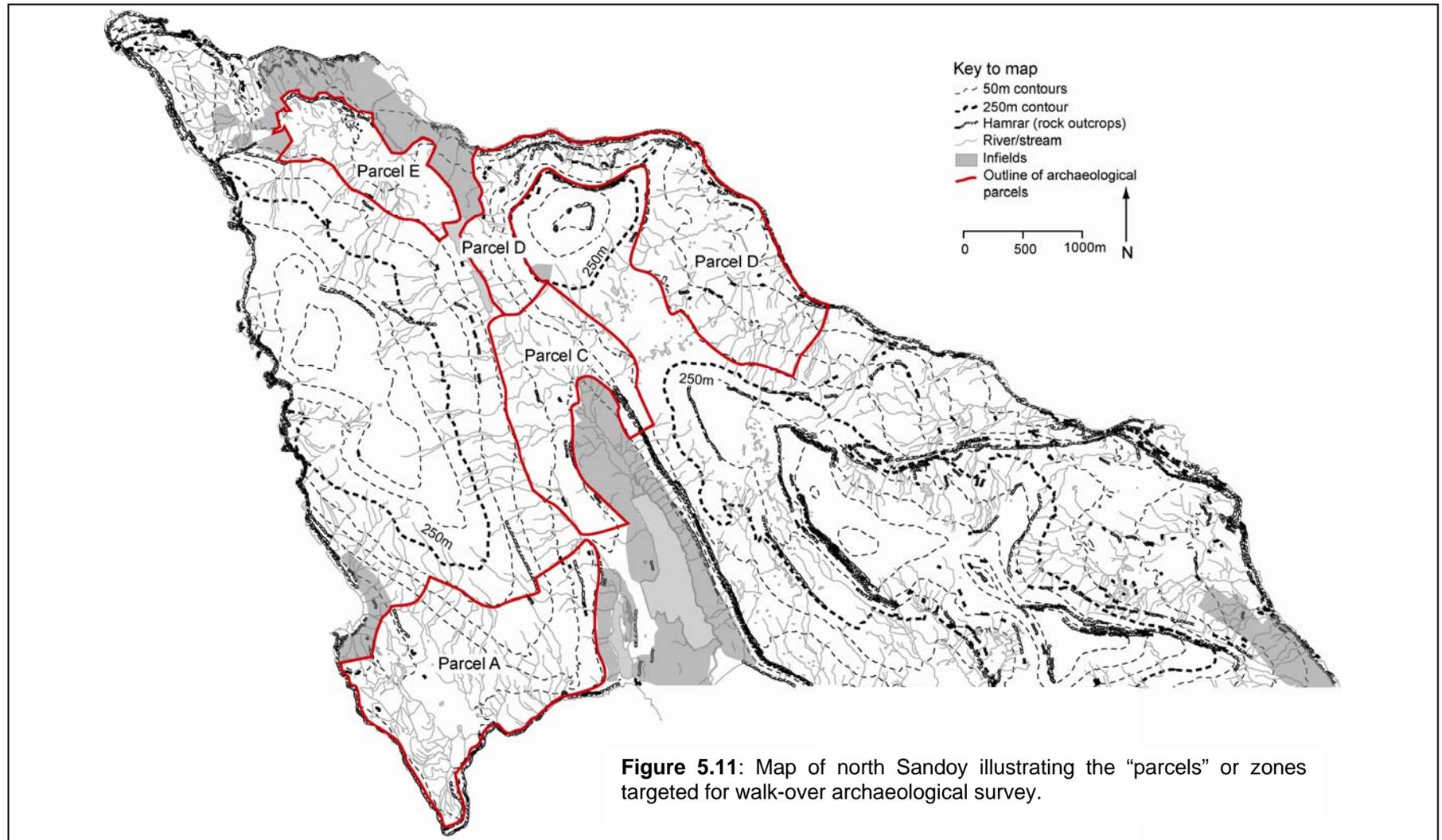


Figure 5.11: Map of north Sandoy illustrating the “parcels” or zones targeted for walk-over archaeological survey.

