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METSÄHALLITUS

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Spatial conservation prioritization of Finnish forests for more sustainable land use planning

METSO Forest Biodiversity

We identified areas important to forest biodiversity throughout Finland to support sustainable land using planning and nature conservation at local, regional and national level by informing land owners, ministries and forestry stakeholders[(a)].

Produced maps provide the first nationwide spatial conservation prioritization for Finnish forests. Analyses were conducted using biodiversity-related forest and land use data recorded at the scale of forest stand.

Results show that a significant portion of high biodiversity value forests lay outside the current Finnish protected area (PA) network. As most of the Finnish forest area is under commercial management, PA network cannot halt the on-going decline of forest biodiversity.

Input data

Best available **forest stand level datasets**[(b)] **(tree species, diameter, volume, fertility**) covering the whole country (24 % state-owned forestry and conservation areas and private conservation areas, 37 % privately owned forestry areas, 39 % multi-source national forest inventory data of Finland)

Spatial data on **forestry operations with negative impact** on biodiversity (e. g. fellings, thinning and ditching)

Observations of **IUCN Red List** (RL) **forest species**

Spatial data on permanent **conservation areas** and areas protected by The Finnish Forest Act

Methods

Decaying wood potential indexes (DVPi) were modelled with **MOTTI-program**[(c, d, e)].

- 168 tree species, fertility class and latitude combinations

DVPis were used for converting diameter and volume into **decaying wood potential**

- Generated for the whole Finland at tree stand level at the resolution of 16 m x 16 m
- Eventually combined into 20 tree species & fertility classes and aggregated to 96 m x 96 m resolution.

Spatial conservation prioritizations[(f)] were made with Zonation software[(g)] in six consequent steps with increasing complexity so that each new version included everything that had been added before. Analyses were done in nation wide and in administrative scale.

Version 1 (V1) included the local **decaying wood potentials**

Version 2 = V1 + penalties for forestry operations with negative impact on biodiversity
Version 3 = V2 + connectivity based on ecological similarity, distance and quality between forest patches (attenuation avg. 400m)
Version 4 = V3 + observations of **RL species**
Version 5 = V4 + connectivity to areas protecetd by **Forest Act** (attenuation avg. 200m)
Version 6 = V5 + connectivity to permanent **conservation areas** (attenuation avg. 2km)

Results

All prioritization versions show high conservation value forests but from different viewpoints:

Version 1: Areas with lot of large trees, many tree species and rare forest environments get high local value.

Version 2: More realistic local values when taking into account real life changes in forests.

Version 3: Unfragmented high value forests areas emerge.

Version 4: RL species habitats emerge.

Versions 5 and 6: Valuable forest areas and landscapes close to protected high biodiversity areas emerge.

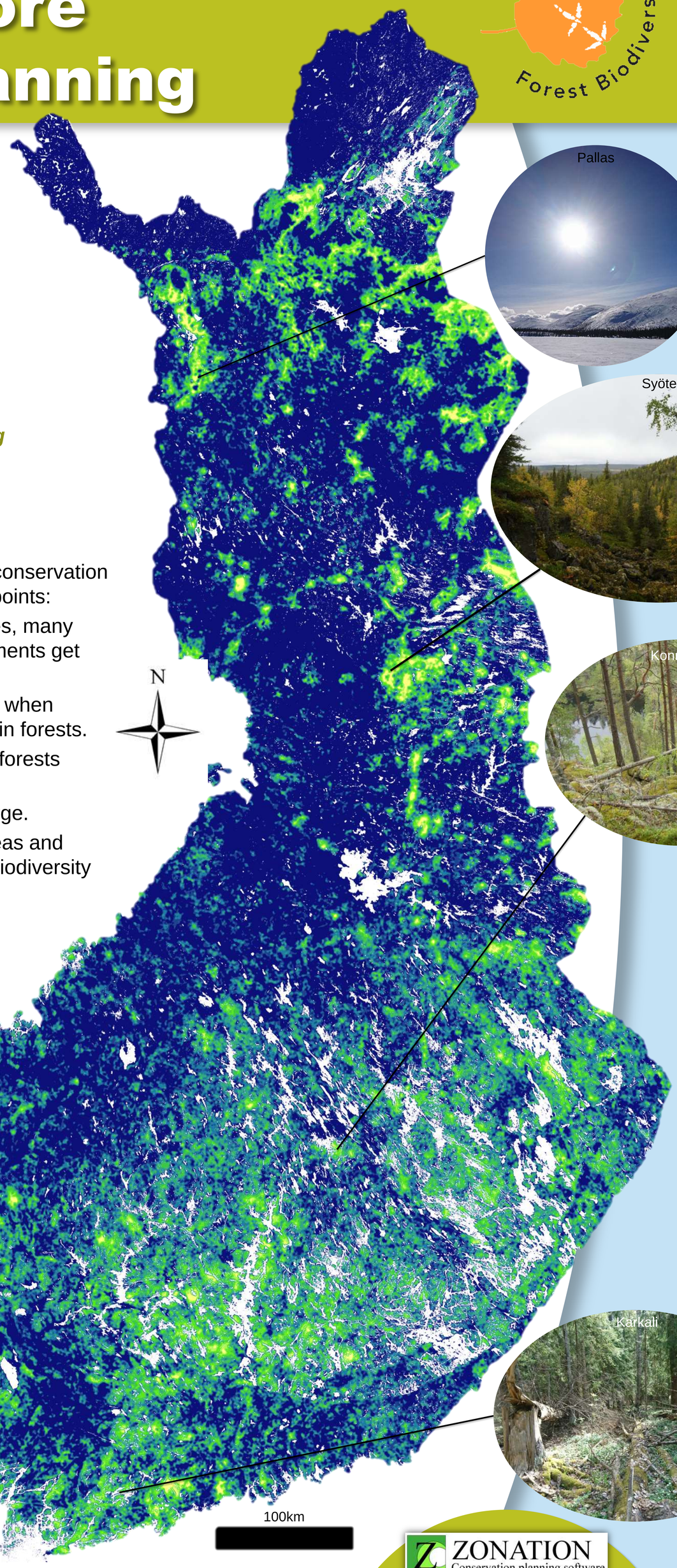

Fig. 1. Areas important to forest biodiversity, map version 6. This analysis included decaying wood potential, penalty for forestry operations with negative impact on biodiversity, Red List forest species observations and all 3 connectivity measures. For poster map results were summed for every 96m x 96m cell in 1km radius so that e. g. cell surrounded by high prioritization cells got high value. This map could be used for example for landscape level land use planning.

Prioritizations are available (metadata currently only in Finnish):
http://www.syke.fi/en-US/Open_information/Spatial_datasets

- High Biodiversity Value Forests 2018 (Zonation) nationwide

ZONATION Conservation planning software

produces a prioritization of the landscape based on spatial distributions of species, habitats, costs and threats. It produces a complementarity-based priority ranking that maintains balance between all features through the ranking.

References

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