

SOME ESTIMATED EFFECTS OF THE PLANNED HARNESSING OF THE OUNASJOKI RIVER ON REINDEER HUSBANDRY.

Ounasjoki-projektets eventuella följder på renskötsel.

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Abstract: The harnessing of waterways for electrical power has caused permanent pasture losses and prevented the free movement of the reindeer herds in Finland. Many great changes occurred after construction of the two large artificial lakes of Lokka and Porttipahta (total 630 km²) in the Lappi reindeer herders association in the 1960's. The planned harnessing of the Ounasjoki river consists of 10 power plants and 2 big and 12 smaller artificial lakes (total 270 km²). The plan will have effects on the income of 1070 owners in 7 reindeer herders associations. The losses in reindeer husbandry estimated by three different methods were maximally 476, 2824 and 9900 reindeer (value of meat production 0.12 to 2.5 million FIM/year), 64 jobs and various herding buildings (value 3.9 million FIM). Two new reindeer farms would become unusable (0.5 million FIM) and in addition hay production from seasonally flooded fields (approx. 25 000 - 30 000 FIM/year) would be lost. The building of new forces in the reindeer herders association areas of Ounasjoki river would require 6.2 million FIM.

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NIEMINEN, P. & NIEMINEN, M. 1983. Ounasjoki-projektets eventuella följder på renskötsel.

Sammandrag: Vattendragens utnyttjande för production av el-kraft har förstörd renbetesmarker och försvärat renarnas möjlighet att röra sig fritt i Finland. Som exempel härav må nämnas byggnadsprojekten för Lokka och Porttipahta regleringsreservoarer (inalles 630 km²) fr.o.m. början av 1960-talet inom Lappi renbeteslag. Ounasjoki-projektet omfattar 10 kraftverk samt 2 stora och 12 mindre reservoarer (inalles 270 km²). Byggnadsprojektets influensområde skulle omfatta 1070 renägarens hushåll inom 7 renbeteslag. Genom att använda tre olika räknesätt kommer man till ett resultat, att man skulle bli tvungen att förminska maximalt 476, 2824 och 9900 renar (ett köttproduction på ca. 0.12-2.5 million FIM/år) och skulle mista 64 året rundt användbara arbetsplatser och dessutom bli lidande av flere olika slags damage (förstörda stängslen osv.) med ett värde på ca. 3.9 million FIM. Två rencgendomar skulle bli förstörda (0.5 million FIM) och dessutom skulle man förlora flodängarnas höskörd (25 000 - 30 000 FIM/år). Inom Ounasjoki-områdets renbeteslag skulle man behöva 6.2 million FIM för upprättande av nya stängsel på området.

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NIEMINEN, P. & NIEMINEN, M. 1983. Ounasjoen rakentamissuunnitelman mahdolliset vaikutukset porotalouteen.

Yhteenveto: Vesistöjen valjastaminen sähköntuottoon on tuhonnut porolaitumia ja vaikuttanut porojen vapaata liikkumista Suomessa. Tästä on hyvänä esimerkkinä Lokan ja Porttipahdan tekoaltaiden (yhteensä 630 km²) rakentaminen Lapin paliskunnassa 1960-luvulta alkaen. Ounasjoen rakentamissuunnitelma käsittää 10 voimalaitosta ja 2 isoa ja 12 pienempää tekoallasta (yhteensä 270 km²). Rakennussuunnitelma vaikuttaa 1070 poronomaistajan talouteen 7 eri paliskunnassa. Kolmella eri menetelmällä laskien jouduttaisiin enimmillään vähentämään 476, 2824 ja 9900 lukuporoa (lihantuotto 0,12-2,5 milj. mk/vuosi) sekä menetettäisiin 64 ympärivuotista työpaikkaa ja koettaisiin useita eri rakennevahinkoja (arvoltaan noin 3,9 milj. mk). Kaksi uutta porotilaa jäisi käyttökeltvottomiksi (0,5 milj. mk) ja lisäksi tulvaniittyjen keinäntuotto (noin 25 000 — 30 000 mk/vuosi) menetettäisiin. Uusien esteitojen rakentamiseen tarvittaisiin Ounasjoki-alueen paliskunnassa 6,2 milj. mk.

