

Work-package 2: High Natural and Cultural Value (HNCV) agroforestry

Specific group: Wood pastures and reindeer in Sweden

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Facilitator of meeting: Daana Fjällberg, Njaarke Sami Village

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1. Context

The AGFORWARD research project (January 2014-December 2017), funded by the European Commission, is promoting agroforestry practices in Europe that will advance sustainable rural development. The project has four objectives:

- 1) to understand the context and extent of agroforestry in Europe,
- 2) to identify, develop and field-test innovations (through participatory research) to improve the benefits and viability of agroforestry systems in Europe,
- 3) to evaluate innovative agroforestry designs and practices at a field-, farm- and landscape scale, and
- 4) to promote the wider adoption of appropriate agroforestry systems in Europe through policy development and dissemination.

This report describes one of about 40 initial stakeholder workshops to address objective 2. Further details of the project can be found on the AGFORWARD website: www.agforward.eu

2. Description of reindeer husbandry agroforestry system

Reindeer husbandry systems based on forest understorey resources in Finland, Norway and Sweden have been estimated to extend to 41.4 million ha (Jernsletten and Klokov, 2002). The reindeer agroforestry system across Sweden and Finland is associated with wooden pastures in the Fennoscandian area (Figure 1). These are demarcated by EU Directive Habitats Code 9070.

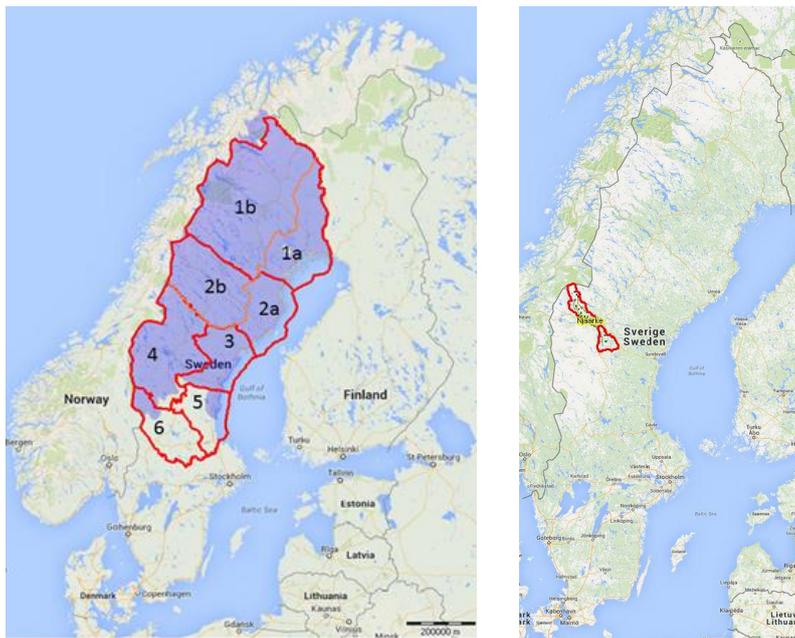


Figure 1. The Reindeer Husbandry Area (RHA), left map, as defined by the area enclosing all 51 reindeer herding communities by the Sámi Parliament (dark area; 2014). The counties of Norrbotten (1a coastal area and 1b inland area), Västerbotten (2a coastal area and 2b inland area), Västernorrland (3), Jämtland (4) Gävleborg (5) and Dalarna (6) are delineated with red lines. The right map shows the location of Njaarke Sami village. (Maps: Per Sandström, SLU).

Reindeer husbandry has been managed alongside forestry in Sweden and in the area used by the Sami village Njaarke since late 19th century. Preceding the turn of that century there was a short interruption of reindeer husbandry due to harsh social and climatic conditions during a period of 10 years. However, there is evidence of the presence of Sami people and reindeer husbandry in the area for more than three thousand years (Ljungdahl 2007). Due to the migration of other groups into the area and legislative development, the Samis' relations to the land around their settlements have changed. The first document regulating the tax obligations for the Sami in the area emerged just after 1645. This implies that the Swedish crown acknowledged their ownership to the land. The latest adjustment of the legal conditions, dated as Rennäringslagen (1993:36), acknowledges the rights of the Sami village to the use of the land, but not ownership. Consequently the Sami pay no taxes for the land, only for the enterprise on conditions that is equivalent to any other enterprise.

