seamless

System for Environmental and Agricultural Modelling;
Linking European Science and Society

The major characteristics of scenarios and agricultural systems to be studied in Test case 1

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General part

Objective within the project

To provide all participants of the project, and especially WP leaders, with information on the type of scenarios and the type of agricultural systems which are targeted by SEAMLESS-IF. This deliverable is to be used as working document to develop practical examples of questions and systems to be addressed in the IP and particularly in Test case 1.

General Information

Task(s) and Activity code(s):	T61 – A612
Input from (Task and Activity codes):	T62 – A623
Output to (Task and Activity codes):	T13 – A136
Related milestones:	

Executive summary

In order to test and improve the SEAMLESS Integrated Framework and its components two Test cases have been identified and are considered as representative of the types of questions that SEAMLESS-IF is designed to address, combining top or bottom driven issues with economic or environmentally driven issues. The objective of this deliverable is to describe the major characteristics of scenarios and systems which will form the basis of Test case 1 which is mainly driven by economic policies. We first describe the major characteristics of the baseline scenario (implementation of CAP reform until 2013) and of the policy scenario based on WTO negociations. These scenario will be applied at EU level (not described here) and on specific agricultural regions in EU (two in France, one in Poland) and in a developing country (Mali). The description of these agricultural systems and of their major types of farms, based on a system approach, is presented in this document and illustrated in more details in its four appendix (one per region) using a system approach. This deliverable is to be used as working document to develop practical examples of questions and systems to be addressed in the IP and particularly in Test case 1.

Scientific and societal relevance

This deliverable has no other objective than providing working materials for other WP in the conceptualisation phase of SEAMLESS-IF, and especially for Activity A136 of WP1 (specification of a procedure for application of SEAMLESS-IF to concrete policy and innovation issues).

Specific part

1 Introduction

Ignacio PEREZ, Thomas HECKELEI, Jacques WERY

The overall objective of WP6 is to test and improve the SEAMLESS Integrated Framework and its components by using them in typical real situations combining the various spatial scales addressed in the project. The application of SEAMLESS tools (indicators, data bases, quantitative models, etc.) in the short term to these representative test cases was regarded by the European Commission as an important step in the evaluation and future development of the project. With this purpose, two test cases are foreseen: test case 1 focusing mainly on policy changes at EU level (reform of the CAP) and world wide (ongoing WTO negotiations), and test case 2 focusing on changes driven by environmental policies at the meso scale. The idea behind these test cases is to evaluate the effects of changes in the European agricultural policy framework (CAP), the adoption of the current Doha round (trade liberalisation) and introduction of environmental legislation (nitrates directive, water framework directive at European level and Kyoto Protocol at international level) on several sustainability and multifunctionality indicators (agricultural income, relative competitiveness of agricultural activities within and outside of the EU, environmental impacts, labour supply, etc.). The scenarios will be applied with a EU coverage at NUTS2 levels with a limited set of assessment indicators and on typical regions with more detailed set of indicators. These regions are the Massif Central in France, the Neste System in France,the Pyrzyce region in Poland, the Sikasso and Koutiala regions in Mali.

In this internal project deliverable the main characteristics of scenario and agricultural systems used in test case 1 are described. It is completed by four appendix (PD611_appendix), one for each region, with photographs of typical systems and their components.

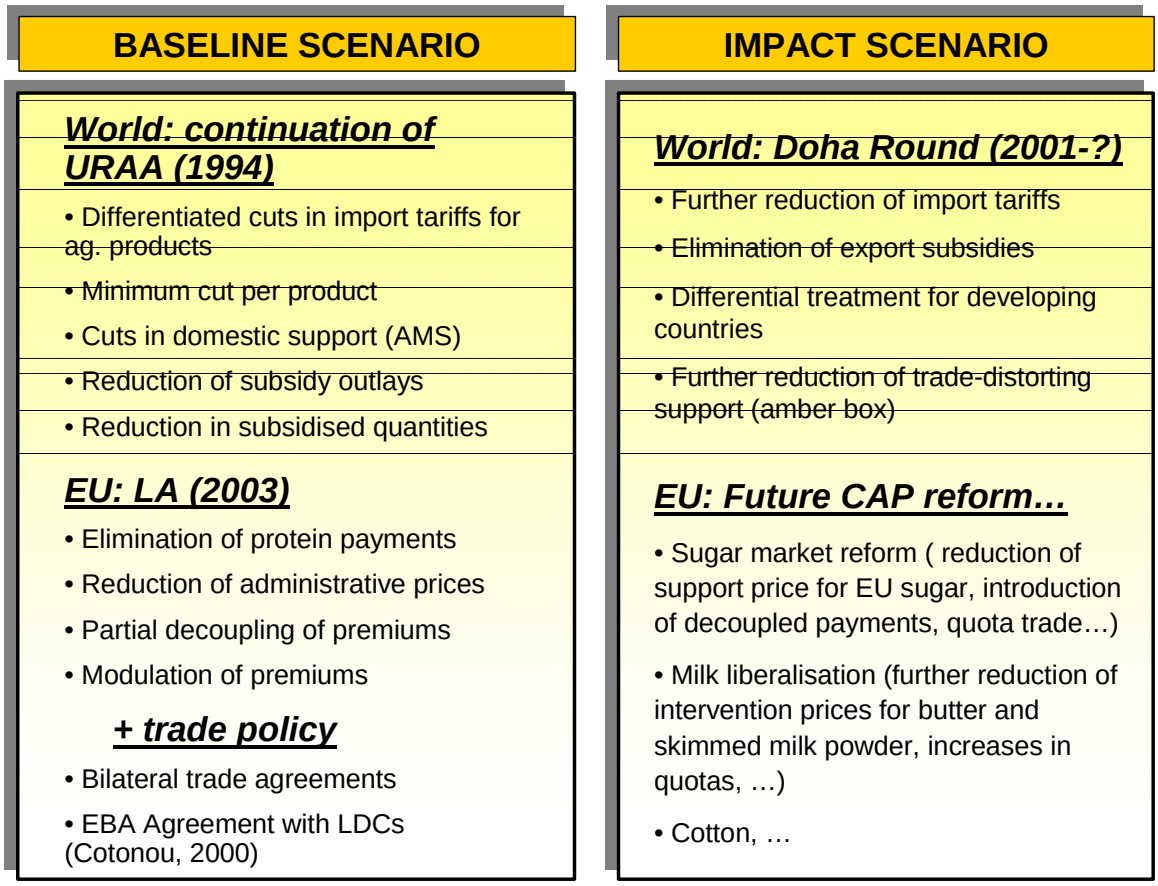
2 Scenario Setting and Objectives

In the Doha WTO ministerial declaration (WTO, 2001) WTO members agreed on the need to continue the process of reform initiated with the Uruguay Round and further liberalise trade policies. The aim was "to promote the recovery, growth and development of the global economy". This decision has important implications for the agricultural sector, especially for developed countries, since agriculture has been historically (and remains) one of the more distorted economic sectors. Improvements in market access and differential treatment for developing countries, further multilateral tariff reductions, phasing-out of export subsidies and other export support measures, and the reduction of trade-distorting domestic support are key issues being currently addressed in the course of WTO negotiations.

Within this political framework, the European Commission approved in 2003 a set of measures to reform the CAP ("Luxembourg agreement") (European Commission, 2003). These measures were meant to help in the adaptation of the European Union to challenges posed by EU enlargement and to strengthen its negotiating position in the WTO. The CAP reform's most important element is a replacement of premium payments coupled to certain production activities by "decoupled" payments largely independent of current production decisions. Beyond that, the reform measures comprise a modest cut in domestic support (modulation), some reduction of price safeguards (and indirectly reduced subsidies for exports and interventions in agricultural markets), as well as a shift of payments to environmental programmes and rural development schemes.

Apart from the Luxembourg agreement – which is now part of "current" policies – the commission saw the need to respond to growing international pressures and preferential agreements with developing countries ("Everything but Arms initiative") and suggested a reform of the sugar common market organization (CMO), a highly contentious issue due to strong lobbying efforts by affected interest groups. Furthermore, the discussion on the future of the milk quota and corresponding market support measures continues and generates interest of policy makers on impacts of possible reform options. Both, the already initiated change of the CAP related to the Luxembourg Agreement and the possible reforms of the sugar and milk CMO's are linked to current international trade negotiations and analysis requires an integrated perspective (see following figure).

Figure (1) Links between WTO commitments and the ongoing CAP reform



URAA: Uruguay Round agreement on agriculture; LA: Luxembourg Agreement on CAP Reform (European Commission, 2003); AMS: total aggregate measurement of support; EBA: everything but arms agreement; LDCs: least developed countries

Given this background we suggest as the main *objective of test case 1* with respect to the content of analysis to assess the combined impact of further international trade liberalisation and EU-reform of the CMO's for sugar and milk on the agri- environmental system within the EU, international trade, and agri-environmental systems of developing countries.

In SEAMLESS the analysis of indicators takes place at different spatial levels: *"from the farm to the world markets"*. Despite the macro perspective of the policy change to be analysed, this is quite relevant for the evaluation of test case 1, since effects of market policies on the farm level via prices can be substantial. Furthermore, changing economic policies might imply environmental consequences to be measured with biophysical models and indicators at low spatial scale. Consequently, different economic and biophysical models and indicators covering the different spatial scales are chosen and linked in the course of analysis. Indicators will also be used to capture the major social issues, especially at meso levels (from NUTS2 region to farm level).

The specific objectives of test case 1 are:

(1) To understand the economic mechanisms behind the different domestic and international trade-distorting instruments and the links between them.

(2) To assess impacts of liberalising international trade and domestic policies on markets for agricultural products at the international and EU level.

(3) To assess impacts of liberalisation through the price mechanism on the economic conditions of different farm types and regions. In more detail on three representative European regions: the Massif Central in France (extensive cattle production, importance of origin trading marks like cheese, regional payment schemes), the Pyrzyce region in Poland ("new" Member State, good cereal region, important water basin) and the Neste System in France (good cereal region with intensive cropping and irrigation) at least for test of prototype 1.

(4) To assess impacts of liberalisation on some environmental aspects at EU (NUTS 2) level and in more detail in the EU test case regions.

(5) To assess impacts of liberalisation (including change in cotton support) on markets, farming systems and environment in two regions of Mali.

3 Use of Quantitative Models and Indicators

In order to evaluate the impact of specific shocks in the system the use of several interlinked quantitative models has been foreseen in SEAMLESS-IF. They can be ordered on the spatial scale they work on. In the following figure an overview of spatial levels, models used and some scenario variables analysed is offered.

Table (1) Connection between disaggregation levels, models and scenario variables in test case 1

Spatial Level	Farm	Farm-type/ Administrative Region	Member State	EU-25	World
Model applied	FSSIM, APES	FSSIM, CAPRI	CAPRI, GTAP	CAPRI, GTAP	CAPRI, GTAP
Example scenario variables analysed (not exhaustive)	Production Technology	Regional premiums, agricultural income, …	Regional allocation of payments (decoupling)	National allocation of payments (decoupling)	Preferential trade agreements, TRQs, …

SEAMLESS-IF should be able to work from right to the left (impact on the market level of changes in farm systems) and from the left to right (impact on the farm of changes in market variables). Both will be tested in test case 1.

4 Data Requirements for Scenarios

In this section an overview of the typology of data needed for the design of test case 1 is given. The list of data needed is not exhaustive, since the specific indicators modelled are still not specified.

4.1 Base year period

In a modelling framework, *the base year should refer to a recent or current situation, for which a complete data set is available* (with which different behavioural functions used in the simulation part are calibrated)[2]. These initial data are behind any simulation exercise. For the purposes of SEAMLESS test case 1, the following data are needed:

– Physical data: land use, yields (input in CAPRI/GTAP and output in APES, as response to technical changes at farm levels) and production statistics, etc.

– Economic data: revenues, costs, premiums, budgetary outlays, prices (domestic producer and consumer prices, world market prices), etc.

– European policy data: CAP premiums, intervention purchases, export subsidies (current notifications to the WTO), etc.

– World policy data: bilateral trade flows, import tariffs (specific and ad-valorem, rates of application), CSEs, PSEs, tariff rate quotas and preferential agreements between main world trade partners, etc.

4.2 Baseline scenario

In test case 1 *the baseline scenario comprehends the implementation of the current CAP until 2013*[3]. The following data are needed (not exhaustive):

– Shift of demand preferences for agricultural products; evolution across time

– Inflation, exchange rates and GDP growth.

– Evolution of current market policies (agreed schedules): import tariffs, tariff rate quotas, export subsidies (commitments)

– Implementation plan of CAP reform in each country until 2013

4.3 Impact scenario

In the impact scenarios changes in the current policy framework are analysed in the future. The following data are needed:

[2] For the first prototype, the base year period will be a three-year average around 2001 or 2002, depending on the data availability for the different models involved in the test case (e.g. CAPRI, GTAP, …).

[3] This will probably be 2013, although not final decision has been taken.

- Specific policy shock to introduce in the model: WTO proposal on trade liberalisation, comprehending changes in: domestic support, administrative prices, tariffs, tariff rate quotas, etc.
- A complete description of the specific CAP measures to be implemented in the simulation period (if not covered in the base year, e.g. milk and sugar reform) and other reform processes (sugar, milk, cotton, etc.).
- The development of some new environmental friendly technologies will be added in a second impact scenario (organic or integrated farming are examples but others will be selected from the Environmental Technology Action Plan from the European Commission).

5 Test Case Regions

Jacques WERY, Ignacio PEREZ

5.1 Comments on tables

The following tables present the major characteristics of the systems which are included in -or which include- the agricultural regions chosen for Test Case 1 (following the WP1 conceptual framework). As the first prototype of Seamless-IF will not be able to simulate all agricultural activities (especially animals, grasslands and horticultural crops) it will be tested only on systems in which grain crops are important (i.e. the Neste region in France, the Pyrzyce region in Poland, and the Koutiala and Sikasso regions in Mali). The second prototype will be tested on all European regions (the previous ones plus the region of the Massif Central). Illustrations (maps, tables and photographs) for these regions are given in separate files.

