

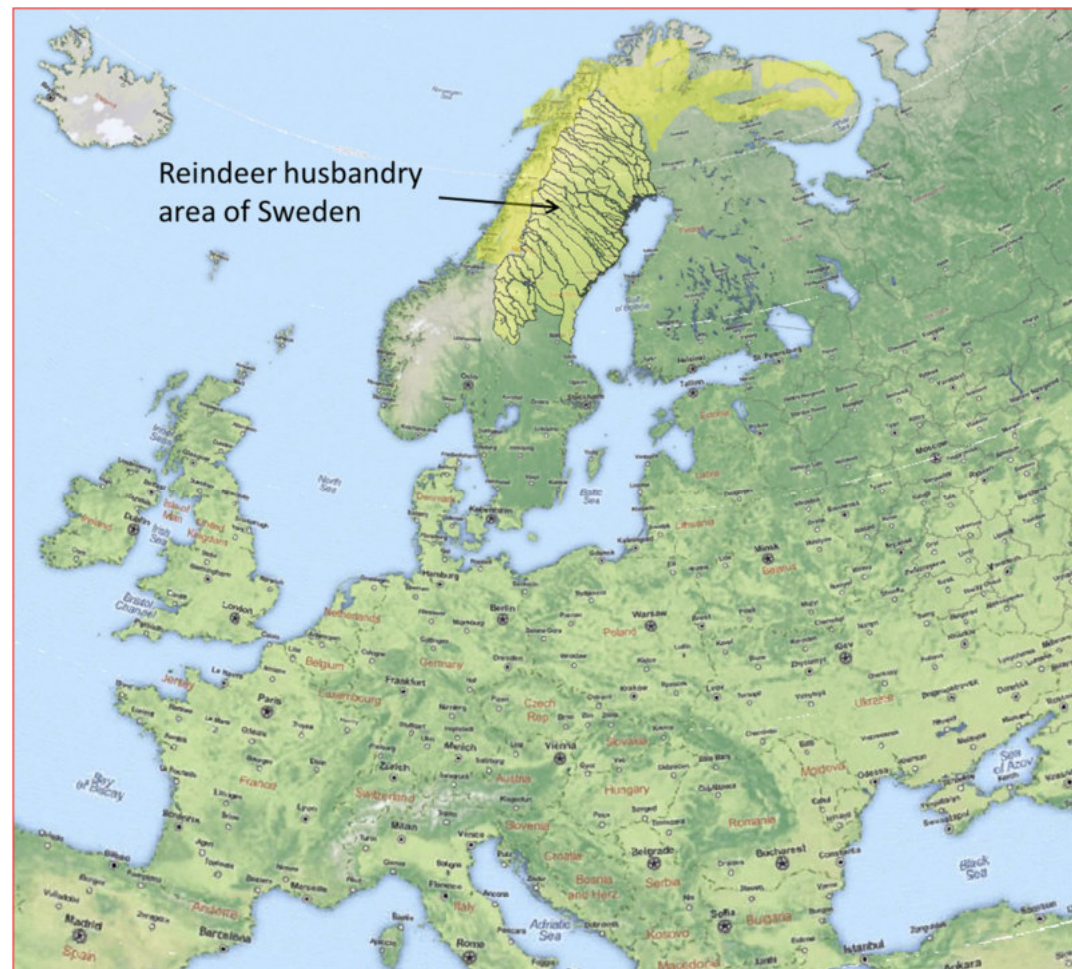
The value of community-based monitoring to support green-infrastructure planning, sustainable resource use and multi-use of the landscape

Henrik Hedenås, Sven Adler, Alessia Uboni & Per Sandström
Swedish University of Agricultural Sciences



Background

- Reindeer husbandry: An indigenous Sami land-use tradition



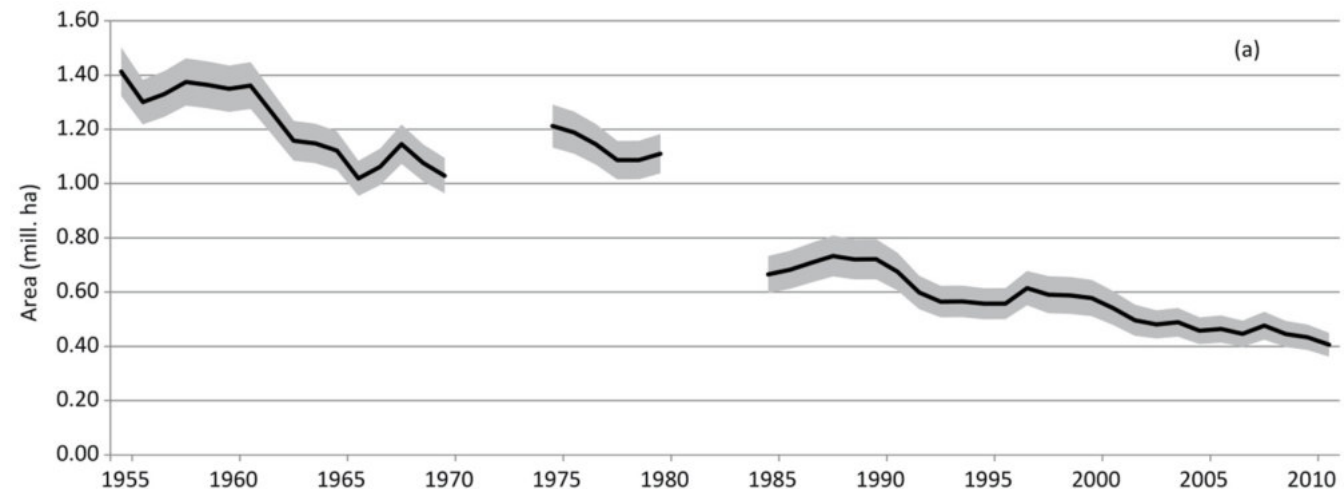
Background

- Reindeer husbandry, an indigenous Sami land-use tradition
- Lichens: A pivotal resource for reindeer



Background

- Reindeer husbandry, an indigenous Sami land-use tradition
- Lichens: A pivotal resource for reindeer
- Decline of lichen abundant forest



