

# THE USE OF AERIAL PHOTOGRAPHS AS A TOOL FOR LANDSCAPE ANALYSIS IN AN OIL PALM PLANTATION IN MAPIRIPÁN, META, COLOMBIA

Adriana Marcela Gómez Mateus<sup>1</sup>, Dr. Stephanie Domptail<sup>1</sup>, Dr. Anja Magiera<sup>2</sup>, Prof. Dr. Rainer Waldhardt<sup>2,3</sup>

<sup>1</sup>Institute for Agricultural Policy and Market research, Justus Liebig University, <sup>2</sup>Centre for Environmental Sciences and International Research (ZEU), <sup>3</sup>Justus Liebig University, Institute of Landscape ecology and resource management, Justus Liebig University

## Introduction

- Aerial photography provide information on land cover, land use change.
- Cost-, time- effective, user friendly method for high resolution ortho-photos for ground-truthing and landscape analysis.

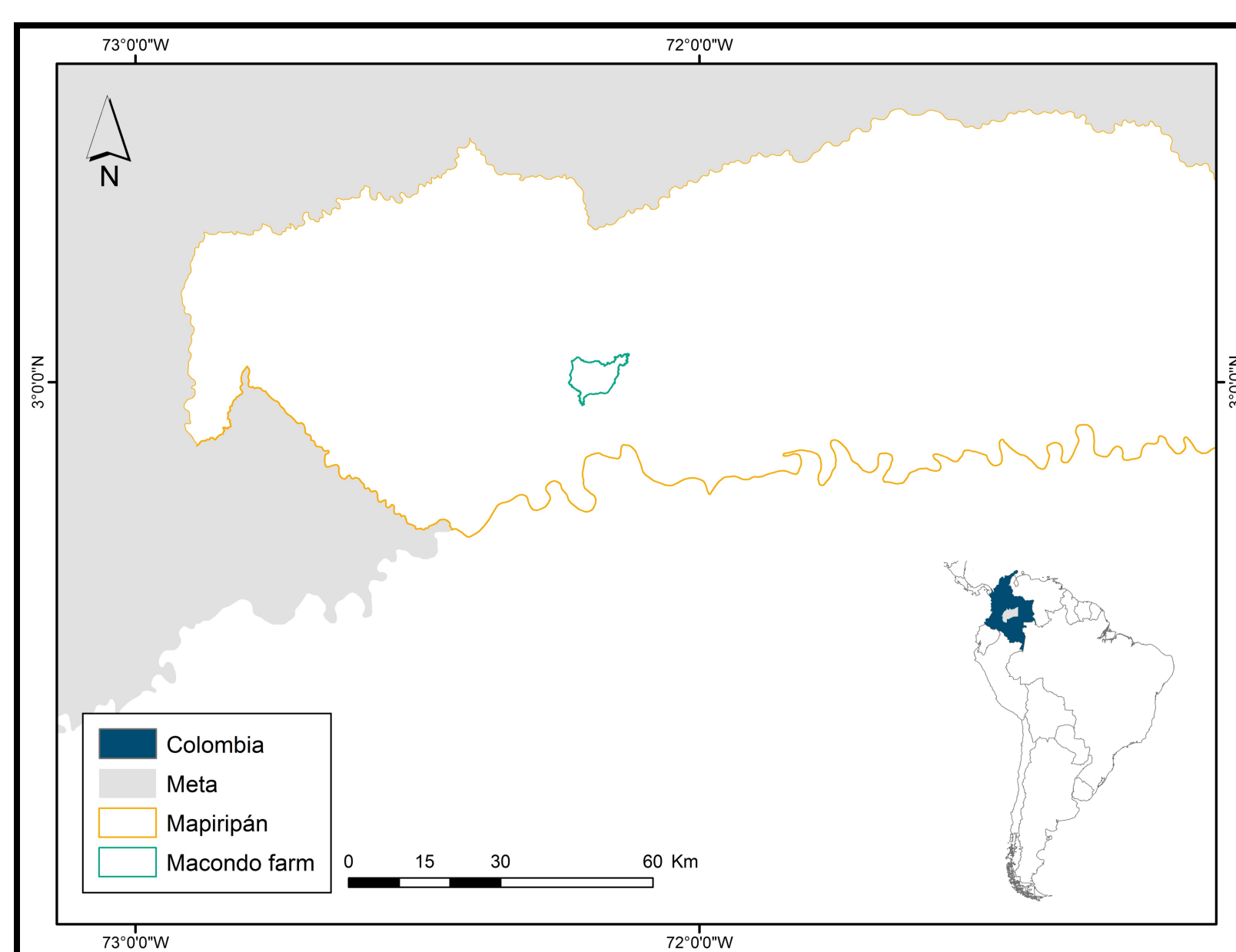


Fig 1. Study Area

To answer the following question: Which landscape structural properties characterize the landscape of the oil palm plantation in a ten-year range in Mapiripán, Meta, Colombia?