To increase the possibility for sustainable utilization of the land area for both reindeer husbandry and forestry, much of their coexistence is regulated in the Swedish Forestry Act (Skogsstyrelsen, 2012). According to Section 20, consultation with concerned residents from the Sami village is obligatory for forest owners when clear cuttings and road constructions are planned in the areas where reindeers are allowed to be kept all year around. More generally, plans on how to meet the interests of the Sami village is regulated in Section 21. Certain considerations related to reindeer husbandry including planning of size of the clear cuts, regenerations, and forest road building is regulated by Section 31. Much of this is handled during consultation.

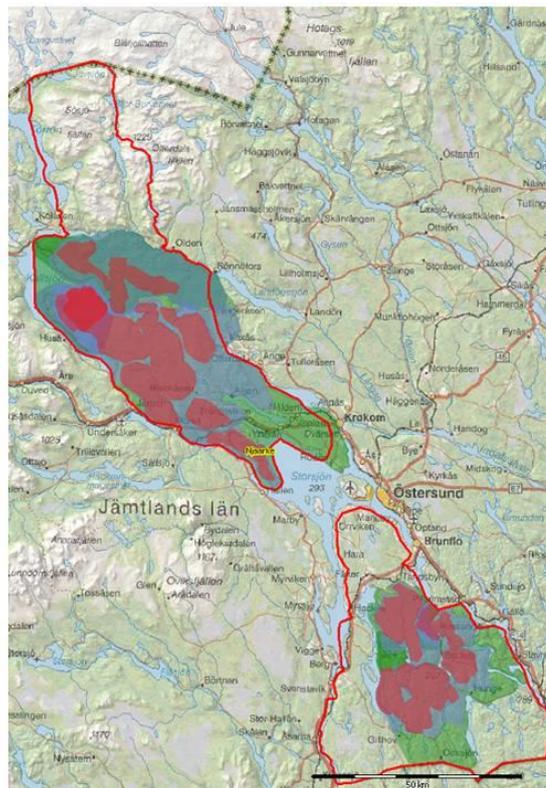


Figure 2. Detailed map over Njaarke Sami village showing lands with different grazing qualities (Map: Per Sandström, SLU)

In the case of Njaarke Sami village (Figure 2), there have been annual consultations with the following large forest owners: the National Property Board of Sweden, SCA Forest AB, Sveaskog AB, Korsnäs AB, and Persson Invest. According to the law (Skogsstyrelsen, 2012), private forest owners with less than 500 hectare productive forest land do not need to have consultative discussions with Sami. During summer, reindeers from Njaarke Sami village are kept up in the Scandinavian mountain areas (mainly not forested areas), and during the period 1 October to 30 April they are allowed out in the forest i.e. the winter grazing area (Figure 3).



Figure 3. Collection of reindeer before transport to winter grazing area



Figure 4. Collection of reindeer during summer for marking of calves.

During the year, members of the Sami village work with reindeer husbandry alongside tourism, hunting, fishing, and work in the forest (Figures 4 and 5). There is a strong tradition of hand craftsmanship. Functional tools are/were made of horn, bone, wood and steel. Skin leather and wool were used for the fabrication of functional and traditional clothing, silver for traditional jewellery. Even today a choice of these works prevails. Some women in the Sami village sew traditional clothing for a living.



Figure 5. Part of the boreal land utilized by the Njaarke Sami village for reindeer husbandry and fishing.

It is important to note that the Sami village are responsible for the management of the land, which is state-owned (Figure 6). Other stakeholders responsible for the management of the land in the area include the County Board of Jämtland, the National Property Board of Sweden, the forest owner association Norrskog, forest companies as SCA Forest and Sveaskog and also small-scale forest owners.

