Spatial Decision Support System

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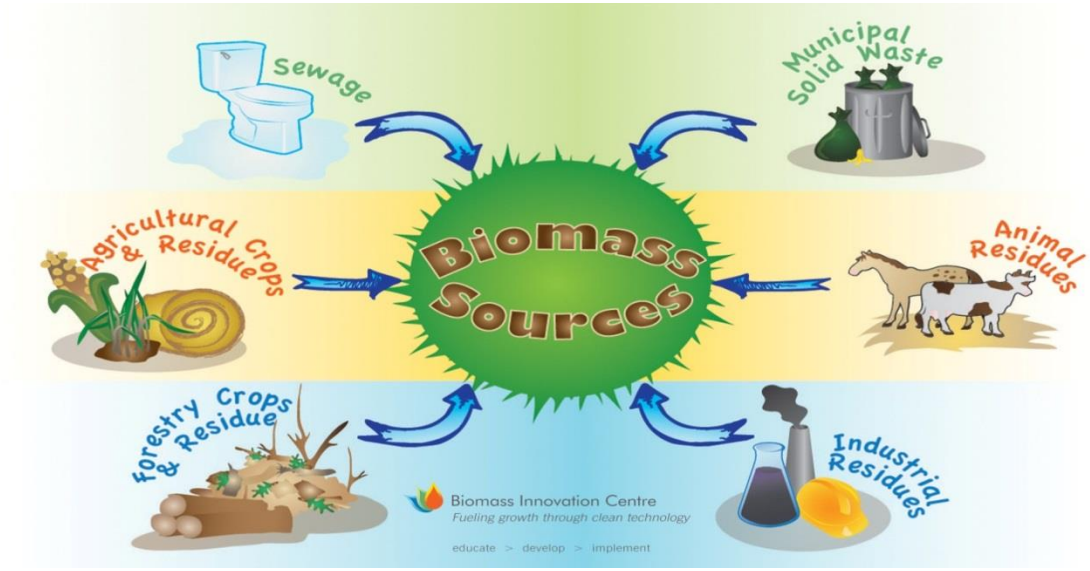
Introduction

- **Renewable energy sources**
- **Importance of renewable energy sources according to their use**

Biomass production

- Positively stimulates the development of employment in regions with suitable conditions.
- Improves supply regions of heat and electricity.
- In addition to important economic aspects of its use is closely related to climate change mitigation, which nowadays reaches critical dimensions.