## Methods

- Field research Oct. 2018 - April 2019. (Fig 2)
- Use CORINE land cover nomenclature for Colombia

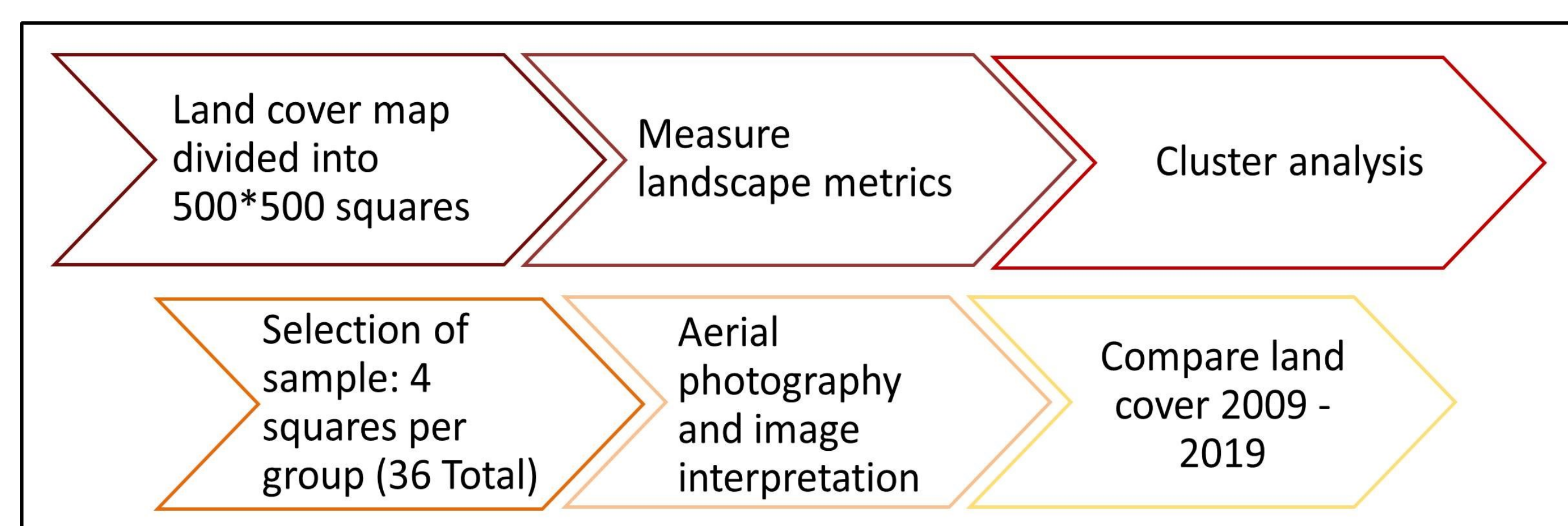
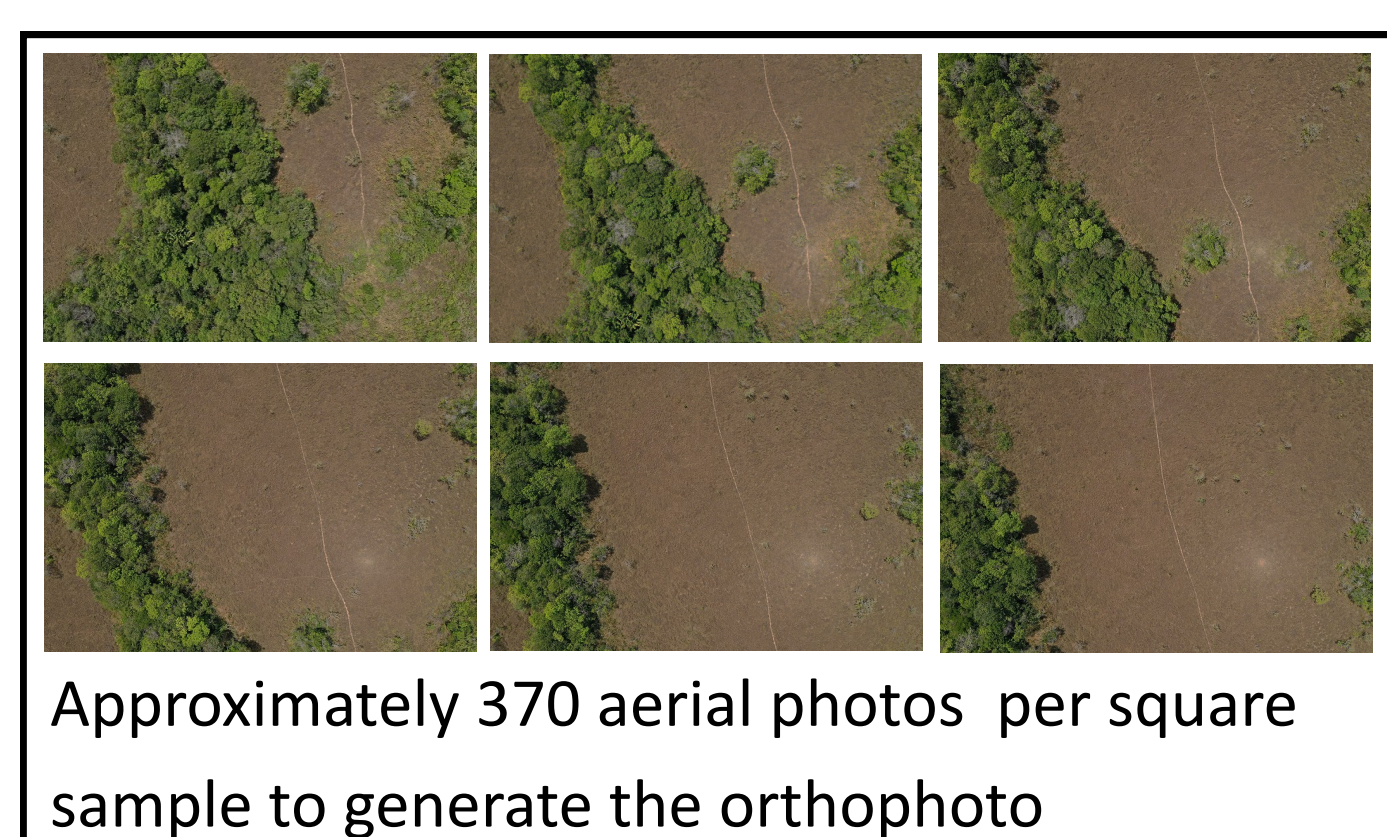


