

Condition Assessment



HORDALAND
COUNTY COUNCIL



The ASCENT Site

Trolltunga, Norway

T1.1

Research on the Impact of Unregulated Access to Upland Sites

A report on research on the ASCENT site Trolltunga in cooperation with the municipality of Odda Kommune.

by Hordaland County Council

SKJEGGEDAL TIL TROLLTUNGA

Merket sommerrute 

Type:  Fottur
Lengde:  Ca. 10,7 km
Varighet:  5 timer, 30 minutter
Gradering:  Ekspert 
Passer: Voksen

Område: **Hardangervidda**
Sesong: jul aug sep



Background information

Trolltunga (The “troll’s tongue”) is a striking rock formation offering stunning views over its mountainous surroundings and the lake below. It is located on the border of the Hardangervidda national park and is a part of Odda municipality in the region of Hardanger on the west coast of Norway.

Trolltunga is inaccessibly located in a remote and natural landscape: an 11 km hike from the nearest road and entry point. While there have been some hiking trails in the area for decades, visitor numbers here have been low and so the rural environment has not been damaged. A small, unmanned cabin run by the Norwegian Trekking Association (DNT) exists in the area, with two trails leading on to different locations to the south and east of Trolltunga.

In 2009, the estimated number of visitors to Trolltunga was 1000, 99% of them Norwegian hikers. In 2010, the local tourist board started using a photo of Trolltunga as its main profile picture for the region. The photo was also picked up by the regional international tourism organisation for worldwide publication and distribution. At the same time, social media arrived in full force.

By 2013, the visitor numbers had gone up to 21,000, doubled to 40,000 in 2014 and continued to rise sharply to 75,000 visitors in 2016.

In the town of Odda, the number of tourists outstrips the local supply of accommodation, leading to major camping and parking problems. The influx of visitors has a much-needed positive impact on local business, but Odda as a community is not set up properly to take full advantage of this. Local pride in Odda is on the way up and new jobs are becoming available. Most of the tourists, who came to hike at Trolltunga in 2016, were not Norwegian. The problems are also affecting the wider region in Hardanger and in Bergen. Access to the parking area is via a narrow mountain road, which causes logistical problems for daytrippers.

The number of visitors has also led to a number of environmental challenges. Path erosion, litter and human waste have become a real concern. The number of hikers in distress is also a problem, with more than 40 help and rescue operations launched by the local Red Cross. Most injuries are minor but there was one fatality in 2015. In 2016, there was concern that more accidents of a serious nature would occur. The ASCENT project aims to address some of these challenges.

The Geology

The plateau of the Hardangervidda national park is largely built of Precambrian bedrock and mainly consists of hard gneiss and granite. The old original bedrock was later flooded by seawater. On the sea bed, sediment of sand, gravel, clay and organisms was later formed into various types of calcareous rock. During the Caledonian orogeny, large sheets of hard rock were pushed over the ancient sea bed from the west. Later, the land rose considerably in the west, meaning the water and glaciers had a greater effect on the landscape and cut further into it rather than further to the east. Not much remains today of the old strike-slip fault. The old sea bed remains in large sections, partly covering the bed rock. The calcium-rich rock provides good soil and, coupled with high levels of precipitation, this makes the western part of the Hardangervidda ?? word missing than the eastern area.

The Trolltunga hiking trail is to the extreme west of the Hardangervidda, forming part of the same landscape, but just outside the border of the national park area. The route to Trolltunga goes through high mountain terrain, with creeks, streams, boulders and wet marshlands. The trail also passes over the bedrock and slippery hillsides. The starting point for the hike is at Skjeggedal, which is 470 metres above sea level. Trolltunga is 1100 metres above sea level. From late September to June, the trail is normally covered in snow and ice.

The actual Trolltunga cliff is part of the Precambrian bedrock and was formed during the Ice Age approximately 10,000 years ago, when the edges of the glacier reached the cliff. The water from the glacier froze in the crevices of the mountain and eventually broke off large, angular blocks, which were later carried away with the glacier. Along the cliff itself, a gneiss, there continues to create deep cracks.