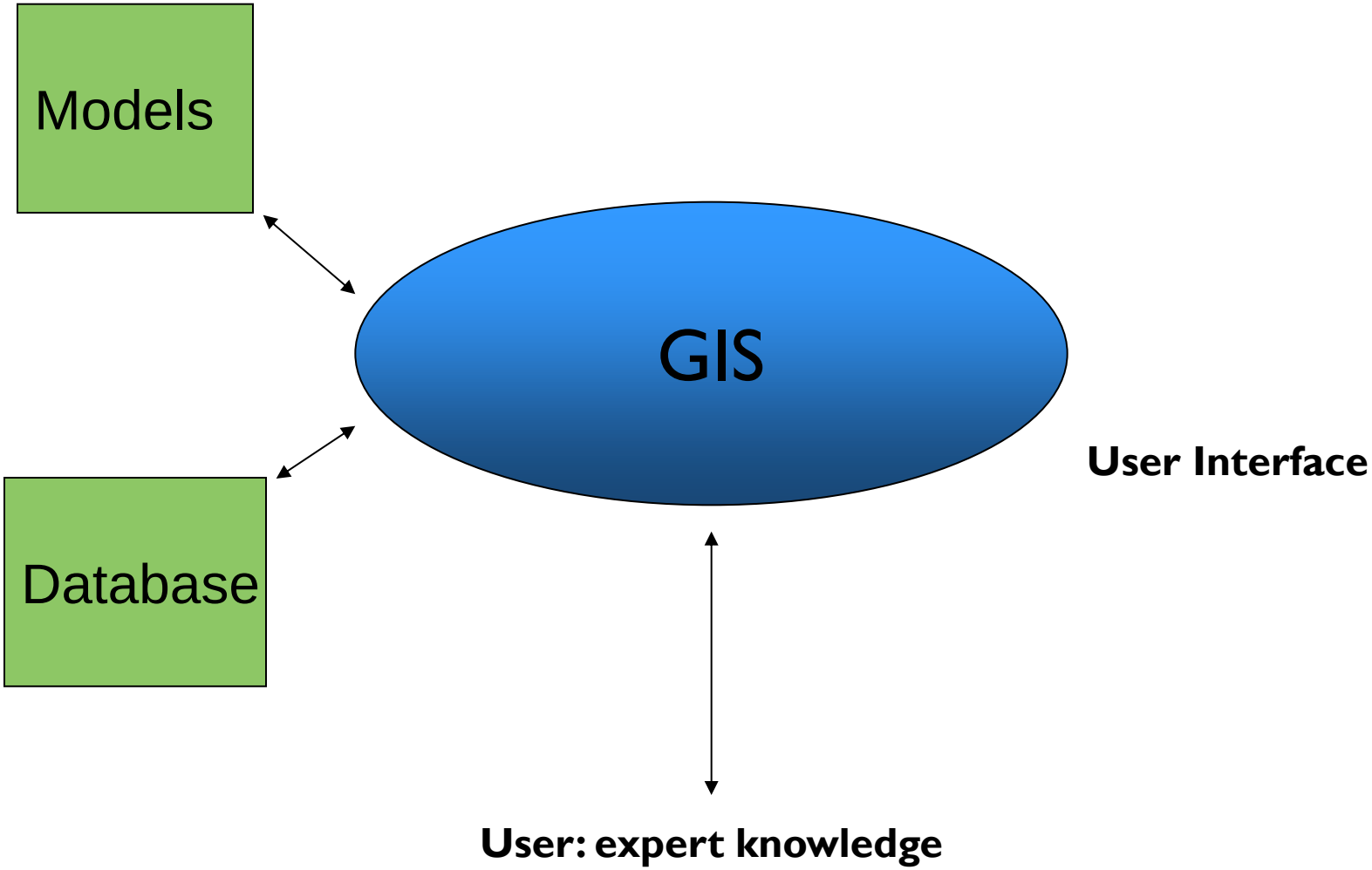
What is the SDSS

- SDSS is an interactive, computer-based system designed to ***support*** a user or group of users in achieving a higher ***effectiveness*** of decision making while solving a ***semi-structured spatial decision problem***;
- SDSS concept is defined by three terms (semi-structured spatial problems, effectiveness, and decision support).

Spatial decision support system

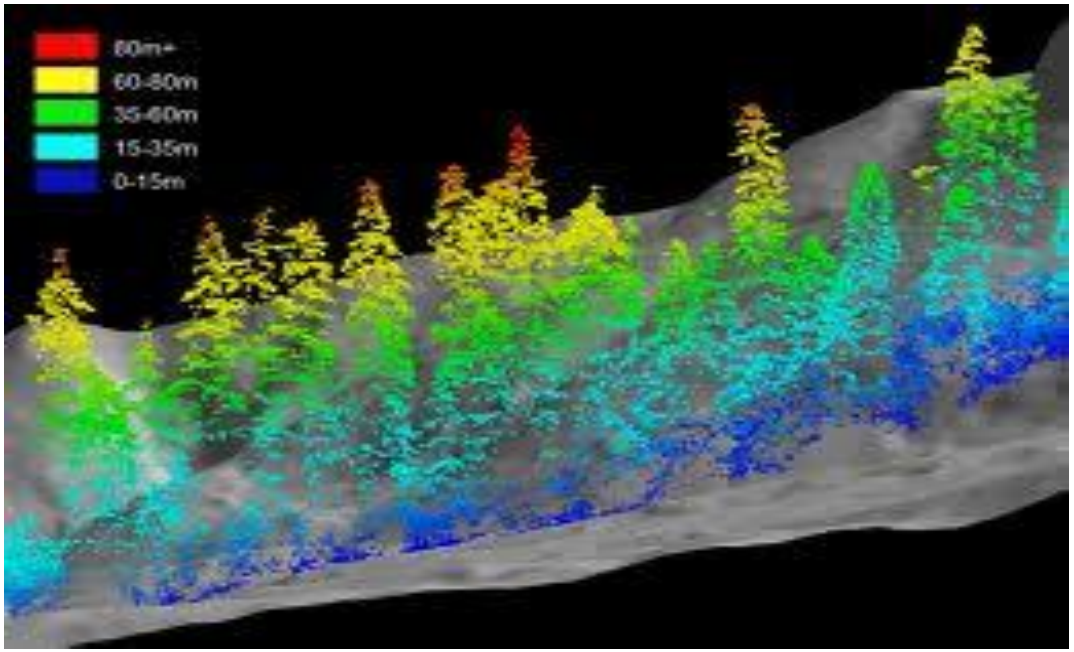
- has been developed for the accurate evaluation of the resources
- allows to evaluate the spatial distribution of biomass,
- allows to determine its potential on several levels (theoretical level, available technology and economically exploitable biomass),
- is able to find the optimal location of the place of consumption of biomass in view of its availability in the region,
- is known as integrated system incorporating GIS, expert systems, and computer based methods,
- advantage of the system - the methods of geographical analysis can also be used to find the optimal location of biomass.

