

# Assessment of functional connectivity by comparing two data types: satellite imagery and vector databases

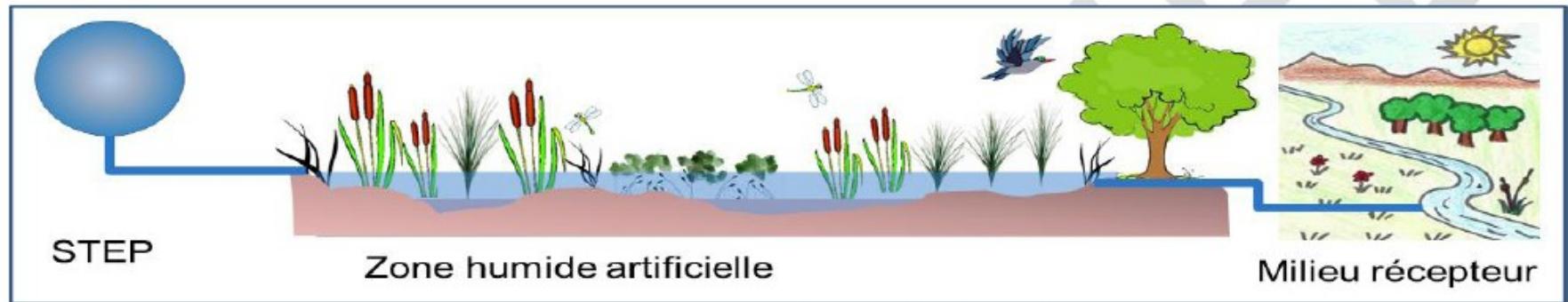
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1 : CITERES-IPAPE, UMR 7324 (Tours) ; 2 : LIVE - UMR 7362 UDS (Strasbourg)

Télédétection de la biodiversité. "Télédétection de la biodiversité : état des lieux et perspectives  
Séminaire conjoint à la conférence SAGEO'2014. 24-25 novembre 2014 - Grenoble

# Artificial wetland

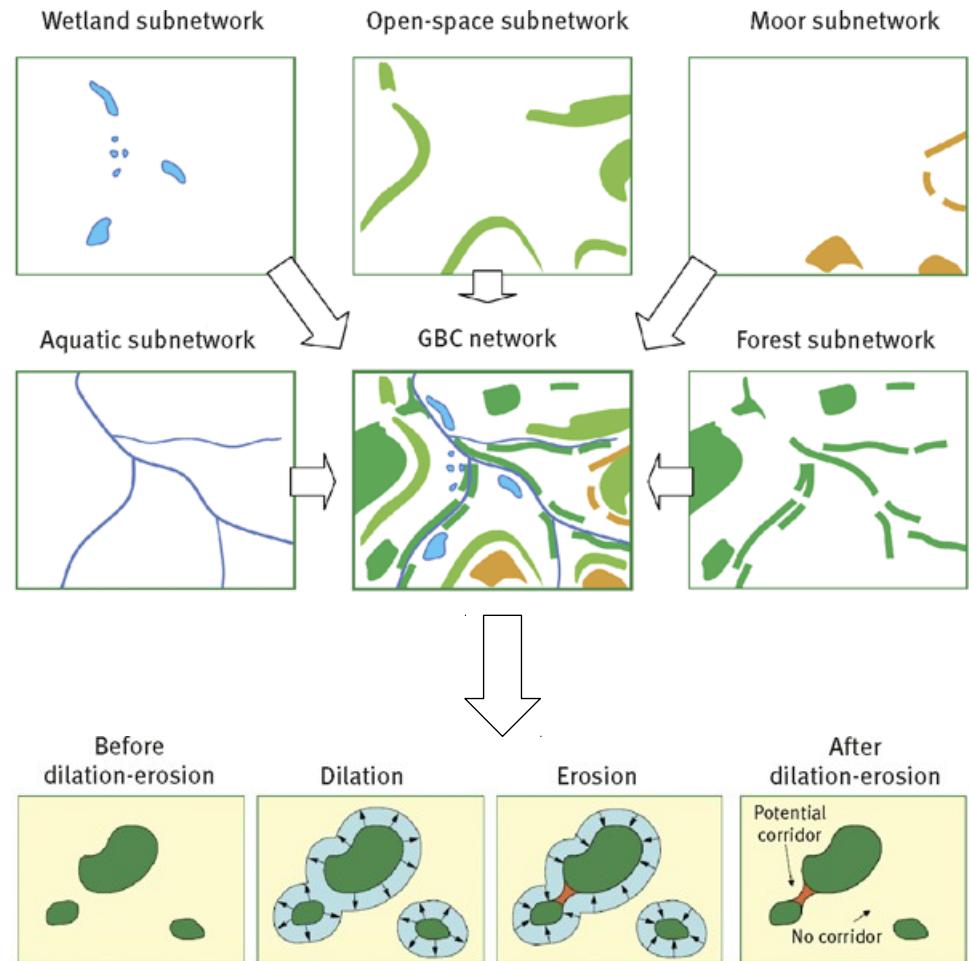
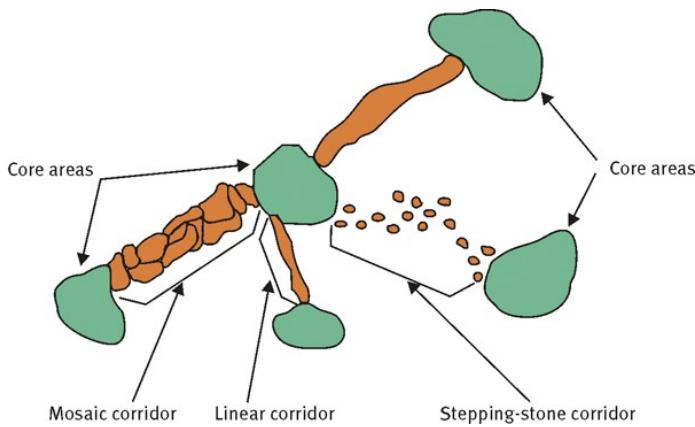
## Zone humide artificielle (ZHART)



The purpose of the ZHART project is to develop and to market Planted Discharge Areas (PDA : ZRV) located in the outlet of wastewater treatment plants (STEP) in order to convert it into artificial wetland that support micro pollutant treatments and ecological diversity.

# Planning of green and blue way (method often used)

Ecological network diagram



# I. Question

- Does the artificial wetland creation change the landscape connectivity potential?

**Hypothesis :** Artificial wetland increases the connectivity

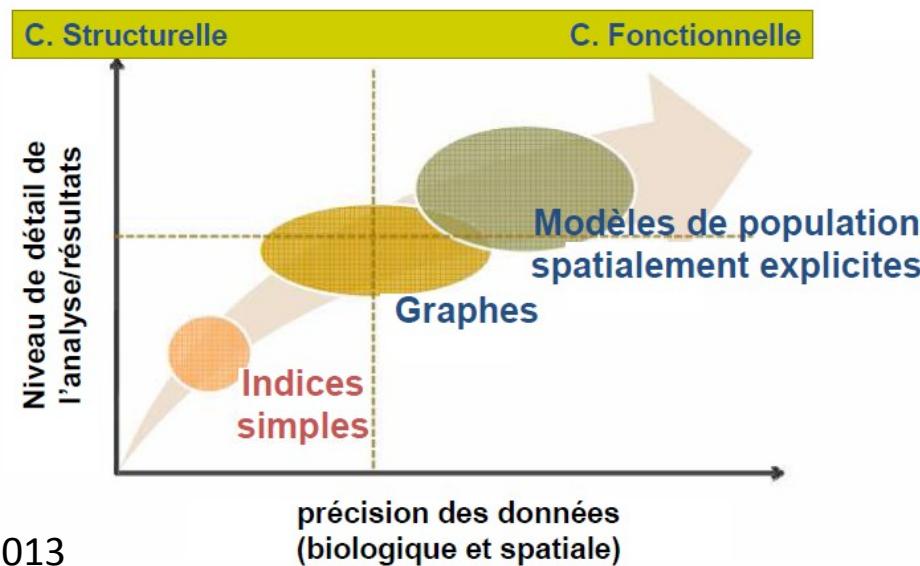
# II. Purposes

- Developed scenarios

- 1 - Effect of natural areas located 200 meters and 500 meters around wetlands
- 2 - Effect : absence / presence of PDA (ZRV)

- Comparative approach

- 1- Remote sensing : satellite imagery + NDVI
- 2- Spatial Analysis : (developed method) : merge multiple database : Topo database, **Forest database** ,...