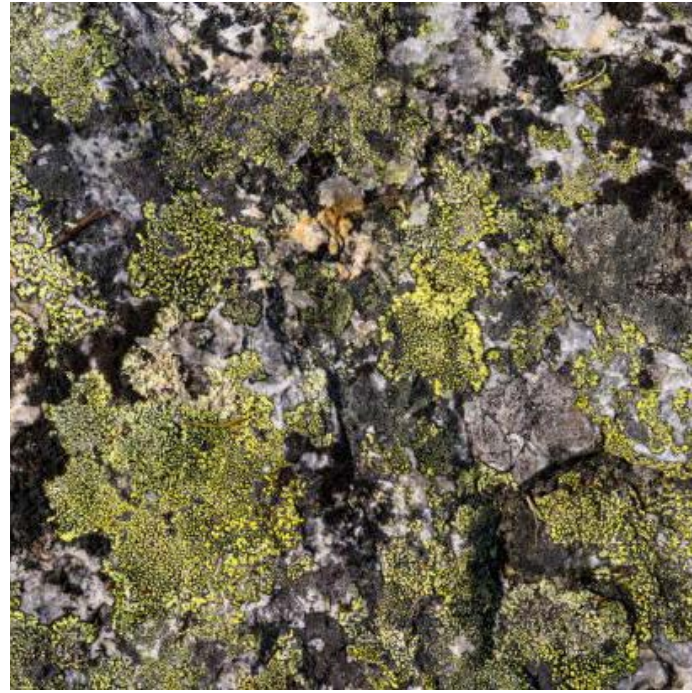
Flora

Hardangervidda is the largest highland plateau in Northern Europe and the largest national park in Norway. Hardangervidda became ice-free about 9,000 years ago. Lichens began to grow on the bare ground, providing food for reindeer. The varying climate of the plateau has a marked effect on the flora, which is richer on the wetter west side than in the drier east. Large parts of the plateau are covered by coarse grasses, mosses (especially sphagnum) and lichens.

The Alpine climate of the Hardangervidda plateau engenders the presence of many species of Arctic animals and plants further south than anywhere else in Europe. Plants grow more vigorously in the west where there is more precipitation and a less-fluctuating temperature. Flowers such as Purple Saxifrage and Scandinavian Primrose are typical to the region. While other national parks may have a larger diversity of plants, Hardangervidda is special as we find the south/west border for many of our mountain plants here. Lichen, fungi and moss abound. The many and large bog areas form a particular feature for the flora on the Hardangervidda.

Windy heaths are common in areas with little snow and poor bedrock. The whole of the Hardangervidda is above the treeline. Today, the treeline for the Trolltunga hiking trail is around 450 metres above sea level.

In the Holocene climatic optimum (Stone Age) 5,000–9,000 years ago, the regional climate was warmer, and large parts of Hardangervidda were wooded. Pine logs can still be found preserved in bogs well above today's treeline.



Fauna

The Hardangervidda national park is important as the home of the largest wild reindeer herds in Europe and the largest populations of many species of birds that are comparatively rare in southern Norway. Its wild reindeer herds are among the largest in the world, with some 15,000 animals recorded in 1996 and about 8,000 in 2008. Every spring, the large herds of wild reindeer migrate westwards from their winter grazing on the eastern part of the plateau to areas where high precipitation and nutrient-rich soils provide good summer grazing, with succulent grass for both reindeer and domestic livestock. Early in May, the pregnant females reach their calving grounds. Disturbing them then may prove disastrous. The males and juveniles migrate to lower ground and graze in the birch woods. The objective of the wild reindeer management is to stabilise the winter population by matching it with the grazing resources.

Today, there is no permanent population of large predators in the Hardangervidda area. Individual wolverines have been spotted. The breeding populations of black-throated divers, scaups, velvet scoters, common scoters, dotterels, Temminck's stints, great snipes and shore larks are particularly valuable.

Mountain trout is well established in most lakes across the Hardangervidda and within the national park limits it is practically the only species of fish. In many areas, the lakes are very productive for trout, since there is a good supply of nutrients in the form of aquatic amphipods and notostraca.

Human impact

Humans have hunted reindeer and fished on the Hardangervidda since the early Stone Age. About 250 Stone Age sites have been found; the oldest dating from 6300 BC. The old paths crossing the plateau were important routes linking south-east and western Norway.