The following structure for the tables could be**:**

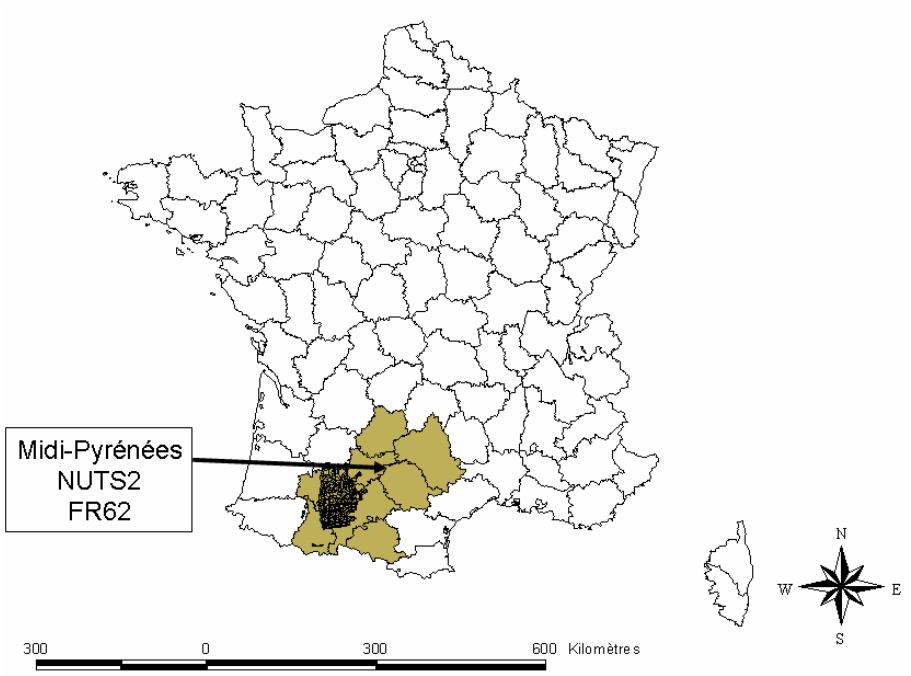
- *System name and boundaries (A):* described according to the nested systems theory presented by Frank Ewert in WP1. In a simplified way it means that each system (a column in the table) is included in a system or several systems at an upper level).
- *System aspects (B):* in reference to the system's theory presented by Frank Ewert in WP1. An "aspect" mean here an attribute the system's may have (or an influence it may have on upper level) with regards to sustainability and multifunctionality.
- *System components (C):* what are the components of the systems which are essential to predict its behaviour?
- *Key decision makers and stakeholders for the system (D):* major actors having an influence on the system or being influenced by it.
- *Data (E):* type of data required to simulate the system or to calculate an indicator.
- *Administrative region (1):* in which the agricultural region is included or to which it belongs.
- *Administrative sub*-region (2): in which the agricultural region is included or to which it belongs.
- *Agricultural region (3):* it is the system ("region") we have selected as homogeneous in its agricultural activities and sustainability issues (Neste, Cheese producing region in Central Massif, Pyrzyce,…)
- *Natural system (4):* a typical landscape, a watershed, etc.
- *Farming system (5):* farm-types are used to describe the most typical/frequent farming system in the agricultural region. At this stage a simplified description of an average farm of the major type is given. In a second step selection of actual farms, on which WP6 partners have data, will be done. In addition farm types at the NUTS2 level will have to be identified, in agreement with the farm types of the CAPRI model

5.2 Neste Region (France)

Jacques-Eric BERGEZ, Delphine LEENHARDT

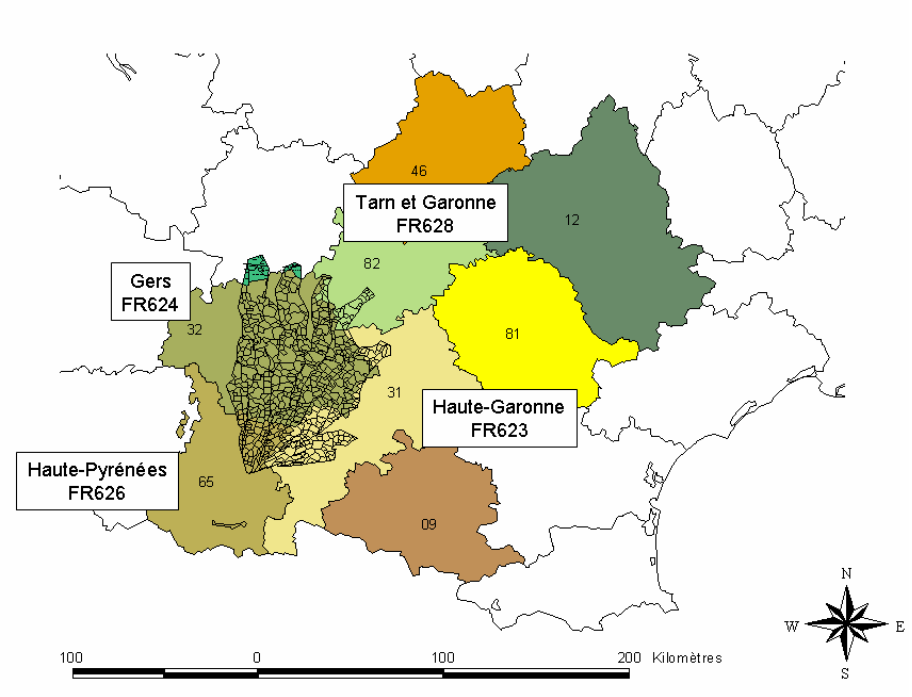
The Neste system (around 12000 km²) is mainly included in Midi-Pyrénées Region (NUTS2 – FR62): the part included in Aquitaine Region (NUTS2 – FR61) will not be considered since it is very small. The Neste system is part of 4 French Departments (NUTS 3 – FR624, FR626, FR623, FR628) of Midi-Pyrénées (NUTS2 – FR62) – see Fig (2) to (4):

Figure (2) The Neste Region is in south-west France and is part of NUTS2 FR62



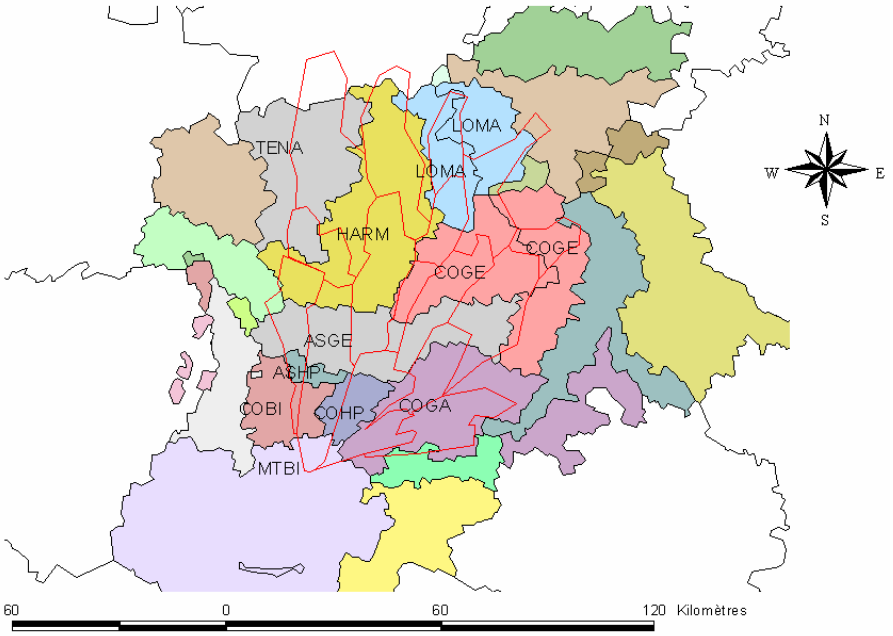
Source: GIS output from Leenhardt for the SEAMLESS project

Figure (3) The Neste Region concerns 4 French departments (NUTS3)



Source: GIS output from Leenhardt for the SEAMLESS project

Figure (4) French small agricultural regions part of the Neste System



Source: GIS output from Leenhardt for the SEAMLESS project

5.2.1 Meso-level

The table below give the major characteristics of the agricultural systems identified at meso-level, i.e. at intermediate levels between EU (macro-level) and farm (micro-level). These systems will be involved in the implementation of the scenarios with SEAMLESS-IF either as intermediate levels in up (down) scaling processes (e.g. NUTS 2 level in CAPRI) or as level of production of assessment indicators (eg. Agricultural Region, Natural System).

Table (2) Meso-level detailed information for the Neste region

		(1) Administrative Region	(2) Administrative Sub-Regions					(3) Agricultural Region	(4) Natural System
(A) System name and boundaries	**Name**	Midi-Pyrénées (FR62)	Gers (FR624)	Hautes-Pyrénées (FR626)	Haute-Garonne (FR623)	Tarn et Garonne (FR628)		Neste	
	Level	NUTS 2	NUTS3	NUTS3	NUTS3	NUTS3	NUTS4= communes = LAU2		Hilly landscape with flat areas. Deficient region regarding water budget. Irrigated areas based on rivers filled from dams (Fig 4 to 6)
	Area	45348 km²	6301 km²	4521 km²	6357 km²	3731 km²	670 communes in Midi-Pyrénées and 44 communes in Aquitaine (actually not taken into account in the project to simplify databases	10437 km² 10055 km² (96%) are in FR62 (Midi-Pyrénées)	

		(1) Administrative Region	(2) Administrative Sub-Regions					(3) Agricultural Region	(4) Natural System
							queries)		
	Number of subsystems	8 Departments but only 4 concerned by the Neste System							

		(1) Administrative Region	(2) Administrative Sub-Regions					(3) Agricultural Region	(4) Natural System
(B) System aspects	**Economic**	GDP[4]= 57 577 10^6 € 3.8% of France IBP 8th region in France Crop productions 2119.4 10^6 € Animal production 1709 10^6 € In economic activities, agriculture represents 3.8% and food industry 2.5% The main economic sectors are space and aeronotic industries	Agriculture income repartition (part of agricultural IBP): Corn= 14% Wheat= 13% Cereals (sum)s = 29% Oil crops = 14% Wine= 12% Poultry = 16%	Agriculture income repartition: Corn = 20% Fourrage = 16% Cattle = 12% Poultry = 13%		See Fig 7			
	Social	Total population =2 552 000 Active population = 985000 (in Agricultural activities: 7%) In 1999, the population decreased -0.10% since 1990	Total population =172 335 Active population = 63696 (in Agricultural activities: 25%)	Total population =222 368	Total population=1 046 300 Active population=429 283	Total population=206 034 Active population=73410 (in agricultural activities: 12.6%)			
	Environmental	Midi Pyrenees is very large region with many different natural region, mountain, piedmont, hillsides and plain						The main problem regarding water resource is a scarcity problem	

[4] GDP= Gross Domestic Product

		(1) Administrative Region	(2) Administrative Sub-Regions					(3) Agricultural Region	(4) Natural System
		The mainly environmental stakes are, the erosion, the water using for irrigation, and the mountainous landscape preservation						during summer due to a great development of irrigated maize. A problem of water quality exist also due to nitrate and pesticides pollution.	
(C) System Components	**Agricultural activities**	The three main activities are : bovine livestock, ovine livestock and field crops Cf. Fig. 8 SAU= 2559000 ha In which: Annual crops = 1927000 ha Total cereals= 719248 ha Maize = 224 427 ha STH = 931000 ha 372700 ha irrigable	SAU= 461947 ha In which: Total cereals= 212030 ha Maize = 78285ha STH = 25733 ha	SAU=130944 ha In which: Total cereals= 49795 ha Maize = 41772 ha STH = 47354 ha	SAU= 346035 ha In which: ha Total cereals= 147474 ha Maize =36373 ha STH = 50700 ha	SAU=224 181 ha In which: Total cereals= 86702 ha Maize =34097 ha STH = 30846 ha		In the northern part, field crops are dominating. They include mainly wheat and sunflower in rotation (mainly on slopes), but also maize and soybean that are irrigated (mainy in lower geomorphological positions). In the southern part, farms with livestock are more numerous. The land use is dominated by woods and pastures.	
	Other activities	Large industries such as Airbus or CNES Leisure and tourism							
(D) Key decision makers and stakeholders	**Manage the system**	Direction Régionale de l'Agriculture et de la Forêt, DIRection Régional de l'ENvironnement, Agence de l'eau Adour Garonne	DDAF 32 MISE 32	DDAF 65 MISE 65	DDAF 31 MISE 31	DDAF 82 MISE 82		Compagnie d'Aménagement des Coteaux de Gascogne	
	Is influenced	Chambre régionale d'Agriculture de Midi-Pyrénées	CDA 32	CDA 65	CDA 31	CDA 82		Cooperatives	

		(1) Administrative Region	(2) Administrative Sub-Regions					(3) Agricultural Region	(4) Natural System
for the system	**by the system**								
	Has an influence on the system	Chambre régionale d'Agriculture de Midi-Pyrénées	CDA 32	CDA 65	CDA 31	CDA 82		Cooperatives	
(E) Data	**Provided by WP6**							SICOMORE farm types, General survey of agriculture data	
	Required from WP4							FADN, LUCAS, CorineLandCover	

5.2.2 Micro-level

The farm types described here are for information on typical farming systems of the region and will be used to calibrate FSSIM. They will not be used to implement the scenarios, for which farms will be virtual and in agreement with the regional typologies.

Farm presented below come from the SICOMORE Database of the Chambre Régionale d'Agriculture de Midi-Pyrénées. They have been selected among a panel of some 70 farm types describing the Neste system zone.

Table (3) Micro-level detailed Information for the Neste region: farming system level (5)

		Farm 1: field crops, average farm	**Farm 2: crop livestock, average farm**	**Farm 3: field crop, big farm**	**Farm 4: crop livestock, big farm**
(A) System name and boundaries	**Level**				
	Area	agricultural area= 45 ha	agricultural area = 41 ha	agricultural area = 95 ha	agricultural area = 76 ha
	Number of subsystems				
(B) System aspects	**Economic**	Some data exist (in Francs)	Some data exist (in Francs)	Some data exist (in Francs)	Some data exist (in Francs)
	Social	1 annual work unit	1.3 annual work unit	1.4 annual work unit	1.8 annual work unit
	Environmental				
(C) System components	**Agricultural activities**	5.9 ha fallow 1.5 ha winter barley 5.8 maize (not irrigated) 1.7 ha rapeseed 5.2 ha hard wheat 13 ha wheat 8.4 ha sunflower (not irrigated) 3 ha soybean (not irrigated) 0.5 ha melons 250 ducks (canards à gaver)	2.8 ha fallow 0.6 ha winter barley 7.5 maize (irrigated) 5.4 ha wheat 3.3 ha sunflower (not irrigated) 1 ha soybean (irrigated) 0.4 ha silage maize 10.9 ha cocksfoot alfalfa (4 years) in production 3.6 ha cocksfoot alfalfa (4 years) in sowing 5.5 ha pasture	11.6 ha fallow 2.9 ha winter barley 9.1 maize (irrigated) 3.5 ha rapeseed 10.2 ha hard wheat 24.1 ha wheat 18.1 ha sunflower (not irrigated) 1.6 ha sorghum (not irrigated) 3.3 ha soybean (not irrigated)	6.4 ha fallow 1.4 winter barley 17 maize (irrigated) 13.6 ha wheat 6.9 ha sunflower (not irrigated) 2.4 ha silage maize 14.9 cocksfoot alfalfa (4 years) in production 5 ha alfalfa (4 years) in sowing 33 cows (Blondes

		Farm 1: field crops, average farm	Farm 2: crop livestock, average farm	Farm 3: field crop, big farm	Farm 4: crop livestock, big farm
			300 ducks (canards à gaver) 21 cows (Blondes d'Aquitaine – broutard)	2.8 ha spring pea irrigated 1 ha melons 0.5 ha vine yard for wine 3.5 cocksfoot alfalfa (4 years) in production 1.1 ha alfalfa (4 years) in sowing 5 cows (Blondes d'Aquitaine – broutard) 1.7 ha pasture	d'Aquitaine – broutard) 6.2 ha pasture >1000 ducks ("canardsà gaver")
	Other activities				
(D) Key decision makers and stakeholders for the system	**Manage the system**	The farmer	The farmer	The farmer	The farmer
	Is influenced by the system	The farmer's family	The farmer's family	The farmer's family	The farmer's family
	Has an influence on the system	The farmer's family	The farmer's family	The farmer's family	The farmer's family
(E) Data	**Provided by WP6**				
	Required from WP4				

5.3 Massif Central (France)

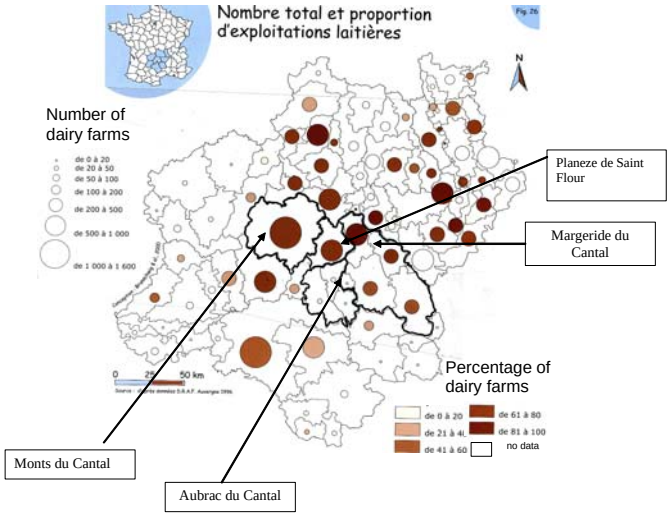
Geneviève BIGOT, Vincent THENARD, Etienne JOSIEN

The Massif central agricultural region chosen for Test case 1 overlaps three nuts3 zones (Aveyron, Cantal, Lozère), corresponding to three nuts2 zones (Auvergne, Languedoc-Roussillon, Midi-Pyrénées). See map n°1.

