The contribution of organic agriculture to landscape quality in the Sogn og Fjordane region of Western Norway

Morten Clemetsen a,*, Jim van Laar b

a Dr. scient, Fjordsenteret, 5745 Aurland, Norway
b Wageningen Agricultural University, Leerstoelgroep Biologische Bedrijfssystemen, Haarweg 333, 6709 RZ Wageningen, The Netherlands

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Abstract

To substructure the hypothesis that ecological agriculture positively contributes to landscape quality, a methodology has been developed that evaluates a broad range of components of the cultural landscape based on sets of objective and subjective criteria. This methodology aims to be a feasible regional planning tool Europe-wide and has subsequently been tested and improved in several European regions, the latest in Western Norway. This article presents the results of the farm and landscape quality assessments by an international group of experts of various disciplines and its possible implications for regional planning in a specific local situation. In an interdisciplinary approach two different organic farms in the impressive Norwegian fjord landscape were comparatively studied, especially with respect to their contributions to landscape quality, with emphasis on sensorial perceptions (subjective appreciation) and landscape identity issues (objective appreciation). Moreover, the preservation of values at landscape level as well as the meaning of the cultural landscape values for the local population are discussed. Landscape qualities in the study area are related to nature and cultural heritage values, but these values are declining without active human involvement. The methodology as developed so far appeared useful in demonstrating the values of the landscape and elements in the region to different stakeholder groups, especially with respect to local and regional planning processes. Both the organic farms, as part of the landscape, provide important contributions to the cultural and ecological values of the landscape, but according to the assessment results these contributions are different in quality. ©2000 Elsevier Science B.V. All rights reserved.

Keywords: Ecological agriculture; Goat farming; Landscape assessment; Landscape values; Regional planning; Western Norway

1. Introduction

In the framework of the EU Concerted Action ‘Landscape and nature production capacity of organic and sustainable types of agriculture’ a 5 days’ subgroup meeting took place in Aurland, Western Norway, in the summer of 1997. Scientists of the Concerted Action’s working group and local landscape and agricultural experts discussed a methodology to assess the rural landscape quality as it was developed in the Concerted Action.

This article deals with the results of these assessments on landscape level and, based on a comparison between the two visited ecological farms, on farm level. Finally, the feasibility of a checklist with sets of criteria’s and parameters as a general tool in landscape planning and agricultural practice will be discussed.
2. Goals and methods

The meeting’s main goal was to test the checklist as mentioned in Section 1 in a specific European rural landscape for its feasibility in evaluating landscape quality on farms (van Mansvelt, 1997; Stobbelaar van Mansvelt, 1999; Rossi and Nota, 2000). More specifically, it was aimed to investigate in what ways the checklist could be used as a tool for identifying key issues useful in further planning on landscape and on farm level.

The investigations were based on field observations made at two selected ecological farms in Undredal (Undredal farm) and Flåm (Fretheim farm), respectively and on one excursion to the Nærøyfjorden area to observe landscape features. Local experts were involved in order to discuss the feasibility of the checklist and to provide local data, general information and feedback. The research must be seen as a rapid rural appraisal.

On location, the two farmers informed the expert group and showed the relevant parts of their farms. Some literature on the Undredal farm was already available. The description of the ‘Fretheim farm’ near Flåm is mainly based on information given by the farmer family and local experts during the visit. The Nærøyfjorden area was visited partly by boat and partly on foot.

The impressions and information collected during the field visits were discussed in group sessions afterwards, in which subjective appreciation (column 5 of the general checklist, van Mansvelt, 1997) and objective appreciation (column 6 of the general checklist, van Mansvelt, 1997) of the landscape were the main issues to discuss in the context of the following key-questions:

1. How sustainable is the landscape?
2. What are the contributions of the farms to landscape values?

3. The region

3.1. Geography, geology and climate

Sognefjorden is the largest fjordsystem in Norway, covering an area of more than 10,000 km². The main fjord has a total length of 200 km. The Aurlandsfjorden and Nærøyfjorden are two of the innermost southern branches.

The Sognefjorden area is situated in the southern part of the Sogn og Fjordane County, and includes 12 municipalities with an estimated population of 40,000 people.

Results of glacial activity of 20,000 years ago is clearly visible in the landscape like U-shaped fjords and valleys and large plateau’s consisting of moraine deposits in the lower parts of the valleys.

The climate is shifting from humid near the coast to a dry and slightly continental climate in the inner parts of the fjord area. The precipitation varies from 4000–5000 mm annually near the ocean to 400–500 mm in some of the deep eastern valleys (Figs. 1–3).