MONUMENT FORM		
PROJECT: Sandoy Arc 2005		DATE:
TEAM: KAM		WEATHER:
PARCEL NO/ZONE:	MONUMENT NUMBER:	
COMPONENTS:		
MAP SHEET:	PHOTOS:	
MONUMENT	DIMENSIONS	
SOURCE:	LENGTH - INNER:	
NGR/GPS:	LENGTH - OUTER:	
CLASS:	WIDTH/DIAMETER - INNER:	
NATURE:	WIDTH/DIAMETER - OUTER:	
FORM:	HEIGHT/DEPTH:	
CONDITION:	ASPECT:	
LAND COVER:	SLOPE ANGLE:	
LAND USE:	ELEVATION:	
	ORIENTATION:	
PERIOD:		
DESCRIPTION:		
WALLS:		
STONE SIZE/SHAPE:		
PHASES OF ACTIVITY:		
LONG AXIS ORIENTATION:		
DOORWAY ORIENTATION AND POSITION:		
EXPOSED/SHELTERED:		
ENVIRONMENTAL RELATIONSHIPS:		
VEGETATION:		
LEVEL OF DEGRADATION:		
GRAZING QUALITY:		
PROXIMITY TO WATER:		
PROXIMITY TO BUILDING MATERIALS:		
LICHEN PRESCENCE:		

Figure 5.12: Sample monument form used for Hov and Sandoy archaeological surveys.

scale resolution, and can be used to test the extent to which landscape change is a result of anthropogenic or climatic factors. For example, if the landscape record (in terms of the extent of erosion) differs between landholdings in a single region, the impact of management decisions made by individual landholdings are probably dominant. If landscape changes are regionally similar, and are unconstrained by landholding boundaries, climatic effects or more widespread anthropogenic activities are likely to be the dominant cause of erosion. The inheritance of current landholding boundaries on Sandoy is not fully understood, so the application of landholding data was less important in the Faroes than in southern Iceland, where landholding boundaries are known to have a long history (Sveinbjarnardóttir *et al* 2006) and can, therefore, be incorporated and compared directly with the physical landscape data.

Conceptual methods

Interview process

Semi-structured interviews were conducted with selected farmers from Sandoy with the aim of relating the data collected from archaeological surveys (i.e. evidence of past human activity) and the palaeoenvironmental records to the current knowledge and practices of local populations who have lived in and managed such environments, and have knowledge of the practices of previous generations. Local perspectives on subsistence practices, social interactions and values can provide vital insights into the recent past, as local knowledge is passed down through oral histories and past experience, and because there has been a temporal continuity in farming practices and conservativeness of values in the Faroe Islands. Farmers also have a wealth of spatially localised knowledge, for example, concerning locations of previously used peat banks, and the ownership of specific areas of cliffs used for bird catching by individual farms.

The number of interviews was limited to four, but represents a significant proportion of the active farming population of Sandur (the main centre of agriculture on the island). The interviewees were carefully selected so that they were of the older generation. In particular, the oldest had childhood memories back to the Second World War, giving an insight into farming practices from the mid 20th century and before. There was a combination of both active farmers and people with both a personal experience of farming and wider perspective of agriculture. Crucially, rather than adopting a more extensive but less detailed approach, each interview was in depth, and together have produced more than 20,000 words from the two English language discussions alone. The conversations were wide ranging, covering all aspects of farming. Data is reproduced in full in Appendix B, because there is a notable lack of information in the English language, and unfortunately first hand knowledge is dying out in

the Faroe Islands. It was notable by the third or fourth interview that diminishing returns were being encountered and a very similar picture was emerging with limited additional information. The specific objectives of the interviews were:

- (i) To compare past and present resource use and resource “value” with archaeological and environmental data.
- (ii) To compare past and present settlement patterns and community structures with that of other North Atlantic settlement patterns.
- (iii) To compare perceived and actual land quality and erosion and how these qualities are measured.
- (iv) To establish the environmental/climatic criteria that most impact farmers in the Faroe Islands.

The interviews consisted of open-ended questions arranged around a framework of topics which are presented in Appendix B and include the exploitation of resources, particularly peat, birds, fish and whale, resource ownership, community and social structures, settlement location, affects of erosion and affects of climate on agriculture. Some specific questions were also asked to elicit locally based information particular to Sandur, such as where the best peat banks or nearest bird cliffs were to be found, as such information is difficult to procure from the existing literature. Although the framework set out in Appendix B was initially referred to, queries were not followed in a strict order, and in a number of cases it was appropriate to deviate from the suggested questions.