# **III. Methodology**

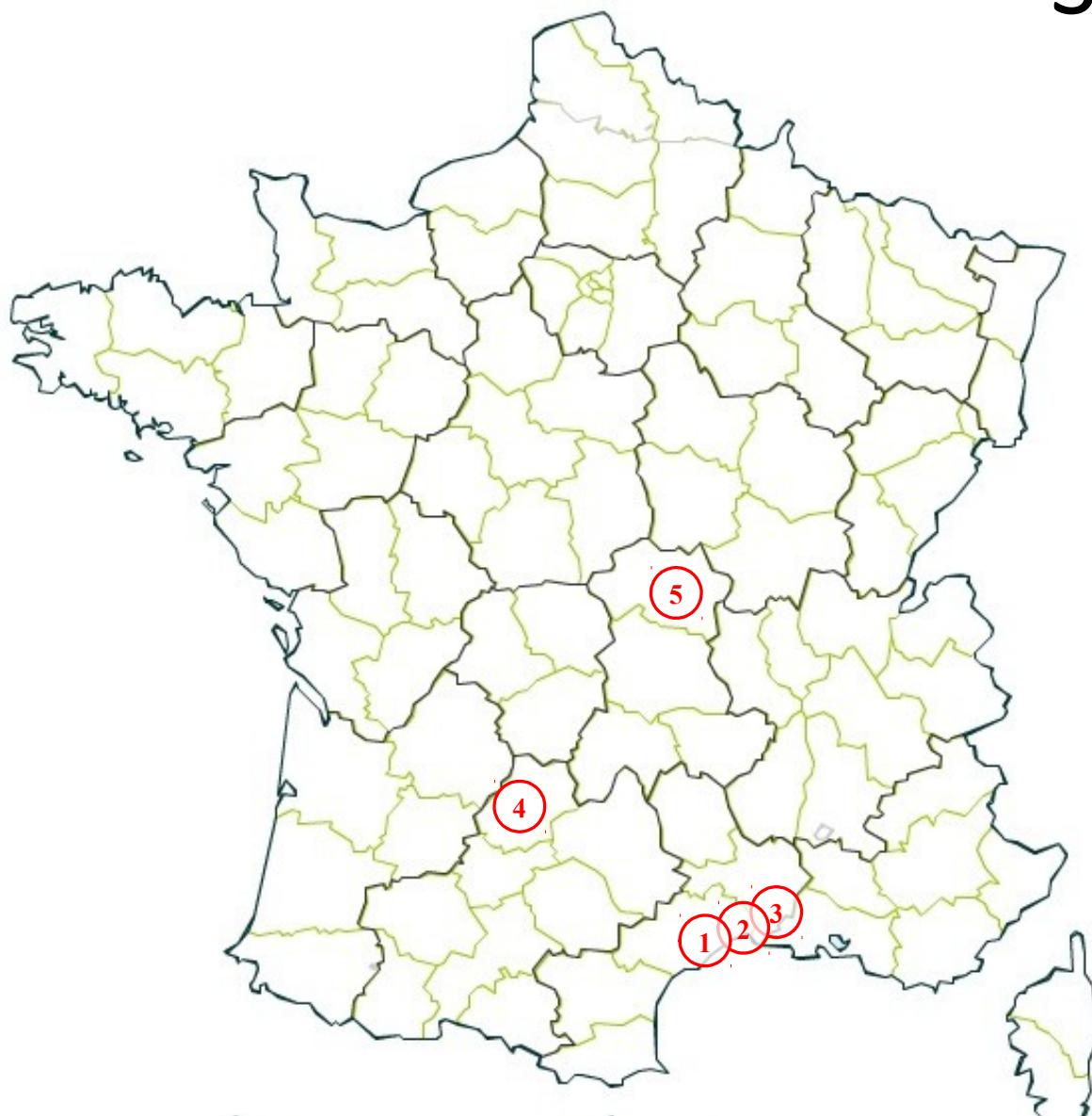
**Analysis of landscape connectivity :**

**Creation of landscape maps from following sources :**

- [NDVI Map \(Spot image\)](#)
- [Topo database, Forest database, RPG database, ..](#)

**Creating landscape graphs**

# Selected sites



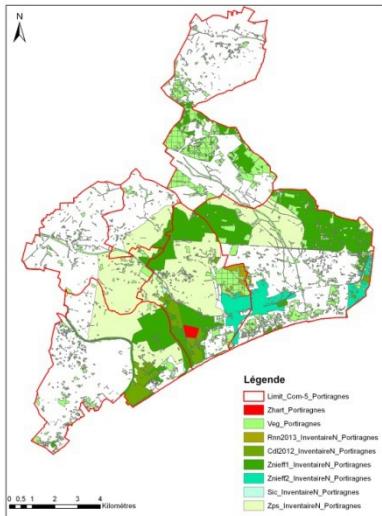
- 1- Portiragnes (34)
- 2- St Just (Zone Libellule) (34)
- 3- Grau du Roi (30)
- 4- Caillac (46)
- 5- Magnet (03)

5 km around wetlands

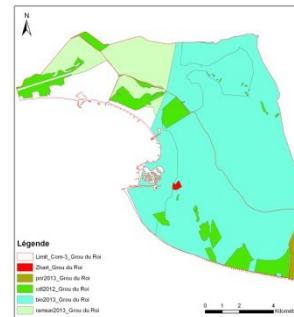
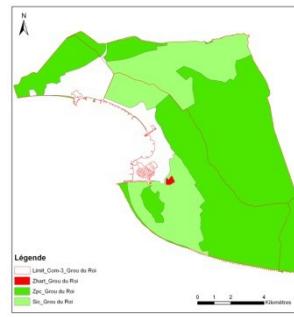
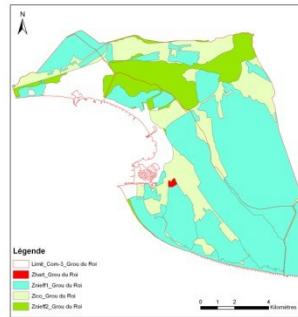
# IV. Results

- 1- For each site :
  - Creation of fine-scale landscape maps
  - Calculation of NDVI(Spots Images) (ex. Portiragnes)
- 2- Results of scenario 1 and 2 (ex. Portiragnes)
- 3- Results of the comparative approach (ex. Portiragnes)