Hardangervidda differs from the other national parks in Norway because it has been used a great deal by local people and has many buildings (cabins) and much privately-owned land. As a result, there is a considerable amount of motorised traffic associated with the



Photo: Olav Liestøl

harvesting of resources, the upkeep of buildings and the running of lodges and huts for hikers and skiers. Large flocks of sheep and goats are taken there to graze each summer, while, for many people, fishing and hunting are highly valued forms of relaxing recreation and sources of food.

Since the Stone Age, several trails have crossed Hardangervidda and one of the three greatest trails, Nordmannsslepa, starts at Skjeggedal and also forms the starting point of the Trolltunga hiking trail. This ancient trail does not follow the Trolltunga's trail beyond the first ascent to up Mågelia. There are no known structures of cultural heritage along the trail to Trolltunga, although the area has not been subject to archaeological surveys or excavations.

The lake Ringedalsvatnet, which is situated by the parking lot at Skjeggedal and which Trolltunga overlooks, is a main reservoir for a hydroelectric power station at Tyssedal. The hydropower company Statkraft manages the Ringedalen power station and the company is a major ground owner in the area.

There are a number of privately owned cabins situated near the start of the trail at Mågelia. As the number of hikers has increased, the impact on the cabin owners has been largely negative.

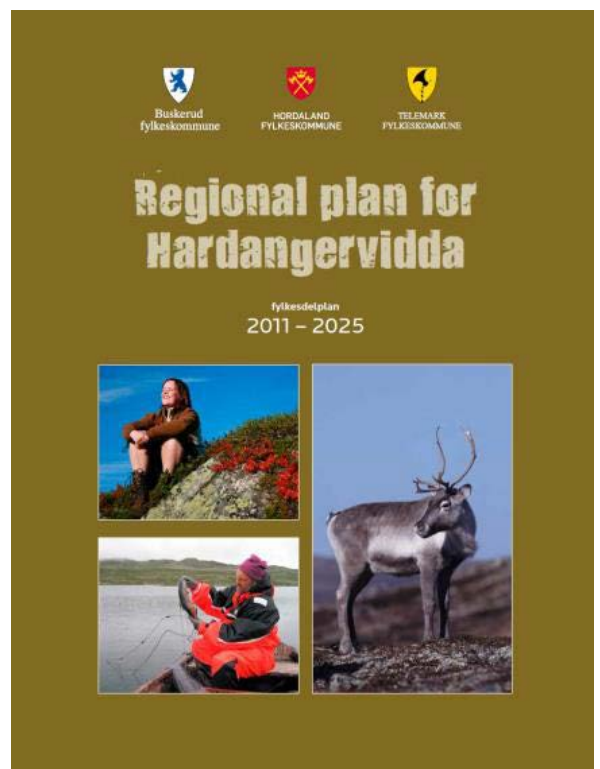
Local and Regional Plans

- Odda council: Area plan for Odda 2007-2019
- Hordaland county, Buskerud county and Telemark county: Regional plan for Hardangervidda national park 2011-2025
- Norwegian Environment Agency: Design manual for Norwegian national parks: Describing the national identity of Norway's national parks. (Not specifically for Hardangervidda).

Trolltunga area is regulated as uncultivated agricultural land in Odda council's area plan. This places restrictions on the possibility of building on the land. It is not necessary to regulate paths for hiking in Norway, however any road suitable for vehicles is subject to a regulation plan.

The area also comes under the regional plan for the Hardangervidda as the path is located in the border area to the Hardangervidda national park.

A design manual for visitor strategy for Norway's national parks has been developed by the Norwegian Environment Agency. This is a new plan and has been piloted in 4 of Norway's 46 national parks. The manual describes a suggested process for creating a strategy for the relevant area.



Norway's Relationship with Nature: Public Expectations

Outdoor recreation is an important part of Norwegian cultural heritage. Since ancient times, we have had the right to roam freely in forests and open country, along rivers, on lakes, among the skerries and in the mountains – irrespective of who owns the land.