Figure (5) Zone situation according to administrative regions

Source: Map from Brunschwig completed by Thénard for the SEAMLESS project

Figure (6) Map of the zone



Source: Map from Brunschwig completed by Thénard for the SEAMLESS project

5.3.1 The main table is divided into three sub tables : nuts2 and nuts3 characteristics, natural system characteristics, and farming systems characteristics.

Table (4) Meso-level detailed information for the Massif Central

		(1) Administrative Region	(2) Administrative Sub-Region	(1) Administrative Region	(2) Administrative Sub-Region	(1) Administrative Region	(2) Administrative Sub-Region
(A) System name and boundaries	**Name**	Auverne	Cantal	Midi-Pyrénées	Aveyron	Languedoc-Roussillon	Lozère
	Level	NUTS 2	NUTS3	NUTS 2	NUTS3	NUTS 2	NUTS3
	Area	2,6 M ha	577 755 ha	4, 535 M ha	877 122 ha	2.740 M ha	517 664 ha
	Number of subsystems		8 small agricultural regions Test case area based on 12 LAU2 (give significance of LAU2 below the table) in "Aubrac" 76 LAU2 in "Cantal" 33 LAU2 in "Planèze de St Flour" 27 LAU2 in " Margeride		8 small agricultural regions Test case area based on 20 LAU2 in "Aubrac"		4 small agricultural regions Test case area based on 92 LAU2 in "Margeride" 10 LAU2 in "Aubrac"

		(1) Administrative Region	(2) Administrative Sub-Region	(1) Administrative Region	(2) Administrative Sub-Region	(1) Administrative Region	(2) Administrative Sub-Region
(B) System aspects	**Economic**	GDP[5] =27 586 M€; 1.8% of France, 18th region in France Economic activity is dominated by agriculture (3.9%) and food industry (4.0%), and tourism	Cantal totalize 7 365 enterprises which employ 57 461 persons. Economy is highly influenced by agriculture and food industry..	IBP=57 577 M€; 3.8% of France, 8th region in France In economic activities agriculture represent 3.8%, and food industry 2.5%	Aveyron totalize 14 067 enterprises which employ 103 632 persons Economy is highly influenced by agriculture and food industry..	IBP=46 121 M€; 3.0% of France, 11th region in France In economic activities agriculture represent 4.2%, and food industry 2.4%	Lozere totalize 4 028 enterprises which employ 29 025 persons Economy is highly influenced by agriculture and forest industry..
	Social	Total Population = 1,31 millions of inhabitants in 1999, the population decreased -0.10% since 1990 Density of population is 50 inhb/km2 It is also ageing (25 % over 60 years vs 20 % for France). Active population =524 484 in agricultural activities:6.7% Unemployment is 8.5 % (vs 9.9 % in France) and the income per person is 14 647 € / inhb / year vs 16 282 € for France.	Cantal is a rural department with only 26 inhb/km2 Annual population decreasing is 0.57% since 1990. Unemployment is 6.3% and the income per person is 12 029 €. On the other side, the second homes represent 21.2 % of housing	Total population =2,552 millions of inhabitants in 1999, the population decreased -0.10% since 1990 Density of population is 56 inhb/km² 25% over 60 years Active population =1 057 269 in agricultural activities: 6% Unemployment is 9.9 % The income per person is 14 101 € / inhb / year	Aveyron is a rural department with 30 inhb/km². Annual population decreasing is 0.26% since 1990 Unemployment is 6.1% and the income per person is 13 032 €	Total population =2,339 millions of inhabitants in 1999, the population decreased -0.10% since 1990 Density of population is 84inhb/km² 25% over 60 years Active population =831 450 in agricultural activities:5.6% Unemployment is 14 % The income per person is 12 834 € / inhb / year	Lozère is a rural department with 14 inhb/km². Annual population increasing is 0.10% since 1990 Unemployment is 5.5% and the income per person is 12 841 €

[5] GDP = Gross Domestic Product

		(1) Administrative Region	(2) Administrative Sub-Region	(1) Administrative Region	(2) Administrative Sub-Region	(1) Administrative Region	(2) Administrative Sub-Region
	Environmental	Auvergne is mainly a low mountain region (600 to 1800 m asl) with a very high value natural patrimony according to the richness of the scenaries (volcanos, lakes) and the biodiversity (see pictures 1) .It has two Natural Parks. Water quality and air quality are very high.	Cantal is exclusively a mountainous region	Midi Pyrenees is very large region with many different natural region, mountain, piedmont, hillsides and plain The mainly environmental stakes are, the erosion, the water using for irrigation, and the mountainous landscape preservation	Aveyron is a piedmont and mountainous region, 64% of the territory are hills and dry limestone plateaus, 34 % are mountains The forest represents 1/3 of the area.	Languedoc Roussillon is a large region with many different natural region, low mountain, dry hills and littoral plain The mainly environmental stakes are, the erosion and forest fires, linking with the land abandonment	Lozere is a mountainous region (average 979m) The forest represents 1/3 of the area.

		(1) Administrative Region	(2) Administrative Sub-Region	(1) Administrative Region	(2) Administrative Sub-Region	(1) Administrative Region	(2) Administrative Sub-Region
(C) System Components	**Agricultural activities**	Agriculture is mainly cattle husbandry (suckle cows and milk cows) on grass area, in the mountains. In the plain area some crops production are developed (table 2) Number of farms is 27 224 for an average of 76 ha / farm.. Mean of farmer's age is 44,5 and increasing. Main farm orientations are meat cows husbandry (28%), milk cows husbandry (22 %). Meadows cover 66 % of the agricultural area. A part of the milk is transformed in PDO cheese, with a variable added value.	Agricultural area is 369 00 ha which grasslands represent 80%. 6 640 farms of 52 ha in average Cattle (for milk and meat) produce 70% of agricultural value. Dairy farming is important : 22 firms produce 47 526 t of cheese (ie 55% tonnage made in Auvergne) and 78% of regional PDO production.	The three main activities are : bovine livestock, ovine livestock and field crops SAU= 2559000 ha In which: Annual crops = 1927000 ha Total cereals= 719248 ha Maize = 224 427 ha STH = 931000 ha 372700 ha irrigable	Agricultural area is 520 000 ha Grassland represent 86% of agriculture area (which 55% are natural grassland) 10 712 farms of 52 ha in average Animal production produce 73% of the agricultural value Main productions in value are: Cattle meat 27% Ewe milk 14% Cattle milk 12% The main part of ewe milk is transformed in "Roquefort" a PDO cheese	The main activities are vineyards 49% fruits & vegetables 24% Animal production 12% of the value	Agricultural area is 252 000 ha Grassland represent 94% of agriculture area (which 26% of natural grassland and 61% of rangeland 3 080 farms of 82 ha in average Animal production produce 71% of the agricultural value Main productions in value are: Cattle meat 30% Cattle milk 17.5%
	Other activities	Food industry and forestry	Meat industry	Large industries such as Airbus or CNES Leisure and tourism		Tourism is the main activity of the region	
(D) Key decision makers and stakeholders for the system	**Manage the system**	Regional Council - State administration in the Region (DRAF, DIREN)	Departmental council - state Agricultural, environmental, services	Regional Council - State administration in the Region (DRAF, DIREN	Departmental council - state Agricultural, environmental, services	Regional Council - State administration in the Region (DRAF, DIREN	Departmental council - state Agricultural, environmental, services
	Is influenced by the system	Chambre régionale d'Agriculture d'Auvergne	Chambre départementale d'agriculture du Cantal	Chambre régionale d'Agriculture de Midi-Pyrénées	Chambre départementale d'agriculture de l'Aveyron	Chambre régionale d'Agriculture de Languedoc-Roussillon	Chambre départementale d'agriculture de Lozere
	Has an influence on	Professional organisations	Professional organisations	Professional organisations	Professional organisations	Professional organisations	Professional organisations

	the system						
(E) Data	**Provided by Provided by WP6**						
	Required from WP4						

5.3.2 Natural system characteristics.

Table (5) Natural system characteristics for the Massif Central

		Agricultural Region (3)	Natural system (4) (see map n°2)			
(A) System name and boundaries	**Name**		Monts du Cantal	Planèze de Saint Flour	Margeride	Aubrac
	Level	271 communes				
	Area	440 631 ha	112 636 ha	56 555 ha	172 362 ha	99 078 ha
	Number of subsystems	4 agricultural sub-regions	76 communes	34 communes	119 communes	42 communes
(B) System aspects	**Economic**	In this zone, only 3 towns have more than 5000 inhabitants and local economy depends specially on agricultural activity. (see rural scenery on picture 7)	Mainly agriculture and tourism PDO Cheeses area (Cantal, Saint Nectaire and Salers) Meat quality industry (salers) Tourism	Mainly agriculture and tourism PDO Cheese area : Cantal, Salers and Fourme d'Ambert	Mainly agriculture A little part of the PDO Cheeses area: Cantal, Laguiole and Bleu des Causses	Agriculture and tourism Local craft industry : famous pocket knife "Laguiole" Meat quality industry (heifers : fleur d'Aubrac) PDO cheese : Laguiole
	Social	Between 1982 and 1999, total population had decreased from 10 to 20% owing to local sub-regions. 49% of farmers are between 40 and 55 years old. And the average increases annually about 0, 4 years.	The region belongs to a natural regional Park High value sceneries			High value sceneries
	Environmental	About 30% of this zone belongs to a regional park. Biodiversity is specially important in summer pastures, and rough grazing, (Picture 2)	High volcanos with large glacial erosion valleys High biodiversity value, peat bogs, summer pasture in mountains High level of rainfall	Flat high plateau (1000 m asl) Volcanic soils Rainfall : 800 mm/y with a bad temporal distribution	Region of granitic soils at 1000 m asl, very draining and sensitive to dryness Rainfall : 1000 mm/y Lot of rough grazing	High plateau (1000 m asl) Partially granitic partially volcanic. Rainfall : 1000 mm/y High biodiversity

		Agricultural Region (3)	Natural system (4) (see map n°2)			
			1400 up to 2000mm/y Long winter traditional cattle breed: Salers (Picture 3)	Some wetlands		value traditional cattle breed: Aubrac (Picture 4)
(C) System Components	**Agricultural activities**	Main characteristics of agriculture are presented in table 3 and map 2. For the future, the goal is to support an agriculture able to maintain the landscape, a rich biodiversity and a high level quality of water resource and social cohesion, in spite of higher production costs due to the geomorphology and climate conditions. Thus, added-value of the products linked to the quality, tourism diversification and agro-environmental subsidies weight heavily in the evolution of this region.	Mainly cattle husbandry on grassland areas 100 % grass land Dairy farms represent more 60% of the farms	Cattle husbandry on grassland areas and some crops (cereals, lentils) Dairy farms represent more 60% of the farms	Cattle and sheep husbandry Some sylvopastoral systems Dairy farms represent more 40% of the farms	Cattle husbandry on grassland areas Dairy farms represent less 20% of the farms
	Other activities	Tourism	tourism	tourism	tourism	tourism
(D) Key decision makers and stakeholders for the system	**Manage the system**		Natural Regional Park of Auvergne Volcanos			
	Is influenced by the system					
	Has an influence on the system	Local cooperative or industry, Local representative of farmers, Local association involved in environment, Cattle breed association Natural Regional Park of Auvergne Volcanos				PDO cheese Laguiole : cooperative “Jeune montagne”
(E) Data	**Provided by WP6**		Agriculture census data	Agriculture census data	Agriculture census data	Agriculture census data
	Required from WP4	FADN data	FADN data	FADN data	FADN data	FADN data

5.3.3 Micro-level

The farm types described here are for information on typical farming systems of the region and will be used to calibrate FSSIM. They will not be used to implement the scenarios, for which farms will be virtual and in agreement with the regional typologies.

Eight farm types have been selected to represented the main farming system of the region

The features of the farms type are presented in the additional table n°4 – the meaning of ++ or - - is at the bottom of the table.