Lichen abundant forest: Lichen cover > 50%

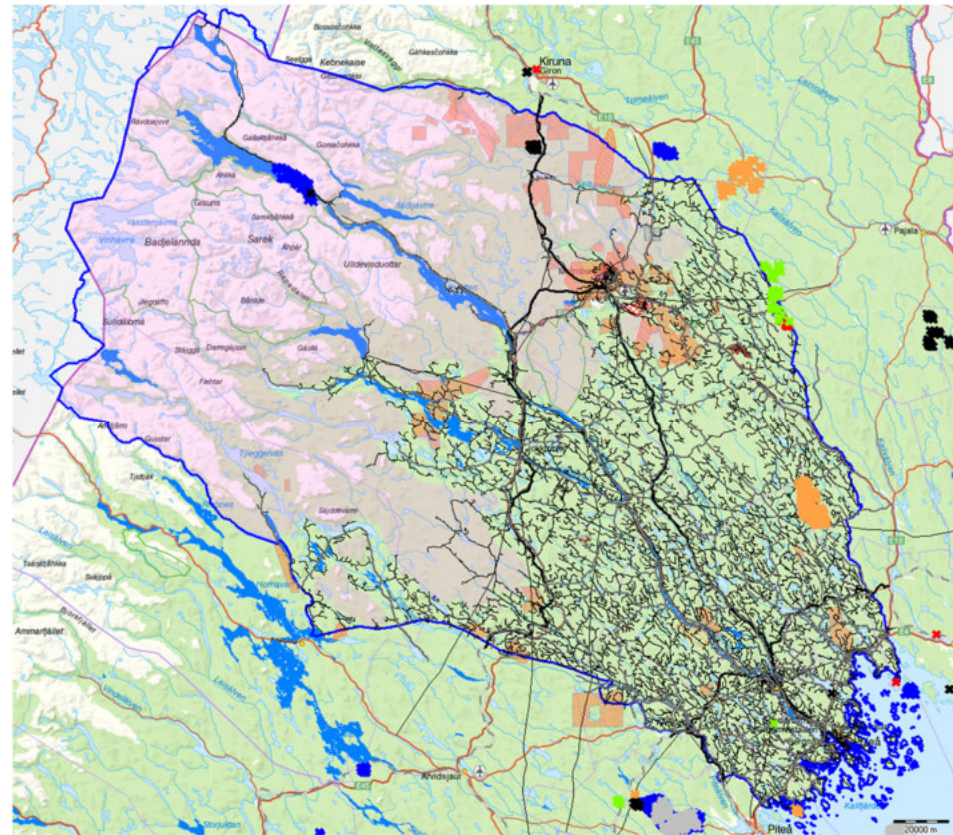
Background

- Other land use



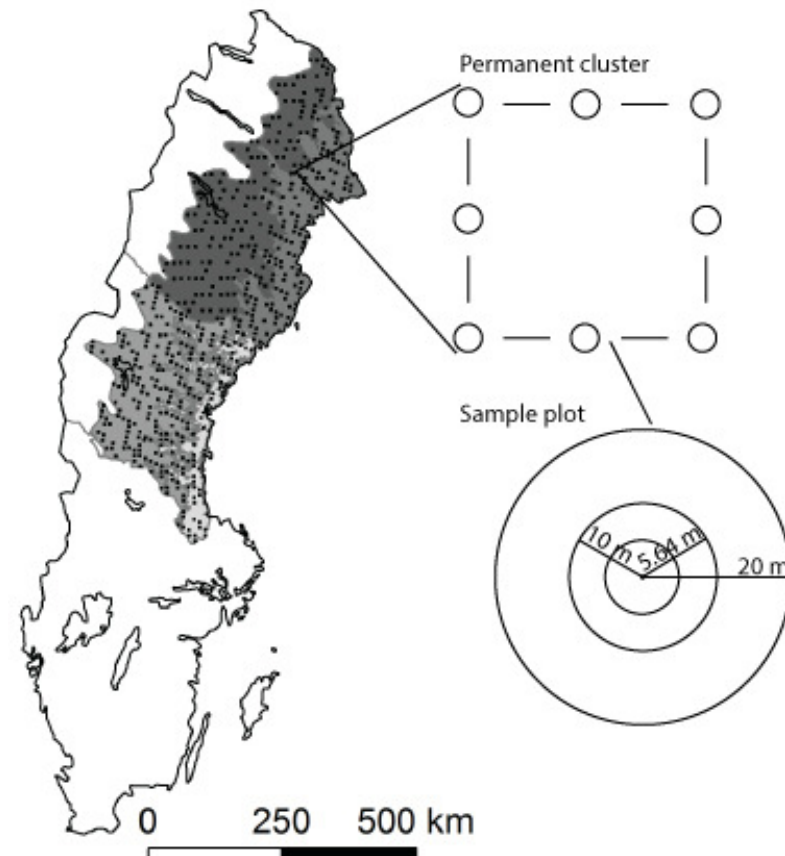
Background

- Other land use
- Spatial planning
- Lichen maps



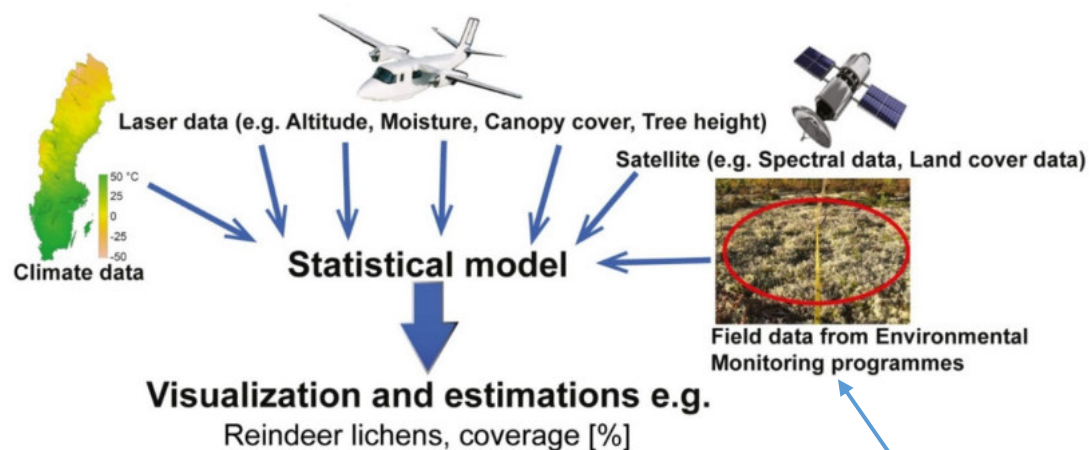
We have

Lichen coverage data from national environmental monitoring programme



We have

- Environmental monitoring data
- Data covering the whole landscape



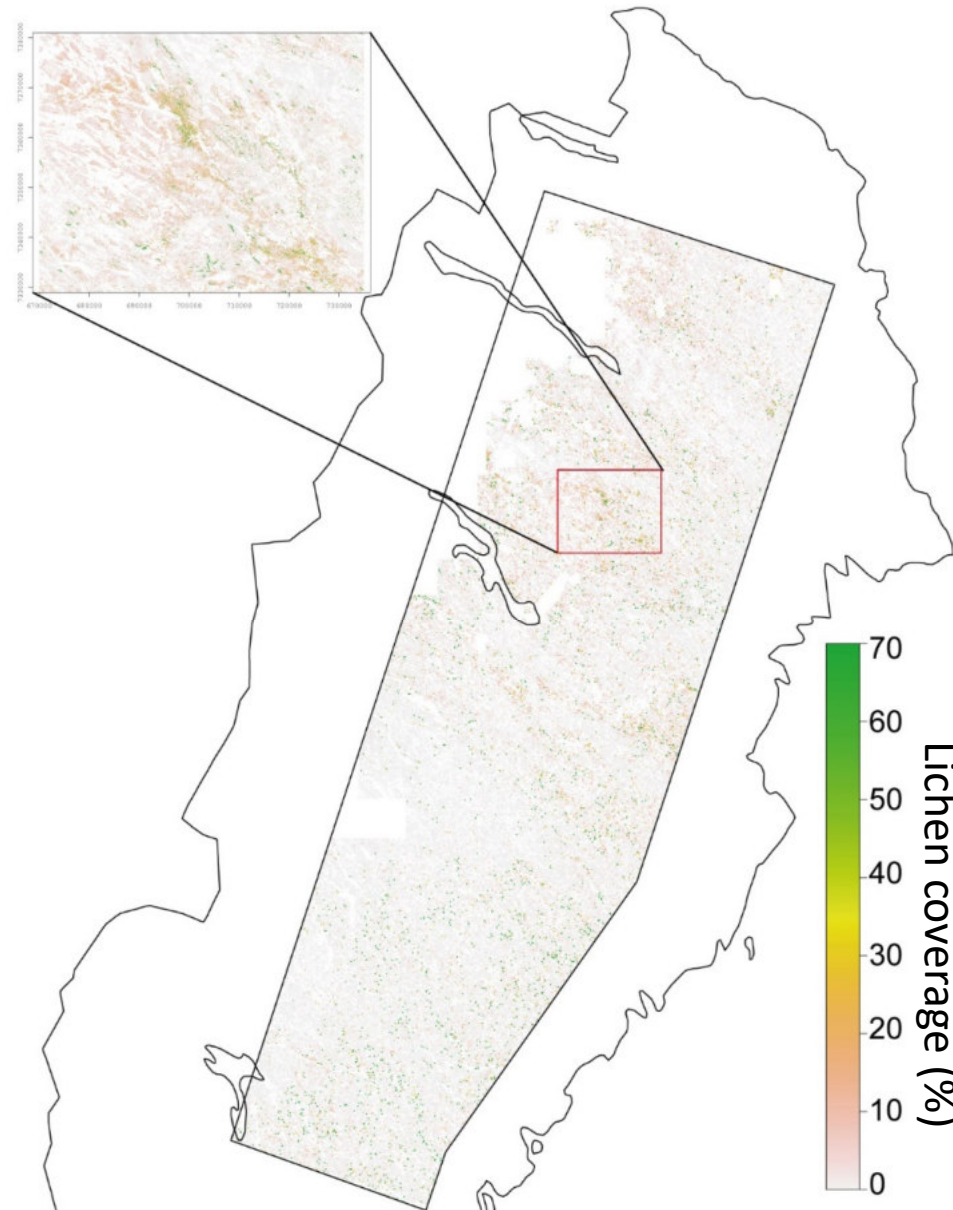
National Forest Inventory

National Inventory of
Landscapes in Sweden





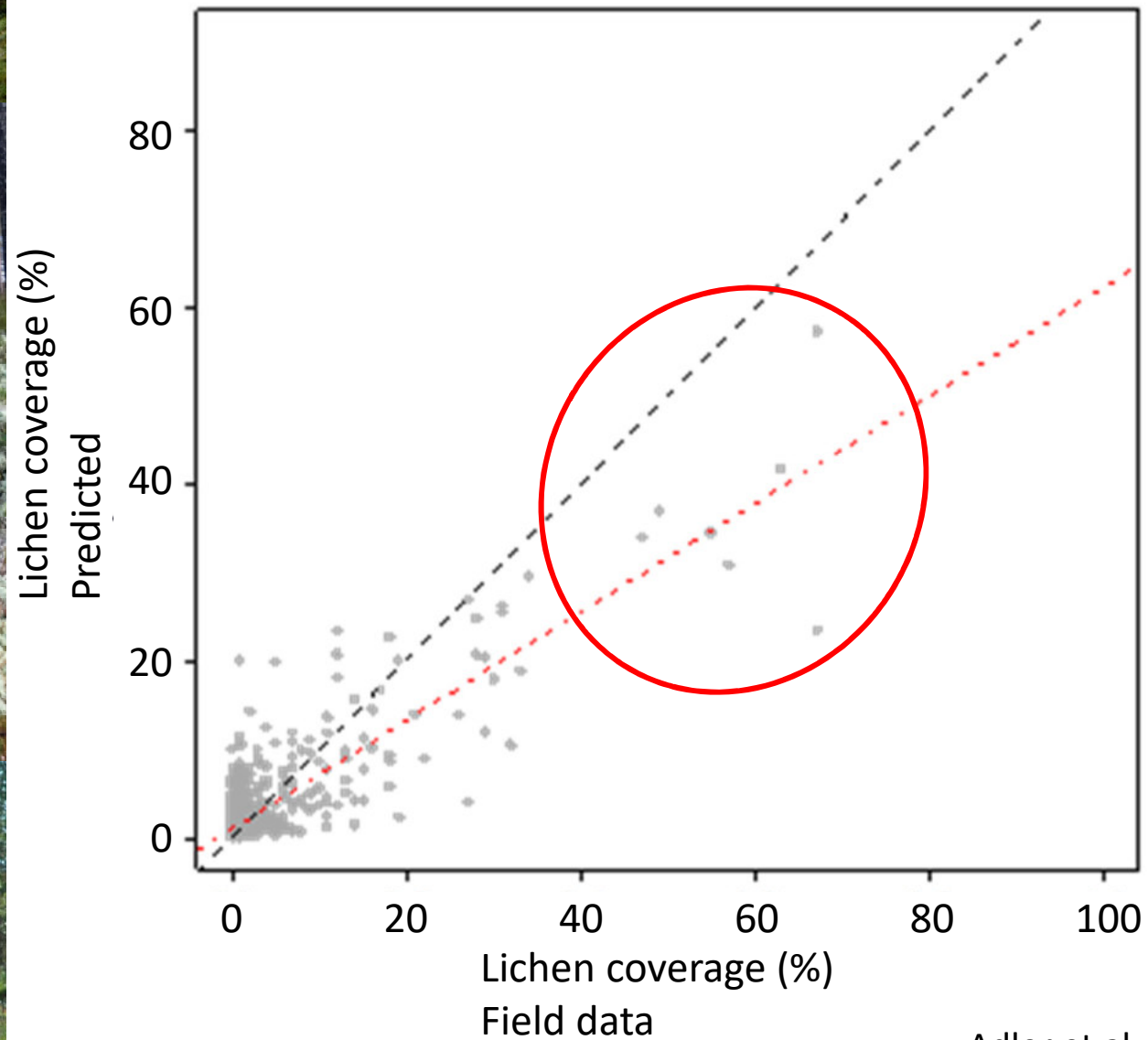
Model-based lichen map



Deviance
explained
66.8%

Adler et al. in prep

Model evaluation



We also have

- Community based monitoring data
- ## Reindeer Husbandry Plans

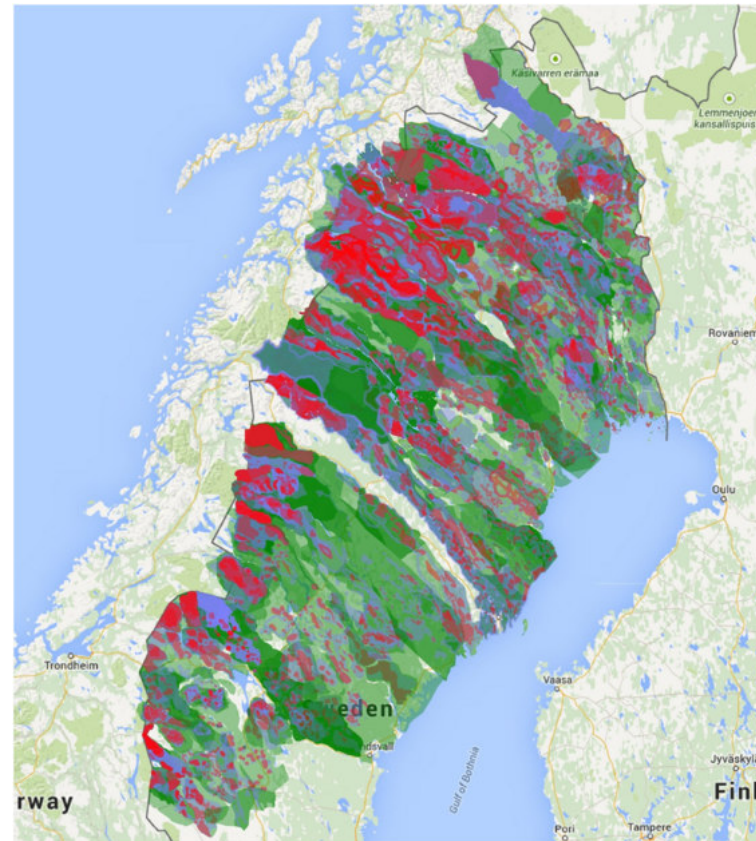
Purpose:

- Improve the basis for operational reindeer husbandry
- Improve the basis for consultation discussions with other land users
- Produce information that can be combined with other land users' databases



We also have

- Community based monitoring data
- ## Reindeer Husbandry Plans



Data owned and managed by each Sami village

We also have

- Community based monitoring data
- ## **Reindeer Husbandry Plans**

Purpose:

- Improve the basis for operational reindeer husbandry
- Improve the basis for consultation discussions with other land users
- Produce information that can be combined with other land users' databases

Includes inventories in the field



Community based monitoring Reindeer Husbandry Plans

- Standardized protocol



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**Fältblankett
RENBRUKSPLAN
Skogsinventering
Provyta med 15 m radie**

A. Generella uppgifter och identifikation av ytan

Datum	Län	Samnäs	Koordinater	Beteslandindelning	Årstid