3.2. Landscape features

The landscape has a natural appearance, with characteristic features like fjord arms, steep mountains up to 1800 m above sea-level, glaciers, rivers, waterfalls and forests. Small scale cultural landscapes with clusters of farms are spread out along the shoreline and in river valleys. In some areas the traditional settlement patterns and the cultivation systems are still rather intact, and are now a major part of the tourism attractions of the area.

3.3. Agriculture in western Norway

The conditions for agriculture are limited in the landscape of Sogn og Fjordane County. Not more than 2.5% of the total area is in agricultural use, i.e., 46,000 ha. Agricultural land is scattered in patches along the fjords and lower parts of the valleys, of which 95% of it is permanent or semi-permanent grassland and pasture (see Fig. 4).

Agricultural production in the county is generally based on cattle raising and small live-stock production. The most important is milk production, succeeded by the production of beef and mutton. Goat and sheep are the most common grazing animals. In some areas the climate offers good conditions for fruit production like apples (Malus domestica), pears (Pyrus communis), plums (Prunus domestica), raspberries (Rubus idaeus) and strawberries (Fragaria ananassa).
Fig. 1. Eastern part of the Sognefjorden.
In spite of less favourable conditions for farming, almost 14% of the population in the county is employed in agriculture. The national average is less than 6%. There are 5500 farmers in the county, 1750 of them are full time farmers. The number of farmers is showing a declining trend of 1–2% per year. The average size of farms is 7.6 ha of private cultivated land.

3.4. Agricultural support system in Norway

Since the 1970s, agricultural policy in Norway has been based on concentration of cattle, goats and sheep production in western Norway and cereal production in the central eastern region.

In recent years, there has been a shift from bulk production based support to acreage based support. In general this was meant to improve landscape and environment. But at the same time adjustments to EU and world market competition have led to reductions in direct agricultural support to farmers over the last 3 years with about 20% and market prices have been frozen or reduced (Nestande, 1997).

Support for organic agriculture contains both supplement of 6000 Norwegian crowns per hectare land under conversion, and an annual acreage supplement of 1100 Norwegian crowns per hectare for already converted farmland.
3.5. Ecological farming in the region

At the moment there are more than thousand certified organic farms in Norway. The number increases by about 300 new farms per year. In 1996, 4650 ha had been certified as organic, and another 3300 ha were in conversion. Ecological farming is supervised by a national certification body (called DEBIO), which covers both organic and bio-dynamic farms.

In Sogn og Fjordane county there are 70 organic farms land in conversion, with 420 ha of registered infield land. The farms are small and in general the production is based on raising sheep and goats. There is very little milk production for consumption, due to the lack of a distribution system in the region. Consequently, main products are meat and cheese. Also some vegetable and fruit production occurs.

Organic farming is generally regarded to have a positive effect on bio-diversity. A recent comparative study made on three conventional and three converted farms in Sogn indicates that there are differences between farms in this region in terms of the level of biological diversity on farms and number of plant species in meadows (Bothun et al., 1996).

For a long time, ecological farmers and consumer groups have been criticising the lack of marketing strategies for ecological products. There is also a lack of institutions that can promote ecological farming. However, an increasing trend of governmental supported processing and marketing initiatives on regional
level, mainly ecological milk and meat products can be observed now.

3.6. Aurland and its economy

The municipality of Aurland is covering an area of 1489 km², including 70 km² of fresh water. Eighty percent of the land is higher than 900 m above sea-level. The municipality has about 1850 inhabitants, mainly living in the four villages: Aurland, which is the administration centre, Flåm, Undredal and Gudvangen. The local economy is still based on farming and some small industry, but the main economic income is generated from hydro-electric power production and a growing international tourism industry. Tourism has become more and more important in the last decades. Today at least 600,000 persons are visiting Aurland each year, most of them on day-trips in the months between May and September. The combination of outstanding natural and scenic qualities and a living cultural landscape is without doubt the most important experience offered to the visitor.

Approximately 100 farms are still in practice in Aurland, but their number is decreasing every year. Live-stock production is based on low input grazing of extensive resources in the common outfields. Six farms (63 ha, nearly 10%) have been certified as organic or are in conversion. Sheep and goat farming are dominant. Aurland belongs to the municipalities with the highest numbers of goats in Norway. Next to live-stock raising, there is also some fruit, berry and vegetable production.

Reindeer-and deer-hunting have ancient traditions in Aurland and still play an important role in the local economy and social life. Formerly, salmon and trout fishing was an important income-source for the farms, but are at present of less economic importance.