Table (6) Micro-level detailed Information for the Massif Central region: farming system level (5)

		Farm 1: Milk cow specialized	**Farm 2: Milk cow specialized**	**Farm 3: Mixed cows milk/meat**	**Farm 4: Mixed cows milk/meat**	**Farm 5: Meat cows specialized**	**Farm 6: Meat cows specialized**	**Farm 7: Meat cows specialized**	**Farm .8: Mixed Milk / sheep**
(A) System name and boundaries	**Level**								
	Area	50 ha	63 ha	65 ha	100 ha	80 ha	90 ha	130 ha	80
	Number of subsystems								
(B) System aspects	**Economic**	income/WU: - - productivity (LU/WU)= - - working capital ++	income/WU: - productivity (LU/WU)= - working capital = -	income/WU: - - productivity (LU/WU)= + working capital =	income/WU: + productivity (LU/WU)= + + working capital --	income/WU: = productivity (LU/WU)= + + working capital =.	income/WU: = productivity : (LU/WU)= + working capital : +	income/WU: - productivity : (LU/WU)= + working capital -	income/WU: = productivity : (LU/WU)= - working capital ++
	Social	Area/ WU: + + Work load: - daily milking but few cows	Area/ WU: + Work load: - - daily milking and numerous cows /WU.	Area/ WU: + Work load: -- difficulties of mixed cattle	Area / WU: = Work load: - difficulties of mixed cattle, but 2 WU	Area/ WU: = Work load: +	Area / WU: - Work load: +	Area / WU: - Work load: =	Area/ WU: = Work load: =

		Farm 1: Milk cow specialized	**Farm 2: Milk cow specialized**	**Farm 3: Mixed cows milk/meat**	**Farm 4: Mixed cows milk/meat**	**Farm 5: Meat cows specialized**	**Farm 6: Meat cows specialized**	**Farm 7: Meat cows specialized**	**Farm .8: Mixed Milk / sheep**
	Environmental	Permanent meadows - Percentage of cereals - fertilizer inputs = local breeds: no	Permanent meadows - Percentage of cereals - fertilizer inputs = local breeds no	Permanent meadows + Percentage of cereals ++ fertilizer inputs = local breeds yes	Permanent meadows = Percentage of cereals = fertilizer inputs -- local breeds yes	Permanent meadows + Percentage of cereals ++ fertilizer inputs ++ local breeds yes	Permanent meadows = Percentage of cereals + fertilizer inputs + local breeds yes	Permanent meadows = Percentage of cereals + fertilizer inputs = local breeds yes	Permanent meadows = Percentage of cereals = local breeds no
(B) <u>System components</u>	**Agricultural activities**	42 ha meadows 8 ha ceral 28 dairy cows 130 000 l of milk Dependence on milk price, and quota	54 ha meadows 9 ha cereal 38 dairy cows 230 000 l of milk Dependence on milk price, and quota	65 ha meadows 23 dairy cows 130 000 l of milk 29 suckle cows 26 grass calves Dependence on milk and meat prices and secondarily on cereals price. .	95 ha meadows 5 ha cereal 33 dairy cows 200 000 l of milk 40 suckle cows 14 grass calves 20 fattened heifers Dependence on milk and meat prices. Subsidies become significant.	80 ha meadows 65 suckle cows 54 grass calves This system is hardly dependent on grass calves exportation and level of subsidies.	87 ha meadows 5 ha cereal 48 suckle cows 39 grass calves 3 fattened heifers This sytem limits its dependence on grass calves market by fattening some animals; subsidies are important.	126 ha meadows 4 ha cereal 60 suckle cows 34 grass calves 20 fattened heifers Dependence on grass calves exportation , meat price and subsidies.	74 ha meadows 6 ha cereal 25 dairy cows 100 000l of milk 117ewes 117 lambs Dependence on milk price and quota and sheep market.
	Other activities								

		Farm 1: Milk cow specialized	Farm 2: Milk cow specialized	Farm 3: Mixed cows milk/meat	Farm 4: Mixed cows milk/meat	Farm 5: Meat cows specialized	Farm 6: Meat cows specialized	Farm 7: Meat cows specialized	Farm .8: Mixed Milk / sheep
(D) Key decision makers and stakeholders for the system	**Manage the system**	The farmers. Dairy industry,	The farmers. Dairy industry,	The farmers. Dairy industry, Calves exporters,	The farmers. Dairy industry, Calves exporters, Slaughterers, Politics,	The farmers. Calves exporters, Politics,	The farmers. Calves exporters, Politics,	The farmers. Calves exporters, Slaughterers, Politics,	The farmers. Calves exporters, Slaughterers, Politics
	Is influenced by the system	The farmer's family	The farmer's family	The farmer's family	The farmer's family	The farmer's family	The farmer's family	The farmer's family	The farmer's family
	Has an influence on the system	Milk price and quota	Milk price and quota	Milk and grass calves prices		Calves export, Politics,	Calves export, Politics,	Calves export, Politics,	Calves export, Sheep market, Politics,
Data	**Provided by WP6**	Additional data on diversity within farms and between farms	Additional data on diversity within farms and between farms	Additional data on diversity within farms and between farms	Additional data on diversity within farms and between farms	Additional data on diversity within farms and between farms	Additional data on diversity within farms and between farms	Additional data on diversity within farms and between farms	Additional data on diversity within farms and between farms
	Required from WP4	FADN data	FADN data	FADN data	FADN data	FADN data	FADN data	FADN data	FADN data

Economical parameters are good if : "income /WU" is important (= , + or ++), "LU / WU" is important (= , + or ++), and working capital not to high (=, +,++).

Social parameters are good if : (i) "area / WU" is low (= , + or ++) (Owing to the low population density of this region, the priorities are to maintain numerous farms and to limit the increase of their area.) ; (ii) "work load" is not important (= , + or ++)

Environmental parameters are good if : (i) "permanent meadows" is important (= , + or ++) (Permanent meadows and low stocking rate (< or = 1) contribute to the development of flora diversity) ; (ii) "cereals area" is not important (=, +,++). (these crops limit biodiversity) ; (iii) "fertilizer inputs" are low (=, +,++);

(iv) "local breeds" are maintained (In Cantal, two local cattle breeds: Salers and Aubrac are still bred for meat production).

5.4 Pyrzyce Region (Poland)

Edward MAJEWSKI

5.4.1 Meso-level

Table (7) Meso-level detailed information for the Pyryce region

		(1) Administrative Region (2)	(2) Administrative Sub-Regions		(3) Agricultural Region	(4) Natural System
(A) System name and boundaries	**Name**	Zachodniopomorskie (voyevodship) – 2.32.	Szczecinski (Subregion 3.32.43)	Pyrzyce (powiat) - 3.32.43.12	Pyrzyce	
	Level	NUTS 2	NUTS3	NUTS4		Flat, typically agricultural area, a large number of small lakes, ponds, rivers water catchments. Very good soils. Permanent grasslands along small rivers.
	Area	22 896 km2	12498 km2	726 km2	68142 ha	
	Number of subsystems	2 NUTS3 sub-regions	11 NUTS4 subsystems	8 NUTS5 subsystems		
(B) System aspects	**Economic**	Total GDP (Gross Domestic Product)– 8575 millions (mln) EUR Share of agriculture in GDP 1,94 % Agricultural production PLN – 561,8 mln EUR (crop production –349,8 mln EUR, animal	Added value for GDP (GVA) – 5159,2 mln EUR Added value for GDP (GVA) in agriculture – 287,6 mln EUR (5,57%)		Formerly state farms dominated (67,8 % of land in 1991), at present 97% private ownership. Of the total number of 2.235 farms – 2207 – family farms (61,5% of land), 23 companies, 5 co-ops. About 22% of farms classified as semi-subsistence and	

		(1) Administrative Region (2)	(2) Administrative Sub-Regions		(3) Agricultural Region	(4) Natural System
		production – 212 mln EUR)			subsistence. Large average farm size (about 15 ha), compared with other regions and the country. Varied, between farms, value and quality of fixed assets.	
	Social	Total population – 1697718 Working age population – 713223 Active population– 523580 Unemployed - 189643 Unemployement rate – 26,6% Employed in agriculture– 84297 Share of employed in agriculture – 16,1% Proportion of agricultural labour force: over 65 years old – 20,8%, 18-44 years old – 41,7%,	Total population – 415117 Working age population – 182940 Active population – 154740 Unemployed– 28200 Unemployement rate – 15,2% Employed in agriculture – 20120 Share of employed in agriculture – 13%	Total population – 40218 Working age population – 16559 Active population – 11159 Unemployed – 5400 Unemployement rate – 32,8% Employed in agriculture – 4553 Share of employed in agriculture – 40,8%	Differentiated living standards. High unemployment in a group of former state farms employees.	
	Environmental	Water protection, biodiversity, landscape	Water protection, biodiversity, landscape	Approximately 10% of soil endangered with erosion, landscape, biodiversity	Long vegetation period, high temperatures, above country average. Very low rainfall (500 mm - 600 mm per year). Frequently occuring extremely dry or wet months in vegetation season.	Different types of landscape can be distinguished on a relatively small area. Highly diversified (landscape parks, nature protection areas), differentiated

		(1) Administrative Region (2)	(2) Administrative Sub-Regions		(3) Agricultural Region	(4) Natural System
						geologically, rich nature – including lakes (Miedwie – the 5th in size in Poland, Plon) and rivers, geothermal water resources on the 1600 m depth.
(C) <u>System components</u>	**Agricultural activities**	agricultural land [ha] – 1050942 arable land [ha] – 861238 permanent grassland[ha] – 185106 orchards[ha] – 4598 forest land [ha] – 814852 other land [ha] – 424354 total [ha] – 2290148 sown area[ha]: total – 708635 cereals – 533548 (75,3%) of which: wheat – 217100 (30,6%) rye – 105705 (14,9%) potatoes – 33710 (4,76%) industrial – 88132 (12,4%) of which: sugar beets – 14282 (2,0%) oilseed – 73712 (10,4%) fodder crops – 35253 (5,0%) other crops– 15718 (2,2%) of which: vegetables – 6200 (0,9%)	Total area (ha) 685720 agricultural land [ha] – 616022 arable land [ha] – 499711 permanent grassland [ha] – 573 orchards [ha] – 2591 Madows and pastures [ha] – 113721 Forests11663 other land [ha] – 58035	agricultural land [ha] – 53923 arable land [ha] – 47495 permanent grassland [ha] – 6044 orchards [ha] – 4598 forest land [ha] – 4886 other land [ha] – 13762 total[ha] - 72571	Mixed farming (crops and livestock), although growing number of crop farms (mainly large companies). Share of cereals above agrotechnically optimal level, monoculture in cereals in a number of farms, resulting with lowering productivity. Diminishing livestock density, 2 times lower than country average..	Agricultural land of 57417 ha

		(1) Administrative Region (2)	(2) Administrative Sub-Regions		(3) Agricultural Region	(4) Natural System
		beef for slaughter [without calves] – 30500 szt./ 12300000 kg pigs for slaughter– 763600 szt./ 81600000 kg milk production [mln. l] – 216,5 meet production[kg] – 126700000 of which: beef – 6400000 pork – 63600000 procurement: milk[mln l] – 125 cattle[th. tons] – 8,3 pigs[th. tons] – 61,4				
	Other activities	Shipyards, sea ports, fishery, chemical industry (fertilizers), trade and tourism		Agritourism		
(D) <u>Key decision makers and stakeholders for the system</u>	**Manage the system**	Marshall of the province	No official management (it is only statistical area)	Head of the district		
	Is influenced by the system					
	Is influenced by the system					
	Has an influence	Regional Extension Service Cemtre, The Chief Inspector of Environmental Protection, Regional Board of Water		Local branch of Regional Extension Service Centre		

		(1) Administrative Region (2)	**(2) Administrative Sub-Regions**		**(3) Agricultural Region**	**(4) Natural System**
	on the system	Management, regional branch of Agro-Chemistry Station, Agricultural Property Agency				
Data	**Provided by WP6**					
	Required from WP4					

5.4.2 Micro-level

The farm types described here are for information on typical farming systems of the region and will be used to calibrate FSSIM. They will not be used to implement the scenarios, for which farms will be virtual and in agreement with the regional typologies.

Table (8) Micro-level detailed information for the Pyrzyce region: farming system level (5)

		Farm 1: Crop milk cattle family farm	**Farm 2: Crop beef cattle family farm**	**Farm 3: Crop pig family farm**	**Farm 4: Field crops family farm**	**Farm 5: Field crops commercial farm**
(A) System name and boundaries	**Level**					
	Area	19 ha	38 ha	42 ha	18 ha	1200 ha
	Number of subsystems					
(B) System aspects	**Economic**					
	Social	2 fully employed	2,5 fully employed	2 fully employed	1 fully employed	10 fully employed
	Environmental					
(C) System components	**Agricultural activities**	13 ha winter wheat 2 ha rapeseed 6 ha sugar beets 5 milk cows (HF) 2 calves, 2 young cattle 5 ha grassland	9 ha winter wheat 9 ha rapeseed 17 suckler cows (beef breeds eg. Limousine) 10 calves, 3 heifers, 10 young beef cattle, 20 ha grassland	28 ha winter wheat 3 ha spring barley 3 ha rapeseed 8 ha sugar beets 8 sows, 100 piglets 100 fatteners	12 winter wheat 6 ha rapeseed	700 ha winter wheat 150 ha spring barley 250 ha rapeseed 100 ha sugar beets
	Other activities					

		Farm 1: Crop milk cattle family farm	Farm 2: Crop beef cattle family farm	Farm 3: Crop pig family farm	Farm 4: Field crops family farm	Farm 5: Field crops commercial farm
(D) Key decision makers and stakeholders for the system	**Manage the system**	The farmer	The farmer	The farmer	The farmer	The farmer
	Is influenced by the system	The farmer's family	The farmer's family	The farmer's family	The farmer's family	The farmer's family Farm employees
	Has an influence on the system	The farmer's family	The farmer's family	The farmer's family	The farmer's family	The farmer's family
Data	**Provided by WP6**					
	Required from WP4					
Others						

5.5 Sikasso Region (Mali)

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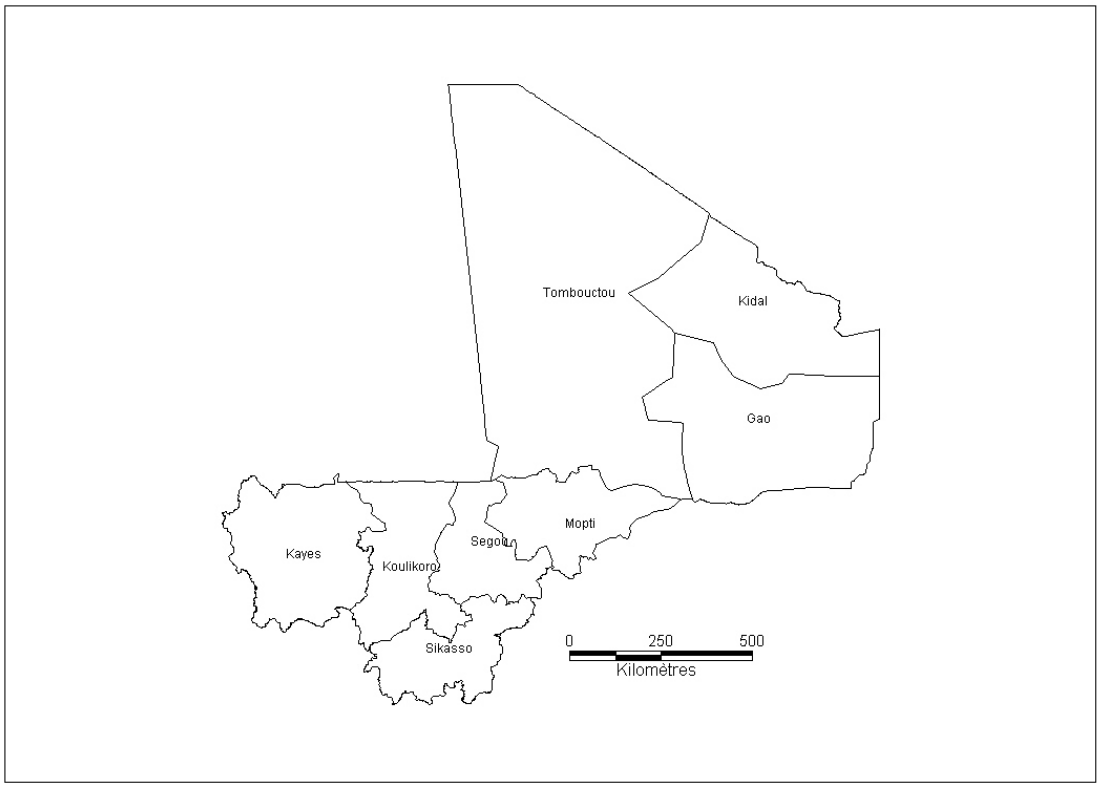
Administrative/agricultural regions

Mali is divided into 8 administrative regions (see map), further organized in "Circles". In southern Mali, the CMDT, once in charge of the rural development, divided the area where cotton was grown into agricultural regions. In each region, CMDT owns a few cotton factories in which seed cotton is brought.

The agricultural regions are smaller than administrative regions and the limits usually correspond approximately.

The selected regions are agricultural regions (Sikasso and Koutiala). The Sikasso CMDT region corresponds with the circles of Sikasso and Kadiolo. The Koutiala CMDT region corresponds to the circles of Koutiala and Yorosso. The 2nd administrative region of Sikasso encompasses the CMDT regions of Koutiala, Sikasso and Bougouni.