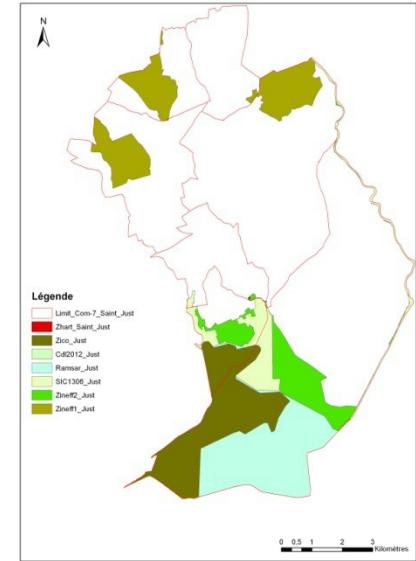
# Comparison of regulatory areas



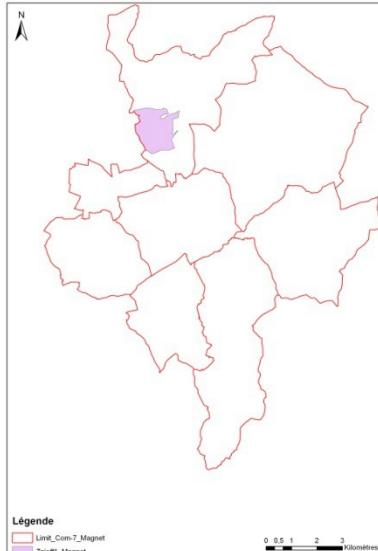
Portiragnes



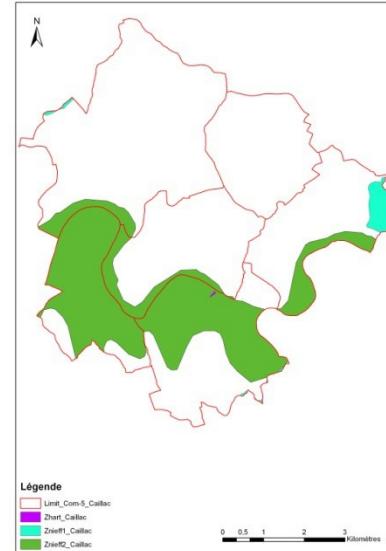
Grau du Roi



Saint Just

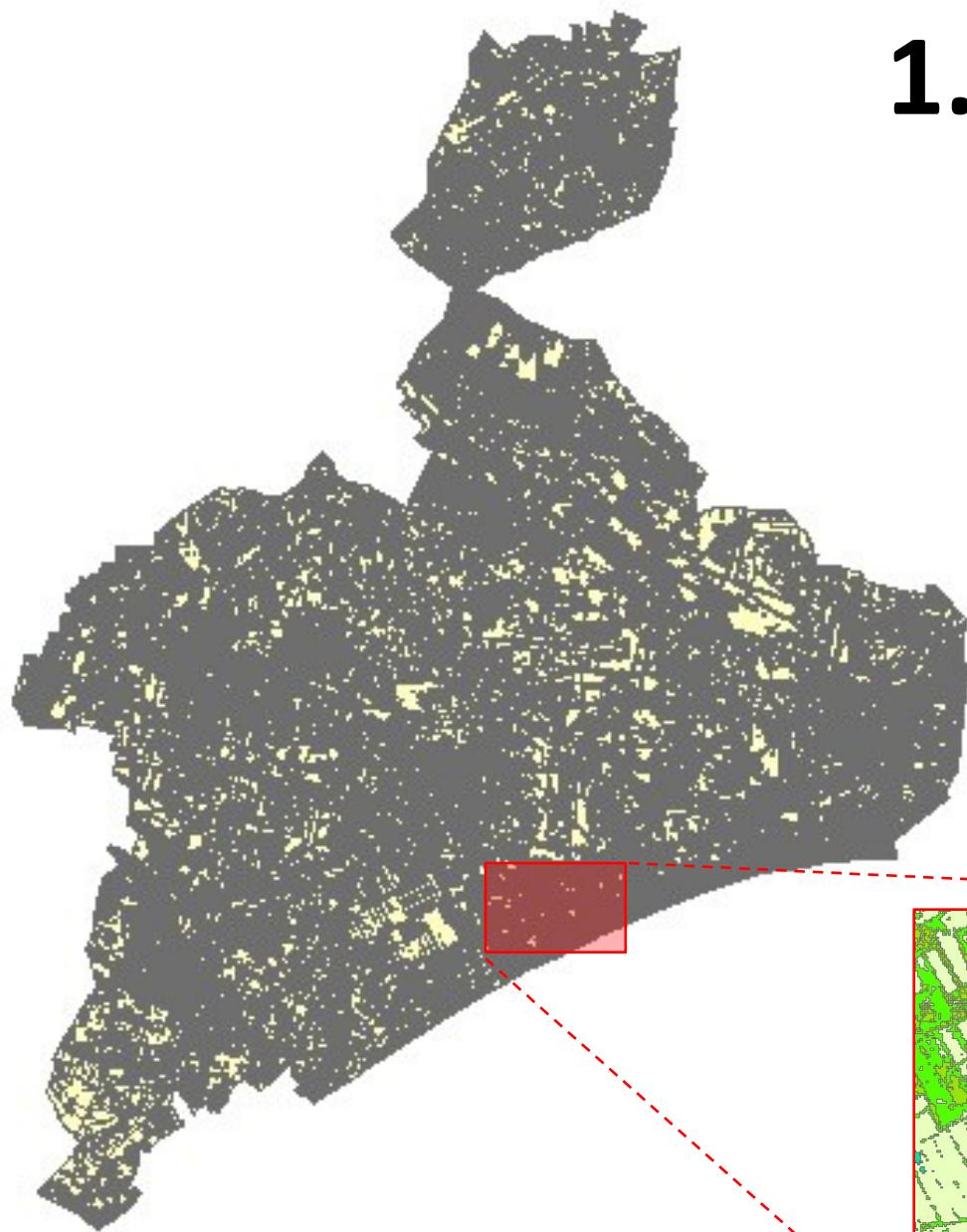


Magnet



Caillac

# 1.1. Portiragnes

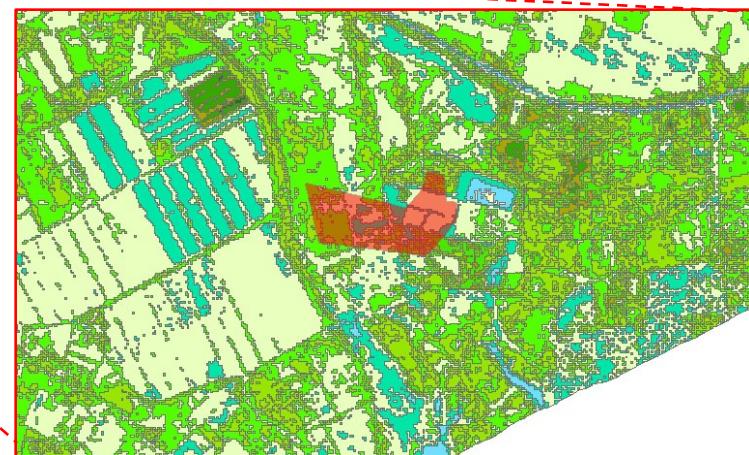


Spot Image (NDVI)

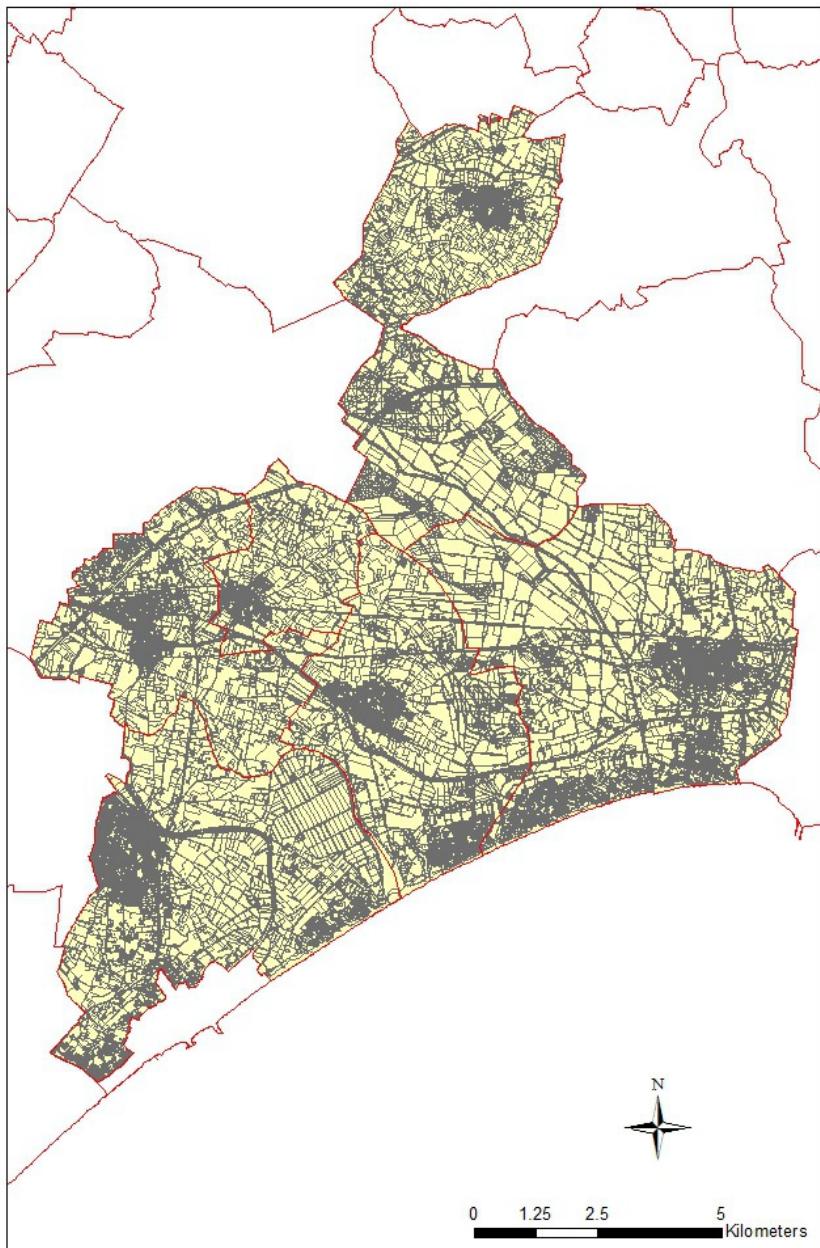
PDA (231442,44 m<sup>2</sup>)

