
metsäkeskus

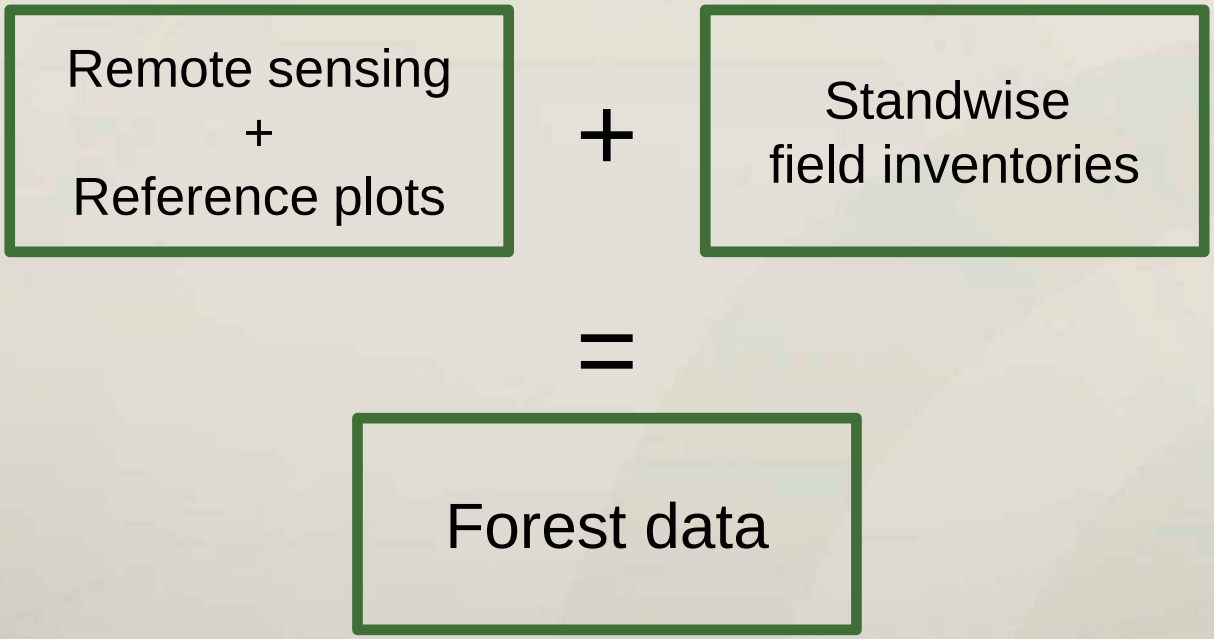
Cross-country route optimization for forest inventory in Finland

Henna Etula
The Finnish Forest Centre

2014 Esri International User Conference
July 14 – 18, San Diego, California

Forest inventory in Finland

- The Finnish Forestry Centre collects forest data on privately owned forest resources



Problem to be solved

- How to choose the best route from the car through all forest stands to be inventoried and return to the car?

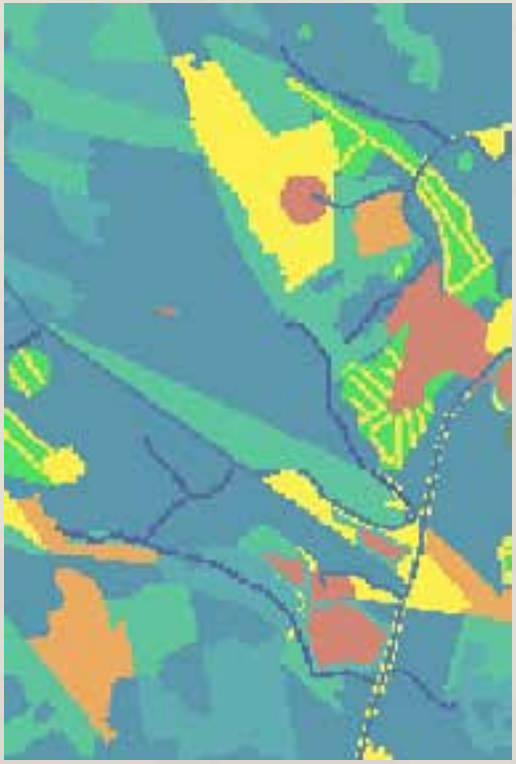
How the problem was solved?