Figure (7) : Administrative regions of Mali. Both agricultural regions are included in the Sikasso administrative region, in southern Mali.



The reason why we selected CMDT regions instead of administrative regions relies on data availability: as rural development was mainly in charge of CMDT extension services, the databases were also collected and owned by the CMDT at CMDT regions level.

Figure (8) The two selected agricultural regions: Koutiala (blue) and Sikasso (red). Two administrative "circles" are included in each region. The dots indicate the CMDT Villages studied with annual agricultural data from the CMDT assessment service database.

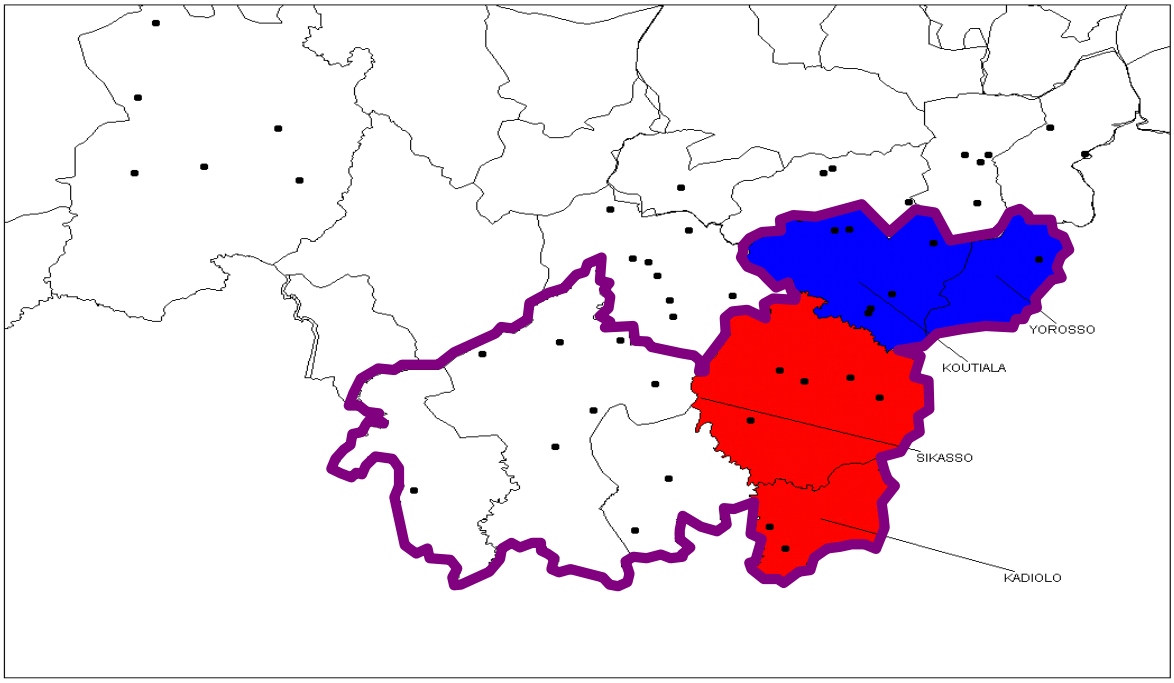
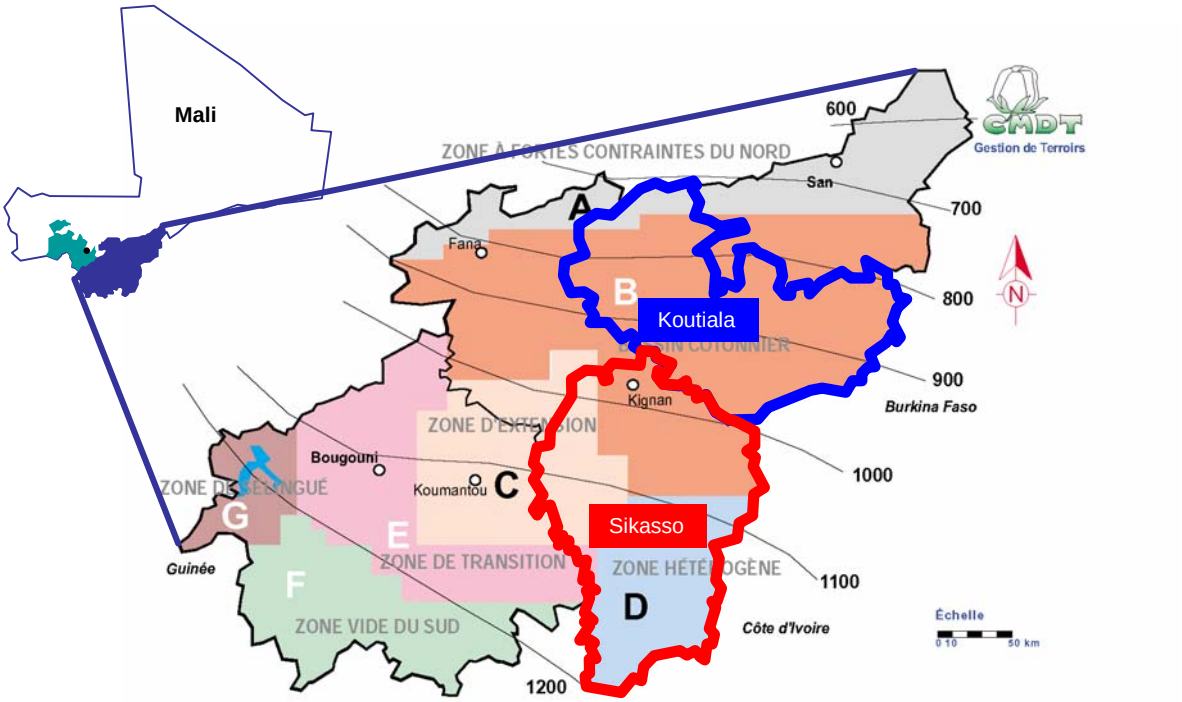


Figure (9) The two selected regions replaced within the natural regions and the current annual rainfall.



Differences between the 2 regions

The two selected regions differ in some ways: the Koutiala region is one of the most ancient cotton producing areas. It is also a region where agricultural diversification is scarce. Rural development has heavily relied upon cotton production. Capital accumulation has been steady for long and despite the limited rains (around 850 mm per year), livestock is associated to crops at the farm level and used by farmers as a means for banking and fertility maintenance. The area devoted to cotton (THE cash crop) is limited fundamentally by the possibility to crop enough food crops (sorghum, pearl millet and, in the southern part, maize) on the remaining area to sustain livelihoods. There is no available agricultural land and fallow has disappeared.

The Sikasso CMDT region, on the other hand, is also a great cotton producing area, but diversification is possible and used. More rains, more access to foreign markets for meat, and more recent cotton production. Cotton is not the only possible cash crop, and the food crop productivity is higher. Maize is widespread. In the southern part, there is land available.

The farm types described in the two regions are the same. The differences arise from the relative importance of these types in the two regions.

5.5.1 . Meso-level

Table (9) Meso-level detailed information for the Sikasso region

		(1) Administrative Region	(2) Administrative Sub-Regions		(3) Agricultural Region	(4) Natural System
(A) System name and boundaries	**Name**	SIKASSO Region (MLADM2)	Sikasso Cercle (MLADM3)	Kadiolo Cercle (MLADM3)	Sikasso CMDT Region	
	Area	71 500 km2	15 500 km2	5 300 km2		
	Number of subsystems	7 Cercles, only 2 belonging to the agricultural region	43 Communes Rurales in the Sikasso cercle	9 Communes Rurales in the Kadiolo cercle.	5 CMDT sectors : Kadiolo, Kignan, Klela, Niena et Sikasso	Opposing Soudanean and Guinean climates
(B) System aspects	**Economic**	Sikasso : regional urban centre	Sikasso : market of more than 200.000 inhabitants; asphalted roads favour trade to Bamako the capital city of Mali and outside the country.	Proximity of Côte d'Ivoire favours exports	Cotton is the main crop but diversification occurs. Autosufficiency in food products is a priority, cash crops come afterwards.	
	Social	Social structure characterized by the presence of may civil servants carrying out administrative duties mainly in the regional capital city of Sikasso. Otherwise the great majority of the population (over 80 %) is made up of farmers.			The social system, predominated by Senoufo group and big-families. Within the family strong "mother subdivisions" exist. Social security depends on family. The power of the family head is reckoned by all members, for any social or economical act (marriages, cultivation, any purchase). Wealth or harshness are shared among the big family members. Age group working associations and village level associations are strongly established within sex.	
	Environmental	Climate favorable for agriculture High agricultural land	Rainfall = 1000 to 1200 mm / year	Rainfall > 1300 mm / year	Abundant rains very favourable to agriculture. Widespread use of pesticides on cotton and periurban vegetables. In peri urban vegetables,	

		(1) Administrative Region	(2) Administrative Sub-Regions		(3) Agricultural Region	(4) Natural System
		availability			their use is poorly controlled. In rural areas, the commercial systems are controlled by CMDT, which selects active ingredients and brands, and brings only the quantities needed for the areas under cropping. Fertilizer use is limited (around 50kg/ha N, only on cotton and maize crops). Thus, the maintenance of soil fertility is a main concern and relies mainly on manure. Livestock presence on the farm and residue management is therefore key strategy to sustainibility.	
(C) System Components	**Agricultural activities**	Cotton, cereales, livestock, fruits and vegetables	Cotton-maize system.	Strong diversification through vegetable cropping and arboriculture	Cotton: 50%; maize: 30%; sorghum-millet:l 20%, tubers.	
	Other activities		Forestry	Prospective mining (gold)	Legume cropping and arboriculture	
(D) Key decision makers and stakeholders for the system	**Manage the system**	Governor of Sikasso Regional direction Minister of agriculture (DRAMR), Regional Chamber of Agriculture	"Prefet" SLACAER Local service for rural development, Local Camber of Agriculture, Community leaders; Communal Powers	"Prefet" SLACAER Local service for rural development, Local Camber of Agriculture, Community leaders; Communal Powers	Regional Chamber of Agriculture , Farmers Unions, farmer organizations, village leaders	
	Is influenced by the system				Traders of agricultural products : selling of farm inputs (factories), buying of farm products, and credit systems (micro credit banks et NGOs)	
	Has an influence on the system				Regional Direction of CMDT, CRRA (agricultural research centre), Traders of agricultural products : selling of farm inputs (factories), buying of farm products, and credit systems (micro credit banks et NGOs)	
(E) Data	**Provided by WP6**	Few databases exist at administrative region or subregion levels. The CPS (Planning and Statistic Cell) database collect for the agricultural minister its data			Data collected at farm level are representative at this level, because the sample is designed	

		(1) Administrative Region	(2) Administrative Sub-Regions	(3) Agricultural Region	(4) Natural System
		through other sources such as CMDT. Some economic data provided from OMA give full information about dynamics of prices for most agricultural products within approximately 30 markets. Many regional data are based on estimations and don't provide on aggregation of local data; the biais is important using such data collection scheme.		for this purpose, or because all farms are taken into account (Operational follow-up)	
	Required from WP4	It is unsure whether WP4 will provide any data at regional levels for this case study.			

5.5.2 Micro-levels

The farm types described here are for information on typical farming systems of the region and will be used to calibrate FSSIM. They will not be used to implement the scenarios, for which farms will be virtual and in agreement with the regional typologies.

Table (10) Meso-level detailed information for the Sikasso region: farming system level (5), farms 1 to 6

		Farm 1: Medium and non intensive farm	**Farm 2: Small and non intensive farm**	**Farm 3: Small and intensive farm**	**Farm 4: Medium unequipped farm**	**Farm 5: Very small unequipped farm**	**Farm 6: Big non intensive farms**
	Level						
(A) System name and boundaries	**Area**	15.68%	11.94%	3.74%	19.64%	12.37%	7.91%

		Farm 1: Medium and non intensive farm	Farm 2: Small and non intensive farm	Farm 3: Small and intensive farm	Farm 4: Medium unequipped farm	Farm 5: Very small unequipped farm	Farm 6: Big non intensive farms
(B) System aspects	**Economic**	Cultivated area (S2): 9.77 ha Population: 17.22 Working population (WP): 8.90 S2/WP: 1.10 Cattle* : 9.40 Including: draught ox: 3.83 Draught ox/WP: 0.43 Maize area/WP: 0.26 Sorghum area/WP: 0.19 Millet area/WP: 0.12 Rice area/WP: 0.09 Cotton area/WP: 0.32 Peanut area/WP: 0.04 Other crops area/WP: 0.01 Cereal food security ratio (excl. rice): 1.45 Cereal food security ratio (excl. rice and maize): 0.58	Cultivated area (S2): 5.20ha Population: 9.30 Working population (WP): 4.96 S2/WP: 1.05 Cattle* : 2.78 Including: draught ox: 1.72 Draught ox/WP: 0.35 Maize area/WP: 0.23 Sorghum area/WP: 0.21 Millet area/WP: 0.17 Rice area/WP: 0.08 Cotton area/WP: 0.23 Peanut area/WP: 0.04 Other crops area/WP: 0.03 Cereal food security ratio (excl. rice): 1.52 Cereal food security ratio (excl. rice and maize): 0.74	Cultivated area (S2): 6.43 ha Population: 8.90 Working population (WP): 4.36 S2/WP: 1.47 Cattle* : 5.61 Including: draught ox: 2.49 Draught ox/WP: 0.57 Maize area/WP: 0.29 Sorghum area/WP: 0.40 Millet area/WP: 0.24 Rice area/WP: 0.05 Cotton area/WP: 0.28 Peanut area/WP: 0.10 Other crops area/WP: 0.09 Cereal food security ratio (excl. rice): 2.07 Cereal food security ratio (excl. rice and maize): 1.15	Cultivated area (S2): 8.53ha Population: 25.18 Working population (WP): 13.67 S2/WP: 0.62 Cattle* : 8.77 Including: draught ox: 3.29 Draught ox/WP: 0.24 Maize area/WP: 0.13 Sorghum area/WP: 0.11 Millet area/WP: 0.09 Rice area/WP: 0.04 Cotton area/WP: 0.14 Peanut area/WP: 0.03 Other crops area/WP: 0.02 Cereal food security ratio (excl. rice): 0.85 Cereal food security ratio (excl. rice and maize): 0.39	Cultivated area (S2): 3.35ha Population: 9.56 Working population (WP): 5.26 S2/WP: 0.64 Cattle* : 1.22 Including: draught ox: 0.58 Draught ox/WP: 0.11 Maize area/WP: 0.15 Sorghum area/WP: 0.07 Millet area/WP: 0.10 Rice area/WP: 0.10 Cotton area/WP: 0.10 Peanut area/WP: 0.04 Other crops area/WP: 0.01 Cereal food security ratio (excl. rice): 0.86 Cereal food security ratio (excl. rice and maize): 0.33	Cultivated area (S2): 25.95ha Population: 58.81 Working population (WP): 29.23 S2/WP: 0.89 Cattle* : 41.97 Including: draught ox: 10.3 Draught ox/WP: 0.35 Maize area/WP: 0.21 Sorghum area/WP: 0.11 Millet area/WP: 0.09 Rice area/WP: 0.08 Cotton area/WP: 0.29 Peanut area/WP: 0.04 Other crops area/WP: 0.01 Cereal food security ratio (excl. rice): 1.03 Cereal food security ratio (excl. rice and maize): 0.36
	Social	The precise social situation of these classes needs clarification, under way. Generally speaking, there is a strong patriarcal structure of the household. The land appropriation is often strongly influenced by clanic appurtenance and anteriority in the village. The smallest farms (poor land/population ratio) are either the newest farmers in the village, or the results of farm disintegration after inheritance.					
	Environmental	The cotton crop is usually central in this region for agricultural input use, as the cotton sector is well organized (credit, price negotiations, etc). The cotton crop is also the most demanding in crop protection, and insecticides are widely used. Sorghum and millet are usually cropped after cotton, to beneficiate form the cotton fertilization. Maize is intermediate, as it is usually cropped with some mineral fertilizers. Herbicides are known and sometimes used, but not widespread.					
(C) System components	**Agricultural activities**	Medium size farms, poorly equipped, cotton becomes important but	Small farms, poorly equipment, small cotton area, yet the priority is	Small farms, well equipped, ratio labour/ha is high, food	Medium farms, with high population, cotton is not central. Food	Tiny farms, not equipped. Small cotton area, but relatively large	Very big farm, but even larger population to feed. Probably old