Basic SDSS structure



Precision forestry

- **Definition of precision forestry is based on precision agriculture.**
- Can be understood as a system for the identification, analysis and management of soil - with a view to optimal productivity, sustainability and protection of the environment.

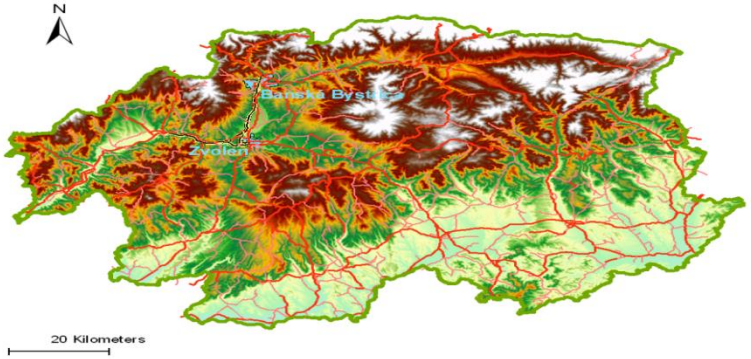


Character of precision forestry

- the need of precise information to understand better the complex tree species, genetic origin, soil type, geology, topography, terrain elevation, rainfall, microclimate,
- uses hi-tech imaging and analytical tools to obtaining useful information for the forestry sector,
- the important thing is to define innovative technologies considered as the basis for precision forestry – such as **GPS, GIS, remote sensing, wireless communication systems,**
- modern technologies allow to obtain precise information much better and easier than before.

SDSS in Slovakia

- In the Slovak conditions is SDSS poorly developed, but very **needed and justified.**
- Cooperation between Heating Plant Enterprise in Zvolen, Technical Univerzity in Zvolen, National Forest Centre in Zvolen, **METLA (Finnish Institute for Forest Research)** was the one of the first cases using **SDSS.**
- Analyzis of biomass sources used by GIS technology - Proposal for Community of Practise (**Forest Decision Support System**).
- Region **Banska Bystrica**, Total area : **9 450 km^2 ,** Forest area : **4 429 km^2,** what means **47 %** of total area.



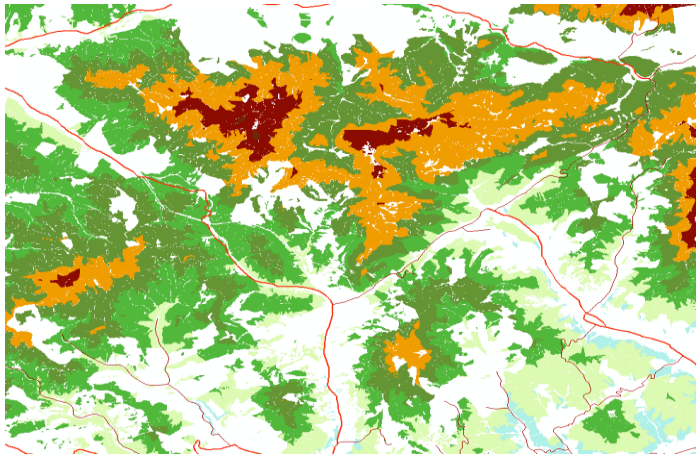
Main project objectives

- Proposal of methodology
- Creating a database of the necessary data
- Assessment of biomass resources
- Traffic analysis
- Selection of technologies

The existing methodology

Based on the analysis of following components has been achieved project objectives

- Forest stand maps
- Digital elevation models
- Road network
- Analysis of transport distances
- The shortest distance to the heating plant enterprise
- Analysis of heights and inclinations
- Geographical Analysis
- Location of constraints



Results

- From all analyzes have been obtained necessary informations which allows to create **geographical databaze and models:**
- **Admission databases and maps, basic data of forests in the region, zones of transport distance, the volume and quality of timber, location limiting factors.**
- **Outputs of economical analyzes** are **location of biomass resources**, **costs of its transport, choosing the place of manufacture.**
- This results can bring practical purpose from point of **wider and optimal using of biomass in region**.
- Can increase **employment** in region with suitable conditions.
- Wider using of renewable energy source as a biofuels is **closely related to climate change mitigation**, which nowadays reaches critical values.
- Can **identify** the correct condition of forest land with respect to growing tree species used for biomass production.

Thank you for your attention