Fig 2. Methods followed



Fig 3. Aerial photography with drone

- 10,800 aerial photographs
- Approximately 370 photos per square
- 36 sample squares
- 36 orthophotos.



Approximately 370 aerial photos per square sample to generate the orthophoto

Fig 4. Aerial photography



Fig 5. Orthophoto per sample square

## ACKNOWLEDGEMENTS

This research was supported by DAAD (Deutsche Akademische Austauschdienst) and Fedepalma Colombia (National Association of Oil Palm Growers – in English), and Poligrow Colombia

Contact person: Adriana Marcela Gómez Mateus  
Adriana.gomez@agr.uni-giessen.de / Adriana.gomezmateus@gmail.com

## Results

- The results showed an increase in gallery and riparian forests as well as secondary or transition vegetation.
- The *Table 1* represents the change or shift in the land cover during the last decade, and reveals that:
  - i) 13 ha of forests plantation and 11 ha of open areas into secondary vegetation,
  - ii) 21 ha of Nat. grasslands and 52 ha of secondary vegetation into Gallery forests,
  - ii) about 26 ha of Open spaces into Gallery and riparian forests and 56 ha into oil palm.

Table 1. Land Use Change matrix table (2009-2019)

Area (ha)	2019							Total
	Forest Plantation	Gallery and Riparian Forest	Mixed Forests	Natural Grasslands	Oil Palm Plantation	Open Spaces with Little or no Vegetation	Secondary or Transition Vegetation	
Forest Plantation	7.30	0.19	0.00	0.16	0.02	0.73		8.39
Gallery and Riparian Forest	1.24	44.44	1.40	21.02	0.69	26.32	51.57	146.70
Mixed Forests		0.04	0.03	0.06	0.06	0.51		0.68
Natural Grasslands		0.19		75.23	0.35	5.62	0.32	81.71
Oil Palm Plantation	2.08	1.71	0.13	1.42	365.94	55.72	7.65	434.65
Open spaces with little or no Vegetation	3.98	0.10		10.68	4.77	14.87	32.32	66.73
Secondary or Transition Vegetation	13.15	8.77	2.41	39.47	5.23	61.31	10.19	140.52
Total	27.75	55.43	3.97	148.04	377.06	165.09	102.05	879.39