20- -			X=Nord/Syd	Betesmark	<input type="checkbox"/> Vår
Inventerare	Områdesnamn	Vår	Y=Öst/Väst	Kärrmark	<input type="checkbox"/> Sommar
				Nyckelmåsskade	<input type="checkbox"/> Höst
				Lågmåsskade	<input type="checkbox"/> Vinter
				Ågsskade	

B. Beskrivning av inventeringsytan

Foto riktning	Huggningsklass	Trädskikt	Grundvta	Stamantal: Antal per ha
Norr	Förskott	Höjd	m	Ant. ≥ 1.3 m
Syd	K. Kallmark	G. Gullingskog		
Väst	P. Pannskog	S. Stenverksamhet		
Öst	R. Rådjurskog			

Fördelning tiodelar	Trädskikt	Rästy	Marklävar	Förskott	Lavar på träd
Lövträd	Tot. Kronäck	<input type="checkbox"/> 0 Bj. rötter	Tot. Markläv	<input type="checkbox"/> 10 Gultv. renlöv	Tot. hänglöv
Tall	Björk	<input type="checkbox"/> 10 Ljung	Bladformade	<input type="checkbox"/> 20 Gultv. renlöv	Gultv.
Gran	Öst. lövträd	<input type="checkbox"/> 20 Krikur	Renlävar	<input type="checkbox"/> 30 Företslöv	Mörlöv
Consorta	Gran	<input type="checkbox"/> 30 Lingon	Öst. Buskformade	<input type="checkbox"/> 40 Piggslöv	Skugglävar
Öst. barrträd	Tall	<input type="checkbox"/> 40 Björk	Båghög	<input type="checkbox"/> 50 Piggslöv	
	Öst. barrträd	<input type="checkbox"/> 50 Odon		<input type="checkbox"/> 60 Långslöv	
				<input type="checkbox"/> 70 Snöslöv	
				<input type="checkbox"/> 80 Björk	

Renbetesplan

Om andra koder än nedan angivna används, skriv numret på raden. Annan renbetesplan:

<input type="checkbox"/> 111 Tallbäckskog - Lövträd (<50%)	<input type="checkbox"/> 105 Granskog - Östrik typ
<input type="checkbox"/> 112 Tallbäckskog - Lövträd (25-50%)	<input type="checkbox"/> 106 Granskog - Mörtik typ
<input type="checkbox"/> 113 Tallskog - Lövträd (<50%)	<input type="checkbox"/> 107 Granskog - Granskog med hänglöv