3.7. Local landscape management strategies in Aurland

Small scale farming in a fjord-region is generally disfavoured in comparison with large scale agriculture in suitable areas in terms of production and competition. There is a process of continuous reduction of farms still in practice. In the past 15 years the number of active farms in Aurland has decreased up to 20% and the area has been partly abandoned. This is in conflict with the fact that the main attraction for the increasing numbers of visitors coming to Aurland is the experience of a unique cultural landscape in active use. Therefore, a major challenge for the future will be to create ways of supporting farmers and local communities in keeping agricultural production, traditional landscape management techniques and scattered settlements alive.
Different strategies to support local landscape management initiatives are being discussed in Aurland at the moment. Development of high quality farming products based on local traditions is one important way to make the farms competitive. Other initiatives include direct involvement from interested persons and voluntary groups from outside. The conditions for conversion to ecological farming in terms of production and economy are regarded as good and many farmers are now encouraged to start the conversion process. The School for Ecological Farming in Aurland is an important source of inspiration in this process.

4. The study area

4.1. Nærøyfjorden and Aurlandsfjorden

The landscape area that surrounds the two fjord branches (Fig. 1) is of high scenic beauty with a dramatic relief. The steep mountain slopes are covered with a variety of deciduous trees, like Birch (*Betula verrucosa*), Alder (*Alnus incana*), Hazelnut (*Corylus avellana*), Elm (*Ulmus glabra*), Ash (*Fraxinus excelsior*), Lime tree (*Tilia* spp.) and herbs. Old settlements are found mainly in the lower parts along the fjord or on mountain plateaus. Along the fjord active cultivation and harvesting can be observed, but only a few farms are still in practice. Formerly, the land-use system has been dominated by grazing, hay-making and pollarding of trees. Nowadays, the agricultural activity has decreased to a minimum level and the characteristic traditional cultural landscape is about to disappear. The landscape also contains many important heritage monuments and cultural elements, like the old postman’s road from the 17th century, which has recently been restored. Parts of the Nærøyfjorden area has been designated as a nature reserve. Here traditional tree management was reintroduced, carried out by students of the School for Ecological Agricultural in Aurland. Local farmers have also been involved through management agreements to keep some parts of the landscape open by making hay and by animal grazing. Woods are a restricted and regulated resource for instance used for the famous brown cheese production.

The whole Nærøyfjorden, most of Aurlandsfjorden and the surrounding mountain plateau’s are in the process of being designated as a ‘Landscape Protected Area’ and moreover, the area has been nominated for the UNESCO World Heritage List as a landscape of outstanding geological significance, natural beauty and with unique farming traditions.

4.2. Characteristics of the Undredal farm and its surroundings

4.2.1. The village and surrounding landscape

The community of Undredal has 120 inhabitants, and 10 farm units are still in practice. Originally there used to be 20 farms in Undredal. The average size of the infields belonging to the farms is less than 5 ha. The production on six farms is based on goat farming and cheese production. On four farms, sheep raising is combined with other sources of income. Fruit and vegetable production is also done on some of the farms. Undredal can be reached by car since 1988. Till then, boats were the only way of transportation.

Two summer farms, that are only used during the growing season by goat farmers, are situated in the Undredalen valley. The connection to the main road system makes it easier for the farmers to reach the summer farms, which are located along the road. Old pastures are kept open by animal grazing and by cutting of firewood for the cheese-making process. These activities contribute to the conservation of characteristic diversity of species in human-influenced vegetation types (also see: Austad, 1988; Austad et al., 1993). Soil types around Undredalen belong mainly to Rankers (*Umbric Regosols*), Lithosols and Orthic Podzols, according to the FAO soil classification 1974.

4.2.2. The farm

The only ecological goat farm in Undredal started the conversion process by the end of the 1980s (Fig. 2). The woman farmer is responsible for the farm. Her husband is currently working full-time outside the farm. The live-stock represents 45 milking goats, hens, two horses and a few pigs.

The main farm building of the ecological farm ‘Undredal’ is located at the edge of the small village, within the designated area of the Valuable Landscape and facing the Aurlandsfjorden. Adjacent to the farm house, a modern stable has been built, with a place to store hay and a place to accommodate about 50
goats and their kids. Inside, additional proteins from fish products, sea-weed and cereals (barley, oats) are stored and will be fed to the goats when necessary. There is some horticulture production.

There are two summer farms in regular use by all the goat farmers in Undredal; one in Melhus, located 3 km upstream in the Undredalen valley, and the other is Langhuso, 3 km further on.

