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Analysis of Distribution of Invasive Plant Species Japanese Knotweed (*Fallopia japonica*)

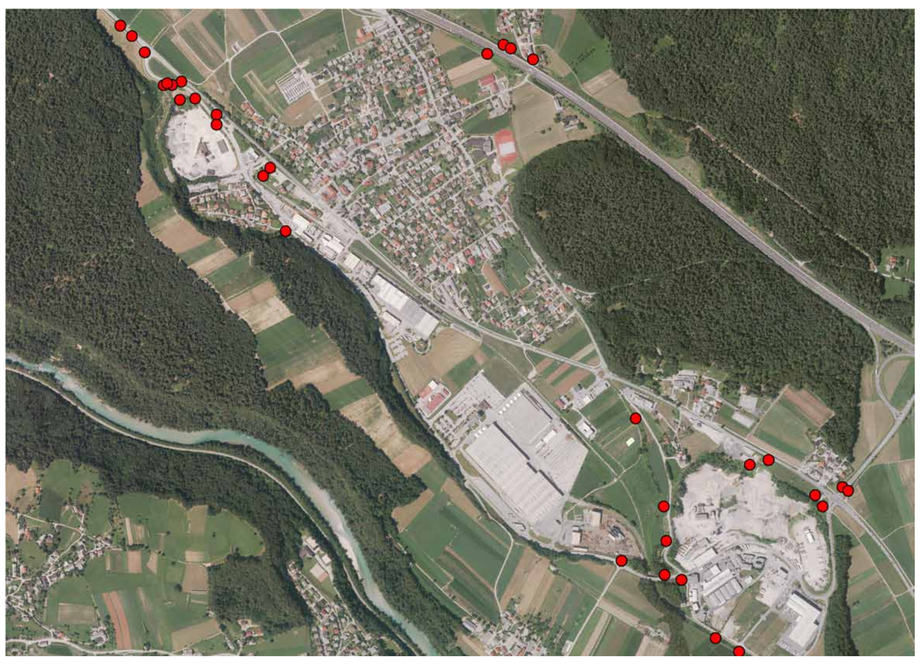
Japanese knotweed is, listed by the World Conservation Union one of the world's 100 worst invasive species. In the town Naklo, Japanese knotweed has spread severly in the last 5 years, especially near rivers, roads and building sites. In this project we analysed remote sensing techniques on which determination and mapping of its distribution is based on. Reasons that Japanese knotweed had spread so quickly are biological, geological and anthropological.

Problem overview

There is a lot of Japanese knotweed in our region that cannot be exterminated anymore. We were wondering why and how had its invasion begun and how satellite and aerial imagery can be used for its detection.

Data

- Digital ortophoto imagery (DOF) for 2006 (RGB, 0.5 m spatial resolution and CIR, 1 m resolution), 2011 (RGB only, 0.5 m resolution).
- SPOT 5 satellite imagery for 2009 and 2011, with 2m spatial resolution.
- Laboratory results of pH analysis and chromatography of chlorophyll.



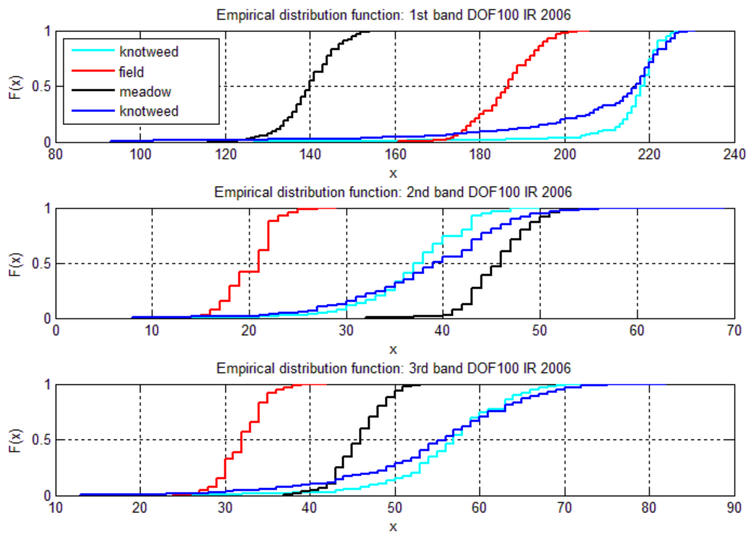
Up: Vernier lab equipement for pH measurements of the soil.

