Linking National Forest Inventory measurements with land cover and habitat datasets to quantify carbon sequestration in Finnish Forest Lapland

Laura Mononen[a*], Timo Kumpula[a], Teppo Repo[a], Petteri Vihervaara[b], Kari T. Korhonen, K. T.[c] & Antti Ihalainen[c]

[a] Department of Geography and Historical Studies, University of Eastern Finland, 80101 Joensuu, Finland
[b] Finnish Environment Institute, P.O.Box 111, 80101 Joensuu, Finland
[c] The Finnish Forest Research Institute, 80101 Joensuu, Finland
*Laura.Mononen@uef.fi

UNIVERSITY OF EASTERN FINLAND

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INSTITUTE FOR NATURAL RESOURCES, ENVIRONMENT AND SOCIETY

KARJALAN KULTTUURIRAHASTO POHJOIS-

What & why?

- Goal of this research is to identify important forest types for carbon sequestration and evaluate how changes in land use would affect to carbon sequestration and possibly other *ecosystem services [ES]*

- This is important as in land use planning not all ecosystem benefits aren't acknowledged
  - Important to take ecosystem services to environmetal impact assessments to prevent losing essential ESs

- Why carbon?
  - Carbon sequestration is probably seen as the most important ES that forest ecosystem can provide.

Research area

- Research area in Finnish Forest Lapland vegetation zone

- Finnish Forest Lapland has gone through many land use disputes
    - Forestry, conservation, tourism, reindeer herding, residents, hikers, gold diggers, mining

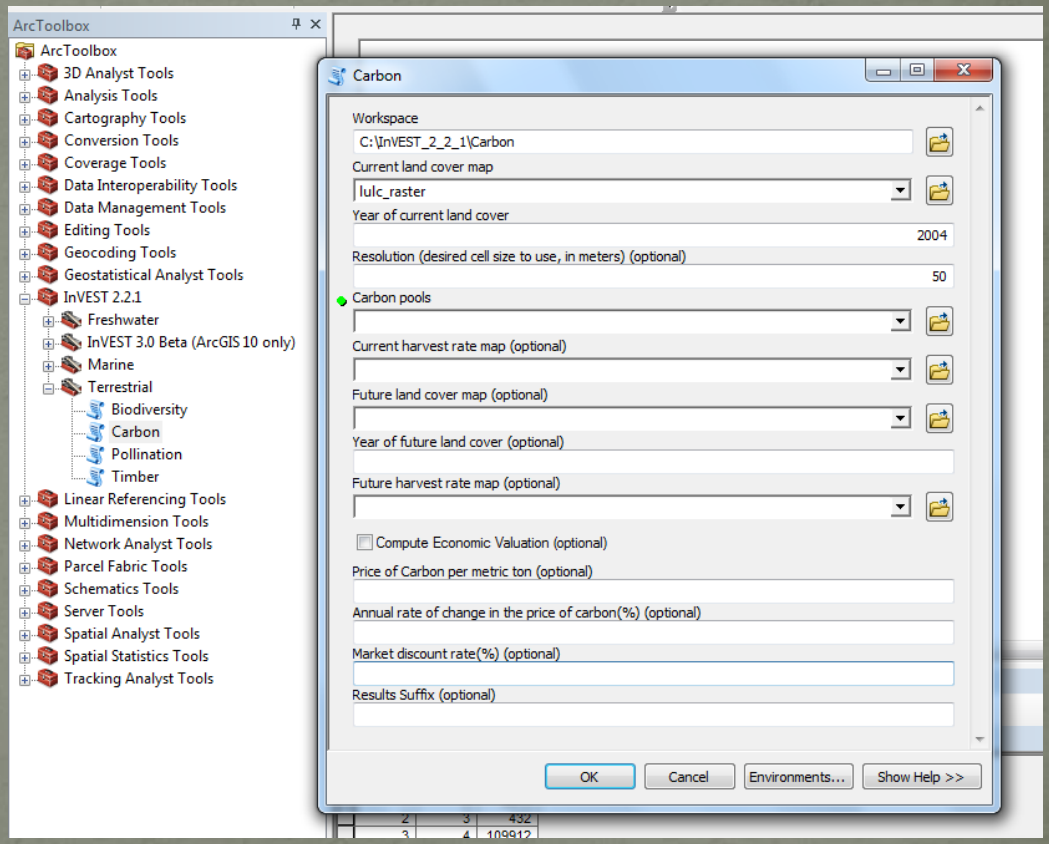
- Many times economical interests overtake the others

Data

- NFI data of biomass values calculated in sample plots in Finnish forest Lapland
  - Habitat
    - Heathland
      - Woodland
        - Mesic/Sub-xeric/Xeric heath forests
      - Schrub land
    - Peatland
      - Woodland
        - pine swamp/spruce swamp
      - Schrub land
  - Five development class (clear cut-old growth forests)
  - Dominating tree species pine/spruce/hardwood/mixed (>75 %)
- SutiGIS, biotope data from Finnish Forest Administration (Metsähallitus)
  - Done in state owned forests by using aerial photograps of 1 m resolution
  - Vector format
- Data is now combined and the most carbon rich areas can be identified on a map