4.2.3. Economy of the farm

During the field visits, milking of goats and the production of the cheese took place in the modern stable at Melhus, about 3 km outside Undredal. The milking process is mechanised. Six goats can be milked at the same time. The cheese production takes place in big metal tubs which are heated with fuel-wood of Alder (*Alnus* sp.). One horse chart load of wood is sufficient for 2 days of energy supply. After evaporation, the cheese is taken out and put into little wooden boxes, containing 1.5–2.0 kg of cheese. The light-yellow unboiled cheese is considered as a by-product. The famous regional goat cheese has a caramel like colour. Seasonal young workers assisted in milking and cheese production. Here, 40 goats produce 22,000 l per year. 14,000 l is being delivered, the rest is being used for home-made cheese production. It seems that inappropriate hygienic regulations from the national health authorities has been a problem for this kind of local production. Norwegian small scale cheese producers are now working hard to find acceptance for more appropriate regulations.

As a conclusion, ecological farming and a certain amount of extra income from tourism provide for the means of subsistence. Besides, the female farmer’s innovative enthusiasm contributes to successful goat farming in Undredal.

4.2.4. The society of Undredal

The cheese-production on the summer farms is a key factor to the farm economy, but is also an important part of the identity of the society as well. The people in the village of Undredal are proud of their brown and white goat cheese which is produced from May until the end of September. Summer farming involves the farmers socially and personally in an activity which have important effects both in maintaining traditional knowledge and in developing new production techniques. As a result of a local development project, the farmers have founded a co-operative organisation for marketing and sale of the cheese products. Concerning this, there is no distinction between the ecological farm and the conventional ones.

4.2.5. The fields

Four hectares of private cultivated fields are mainly located in the lower part of the Undredalen valley, and on terraces of glacifluvial moraine deposits at an altitude of 150 m above sea-level. Some meadows along the fjordside are still in use on places only accessible by boat. From the settlements, the mountain slopes rise up steeply to 900 m, where the fertile summer pastures for sheep can be found.

In order to produce enough hay, some fields-covering totally 10 ha are rented. One field had a very steep topography. Hay-making under these conditions includes a lot of labour with low yields. Light mowing machines, as well as a scythe are used. After collecting, the hay is mainly transported by horse traction and to a lesser extent by two-wheel tractor and is subsequently stored. Solid manure as traditional fertiliser has been reintroduced.

A hayfield nearby, located on a natural terrace and former arable land (Fig. 5) had a rather flat topography and some improvements have been carried out like ploughing, removing boulders (in 1982) and using better producing grass species and clover, all aimed at obtaining good yields of hay. An avalanche disturbed one of the irrigation tubes in the winter of 1997, but did not harm the fields.

Since the in-fields are so limited in size, the working rhythm on the farm is more related to the continuous shifting of grazing and milking places than the working operations on the cultivated fields. Grazing goats and sheep and to some extent hay-making, is the only possible way of using the vast outfield resources for agricultural purposes.

The system of shifting grazing several times during the summer, indicates that this farming system is highly adapted to the landscape conditions and restrictions. Until the end of the 1980s, several farmers in Undredal were involved in the traditional transportation of goats to the other side of the fjord where they were milked by hand. At present, only the ecological farm has continued this labour-intensive operation.
Table 1
The seasonal cycle of goat farming at the Undredal organic goat farm

<table>
<thead>
<tr>
<th>Period of the year</th>
<th>Production</th>
<th>Grazing area</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>January–March</td>
<td>Milking, milk delivered to central dairy</td>
<td>Indoor, winter foddering</td>
<td>Kidding period</td>
</tr>
<tr>
<td>April–May (3 weeks)</td>
<td>Milking/cheese-production</td>
<td>Along the fjord, farmside</td>
<td>Goats brought home for milking. Fresh grazing area</td>
</tr>
<tr>
<td>Mid-May–July</td>
<td>Milking/cheese-production</td>
<td>The other side of the fjord. Steep mountain side, up to 600 m a.s.l.</td>
<td>The milk brought home by boat twice a day. Fresh grazing area. More than 30% of the total milk production</td>
</tr>
<tr>
<td>August–September</td>
<td>Cheese-production</td>
<td>Summer farming in the valley of Undredal (450 m a.s.l., 6 km from the village. The goats graze up to 900 m a.s.l.</td>
<td>Traditional summer farming. Direct sale to tourists. Fresh grazing area</td>
</tr>
<tr>
<td>October–mid November</td>
<td>No milking</td>
<td>Grazing at the other side of the fjord</td>
<td>Good grazing quality</td>
</tr>
<tr>
<td>November–December</td>
<td>No milking</td>
<td>Indoor feeding</td>
<td></td>
</tr>
</tbody>
</table>

The same happens to the milk twice a day. On the slope, lime trees (*Tilia* sp.) grow and their leaves are grazed by the goats as good fodder. The carrying capacity does not exceeded, since natural erosion of the rocks provides for new minerals.

