# Site description and methodology

## Brief history of forest cover in Scotland

“In the aftermaths of the last Ice Age some type of Forest covered the Highlands, apart from the high tops, though pine and oak did not grow on the islands and the flow country of the north, where such cover was largely consisted of birch and hazel. However, there is no evidence that even in Roman times, 2000 years ago, the forest was still anything like this extent. Whilst in north-west Scotland the pine forests were largely replaced by blanket-bog before any large impact by man, in the Eastern Highlands human activity was the main destructive agent, stretching over a period from about 1700 BC to about 1000 AD: the fire, the cattle, the sheep and the goats of the Highland peasants, aided by a period of climatic deterioration (the “Little Ice Age” started in the later fourteenth century and not really over before the late seventeenth century) reduced the estimated 50-60% of forest cover during the Mesolithic period to about the four percent during the Middle Ages.

Tompkins, Steve. Forestry in crisis. The battle for the hills. 1989. Christopher Helm, London.

“The vocabulary of an upland forester draws irresistible comparisons with agriculture. Afforestation of a bare hillside requires fencing, the elimination of wildlife such as hares and deer (regarded as vermin), deep ploughing and drainage, planting, fertilising and weeding. Today’s foresters talk of rotations, crops and harvests. Their crops have become steadily more dependend on a single, alien species, the Sitka spruce, with lodgepole pine used where the ground is poorest. Tree-breeding programmes are also ensuring that the genetic base of the plants used will steadily decrease. Blanket afforestation consists of even aged conifer monocultures, that are harvested and replanted, like any crop of surplus grain, except that the trees take decades to grow.

The first basic ingredient or recent British forestry policy has always been an obsession with a target area of bare land to be afforested. During the WWI about 182,000 ha of mostly broadleaved woodland were felled. The Forestry Act of 1919 formed the foundations of today’s forestry policy and practices. The Forestry Commission (FC) was created and a target of 0.75 million ha of new forests was set. The WWII came all too soon, and so the need for more timber. In 1943 the FC set a new ambitious target: 1.2 million ha to be afforested and a further 0.8 million ha of “effective” forest to be created by restocking existing woodlands. Afforestation continued undisturbed despite of the loss of strategic interest; the justification came to the creation and diversification of employment in rural areas. At the end of the 1970s the 1943 target was about to be passed. In December 1980 a ministerial statement announced a forestry policy that did not mention a total area of plantations anymore, but envisaged an afforestation rate of 20,000-25,000 ha per year, later increased to 30,000 ha in March 1986. Since 1919 upland afforestation has continued inexorably. Over the last 60 years nearly 18,000 ha have been planted each year.

The second basic ingredient of British forestry is that the rapid expansion of coniferous plantations has occurred on land where tree growth is least satisfactory – in the uplands. This was due to avoid competition with agriculture, as the production of food was seen to be of key importance, and to take place on cheap land and on a large scale, to reduce unit costs. As to 1986, 34% of hill, moor and rough grazing in Scotland had been afforested (source: NCC 1986).

This chapter gives a description of the site in which the experiments of this study were conducted,

Structure:

The site (geophysical description)

Forest Plantation description: generalities (sitka in Scotland) 2) specific (including recent felling)

Data collection “N fluxes – water collection”: methodology in field and in labs

Experiment “15N-labelled simulated Ndep”

Experiment “15N-labelled application on branches”

Brief explanation of the gas chambers collection too.

15N – labelled

**The site**. See Robert thesis for a rough structure.

The experiment site is located in Griffin Forest, Perthshire (UK). \*topography and climate.

T plot: 56°36’22’’ N, 3**°**47’41’’ W

C plot: 56°36’38’’ N, 3**°**47’40’’ W

The about 3,000 ha were planted in 1980-1981 with a dominance (80%) of Sitka spruce (*Picea sitchensis* (Bongard) Carriere 1855) and additional species such as Douglas fir (*[Pseudotsuga menziesii](https://en.wikipedia.org/wiki/Douglas_fir" \o "Douglas fir)* ([Mirb.](https://en.wikipedia.org/wiki/Charles-Fran%C3%A7ois_Brisseau_de_Mirbel" \o "Charles-François Brisseau de Mirbel)) [Franco](https://en.wikipedia.org/w/index.php?title=Jo%C3%A3o_Manuel_Antonio_do_Amaral_Franco&action=edit&redlink=1)), Japanese larch (*[Larix kaempferi](https://en.wikipedia.org/wiki/Larix_kaempferi" \o "Larix kaempferi)* (Lamb.) Carr.), Scots pine (*Pinus sylvestris* L.) and downy birch (*Betula pubescens* Ehrh.).

Before afforestation: treatment and 3 different soil features.

Reasons to choice the site.

Historical – geological description.

Topographic description (Clement paper, Ecocraft).

**Forest description** (dbh from Amy Harbinson 2010 (nested Anova to analyse the data. ???), my update 2016)

Soil description. Richard Nair plots.

Description of the main sample collection – rationale: choice of trees by dbh classes, prolisso sulla descrizione di TF e SF. Streamwater: British standard plate weirs. Litter collection. In the labs: water filtering. Colorimetric analysis

Open questions: ma la rationale, Magnani e pippe varie, da dove era partito il progetto, vanno qui? Secondo me, si. In that case, see the PhD offer document.

Brief description of some of the previous experiments.

Experimental design

E I lost shots? Using a drone…

Methodology for the 5 years dataset: Descrizione del database ottenuto -> fieldwork and lab methodology, data quality (NAs), data treatment, outliers, regression and interpolation.