Methods

- InVEST modeling tool (version 2.2.1)
  - To see how different scenarios in land use would affect different types of forests
  - Eg. possibilities to apply future land use maps, harvest rate maps, carbon pools
  - InVEST not only to model carbon



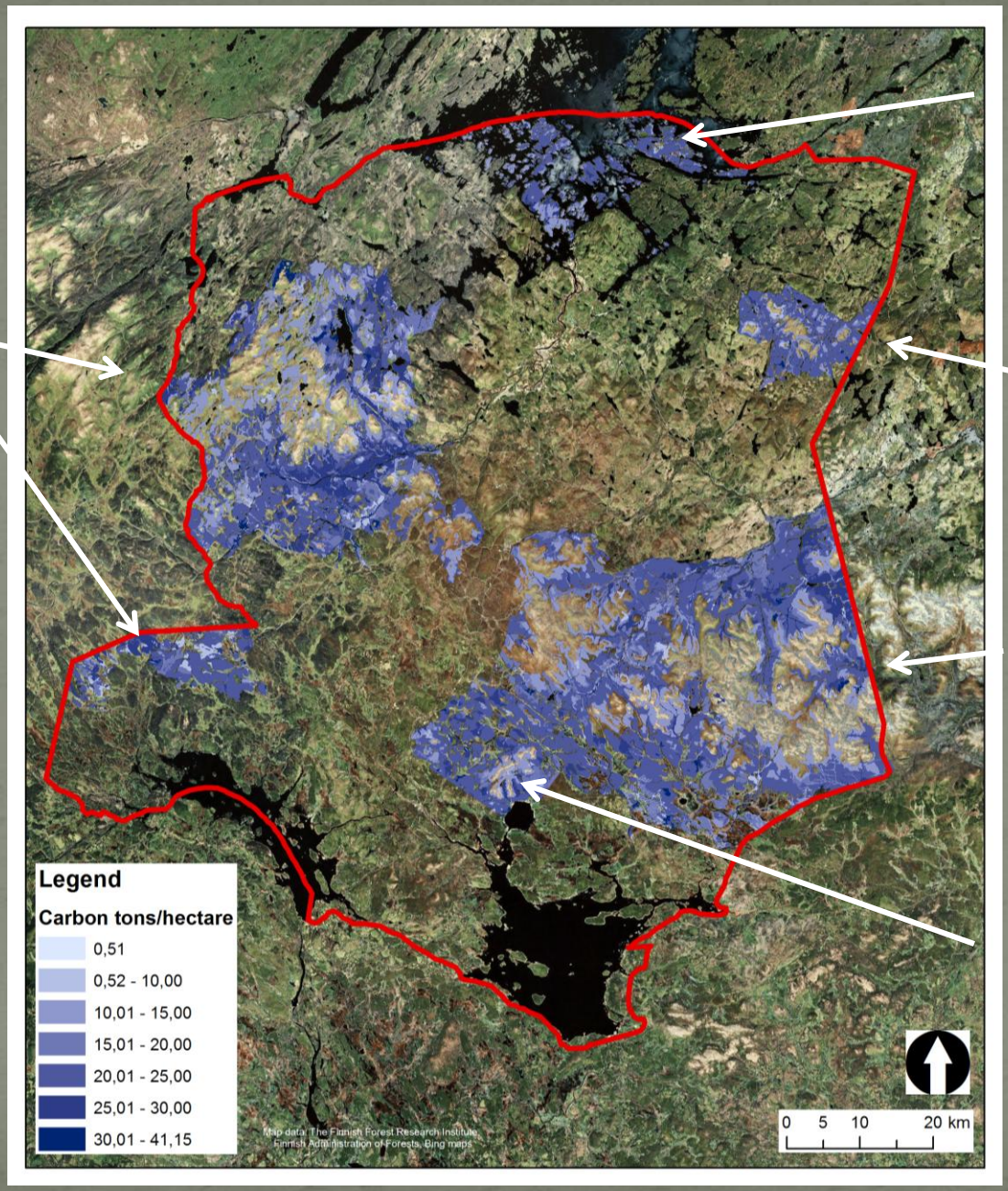
http://www.naturalcapitalproject.org/

Preliminary results

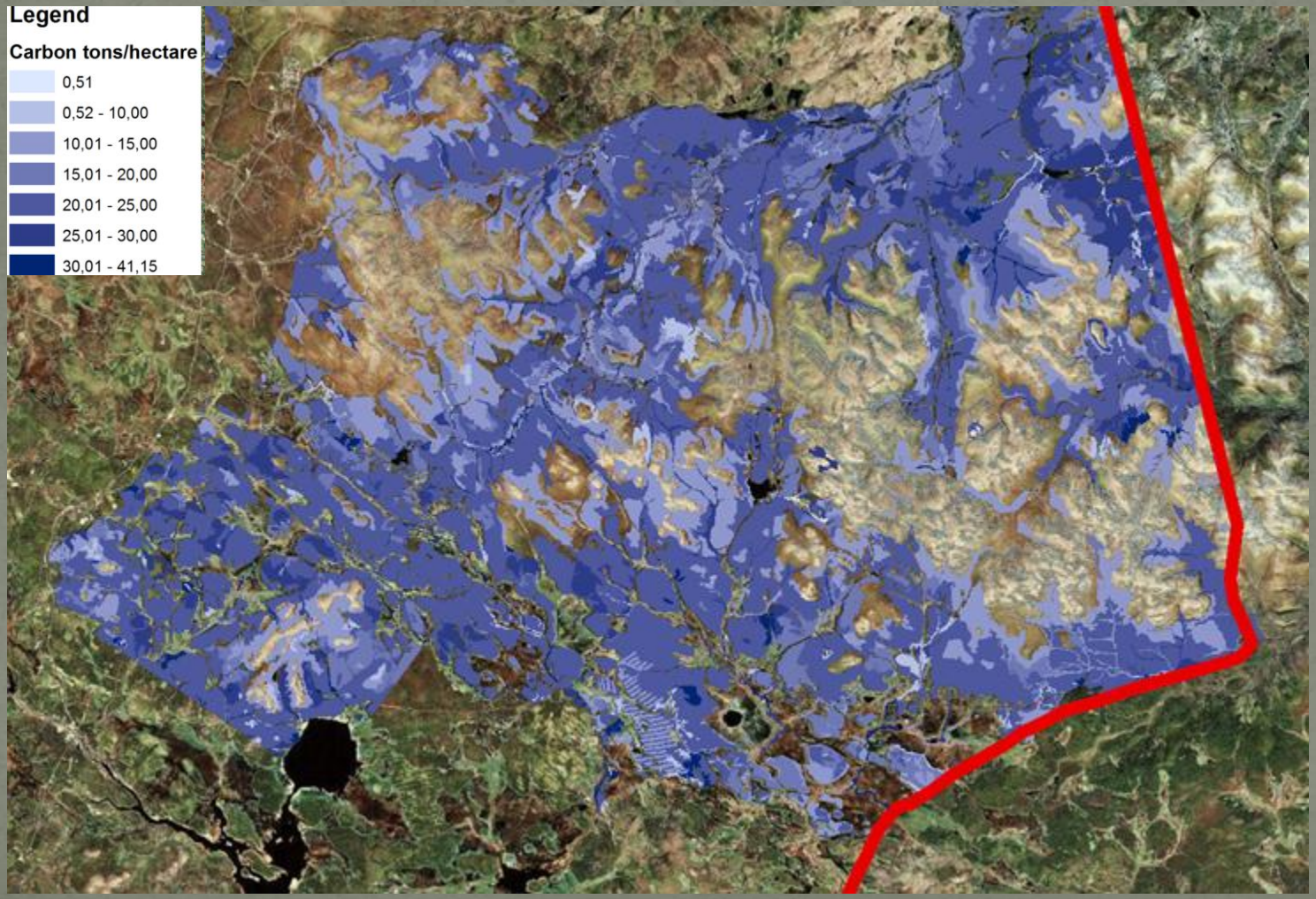
- So far:

Most significant forest types in the study area	Carbon (Mt)	Area (km2)	Carbon (t/ha)
Pine forest, 40-60 yrs (Sub-xeric heath forest)	1,55	634,08	24,38
Pine forest, +60 yrs	0,55	183,48	29,72
Mixed forest, 40-60 yrs (Sub-xeric heath forest)	0,50	211,98	23,37
Hardwood forest, 20-40 yrs (Sub-xeric heath forest)	0,34	317,73	10,67
Pine forest, 40-60 yrs (Xeric heath forest)	0,29	152,21	18,8
(40 classes in total)	**Total 4,55**	**Total 2220,05**	**Average 18,62**

Most carbon rich forest types	Carbon (t)	Area (km2)	Carbon (t/ha)
Mixed forest, +60 yrs (peatland forest)	18054,15	4,39	41,15
Hardwood forest, +60 yrs	119055,51	37,80	31,5
Spruce forest (+60 yrs) (peatland forest)	3637,46	1,21	29,97
Pine forest, +60 yrs	545314,45	183,48	29,72
Pine forest, 40-60 yrs (Mesic heath forest)	25257,46	8,72	28,96


Archipelargo of Inarijärvi
Hammastunturi wilderness area
Tsarmitunturi wilderness
UKK national park
Sompio Strict Nature Reserve
Legend
Carbon tons/hectare
0,51
0,52 - 10,00
10,01 - 15,00
15,01 - 20,00
20,01 - 25,00
25,01 - 30,00
30,01 - 41,15
Map data: The Finnish Forest Research Institute, Finnish Administration of Forests, Bing maps
0 5 10 20 km

Urho Kekkosen kansallispuisto



What next?

- Intentions to add soil carbon values to get the total sequestrated carbon
- Improvement the accuracy of combined data
- Apply InVEST to see what happens to carbon sequestration in different land use scenarios
- Manuscript

Thank you for your attention!

Contacts: laura.mononen@uef.fi