<input type="checkbox"/> 114 Tallskog - Lövträd (25-50%)	<input type="checkbox"/> 108 Constartallskog
<input type="checkbox"/> 115 Lövskog - Lövträd (10-25%)	<input type="checkbox"/> 109 Blandskog (gran, tall, björk)
<input type="checkbox"/> 103 Tallskog - Mörtik, björk & lingon	<input type="checkbox"/> 110 Granskog - med markläv
<input type="checkbox"/> 104 Tallskog - Granskog med hänglöv	

Annan renbetesplan

C. Frivilliga uppgifter

Ört	Strävt	Markberedning, förvaring & skogsvårdstyper
Förskott	Täckning % (total)	Markberedningsmetod
<input type="checkbox"/> Inga av nedanstående arter	<input type="checkbox"/> Inga strävt	<input type="checkbox"/> Ingen markberedning
<input type="checkbox"/> Blodrot	<input type="checkbox"/> Småbladiga gräs	<input type="checkbox"/> Hög <input type="checkbox"/> Invers <input type="checkbox"/> Flick <input type="checkbox"/> Hävning <input type="checkbox"/> Bränning
<input type="checkbox"/> Borstrot	<input type="checkbox"/> Bredbladiga gräs	<input type="checkbox"/> Annan: Om annan vilken
<input type="checkbox"/> Fjällvass	<input type="checkbox"/> Öst. strävt	Förnyingsmetod
<input type="checkbox"/> Fjällakka		<input type="checkbox"/> Ökad <input type="checkbox"/> Planterat <input type="checkbox"/> Sitt <input type="checkbox"/> Självförnying
<input type="checkbox"/> Fjällsyrta		Uförda skogsvårdstyper
<input type="checkbox"/> Gullris		<input type="checkbox"/> Inga åtgärder <input type="checkbox"/> Rät <input type="checkbox"/> Gullris <input type="checkbox"/> Björk <input type="checkbox"/> Fjällakka
<input type="checkbox"/> Hjärtrot		<input type="checkbox"/> Skräp <input type="checkbox"/> Dukt <input type="checkbox"/> Rät <input type="checkbox"/> Gullris
<input type="checkbox"/> Krikklöv		

Observera: Om täckningen är <0,5 % anges +. Saknas det täckning anges 0 %.