		Farm 1: Medium and non intensive farm	Farm 2: Small and non intensive farm	Farm 3: Small and intensive farm	Farm 4: Medium unequipped farm	Farm 5: Very small unequipped farm	Farm 6: Big non intensive farms
		food security is still poor.	given to food production	security is good. Little cotton cropped, and probably poor capitalization	security is low.	rice fields, labour demanding. Their perspectives seem difficult, without land available elsewhere	families but equipment is not good. Cattle accumulation is good.
	Other activities						
(D) Key decision makers and stakeholders for the system	**Manage the system**	Family chief, Field work leaders and Head of household	Family chief, Field work leaders and Head of household	Family chief, Field work leaders and Head of household	Family chief, Field work leaders and Head of household	Family chief, Field work leaders and Head of household	Family chief, Field work leaders and Head of household
	Is influenced by the system						
	Has an influence on the system	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux
(E) Data	**Provided by WP6**	CMDT assessment service: monitor about 20 farms in 10 villages since 1997. In each farm, field area and yields are measured for each crop; agricultural practices are recorded. CMDT operational services: monitor agricultural campaign (restricted to cotton crop for two years) to plan fertilizer and seed needs, etc. Data are stored for 20 years, but not verified after the campaign, their aim is mainly operational. The Research services also have stored some data useful for up to date farm typology (FFEM project), or for APES modules development and validation (cotton and food crops), either in experimental stations or in farmers fields.					
	Required from WP4						

Table (11) Meso-level detailed information for the Sikasso region: farming system level (5), farms 7 to 10

		Farm 7: Medium intensive farm	Farm 8: Medium very intensive farm	Farm 9: Big intensive farm	Farm 10: Peri urban farms
(A) System name and boundaries	**Level**				
	Area	17.34%	3.60%	7.77%	?% (data not known)
(B) System aspects	**Economic**	Cultivated area (S2): 9.32ha Population: 11.11 Working population (WP): 5.35 S2/WP: 1.74 Cattle* : 10.75 Including: draught ox: 3.87 Draught ox/WP: 0.72 Maize area/WP: 0.41 Sorghum area/WP: 0.30 Millet area/WP: 0.19 Rice area/WP: 0.11 Cotton area/WP: 0.56 Peanut area/WP: 0.07 Other crops area/WP: 0.03 Cereal food security ratio (excl. rice): 2.15 Cereal food security ratio (excl. rice and maize): 0.88	Cultivated area (S2): 9.20ha Population: 8.12 Working population (WP): 3.36 S2/WP: 2.74 Cattle* : 9.03 Including: draught ox: 3.93 Draught ox/WP: 1.17 Maize area/WP: 0.65 Sorghum area/WP: 0.47 Millet area/WP: 0.29 Rice area/WP: 0.18 Cotton area/WP: 0.89 Peanut area/WP: 0.10 Other crops area/WP: 0.04 Cereal food security ratio (excl. rice): 2.89 Cereal food security ratio (excl. rice and maize): 1.15	Cultivated area (S2): 19.05ha Population: 29.40 Working population (WP): 14.16 S2/WP: 1.34 Cattle* : 25.39 Including: draught ox: 7.12 Draught ox/WP: 0.50 Maize area/WP: 0.31 Sorghum area/WP: 0.20 Millet area/WP: 0.15 Rice area/WP: 0.13 Cotton area/WP: 0.46 Peanut area/WP: 0.07 Other crops area/WP: 0.01 Cereal food security ratio (excl. rice): 1.58 Cereal food security ratio (excl. rice and maize): 0.60	Activities carried out encompass all kinds: market dependent livestock, lowland vegetable crops with perishable products, trading, building enterprises, tailors, etc.
	Social	The precise social situation of these classes needs clarification, under way. Generally speaking, there is a strong patriarcal structure of the household. The land appropriation is often strongly influenced by clanic appurtenance and anteriority in the village. The smallest farms (poor land/population ratio) are either the newest farmers in the village, or the results of farm disintegration after inheritance.			Large implication of women, for their own account, in vegetable production. Existence of many professionnal organisations (coopératives, associations, etc.) Weakening of power structure and decision making in households.
	Environmental	The cotton crop is usually central in this region for agricultural input use, as the cotton sector is well organized (credit, price negotiations, etc). The cotton crop is also the most demanding in crop protection, and insecticides are widely used. Sorghum and millet are usually cropped after cotton, to beneficiate form the cotton fertilization. Maize is intermediate, as it is usually cropped with some mineral fertilizers. Herbicides are known and sometimes used, but not widespread.			Exploitation of flooded lands; high pressure on rice shallows. Intensification related to sedentarisation of herds; strong pressure for fodders imposes supplemental feeding.

		Farm 7: Medium intensive farm	Farm 8: Medium very intensive farm	Farm 9: Big intensive farm	Farm 10: Peri urban farms
(C) System components	**Agricultural activities**	Medium farm, well equipped, large cotton area.	Medium farms, with little available labour but good equipment, the most intensive type. Food security is good, capitalization is probably on way.	Big farms poorly equipped, but capitalization is occurring despite poor food security. Cotton is very important.	
	Other activities				Generalized among the big family
(D) Key decision makers and stakeholders for the system	**Manage the system**	Family chief, Field work leaders and Head of household	Family chief, Field work leaders and Head of household	Family chief, Field work leaders and Head of household	Family chief, Field work leaders and Head of household
	Is influenced by the system				
	Has an influence on the system	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux
(E) Data	**Provided by WP6**	CMDT assessment service: monitor about 20 farms in 10 villages since 1997. In each farm, field area and yields are measured for each crop; agricultural practices are recorded. CMDT operational services: monitor agricultural campaign (restricted to cotton crop for two years) to plan fertilizer and seed needs, etc. Data are stored for 20 years, but not verified after the campaign, their aim is mainly operational. The Research services also have stored some data useful for up to date farm typology (FFEM project), or for APES modules development and validation (cotton and food crops), either in experimental stations or in farmers fields.		The periurban agriculture is a new developing subsector and is not well described yet. Few data exist. Some were collected by the livestock program, i.e. milk for the city markets is produced in periurban facilities. Data on farmers strategies and agricultural activities and results need to be collected either within WP6 or with WP4 help.	
	Required from WP4				

5.6 Koutiala Region (Mali)

Bruno RAPIDEL, Didier Bazile (CIRAD-TERA, Mali), Mamadou Coulibali (IER, Livestock Programme, Mali)

(See introduction in the Sikasso region's description)

5.6.1 Meso-level

Table (12) Meso-level detailed information for the Koutiala region

		Administrative Region (2)	Administrative Sub-Region (2)	Administrative Sub-Region (2)	Agricultural Region (4)	Natural System (5)
(A) System name and boundaries	**Name**	Région SIKASSO (MLADM2)	Koutiala Cercle (MLADM3)	Yorosso Cercle (MLADM3)	Région CMDT Koutiala	
	Area	71 500 km2	9 500 km2	4 600 km2		
	Number of subsystems	7 Cercles, only 2 belonging to the agricultural region	36 Communes Rurales in Koutiala cercle	9 Communes Rurales in Yorosso cercle	7 CMDT sectors : Koutiala, M'Pessoba, Molobala, Zebala, Karangana, Yorosso et Bla	Soudanean climate
(B) System aspects	**Economic**	Sikasso : regional urban centre	Economic activities based infrastructures for cotton production; Trade crossroads for Burkina Faso and Côte d'Ivoire, etc.	Share borders with Burkina Faso	Development driven by cotton through the financing of equipements	
	Social	Social structure characterized by the presence of may civil servants carrying out administrative duties mainly in the regional capital city of Sikasso. Otherwise the great majority of the population (over 80 %) is made up of farmers.	Tendancey to mononuclear families (one man, spouses and children)		Social system dominantly Minianka; extended-family oriented behavior; Social security depends on family. The power of the family head is reckoned by all members, for any social or economical act (marriages, cultivation, any purchase). Wealth or harshness are shared among the big family members. Women are hardly authorized to engage farming	

		Administrative Region (2)	Administrative Sub-Region (2)	Administrative Sub-Region (2)	Agricultural Region (4)	Natural System (5)
					activity for their own account; Age group working associations and village level associations are strongly established within sexe.	
	Environmental	Climate favorable for agriculture; High agricultural land availability	High pressure on lands, saturation of agricultural; land degradation problems	High pressure on lands, saturation of agricultural; land degradation problems	Average annual rainfall (800 to 1000 mm) favorable for agriculture; but risk of rain shortage in odd years	
(C) System Components	**Agricultural activities**	Cotton, cereales, livestock, fruits and legumes	Cotton 30% Maize 20% Millet-Sorghum 35%	Cotton 30% Maize 20% Millet-Sorghum 35%	Production system organized around cotton.	Risks for maize which is being cultivated in the northern limit of its area of predilection.
	Other activities					
(D) Key decision makers and stakeholders for the system	**Manage the system**	Governor of Sikasso Regional direction Minister of agriculture (DRAMR), Regional Chamber of Agriculture	"Prefet", SLACAER (Local service for rural development), Local Chamber of Agriculture, Community leaders; Communal Powers	"Prefet", SLACAER (Local service for rural development), Local Chamber of Agriculture, Community leaders; Communal Powers	Regional Chamber of Agriculture Farmers Unions, farmer organizations, village leaders	
	Is influenced by the system				Traders of agricultural products : selling of farm inputs (factories), buying of farm products, and credit systems (micro credit banks et NGOs)	
	Has an influence on the system				Regional Direction of CMDT, CRRA (agricultural research centre), Traders of agricultural products : selling of farm inputs (factories), buying of farm products, and credit systems (micro credit	

		Administrative Region (2)	Administrative Sub-Region (2)	Administrative Sub-Region (2)	Agricultural Region (4)	Natural System (5)
					banks et NGOs)	
(E) Data	**Provided by WP6**	Few databases exist at administrative region or sub region levels. The CPS (Planning and Statistic Cell) database collect for the agricultural minister its data through other sources such as CMDT. Some economic data provided from OMA give full information about dynamics of prices for most agricultural products within approximately 30 markets. Many regional data are based on estimations and don't provide on aggregation of local data; the bias is important using such data collection scheme.			Data collected at farm level are representative at this level, because the sample is designed for this purpose, or because all farms are taken into account (Operational follow-up)	
	Required from WP4	It is unsure whether WP4 will provide any data at regional levels for this case study.				

5.6.2 Micro-level

The farm types described here are for information on typical farming systems of the region and will be used to calibrate FSSIM. They will not be used to implement the scenarios, for which farms will be virtual and in agreement with the regional typologies.

Table (13) Micro-level detailed information for the Koutiala region: farming system level (5), farms 1 to 6

		Farm 1: Medium and non intensive farm	**Farm 2: Small and non intensive farm**	**Farm 3: Small and intensive farm**	**Farm 4: Medium unequipped farm**	**Farm 5: Very small unequipped farm**	**Farm 6: Big non intensive farms**
(A) System name and boundaries	**Level**						
	Area	8.08%	11.04%	14.22%	10.69%	5.57%	5.35%
(B) System aspects	**Economic**	Cultivated area (S2): 9.77 ha Population: 17.22 Working population (WP): 8.90 S2/WP: 1.10 Cattle* : 9.40 Including: draught ox: 3.83 Draught ox/WP: 0.43 Maize area/WP: 0.26 Sorghum area/WP: 0.19 Millet area/WP: 0.12 Rice area/WP: 0.09 Cotton area/WP: 0.32 Peanut area/WP: 0.04 Other crops area/WP: 0.01 Cereal food security ratio (excl. rice): 1.45	Cultivated area (S2): 5.20ha Population: 9.30 Working population (WP): 4.96 S2/WP: 1.05 Cattle* : 2.78 Including: draught ox: 1.72 Draught ox/WP: 0.35 Maize area/WP: 0.23 Sorghum area/WP: 0.21 Millet area/WP: 0.17 Rice area/WP: 0.08 Cotton area/WP: 0.23 Peanut area/WP: 0.04 Other crops area/WP: 0.03 Cereal food security ratio (excl. rice): 1.52	Cultivated area (S2): 6.43 ha Population: 8.90 Working population (WP): 4.36 S2/WP: 1.47 Cattle* : 5.61 Including: draught ox: 2.49 Draught ox/WP: 0.57 Maize area/WP: 0.29 Sorghum area/WP: 0.40 Millet area/WP: 0.24 Rice area/WP: 0.05 Cotton area/WP: 0.28 Peanut area/WP: 0.10 Other crops area/WP: 0.09 Cereal food security ratio (excl. rice): 2.07 Cereal food security ratio	Cultivated area (S2): 8.53ha Population: 25.18 Working population (WP): 13.67 S2/WP: 0.62 Cattle* : 8.77 Including: draught ox: 3.29 Draught ox/WP: 0.24 Maize area/WP: 0.13 Sorghum area/WP: 0.11 Millet area/WP: 0.09 Rice area/WP: 0.04 Cotton area/WP: 0.14 Peanut area/WP: 0.03 Other crops area/WP: 0.02 Cereal food security ratio (excl. rice): 0.85	Cultivated area (S2): 3.35ha Population: 9.56 Working population (WP): 5.26 S2/WP: 0.64 Cattle* : 1.22 Including: draught ox: 0.58 Draught ox/WP: 0.11 Maize area/WP: 0.15 Sorghum area/WP: 0.07 Millet area/WP: 0.10 Rice area/WP: 0.10 Cotton area/WP: 0.10 Peanut area/WP: 0.04 Other crops area/WP: 0.01 Cereal food security ratio (excl. rice): 0.86	Cultivated area (S2): 25.95ha Population: 58.81 Working population (WP): 29.23 S2/WP: 0.89 Cattle* : 41.97 Including: draught ox: 10.32 Draught ox/WP: 0.35 Maize area/WP: 0.21 Sorghum area/WP: 0.11 Millet area/WP: 0.09 Rice area/WP: 0.08 Cotton area/WP: 0.29 Peanut area/WP: 0.04 Other crops area/WP: 0.01 Cereal food security ratio (excl. rice): 1.03