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Fig. 1. Ounasjoki river

Bild 1. Ounasjoki älv.

INTRODUCTION

Competing forms of land use have restricted reindeer husbandry in Finland. In addition to loss of pastures caused by the forest and peat industries there has also been threats from various large hydro-electric projects. The planning of the Lokka and Porttipahta reservoirs began in the mid-50's and the regulation scheme was completed in 1963. The building of Lokka reservoir started in 1958 and fulfilled in 1970. Both reservoirs have affected the reindeer husbandry in the area in many ways (Jaakkola & Aikio 1970, Järvilehto 1979).

The project for the harnessing of Ounasjoki river was considered throughout the 1970's. The possible damage and losses to reindeer husbandry caused by the harnessing were ascertained in 1981. The final decision to protect Ounasjoki river came into force on 1 September 1983. This paper reports on the calculated losses for the reindeer husbandry from a hydro-electric development in Ounasjoki river.

THE PLAN TO HARNESS OUNASJOKI RIVER

The Ounasjoki river development included 8 hydro-electric plants and 2 regulating reservoirs

with associated hydro-electric plants affecting the reindeer husbandry areas of Kyrö, Jääskö, Kuivasalmi, Alakylä, Poikajärvi and Palojärvi (Figs 1, 2 and 3). In addition initial plans for hydro-electric plants were made for the Kurkkio and Ketomella reservoirs (second construction phase, see Table 1) on the upper reaches of the Ounasjoki. Kurkkio is situated in the Kyrö and Ketomella in the Näkkälä reindeer husbandry area. The total reservoir capacity of planned project would be 450 million m³ (Lapin vesien käytön kokonaissuunnitelma 1980).

MATERIAL AND METHODS

The loss of reindeer pastures were estimated using a square method based on the highest water level in the construction plans. Statistics on the number of reindeer in the reservoir-areas and income from reindeer husbandry are calculated from the statistics of the Reindeer Herders Association (Paliskuntain Yhdistys). Practical information on reindeer husbandry work has been obtained from the boards of the reindeer herders associations in the Ounasjoki area. The required reduction in reindeer numbers caused by pasture losses is calculated from the reindeer density, food

TOTAL CAPACITY 204 MW
 ENERGY AMOUNT 876 GWh/A (220 000 TN OF OIL)