- The overall change in natural grassland is around -8% and around 7% for open spaces with little and no vegetation.
- Cluster analysis considered the landscape composition and configuration, the land cover types, and the landscape metrics measurement: the farm was divided into nine groups (Fig 6).
- The clustering helped to select the sample squares to obtain the main landscape characteristics the farm.

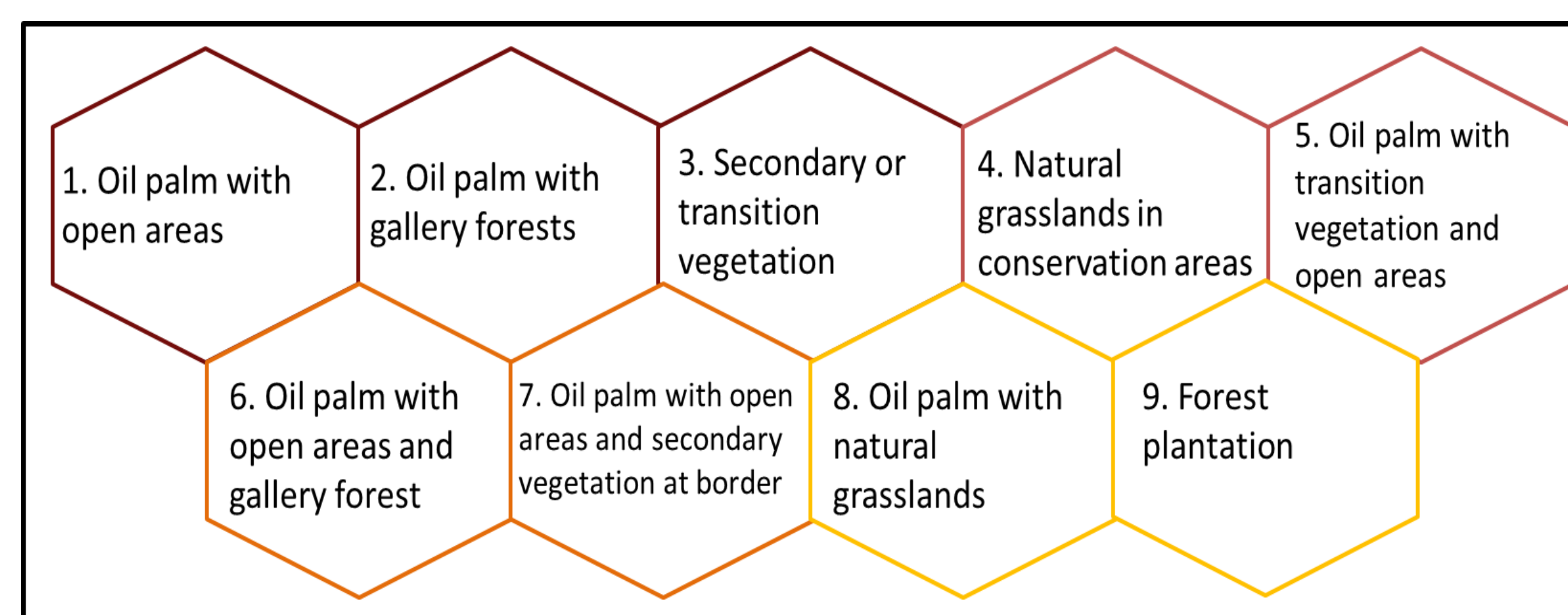


Fig 6. Cluster groups of the farm

## Conclusions

- Aerial photography (drone) is a cost- and time-effective method to do “real-time” ground-truthing, and generate high-resolution and -detailed orthophotos on the contrary to satellite imagery - usually low resolution for detailed land cover studies.
- Aerial photography can replace ground-based method especially when the later is restricted by accessibility, time- and resources- constraints.
- The comparison 2009 - 2019 provided detailed information on land cover change, that can help for decision making in the plantation.



JUSTUS-LIEBIG-  
UNIVERSITÄT  
GIESSEN



Agricultural Economics,  
Bioeconomy and  
Rural Development



fedepalma

DAAD