

APPENDIX 2. Description of the studied SESs

Details on the social-ecological contexts of our four SESs

a. The Camargue SES

Situated in the delta of the Rhône River on the French Mediterranean coast in southern France, the Camargue is a landscape of rice fields, reed beds, marshes, halophytic scrublands and lagoons (Mathevet 2004). Rice is the main crop, either in rotation with wheat or in monoculture, crop diversity being limited by soil salinity (Barbier & Mouret, 1992). Intensive rice farming has promoted the desalinization of uncultivated lands and the development of the hydraulic network, sometimes to the detriment of natural wetlands. This landscape also presents extensive livestock breeding on non-arable lands. Hedges have gradually disappeared due to land restructuration and use of aerial chemical treatments through helicopters (Mathevet et al. 2002). The Camargue represents one of the most important wetlands in Europe for migratory birds. It is protected by a Regional Nature Park, a conservation tool based on local political will, that promotes landscape and biodiversity through territorial coordination, concertation and AES contracts with farmers. It also has been designated by UNESCO as a World Heritage Site and a biosphere reserve.

b. The Plaine et Val de Sèvre SES

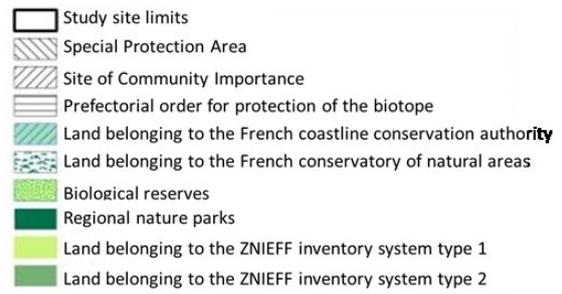
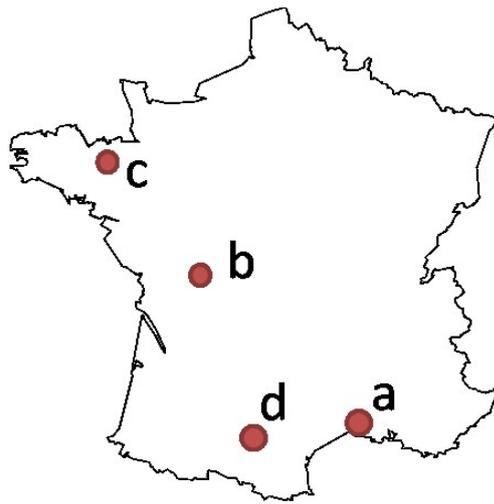
The "Plaine et Val de Sèvre" SES is a Long-Term Ecological Research (LTER) site located in Western France, southwest of Niort. The landscape is a grain-growing plain with intensive crop farming systems, mainly producing wheat, corn, sunflower, and rape (Agreste 2010). Over the last fifty years traditional mixed farming systems have been replaced by cereal systems only (Odoux et al. 2014) leading to a sharp decrease in meadows and grasslands. Agricultural intensification has also led to removal of most of the hedges since the 1960s (Berthet et al. 2012). Half of the study site has been designated as a Natura 2000 site according to the European Bird Directive (Figure A2.1). This conservation status allowed the implementation of local territorialized AES contracts with farmers on nearly 10,000 ha since 2011 (Odoux et al. 2014). These contracts are designed and managed by a local research center, especially to protect farmland birds.