**60 296** units

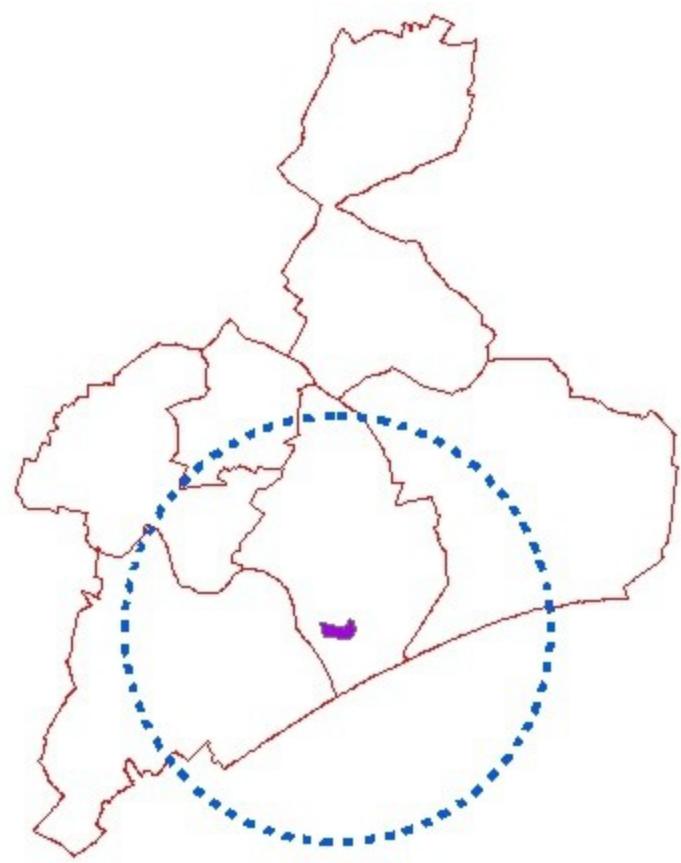
Types of land use : 13



## 1.2. Portiragnes



Landscape map



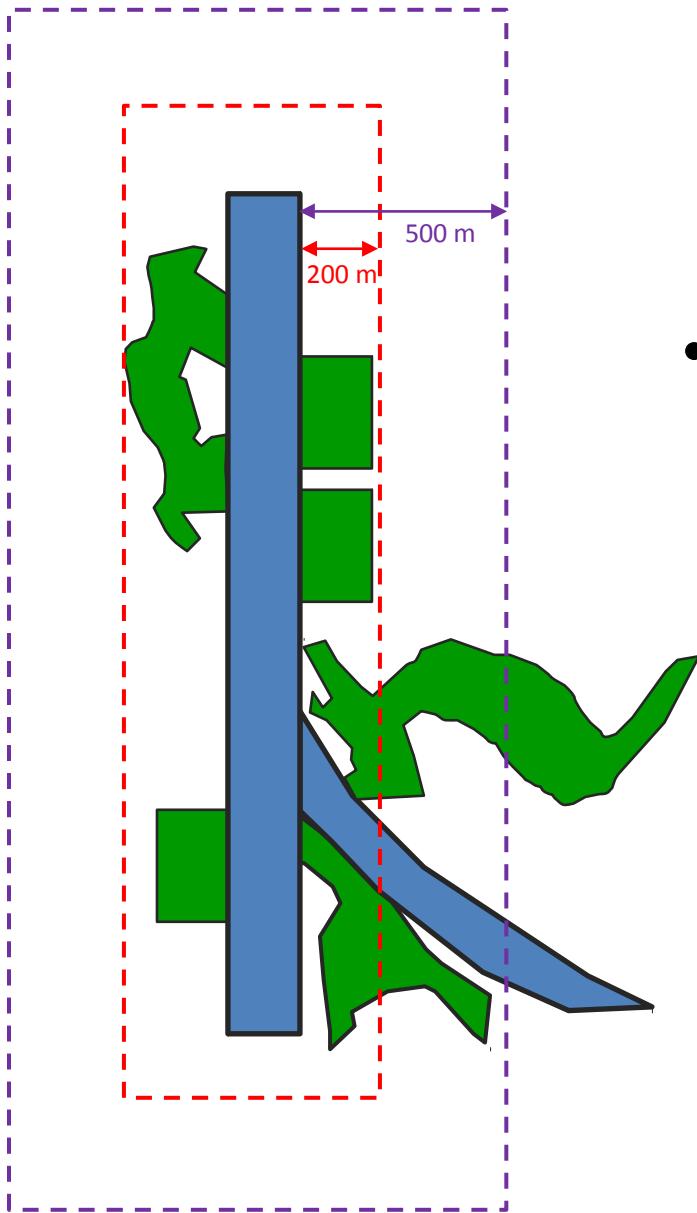
**PDA (231442,44 m<sup>2</sup>)**

**191 317 units**

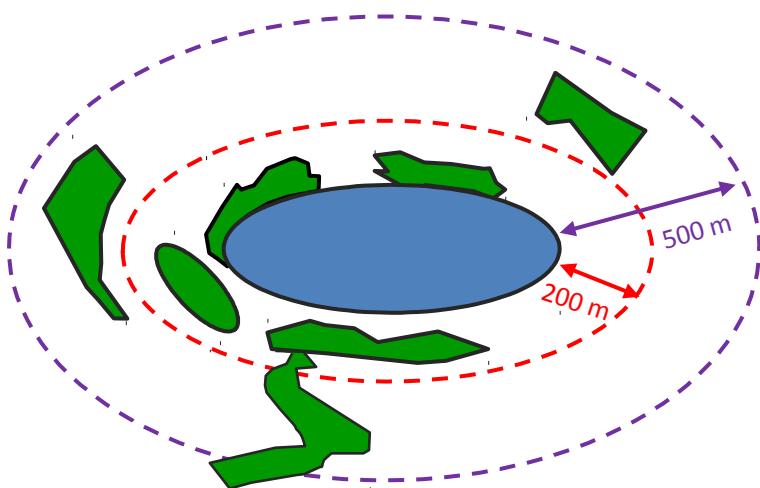
**Types of land use : 62**

## 2. Results

### 2.1. Scenario 1 : habitat selection (ex. Portiragnes)

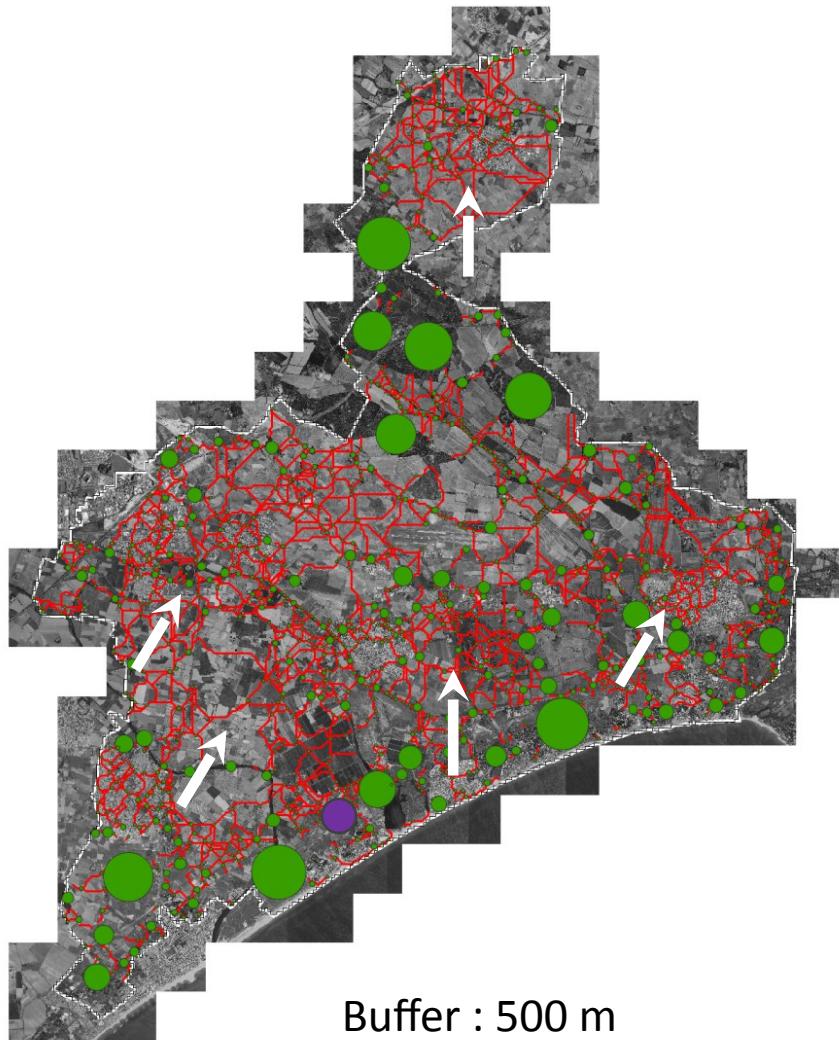


- Habitats : wetland+ woodland+ grassland + barren (either or not considered as natural area) 200 m / 500 m:

