

Quantifying Sami Settlement and Movement Patterns in Northern Sweden 1700–1900

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ABSTRACT. The indigenous Sami people of northernmost Europe have developed unique adaptations that enable them to cope with harsh climate and subsist in low-productivity ecosystems. These adaptations have been shaped by both internal factors, such as demographic and traditional land-use systems, and external factors, such as colonization and national legislation. In this paper we interpret the quantitative impacts of land use by reindeer herders in a subarctic forest landscape in northern Sweden during the 18th and 19th centuries. We used archival sources (cameral and judicial documents and church records) together with environmental data to reconstruct past changes in population size and the spatial configuration of traditional Sami lands, which the Swedish state accepted and recognized as taxation units for several centuries up to the 19th century. The taxation lands encompassed several hundred square kilometres and featured distinct proportions of different vegetation types. We propose that these taxation lands were originally established so that each provided sufficient resources to support the subsistence of a Sami family, incorporating pastures for small-scale reindeer herding and opportunities for hunting and fishing within its borders. However, there were substantial differences in the resources they provided. Estimates of population density indicate that they may have been able to support 0.04–0.06 persons per km². Unlike many other indigenous groups around the globe, the Sami interacted with the state and claimed their rights in court proceedings and were thus able to maintain strong recognition of their land tenure by the Swedish state until the late 19th century.

Key words: northern Sweden, forest history, archaeology, archival sources, Sami, population changes, reindeer pastoralism, taxation lands, mountain birch, Scots pine

RÉSUMÉ. Le peuple indigène des Samis de l'Extrême-Nord de l'Europe s'est adapté de manières uniques afin de faire face au climat difficile et de subsister dans des écosystèmes à faible productivité. Ces adaptations ont été façonnées à la fois par des facteurs internes tels que la composition démographique et les systèmes traditionnels d'utilisation de la terre, ainsi que par des facteurs externes tels que la colonisation et l'adoption de lois nationales. Dans le présent document, nous interprétons les incidences quantitatives de l'utilisation des terres par les pasteurs de rennes dans un paysage forestier subarctique situé dans le nord de la Suède aux XVIII^e et XIX^e siècles. Nous nous sommes appuyés sur des sources archivées (documents caméraux et judiciaires ainsi que dossiers d'église) de même que sur des données environnementales pour identifier les anciennes variations de population et la configuration spatiale des terres traditionnelles des Samis, que l'État de la Suède a accepté et reconnu en tant que taxeurs pendant plusieurs siècles jusqu'au XIX^e siècle. Les terres faisant l'objet d'une taxation s'étendaient sur plusieurs centaines de kilomètres carrés et englobaient des proportions distinctes de types de végétation différents. Nous laissons entendre que ces terres de taxation avaient été établies à l'origine pour que chaque terre fournisse des ressources suffisantes pour favoriser la subsistance d'une famille de Samis, intégrant ainsi des pâturages pour l'élevage des rennes à petite échelle et des possibilités de chasse et pêche à l'intérieur de ses frontières. Cependant, les ressources offertes par chaque terre variaient beaucoup d'une terre à l'autre. Les estimations en matière de densité de population indiquent que les terres auraient pu faire vivre de 0,04 à 0,06 personne par kilomètre carré. Contrairement à bien d'autres groupes indigènes du monde entier, les Samis ont négocié avec l'État et réclamé leurs droits devant le tribunal, ce qui leur a valu de maintenir une bonne reconnaissance de leur occupation foncière par l'État suédois jusque vers la fin du XIX^e siècle.

Mots clés : nord de la Suède, antécédents forestiers, archéologie, sources archivées, Sami, variation de la population, pastoralisme des rennes, terres de taxation, bouleau fontinal, pin sylvestre

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INTRODUCTION

Northern subarctic and boreal ecosystems place many restraints on indigenous peoples' subsistence. The harsh

climate with long, cold winters and short vegetation periods, low-productivity ecosystems, and low population pressure have shaped unique subsistence strategies and settlement patterns in the region. In the Russian and European North,

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herding of reindeer (*Rangifer tarandus* L.) developed as a specific adaptation to these circumstances. During the first millennium AD, reindeer domestication and pastoralism emerged in northern Sweden among the Sami, the indigenous peoples of Sápmi—a region in the northernmost part of Europe stretching from the northern Norwegian coast in the west through northern Sweden and Finland to the Kola Peninsula in the east. When the transition from a hunter-gatherer economy to reindeer herding occurred is still much debated. According to some scholars, a pastoral economy based on reindeer herding developed during the 16th century (Lundmark, 1982; Mulk, 1994), while others argue that this transition took place before the first millennium AD (Aronsson, 1991; Storli, 1994; Bergman et al., 2008).

This transition likely occurred at different times in different parts of Sápmi, but whenever it happened, it prompted significant changes in social structure and relations, as well as in land use, logistics, and settlement patterns. While large-scale hunting of wild reindeer involved the whole community with the collective sharing of prey, reindeer herding implied the private ownership of reindeer, with the *siidda*, the local band of conjoined families or households, forming the basic social unit (Ingold, 1978). Reindeer herders were in total control of the life cycle of their reindeer, practicing intensive year-round herding and selective breeding. Also, reindeer pastoralism included the milking of reindeer, and the various milk products, specifically cheese, were of great economic significance (Manker, 1953; Ruong, 1969; Fjellström, 1985). Yet hunting, fishing, and gathering of edible plants remained key parts of Sami subsistence until the beginning of the 20th century.

Valuable information has been obtained regarding northern indigenous peoples' perceptions and use of lands extending from the Arctic and Subarctic areas of Alaska (Nelson, 1983; Arundale and Jones, 1989), to Canada (Brice-Bennett, 1977; Ray, 1996), Greenland (Sejersen, 2004), and northern and eastern Russia (Charrin, 1984; Murashko, 1994; Golovnev and Osherenko, 1999; Reid, 2002). One important aspect that is still poorly understood is the magnitude of the environmental impact of their communities, in terms of the size and spatial configuration of the land that specific communities used and the population density that specific areas could support. A related issue that warrants further attention is whether population growth over time triggered changes in settlement patterns and ways of using resources. In order to address these issues, we require deeper understanding of the relationship between land use and the environment, understanding that can be acquired only by considering detailed data from several disciplines.

In this paper, we present a detailed case study of Sami land use in northern Sweden during two centuries (1700–1900). The study is based on interpretation of historical documents and spatial analyses of ecological variables using Geographical Information Systems (GIS) data complemented by data from previous archaeological investigations. While the archaeological data provide temporal and spatial information regarding cultural remains, written

historical sources may provide context and information on individuals and geographical features within specific territories at specific points of time. Such information, together with data on environmental variables and the spatial configurations of vegetation types and natural resources, allows us to interpret the quantitative impacts of past land use. The following four important questions are addressed here. What was the size and spatial configuration of the traditional Sami taxation land unit used by a Sami family in northern Sweden? How many people could each land unit support? How did population size change within the period studied? What were the relationships between specific natural resources and the population? The results are used for a wider analysis and interpretation of the stability and changes in cultural landscapes, movement patterns, and affiliation of land by indigenous peoples in general.

