

# **EVOLTREE candidate ISS : Riparian Forest along Loire River near Orléans**

Correspondant Partner : P1d INRA (Marc Villar)

Ecological information :

riparian forest

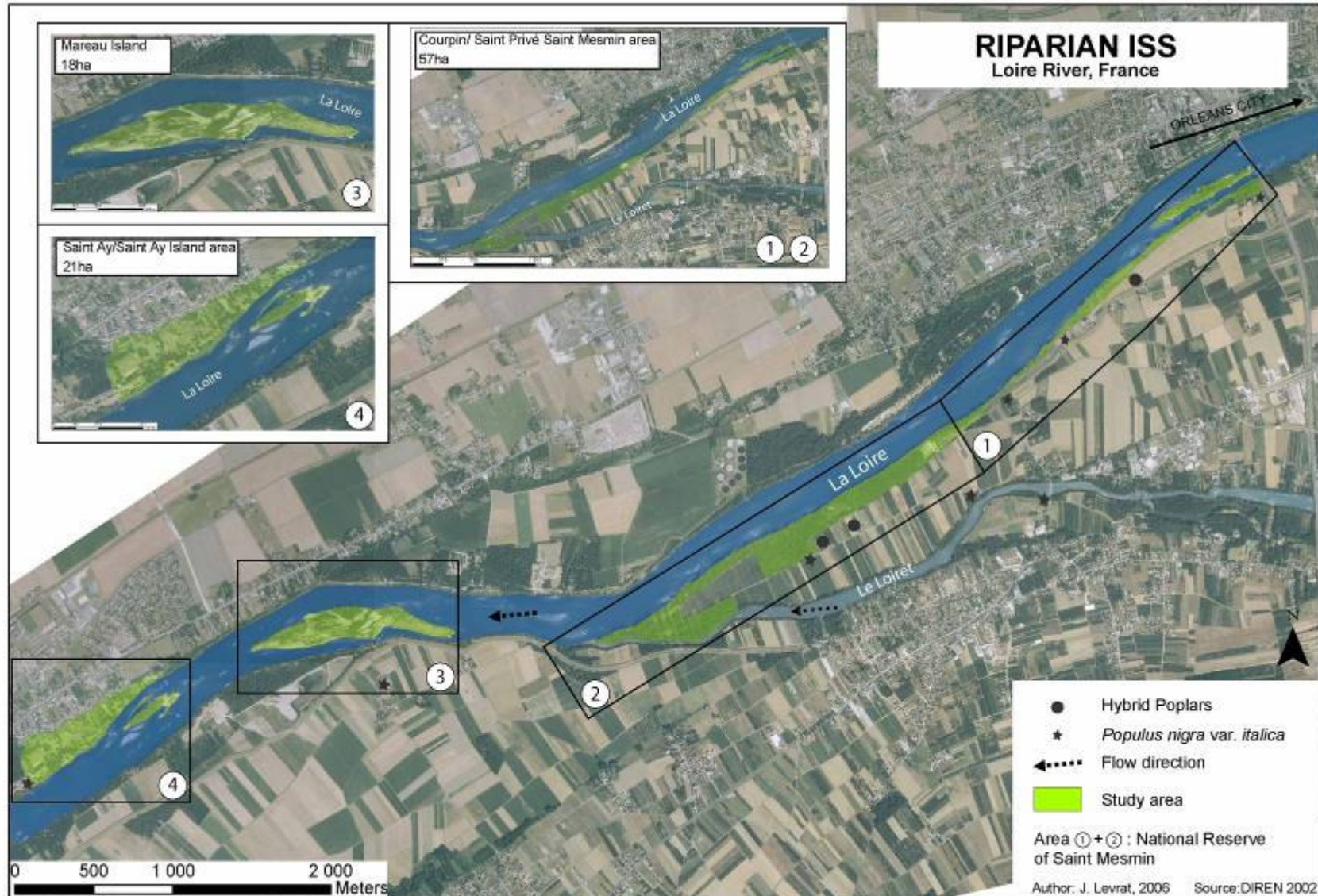
Model species : *Populus nigra*,

Target species : *Acer, Alnus, Castanea, Corylus, Crataegus, Fraxinus, Populus, Prunus, Quercus, Salix, Tilia, Ulmus.*

# ISS LOIRE RIVER PROJECT



## RIF-LOIRE : riparian forest corridor / 10km long



**Legal status : French Natural Reserve St Mesmin (1 + 2 + 3) + St Ay (4)**

## **Scientific value**

Description / within site diversity

Riparian forest composed of five different zones with biological links





Photo : M. Chanterreau

## RIPARIAN ISS Loire River, France



**Zone 1 : linear row of disseminated adult trees** of isolated *Populus nigra* and *Salix alba* (i.e. 97 *Populus nigra* on a 2.3km long, 30-50 years old).  
- Id. south bank + island.