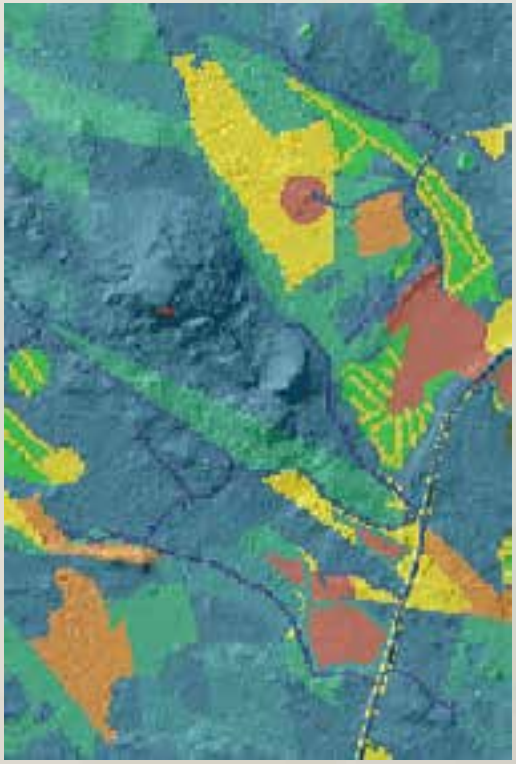
- Checking which relevant GIS data is available
- Defining terrain classes for the cost surface
- Finding cost values for the cost surface
- Deciding if the slope data is needed
- Deciding how the areal objects need to be inventoried
- Implementing the GIS tools
- Testing the route optimization application in a field work
- Evaluating the test results

Data

- Forestry stand database (The Finnish Forestry Centre)
- Topographic database (The National Land Survey of Finland)
- Digital elevation data (The Finnish Forestry Centre)

