LAND-COVER CLASSIFICATION OF AN INTRA-URBAN ENVIRONMENT: the case of *APA Mananciais do Rio Paraíba do Sul*

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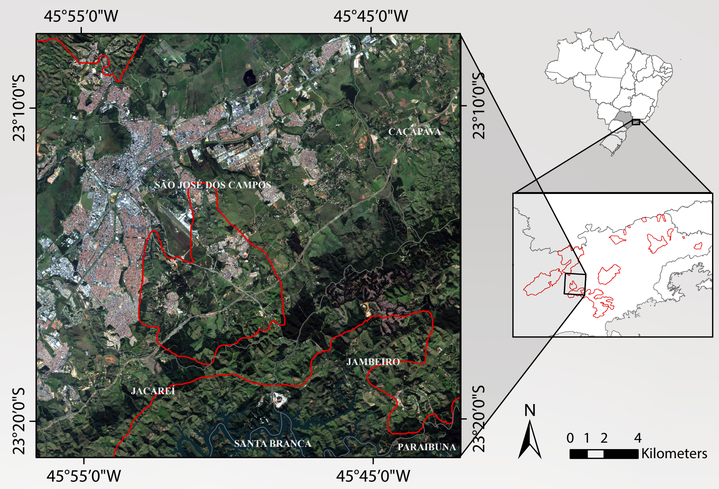
INTRODUCTION

Protected areas of sustainable use such as the **Environmental Protection Areas** (*Área de Proteção Ambiental* - APA) encompass **urban areas** (BRASIL, 2000). Urban spaces are under dynamic changes, and usually entail problems related to planning land cover. Such areas are fragile, especially when located inside protected areas, so it is necessary to **monitor and evaluate** them. Orbital **remote sensing** data provides important information for urban planning and management issues, and have a great potential to assist conservation unit managers in monitoring such protected areas (NAGENDRA et al. 2013). The **objective** of this paper is to demonstrate the capability of RapidEye sensor data, for the intra-urban scale classification of land cover in protected areas, and to develop a semi-automatic classification method based on geographic object-based image analysis and data mining techniques, for efficiently identifying small changes in urban areas, providing qualified information about protected areas for managers in their decision-making tasks.