**Zone 1 : cont.**

Photo M. Villar





**Zone 2 : dense mature riparian forest (at the confluence of Loire and Loiret rivers), near intensively managed orchards.**

Composition : Old remaining *Populus nigra* (80-100 years old) among *Acer* (present), *Alnus* (rare), *Castanea* (rare), *Corylus* (rare), *Crataegus* (important), *Fraxinus* (important), *Prunus* (present), *Quercus robur* (important), *Salix* (important), *Tilia* (rare), *Ulmus* (important, especially *Ulmus laevis*).

Photo : M. Juteau, C. Bastien





**Zone 2 : cont.**



Photo : M. Chantereau (NO)





Photo : M. Juteau

**Zone 3 : Large island of Mareau** with very dense cohorts of 8-10 years old populations of *P. nigra* and large areas of seedlings from 2004, 2005 and 2006.

**North part of the island is different**, with a higher elevation zone composed of mature forest with old remaining *Populus nigra*, *Ulmus* (important), *Quercus robur* (present), *Salix* (present), *Fraxinus* (present) and *Prunus* (rare).



Photo : J. Levrat



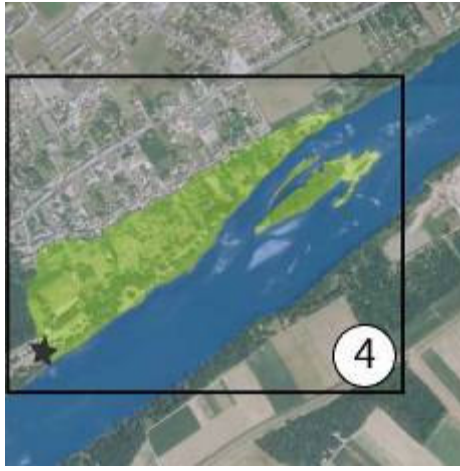
Zone 3 : North Upper part.



Zone 3 : North Upper part.

## Zone 3 : cont.





**Zone 4 : Smaller island of St Ay** with very dense cohorts of 8-10 years old young populations of *P. nigra* and young seedlings of *P. nigra* and *Salix alba*.

**Zone 4 North bank :** Mature stand of 500 *Populus nigra* (30-50 years old) linked with other forest tree species (*Salix* along the river bank and *Acer*, *Juglans*, *Ulmus*, *Prunus*).





Photo : M. Juteau



**Zone 4 North bank : cont.**

## Scientific value

### Within site comparability :

- (1) succession in time and space between juvenile to mature riparian forest.
- (2) diversity of gene pool between population of *Populus nigra* of zone 1 and zone 4 (i.e. distinct floral phenology)
- (3) large and dense cohorts of *Populus nigra* of different ages (mainly in the two islands)
- (4) spatial and temporal heterogeneity of the different zones

## **Past Research and available datasets :**

By Association des Naturalistes Orleanais (M. Chantereau) :

- (1) **Inventory and evolution** every 8 years of the **flora** of the riparian forest through fixed plots (data available : 1994 and 2002). Coordination : Network of the French Natural Reserve (10 NR are included in this dynamic inventory).
- (2) **Inventory and evolution of common birds**. Coordination : National Museum of Natural History (Paris), 2 measures per year every year since 2001.
- (3) **Mycological Inventory** : 315 species in zone 2.
- (4) **Insect (Coleoptera) and Arachnid** inventories made in 2003 and 2002.
- (5) Water level followed every week through piezometer.
- (6) Analysis from 8 series of aerial photographs since 1949 of zone 2.