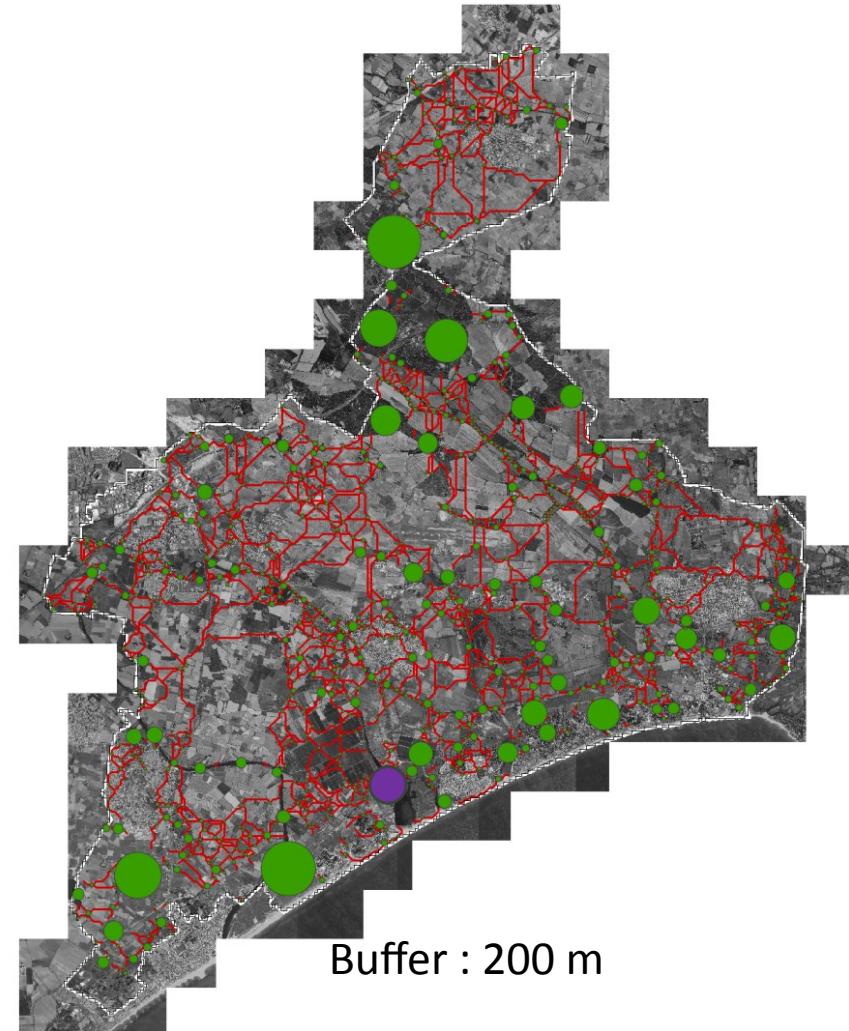


# Comparison of graphs landscape: habitats located 200 meters and 500 meters around the wetlands

Intercommunal scale : landscape graphs structure in both cases is different



Buffer : 500 m



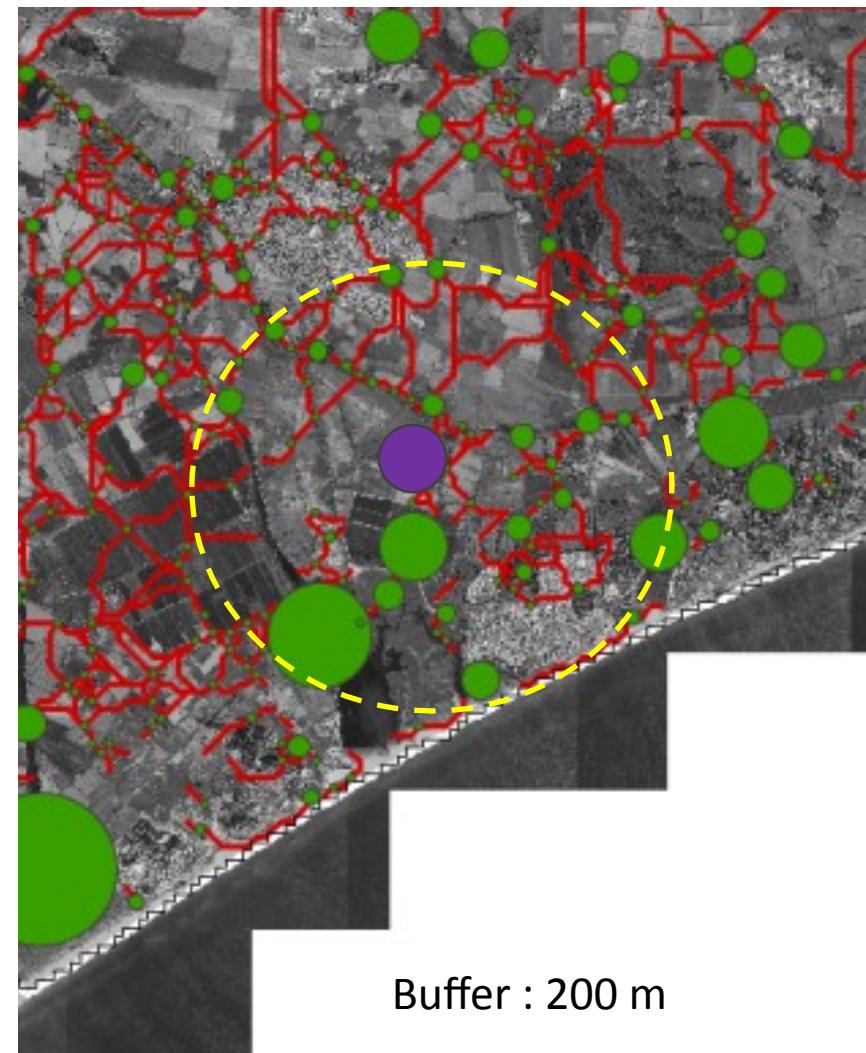
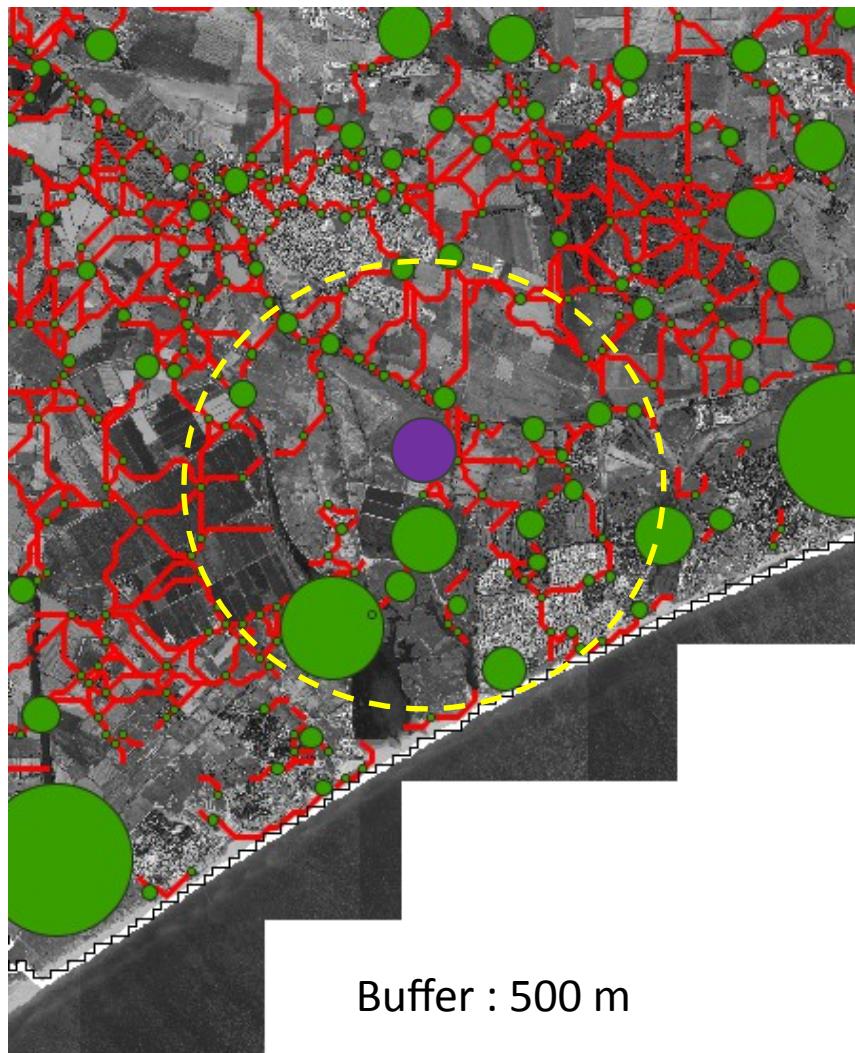
Buffer : 200 m

Data generated from landscape map



# Site Scale

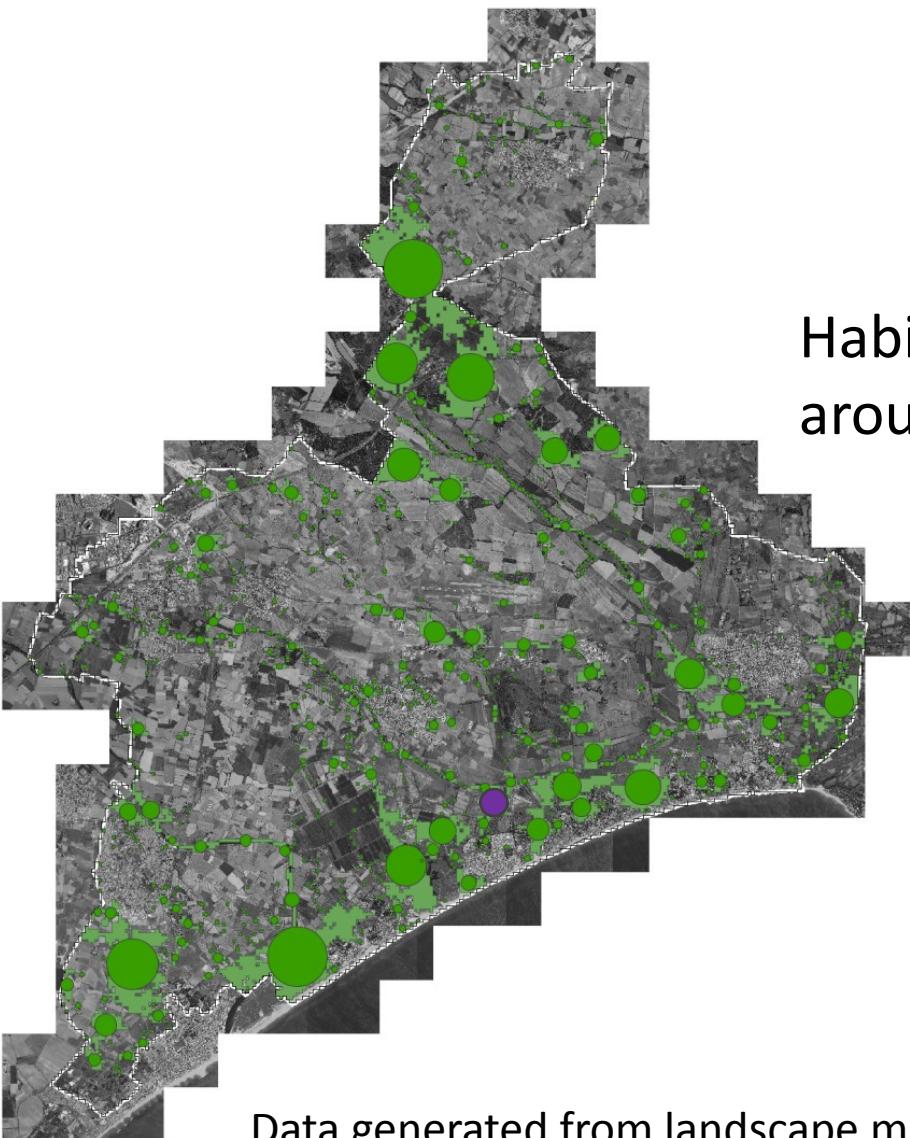
landscape graphs structure in both cases is similar



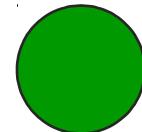
Data generated from landscape map

PDA Portiragnes

## 2.2. Scenario 2 : presence / absence of PDA (Portiragnes)



Habitats within a radius of 500 meters around wetlands



Habitat represented as a circle



Habitat represented as a pixel (raster)