According to the farmer’s family, maintenance and even extension of the traditional use of the outfield resources has been essential for the result of the conversion process. By extending the grazing period (see Table 1), the level of added concentrates could be kept within acceptable limits without reduction of the amount of milk produced (Clemetsen and Kerner, 1992). From the beginning of April until November the goats are systematically grazing the surrounding outfields of the farm (see Table 1). In this way, the milk goats will always have access to fresh and tasteful, energy-rich fodder.

4.3. Characteristics of the Fretheim farm

4.3.1. The surrounding landscape

During the last four centuries, agriculture has been the main means of subsistence for the people in the
Flåm valley. Originally there were 13 ‘named farms’ (including Fretheim) in the Flåm valley (Indrelid, 1988). Each farm was divided into several separate family holdings and cotter’s places. Today 20 of these units are in production. One of them is the Fretheim farm, converted to ecological agriculture quite recently (Fig. 3). Now that the number of sheep in general has decreased, the vegetation on the slopes has changed. An increase of tree vegetation, mainly birch (Betula spp.) woodlots, can be observed.

4.3.2. The farm

The farm is located at the inner end of the Aurlandsfjorden, close to the tourism village of Flåm and just outside the borders of the designated Landscape Protected Area. The farmyard and major parts of the infield are situated on a plateau of moraine and marine deposits, belonging to the Dystric Fluvisols, Cambisols and Lithosols in terms of the FAO soil classification 1974. The high degree of clay soils is rather seldom in this region and provides the infield with a high level of natural fertility. A young family took over the farm in 1991 and started conversion to ecological agriculture in 1993. The whole farm was certified organic in 1997. The farm has belonged to the same family since the 17th century. The farmyard was moved to a better location after a land consolidation process in the last century. Remains of the old farmyard are still perceptible in the landscape. The place is surrounded by a woodlot of old pollarded birch trees and represents an important visual element in the farm landscape. The Fretheim farm can be characterised as a mixed, organic farm with live-stock, grass land, arable land and horticulture, grazed wood pastures and common, extensively grazed lands, the so-called ‘utmark’ (see Fig. 6).

4.3.3. Economy of the farm

The infield represents 12 ha, which is above the average in the area. In the adjacent hillside 200 ha of rather steep and wooded pastures are used for animal grazing in spring and autumn. 1500 ha of mountain pastures (outfields) are grazed by sheep during 3 months in the summer. The total grazing period is 20 weeks. More than 40% of the fodder comes from grazing on natural pastures. The production on the farm consists of sheep, a few beef cattle, 0.3 ha of horticulture and fruit growing. The income of the family is generated from activities related to the farm.

The farmer’s family has not made heavy investments in stable buildings and machinery. For instance, special equipment for spraying manure is rented. The manure is not composted. The farm was converted in a short period of time, 3 years. This was possible because of the good soil condition, traditionally little use of chemical fertilisers and a production mainly
Table 2
Differences in motivation and strategies in ecological farming

<table>
<thead>
<tr>
<th></th>
<th>Undredal farm</th>
<th>Fretheim farm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main approach to ecological</td>
<td>Ideological</td>
<td>Pragmatic</td>
</tr>
<tr>
<td>farming</td>
<td>Ecological goat farming is the only possible alternative. Aiming at reaching an</td>
<td>Ecological farming as common sense: the best way of getting an economic return</td>
</tr>
<tr>
<td></td>
<td>ecological and economical optimum within the production</td>
<td>from the farm</td>
</tr>
<tr>
<td>Farmer’s motivation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ecological farming as common sense: the best way of getting an economic return</td>
<td></td>
</tr>
<tr>
<td></td>
<td>from the farm</td>
<td></td>
</tr>
<tr>
<td>Strategies for diversification</td>
<td>Continuity: developing traditional, existing knowledge, based on stability in the market</td>
<td>Trying out and making improvements on a wider range of products</td>
</tr>
<tr>
<td>in order to meet changes in future market situation</td>
<td>Highly specialised knowledge giving a unique position in todays market</td>
<td>Building up a broader knowledge of what is possible to produce on the farm. Creativity towards uncertain market situation</td>
</tr>
</tbody>
</table>

based on grass for silage. The soils consist mainly of clay.

In June, 150 sheep graze in the mountains, which are very important for summer grazing. The sheep meat is approved for organic meat. The farmer and his wife have started to build up a beef cattle herd. At the time of the farm visit they had one grown-up cow and three young cows.

Oats and peas are grown for silage and the same counts for grass. The products from the fields are used for winter fodder. The farmers consider traditional hay-making to be too labour intensive. In their opinion, it is quite easy to obtain reasonable yields in organic farming on the property, because the cold winter kills crop affecting insects. The birch woodlots on the slopes are used for firewood.