## Past Research and available datasets :

By the Correspondant partner (P1d, INRA Orléans) :

- (1) **Inventory and georeferences** of 550 *Populus nigra*, of hybrid poplars, of ornamental *P. nigra var italica*, and seedlings patches of 2004 and 2005 in this ISS.
- (2) **Diversity studies** via phenotypic **evaluation *in situ*** (floral phenology and growth). Floral phenology on 57 trees of *Populus nigra* of zone 1 : data from 2003 to 2006. Floral phenology on 80 trees of *Populus nigra* of zone 4 : data in 2005 and 2006. Floral phenology on 420 other trees of the same zone 4 : data in 2006.
- (3) **Diversity studies** through nursery test with 6 copies of these 57 genotypes and phenotypic **evaluation *ex situ*** (foliar phenology, foliar characteristics, growth, architecture, SLA, rust tolerance). Current evaluation of tolerance to drought in nursery test of this population (in comparison with two other natural populations)
- (4) **Diversity studies** on these 57 trees via **12 microsatellites markers**.
- (5) Current **introgression studies** via pollen flow in between *Populus nigra*, hybrids cultivars and *P. nigra var italica* on 500 trees from north bank of zone 4 (maternal progeny collection with genotyping of adult trees)

## Past Research and available datasets :

By CNRS (N. Frascaria Lacoste, ENGREF, Partner 18) :

- (1) Floral phenology of 23 georeferenced *Fraxinus excelsior* in 2005 and 2006 in Zone 2. Estimation of introgression between *F. excelsior* and *F. angustifolia* via 5 microsatellites markers and chloroplastic markers. This zone is one of the 10 sites along the Loire river (from this site to Loire estuary) involved in such study of introgression.

## Scientific value

### Main interest for JERA 3 and JERA 4 and other JERA

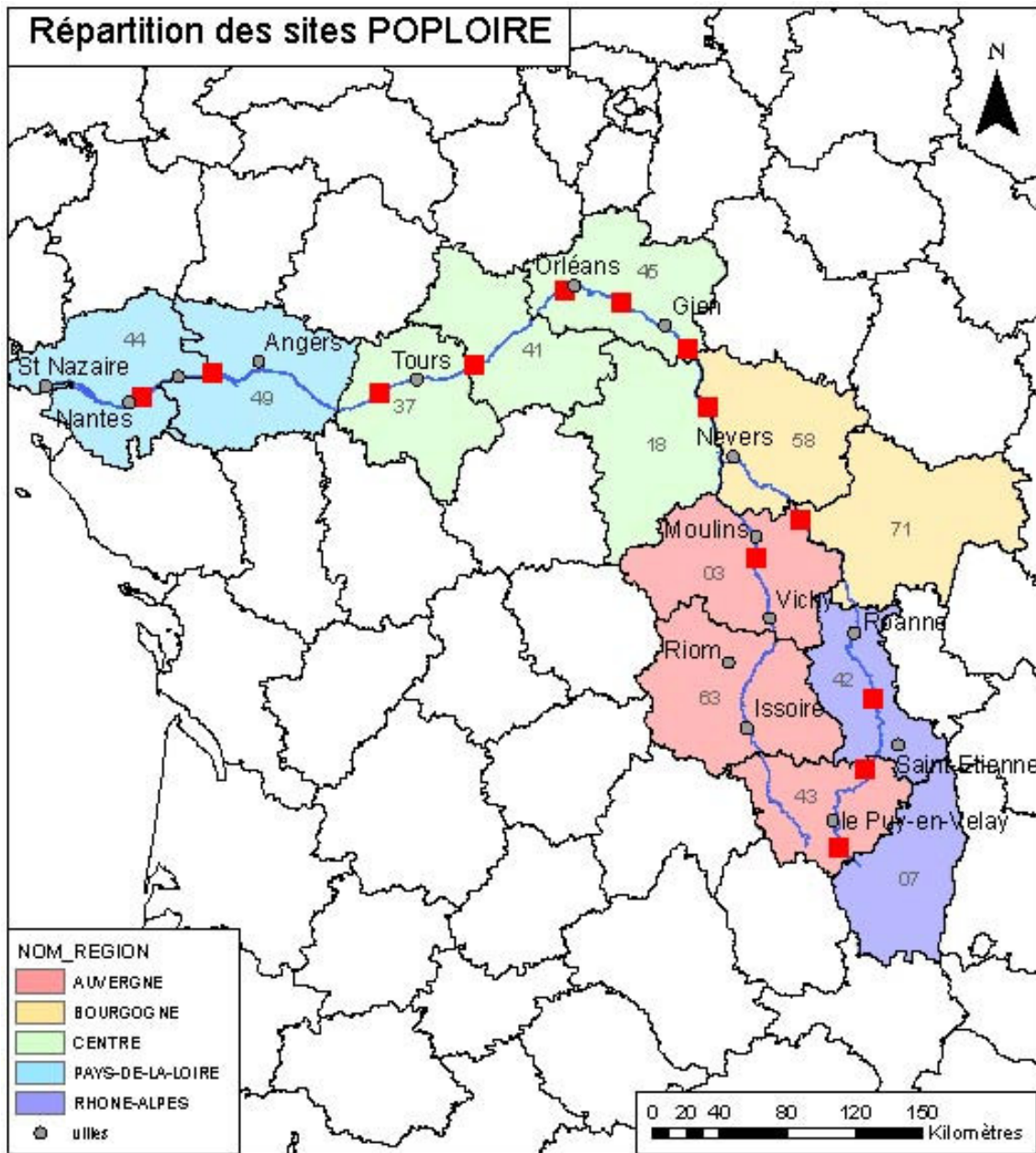
- (1) Long term natural ecosystem representing a long term experimental infrastructure (National protection). Riparian forests are hosting an important diversity of associated species, thanks to the characteristics of such buffer zone between water and agricultural lands.
- (2) Phytophagous insects and mycorrhizal fungi are present in these forests (observations made on *Populus nigra* only).
- (3) This ISS represents a unique site of 100 hectares along Loire river, at the vicinity of a large city with an important agriculture pressure (cf. aerial picture). Numerous other natural sites are present upstream and downstream of this ISS with protection status (data available through GIS inventory of *Populus nigra* stands along the 1000km long Loire river - current projet -). Loire River presents 3 Natural Reserves and 80% of its river banks are classified as Natura 2000 sites.