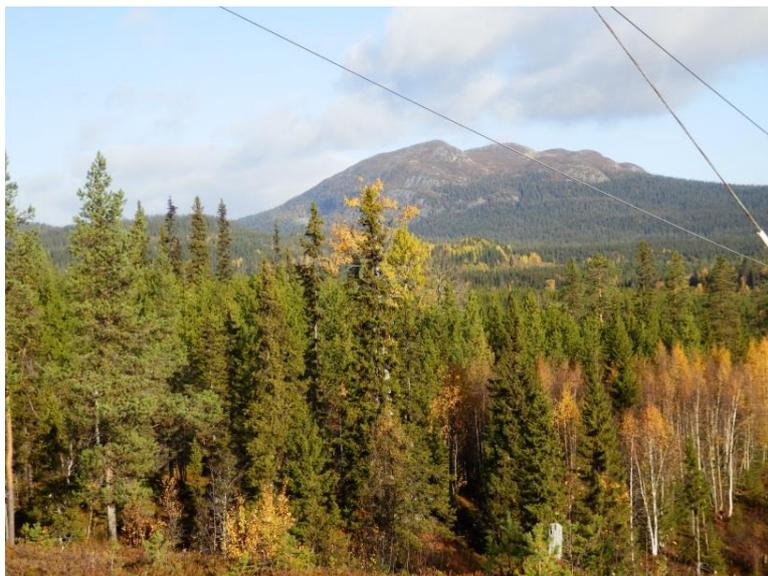


Figure 6. Part of the area used by the Njaarke Sami village is situated close to the Scandinavian mountains or the Scandes.

3. Introductory session and participants

The authors' participation in AGFORWARD was anticipated before its formal start on 1 January 2014. Such early activities were kindly supported by the research fund of Norrskog, a forest owners' association in the region. The initial stakeholder meeting took place in Östersund on 3 October 2013 at Gaaltije, a cultural Sami center for central Sweden. The authors gave an introduction to the AGFORWARD project, the role of the Njaarke Sami Village case study and why reindeer husbandry is considered an example of agroforestry. The primary objectives of this meeting were to identify;

- the most prominent issues and challenges to the sector,
- best practise examples,
- stakeholder-led innovations and
- producers willing to participate in the innovation research.

The stakeholder group was established to evaluate the reindeer husbandry in the Njaarke Sami village in combination with forest management in the county of Jämtland. A further stakeholder meeting took place in Östersund on 26 March 2014 at the local office of Norrskog. These two meetings were followed up by a teleconference on 27 June 2014. There were seven participants at the meetings; three people from academia, two forest owners and two representatives of Sami organisations. The outputs from the initial meetings with the stakeholder group are presented in this report.

A third physical stakeholder meeting was facilitated by representatives from the Njaarke Sami village: Daana Fjällberg, Jovva Joma and Pär Nilsson. This meeting was held at their hunting and fishing camp [Sovvene](http://www.sovvene.se), (www.sovvene.se) northwest of Östersund in the county of Jämtland (Figure 7). The site is situated close to the area for collection sorting and distributing animals after the summer grazing in the mountains, and before walking (transport) to winter lands (Figure 3). The first day was held at the camp in Åkroken. The chair of the Sami Village, Pär Nilsson, was unable to attend this meeting due to extenuating circumstances. This led to a meeting with him on 2 October 2014 at his home. After discussions on the first day we visited an area where the Sami village has a reindeer-drift fence where reindeers (*Rangifer tarandus* L.) are gathered every autumn for marking and slaughtering. Stakeholders attending this meeting were in the age range between 35 and 50 years.



Figure 7. A meeting was held at the Sovvene hunting and fishing camp at Åkroken in the county of Jämtland.

4. Issues addressed

There was a general consensus at the meeting that forestry and reindeer husbandry are performed in the same geographical area. The basic condition is that reindeer husbandry is a basic right for the Sami Village Njaarke guaranteed by Swedish law. It was generally accepted that forestry in general is positive for reindeer husbandry and vice versa. There are some focal points of operations in forestry that cause concerns for reindeer husbandry.

Areas for calving: the calving is done in early spring and these areas (grazing lands) should contain protective vegetation against harsh weather and sufficient pasture for adult animals and calves. The location of the land shall enable guarding and possible protection against predator attacks.

Areas for winter grazing: during the winter the reindeer herds are walked or transported to forest land; these winter grazing areas should contain trees or ground lichens as fodder. These qualities are most commonly found in older forest stands, which is a rare commodity in present forestry as modern management cause shorter rotation periods. If a shortage of grazing occurs, the reindeer have to be fed by artificial means. This implies transport of harvested lichens, hay or pellets with lorries, snowmobiles or helicopters. This can be very costly and can undermine the economics of the enterprise.

Infrastructure for the transport between reindeer management lands: traditionally reindeer husbandry implied the moving of the herds for calving and grazing, and the Sami people generally followed their herds. Today this management is within an area of geographical land called a "Sami village". In this example, the herd moves from the calving land in the mountains in the west to forest land (in the east) during early autumn and winter. This movement occurs by walking or by road vehicle. Safe passing with sufficient fodder is crucial for the survival of the herd, as dispersal of the herd requires substantial labour and may also result in losses of reindeer.