Today tourist rental of two recently built cabins along the fjordside is an important part of the income of the farm. In addition there is some income from salmon fishing in the river.

4.3.4. Pressure

The property meets continuous stress due to expansion in nearby tourism facilities and tunnel construction. But the location also offers opportunities for extra financial income to the farm’s economy. The farmyard and major parts of the infields are situated on a plateau of moraine and marine deposits. The high degree of clay soils is rather seldom in this region and provides the infields with a high level of natural fertility. Still, there is no need for irrigation-which in general is necessary in the area-, but since a road tunnel was constructed underneath the fields some 10 years ago, the soils have rather dried out due to the drainage effects.

This is observed as a problem, but so far there is no need for irrigation.

4.4. Comparison between the two farms

Both the Undredal and the Fretheim farms have succeeded in converting to ecological farming, but they appear different in terms of farming motivation and farm strategies. This has been described in Table 2.

5. Results of the assessment studies

Three expert subgroups were dealing separately with the three main issues of the checklist: the quality of the (a)biotic environment, the quality of the social environment and the quality of the cultural environment. In this article emphasis has been laid on columns 5 and 6 concerning the quality of the cultural environment. The results are presented and elaborated in detail in Tables 3 and 4.

5.1. Sensorial perceptions (Table 3)

Questions were used to structure the research of subjective and sensorial perceptions (Kuiper, 1997; Kuiper, 2000; Stobbelaar and van Mansvelt, 2000):

1. What is your appreciation of the natural environment like relief, water, soil and climate?
2. What is your appreciation of the land use?
3. What is your feeling about the naturalness?
4. Do you like the range of sensorial information like colours, smells and sounds?
   - are any sensorial aspects disturbing?
Table 3
Assessment of subjective appreciation of the landscape (++ = best, −− = lowest)

<table>
<thead>
<tr>
<th>Landscape level</th>
<th>Motivation</th>
<th>Undredal farm</th>
<th>Fretheim farm</th>
<th>Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ++</td>
<td>No elements missing</td>
<td>++</td>
<td>Impressive relief, flowing water, great variety of natural elements</td>
<td>(+)</td>
</tr>
<tr>
<td>2 +</td>
<td>Difficult to range, but there is something missing, an impression of abandonment</td>
<td>(+)</td>
<td>Land-use less diverse. Mainly goat husbandry, little other agricultural production</td>
<td>(+)</td>
</tr>
<tr>
<td>3 ++</td>
<td>The naturalness is a dominating impression</td>
<td>++</td>
<td>Strong feeling of naturalness</td>
<td>++</td>
</tr>
<tr>
<td>4 ++</td>
<td>Wide range of natural sounds. Little bird-sounds. Some noise from boats passing by (experienced from land-side)</td>
<td>++</td>
<td>No missing elements</td>
<td>+</td>
</tr>
<tr>
<td>5 ++</td>
<td>No disturbing landscape elements</td>
<td>(+)</td>
<td>Abandonment of fields and lack of maintenance of retaining stone walls. Gives a feeling of something missing. Little concern about giving a good impression of the farm</td>
<td>(+)</td>
</tr>
<tr>
<td>6 ++</td>
<td>The landscape offers a lot of information about the natural and cultural history</td>
<td>++</td>
<td>Plenty of information about the past. Structures of parcels, infields/outfields, buildings can be recognised and understood</td>
<td>+</td>
</tr>
<tr>
<td>7 ++</td>
<td>Natural vegetation, farming activity in the landscape</td>
<td>++</td>
<td>Plenty of experiences possible</td>
<td>+</td>
</tr>
<tr>
<td>8 +(+)</td>
<td>The old postroad is not well kept. As a landscape in abandonment, lots of signs of lacking management can be observed. Modern farms are well kept</td>
<td>+</td>
<td>Well kept in general, but since the animals (goats) are around the houses all the time, it gives a little ‘messy’ impression</td>
<td>+</td>
</tr>
</tbody>
</table>

5. Do you get a feeling of unity in the landscape?
   - are any landscape components missing? (completeness)
   - are any landscape components disturbing? (wholeness)
6. Does the landscape give information (or sensations) about the past?
   - which elements?
7. Does the landscape offer you experiences of the seasons?
8. Is the landscape well-kept?

5.2. Landscape identity (Table 4)

The questions used for evaluating the objective landscape identity are listed below. From the main question that is related to the general impression of the landscape four subquestions are posed: ‘Does the arrangement of landscape components express the natural heritage, the cultural heritage and the present meaning?’