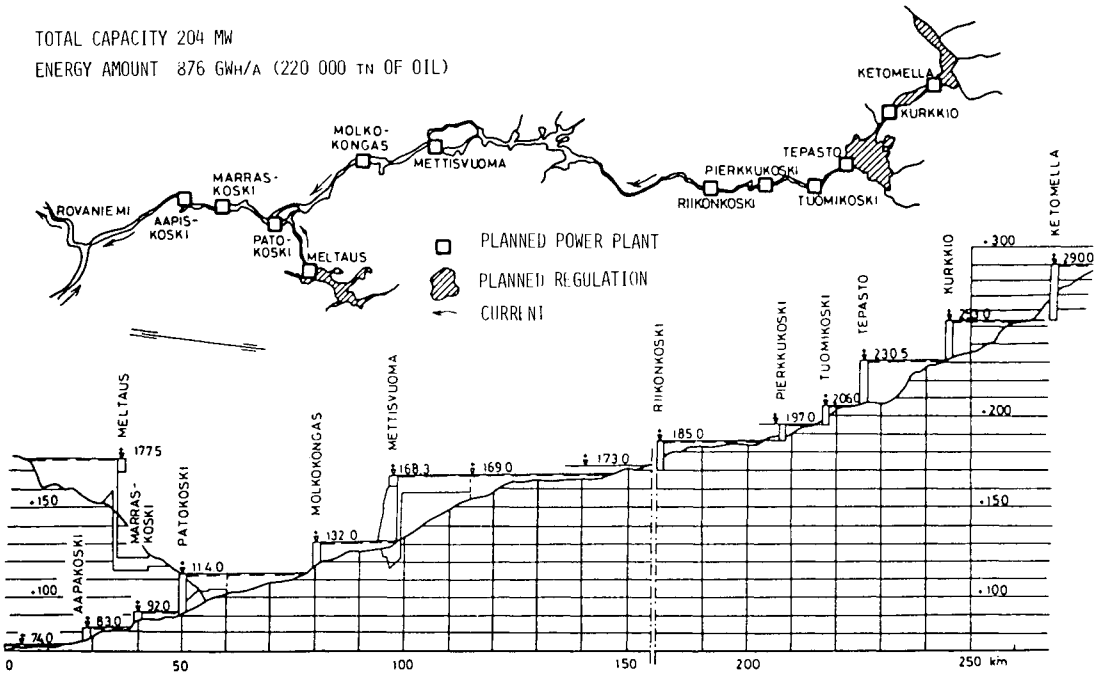


Fig. 2. The power economical use of the Ounasjoki river

Bild 2. Bruket av Ounasjoki för el-kraftproduktion.

resources and the estimate of the reindeer herder associations (see Nieminen 1982).

RESULTS AND CONCLUSIONS

The total area of the Ounasjoki reindeer herders associations is 18 560 km² of which 590 km² (3.2%) is water (Table 1). During the herding year 1979/80 there were 1070 reindeer owners in the associations. The maximum number of reindeer permitted was 34 500. A total of 28 662 reindeer were recorded, of which 4272 one year or older and 6426 calves were slaughtered. The wintering herd was estimated at 6776 calves and 11 188 yearlings or older animals. Husbandry costs for animals over one year old were approx. 73 FIM per animal.

The Ounasjoki herders associations' share of the total member of owners and domestic reindeer in Finland during the 1970's was 15% and 17-18% respectively. About 50% of the owners had less than 10, 21% had 11-30 and a good 23% had over 30 counted reindeer (one year and older). More than 16% of all the reindeer owners had over 50 reindeer.

During the herding year 1979/80 the income from reindeer husbandry in the Ounasjoki area was 4.9 million FIM which corresponds to 18% of the income from the whole reindeer husbandry area.

Almost 13 500 working days in the research field were paid for by the herders associations during 1979/80 to a total value of 1.1 million FIM. Own labour costs were at the same time over 400 000 FIM and almost 190 year-round jobs were provided.

In addition to 100 reindeer farms, there was a total of 164 necessary structures, separation-, marking- and feeding-enclosures and camps in the study area. Twentyfive new farms were planned.

Apart from the Palojärvi association, all the other reindeer herders associations in the Ounasjoki area would suffer loss of pasture on implementation of the construction project. The total area losses would be 211.9 ha (1.2% of the reindeer husbandry area) and under the second construction phase 270 ha (1.5%) (Table 1). The area loss would be forest (over 37%), marshes (54%) and fields and clearings (about 8%). The losses would particularly affect the Kyrö (Tepasto reservoir), Alakylä (Mettisvuoma reservoir) and Poikajärvi (Meltaus reservoir) reindeer herders associations (Figs 3 and 4).

The Tepasto reservoir would have covered over 78% marshes (Ruuhijärvi and Kukko-oja 1978), which are of especial significance to reindeer summer, autumn and late winter grazing. The