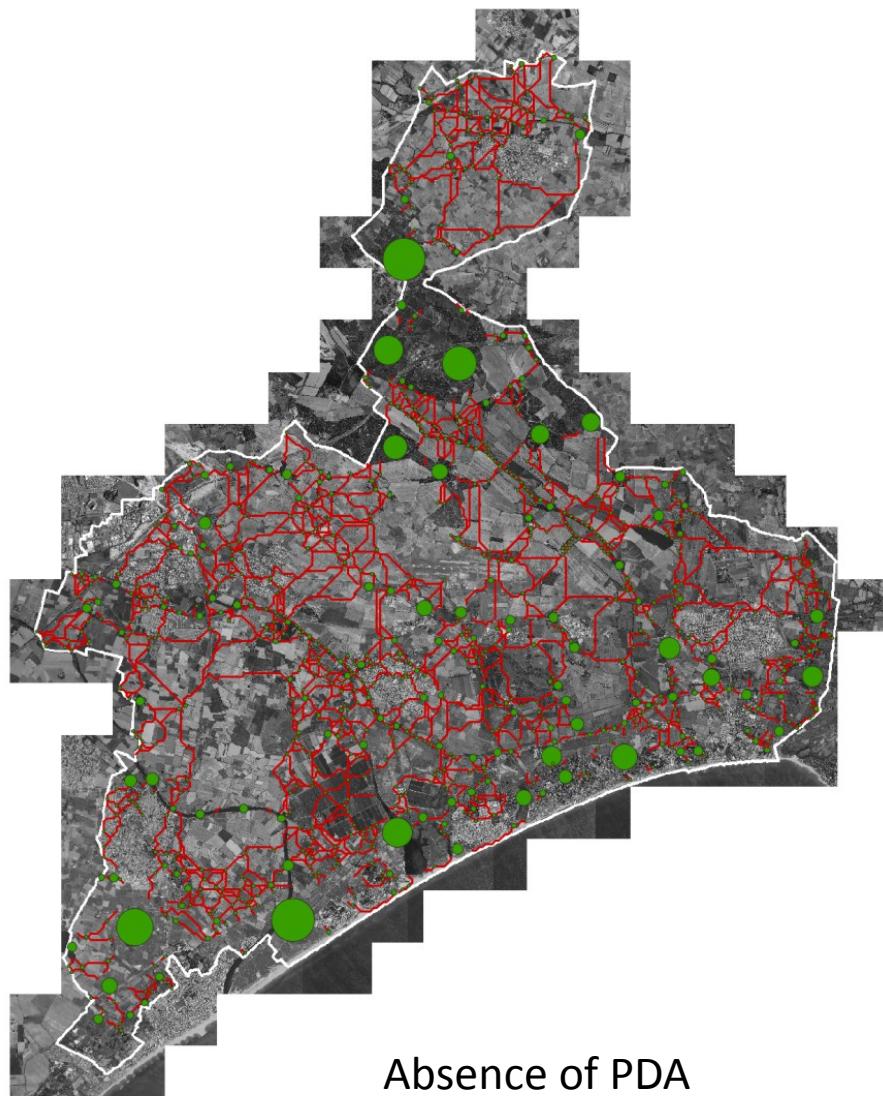


PDA Portiragnes

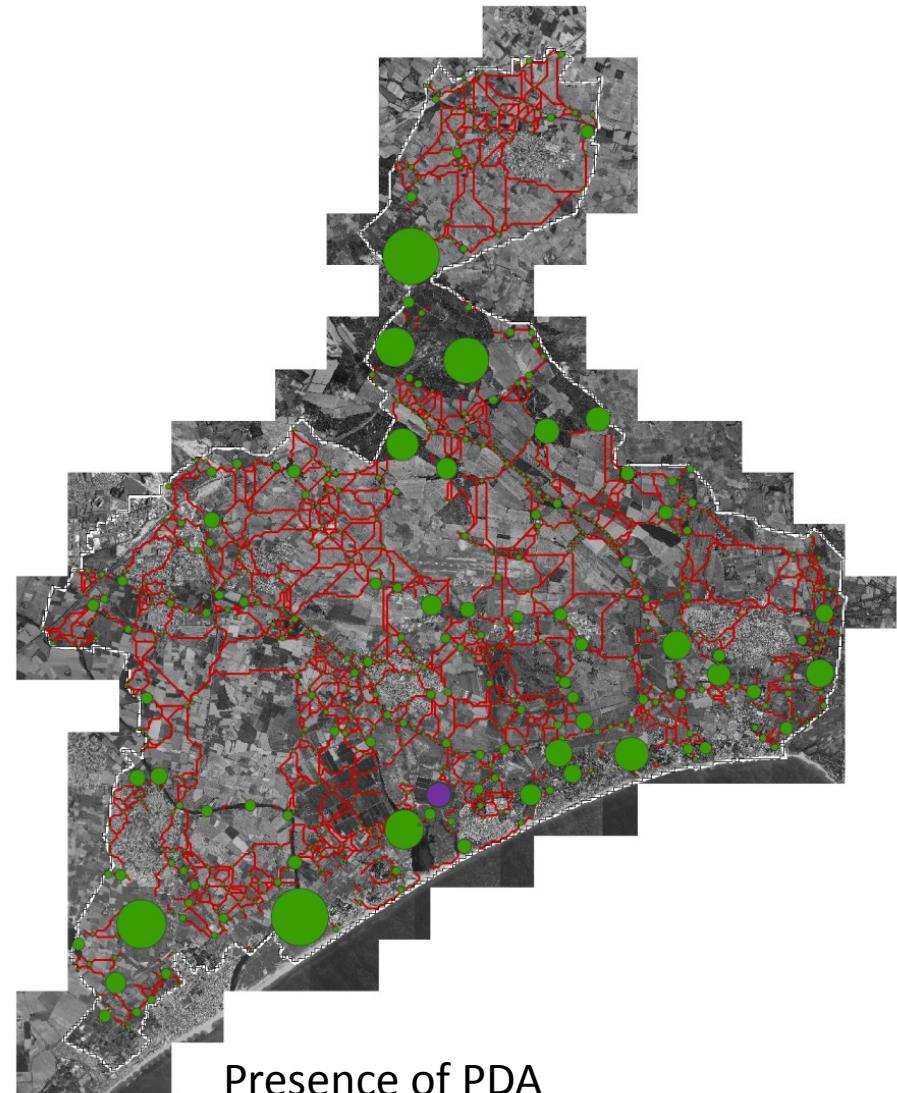
Data generated from landscape map

# Intercommunal scale

landscape graphs structure is relatively similar in both cases



Absence of PDA



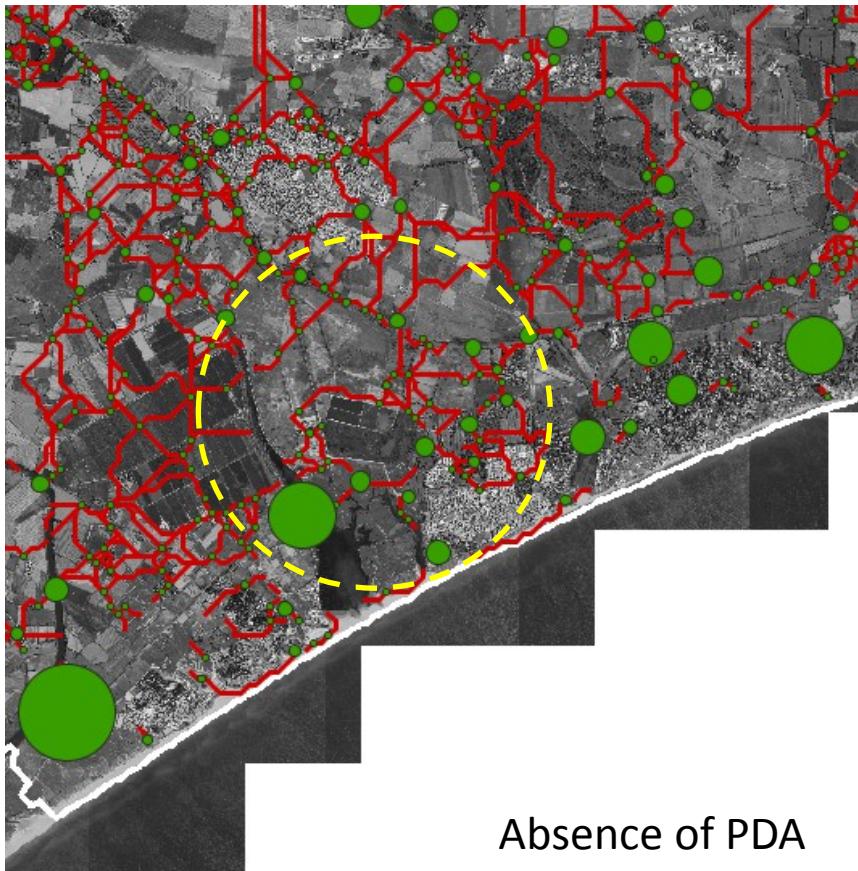
Presence of PDA

PDA Portiragnes

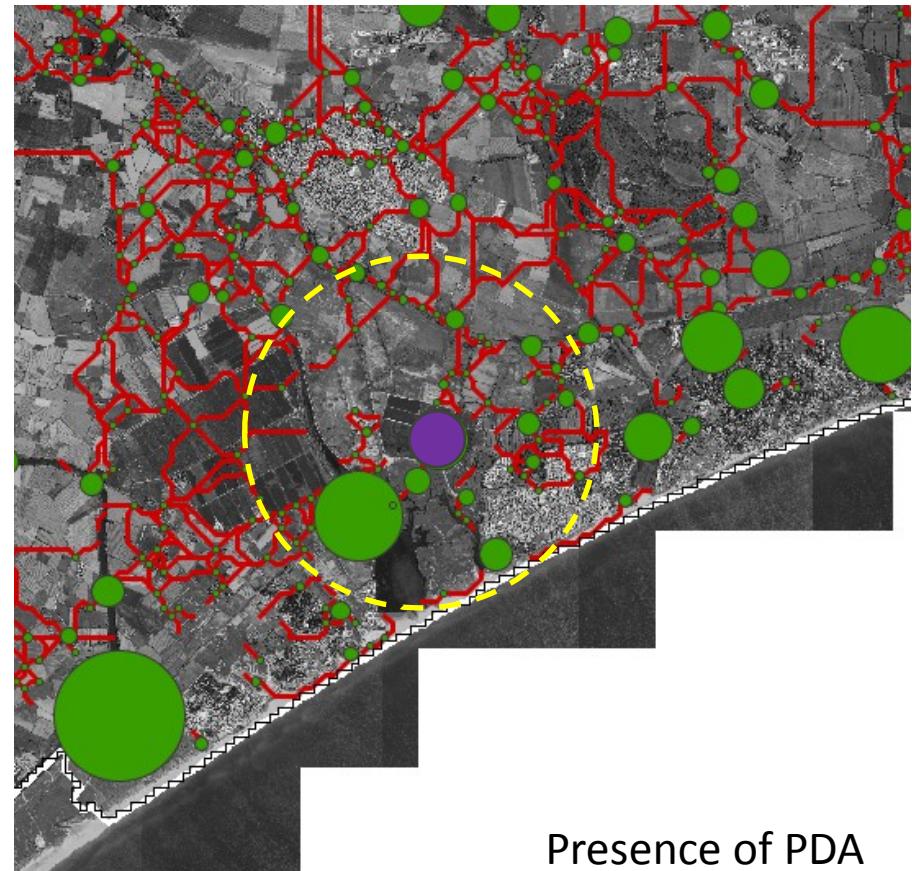
Data generated from landscape map

# Communal scale

Landscape graphs structure is relatively similar in both cases



Absence of PDA

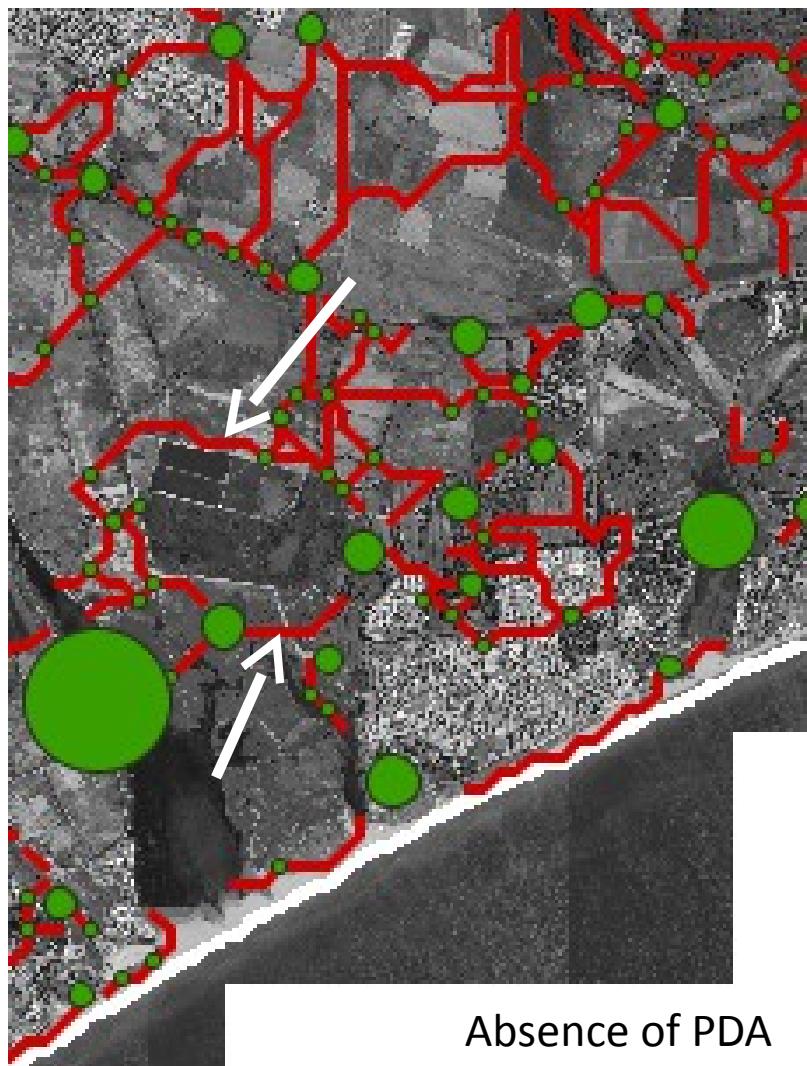


Presence of PDA

PDA Portiragnes

Data generated from landscape map