We are allowed to harvest nature's bounty - which means not only our saltwater fish, berries, mushrooms and wildflowers, but also our sensory impressions of the whole outdoor experience. The main principles of the right to roam are legally enshrined in the Outdoor Recreation Act of 1957.

For this reason, both legally and emotionally, the idea of restricting access to an outdoor area is strongly opposed in Norway. Leading an active outdoor life with hiking in the mountains is not only seen as a right, but also as an important skill for young children. As such, activities such as camping, hiking, rambling etc are strongly encouraged. The Norwegian population is generally fit, able and knowledgeable enough to go hiking in the mountains in a safe and considerate manner.

With the sharp increase in hiker numbers, the wear and tear on the path and surrounding environment has become considerable. The iconic site is attracting not only hikers from abroad, but also people who are keen to reach the site but who have no hiking experience, who are not fit enough to manage a hike of such length in a safe manner and who have no experience with the type of exposure expected at this altitude and latitude. The option of closing the path on days when the weather has been particularly ill-suited to hiking to ensure public safety missing words, however this is regarded as problematic and in breach of the Right to Roam act.

The Norwegian concept of friluftsliv, or "open air life" is deeply embedded in Norwegian culture and way of life.



Safety

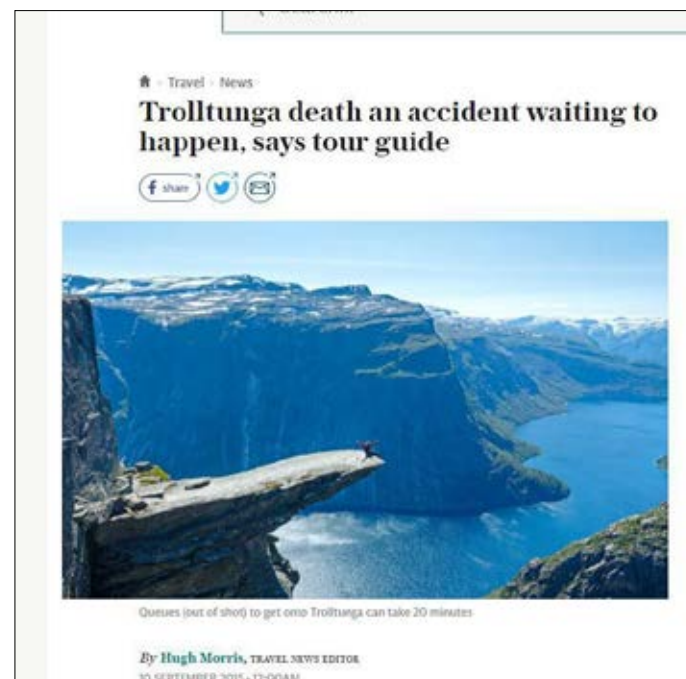
In 2016, there were 40 help and rescue missions by the local Red Cross in Odda municipality. Most of these were to deal with minor injuries and the vast majority were to deal with cases of hypothermia, fatigue and anxiety. In some cases, young children were involved, including a one year old in a baby carrier, who needed hospital treatment for hypothermia. A number of hikers also lost track of the path.

Hikers were setting off ill-equipped, with some attempting the hike in sandals and jeans and with little or no food or alternative clothing. They were also setting out too late in the day, meaning they would be returning after nightfall with no light.

Many found that, although they considered themselves fit and active, they became exhausted by the unfamiliar sensation of hiking cross country. Blisters, sore muscles and aches and pains were the most frequent problems encountered by the rescue teams, as were lack of food and warm clothing. Nearly all of the people who called for assistance were able to walk themselves to safety.

Before 2016, there was no mobile phone connection in the area. In many cases, some members of a group would lag behind and would subsequently lose touch with their group. Concerned friends would then call Red Cross for assistance as they were unable to locate their friends and were worried for their safety. In 2016, a mobile network was established to a certain degree but it can still not be relied upon by users of all networks. Problems with operating a smartphone in the rain and cold, running out of power and so on are other obstacles to using mobile phones as a "lifeline".