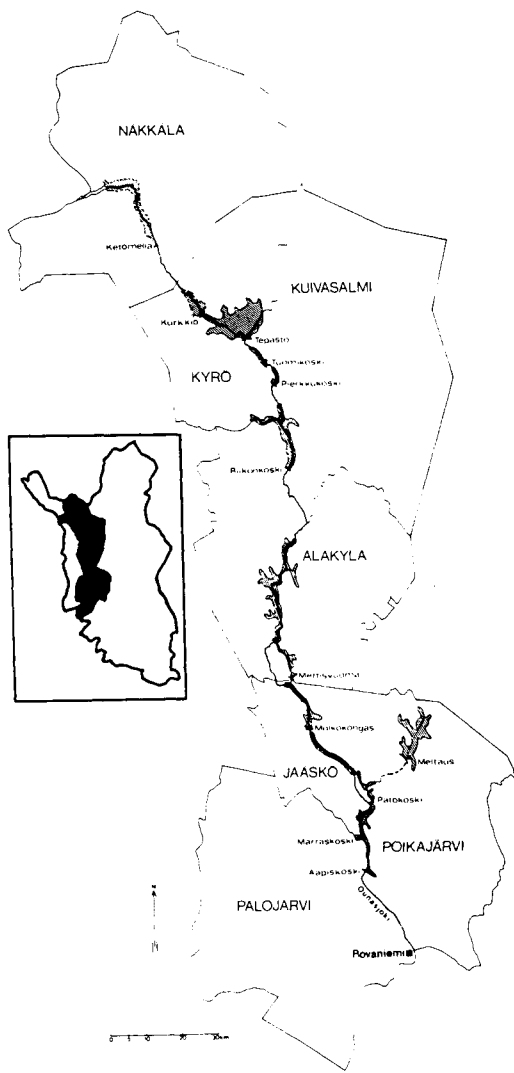


Fig. 3. Hydro-electric plants and regulation reservoirs according to the harnessing plans of the Ounasjoki river

Bild 3. Kraftverk och regleringsreservoarer av Ounasjoki-projektet.

marsh-area consists of 35.6% open marshes and bogs, 40.2% of pine marshes and 24.2% of spruce bogs. 85% of the forest area is of the reindeer winter grazing type. Losses due to the Tepasto reservoir would primarily affect the Kyrö and, in part, the Kuivasalmi reindeer herders associations (Figs 3 and 4).

The Mellus reservoir situated in the Poikajärvi reindeer herders area have been about 2/3 forested

(Heikkinen 1978). Of this over 3000 ha area, more than 80% is forest type considered normal winter pasture. The marshes are in the main open marsh, the type considered to be the most important for summer grazing (Figs 3 and 4). The small river reservoirs on the Ounasjoki would be situated mainly along the river bank and 20% of the area loss would be fields and clearings. Of the forest area loss (2470 ha) 27.9% is arboreal lichen (*Alectoria* and *Bryoria* spp.) grazing type (Tuovinen and Ruuhijärvi 1978) and 23.6% of the marshes (2626 ha) is spruce bogs which are also possible late winter and early spring grazing areas. The bank heights of the Ounasjoki are significant winter grazing areas. Altogether 1480 ha of MCCIT (*Myrtillus - Calluna - Cladonia*) and EMT (*Empetrum-Myrtillus*) type forests would be lost, or in other words about 60% of the forest of the reservoir areas (Figs 3 and 4).

The required reduction in the number of reindeer due to the loss of grazing areas and increased difficulty in reindeer herding is given in Table 2. Reduction in reindeer numbers calculated according to the counted reindeer (one year and older) density/km² would be 353 reindeer and after the second construction phase 476 reindeer. The required reduction based on sufficiency of food was calculated to be 2824 reindeer, after second construction phase 3808 reindeer. According to the estimates of the boards of the reindeer herders associations the reduction in the number of reindeer would be maximally 6900 or 9900 reindeer (Table 2) which would entail a gross annual loss of income of 1 725 000 to 2 475 000 FIM. During 1979/80 the gross income/counted reindeer was 250 FIM (Nieminen 1982). The estimates of reindeer herders associations base on detailed knowledge of reindeer pastures, herding and moving during different seasons. This method observes very carefully the effects of construction on the reindeer husbandry in the study area. In accordance with the method of calculation of Anttila (1972), loss of income should be compensated on the basis of gross income and in the case of single payment this should be 20 times the annual gross yield. A single total compensation payment for the loss of income in the Ounasjoki area would thus be maximally 1.77 to 49.5 million FIM.

