Agr’Eau: developing a resource-efficient, eco-friendly, climate-smart agriculture across the Adour-Garonne basin (South-West France)

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3rd European Agroforestry Conference
23rd May 2013, Montpellier, France
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The Adour-Garonne basin – Where?

Europe

France

Adour-Garonne basin
What context brings about the need for change?
An agriculture that leads to desertification...
... Ecologically, agriculturally, climatically... and humanly speaking!
Not enough water?
Too much water?
A matter of (degraded) soils...
Water degrading the soils...

... And soils degrading the water...
Wind erosion!
• Mean soil loss in EU: 2.46 t/ha annually

• 12.7% of European arable lands have soil loss >5 t/ha annually

• Among all land uses, arable and sparse vegetation have the highest soil loss rates
What are the solutions?
**Adour-Garonne basin**

**Agr’eau** – a farmer-centered initiative

**Aim:** collaborative development of farming practices that allow for...

- Sustainable soil & water management (*landscape approach*)
- Intensification & optimization of farming systems

→ Producing more, with less... while protecting the environment

The long-term development programme launched in 2013

France

Adour-Garonne basin
**Agr’ea**u – A multi-partner, local initiative

**The institutions**

**Program manager:**

*French Agroforestry Association*

**Founding partners:**

- **IAD**: Sustainable agriculture Institute
- **A.O.C Sol**: Local soil conservation association
- **Arbre et Paysage 32**: Local farmer association

**Sponsors:**

- Water Agency: 50% of programme budget

**Associated partners:**

- **Agr’Eau**: Multi-partner, local initiative
- **Michelin**: Local association
- **GAIA**: Local organisation
Agr’eau – A multi-partner, local initiative

The people

Ag. extension workers

Researchers

Road maintenance officers

Farmers*

River conservationists

Foresters

Bee-keepers

*more than 300 farms (still increasing)
What framework to use?
Agroforestry!

Building on 20+ years of field and research experience...
Nature is showing us the way!

Principle 1: retain plant cover all year long, no soil disturbance

Principle 2: plants as big as possible... and on top of each other
• **Principle 1**: retain plant cover all year long, no soil disturbance

  Intermediate cover crops, no-till practices, direct seeding into standing crops

• **Principle 2**: plants as big as possible … and on top of each other

  Multi-level plant systems that include trees and other woody perennials = AGROFORESTRY
Agroforestry?... Principle 2??...

Wait... did we miss a step?
Principles 1 + 2...

... Here we are!
No-till + direct seeding into living mulch = Healthy, fertile, filtering soils
Crop succession (1 year)

**BEFORE:**
- 1 crop a year
- Soil left bare part of the year
- Low biomass production

**Vicious circle**

**AFTER:**
- Up to 3 crops a year
- Soil permanently covered with plants
- High biomass production

**Virtuous circle**
On a 1-yr period, 15 yr old trees + wheat (without intermediate cover crops)
Exported carbon (t/ha/yr)

Carbon restituted to soil (t/ha/an)

"Modern" agriculture (1 crop a year)
7 tC/ha/yr

Intermediate cover crops (2-3 crops a year)
12.5 tC/ha/yr

Intermediate cover crops + agroforestry
16.5 tC/ha/yr

Food production

Soil restitution (fertility)

Biofuels (fuelwood, anaerobic digestion...)

Storage in biomass (timber)

France could capture **twice as much carbon**!
Living soil = Autoregulation

- Water
- Chemical pollutions
- Temperature
- Pathogens
Protecting spaces, not species...
The keystone of the *Agr’eau* initiative: 

**The pilot-farms**

- A 2-scale follow-up and evaluation: farm & field-level
- A constant interaction with research
- Expected: **125 pilot-farms** by 2018
Farmers, the motor of innovation!
**Connecting farmers**

- Identify **innovative farmers** and bring them to the forefront
- Encourage **sharing** of views & ideas
- Gather and **analyze** the results (successes & failures)
- **Out-scaling** & **up-scaling**
A program for all farmers, regardless of:

- **Certification** scheme (conventional, organic... ... everyone welcome!)
- Type of **farming system**: arable, vegetable, mixed crop-livestock systems, viticulture...
- **Pedoclimatic** context
- **Size** of farm
- **Level of experience**...
... Just one "deal":

Being willing to engage in continuous improvement processes towards a "more plant cover, less soil tillage" target...
Conversation agriculture...

Building local innovation networks
A diversified and productive landscape

Highway engineers
125 m³/yr of fuelwood
75 t of grass for each 25 km of road

River conservationists
460 m³/yr of fuelwood for each 55 km of river

Foresters
880 m³ of fuelwood for an area of 800 ha

Farmers
30 m³ of fuelwood/yr/farm
(100 ha, of which 20ha are agroforestry + 5km of hedges)
To plant…

… or not to plant!

(Assisted Natural Regeneration)
The thorn (*Rubus* spp.) is the mother of the oak!
Tree growth without planting cost
The multi-purpose biomass as a socio-economic leverage:

Development of new jobs and market channels
L'écosystème ferme à la loupe
Assessing the performances

- Providing farmers with user-friendly evaluation tools/indicators to guide their decision making
- Gather and analyze the results (successes & failures)
- Out-scaling & up-scaling
Agr’eau follow-up procedure – Farm-level

- Multi-criteria evaluation of farm performances (radar charts)
Agr’eaufollow-up procedure – Field-level

- **Nitrogen balances** to determine soil dynamics
- **Soil analysis**
Agr’eaufollow-up procedure – Field-level

- Above-ground biomass yield of main and intermediate crops (MERCI method)
Agr’eau follow-up procedure – Field-level

- **Humus & carbon balances**: impact of farming practices on soil organic matter

- **Soil quality assessment**: biological activity, water infiltration capacity, etc.
Promising results within all cases, though with a variable extent:

- Higher **soil organic matter**
- Higher soil **porosity & biological activity**
- Lower **input** requirement (fertilizers, pesticides, irrigation)
- Reduction of the "**tractor working time**" = lower fuel consumption
- Diversification of **income sources** = lower economic risk

➔ Most farms prove to be "healthier", both **ecologically & economically**
➔ Farmers feel **happier & more peaceful**!
Starting: January 2016
Ending: December 2020

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