1. Diversity (vertical coherence in favour of orientation in space): ‘Does the diversity of landscape
Table 4
Assessment of objective appreciation of the landscape (++ = best, −− = lowest)

<table>
<thead>
<tr>
<th>Landscape level</th>
<th>Motivation</th>
<th>Undredal farm</th>
<th>Motivation</th>
<th>Fretheim farm</th>
<th>Motivation</th>
</tr>
</thead>
</table>
| General impression | +(+)       | The structure of the traditional cultural landscape is still intact, but vanishing. Due to reduced farming in general and less products per farm, the diversity has been reduced | ++ | Based on local resources and development of traditional knowledge | +(+)
|                  |            | Modernising makes the farm ‘a living place’. The cultural heritage is not a major concern |
| 1. Diversity: Vertical relationships between land-use and abiotic features | ++       | Landscape in decline. The landscape today is a weaker reflection of the former fine graded diversity of land-use (e.g. harvesting methods of different tree species). Farming today is mainly specialised (on goats or sheep) | ++ | Due to a high level of rotation between areas, the pattern of parcels and the species diversity of human influenced vegetation types is maintained | + |
|                  |            | Mainly modern, cultivated pastures and meadows with little biodiversity. Grazed outfields with higher diversity. Some plantings in and close to farmyard are also positive contributions |
| 2. Coherence: Horizontal: functional, social, ecological | ++       | The position of farmsteads and infields reflects the abiotic conditions (protection from landslides) | ++ | The use of the resources is strongly related to the natural production capacity. The structure of common outfield grazing is clearly visible in the landscape | +(+)
|                  |            | Production is more market oriented, but still based on the local resources. More of the landscape has been changed (levelled and cultivated) |
| 3. Continuity: Temporal (orientation in time) | +(+)       | Deterioration of farming and landscape, but still some of the traditional land-use is legible in the landscape (for instance, the system of hay-making on small parcels along the fjord, north of Undredal) | +(+) | The modern road and river embankments through the valley are abrupt. Goat-cheese production is following the traditions, including the seasonal rhythms of the year | +(+)
|                  |            | Modernisation of the farm is done gradually. The barn and stable is a functional renovation of the old building. The site of the old farmyard has not been cultivated, some birch trees are marking the site |
| 4. Perspectives for the landscape and farms in the future | + |
|                  |            | In general there is a declining trend for these types of landscape. Old farmers are not willing to sell their farms to young farmers. Relatives keep them for holiday-purpose | +(+) | Today almost all energy is used for one product (goat-cheese). A lot of innovation and creativity is brought into this. But a changing market situation or health regulations might frustrate this on the short term and it will not be easy to face these problems | ++ |
|                  |            | The farmer is very aware of the need of diversification of his production, based on the available resources of the farm, to meet an uncertain market situation in the future. The ecological and landscape potentials (climate, soils, scenery, location versus market) are good |
components express the relationship between the land-use and the abiotic features?'
2. Coherence (horizontal coherence in favour of orientation in space): 'Does the arrangement of landscape components and patterns reflect the abiotic features?'
3. Continuity (temporal coherence in favour of orientation in time): 'Does the arrangement of landscape components reflect (passive) and/or correspond with (active) the cultural heritage?'
4. Potentials: 'Imagine what the landscape will look like in 20 years and are there any indications of continuation in the future?'

6. Discussion

6.1. Feasibility of criteria and parameters

The discussion is directed at the feasibility of criteria's and parameters of column 5 and 6 of the general checklist. Perception and evaluation are considered context related: the farms are evaluated in comparison with each other and with the landscape/regional situation. This means that the Fretheim farm perhaps would have been ranked higher if evaluated with a randomly chosen farm. The visit to the Fretheim farm has been restricted to the infields around the farm. The surrounding outfields and landscape were not deeply investigated.

To some extent it was felt difficult to separate the personal, subjective approach in column 5 from the objective one in column 6. A reason might be that it is difficult not to use one's 'professional eyes' in column 5. When comparing different farms in a region like Sogn, it appears difficult in using the checklist to rank them. Most farms are more or less in the same situation, whether they are ecological or not. In many situations, like Undredal, the single farms are so closely related to each other (e.g. the summer farming system) that it is justified to evaluate the whole farming system of the village.

The general impression is that column 5 and 6 function well as a basis for communication between professionals to provide a common understanding of a specific landscape situation. However, the criteria can be understood more easily by formulating questions as demonstrated in Section 4.2.