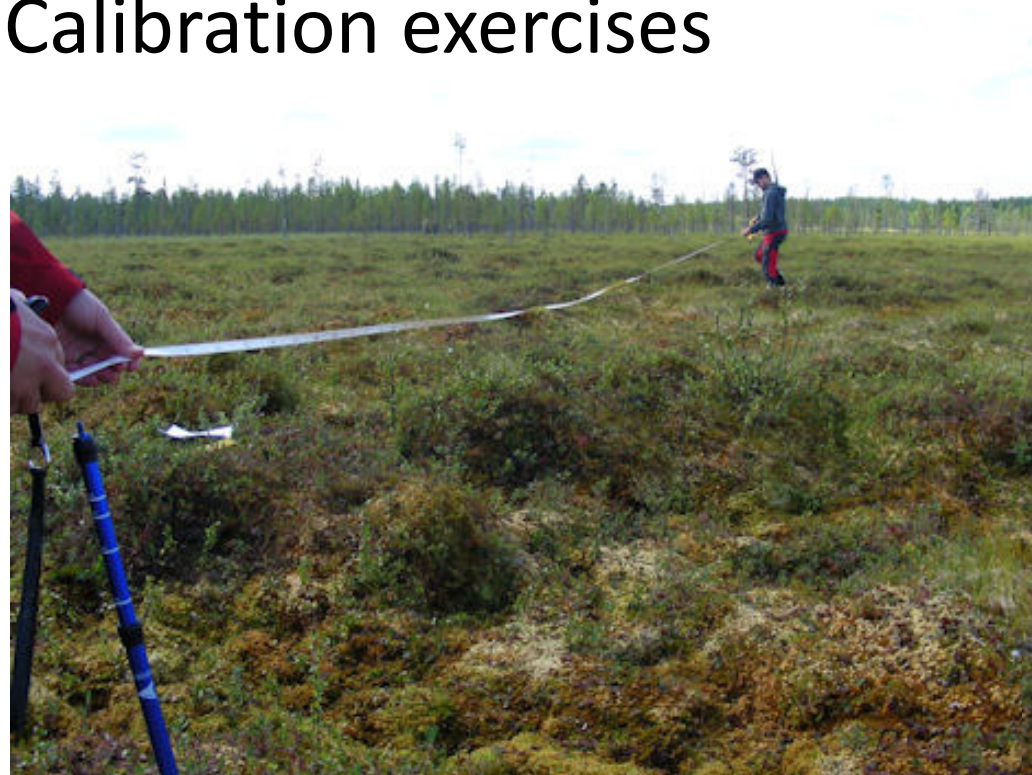
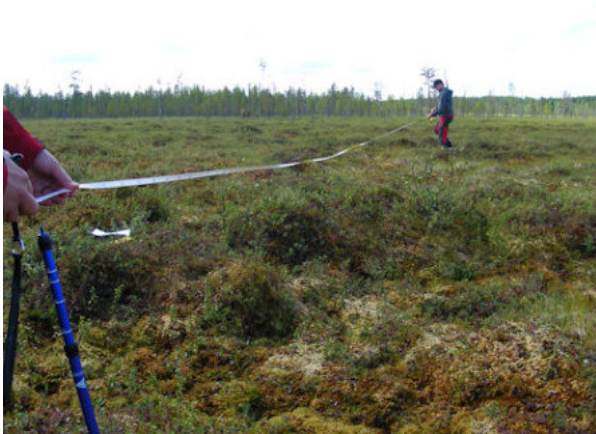
D. Kommentarer