		Farm 1: Medium and non intensive farm	Farm 2: Small and non intensive farm	Farm 3: Small and intensive farm	Farm 4: Medium unequipped farm	Farm 5: Very small unequipped farm	Farm 6: Big non intensive farms
		Cereal food security ratio (excl. rice and maize): 0.58	Cereal food security ratio (excl. rice and maize): 0.74	(excl. rice and maize): 1.15	Cereal food security ratio (excl. rice and maize): 0.39	Cereal food security ratio (excl. rice and maize): 0.33	Cereal food security ratio (excl. rice and maize): 0.36
	Social	The precise social situation of these classes needs clarification, under way. Generally speaking, there is a strong patriarcal structure of the household. The land appropriation is often strongly influenced by clanic appurtenance and anteriority in the village. The smallest farms (poor land/population ratio) are either the newest farmers in the village, or the results of farm disintegration after inheritance.					
	Environmental	The cotton crop is usually central in this region for agricultural input use, as the cotton sector is well organized (credit, price negotiations, etc). The cotton crop is also the most demanding in crop protection, and insecticides are widely used. Sorghum and millet are usually cropped after cotton, to beneficiate form the cotton fertilization. Maize is intermediate, as it is usually cropped with some mineral fertilizers. Herbicides are known and sometimes used, but not widespread.					
(C) System components	**Agricultural activities**	Medium size farms, poorly equipped, cotton becomes important but food security is still poor.	Small farms, poorly equipment, small cotton area, yet the priority is given to food production	Small farms, well equipped, ratio labour/ha is high, food security is good. Little cotton cropped, and probably poor capitalization	Medium farms, with high population, cotton is not central. Food security is low.	Tiny farms, not equipped. Small cotton area, but relatively large rice fields, labour demanding. Their perspectives seem difficult, without land available elsewhere	Very big farm, but even larger population to feed. Probably old families but equipment is not good. Cattle accumulation is good.
(D) Key decision makers and stakeholders for the system	**Manage the system**	Family chief Field work leaders Head of household	Family chief Field work leaders Head of household	Family chief Field work leaders Head of household	Family chief Field work leaders Head of household	Family chief Field work leaders Head of household	Family chief Field work leaders Head of household
	Is influenced by the system						
	Has an influence on the system	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux
(E) Data	**Provided by WP6**	CMDT assessment service: monitor about 20 farms in 10 villages since 1997. In each farm, field area and yields are measured for each crop; agricultural practices are recorded. CMDT operational services: monitor agricultural campaign (restricted to cotton crop for two years) to plan fertilizer and seed needs, etc. Data are stored for 20 years, but not verified after the campaign, their aim is mainly operational. The Research services also have stored some data useful for up to date farm					

		Farm 1: Medium and non intensive farm	Farm 2: Small and non intensive farm	Farm 3: Small and intensive farm	Farm 4: Medium unequipped farm	Farm 5: Very small unequipped farm	Farm 6: Big non intensive farms
		typology (FFEM project), or for APES modules development and validation (cotton and food crops), either in experimental stations or in farmers fields.					
	Required from WP4						

Table (14) Micro-level detailed information for the Koutiala region: farming system level (5), farms 7 to 10

		Farm 7: Medium intensive farm	Farm 8: Medium very intensive farm	Farm 9: Big intensive farm	Farm 10: Peri urban farms
(A) System name and boundaries	**Level**				
	Area	27.76%	5.92%	11.38%	?% (data not known)
(B) System aspects	**Economic**	Cultivated area (S2): 9.32ha Population: 11.11 Working population (WP): 5.35 S2/WP: 1.74 Cattle* : 10.75 Including: draught ox: 3.87 Draught ox/WP: 0.72 Maize area/WP: 0.41 Sorghum area/WP: 0.30 Millet area/WP: 0.19 Rice area/WP: 0.11 Cotton area/WP: 0.56 Peanut area/WP: 0.07 Other crops area/WP: 0.03 Cereal food security ratio (excl. rice):	Cultivated area (S2): 9.20ha Population: 8.12 Working population (WP): 3.36 S2/WP: 2.74 Cattle* : 9.03 Including: draught ox: 3.93 Draught ox/WP: 1.17 Maize area/WP: 0.65 Sorghum area/WP: 0.47 Millet area/WP: 0.29 Rice area/WP: 0.18 Cotton area/WP: 0.89 Peanut area/WP: 0.10 Other crops area/WP: 0.04 Cereal food security ratio (excl. rice):	Cultivated area (S2): 19.05ha Population: 29.40 Working population (WP): 14.16 S2/WP: 1.34 Cattle* : 25.39 Including: draught ox: 7.12 Draught ox/WP: 0.50 Maize area/WP: 0.31 Sorghum area/WP: 0.20 Millet area/WP: 0.15 Rice area/WP: 0.13 Cotton area/WP: 0.46 Peanut area/WP: 0.07 Other crops area/WP: 0.01 Cereal food security ratio (excl.	Activities carried out encompass all kinds: market dependent livestock, lowland vegetable crops with perishable products, trading, building enterprises, tailors, etc.

		Farm 7: Medium intensive farm	Farm 8: Medium very intensive farm	Farm 9: Big intensive farm	Farm 10: Peri urban farms
		2.15 Cereal food security ratio (excl. rice and maize): 0.88	2.89 Cereal food security ratio (excl. rice and maize): 1.15	rice): 1.58 Cereal food security ratio (excl. rice and maize): 0.60	
	Social	The precise social situation of these classes needs clarification, under way. Generally speaking, there is a strong patriarcal structure of the household. The land appropriation is often strongly influenced by clanic appurtenance and anteriority in the village. The smallest farms (poor land/population ratio) are either the newest farmers in the village, or the results of farm disintegration after inheritance.			Large implication of women, for their own account, in vegetable production. Existence of many professionnal organisations (coopératives, associations, etc.) Weakening of power structure and decision making in households.
	Environmental	The cotton crop is usually central in this region for agricultural input use, as the cotton sector is well organized (credit, price negotiations, etc). The cotton crop is also the most demanding in crop protection, and insecticides are widely used. Sorghum and millet are usually cropped after cotton, to beneficiate form the cotton fertilization. Maize is intermediate, as it is usually cropped with some mineral fertilizers. Herbicides are known and sometimes used, but not widespread.			Exploitation of flooded lands; high pressure on rice shallows. Intensification related to sedentarisation of herds; strong pressure for fodders imposes supplemental feeding.
(C) System components	**Agricultural activities**	Medium farm, well equipped, large cotton area.	Medium farms, with little available labour but good equipment, the most intensive type. Food security is good, capitalization is probably on way.	Big farms poorly equipped, but capitalization is occurring despite poor food security. Cotton is very important.	
	Other activities				Generalized among the big family
(D) Key decision makers and stakeholders for the system	**Manage the system**	Family chief Field work leaders Head of household	Family chief Field work leaders Head of household	Family chief Field work leaders Head of household	Family chief Field work leaders Head of household
	Is influenced by the system				
	Has an influence on the system	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux	Chiefs of village Chiefs of household Livestock farmers and contracts for livestock flux
(E) Data	**Provided**	CMDT assessment service: monitor about 20 farms in 10 villages since 1997. In each farm, field area and yields are measured for each crop; agricultural		The periurban agriculture is a new developing subsector and is not well described yet. Few data exist. Some were collected by the livestock program,	

		Farm 7: Medium intensive farm	Farm 8: Medium very intensive farm	Farm 9: Big intensive farm	Farm 10: Peri urban farms
	by WP6	practices are recorded. CMDT operational services: monitor agricultural campaign (restricted to cotton crop for two years) to plan fertilizer and seed needs, etc. Data are stored for 20 years, but not verified after the campaign, their aim is mainly operational. The Research services also have stored some data useful for up to date farm typology (FFEM project), or for APES modules development and validation (cotton and food crops), either in experimental stations or in farmers fields.		i.e. milk for the city markets is produced in periurban facilities. Data on farmers strategies and agricultural activities and results need to be collected either within WP6 or with WP4 help.	
	Required from WP4				

6 References

European Commission , 2003. *CAP Reform, Council Regulation* – establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers, final text, 19th September, DS 303/1/03 REV 1.

WTO, 2001. Doha Ministerial Declaration, 14.11.2001, WT/MIN(01)/DEC/1

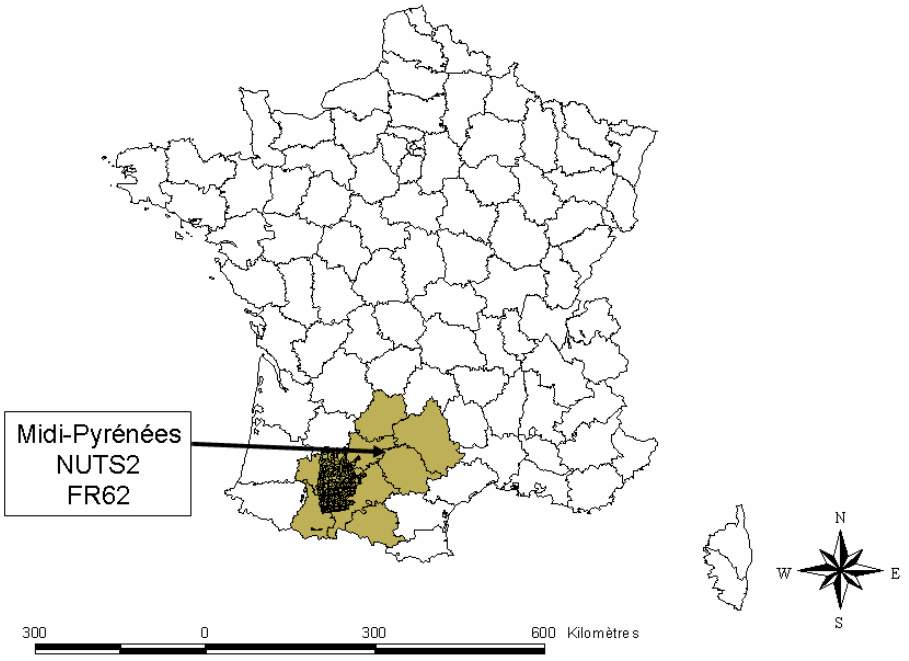
7 Appendices

7.1 Appendix 1: Illustrations to Test Case Regions – NESTE Region (France)

Organisation name of lead contractor for this deliverable: UMR System (INRA), Jacques Wery

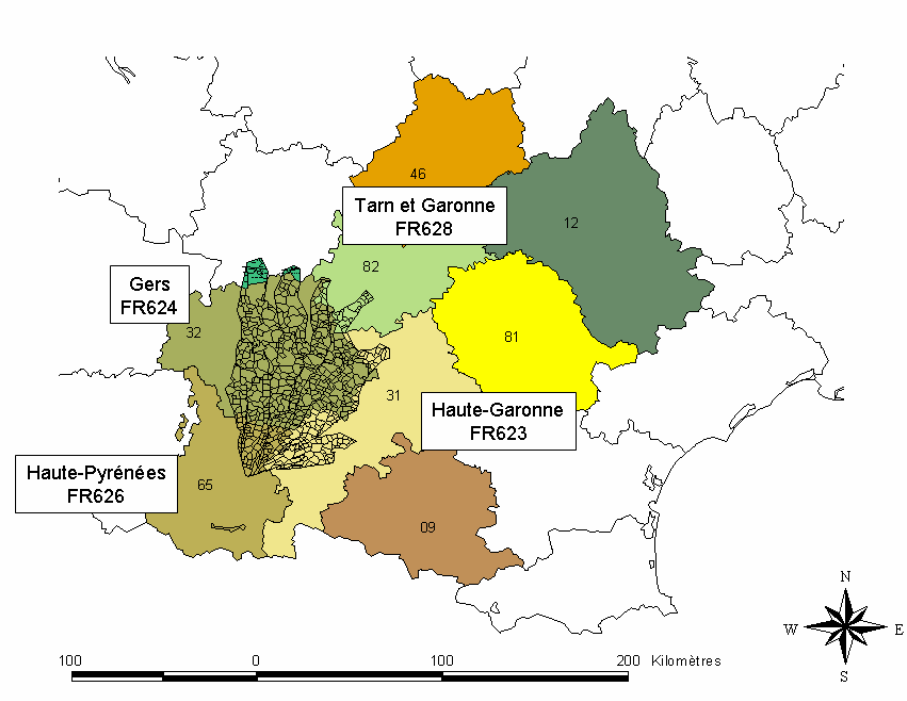
Authors: Jacques-Eric BERGEZ , Delphine LEENHARDT

Illustration (1) The Neste Region is in south west France and is part of NUTS2 FR62



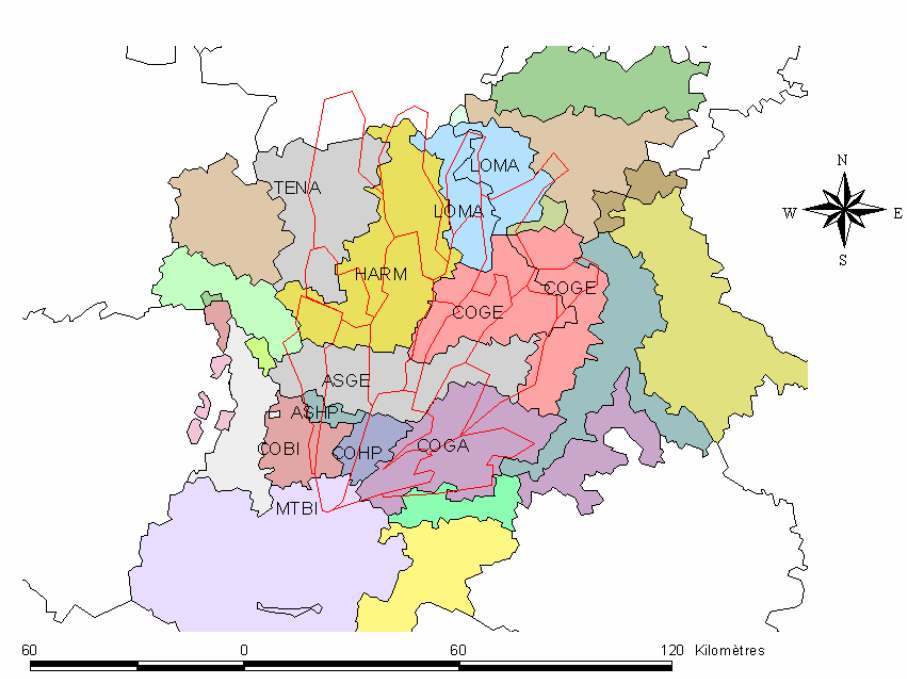
Source: GIS output from Leenhardt for the SEAMLESS project

Illustration (2) The Neste Region concerns 4 French departments (NUTS3)



Source: GIS output from Leenhardt for the SEAMLESS project

Illustration (3) French agricultural small region part of the Neste System



Source: GIS output from Leenhardt for the SEAMLESS project

Illustration (4) Hilly landscape in Gers part of the Neste system

Source: unknown

Illustration (5) Reservoir used to fill the river in Summer in the Neste system in order to allow different water uses: drinking water, water quality and agriculture.

