Land-Cover / Land-Use Change Program

Object Based Classification Using Spectral and Inventory Data in Native Mixed Beech, Fir and Spruce Forest on Igman Mountain

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Abstract

Forest classification in Bosnia and Herzegovina is challenging due to native mixed, multilayer, uneven aged forests. The most important tree species fir, spruce and beech creates complex of tree composition.
In this research was being carried out multi-resolution segmentation using spectral data.
Different compactness and shape parameters (homogeneity criteria) for image objects were

Introduction

- Bosnian forests are native, multi layer, uneven aged with complex structure mainly.
- Researches are always in searching for new classification methods that could best represent complex conditions in the field.
- Object-based image analysis is a relatively new technique compared to classic pixel-based image analysis (Burnett and Blaschke, 2003).
- Object – based image analysis is actually based on data from similar pixels called objects (Blaschke T., 2010).

Objectives

- Finding the best segmentation parameters for multi-resolution segmentation.
- Classification of complex forests conditions combining two types of data:
  - inventory data on groups of species (Conifers and broadleaves) and individual tree species (Fir, Spruce, Pines_species, Beech, Hornbeam and Other broadleaves) and
  - spectral data from Landsat 8 satellite image;
  - Inventory data were collected on projected systematic grid sampling 100x100 meter distance.
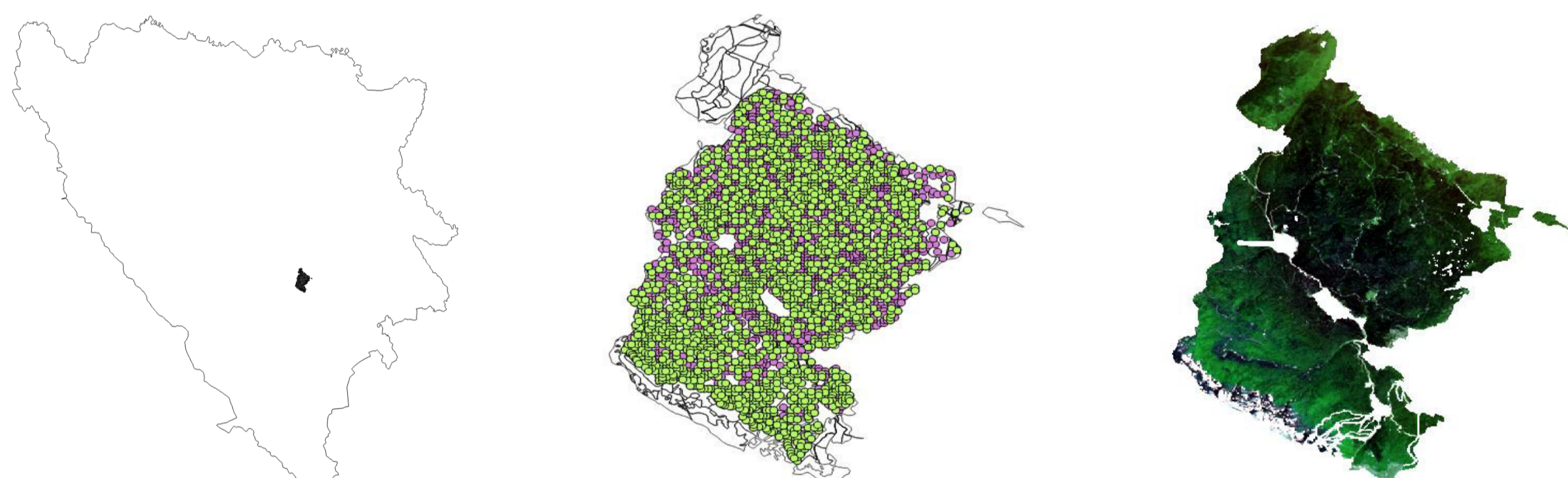
Fig. 1. Position of Igman Mountain in Bosnia and Herzegovina; Inventory data for Mountain Igman; Landsat satellite image that covers mountain

Methods

Multiresolution segmentation
(Scale parameter, Shape, Compactness)

Segmentation Criterion	Scale parameter	Shape	Compactness
Criterion 1	50	0.1	0.1
Criterion 2	10	0.5	0.5
Criterion 3	40	0.2	0.8
Criterion 4	**20**	**0.2**	**0.8**