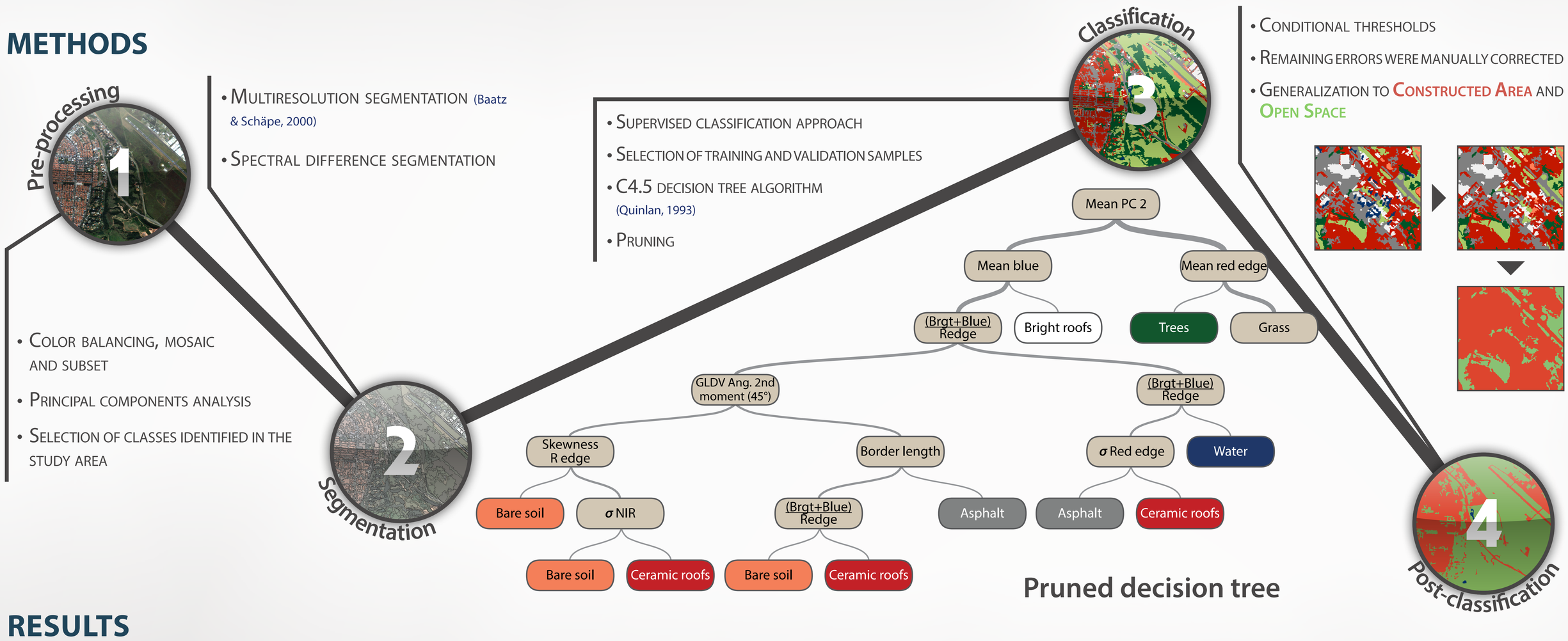
STUDY AREA

The **APA - Mananciais do Rio Paraíba do Sul** (APA-MRPS) was created in 1982 aiming to protect water resources of Paraíba do Sul river basin. The APA-MRPS is located in a highly anthropized region, with different socio-spatial formations, and has a non-continuous spatial arrangement, forming units. The *Putim* unit of the APA-MRPS located in the municipality of São José dos Campos-SP, Brasil, has been chosen for this study because it is inserted in urban area.

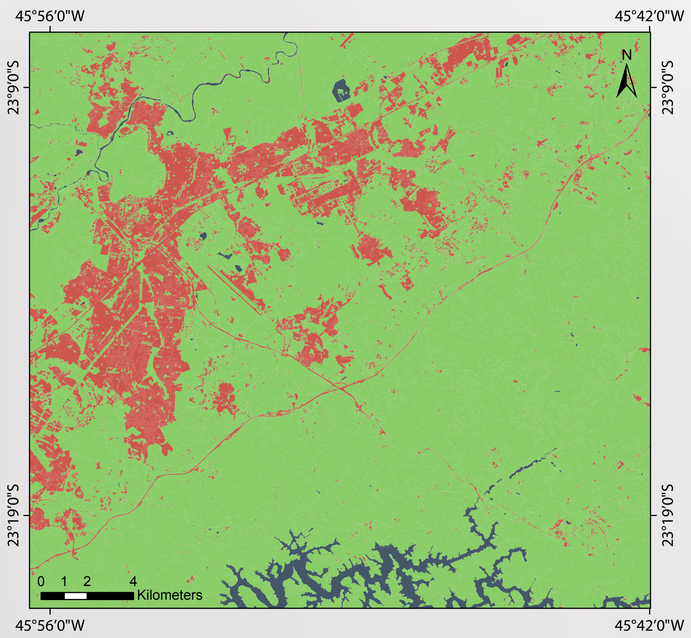


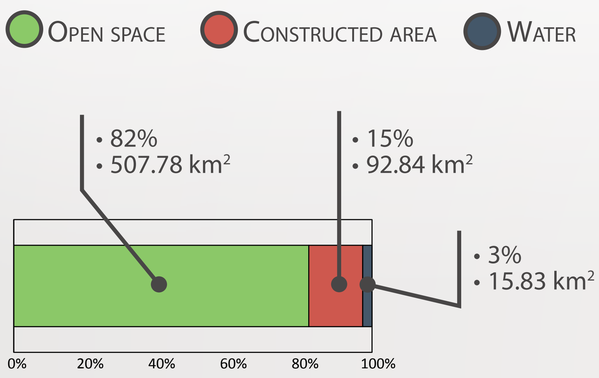
Study area: Putim unit of the APA-MRPS.

METHODS



RESULTS

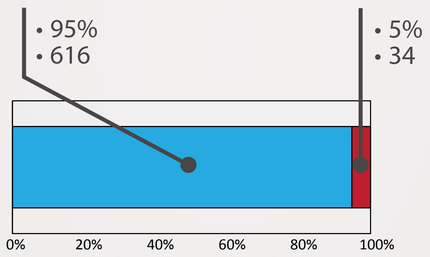




Proportion of classes

Smallest feature of '**Constructed area**' RapidEye sensor recognized with this method was equivalent to 4 pixels, or 100 m².

- **Cross-validation** was performed to verify the accuracy of the classifier
- Confusion due to similar spectral responses between:
  - '**Bare soil**' and '**Ceramic roofs**'
  - '**Water**' and '**Shadows**'



Correctly Classified Samples

	Grass	Water	Ceramc roofs	Trees	Asphalt	Bright Roofs	Bare soil	← classified as
Grass	105	0	0	1	0	0	0	
Water	0	14	0	0	3	0	0	
Ceramc roofs	0	0	151	0	3	0	9	
Trees	0	0	0	170	1	0	0	
Asphalt	0	0	2	0	59	0	0	
Bright Roofs	0	0	1	0	0	70	0	
Bare soil	2	0	11	0	0	1	47	

Kappa statistic	0,94
Total Number of Samples	650

CONCLUSIONS

This paper showed RapidEye data and methodology used were effective in classifying constructed areas, enabling the identification of small changes in land cover. The methodology presented in this paper succeeded to adapt the need to monitor small increases of constructed areas in protected areas. The data and methodology may be able to assist managers in monitoring and evaluation processes of protected areas, especially APAs.

Future work will include a refinement of the methodology using new attributes, and other data mining methods to select the best attributes for composing semantic network. Furthermore, the field validation of the classification is necessary for a more effective verification of the methodology.

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XVI SBSR Simpósio Brasileiro de Sensoriamento Remoto

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