

# 126 Development of vegetation and soil impacts on trails and campsites in a Norwegian National Park during 30 years: Worse or better?

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## Introduction

A report from 2006 states that disturbances and impacts on vegetation and soil are the biggest threats to the conservation values in the national parks. In the spring of 2014, the Norwegian Environment Agency's work began on developing a brand strategy for Norway's national parks. By 2020, all of Norway's national parks should have prepared a visitor strategy. In the visit strategy for Femundsmarka National Park, it is a measure to carry out comparative surveys of wear on campsites and trails, which was done in the 1980s. At the end of the 1980s, a major research project was carried out in the protected areas Femundsmarka (N), Rogen (S) and Långfjellet (S) in the so-called FRL-project. A part of the study was to register impacts on vegetation and soil at campsites.

The purpose of this Master thesis is to map impacts on vegetation and soil and assess changes over time, caused by visitors in Femundsmarka National Park. Both in areas previously investigated and in other areas with management challenges. A method test of aerial photos was also carried out to register campsites. Based on secondary data an assessment of traffic development was done.

## Study area

Femundsmarka National Park was established in 1971 with a protected area of 345 km<sup>2</sup>, and expanded in 2003 to 573 km<sup>2</sup>. Data were collected from three study areas in the national park, by Røsanden, along Røa and on Røvolvfjellet. The study area at Røsanden is 2.4 km long and runs along the beach zone both north and south of the outlet of Røa Lake, by Femunden. Røsanden is a flat area dominated by rocks, sand and gravel in the sediments. Blueberry forest and heather forest are dominant vegetation types. The study area along the south side of Røa is 6.2 km long and starts at Starrhåen and ends at Nedre Roasten. The terrain along the watercourse is hilly with large areas of block land. Dominant vegetation types are blueberry forest, heather forest and oligotrophic bogs. The

study area at Røvolvfjellet includes Røvoltjønnan and the surrounding areas and comprises an area of approx. 1.3 km<sup>2</sup>. The terrain is somewhat hilly with moraine sediments. Dominant vegetation types are heaths of heather and lichen.

## Methods

Registrations of impacts on vegetation and soil on campsites followed the same methods as Vistad (1995) used during his fieldwork in 1988. Vegetation-free areas, condition class, number of firepits and damaged trees. In addition, development of impacts was added as a new indicator. It will tell if the impacts at the campsite is increasing or decreasing. A more detailed registration of damage to trees at campsites was also made. A random sample of trees at each campsite had the type of damage and age of damage examined.

Impacts on vegetation and soil along the trail from Røsanden to Røvollen was measured at an observation point per 200 m. The selection of an observation point was made with a semi-random outlay. At each observation point, trail width (core trail, transition zones and total), trail depth, wear condition, slope and substrate type were measured.

## Results

The number of actual campsites not visible on aerial photos, was higher than the number of beforehand estimated campsites which turned out not to exist in reality. There was thus an underestimation of the number of campsites when using aerial photos. The number of visitors to Femundsmarka in the last 30 years may have increased, but it is difficult to know exactly how these numbers have developed. Since 1988, the number of campsites has increased both at Røsanden and along Røa with resp. 19% and 70%. Between 1988 and 2020 vegetation-free areas increased by 13% at Røsanden and 78% at Røa. Only one of the studied areas has had a declining wear development. The main reason for this development is that the area is not as accessible as before. The number of damaged trees in 2020 has increased

**Table.** Development in number of campsites, vegetation-free areas, condition classes, number of firepits and damaged trees on campsites at Røsanden and along Røa from 1988 and 2020. \*\* Significance at 0.01 level, \*\*\* Significance at 0.001 level.

	Campsites		Vegetation-free areas (m <sup>2</sup> )				Condition classes		Firepits		Damaged trees	
	Total		Total		Mean (mean in c.class. 3 and 4)		Mean		Total		Total	
	Røsanden	Røa	Røsanden	Røa	Røsanden	Røa	Røsanden	Røa	Røsanden	Røa	Røsanden	Røa
<b>1988</b>	21	10	655	246	31 (60)	25 (17)	2,9	2,9	52	33	112	8
<b>2020</b>	25	17	738	438	30 (33)	26 (26)	3,2**	3,6**	29***	25***	241	163

from 112 to 241 at Røsanden and from 8 to 163 along Røa compared with 1988 (see table). Along the current path between Røsanden and Røvollen, the average total width was 223 cm and average depth was 11 cm. All points were considered to have an increased amount of impacts. There is very little traffic along the rerouted path, and the total width was decreasing at all measured points.

### Discussion

The optimal measure to solve a management challenge is the one that minimizes visitors' impact on the natural environment the most and at the same time reduces the quality of the recreational experience the least. Several repairing and preventive measures have been proposed, which, among other things, are linked to information and channeling of traffic to where it is desired. To prevent damage to trees, measures such as transporting firewood to widely used campsites, banning campfires outside facilitated campsites and removing stumps / branches from damaged trees. A physical environment that is in a bad state will be able to trigger bad behavior. An area that is well cared for and looks good will most likely provide

positive experiences for the visitor, leading to a positive behavior.

First-time visitors to Femundsmarka on multi-day trips, often with certain perceptions of what they want, are more difficult to control compared with first-time visitors on "random" day trips in e.g. Jostedalbreen. This means that Femundsmarka has special challenges in also managing first-time visitors. Both first-time visitors and experienced users in Femundsmarka may need to be managed with more direct management measures (prohibition / injunction). Prohibition of traffic is to a very small extent used in Norwegian national parks, and with the political objective of increased use of the national parks, it is difficult to envisage management methods that seek to ban traditional use of an area.

In cases where conservation values are threatened, both central authorities and the individual national park board must raise the discussion about using stricter and regulatory measures if undesirable impacts that damage the conservation values should be reduced or avoided. The resource situation must be adapted to the challenges at hand.