The topographical names and Sami terms (written in italics) in this study are given in the Lule Sami language according to the current orthography.

THE STUDY REGION

The region under consideration (66° N, 17° E) is situated on the Arctic Circle in the northern part of Sweden (Fig. 1). The studied landscape extends from the northern side of the Pite River toward the northeast and encompasses a variety of topographical features, including the granitoid massif of Gájsájs (1046 m) in the west and the western slopes of the Árvesduoddar Mountains in the east. This area, together with the Barturtte Mountains situated south of the river, constitutes the most eastern part of the continuous mountain massif called the Caledonians that forms the border between Norway and Sweden. It has a surface area of approximately 1000 km² and consists largely of treeless, high-altitude mountain heaths and forested valleys featuring mountain birch (*Betula pubescens* Ehrh. spp. *czerepanovii*) up to 750 m. At lower altitudes (450–600 m), Scots pine (*Pinus sylvestris* L.) is the dominating tree species. The centre of the studied region forms a basin covered by very old pine forest on dry and nutrient-poor soils. Deciduous trees, mainly birch, grey alder (*Alnus incana* (L.) Moench), and goat willow (*Salix caprea* L.), also occur throughout the basin, concentrated at wetter sites. The forests are interspersed with small lakes and wetlands, and numerous small streams drain the catchment area.

Short, mild summers and long, cold winters with snow cover from October to May characterize the climate. People have inhabited the interior parts of northern Sweden since shortly after the last ice age, more than 9000 years ago, and Sami ethnicity developed during the last few thousand years (Bergman et al., 2003; Hansen and Olsen, 2006:50–53). There are extensive traces of past human activity in the study region. Archaeological surveys of the central part, including the ancient pine forest, revealed more than 1300 cultural objects (including Sami wooden hut remains and hearths, bark-peeled trees, tree blazes, and stone piles) in a

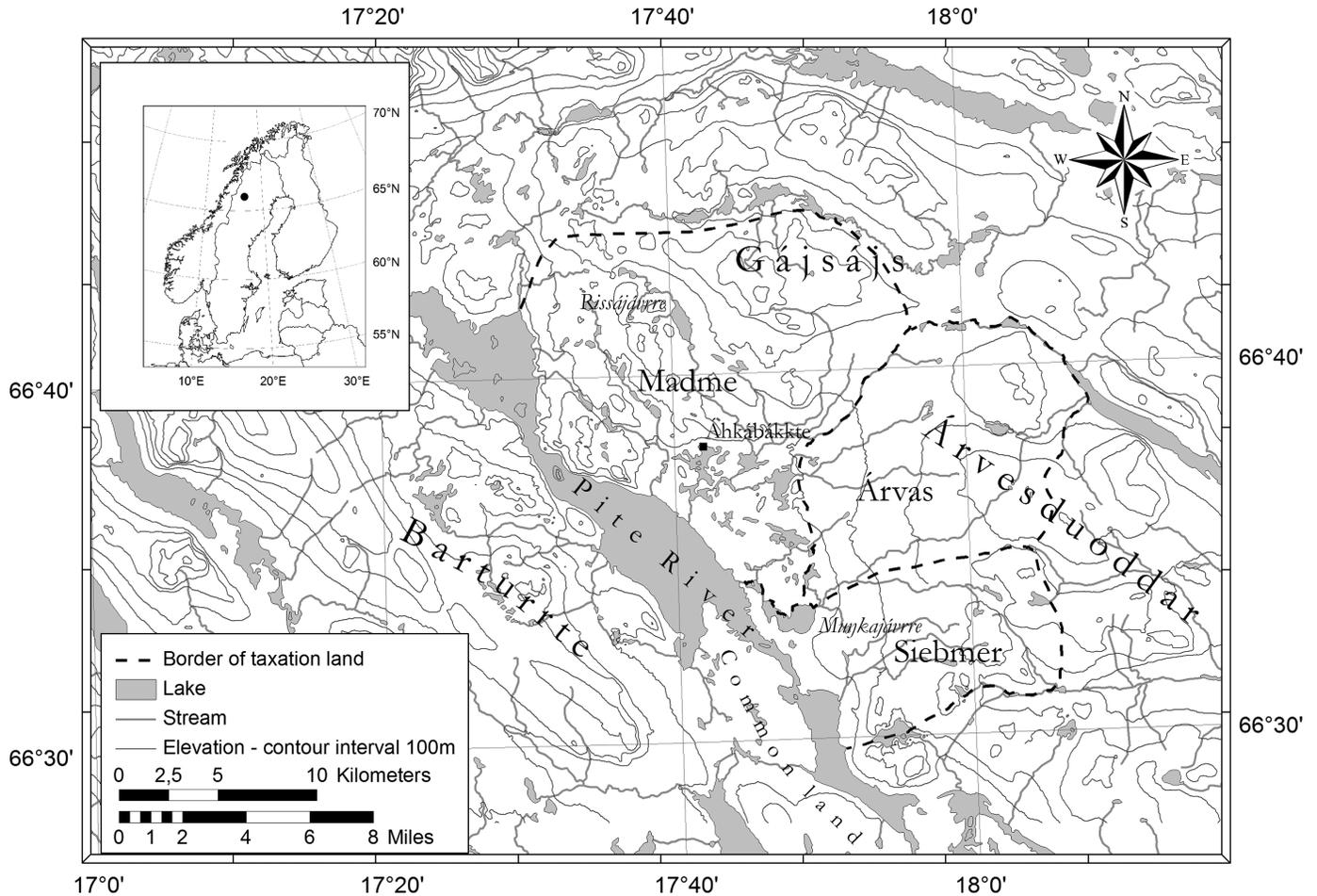


FIG. 1. Map of the study region showing the three studied taxation lands: Madme, Arvas, and Siebmer. From GSD – Roadmap, dnr 507-98-4720, © Lantmäteriverket, 1998.

3000 ha area (cf. Josefsson et al., 2009, in press; Liedgren et al., 2009).

THE ARCHIVAL SOURCES

In Sweden and Finland, the archival sources in the forms of cameral and judicial documents and church records from the 16th century onward are uniquely comprehensive, and for the most part, they are available and well preserved. In contrast to many other Arctic and Subarctic indigenous peoples, the Sami were included in such documents to a large extent. Consequently, several studies on the subsistence and population dynamics of the Sami (Hultblad, 1968; Kvist, 1991; Wheelersburg, 1991; Helle and Helama, 2007; Bergman et al., 2008) and their judicial position (Holmbäck, 1922; Lundmark, 1982; Korpijaako-Labba, 1994; Lundmark, 2006) have used such documents.