Loss of structures in the study area would be about 2.6 million FIM (1981 prices) (Nieminen 1982). In accordance with previous practice structural losses

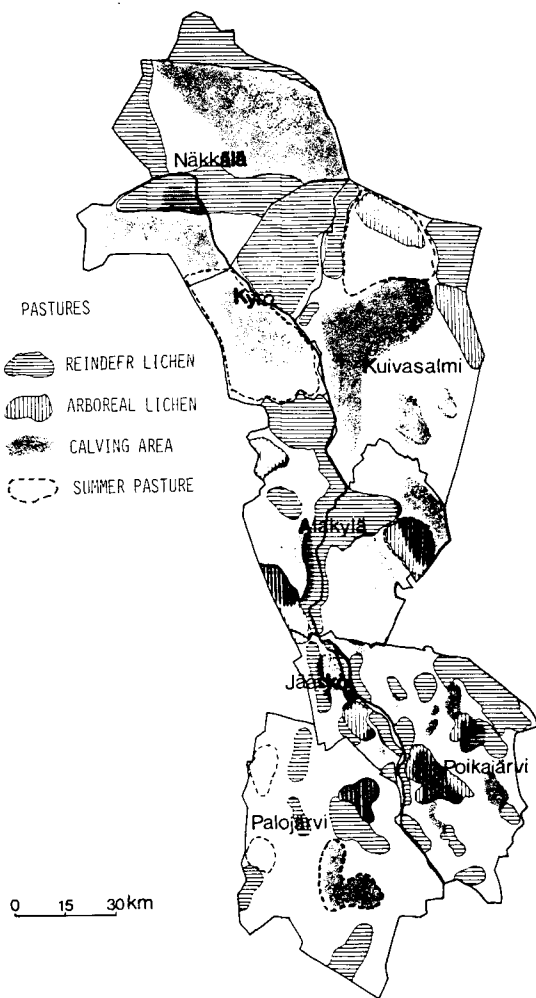


Fig. 4. Reindeer pastures in the reindeer husbandry areas of the Ounasjoki region

Bild 4. Renbetesmarker inom Ounasjoki-områdets renbeteslag.

have been compensated at 1.5 times payment (Järvikoski 1979). The corresponding compensation by association would be as follows: Alakylä 412 500 FIM, Jääskö 180 000 FIM, Kuivasalmi 300 000 FIM, Kyrö 2 005 500 FIM, Näkkälä 825 000 FIM and Poikajärvi 192 000 FIM. The loss of jobs, converted to all-year-round jobs in the Ounasjoki region herders association would be only 64. However, special attention must be paid to significance of reindeer husbandry in the study area as a secondary employment and also as a means of retaining inhabitation in these sparsely populated areas.

It is very difficult to estimate the increase in herding labor of reindeer caused by an eventual construction project. At Lokka and Porttipahta reservoirs the costs of reindeer husbandry increased on an average 55% (range 5-138%) after construction of reservoirs (Järvilehto 1979). During the herding year 1979/80 the costs of reindeer husbandry in the study area were 1 719 710 FIM. If the effects of construction is estimated as an increase in reindeer husbandry costs (average 25%/year) the lump sum of this compensation would be 12.9 million FIM (429 928 FIM x 20 x 1.5) in the Ounasjoki region herders associations (Nieminen 1982). Assuming that in reindeer husbandry an attempt was made to prevent the problems caused by construction it would need an investment of 6.2 million FIM, mainly in fences, in the study area. The financial losses would be made up also of the loss of two new reindeer farms (together 0.5 million FIM) and losses from flood field hay production for reindeer (about 25 000 - 30 000 FIM/year). In addition the existence of the reindeer herders associations of Alakylä, Kyrö, Näkkälä and Poikajärvi as independent administrative units would be endangered after harnessing of the Ounasjoki river.