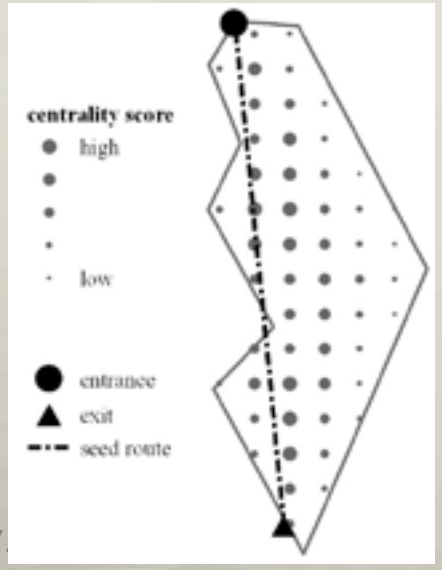
The cost surface and DEM

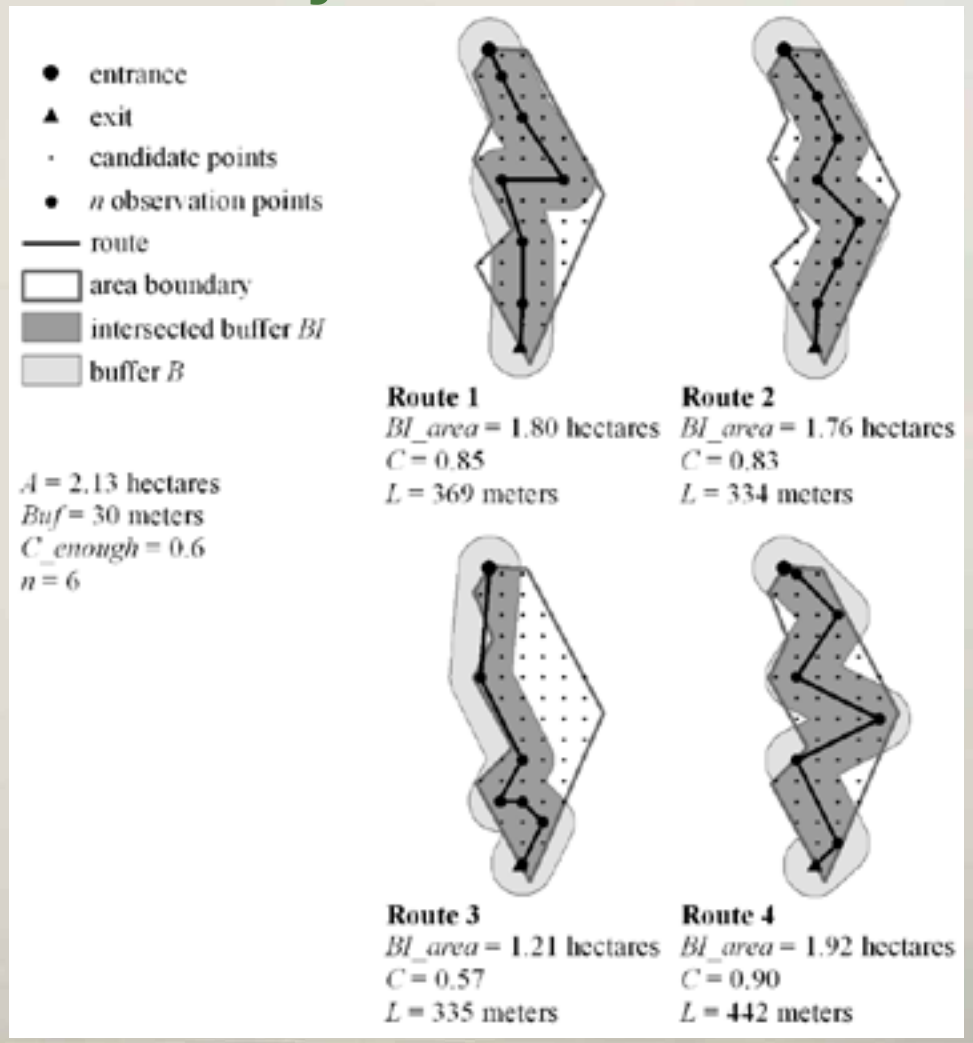




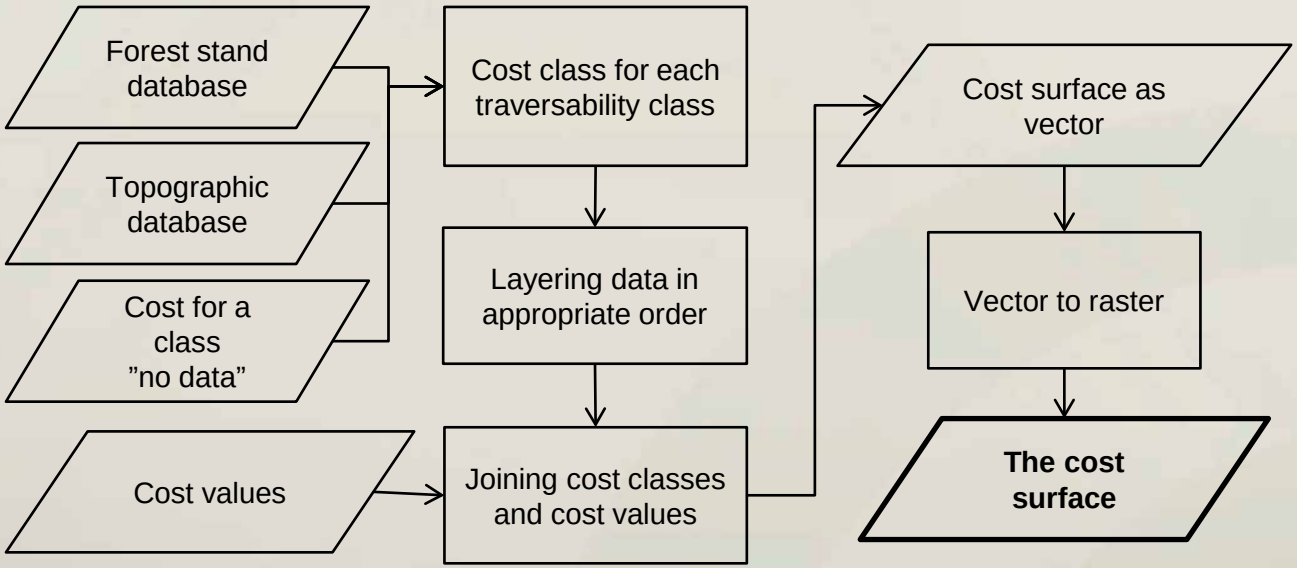
An optimum inventory route for an areal object