Four in depth interviews were conducted with farmers from Sandur, each lasting up to two hours. Two of the respondents are from long-standing farming families from Sandur and are actively farming today. One respondent had retired from active farming (the farming now having passed to his son) and a fourth respondent, although from a farming family on Sandoy, no longer actively farms, but works within the agricultural sphere and has access to local and regional information based on oral family histories. Two interviews were conducted in English as the respondents were fluent English speakers, while the two remaining interviews were conducted primarily in Faroese and interpreted with the help of Faroese archaeologist, Símun Arge, who was present throughout. Audio recordings were made of each interview to assist in analyses. Detailed notes arranged around specific categories were made from the audio recordings of the interviews conducted in Faroese, while the two interviews conducted in English were transcribed in order to minimise the amount of questionable inference involved in the interviews. Interview data was analysed based on the method of “grounded theorising” (e.g. Glaser and Strauss 1967, Strauss and Corbin 1990), whereby analytical categories were developed arising from the initial framework of the data and from the data itself. Segments of data were then gathered together from different parts

of the interview that were relevant to a certain category, and all the items of data that have been assigned to a category were compared and contrasted in order to clarify the meaning and relations among categories.

As the interviews, in general, did not concern controversial or sensitive material, the major issue was the problem of accurate translations between Faroese and English. Material was inevitably lost during translation of the Faroese interviews, both in questioning and answering. To compensate for this, material from transcribed interviews was cross-checked with notes made from the translated interviews. Although the quality of the translated data was inevitably less, the principal loss was the quantity of data.

Temporal methods

Stratigraphic sections

In the Faroe Islands, many proxy records which could be used to gather data on landscape change, are either absent or comparatively desensitised in terms of their response to climate and cultural forcing. For example, significant measurable changes in the biota of the Faroe Islands are limited as the landscape lacked significant woodland cover prior to settlement and has been essentially dominated by grass and heath (Hannon and Bradshaw 2000, Lawson *et al* 2005). Therefore, impacts of human colonisation may be expressed by only comparatively limited changes in the vegetation record, which needs to be complemented by additional or alternative records. In this instance, geomorphological changes may be relevant because they respond to environmental and anthropogenic signals over a range of temporal and spatial scales (Humlum and Christiansen 1998a; 1998b). Changes in the form of the surface landscape through time, as represented in the stratigraphic section, record a fundamental environmental change, such as the crossing of a critical threshold within the landscape. Although specific profiles may be representative of site-specific changes, the majority of profiles identify change at local scales, although by comparing several profiles across a catchment, region or island, and between islands, a regional picture of landscape change can be accumulated.

A study of the soft sediment stratigraphy, overlying either bedrock or glacial/fluvio-glacial sediments, was used to identify periods of landscape stability and major geomorphological change, which together with a reliable dating framework, can be used to reconstruct the Holocene environmental history of the southern Faroes. A total of 86 stratigraphic sections were recorded, 32 from Hov in the east of Suðuroy, with the remaining 54 located across a larger geographical area in the north of Sandoy. Various locations were targeted to represent a wide range of geomorphic situations; fluvial and non-fluvial settings, at various stages on

slopes of various aspects, and at high altitudes on mountain plateaux in places where soil was remaining. Several profiles were recorded along specific topographical transects covering altitudes between 0-350 m, above which little soil cover remains. The transects allowed changes in lithostratigraphic units to be traced through time, under the assumption that impact begins at high altitudes and migrates downhill to affect more stable geomorphic areas. Profiles recorded at altitudes above the lower threshold of periglacial activity (~250 m) may be especially sensitive to anthropogenic and climatic change and are less likely to be contaminated than sediments in lower altitude profiles where re-worked material may be re-deposited.

Stratigraphic sections were recorded from excavations of naturally eroding faces and fluvial channel exposures as well as from the faces of artificial ditches and road cuttings. Stratigraphies therefore covered a wide range of environments allowing sediment units to be traced across the landscape, and allowing profiles illustrating more site-specific changes to be identified. Profiles were recorded across a minimum horizontal exposure of 50 cm to ensure accuracy, and at many localities additional profiles were consulted to ensure the recorded exposures were representative. Detailed notes and sketches of each profile's location and slope catchment within the landscape were made. This permitted an assessment of how the record in each profile was representative of landscape change in a particular area, e.g. KAM 19-21 contains evidence from activity on the slopes directly above up to the watershed. Detailed notes and sketches of individual sediment profiles were also made to record the colour, texture, composition and form of soil units. At specific sites, stratigraphic sequences were sampled using monolith boxes secured into the face of the exposure, measuring between 25 cm and 50 cm in length. Sets of monoliths provided a longer sequence on deeper profiles. All cores were re-examined and re-recorded under laboratory conditions and sub-sampled down to 1 cm contiguous intervals. Loss-on-ignition and dry-bulk density analyses were conducted as part of this research, in order to ascertain how the organic content of the soil stratigraphies changed through time and to establish the optimal depth for subsequent dating of samples using AMS radiocarbon dating. Magnetic susceptibility, tephra analyses, pollen analyses and detailed soil micro-morphological work, incorporating total nitrogen, total carbon, total phosphorous and particle size measurements, were conducted by others as part of the wider "landscapes circum *landnám*" research project, but were not directly relevant to the themes of geomorphological change explained here.