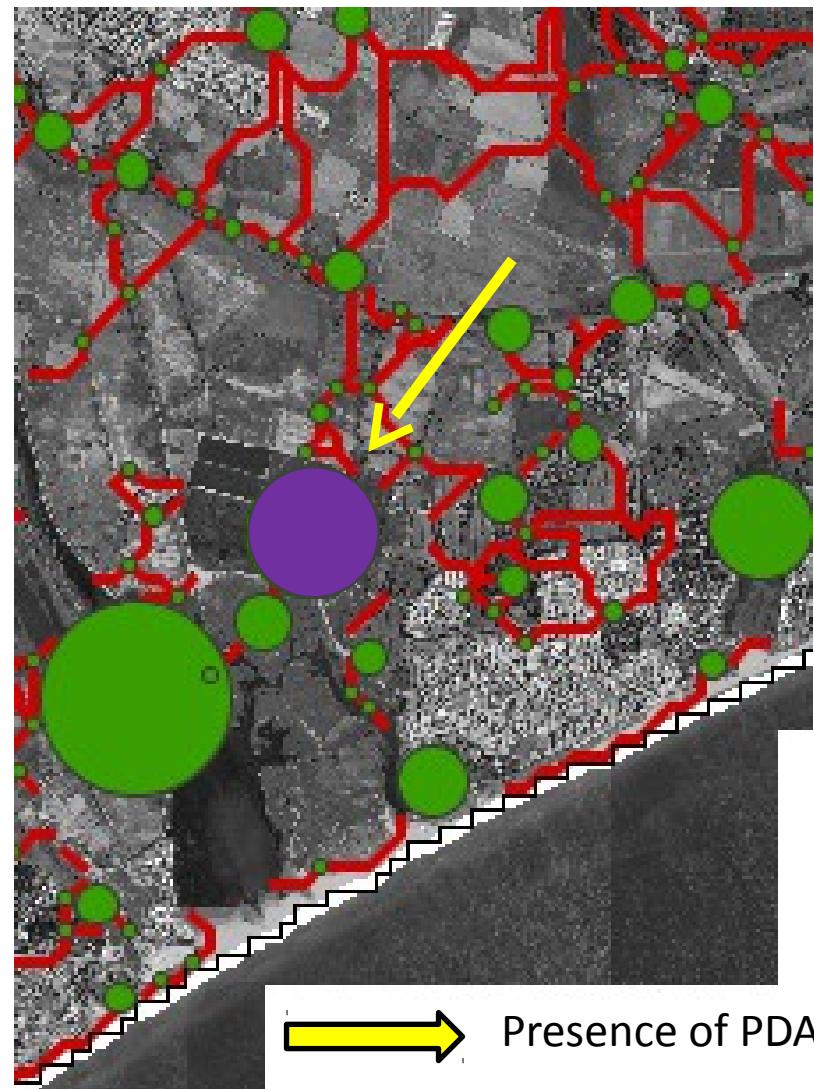
# Site scale



Absence of PDA



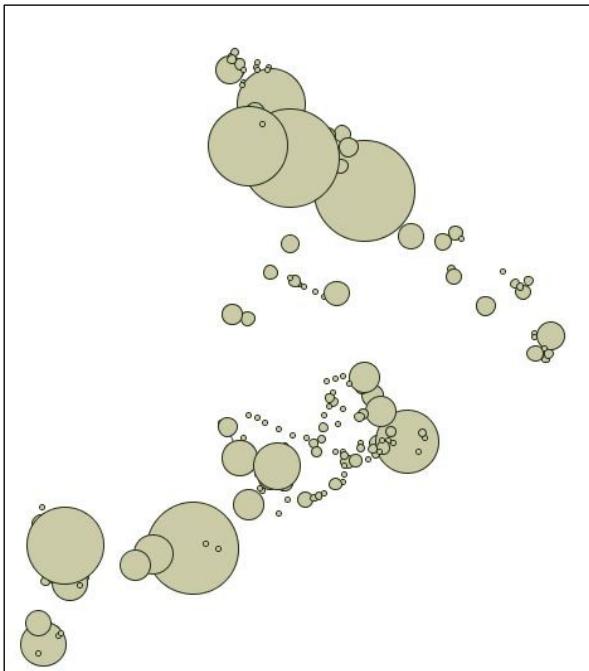
New potential axe of connectivity



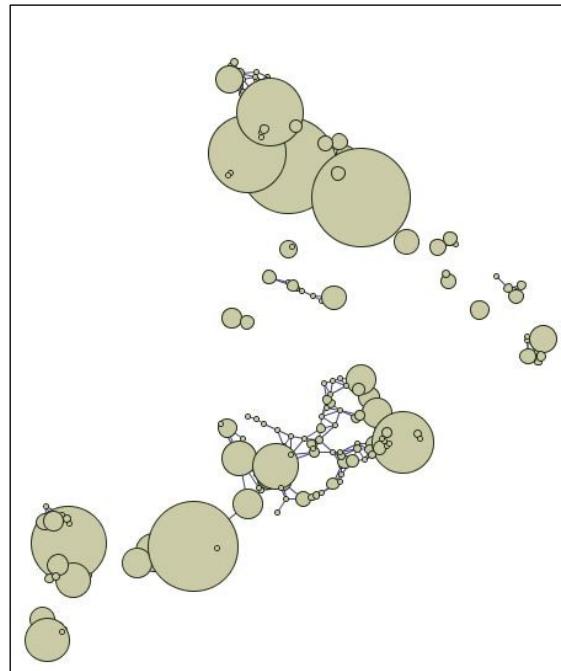
Presence of PDA

# Landscaped graphs dispersion of *Orthetrum cancellatum* (dragonfly) Cas de (Portiragnes)

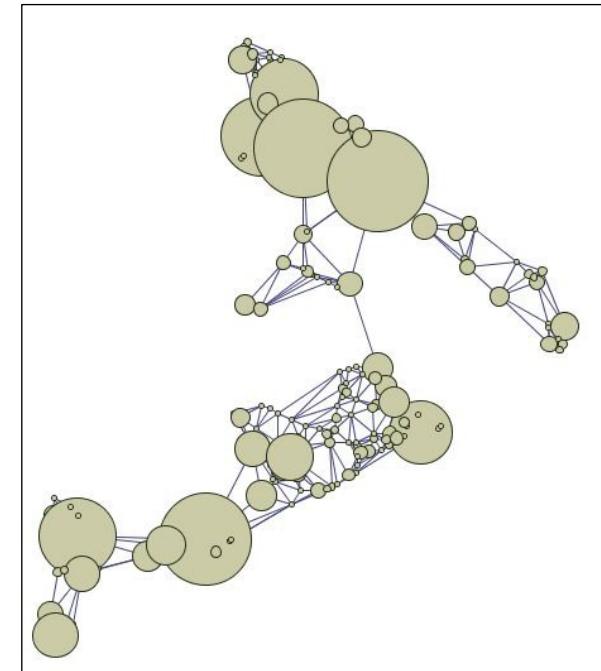
Maximum dispersal distance (MDD)



DMP = 50 m



DMP = 500 m



DMP = 2000 m

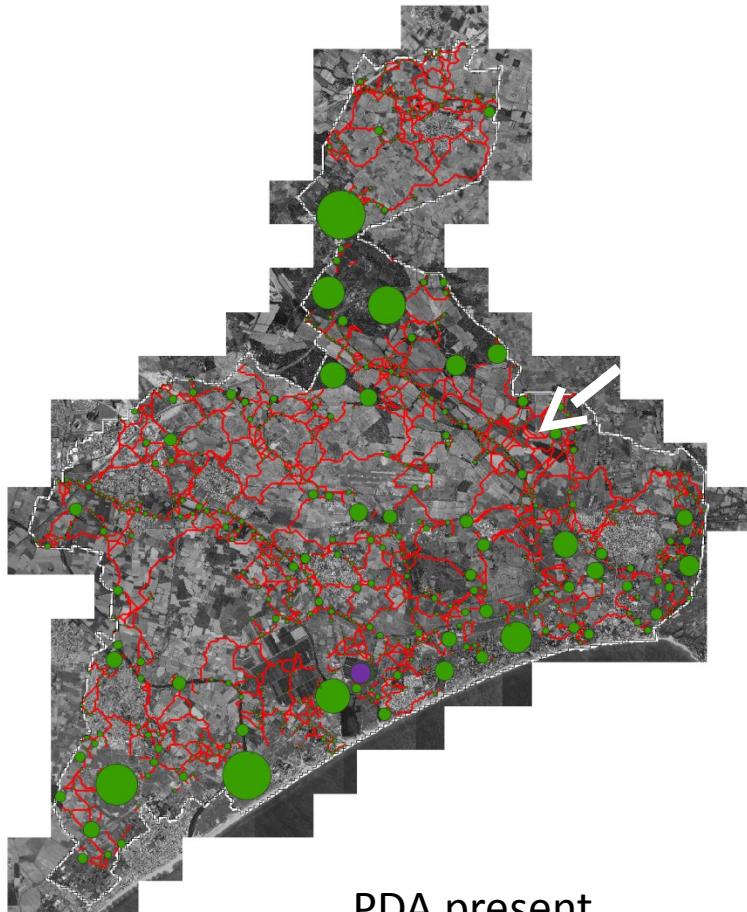
# Methodological Report

The use of selected database: new and relevant approach, particularly at the local scale