The landscape and farm assessments in Aurland offered new views on the feasibility of the concerted action's method, especially regarding to the implementation of the criteria's to local and regional landscape planning and management strategies. The method as developed so far can be of basic use in defining problems and finding solutions from a more holistic approach. This should be of interest for the local community, which will not accept a pure conservation regime in the fjord. The future of local communities in the fjord area will be dependent on a planning process that includes a dynamic integration of both conservation and economic progress, based on the existing broad range of natural, cultural and social resources is required. The checklist appears to be especially useful in a 'rapid rural appraisal'.

The importance of the checklist, especially column 6, as a tool for identifying essential issues for future planning and development of a region was discussed. To make these essential issues clear, questions should be posed on the potential developments related to the natural environment, cultural (heritage) environment and the existing social structures for future development as given in Table 4. Identification of key issues can be used in planning of future development of the Nærøyfjorden area and in other regions as well. The following questions might be helpful with that:
- What are the values of the landscape?
- Who are the beneficiaries of these values?
- What are the threats of these values?
- How can these values be preserved and developed?

This set of questions might give an additional tool in regional landscape planning, especially when all stakeholders are consulted.

7. Recommendations

By including 'potential developments' as a criterion in the table, it will be possible to develop a common understanding on values, threats and potentials of the landscape as an input to a landscape development plan. This can be useful in situations when mutual understanding and communication of values and
threats in a local or regional context is needed among the several persons and institutions involved. This is also useful for the development of political strategies on regional and local levels for landscape conservation and economic development as a part of local planning processes. Participation and empowerment in planning through the concept of ‘Local Agenda 21’ is currently given high priority. Implementation of the method developed by the Concerted Action in conservation and development plans on municipal or landscape level, can, therefore, trigger economic support from national and regional authorities.

The future of the Nærøyfjorden as an agricultural landscape depends on finding creative ways of using the natural resources in agricultural production, for instance co-operative initiatives for the use of abandoned pastures and wood-pastures or keeping grazing animals during the summer period.

8. Conclusions

The landscape and farm assessments in Aurland offered new views on the feasibility of the checklist, especially regarding to the implementation of the criteria’s to local and regional landscape planning and management strategies. Based on the assessments described in this article, some conclusions can be drawn both on landscape level and on farm level. These conclusions are related to the key-questions:
- Is the landscape sustainable?
- What are the contributions of the farms to landscape values?

8.1. Landscape level: Nærøyfjorden

Landscape qualities of the Nærøyfjorden are related to nature and cultural heritage values. However, there are few signs of destructive land-use like modern roads that do not fit into the landscape scenery or have a negative influence on nature. The cultural elements like the old post-road should be kept in a better condition. There are clear evidences of abandonment of farms and dereliction of the traditional cultural landscape. Consequently, the Nærøyfjorden as a cultural landscape can not be regarded sustainable under the present conditions. Diversity is declining and continuity will disappear. Most people living in the fjord are old and nobody within the family is willing to take over as a farmer. There are very few signs of progress.

The future of the Nærøyfjorden is a matter of active involvement. A passive attitude might lead to total abandonment of the land and then the fjord will only be used for transportation of tourists. Here it must be added that even without any human activity in the region, the fjord will still be impressive and unique as a natural scenic attraction. However, this scenario is hardly politically acceptable, because of the integrated values of man–nature relations in this Landscape Protected Area. Both the conservation authorities and the tourism industry are involved in planning for the future of the fjord system which requires a certain level of traditional activities in the fjord (see Fig. 7). There is an urgent need for appropriate planning tools to initiate sustainable development.

8.2. Farm level

It is quite obvious that both the farms make important contributions to the cultural qualities of the landscape. Both farms keep parts of the fjord landscape open and provide for landscape variety. According to Tables 3 and 4, the Undredal farm contributes more to landscape quality in both the subjective and objective sense than the Fretheim farm, because of better scores on some of the sensorial criteria and for diversity and coherence. For instance, the local cheese production in Undredal contributes to the spatial and experiential diversity of the landscape. It is also important for aesthetic, visual and other sensorial perceptions, like the smell of goats and cheese on the farm landscape. Goat farming is of great importance for the quality of the landscape in the study area.

The Fretheim farm has a variety of on-farm activities and agricultural products, including extensive tourism, brought together in a mixed farming system. This farming type also contributes positively to landscape values, but as evaluated in Tables 3 and 4 to a slightly lesser extent. Moreover, with respect to perspectives for the future, social sustainability looks better on the Fretheim farm, regarding its aim at diversification of the production and anticipating uncertain market situations.
Consequently, the contributions of the two farms to the landscape quality are both positive but different, which depends much on the personal strategy of the farmers as described in Table 2.

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References


criteria and parameters in two Tuscan farm-landscape. Agric. Ecosyst. Environ. 77, 53–64.