Radiocarbon chronology

A critical aspect of reconstructing an environmental framework, with which to integrate cultural data and processes, is the establishment of a chronology that is relevant to human

timescales. A high resolution sediment record and a precise and accurate chronology are desirable, without which the identification of causal factors is ambiguous. This is particularly so when analysing the causes of landscape change as, for example, a geomorphic event must occur *after* the natural or anthropogenic event that is implied to have caused it. Although radiocarbon dates may be precise enough to suggest coincidence between two events, they are rarely precise enough to prove causality between those events. Dating the anthropogenic record is further complicated in the Faroe Islands because the timing of human settlement is not known beyond the traditional date of 825 AD (Arge 1991). In southern Iceland, on the other hand, a rigorous and well-established tephrochronology fulfils the criteria of precision and accuracy, and rapidly accumulating soils have provided a high resolution chronology. Within a Bayesian framework, tephrochronology has also been used along with sediment accumulation rates and multiple radiocarbon dates to secure a date on charcoal pits to an accuracy and precision of less than 20 calendar years (Church in press; *pers. comm.*)

Due to difficulties in applying tephrochronological methods to the Faroe Islands material, chronological control was achieved using topographic and stratigraphic relationships combined with radiocarbon dating. In order to provide a robust chronological framework across the southern Faroe Islands, a total of 52 AMS radiocarbon dates were acquired from 19 stratigraphic profiles, with a minimum of two dates from any single profile. Specific stratigraphic sections were targeted for dating with the aim of bracketing major sediment changes in the stratigraphy, for example, to date the timing of transition from a stable peat unit to a clast rich or sandy silt unit. Radiocarbon dating is also dependent on the availability of suitable organic material, although this did not cause any problems in the Faroes where peat is ubiquitous, and where many units consist of up to 98 % organic material. By targeting obvious unit transitions in the profile, which could be traced through the region, the timing of initiation of major geomorphic changes could be compared both within and between the southern Faroe Islands. Dating on profiles at Hov was performed in April 2004, with dating on profiles from Sandoy performed in January 2006. Additional dates on the Hov profiles were secured in 2006, which allowed for the resolution of existing incompatible dates at Hov and to test the robustness of the dating chronology. Peat samples of 1 cm³ were subjected to acid and alkali washes and were dated from the humic fraction (with the humin fraction additionally dated for KAM28 samples). AMS radiocarbon dates were measured and calculated by Gordon Cook at the SUERC, East Kilbride. Calibration to calendar years was performed to 2 σ using Calib 5.0.2 (Stuiver *et al* 2005), using the highest probability value with dates rounded to the nearest ten years.