c. The Armorique SES

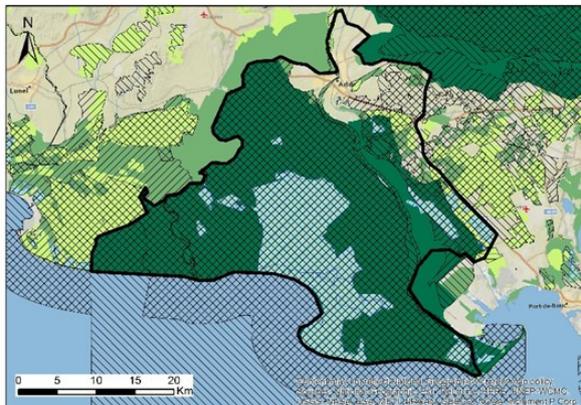
The Armorique SES site is located north of Rennes, in Brittany in western France. It is a landscape of low hills with patches of woods and hedges. Farming systems are mainly dairy cattle systems based on sown and permanent grassland, fodder maize and cereals (Thenail 2002). Only 10% of the arable lands are permanent grassland, due to the spread of intensive enclosed breeding. The landscape presents a gradient of hedge density. It used to be an area of dense bocage (i.e. irregular-shaped fields separated by hedges and ditches with forests) but from the 1950s to the 1970s, several public funded land consolidation and field restructuring led to the destruction of trees and hedgerows (Perichon 2004). More recently, several public replantation programs, like "Breizh Bocage", promote and fund replantation of hedges on part of the territory.

d. The Gascony Valleys and Hills SES

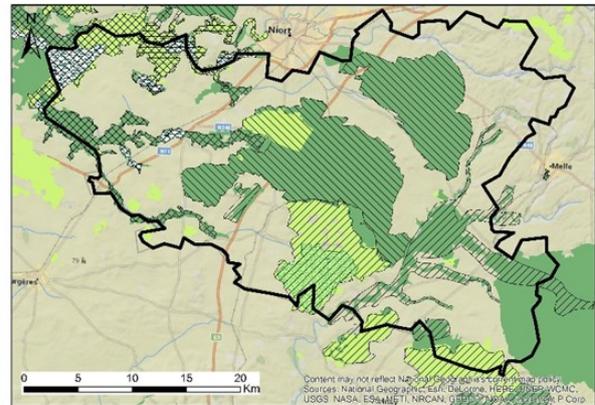
The Gascony Valleys and Hills SES is located 80 km southwest of Toulouse in southern France. The regional landscape is made up of steep hills and narrow valleys in a fine-scaled landscape mosaic of cropland, hedges, isolated trees and small forests. Natural constraints and the peculiarity of the local “house-based” social system have slowed down agricultural intensification and farm enlargement in this region (Choisis et al. 2010), maintaining mixed crop-livestock farming systems although farms are increasingly specializing in either crops or cattle (Ryschawy et al. 2012). There is no specific territorial policies to deal with landscape issues /or biodiversity conservation in this site. Some landscape diagnosis and planning have been conducted by official bodies at a larger scale but we found no evidence of any communication for the general public or any implementation at the local scale.



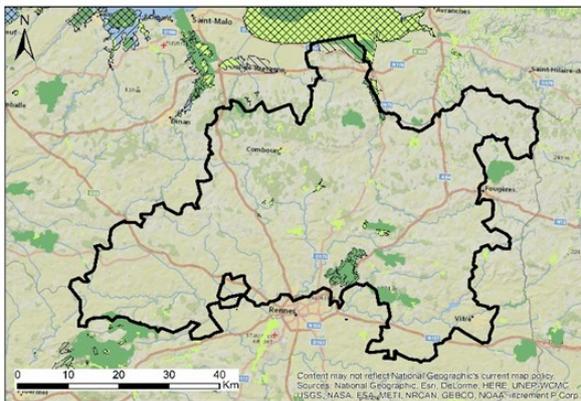
a. Camargue



b. Plaine et Val de Sèvre



c. Armorique



d. Gascony Valley and Hills

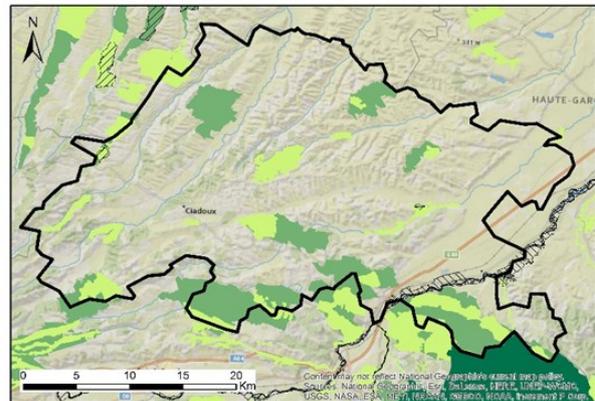


Figure A2.1. Local conservation policies on the four French study sites.