- Create a route
  - › that is as short as possible,
  - › the object will be inventoried adequally well and
  - › the solution is heuristic.

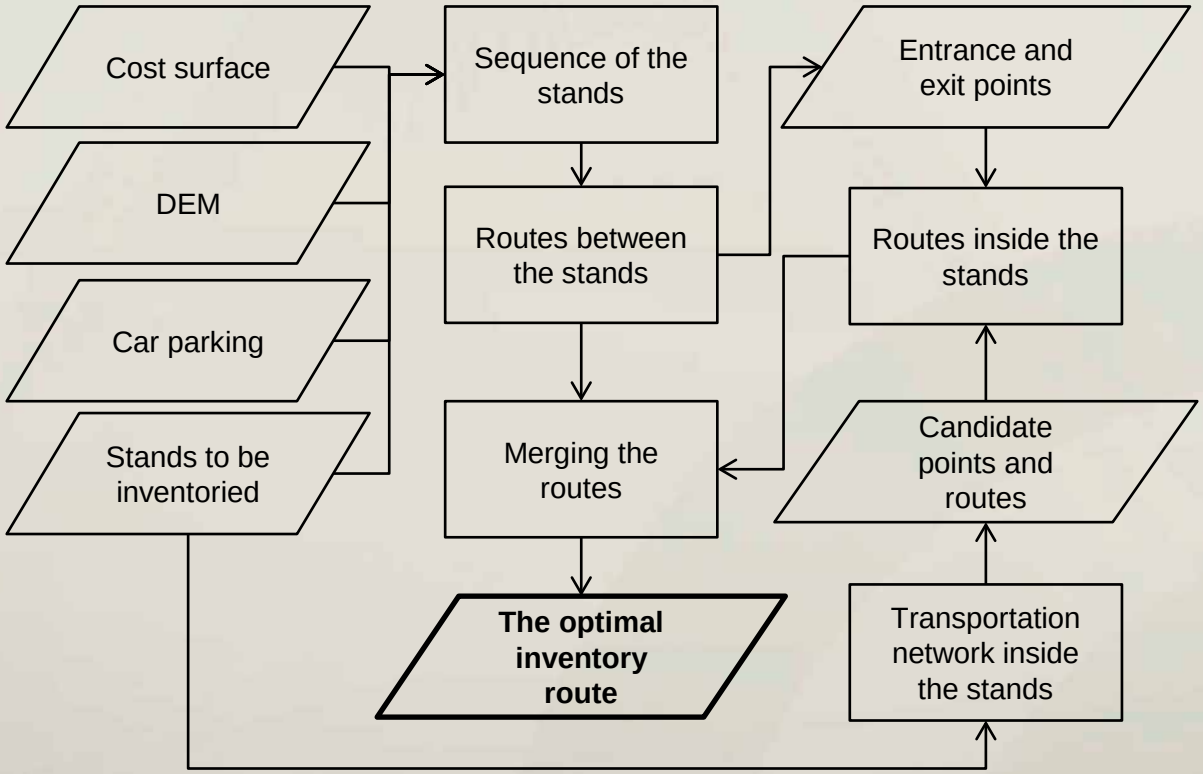




The cost surface tool



The route optimization tool



An example route

Test results

- The cost values describe Finnish terrain realistically.
- Route optimization method is suitable when
  - the proportion of stands to be inventoried is low
  - stands are far away from each other
  - the employee has a little experience of field work
  - the inventory area is not familiar to the employee.
- The route optimization tool needs developement
  - the sequence of the stands is not always locigal
  - the route processing takes too much time.

Future vision: terrain navigator

Thank you for your attention!

Questions?