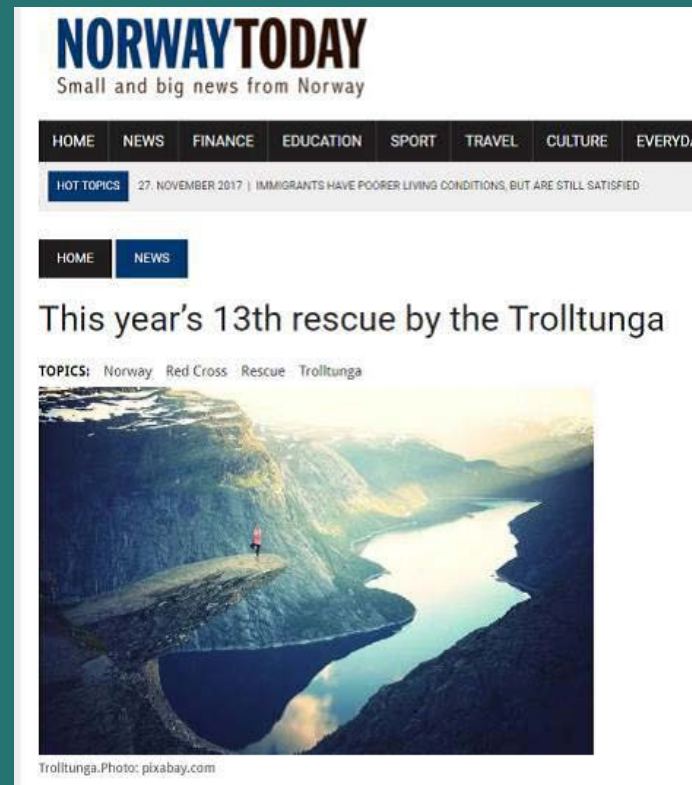
The pressure on the local Red Cross team was verging on the intolerable in 2016. The Red Cross team were local people with daytime jobs, who were volunteering their services, and they were typically called out at night. The person requiring assistance would be a several hour hike away. It was also upsetting for the rescuers to handle, particularly the cases involving young children in distress due to parents' carelessness. The stress on the local service caused a lot of negative publicity in the local media and contributed to a feeling of negativity towards the visitors.



In 2017, Odda council introduced a new safety measure consisting of an extra emergency cabin, manned by guides specifically tasked with assisting hikers. The introduction of the guides slashed the number of rescue operations from 40 in the 2016 season to 15 in 2017. The manned cabin had a power supply, simple cooking facilities and water supply and was manned 24/7 for two months over the summer period. The type of assistance given was food, blankets or shelter, band-aids or support bandages, simple painkillers, comfort and encouragement.

The guides also actively sought out hikers that were obviously ill- equipped or unfit and strongly advised them to turn back if they had started too late in the day or were making slow progress. Odda council intends to repeat the service in 2018.

In winter, trips are primarily made with a guide using snowshoes and there are no incidents to speak of.



Media > News from Norway > Per Magne has been saving lives in the mountains for 30 years

Per Magne has been saving lives in the mountains for 30 years

It's been a busy year for the rescuers at Trolltunga. Per Magne has even had to rescue children.

The Paths

There is no national standard for how paths in Norway should be kept and maintained. In latter years, much work has been done to implement a standard for marking and grading hiking paths in Norway, using a colour-coding system similar to what you would find in ski resorts, where black and red marks challenging slopes, while blue and green are easy slopes. However, maintenance of the paths has received little focus. The key operators for maintaining paths is the Norwegian Trekking Association (DNT), which owns a network of hikers' cabins across Norway. Paths and trails between these are marked at intervals with a red T painted onto rocks and cairns. Some of these trails are maintained by DNT.

Also in latter years, a popular solution to path erosion has been to hire Sherpa path builders from Nepal to build stone stairs and paths. This was also done in the first ascent of the Trolltunga trail as a solution to the original very steep track, which was muddy and difficult to walk both up and down. These steps have not been very successful as they have not coped with the number of hikers very well and have not sat well in the soil. Due to the height of the steps, these stairs were also inconvenient and, in some instances, a trip hazard for tired hikers on the return journey.