Archival sources used in this study are listed in Table 1. The church records contain detailed demographic data, for example, books recording births, deaths, and marriages. Parish surveys (Swedish *husförhörslängder*) are the most informative; these surveys were used from the 18th century

onward to keep records of all members of the parish and to maintain church discipline. The contents varied slightly over time, but usually notes were made of the names of homesteads; the names of family members and the dates of their births, marriages, and deaths; their social and kinship status; emigration from and immigration into the parish; and other details, such as grades for knowledge of scripture. Furthermore, the work of the clergymen was often facilitated by the Sami themselves, who kept close track of their consanguinal and affinal relationships (cf. Bergman et al., 2008). As the reindeer herders were semi-nomadic and moved seasonally between different campsites, a name of a single homestead could not be stated. Instead, the geographical names of the campsites used by their respective families during the autumn and spring were often given. The demographic data for the study region, derived from church records, cover most of the period between 1740 and 1901, but unfortunately, most church records from the period between 1827 and 1854 were destroyed by fire.

Cameral records were established during the second half of the 16th century. The Sami were organized in large community villages (Swedish *samebyar*), each comprising some 20 or 30 families and extending over several thousand

TABLE 1. Unpublished historical records used for data collection.

<p>A. Landsarkivet, Härnösand (HLA) – Regional archive in Härnösand Arjeplogs tingslags Häradsrätts arkiv (ATH) – Arjeplog parish court archive Domböcker och protokoll – Juridical documents and records A1a – Domböcker vid lagtima ting Vol. 1–21 (1729–1901)</p> <p>Norrbottnens läns landskontors arkiv (NLL) – Norrbotten county district office archive G111a – Jordeböcker – Cameral records Vol. 2 (1613–1780), 4 (1740), 5 (1750), 16 (1825)</p> <p>Västerbottnens läns landskontors arkiv (VLL) – Västerbotten county district office archive G111a – Jordeböcker – Cameral records Vol. 2 (1695)</p> <p>B. Svensk arkivinformation (SVAR) – Swedish archive information Arjeplogs kyrkoarkiv – Arjeplog church archive C1 – Födelse- och dopböcker – Records on births and baptism Vol. 1–2 (1719–1790)</p> <p>C. Umeå Universitetsbibliotek (UB) - Forskningsarkivet (FOARK) – Umeå University Library – The Research Archives Arjeplogs kyrkoarkiv – Arjeplog church archive A1 – Husförhörlängder – Parish surveys Vol. 1–6 (1740–1901) D11 – Kommunionböcker – Communion records Vol. 1 (1774–1803)</p>

square kilometres (Hultblad, 1968:68–81). Records of the Sami population included the names of the heads of the families, the amount of tax they paid, and sometimes the name of the taxed land unit, hereafter referred to as taxation land (Swedish *lappskatteländ*) (cf. Holmbäck, 1922). Evidence of taxation of the Sami during the Middle Ages and even earlier exists in early written sources (described in Campbell, 1948:4–12; Lundmark, 1982:78–80; Hætta, 1994:33–38). From the first official taxation records in the mid-16th century, it appears that the Sami population was already at that time divided into large, well-defined geographical units (*vuobme* or *tjiellde*) based on social units within the Sami society. These village communities encompassed large areas that were occupied by several *sijda* (pl).

The Sami settlement patterns, like those of other indigenous peoples in Eurasia, were defined by seasonal movements between areas that provided good pasture for the herded animals and enabled natural resources to be harvested at the most favorable times of the year (Vainshtein, 1980:120–130, 184–186; Arundale and Jones, 1989; Smith and McNees, 1999; Sneath, 2001). Generally, they moved between the same areas year after year. A Sami family had the exclusive rights to use resources and to keep reindeer within the land for which tax was paid (Korpjajaako-Labba, 1994:443–444). Furthermore, this right could be inherited, given away, or even withdrawn by the parish court (Swedish *Häradsrätten*) if misused.

While the cameral records cover only parts of the 18th century, data from the 19th century are almost complete. These records provide abundant information about the users of the taxation lands, but little information regarding the areas encompassed and their boundaries. However, the latter information can be extracted from judicial documents. In January to February of each year, the District court held sessions in the main villages to discuss disagreements

between individuals. Among the most common controversies were the rights of reindeer herders to use certain pasture grounds and to pass over taxation lands owned by other people to reach their own pastures. These disputes and the establishment of farmsteads in the interior part of northern Sweden in the 19th century caused conflicts to emerge not only between reindeer-herding families, but also between reindeer herders and farmers. These conflicts resulted in court cases, in which past land use of specific areas was considered. As a consequence, the boundaries of a taxation land or farmstead were established in the field and set down in writing (Laestadius, 1831:47–49; Hultblad, 1968:87). These records, hereafter referred to as taxation land descriptions (Swedish *insyningsprotokoll*), are extremely valuable: they provide us with information regarding the location and boundaries of specific taxation lands, their physical and environmental settings, and who was given the right to use them. Thus, they allow us to reconstruct with precision both the areas covered and the environmental features of specific taxation lands. The judicial records used in this study go back to the late 17th century.

TAXATION LANDS STUDIED

The study region is situated within the area covered by the Sami community village “Luokta Mavas,” which extends more than 200 km from the lowland interior forests westward towards the Norwegian border. Taxation lands within this community village are first mentioned in 1695 (Holmbäck, 1922:20). The name of a taxation land was usually derived from a geographical feature or the name of the campsite within it that was used during spring and autumn (Ruong, 1945:153). These camps, which were situated in the mountain birch forest just below the mountain heath,



FIG. 2. Photo of a Sami family at Áhkábákte in the central part of the Madme taxation land, probably taken in the late 19th century. Source: The Silver Museum.

sometimes included stationary huts and several wooden constructions for storage, such as a small storehouse (*njálle*) and an open storage construction (*luovve*). This was the land that the people used for a substantial part of the year (cf. Rönnow, 1944; Ruong, 1945).

The taxation lands have often been regarded as synonymous with the spring/autumn campsite. However, an individual taxation land could encompass much larger areas and usually included forested areas as well as high mountain plateaus, thus providing people with diverse natural resources (Hultblad, 1968:82–83). Between 1700 and 1800, the study region encompassed several taxation lands, of which Madme, Árvas, and Siebmer, situated on the north side of the Pite River, are considered in most detail here (Fig. 1). The names of these taxation lands are presented here as they were mentioned in the latest modern judicial records and according to present-day orthography.

Madme taxation land constituted the largest land unit of the three examined, covering in total c. 244 km². This taxation land is mentioned in taxation records from as early as 1695, but under the name Rysawarij (after a lake now named Rissájávrrre). In the late 17th and early 18th centuries, Madme was used by the families of two brothers. The taxation land was larger at that time, also encompassing forest land on the south side of the Pite River, which accords with previous studies showing that there were fewer (and thus larger) taxation lands during the 17th century (Hultblad, 1968:89–90; Sköld, 1992:130–131). In 1712, the land

was divided between the two brothers, and one of the families became the single user of the taxation land on the north side of the river. Since no descendents of this brother were detected in the historical records, it is assumed that the taxation land was either sold or lost in the 1730s.