☐ För kommentarer se baksidan

Community based monitoring

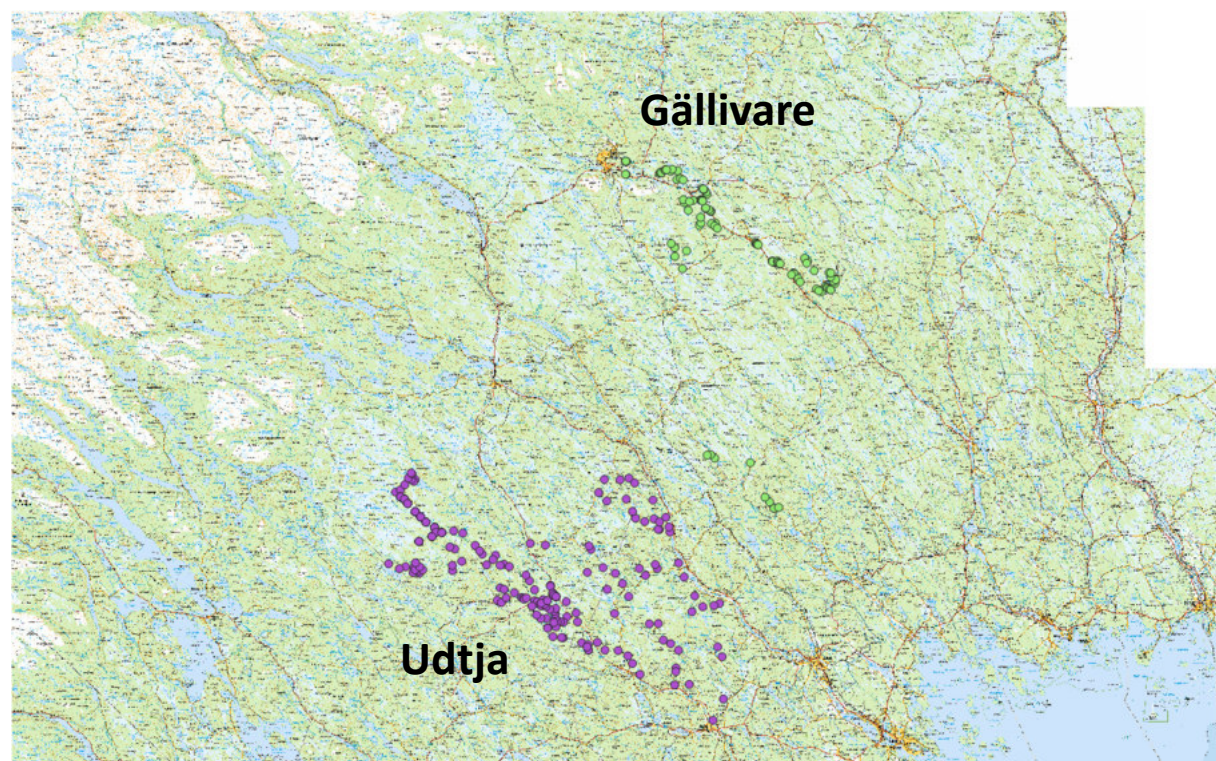
Reindeer Husbandry Plans

- Standardized protocol
- Field courses
- Calibration exercises



Community based monitoring

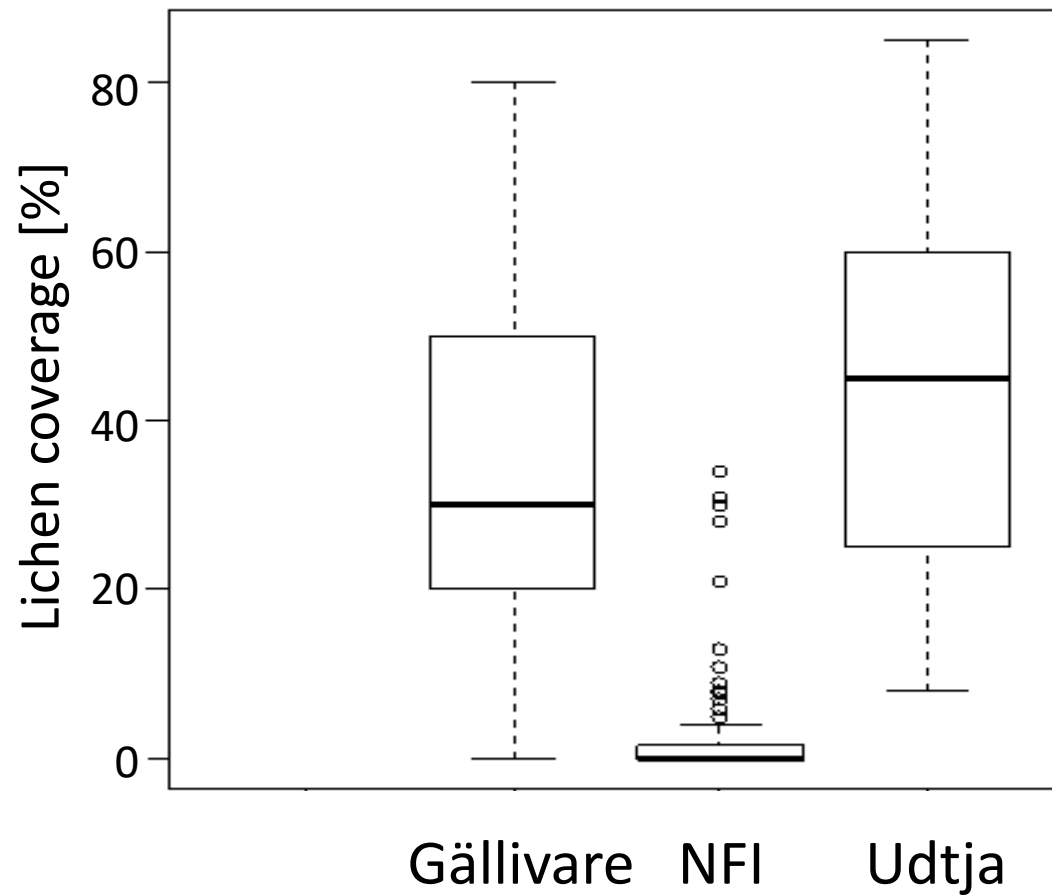
Lichen data from Udtja & Gällivare Sami villages





