

Ingela Bergman, Silvermuseum, Arjeplog

## **The Cultural landscape of mountains. Internal and external factors in sami use of the nature**

The overall objective of the research project has been to analyze the relationship between social and economic processes and environmental impact in marginal ecosystems. The development from a Sami hunter-gatherer economy to pastoral reindeer herding has been the focus, including related changes in land-use in sub-arctic environments, particularly alpine areas. Based on the hypothesis that the so called stállo foundations, i. e. the remains of prehistoric dwellings, represent the initial phase of systematic exploitation of the forest-limit zone, studies were carried out to analyze the chronological position of stállo settlements and to elucidate whether the establishment of settlements resulted in ecosystem degeneration in the surrounding areas. Studies focused on social, economic and ecological factors in the development of reindeer pastoralism, from both internal and external perspectives. The issues addressed in the research project challenged conventional perceptions of the high mountain areas as pristine and also the idea that, in traditional economies, resource utilization is non-manipulative. In addition, the project has revised the prevalent framework used to interpret the nomadism and land use among reindeer pastoralists.

Three of the most important outputs from the project are: The demonstration of the origin, course and socio-economic consequences of the establishment of stállo settlements; the elucidation of the origin of reindeer herding and related changes in land-use; and finally, the demonstration of the human impact on the alpine environment during the Viking Age and on related long-term ecosystem processes. Archaeological data show that, prior to the establishment of stállo sites, the alpine forest-limit zone had been subjected to only sporadic settlement (Bergman et al., manuscript). By AD 700 the first stállo dwellings had been erected, however the majority of stállo settlements belong to the period AD 800-1050 (Liedgren et al. 2007). The establishment and the abandonment of stállo settlements seem to have been two separate synchronous events that occurred over the entire settlement area along the Fennoscandian mountain ridge. The ecological niche in which they were located was characterized by productive pastures with sedges and grasses (Karlsson et al. 2007). The stállo settlements represent the initial phase of a pastoral economy based on reindeer herding. The transition from a hunter-gatherer economy to reindeer herding was instigated by a well organized external market for reindeer products, specifically among the Norwegian chiefdoms (Bergman 2006; Bergman et al. 2006). In contrast to the seasonal settlements in historical times, with summer camps in the mountains, stállo settlements were probably inhabited during the winter and possibly even throughout the year (Bergman et al. 2006; Liedgren & Bergman 2009). At first, reindeer herding was conducted within the social framework of the hunter-gatherer society, characterized by reciprocity and the collective ownership of the reindeer (Bergman et al. 2008). Stállo sites included up to 20 dwellings inhabited at the same time,

and a population of 100 to 150. The size of stállo settlements illustrates the dominant role of the community village structure, the tjiellde (Lule Sami language). Settlements were located to the forest limit zone of that time, where there were large supplies of construction material and wood for fuel. However, extensive logging resulted in deforestation (Karlsson et al. 2007; 2009; Staland manuscript; Liedgren & Östlund, manuscript) and progressive reduction in nitrogen supplies, in turn promoting a process of ecosystem degradation (DeLuca & Zackrisson 2007). The palaeoecological record shows that deforestation processes started in association with the establishment of stállo settlements and that the mountain birch forests had practically disappeared by the time settlements were abandoned (Karlsson et al. 2007; 2009). Deforestation and heath-degradation processes preceded the climate deterioration that occurred during the 14th century, nearly 200 years later (Bergman, DeLuca et al., manuscript; Karlsson et al. 2007). These results add new, and previously unrecognized, perspectives on the discussion pertaining to long-term synergistic effects of climate change and anthropogenic environmental impact in alpine areas.

During the period AD 800-1100 the village community structure was challenged by a progressively stronger emphasis on private ownership and on family and kinship groups (corresponding to the sijdda groups of historical times). The transition to reindeer herding initiated a process that eventually led to the dissolution of the village community and to the autonomy of the sijdda (Bergman et al. 2008). In parallel to the social and economic changes, land use and settlement patterns also changed with a higher degree of mobility in seasonal settlements. During the period AD 1200-1300, the social and economic reorganization was completed and new forms of land use and settlement logistics had developed. Historical sources dating to the beginning of the 15th century reveal the patterns of intensive reindeer herding that remained until the 20th century (Bergman et al., manuscript).

The project work has raised a number of new issues, among which the study of prehistoric and early medieval trading and communication networks deserves particular mention. During archaeological excavations of stállo settlements a segment of an ancient trail marked by pairs of standing stones was recorded. The trail predates AD 1600 and it may have been built much earlier (Bergman et al. 2006). Another trail system was recorded in connection to the so called “Nasaleden” (i.e. the 17th century trail constructed to facilitate movement between the Nasa silver mine in the Arjeplog mountains, and the town of Piteå). It turns out that some of the corduroy roads included several layers of tree-trunks, the oldest of which possibly date to prehistoric times. The ancient trail systems reflect the social, economic, political and religious interfaces between societies in the interior and neighboring societies in the Bothnian and Atlantic coastal areas, adding new perspectives on how trails acted as arenas for socio-economic and political contact between structurally disparate societies. The discovery of ancient trails has resulted in a three year research project starting in 2010 and financed by the Swedish

Research Council. New research issues also include studies of prehistoric and historical deforestation processes in boreal ecosystems, specifically anthropogenic fire manipulation of lichen heath biotopes. Also, issues related to the importance of the alluvial meadows of northern Sweden to subsistence strategies in prehistoric and historic times have been raised as well as issues concerning the general principles of nitrogen reconstruction in ecosystems used at an early stage by humans.

Publications have focused on international peer-reviewed scientific journals, such as for example *Arctic Anthropology*, *Antiquity*, *Journal of Archaeological Science*, *The Holocene* etc. Publishing papers in international journals generally means a prolonged process compared to that of national and university publications. To date, the research project has generated 16 scientific papers and five popular science papers. At least five further scientific papers have either been submitted or are in preparation. Among the most significant papers produced to date are “Kinship and settlements” published in *Arctic Anthropology* (Bergman et al. 2008). The relation between social structure and spatial organisation of dwellings at stállo was analysed based on the reconstruction of the size, kinship relations and demography of 18th and 19th century sijdda groups. The paper “Radiocarbon dating of prehistoric hearths in alpine northern Sweden: problems and possibilities”, published in the *Journal of Archaeological Science* (Liedgren et al. 2007), demonstrates that the stállo sites were in use for a very limited period and that the establishment and abandonment of stállo sites represent two different synchronous events over the whole area of distribution. The paper adds new and significant data to the discussion of the social and economic context of stállo sites and the emergence of reindeer pastoralism.

The palaeoecological data presented in “Long-term vegetation changes in the northern Scandinavian forest limit: a human impact–climate synergy” (Karlsson et al. 2007, published in *The Holocene*) confirms that stállo sites represent the initial phase of systematic use of the forest limit zone in the alpine area and that the presence of settlements coincides with vegetation changes in the surrounding areas. Pollen diagrams show that a deforestation process started in connection with the settlements and that ecosystem degradation accelerated with the subsequent climate deterioration that started in AD 1300.

Results have been presented in the form of lectures for the public, for local schools, for students at the Swedish University of Agricultural Sciences in Umeå, and for officials at the County Administrative Board, the Norrbotten County Council and the Swedish National Heritage Board. Field trips have been arranged for colleagues within the archaeological and ecological disciplines as well as for the public. Results have been presented in a number of popular science papers and in local and regional press, as well as on the radio and TV. Information has been presented on the Silver Museum web site home page and in connection with the Silver Museum’s work with the general public.