At that time, Sami taxation lands were treated as land properties that could be inherited, bought, or sold (Lundmark, 2006:16). Consequently, in 1740 another family using this land appears in the tax records. This family maintained the rights to use the land for six generations, spanning almost two centuries, until the late 19th century. The head of this family, Henrik Andersson, had seven sons, six of whom formed their own conjugal relationships. We know from parish records that Henrik Andersson's household used the campsite close to Lake Rissájávrrre in the western part of the taxation land. Unfortunately, the archival sources provide no information about where his sons resided. In the mid-19th century, one of Henrik Andersson's descendents acquired property rights to a smaller part of the taxation land, named Áhkábákte, and an additional piece of land farther up the Pite River (Fig. 2). In the 19th century, acquiring formal property rights to a taxation land required the establishment of a small farmstead, and thus a change in subsistence. This procedure was becoming more common among the Sami in the 19th century, not only in this region, but throughout the northern parts of Sweden (cf. Hultblad, 1968:91; Arell, 1977:163–197; Lundmark, 2006:101–105). The farmsteads eventually led to a more

TABLE 2. Population data for Madme, Árvas, and Siebmer, 1750 to 1850. Totals are pooled data for all three taxation lands. Population counts were derived from church records¹ and spatial information from court records².

Taxation land:	Total Individuals		Individuals per km ²		Individuals Age 10 or Above		Individuals Age 10 or Above per km ²	
	Mean	(Range)	Mean	(Range)	Mean	(Range)	Mean	(Range)
Madme	16	(8–24)	0.07	(0.03–0.10)	12	(5–19)	0.05	(0.02–0.08)
Árvas	8	(5–11)	0.06	(0.04–0.08)	7	(4–9)	0.05	(0.03–0.07)
Siebmer	15	(9–23)	0.15	(0.09–0.24)	12	(5–17)	0.12	(0.05–0.18)
Total:	38	(23–50)	0.08	(0.05–0.10)	22	(14–41)	0.05	(0.03–0.09)

¹ UB – FOARK, Arjeplogs kyrkoarkiv, AI - Husförhörslängder Vols. 1–6, DII -kommunionsböcker Vol. 1. SVAR, Arjeplogs kyrkoarkiv, CI - Födelse och dopböcker Vols. 1–2.

² HLA, ATH, Domböcker och protokoll A1a - Domböcker vid lagtima ting Vol. 12. HLA, NLL, GIIa – Jordeböcker Vols. 2, 4, 5, 16, VLL, GIIa – Jordeböcker Vol. 2.

stationary subsistence, but also to a geographical split of the family.

The second taxation land, Árvas, covered about 138 km², but unlike the other two taxation lands, it did not border the Pite River. There are also fewer historical records regarding Árvas. However, one of the earliest, dating to 1767, states that Johan Anundsson and his family had exclusive rights to use the taxation land at that time, and that his family had exploited the land for a very long time. Furthermore, the court record from 1767 also states that Anundsson was trying to trade this taxation land for another on the south side of the river. The parish court did not allow this trade, and consequently his family remained the only users of the land until the late 19th century, when the taxation land was abandoned. The spatial extent of Árvas probably remained unchanged from the late 18th century onwards, since its borders were practically identical in taxation land descriptions found in court records from 1819 and 1856.

Siebmer, situated south of Árvas, was the smallest of the three taxation lands, covering only 97 km². While old pine forest covered its western part, the eastern part was characterized by large mountain birch forests and mountain heaths. The borders of the Siebmer taxation land also remained unchanged during the study period, according to taxation land descriptions from 1819 and 1844. In the early 18th century, two different households seem to have been present, namely the families of Lars Paggesson and Tore Andersson Pannack. In parish surveys from 1740 and 1772, Lars Paggesson, his son, and his son-in-law are recorded under the name Muontja, which probably corresponds to an abandoned Sami settlement now named Munka, situated on the north shore of Lake Munjakávrrre (Fig. 1). After the death in 1807 of Lars Paggesson's only grandson who survived to adulthood, there is no additional information regarding this family.

A few years later, in 1810, another person appears in the church records, indicating that another family took over the use of the Siebmer taxation land. The parish surveys also inform us that this person married the daughter of Anund Johansson (whose family used the Árvas taxation land) the very same year. According to Sami tradition, a son-in-law had to spend his first married year with his bride's parents

(Graan [1672] 1899:31–32). Thus, that marriage relationship allows us to assume that Anund Johansson also owned the rights to use some parts of Siebmer. Pannack's family is mentioned in court records from 1755 regarding land disputes, and this family is believed to have been the primary user of Siebmer. However, court records from 1775, again regarding the right to use the land, inform us that Pannack resided in the northern part of Siebmer, but also that the taxation land at that time was shared with another family, residing south of Lake Munjakávrrre and farther east. Thus, at least four different families apparently used this taxation land during different parts of the period under study.

CHANGES IN POPULATION

During the 18th and 19th centuries, the populations within all three taxation lands changed considerably. The demographic data presented here are expressed in terms of total numbers of persons and numbers of persons age 10 or above (Table 2), as well as in terms of numbers per unit of specific vegetation types (below). The reason for separately considering individuals age 10 or above is that this was the age when children began to actively participate in reindeer herding (Graan, [1672] 1899:25), and available labor was probably the key factor affecting the long-term stability of Sami subsistence.

Between 1750 and 1850, the total combined population (persons age 10 or above) of the three taxation lands ranged from 14 to 41 (mean = 22). Since the total area was very large, covering c. 480 km², the population density was extremely low, ranging from 0.03 to 0.09 per km². The demographic data we obtained show that the population increased between 1750 and 1790, then decreased around the turn of the century (Fig. 3). Another steady increase occurred between 1808 and the mid-1820s. Although the data indicate a severe, but temporary drop in population size between the mid-1820s and mid-1830s, some of this apparent decrease can be attributed to the loss through fire of parish survey data from 1827 to 1854. We attempted to compensate for the lack of parish surveys for the period from 1827 to 1854 by examining other cameral and judicial

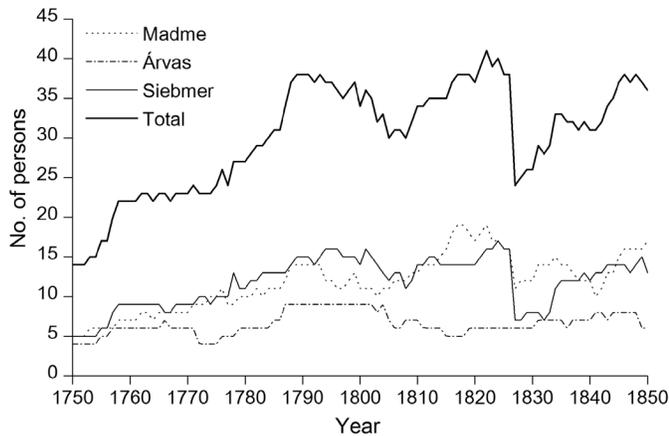


FIG. 3. Changes in population size in the three taxation lands, 1750 to 1850.

records. Thus, the overall population trends illustrated in Figure 3 for 1820–1850 are believed to be fairly accurate. Other factors such as climate variability, epidemics, or instability in subsistence may also have contributed to the fluctuations in population size seen from the 1830s onwards. For example, in the areas north of the study region, unfavorable reindeer grazing conditions caused a marked decline in the population from 1830 to 1837 (Kvist, 1987).