In the higher section of the trail, the path partly goes over bedrock and partly through boggy areas with small trees. The boggy areas have been particularly damaged by large number of hikers, especially when the moisture content has been high. 'Quick fixes' have comprised wooden horizontal ladders or timber ways across the boggier sections of the trail. Norway has a lot of timber available and this is quite a common solution to hiking trails. They are cheap, quick and easy to build and to get into place and withstand the elements very well. However, they can become slippery when wet and are (in this instance) introducing a foreign element into an environment where no trees grow. Path maintenance in Norway in the Trolltunga area is carried out by staff connected to Odda council. Specialist training for terrain sensitive path building and management does not exist in Norway, nor do we have national guidelines for the type of intervention or techniques for various areas.



The focus has been on protecting the upland from the immediate effects of high-impact use and also on protecting hikers. Due to the number of hikers in the area, it is necessary to have a path measuring at least 120 cm wide so that people can pass each other in opposite directions without having to step off the path. This is both to protect the landscape on either side of the path and to avoid hikers having to slow down to step off the path, as this makes their hike longer and increases the chances of them being unable to complete their hike before darkness falls.

As the Trolltunga path is now subjected to at least 80,000 hikers a year, a range of intervention measures have been introduced in this area that would be considered unacceptable anywhere else. This includes the dimensions of the path, the number and style of signs in the upland area, the cost of parking (necessary to fund maintenance work in the area) and the emergency cabins that have been placed along the path.

One of the ASCENT project's aims is to provide a more formal structure for path building skills, standards for type of path and signage appropriate for the various degrees of usage and placement. For example, paths in very remote areas with low hiker numbers would be subject to different standards than paths nearer to urban areas, which would have much higher visitor numbers.

The Trolltunga path is something of an anomaly as it is inaccessible, demanding and remote but, at the same time, has extremely high visitor numbers due to the attraction of the rock formation.

The number of hikers in the winter months will increase. Guided tours are available from mid-February to the end of May. Hikers use snowshoes or skis and leave no mark on the landscape apart from litter. As almost all winter guests take the guided tours, there are no problems associated with this segment.





Human Waste and Litter

The hike to Trolltunga from the starting point is a distance of 11 km; a round trip of 22 km. There is a toilet at the parking lot by the starting point at Skjeggedal, but nothing in the mountainous areas. Consequently, anyone “needy” has no option but to use the outdoors. As the number of people has increased, the amount of human waste, toilet paper and litter has become a significant problem.

A consequence of this is that, while streams and lakes in Norwegian mountains are safe for drinking from, this is no longer necessarily the case along the Trolltunga trail. The biological matter left behind also adds a significant amount of nutrients to the soil, and that, in turn, has consequences for the local flora and fauna in the area. Paper can be seen in many places along the trail (blown around by the wind) and is both unpleasant, unhygienic and a foreign element in the landscape.

Installing toilet facilities anywhere along the trail is complicated for a number of reasons. As the trail is far from roads, any waste that cannot be carried out must be airlifted off the site. Today, there is a system where normal litter is airlifted out a few times a year. However, the amounts of waste that would likely accumulate in a toilet facility would mean that helicopter transport to airlift waste would be necessary on at least a weekly basis, which is not sustainable. Power supply, maintenance, cleaning, water and installation are other challenges.

The winter is harsh and portacabins or similar would have to be airlifted in and out for the summer season as they cannot stay out during the winter. This is a potentially a problem not just for Trolltunga but also for other popular hiking destinations. Funding has been provided from national budgets to develop new solutions that might work in upland scenarios and it is hoped that we will be able to trial such a system in the Trolltunga region as part of the ASCENT project.

Other litter is also routinely left behind by hikers in spite of plenty of signs asking people to take their rubbish away with them. Sweet wrappers, fruit, food packaging, bottles and disposable barbecues are left behind. A more recent problem is wild camping in the area and people leaving tents and sleeping bags behind when they leave. In addition to lying on the ground where they are left, they may also be carried by wind into nearby lakes and rivers, making them difficult to retrieve.

As wild camping is permitted in Norway - as long as you stay 150m away from the nearest house and as the areas are not patrolled - it is difficult to stop people setting up tents or leaving things behind. The key to a solution for this problem seems to lie in better communication with the hikers. However, finding a format that works well across nationalities, cultures and experience segments has proved to be very difficult.

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