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Table 1. Area losses of the Ounasjoki reindeer herders associations if the construction project is carried out. Second construction phase areas are given in parenthesis. Areas are estimated by the square method based on the highest water level according to the construction plans. See also Figs 2 and 3.

Tabell 1. Förlorade arealer inom Ounasjoki-områdets renbeteslag efter byggnadsprojekten. Arealer av det andra byggnadsskiftet är i parentes. Arealerna har man kalkylerat med kvadratmetod efter den högsta vattennivån. Se också på bilderna 2 och 3.

Herders association	Land area (km ²)	Water (%)	Total area (km ²)	Reservoir	Reservoir area (km ²)	Total reservoir area (km ²)	% of total area
Alakylä	2850	2.0	2908	Riikonkoski Mettisvuoma	4.0 36.3	40.3	1.4
Jääskö	593	2.0	605	Molkoköngäs Marraskoski	4.3 1.0	5.3	0.9
Kuivasalmi	3418	1.0	3453	Tepasto Tuomikoski Pierkkukoski Riikonkoski	19.2 2.2 2.1 6.3	29.8	0.9
Kyrö	1620	3.0	1670	Tepasto Tuomikoski Pierkkukoski Riikonkoski (Kurkkio)	64.8 1.0 1.0 4.0 (23.0)	(35.0)	(1.0)
Näkkälä	3453	4.0	3597	(Ketomella)	(35.0)	(35.0)	(1.0)
Palojärvi	3629	5.0	3820	Marraskoski	1.2	1.2	
Potkajärvi	2407	4.0	2507	Meltaus Molkoköngäs Patooski Marraskoski Aapiskoski	42.8 5.0 8.9 4.0 3.8	64.5	2.7
Total	17970	3.2	18560			211.9 (270.0)	1.2 (1.5)

Table 2. Reduction in number of reindeer after the planned harnessing of Ounasjoki river based on counted (one year and older) reindeer density/km² (A), sufficiency of food (B) and estimates of reindeer herders associations (C) during the herding year 1979/80. Effects of the second construction phase are given in parenthesis.

Tabell 2. Förminskade antal av renar efter Ounasjoki-projektet. Antalen baseras på renarnas (över ettåriga) täthet/km² (A), näringsresurser (B) och kalkyler av renbeteslagen (C) under renskötselåret 1979/80. Effekter av det andra byggnadsstiftet är i parentes.

Herders Association	A			B			C			
	Counted reindeer density/km ²	Area to be lost (km ²)	Reduction in reindeer numbers	% of counted reindeer	Reindeer number 1)	Factor x 2)	Reduction in reindeer numbers	% of counted reindeer		
Alakylä	1.4	x 40.3	= 56	1.4	56	x 8	= 448	11.6	2000	51.6
Jääskö	1.7	x 5.3	= 9	0.9	9	x 8	= 72	7.1	400	39.7
Kuivasalmi	1.2	x 29.8	= 36	0.9	36	x 8	= 288	6.8	1500	35.4
Kyrö	1.9	x 70.8 (93.8)	= 135 (178)	4.4 (5.8)	135 (178)	x 8	= 1080 (1424)	35.3 (46.6)	2000	65.4
Näikkälä	2.3	x (35.0)	= (80)	(1.0)	(80)	x 8	= (640)	(8.0)	(3000)	(37.7)
Palojärvi	1.1	x 1.2	= 1	0.0	1	x 8	= 8	0.2		
Poukajarvi	1.8	x 64.5	= 116	2.6	116	x 8	= 928	21.0	1000	22.7
Total	1.6	x 211.9 (270)	= 353 (476)	1.2 (1.7)	353 (476)	x 8	= 2424 (3808)	9.8 (43.3)	6900 (9900)	24.1 (34.6)

1) Reduction in reindeer numbers calculated according to counted reindeer density/km².

2) Helle & Vasama 1978.

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