The population estimates for each taxation land between 1750 and 1850 indicate that there were considerable fluctuations, especially in Madme and Siebmer (Fig. 3). In Madme, the number of persons age 10 or above varied from 5 to 19, with an average of 12 (Table 2). Madme, the largest of the three taxation lands, had only five people more than 10 years old on it in 1749. Half a century later, the population age 10 or older had increased to 16 persons (Fig. 3). During the early 19th century, the population continued to increase until the early 1820s, when it reached its peak (19 persons older than 10 years or 0.08 persons per km²). While the number of individuals in Árvas remained fairly stable between 1750 and 1850, ranging from four to nine persons over the age of 10, the population changes in Siebmer followed the same trends as in Madme. Between 1750 and 1794, the Siebmer population increased from 5 to 16, and between 1795 and 1826 it varied between 11 and 17 (Fig. 3). The temporary decrease in the early 19th century was almost certainly caused by the death of the head of the Paggesson family in 1807. The population in Siebmer decreased suddenly in the 1820s, as in Madme, but even more severely.

ENVIRONMENTAL SETTINGS AND QUANTIFICATION OF HUMAN LAND USE

There are striking similarities in the vegetational settings of the three areas the taxation lands once covered (Figs. 1 and 5). Briefly, all three taxation lands included part of the old pine forest in the centre of the study region and extended to the north or east, where they covered mountain birch

forests and mountain heaths interspersed with mires and bogs (Fig. 4). In addition, the three taxation lands included very similar proportions of pine-dominated forests, lakes, and mountain heaths (Fig. 5). Yet in Árvas the proportion of mires was larger, and that of pine forest somewhat smaller, than in the other two taxation lands, while in Siebmer mountain birch forest was less abundant and the proportion of mountain heaths was larger. In all three taxation lands, the average proportion of pine forest was 23% and that of mountain birch forest about 36%. Mountain heath covered about 28% of the taxation lands, mires about 8%, and lakes about 5%. Since the total areas of the three taxation lands differed substantially, the actual areas covered by different vegetation types and lakes also varied considerably (Table 3). While pine forest and mountain heath covered substantial parts of each taxation land (23–59 and 34–58 km², respectively), mountain birch forest was even more abundant (up to 94 km²). Mires and water (13 and 8 km² respectively, on average) covered the remaining area.

The composition and configuration of the taxation lands effectively illustrate the important elements in Sami subsistence (Table 4). The pine forest was used mainly during the winter, as it offered both shelter and plenty of firewood, primarily from standing dead pines. Semi-permanent campsites were situated close to the larger lakes. In this region, the only area that could be used for grazing during the winter was the pine forest, where the reindeer searched for ground lichens (mainly *Cladonia* spp.) under the deep snow and foraged on hanging lichens (*Bryoria* spp.) that draped the old, rugged pine trees. The reindeer grazing conditions during winter were hazardous. Sometimes the ground froze and a hard crust formed, which prevented the reindeer from feeding on the ground lichens (Ruong, 1969:113). In these circumstances, lichen-rich trees were often felled (Laestadius, 1831:115–117; Rensund, 1984:30; Berg et al., 2009).

The pine forests also provided the Sami with diverse resources to support their subsistence: for example, inner bark from pines provided an important source of nutrition in this harsh environment (Zackrisson et al., 2000). During the late spring when the sap ran rich with sugar in the pines, large quantities of inner bark were harvested. Like many northern indigenous people, the Sami also commonly hunted using extensive systems of traplines (Nelson, 1983:204–218; Brody, 1988:85ff; Ray, 1996:7–10; Ekman, [1910] 1983). In several parts of the old pine forest, there are still signs of such traplines in the form of small piles of stones carefully placed along lines extending several kilometres (Josefsson et al., in press). Animals that were commonly hunted included red squirrel (*Sciurus vulgaris* L.), ermine or stoat (*Mustela erminea* L.), European pine marten (*Martes martes* L.), red fox (*Vulpes vulpes* L.), and wolverine (*Gulo gulo* L.). During the time frame studied, furs were common trading goods. The pine forest also encompassed many lakes, several of which were used for fishing. The most important fish was northern pike (*Esox lucius* L.), which was dried and stored for eating (Campbell, 1948:27–44). However, the whitefish (*Coregonus lavaretus* L.) and

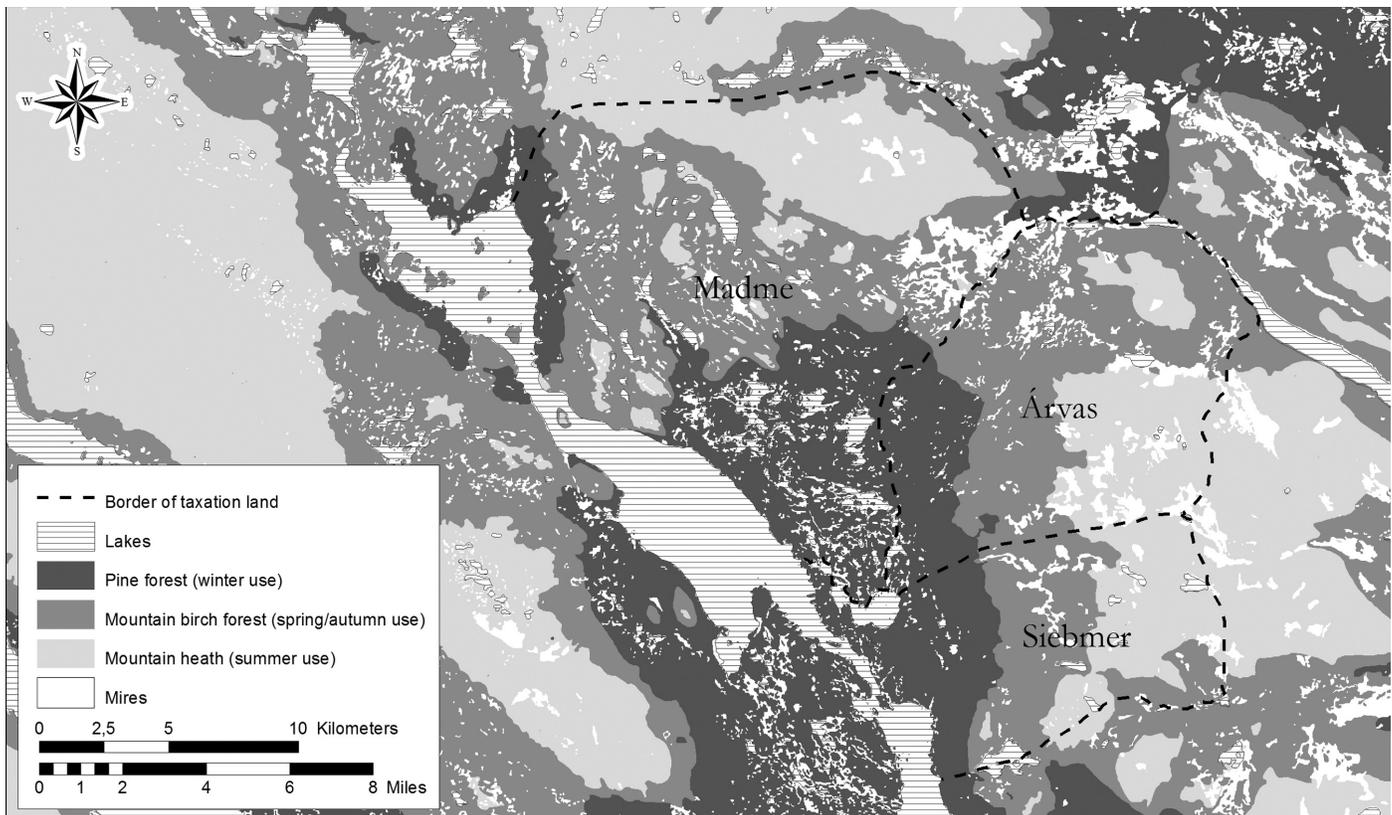


FIG. 4. Distribution of different vegetation types and lakes in the study region. The legend shows seasonal use of these areas. From GSD – Roadmap, dnr 507-98-4720, © Lantmäteriverket, 1998.