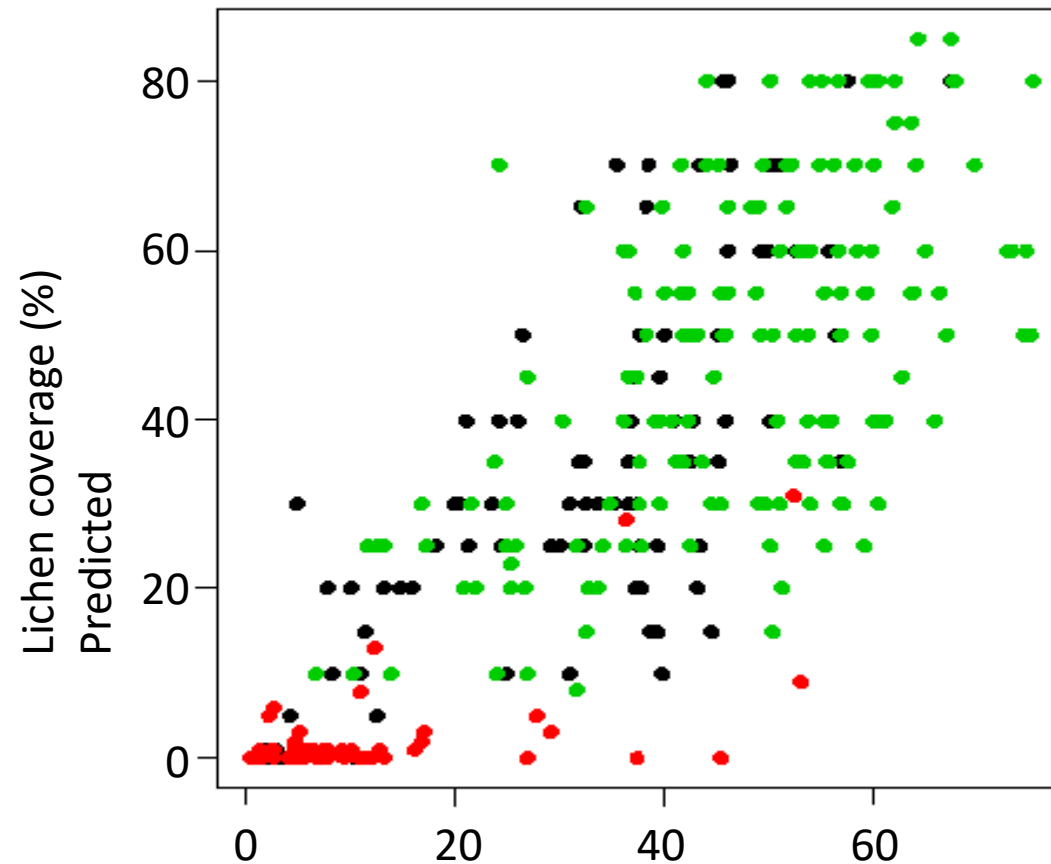
Community based monitoring

Lichen data from Udtja & Gällivare
Sami villages



Model evaluation

Response vs. Fitted Values



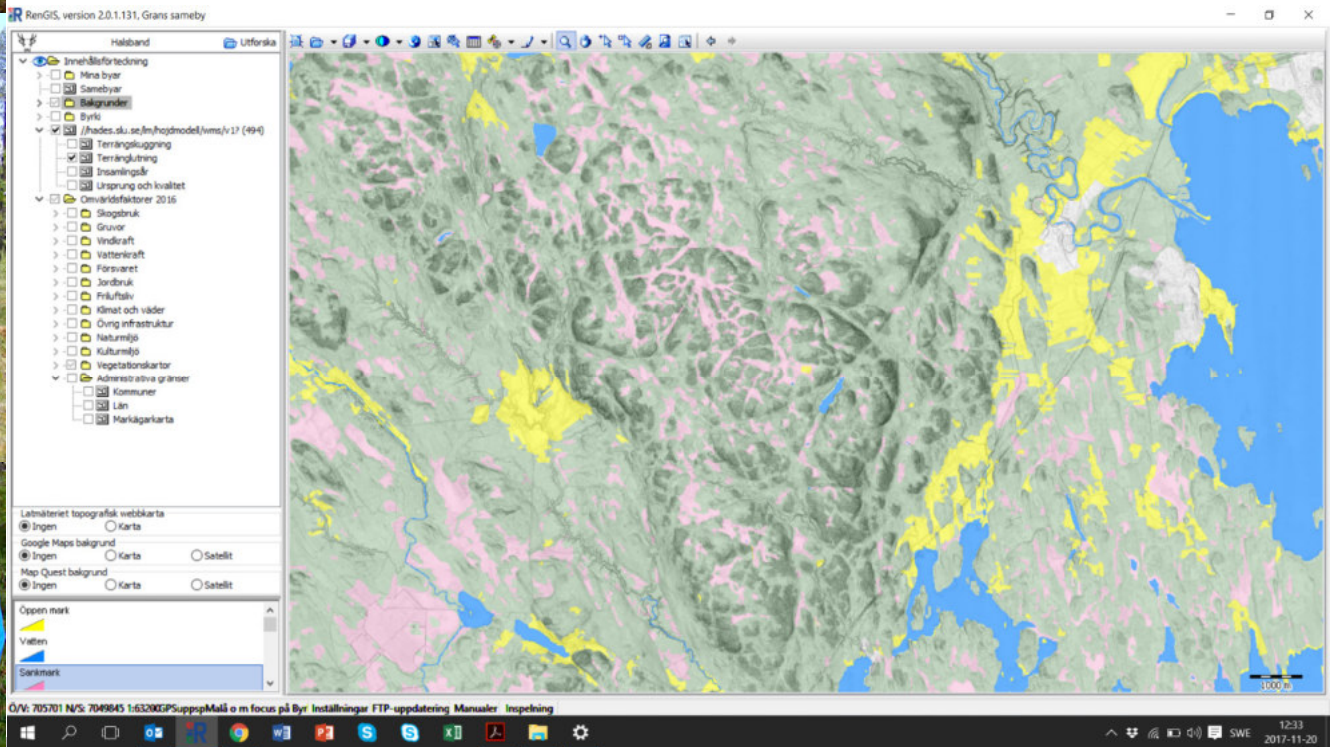
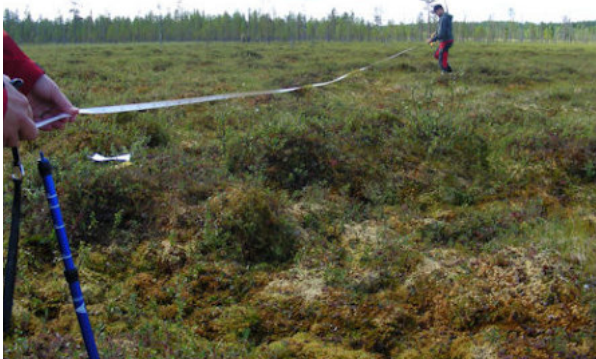
Lichen coverage (%)

Field data

Deviance explained 69%



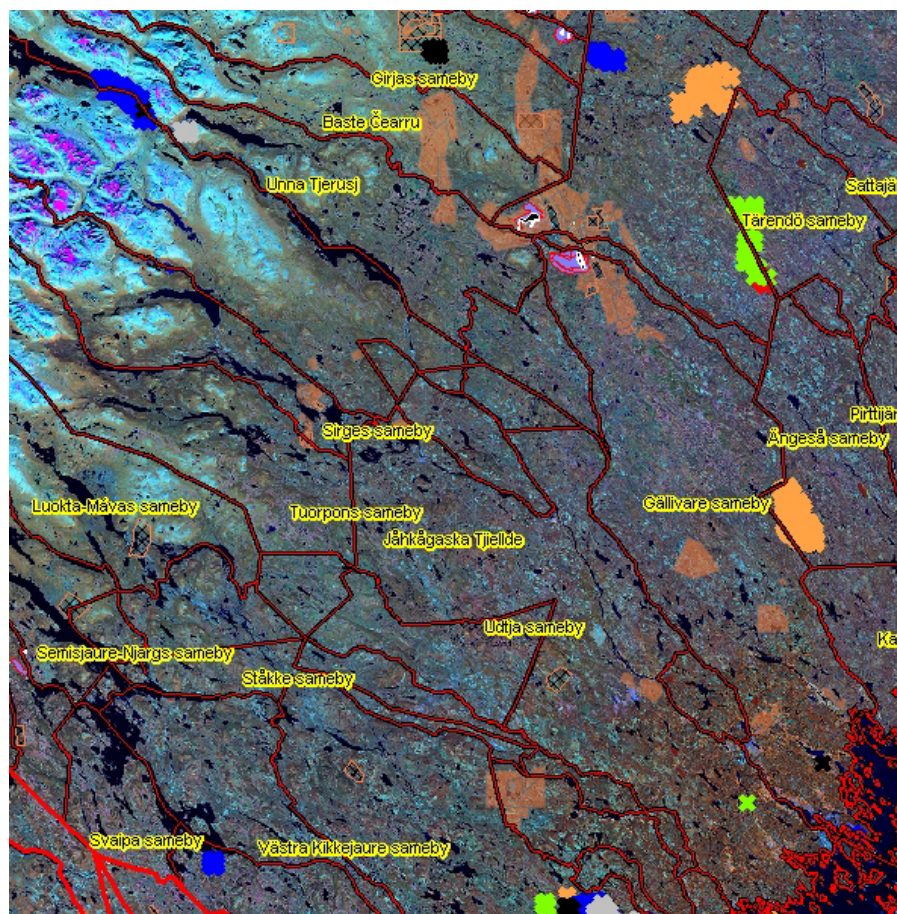
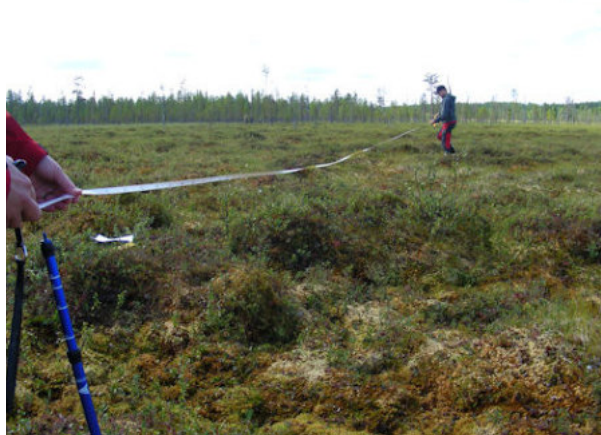
Managing landscapes