The predators, losses and the composition of the herd: the main predators in the area are lynx, bears, eagles and wolves. The calves are most vulnerable and are possibly considered as a "delicacy" by the bears. The predation can be hampered by keeping the herd together and by herdsman who follow the herd. The latter implies that the herdsman knows where the reindeer are. Railways, roads and power plant dams disturb the traditional routes of transport (the reindeer find their way by instinct or by "in herd knowledge" passed on from cow to calf). The composition of the herd determines the growth and slaughtering income. A general beneficial composition (adult animals) is a winter herd of approximately 80% cows and 20% steers (Figure 8). Each cow gives birth to one calf. A loss of cows will have a direct negative effect on regeneration. The steers are important for the protection of the herd and for their instinct to help the calves find lichens under the snow and ice by scratching the crust away.



Figure 8. A good mix is 80% cows and 20% steers

5. Positive and negative aspects of agroforestry

The members of Njaarke Sami village answered the questionnaire, which sought to highlight key positive or negative aspects of agroforestry, i.e. reindeer husbandry and forestry. The most highly ranked positive aspects were “business opportunities”, followed by “rural employment, locally” and “cash flow” (Table 1). These aspects can be regarded as depending on the fact that two of the participants were involved in tourism, working for example with pre-commercial thinning for a forestry company. The scores were derived using the scoring system used by Crous-Duran et al (2014).

The most negatively aspects were “rural employment, forestry”, “disease and weed control”, and “losses by predation” (Table 2). The first aspect was ranked negatively due to lack of competence by foreign-employed personnel that have performed silviculture measures in the area. The other two aspects refer to the high risk of predation of the reindeer in the area used by the Sami village, and also poorly performed forest management measures such as cleaning and thinning that make it difficult to look after the reindeer herd (this issue materialised due to very dense forests in the area). Although the consultation process is beneficial for the reindeer husbandry, there are some negative aspects as these often lead to increased administrative work and travel expenses.

Table 1. Positive aspects of Fennoscandia wooden pastures ranked by three participants

Aspect	Ranking by three participants			Score
	1	2	3	
Business opportunities	1	1	4	62
Cash flow	1	1	5	60
Marketing premium	1	1	5	60
General environment	2	1	4	55
Opportunity for hunting	2	1	4	55
Rural employment (reindeer husbandry)	2	2	2	54
Originality and interest	3	3	2	48
Profit	2	2	4	48
Local food supply	2	2	5	46
Regulation	3	3	3	45
Animal production	3	3	4	42
Tourism	3	3	4	42
Timber/wood/fruit/nut production	5	5	2	38
Mechanisation	3	3	6	38
Tree regeneration/survival	5	5	2	38
Animal health and welfare	4	5	3	37
Biodiversity	4	3	5	37
Inheritance and tax	4	3	5	37
Timber/wood/fruit/nut quality	5	5	3	35
Farmer image	5	5	3	35
Income diversity	3	6	4	35
Landscape aesthetics	4	5	4	34
Labour	5	5	4	32
Administrative burden	4	4	6	32
Crop or pasture production	4	6	5	30
Diversity of products	5	5	5	30
Project feasibility	5	5	5	30
Wildlife habitat	5	5	5	30
Carbon sequestration	5	5	5	30
Change in fire risk	5	5	5	30
Climate moderation	5	5	5	30
Market risk	5	5	5	30
Relationship between farmer/hunter	5	5	5	30
Relationship between farmer/owner	5	5	5	30
Subsidy and grant eligibility	5	5	5	30
Complexity of work	6	6	5	26
Crop or pasture quality/food safety	6	6	7	22
Inspection of animals	7	7	5	22
Control of manure/noise/odour	5	5	10	21
Losses by predation	10	10	4	14
Disease and weed control	7	8	8	14
Management costs	7	8	8	14
Climate change (Warmer)	8	9	7	12
Rural employment (forestry)	9	9	10	5

Table 2. Negative aspects of Fennoscandia wooden pastures ranked by three participants

Negative aspect	Ranking by 3 respondents		
	1	2	3
Rural employment, forestry	2	2	1
Disease and weed control	3	1	2
Losses by predation	1	1	6
Management costs	3	2	2
Climate change (Warmer)	3	2	4
Inspection of animal	3	3	5
Control of manure/noise/odour	5	5	1

Other negative aspects mentioned for agroforestry in the area are exemplified in Figure 9, where wind turbines can be seen in the far distance, a power line right through their area and dense lodgepole pine (*Pinus contorta*) stands in the valley bottom.