the arctic char (*Salvelinus alpinus* L.) were also caught, especially during the spring and autumn. The importance of good fishing lakes is apparent from old court records, in which the taxation land descriptions carefully noted all lakes suitable for fishing. Furs and dried fish were also important as the main sources of revenue for tax payments until the late 17th century (Wheelersburg, 1991; Sköld, 1992:7–12).

The mountain birch forest was used during spring and autumn, mainly for herding reindeer, but also for fishing and hunting. In the late spring and early summer, these forests offered good pasture grounds for the reindeer to forage on the fresh foliage, and in the autumn the Sami gathered all their reindeer for marking of the calves and slaughter. Consequently, this part of the taxation lands also contained several structures, such as fences, for reindeer herding. Furthermore, the mountain birch provided the people with material (wood and bark) for manufacturing various utensils, skis, and wooden constructions (cf. Campbell, 1948:20ff; Aikio and Müller-Wille, 2005). In addition, the numerous mires and bogs scattered within the forests were searched for edible berries such as cloudberry (*Rubus chamaemorus* L.) and for sedges, especially *Carex vesicaria* (L.) and *C. aquatilis* (Wahlenb.), which were used to insulate shoes. The mountain heaths situated at higher altitudes were occupied during the summer, primarily for herding reindeer, since extensive grass meadows and cool winds provided good grazing conditions for the animals.

Consequently, the use of natural resources was an important part of the logistics and procurement strategies year-round.

Accordingly, the people within each of the three taxation lands had access to all of the resources they required for subsistence. Yet the environmental data also suggest that the distribution and quantities of these resources varied from one taxation land to another. The changes in intensity of land use were assessed in this study by comparing the total numbers of persons in each type of environment within each taxation land at three points in time: 1750, 1800, and 1850. In all three taxation lands, the land-use intensity was considerably higher during the 19th century than in the 18th century (Fig. 6). In Madme, the pressure on the environment increased throughout the period studied. However, in Árvas and Siebmer the increases in intensity were more pronounced. In Árvas, land-use intensity doubled from 1750 to 1800 and then decreased again, while in Siebmer, it more than doubled between 1750 and 1800 then remained fairly stable until 1850.

The changes in overall land-use intensity were accompanied by increases in population pressure for all vegetation types, but especially for lakes, since the number of individuals per unit lake area rose to a very high level (> 2 persons/km²) during the 18th century in all three taxation lands. The number of individuals per unit area of forest and mountain heath remained less than 0.6 persons/km². Interestingly, the people in all three taxation lands had access

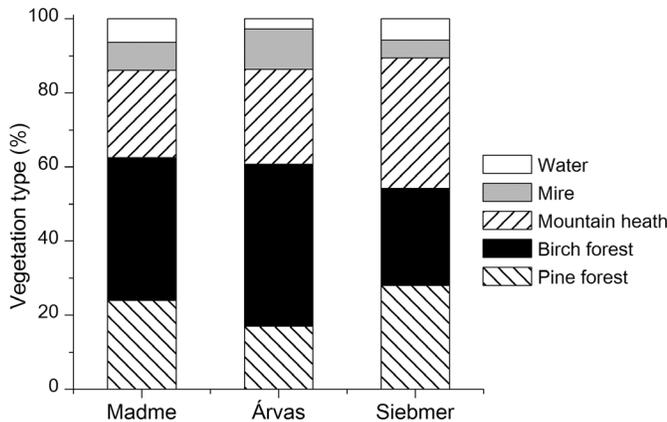


FIG. 5. Present-day proportions of major vegetation types and lakes in the former Madme, Árvás, and Siebmer taxation lands.

to Lake Muñkajávrrre, indicating that this lake was of great importance, possibly because many lakes in this terrain are rather small and shallow, while Lake Muñkajávrrre is larger and fairly deep. Lakes situated within the borders of a taxation land were exploited exclusively by the family that paid tax for the land. However, in lakes located on the border between different taxation lands (like Lake Muñkajávrrre) the fishery was commonly split, so several families used different parts of the lake (Sköld, 1992:49). Presumably, this was an important lake for fishing for northern pike. Increases in the demand for good fishing lakes may have contributed to altered settlement and movement patterns from the late 18th century onward.

Access to good reindeer pasture grounds was also crucial to Sami subsistence, and this fact is shown in the archival sources. For example, the grazing conditions in the lowland forest and the high mountains are well described in many taxation land descriptions from the early 19th century. While the areas of mountain birch forest were large, covering more than a third of the studied taxation lands, the areas used for grazing during the summer (mountain heath) and winter (pine forest) were smaller, each covering about a quarter of the taxation lands (Fig. 5, Table 3). Access to good winter pastures was essential to reindeer survival (Anon, 2006:88–89), so the area of pine forest within a taxation land was probably insufficient in times of severe grazing conditions. This insufficiency probably contributed to changes in reindeer herding practices, eventually leading to larger herds and altered movement patterns.

Within a Sami village community, there were also areas for common use, and in this study region, one such area was positioned along the southern part of the Pite River on the south side (Fig. 1). According to several sources, this common land was exploited during various times of the year, for example, when grazing conditions were very poor, or when predators such as wolves (*Canis lupus* L.) and wolverines severely reduced the number of reindeer (Laestadius, 1831:442; Ruong, 1945:170–172). The use of common lands during the winter months provided flexibility and facilitated the search for good winter pastures. The increased size of

TABLE 3. Area (km²) of major vegetation types and lakes in Madme, Árvás, and Siebmer. Means for combined area of the three taxation lands and the percentage of total area represented by each type are also shown. Data derived from court records.¹

Vegetation Type	Madme	Árvás	Siebmer	Mean	
	km ²	km ²	km ²	km ²	%
Pine forest	58.7	23.0	27.2	36.3	23
Mountain birch forest	94.0	60.2	25.5	59.9	36
Mountain heath	57.5	35.6	34.4	42.5	28
Mire	18.5	15.2	4.7	12.8	8
Lake	15.7	3.8	5.7	8.4	5

¹ HLA, ATH, Domböcker och protokoll, A1a - Domböcker vid lagtima ting Vols. 8, 12. HLA, NLL, GIIIa - Jordeböcker Vols. 2, 4, 5, 16.

the herds and movements over larger areas may also have been partly due to inadequate access to high-quality summer pastures (Table 3, Fig. 4). During summer, the reindeer forage intensively and accumulate large reserves of fat, proteins, and vitamins that sustain them through the mating season in the autumn and the long, harsh winter months (Warenberg, 1982:70–71). Hence, access to large areas of good grass meadow pasture is crucial for people relying on reindeer herding, since such areas may be far apart in this landscape.