Managing landscapes

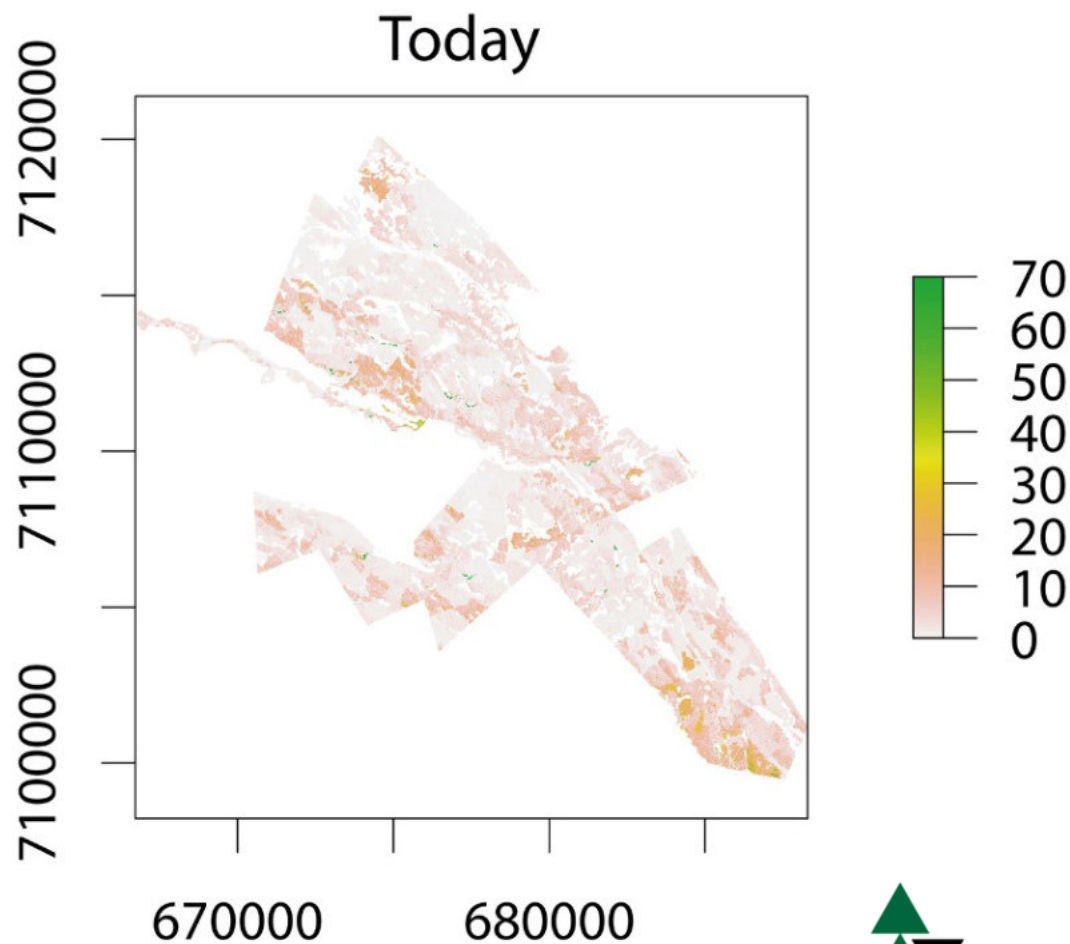
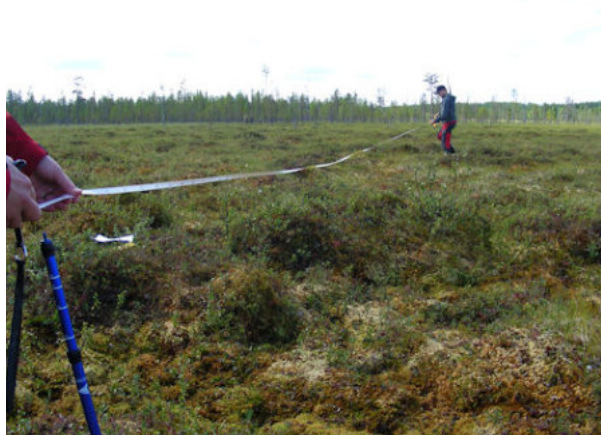
Cumulative effects

e.g. mining, wind-mills



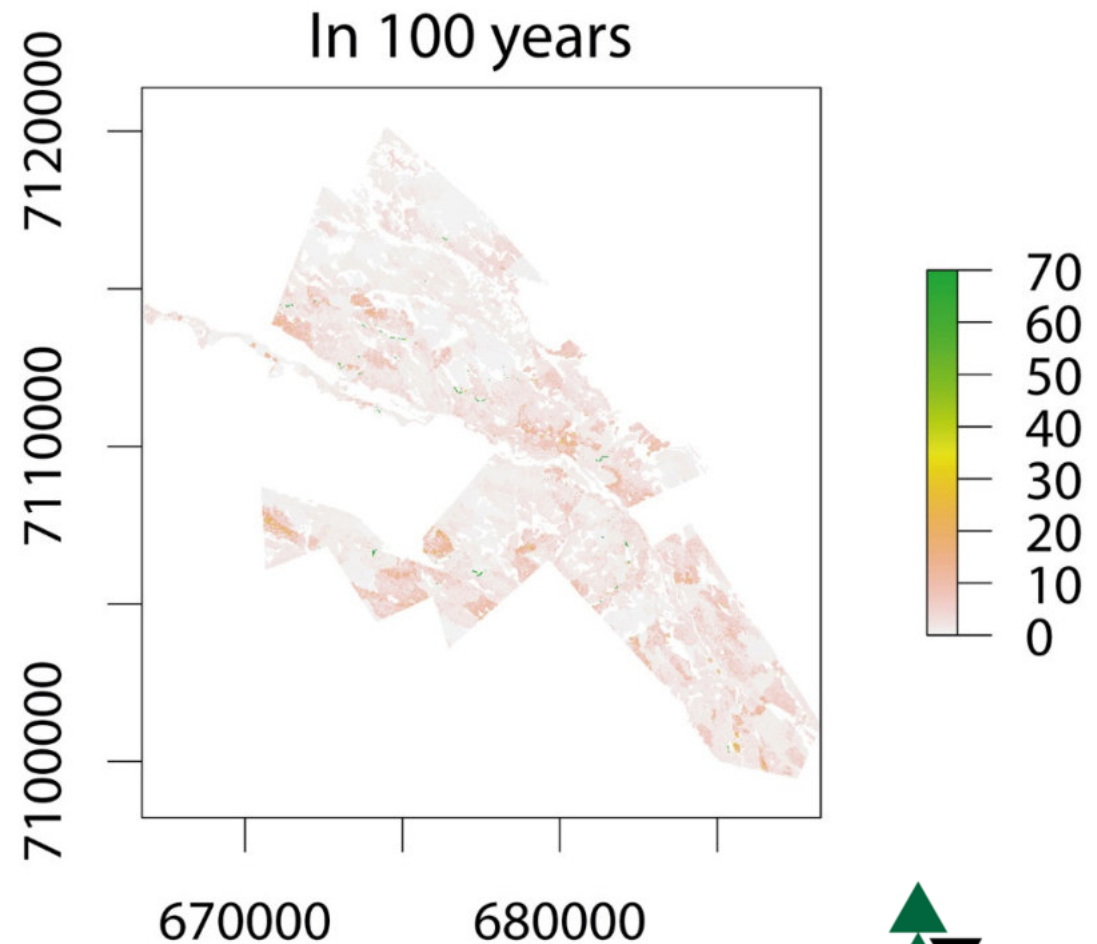
Managing landscapes

Future scenarios



Managing landscapes

Future scenarios



A photograph of a dense forest with tall, thin trees and a mossy ground. The text is overlaid on the image.

Thanks to:

Udtja (Rune Stokke) and Gällivare (Stig Persson) Sami villages for providing field data

Leif Jougda

the “father” of Reindeer Husbandry Plans

- **The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning**
- **The Environmental Protection Agency**
- **Swedish National Space Agency**