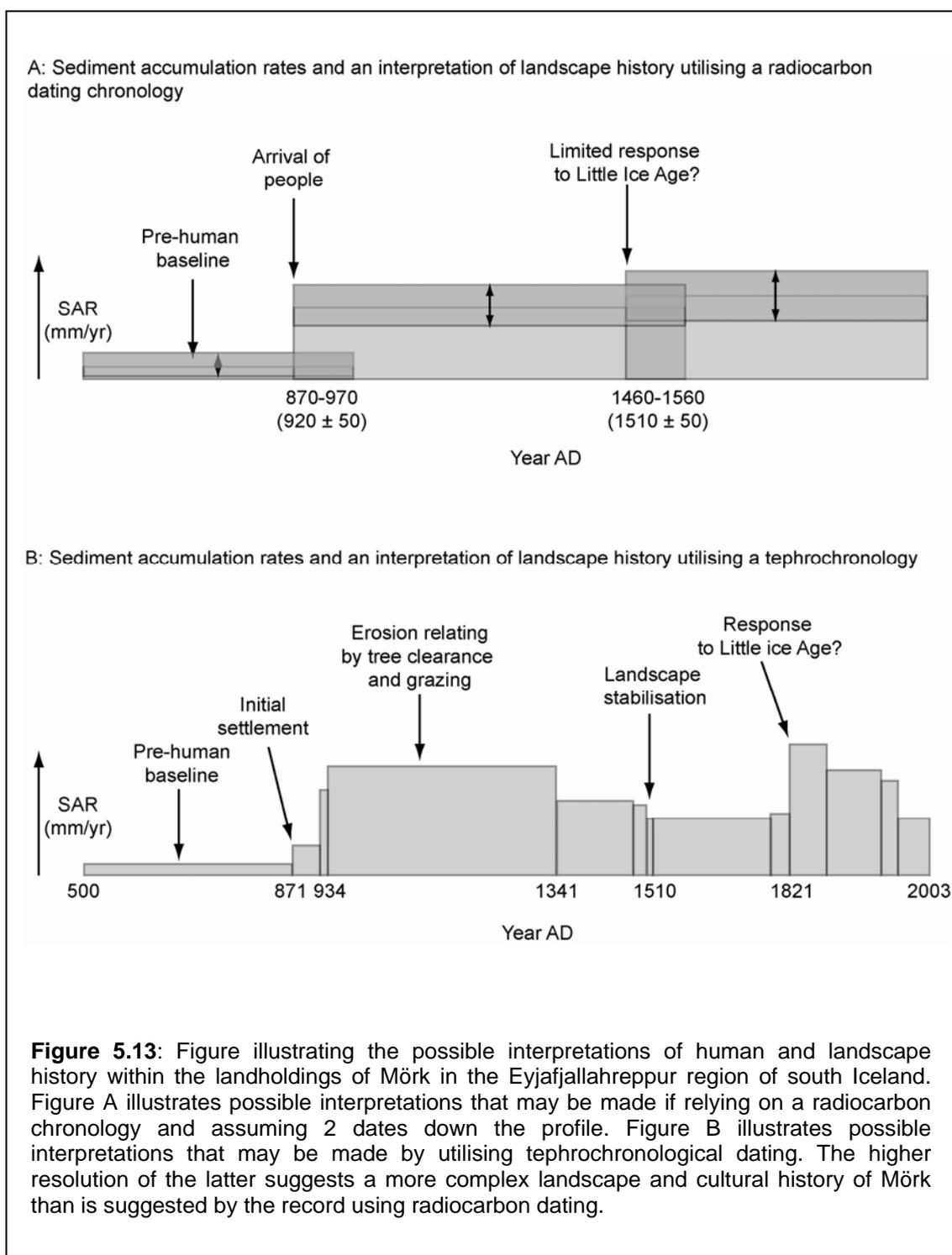
The accuracy of the radiocarbon chronology was assured by corresponding radiocarbon dates acquired from equivalent unit transitions across both islands, from multiple dates on

cores, and through comparison with stratigraphical relationships. However, the application of radiocarbon dating is limited by the precision and resolution of the technique on human timescales. The precision of the calibrated radiocarbon dates varies, and the range on a single date differs between 50 and 200 calendar years, which make it more problematic to understand decadal scale anthropogenic change. Figure 5.13 demonstrates a major drawback of using a radiocarbon chronology to make interpretations of landscape and cultural history. The example used in Figure 5.13 represents the average sediment accumulation rates (SARs) of 22 sediment profiles in the Mörk landholdings in the Eyjafjallahreppur region of south Iceland, and illustrates the differing interpretations that might be made of these SARs when utilising a radiocarbon chronology (A) and a tephrochronology (B). Detailed information regarding, for example, the settlement period and associated erosion between 871 AD and 1341 AD, and a decrease in erosion after 1341 AD indicating landscape stabilisation, is lost when relying on a radiocarbon dating chronology. This presents a challenge when considering detailed palaeoenvironmental trajectories at the time of *landnám* and over long-term trajectories of settlement (Dugmore *et al* 2000).

Additionally in the Faroes, the resolution of the sediment stratigraphies is reduced as soil profiles are general shallow, whereas in Iceland, andisol accumulation has been rapid since settlement, resulting in deep profiles and high resolution records. Re-working of sediments and incorporation of old carbon was also an issue when dating down slope and low altitude profiles, so the majority of samples were collected from higher altitude sites. Other drawbacks when using radiocarbon chronologies relate to both the technique itself (Olsson 1982; 1986), and the presence of radiocarbon plateaux in the 5th and 6th centuries and the latter centuries of the first millennium, which restricts the precision of dates over the crucial settlement period (Dugmore *at al* 2000, Hannon *et al* 2001).

Chapter summary

This chapter began by outlining a methodological framework from which to better understand the integration of scale-matched methods in historical ecology based research. Additional conceptual frameworks explored the relationship between these methods over time and space. Secondly, the field site locations in both the Faroe Islands and Iceland were described and justified. The methods and processes of data collection from those field sites was then discussed relating to the individual collection of landscape mapping, archaeological survey, semi-structured interview and stratigraphic data. Finally, the advantages and disadvantages of a radiocarbon chronology, used to understand and date the Faroe Island landscape record, were evaluated.



The following chapter presents the collected data, which is organised in a similar arrangement to that of the methods described above.