POPULATION LIMITS FOR SUBSISTENCE WITHIN A TAXATION LAND

Today the study region represents a transition zone between the lowland areas farther east and the high mountain plateaus close to the Norwegian border in the west (Ruong, 1969:112–119). Thus, the three taxation lands form an area through which the reindeer belonging to local Sami community village herders pass when traveling the long distances in their current migrations between the winter and summer pasture grounds (cf. Rönnow, 1944). In the past, however, reindeer herding was more stationary, intensive, and commonly based on milk production; the reindeer herds were smaller, and migration routes were shorter. Nevertheless, people covered substantial distances when moving between different settlement sites. Some reindeer herders even moved such long distances that they stayed on the Norwegian side of the national border during the summer (Wiklund, 1908; Rensund, 1984:97–100).

Two important conclusions can be drawn from consideration of the historical data (Table 1), important elements in Sami subsistence (Table 4), and current distributions of the types of environment in the studied taxation lands (Fig. 4). First, the similar proportions of vegetation types and lakes in all three taxation lands indicate that this division of land must have been carefully considered. Second, from the earliest cameral records, established in the mid-16th century, we know that some Sami already had traditionally acknowledged rights to use certain areas, and paid tax for their use,

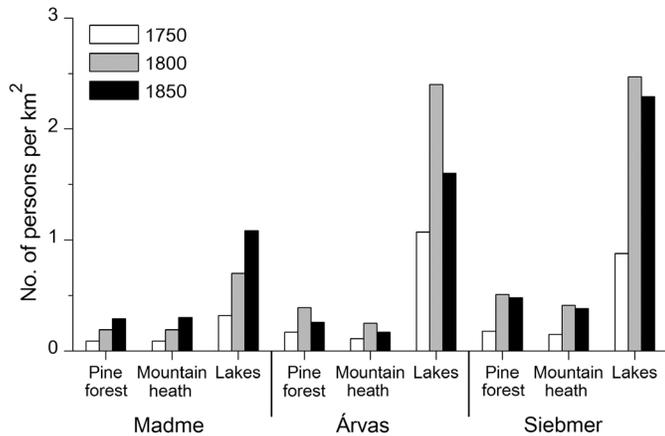


FIG. 6. Number of individuals per unit area of different vegetation types and lakes in 1750, 1800, and 1850.

at that time. Previous studies have suggested that this division of land is in fact much older, deriving from a time long before the land units were acknowledged by the Swedish state as Sami taxation lands (Holmbäck, 1922:7–10, 27; Lundmark, 1982:67–76; Schefferus, [1673] 1956:62–63). Thus, these land units may each originally have been designed to support the subsistence of one Sami family, providing all the natural resources required to meet a family's annual needs and sufficient pastures for small-scale reindeer herding within its borders. When the taxation land became too densely populated, larger areas and more extensive movements were required. A key question this raises is how many people these land units could originally support.

As in other hunter-gatherer and pastoralist economies throughout the Northern Hemisphere, the population density in the study region was very low in the past: about one person or less per square kilometre (Mulk, 1994:189–194). Previous studies on Sami social organization have also provided estimates for the average size of a household during the 18th and 19th centuries of 5.5 persons (Hoppe, 1945:54) and 3.5–4.9 persons (Kvist and Wheelersburg, 1997). In addition, (Hultblad, 1968:122) reported that Sami families usually consisted of several households, most commonly two to four. The data we examined indicate that the total number of persons within a taxation land or family ranged from 5 to 24, with means of 16, 15, and 8 in Madme, Siebmer, and Árvas, respectively (Table 2). These figures correspond fairly well with the results of Kvist and Wheelersburg (1997) and also with estimates in a study of Sami residence patterns carried out not far from our study region, where family size ranged from 4 to 19 (Bergman et al., 2008). These findings indicate that the Sami families in the study region between 1750 and 1850 were usually made up of three households or 0.08 persons per km² (Table 2).

From court records dating to the second half of the 18th century, we know that there were many disputes about reindeer grazing in the three taxation lands. Most of these disputes involved moving reindeer across another family's taxation land, indicating that even at that time the pastures

within a taxation land were often too small, or of too low quality, and hence the movement patterns already extended beyond the respective families' taxation land borders. Presumably Sami subsistence, including intensive reindeer herding and use of natural resources, was confined within these land units in the time preceding the 18th century. Provided that the size of the studied taxation lands was fairly similar before 1700, a crude estimate is that they may have been able to support 0.04–0.06 persons (including young children) per km². This estimate, however, also depends on the spatial distribution and extent of natural resources within each taxation land. In Madme, the estimate implies that approximately 10–15 persons (two to four households), belonging to the same family, could subsist on the resources derived from a 244 km² territory. Interestingly, in a court record from 1749, the parish court declared that users of this taxation land comprised three households, but it could possibly support four. Our estimates imply that 5–8 persons (one or two households) could have been supported on the 137 km² at Árvas, and up to six persons (one or two households) on the 97 km² at Siebmer.

Our estimates of population density can be compared with those from previous studies on group sizes and hierarchic structure of traditional economies, which have found that population density reflects socio-economic complexity (cf. Johnson and Earle, 1987; Kosse, 1990); population densities of less than 0.04 persons per km² are characteristic of hunter-gatherer societies, while densities up to five persons per km² are characteristic of low-technology societies that rely on hunting, fishing, and gathering supplemented by farming or herding. The northern areas inhabited by the Sami have very low productivity, and the conditions are poor for farming; thus the population density seems unlikely to have exceeded one person per km² during the period under study.

QUALITATIVE DIFFERENCES AMONG TAXATION LANDS

It is very difficult to determine the “carrying capacity” of a taxation land with confidence. The areas encompassed by the taxation lands, as defined in the 16th and 17th centuries, clearly varied in the opportunities to subsist and adjust to changes that they provided for the families that used them. However, the estimates of population density (Table 2) and the geographical positions of the three taxation lands examined here (Figs. 1 and 4) provide indications of the abundance of resources they offered and salient examples of the variations in this respect. While the population size in Madme and Siebmer increased during the period studied, the few people using Árvas most likely had to work very hard for their subsistence because of the less favorable physical conditions and paucity of valuable environmental resources. The people inhabiting Árvas had no access to the Pite River, which was important for fishing. Furthermore, in Árvas the proportion of pine forest was lower, and

TABLE 4. Sami seasonal land-use activities in different environmental settings.