Details on sample characteristics in each SES

Table A2.1 Characteristics of sampled farmers based on studied SES. No. = Number; ND = No Data; AES = Agro-Environmental Scheme.

Study site	No. of farmers contacted (positive response rate)	Season of interview	No. of years of education after high school	age	% of farmers with organic farming practices	% of farmers who engaged in AES	% of farmers with livestock farming	% of farmers part of farmers' unions or other associations
Camargue (n=30)	55 (53%)	Spring	1,50 ± 2,12	52 ± 9	38%	53%	33%	70%
Plaine et Val de Sèvre (n=30)	40 (75%)	End of winter	0,03 ± 1,50	50 ± 10	17%	73%	53%	60%
Armorique (n=30)	49 (61%)	Beginning of winter	0,10 ± 1,67	47 ± 9	10%	ND	70%	57%
Gascony Valleys and Hills (n=29)	53 (57%)	Autumn	-0,10 ± 1,32	46 ± 10	10%	ND	79%	66%

Literature cited

- Agreste. 2010. Recensement Agricole – 2010. Actualité et statistique agricole, Paris.
<https://agreste.agriculture.gouv.fr/agreste-web/>
- Barbier, J.M., and Mouret, J.C. 1992. Le riz et la Camargue. *INRA Mensuel* 64:39–51.
- Berthet, E.T.A., Bretagnolle, V., Segrestin, B. 2012. Analyzing the Design Process of Farming Practices Ensuring Little Bustard Conservation: Lessons for Collective Landscape Management. *Journal of Sustainable Agriculture* 36:319–336. <https://doi.org/10.1080/10440046.2011.627988>
- Choisis, J.P., Sourdil, A., Deonchat, M., Balent, G., Gibon, A. 2010. Comprendre la dynamique régionale des exploitations de polyculture élevage pour accompagner le développement rural dans les Coteaux de Gascogne. *Cahiers Agricultures* 19(2):97-103.
- Mathevet, R. 2004. *Camargue incertaine: sciences, usages et natures*. Buchet-Chastel. Paris, FR.
- Mathevet R., Tourenq C., and Mesléard F. 2002. Agricultural policies, land-use and waterbird conservation: the case study of a major Mediterranean wetland, the Camargue. *Cybergeo, The European Journal of Geography*. <http://193.55.107.45/PAYSENV1/mathevet/mathevet.htm>
- Odoux, J.-F., Aupinel, P., Gateff, S., Requier, F., Henry, M., Bretagnolle, V. 2014. ECOBEE: a tool for long-term honey bee colony monitoring at the landscape scale in West European intensive agroecosystems. *Journal of Apicultural Research* 53(1):57–66. <https://doi.org/10.3896/IBRA.1.53.1.05>
- Perichon, S. 2004. L'impossible reconstruction des bocages détruits. *L'Espace Géographique* 33 (2):175–187.
- Ryschawy, J., Choisis, N., Choisis, J.P., Joannon, A., Gibon, A. 2012. Mixed crop-livestock systems: an economic and environmental-friendly way of farming? *Animal* 6(10):1722-1730.
- Thenail, C. 2002. Relationships between farm characteristics and the variation of the density of hedgerows at the level of a micro-region of bocage landscape. Study case in Brittany, France. *Agricultural Systems* 71:207–230. [https://doi.org/10.1016/S0308-521X\(01\)00048-8](https://doi.org/10.1016/S0308-521X(01)00048-8)