Left: Occurences of Japanese knotweed in the city of Naklo.

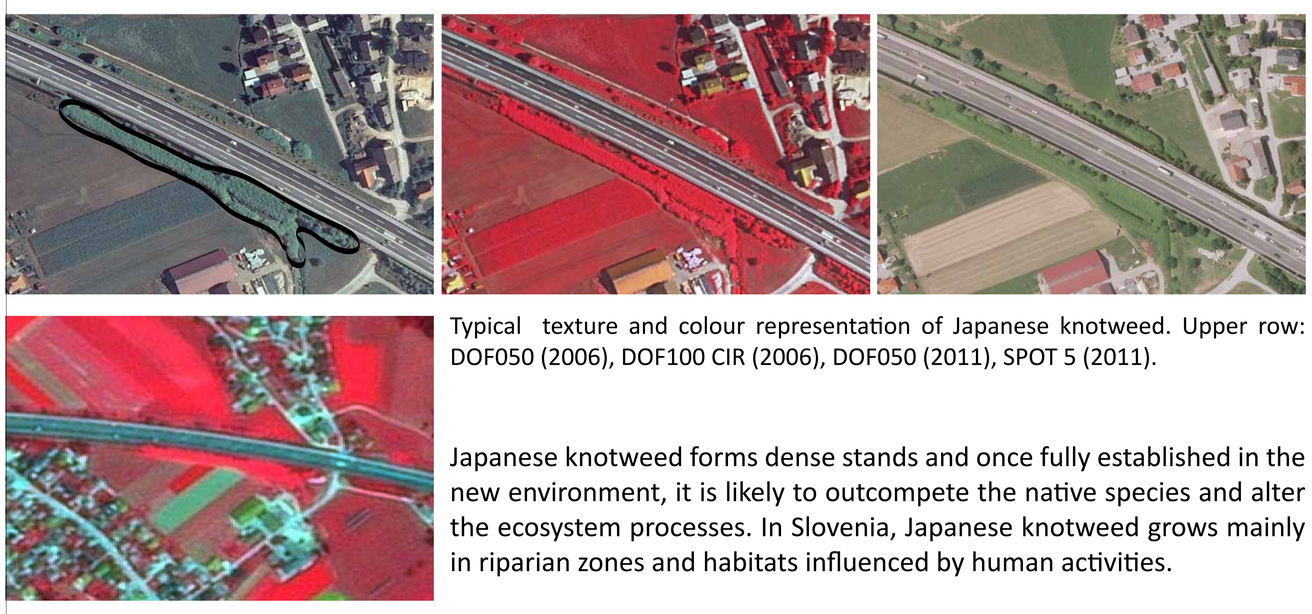
Methods

- Visual interpretation of satellite and orthophoto imagery.
- Visual change detection.
- Analysis of cumulative distribution functions of different land use.
- Field work and soil pH measurements.
- Determination of the amount of chrolophyll A and B in leaves.

Spreading of the Japanese knotweed. **Left:** Knotweed in 2006. **Right:** Knotweed in 2011. It is mainly spread by constructions and natural soil materials, while natural dispersal mechanisms such as rivers and wind also play their role.



Right: Specific spectral signature of two Japanese knotweed spots represented with empirical cumulative distribution function compared with other types of land cover.



Typical texture and colour representation of Japanese knotweed. Upper row: DOF050 (2006), DOF100 CIR (2006), DOF050 (2011), SPOT 5 (2011).

Japanese knotweed forms dense stands and once fully established in the new environment, it is likely to outcompete the native species and alter the ecosystem processes. In Slovenia, Japanese knotweed grows mainly in riparian zones and habitats influenced by human activities.

Conclusions

- **High resolution remote sensing data can provide frequent and spatially detailed information about invasive species distribution and extent.**
- Bioinvasion is recognized as a primary cause of biodiversity loss.
- Japanese knotweed grows on acidic and basic ground and contains a lot of chlorophyll A that enables his violent growth.
- Japanese knotweed produces an extensive network of **rhizomes (underground stem)**, reaching up to 20 meters in length. Rhizomes are **able to survive in a frozen soil**.