Vegetation Type	Season	Main Land-Use Activities
Pine forest	Winter/spring	Reindeer herding, hunting, collection of pine inner bark
Mountain birch forest	Spring/autumn	Reindeer herding, hunting, collection of birch wood and bark, collection of edible plants
Mountain heath	Summer	Reindeer herding
Mire	Spring/autumn	Collection of berries and sedges
Lake	All seasons, occasionally	Fishing

the proportions of mires and wetlands were higher (Fig. 5). Árvas was eventually deserted in the late 20th century for reasons that are not clear, although it is plausible that Johan Anundsson's descendents may have been forced to leave the land because of tax defaults.

Throughout the Pite River valley, as well as in the regions north and south of this area, many taxation lands were either deserted or transformed into agricultural properties (like Madme) during the late 20th century. There were several reasons for these changes. First, the Swedish state put an end to the use of taxation lands, and increased demand for agricultural land and colonization from the southeast prompted many Sami to acquire property rights to their taxation land (Campbell, 1948:240ff; Lundmark, 2006:101ff). In Siebmer, however, the conditions for subsistence were fairly good, provided that the population was kept low, although the high population densities recorded in the 19th century imply that other areas were exploited in addition to the taxation lands. The resources required for subsistence were probably most abundant in Madme, since this taxation land comprised the largest territory and included many lakes suitable for fishing and extensive areas of both pine forest and mountain heath. The old pine forest was known as a very good winter grazing area (Rensund, 1984:80). A large part of Madme also bordered the river, which provided additional fishing opportunities. Even now this area is known as "The Good Land" (Swedish *Det Goda Landet*) among the locals.

Beyond the study lands, at a larger spatial scale, different areas varied in natural resources and movement patterns, even within the same region. For instance, in the 19th century, the Sami residing south of the Pite River (the Barturtte Mountains) and those living on the north side (the Gájsájs and Árvesduoddar mountains) differed in these respects (Laestadius, 1831:452–453). In Barturtte, the herders milked their reindeer and the herds were rather small, whereas in the areas north of the river, the reindeer were not generally milked. Hence, the calves had better chances of surviving the winter, the herds were larger, and the movements between pastures covered larger areas to the north of the river. In addition, the different resources produced (mainly cheese and meat) were traded between the northern and southern herders. This example clearly illustrates that reindeer herding practices varied even within the Sami community. It also shows that the movement patterns of reindeer herders have been far from stable: on the contrary, they have changed considerably, and the herds have tended to roam over larger areas in more recent times.

COMPARATIVE PERSPECTIVES ON INDIGENOUS PEOPLES' LAND USE DURING A TRANSITIONAL PERIOD

The Sami taxation lands were traditional land units established within Sami society, but they were also accepted and recognized by the Swedish state as taxation units for several centuries up to the early 19th century, even in times when agricultural settlements were expanding. Further, although the users of the taxation lands were at a disadvantage in some regards, they interacted and claimed their rights in court proceedings, as shown in this study and several other studies. During the 18th century, they even constituted the majority of the juries in parish courts (cf. Kvist and Wheelersburg, 1997; Hahn, 2000; Lundmark, 2006). This situation contrasts markedly to developments in North America (Thomas, 1988; Ray, 1996; Olund, 2002) and in most parts of the Russian North (Anderson, 1991; Murashko, 1994; Golovnev and Osherenko, 1999:43ff; Wheelersburg and Gutsol, 2008), where the indigenous people had very little active involvement in legal proceedings. For instance, in the same period, during the successive takeover of indigenous peoples' land in the British colonies of present-day Canada, the rights of indigenous people were often stipulated in treaties that included provisions for annuities, gifts, written guarantees regarding resource use and the establishment of reserves (Ray, 1996:149ff). In practice, however, these agreements were poorly respected as the demand for uses such as agriculture, mining, and forestry increased. In due course, resettlement of indigenous peoples' land followed rather than acknowledgement of their traditional land use.

Golovnev and Osherenko (1999:43ff) describe analogous shifts in indigenous peoples' land rights east of the Ural Mountains in the 18th and 19th centuries. Several Samoyed groups in the Russian North (e.g., the Nenets in the west, the Evenki in the central and southeastern parts, and the Eveny and Chukchi in the northeast) have maintained a reindeer-herding culture similar to past forms of Sami reindeer pastoralism, partly as a result of several hundred years of violent resistance to change (cf. Golovnev and Osherenko, 1999; Vitebsky, 2005). There are also similarities in affiliation to the land between the Sami and other indigenous peoples, for example, the traditional forms of land tenure, the common "ownership" of land, and the usufructuary rights of the individual or family belonging to the community (Mörner, 1979:102–103; Brøsted, 1986). The divergence between indigenous people and the imposing authority regarding ownership rights and land tenure has posed and

still poses dilemmas for many indigenous groups around the world, including the Sami (cf. Brøsted, 1986; Thomas, 1988; Korpijaako-Labba, 1994; Olund, 2002; Villamarín and Villamarín, 2003; Hendrix, 2005; Hierro, 2005; Suluk and Blakney, 2008).

CONCLUSION

Up until the late 19th century, the Sami reindeer herders had, in return for paying taxes, acknowledged rights to use certain areas known as taxation lands. The areas included the campsites that were exploited during spring and autumn when the reindeer herders passed through during their movements from lowland winter pastures to high-altitude grazing grounds. Consequently, the taxation lands have commonly been considered to be synonymous with the spring and autumn campsites. Our study depicts a more variable use of these land units, as they commonly encompassed several hundred square kilometres and featured distinct proportions of different vegetation types. The pine and birch forests, mountain heaths, mires, and lakes thus provided the Sami with areas suitable for both winter and summer grazing, in addition to many natural resources. Presumably, this land division is very old and carefully considered. Prior to the 18th century, the population density in all three taxation lands was very low, but between 1750 and 1850, the population more than doubled. These population changes coincided with increased land-use intensity and altered movement patterns.

We suggest that Sami land use during times up to the late 19th century was directed by an intricate relationship between demographic changes and movement patterns, bound up with other factors, especially the spatial and environmental configuration of the land they used. Considering the abundance and proportions of various types of environmental resources in these taxation lands, the changes in population, and information derived from other historical sources, we propose that Sami subsistence, including intensive reindeer herding, may have been confined to these land units from times preceding the study period: from the Middle Ages until the 17th century, and possibly until the early 18th century in some areas. During that time, movement patterns were dictated mainly by the environmental constraints of the taxation land: not solely by the need for access to high-quality reindeer pastures, but also by the distribution of hunting grounds and fishing lakes.

We also believe that the changes in population size during the 18th and 19th centuries were strongly linked to altered reindeer herding practices, including larger herds, instability in subsistence (fluctuations in natural resources and reindeer diseases), and changes in state intervention. More people and larger herds eventually led to shortages of high-quality pastures (especially summer grazing areas) and natural resources such as good fishing lakes. As a consequence, settlement and movement patterns changed, and the traditional exploitation of the taxation lands ceased.

Between the late 17th and the 19th centuries, however, these land units were accepted by the Swedish state, and individual Sami were able to claim their rights in court proceedings, often in the role of court members. Thus the Sami taxation lands presented in this study provide an example of a unique relationship between an indigenous people and the imposing authority.

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