

SECTION 1

Introduction

1.1. Purpose of the Study

In the Introduction which follows we shall show that Iceland's climate is extraordinarily marginal with respect to agriculture. Its summers are barely warm enough or long enough for either natural herbage or cultivated grasses to provide fodder for livestock. Its history is one of constant struggle between man and nature at a long-standing frontier of the settled world – a history in which the impact of climate on society is an unbroken theme. Iceland thus offers an attractive laboratory in which to study both the impacts of climatic variations on agriculture and the responses of agriculture to such impacts.

The objectives of this case study are:

- (1) To examine the sensitivity of various aspects of Icelandic agriculture to variations of climate.
- (2) To attempt to quantify the impacts of specified climatic changes on its agriculture.
- (3) To consider what policies of agricultural response might be the most appropriate.

The investigations follow the structure adopted in the four other case studies in cool temperate and cold regions reported in this volume (in Saskatchewan, Finland, Northern European USSR and Japan). Regression equations are developed that can be used to estimate the effects of climatic variations on the primary productivity of grazing and fodder crops, on the carrying capacity of pastures and rangelands, and on the implied livestock production. Experiments are conducted using these equations to evaluate the impacts of several different climatic scenarios representing:

- (1) An anomalously cool decade taken from the historical instrumental record.
- (2) Individual and groups of anomalously warm and anomalously cool years selected from the recent climatic record.

- (3) The climate derived from the estimates of the Goddard Institute for Space Studies (GISS) general circulation model, for doubled concentrations of atmospheric carbon dioxide (Hansen *et al.*, 1983, 1984).

Several adjustment measures for mitigating adverse climatic effects receive a quantitative evaluation, and many more are assessed qualitatively.

This introduction provides background information on the study area and outlines the considerations governing the selection and development of the various impact models and scenarios used in subsequent sections.

1.2. The Settlement of Iceland

Iceland is situated between latitudes $63^{\circ}23'N$ and $66^{\circ}32'N$ and between longitudes $13^{\circ}30'W$ and $24^{\circ}32'W$. The shortest distance to Greenland to the northwest is 300 km, and to Scotland to the southeast, 800 km. More than one-third of the country is higher than 600 m above sea level (*Figure 1.1*).

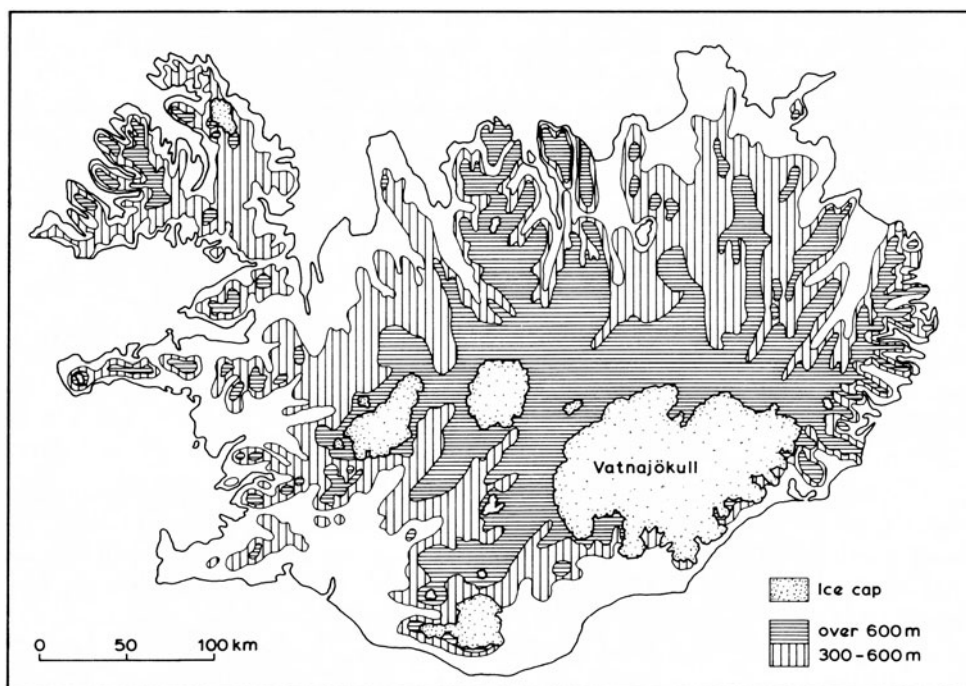


Figure 1.1. The topography of Iceland (for Iceland's location in northwest Europe, see *Figure 1.6*).

Apart from Irish hermits who established their cells in a few places about AD 800, the main settlement period in Iceland is usually reckoned to have taken