## RIF-LOIRE

### Main interest for JERA 3 and JERA 4 and other JERA

- (4) Numerous species of forest trees (inventory available), present in different configurations, that are part of the various landscapes of the Loire river.
- (5) Heterogeneity of different zones (mature and juvenile riparian forests, different density from row to very dense stands)
- (6) Important dynamics of this part of the river (still some winter or spring natural floodings), affecting dynamics of the juvenile riparian forests (on the islands).
- (7) Data available in term of GIS, phenology (*Populus nigra* and *Fraxinus sp*) and spatial distribution of genetic diversity of *Populus nigra*.

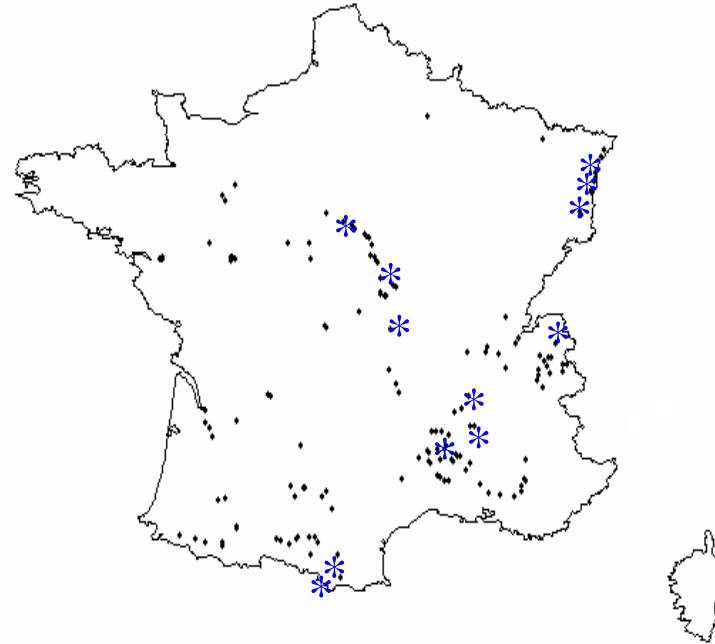


## ISS RIF-LOIRE

one of the 13 sites along the Loire river, involved in inventory and diversity studies of *Populus nigra* (National project)

## ISS RIF-LOIRE

one GCU of the national  
programme of conservation of  
genetic resources  
of *Populus nigra*.





**Welcome !**