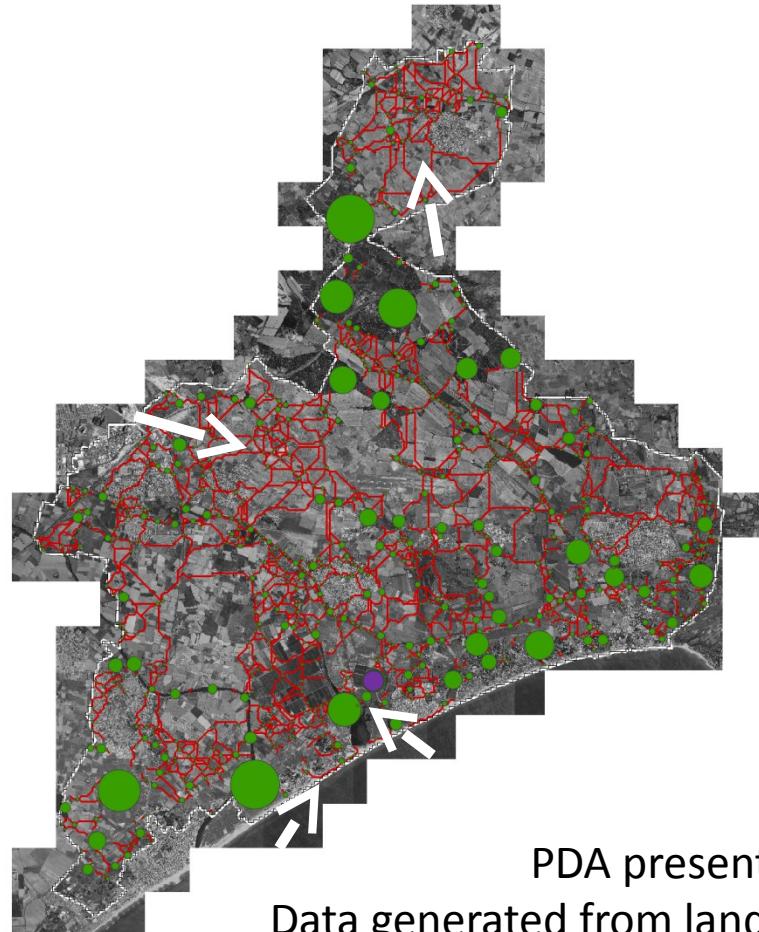
The estimation of the movement cost for each land use class: uncertainty

### 3. Comparison between landscape graphs produced from images Spots and landscape graphs produced from landscape maps

Intercommunal scale: landscape graphs structure is different



PDA present  
Data generated from NDVI image



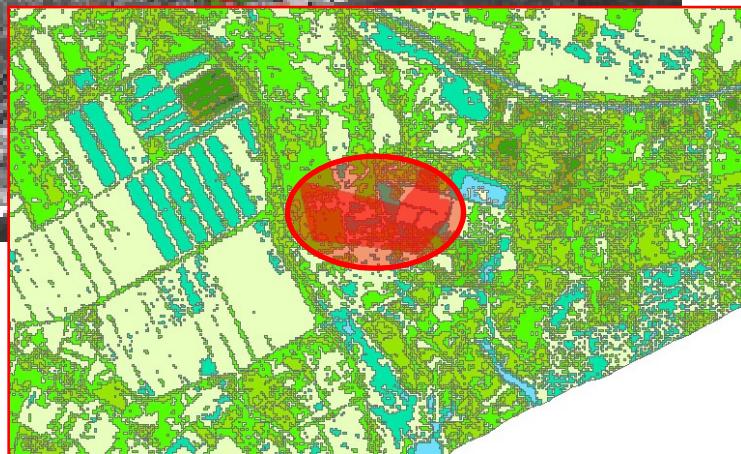
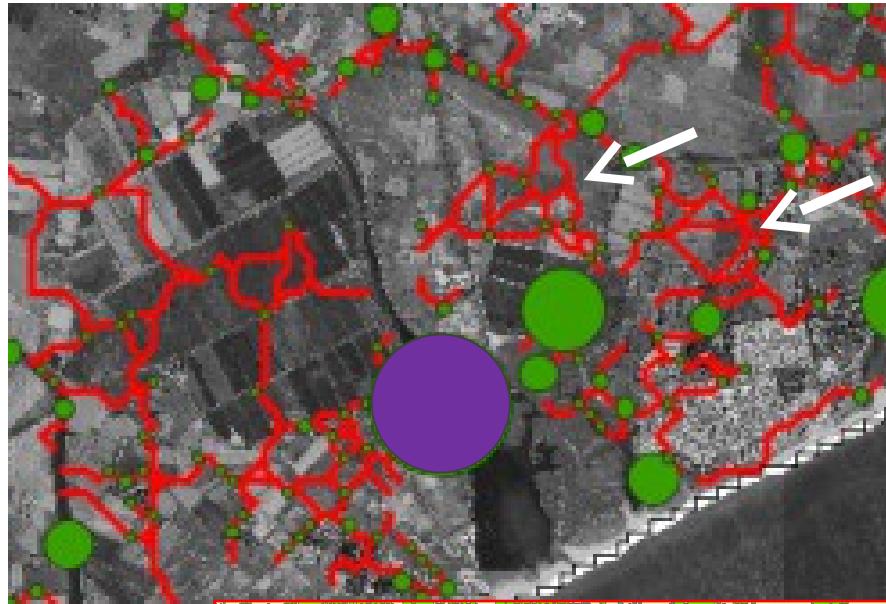
PDA present  
Data generated from landscape map



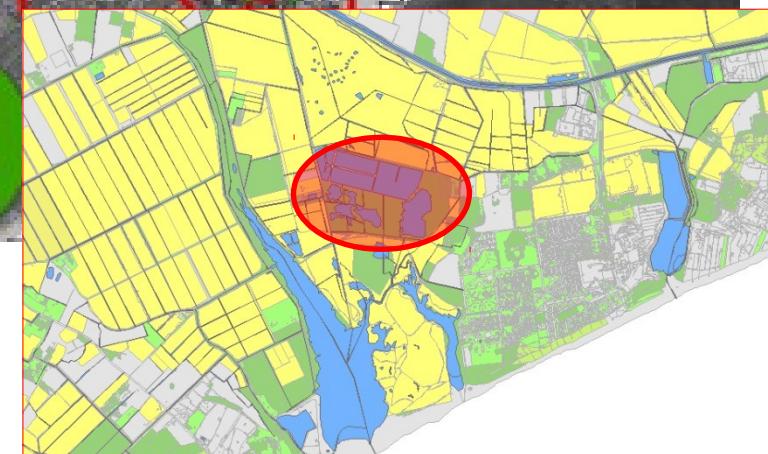
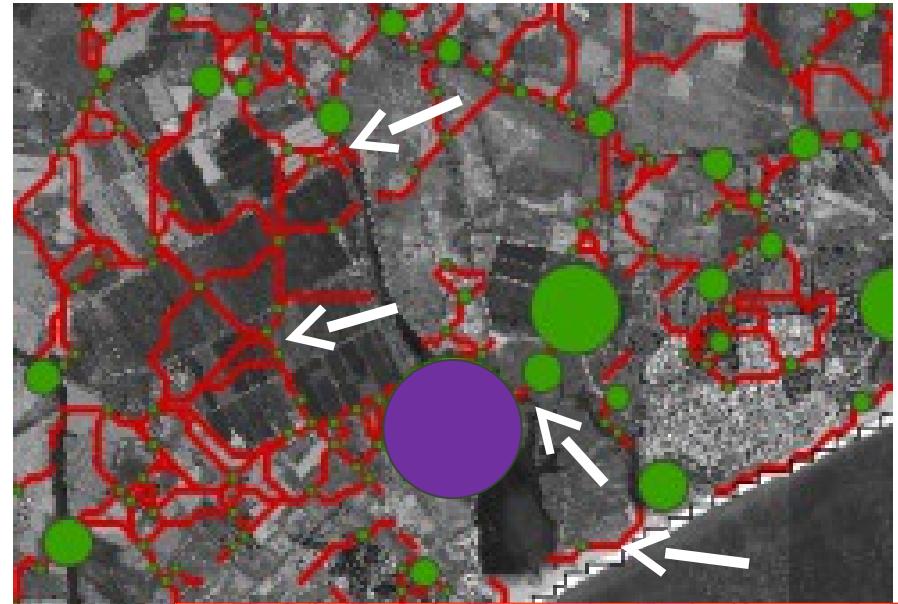
# Comparison between landscape graphs produced by images Spots and landscape graphs produced by landscape maps

Site scale: landscape graphs structure is different

Data generated from NDVI image



Data generated from landscape map



# Conclusion

To assess functional connectivity:

Selected database were more accurate,  
especially at the communal scale

Satellite images are more relevant for the  
structural connectivity treatment at large  
scale

# Perspectives

Creating scenarios of landscape connectivity

Comparing our results with the results of Green  
and Blue Way of each region

**Thank you for your attention**