Source: CACG

7.2 Appendix 2: Illustrations to Test Case Regions – MASSIF CENTRAL (France)

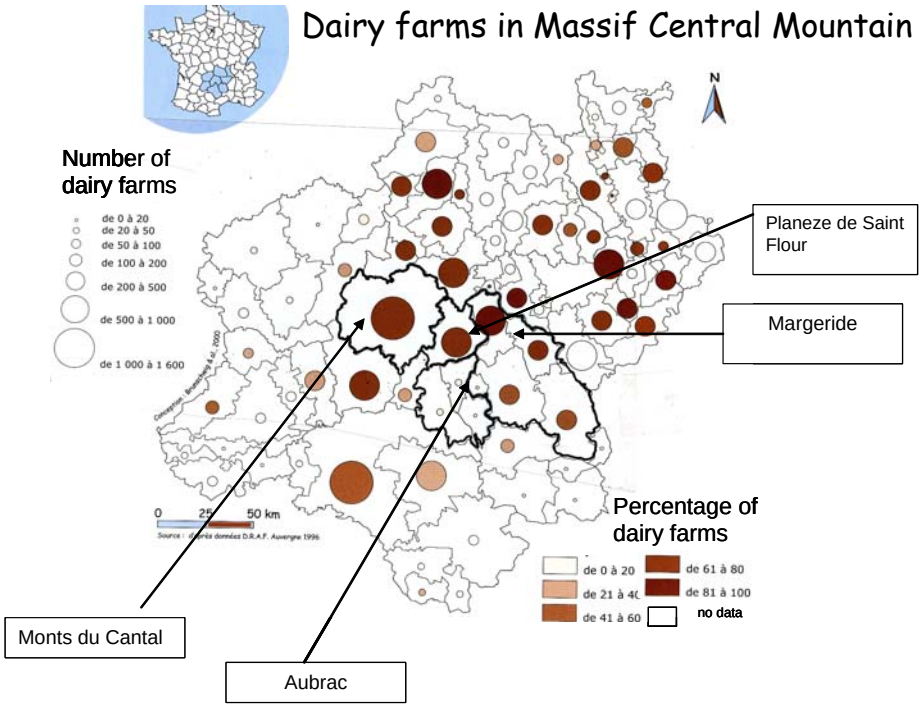
Organisation name of lead contractor for this deliverable: UMR System (INRA), Jacques Wery

Authors: Geneviève BIGOT, Vincent THENARD, Etienne JOSIEN

Illustration (1) Map of the region

Source: IGN 2005 completed by Thénard for the Seamless project

Illustration (2) Map of the region: the four natural regions studied



Source: Brunschwig 2000, comleted by Thénard for Seamless Project

Illustration (3) Few Pictures

Picture 1: Lake and volcanos in Auvergne

Picture 2: River in Massif-Central

Picture 3: The region in summer

Picture 4: The region in winter

Picture 5: Gentian in summer grazing

Picture 6 : PDO cheese from the region

Picture 7: Suckle cows in extensive grassland

Picture 8: Dairy cows in native grassland

Aubrac cow: a suckle breed

Salers cow: a suckle and dairy breed

Simmental cow: a dairy breed

Montbéliarde cow: a dairy breed

Picture 9 : The main breeds of Massif central

Illustration (4) Rural sceneries from the four natural regions

"Aubrac" area

"Margeride" area

"Planèze de Saint Flour" area

"Mont du Cantal" area

Appendix 3: Illustrations to Test Case Regions – PYRZYCE (Poland)

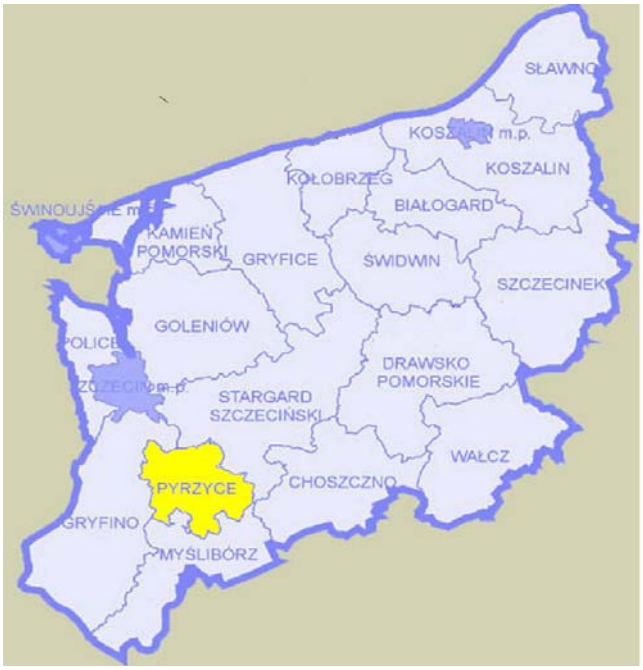
Organisation name of lead contractor for this deliverable: UMR System (INRA), Jacques Wery

Authors: Edward MAJEWSKI

Illustration (1) Locating Pyrzyce Region on the map of Poland

a. Pyrzyce Region

Map 1. NUTS 2 region in Poland



Map 2. Pyrzyce within NUTS 2 zachodniopomorskie region

Map 3. Pyrzyce region

Illustration (2) Pyrzyce – landscape…

Picture 1. One of many small lakes in the Pyrzyce area

Picture 2. Plonia river flowing through agricultural area

Illustration (3) … and farming

Picture 3. Sugar beets – is it to be affected by the policy change?

Picture 4. Potatoes is an important crop for many farms.

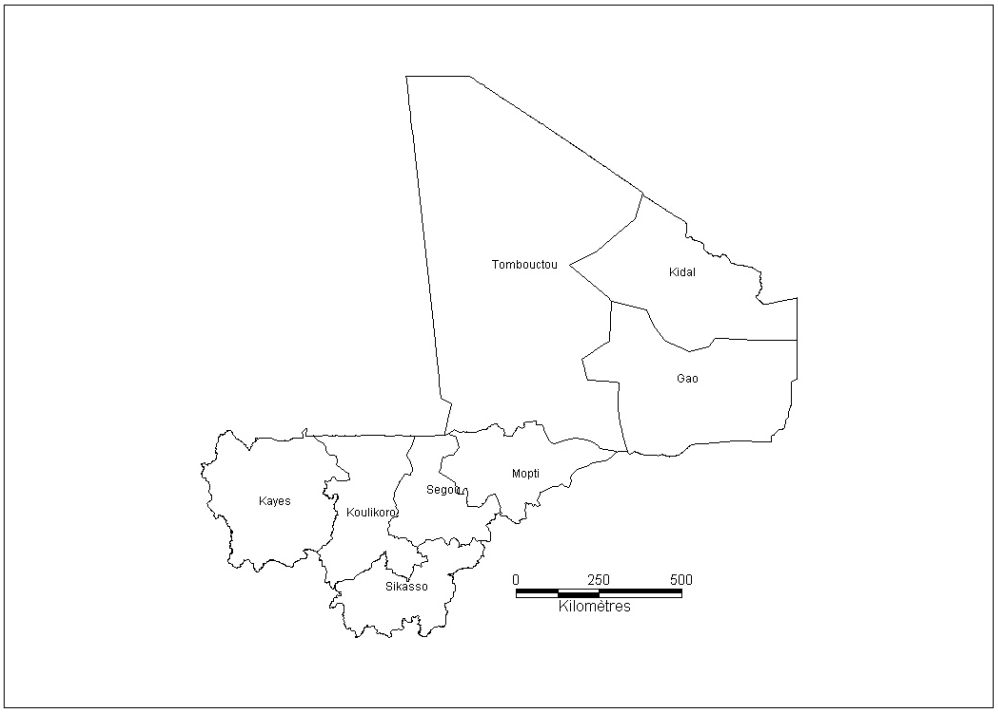
Picture 4. Small scale dairy farming

7.3 Appendix 4: Ilustrations to Test Case Regions – SIKASSO and KOUTIALA (Mali)

Organisation name of lead contractor for this deliverable: UMR System (INRA), Jacques Wery

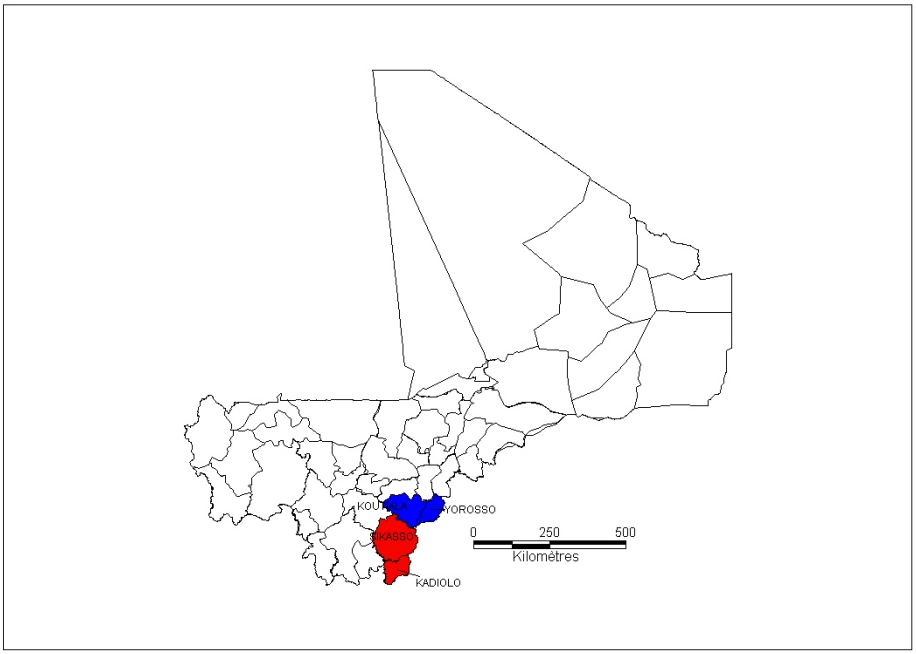
Authors: Bruno RAPIDEL, Didier Bazile (CIRAD-TERA, Mali), Mamadou Coulibaly (IER, Livestock Programme, Mali)

Illustration (1) The Sikasso and Koutiala agricultural regions are included into the Sikasso administrative region, in southern Mali



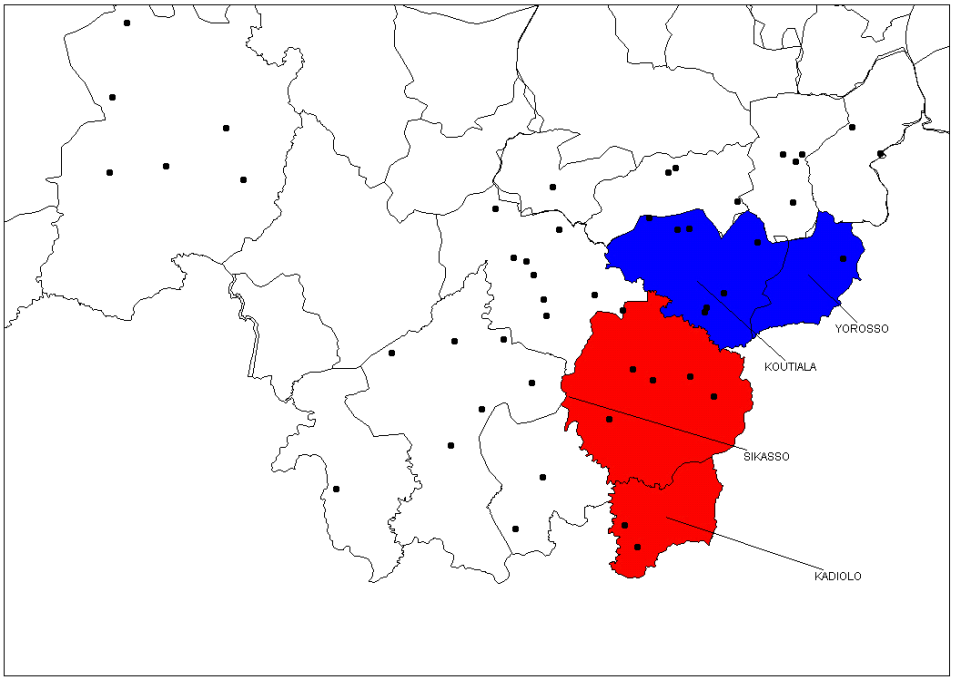
Source: GIS output from Bazile for the SEAMLESS project

Illustration (2) Both Sikasso and Koutiala agricultural regions include 2 administrative circles



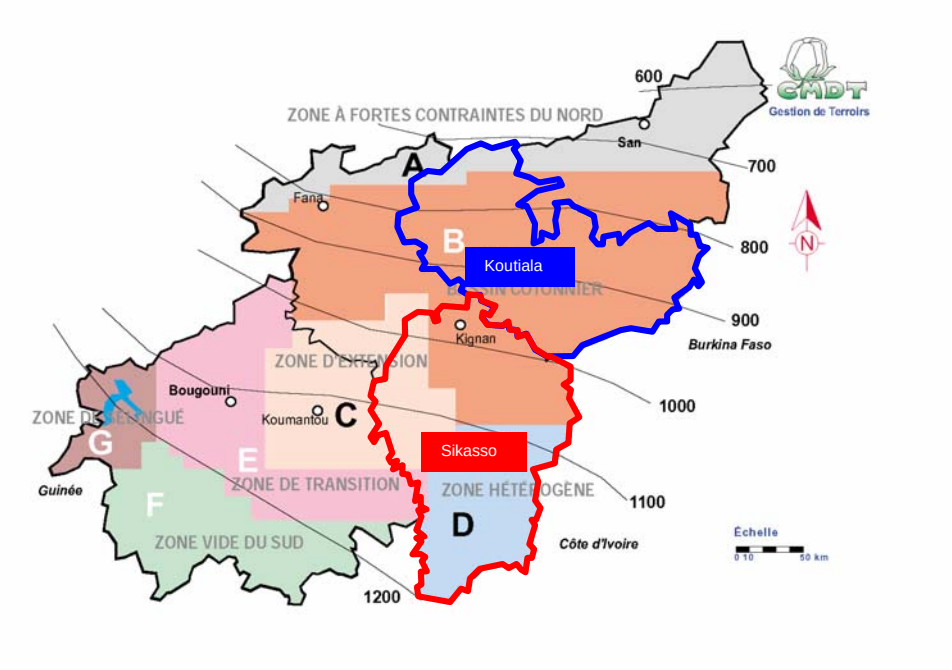
Source: GIS output from Bazile for the SEAMLESS project

Illustration (3) CMDT Villages studied with annual agricultural data replaced into the two regions (correspond to the CMDT assessment service database)



Source: GIS output from Bazile plus CMDT-SSE data for the SEAMLESS project

Illustration (4) The selected regions are differentiated by average precipitations (average annual amounts in mm on the right)



Source: CMDT adapted by Rapidel

Illustration (5) The main crops in Southern Mali

		
Pearl millet	Traditional landraces of Sorghum (6m high)	Cotton field

Sources: Vaksmann and Bazile

Illustration (6) The cotton sector is one of the best organized rural activities and very dependent upon international prices

Source: Rapidel

Illustration (7) Livestock is important as a source of regular or exceptional revenues, and as a major factor of equipment

	
Breeding of milk cows with commercial aiming in Kaniko, a village not far from Koutiala	Equipment is a major factor of farm development

Source: Coulibaly and Bazile

Illustration (8) Agriculture-livestock interactions are key for the intensification of farms

Strong interactions between crop production and livestock: residue decomposition to produce manure is a key factor in fertility maintenance

Crop-livestock interactions: storage of crop residues after harvest is labor intensive but key to livestock alimentation during dry season

Free grazing for herds managed by Peuhls herdsmen is a social compromise

Source: Poccard