Assing classes

Random Forest Supervised Classification
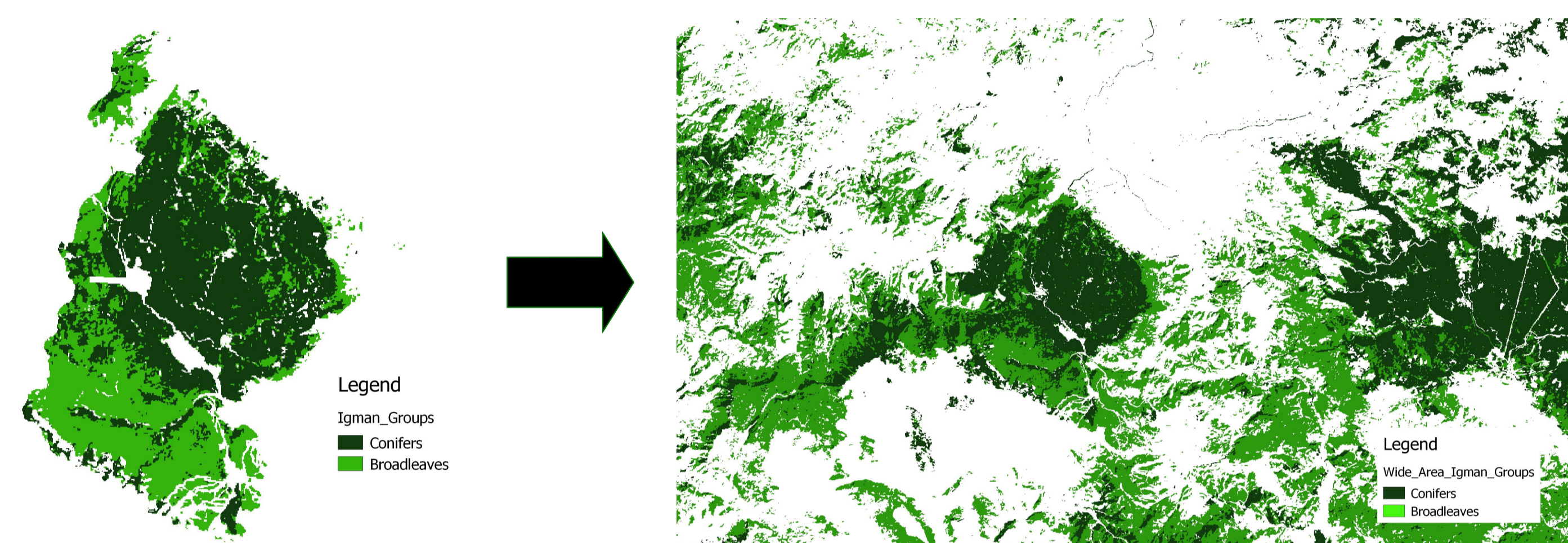
Results

Fig. 2. Classification of group of trees for Management unit "Igman" and wider area of Sarajevo
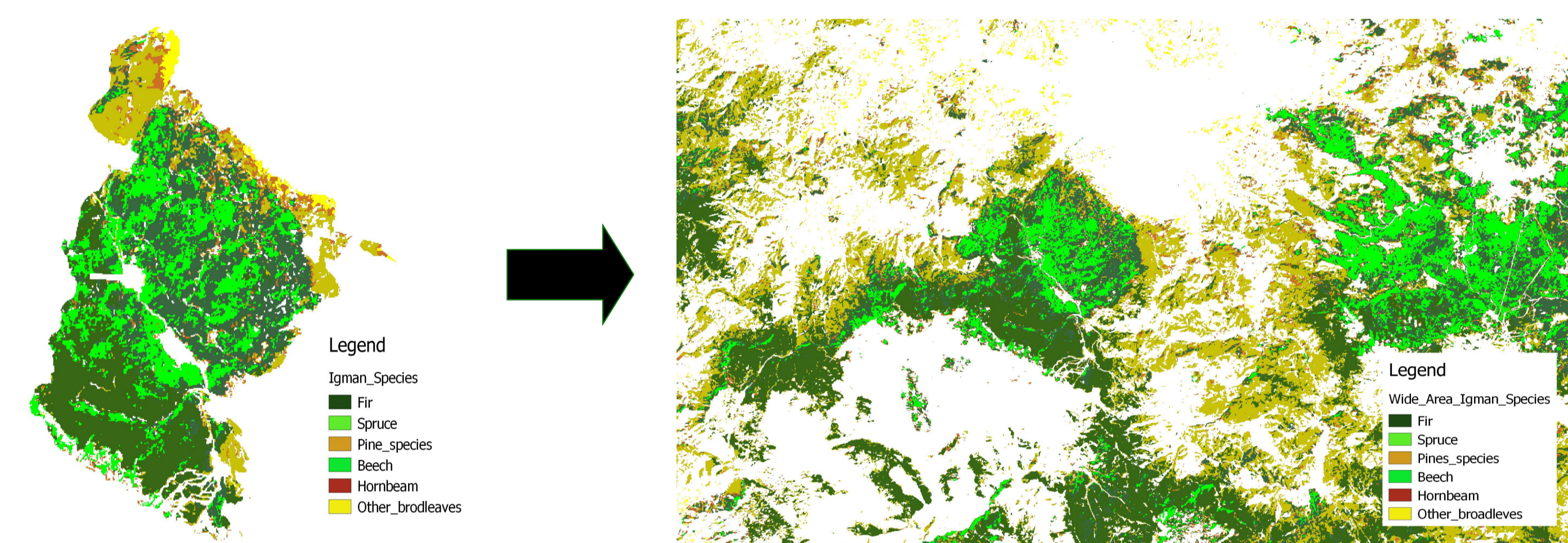
Fig. 3. Classification of tree species for Management unit "Igman" and wider area of Sarajevo

Table 1. Accuracy assasment

User/ Reference Class	Broad. Group	Conifers Group	Unclass.	Sum	Producer	User	Hellden	Short	KIA Per Class	Overall Accuracy	KIA	Overall Accuracy Per Species	KIA Per Species
Broad. Group	613	89	37	739	0.83	0.83	0.83	0.71	0.77	**0.89**	**0.75**	**0.65**	**0.51**
Conifers Group	123	1905	42	2070	0.92	0.96	0.94	0.88	0.73				

Discussion

- In Table 1 is evident that the higher classification accuracy is achieved for groups of three than for the individual tree species.
- Results are expected and consisted with the other studies (Verlič et al., 2014).

Conclusion

- Thematic maps show that the chosen segmentation parameters are suitable for classification of native, mixed, multilayer, uneven aged forests on Mountan Igman.
- Using inventory data, classification was performed not just for mountain Igman, but also for the wider area of Sarajevo (parts of mountain Bjelašnica, mountain Jahorina and the forest areas around Sarajevo city).
- This approach is suitable for classification in other similar areas.
- Approach can also be suitable for classification of mined areas in Bosnia and Herzegovina.

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