Figure 9. Wind turbines in the far distance, power lines, and dense *Pinus contorta* forests are constraints for the Sami village.

6. Constraints and possibilities

As for the challenges for the future an insight into the whole forestry sector, from the Sami's perspective, as well as an increased insight from the forestry organisations into the reindeer husbandry business was mentioned. A wish for longer rotation periods in forestry to promote, for example lichen growth, and a higher degree of landscape perspective in management of the forests in the area was expressed. An idea raised was the need for a longitudinal study that would consider how silviculture measures, over a period of about 20-40 years, would benefit both Sami and forestry.

This is a suggestion that should be put forward to the forest owners, private, state and industrial. At present there is a structure to consider these ideas, the consultative process. However, it does not function this way presently.

One of the most significant problems today is the high pressure on the reindeer herd from predation from lynxes (*Lynx lynx*), eagles (*Aquila chrysaetos*, *Haliaeetus albicilla*) and wolverines (*Gulo gulo*). However, there appears to be a growing awareness of the problem from the authorities, but possibly not the government. Another constraint in land use is the introduction of lodgepole pine (*Pinus contorta*) in the area. The stands often become so dense that visibility and migration through them make the use of that area difficult.

A solution to some of the problems mentioned are early pre-commercial thinning and thinning to open up the forest for better visibility in the stands and facilitate the migration of the herd through the stands. A possible solution to the problem of predators is developing a common approach for other agroforestry systems in other parts of Sweden as well as hunters, e.g. sheep herders. Together they could put pressure on the government so that the numbers of wolves (*Canis lupus*), brown bears (*Ursus arctos*), and other predators could be decreased in areas with reindeer husbandry. The Sami representatives also mentioned that economic support for consultation with forest personnel, which in some cases are obligatory by the forestry law (Anon. 2012) in Sweden, would be valuable. Possibilities to regenerate lichens artificially were also brought up in our discussion as a means to increase future fodder for the reindeer. Positive results from scientific experiments were the basis for this discussion (Krekula 2007, Roturier et al 2007, Roturier & Bergsten 2009).



Figure 10. Invasive natural regeneration of lodgepole pine (*Pinus contorta*).

7. Future innovations and improvements

The improvements can be organized in three categories.

- Technical devices in order to facilitate a more effective reindeer husbandry.
- Adapted forest management.
- A relevant consultative process between Sami and forestry.

Njaarke Sami village have had GPS (Global Positioning System) tracking on some of their reindeer since 2007. This make tracking of them much easier, and the positions indicate key areas for grazing, areas where they prefer being. It also indicates disturbances from predators and makes it easier to find reindeer killed by predators. It has also been a powerful tool when producing a new management plan for the Sami village. Preferred areas identified by GPS tracking can also serve as basic data in consultations with forest owners. During the years GPS tracking have been active they have tested and evaluated several different transmitters. It is now a much better technical device that enables an individual location of the leading reindeer rather than the location of the closest transmitter antenna. This has led to improvements to the whole system, so that they can now detect key areas for reindeer husbandry more precisely.

There should be a training and development process to adjust forestry, especially in the detected key areas, to the needs of reindeer husbandry (Samiid Riikkasearvi 2010). Technical methods for better scarification should be implemented and training courses for forestry personnel to perform pre-commercial thinning according to the needs of reindeers. These are the relatively easy achievements and not controversial. A more difficult task is to develop future areas for winter grazing. This requires a long-term commitment; measures should be taken today in order to have areas in the future.

Alongside the development of improved scarification methods research on the cultivation of Lichens in scarified areas seems promising as reported by Roturier et al. (2007) and Roturier & Bergsten (2009).

8. Research ideas and conclusion

- To evaluate operating costs for Reindeer husbandry and forestry with or without GPS tracking. The evaluation will use the ToSIA tool (Skogforsk 2010).
- To evaluate the latest scarification equipment (soil inversion) considering the soil disturbance and re-establishment of lichens at the disturbed area.
- To further develop the consultative process between Sami and forestry for the long-term planning of future grazing land.

The representatives from the Sami village that were questioned were in many aspects sufficiently pleased with the agroforestry system they were part of. They saw several opportunities in having a common use of the land. The aspects that they regarded as negative were, in several cases, not totally dependent on forestry in the area but on the pressure from predators.

9. References

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