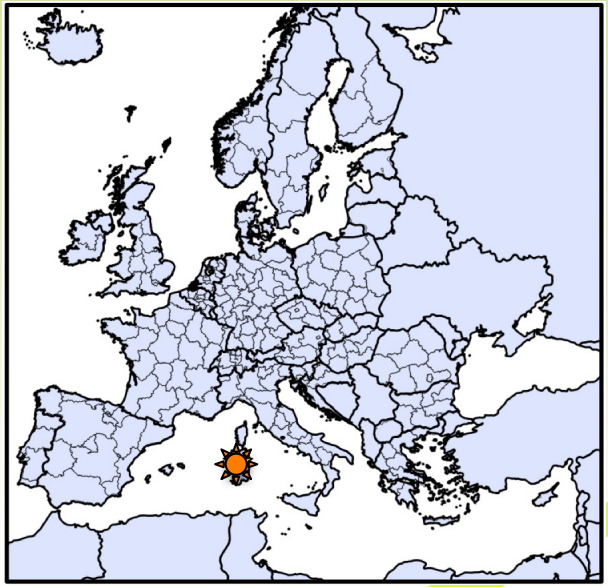
Oristano, Italy

Combining modeling and stakeholder involvement to build community adaptive responses to climate change in a Mediterranean agricultural district

Pier Paolo Roggero, Giovanna Seddaiu, Luigi Ledda, Luca Doro, Paolo Deligios, Thi Phuoc Lai Nguyen, Massimiliano Pasqui, Sara Quaresima, Nicola Lacetera, Raffaele Cortignani, Gabriele Dono



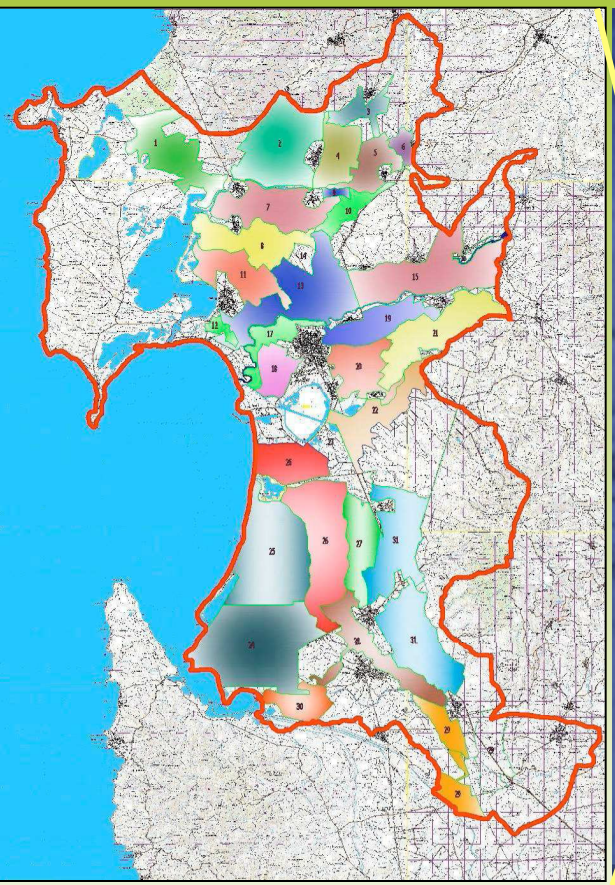
Regional Pilots' meta-question:

What would be the different contributions of different European adaptation strategies to ensure global food security until 2050 at different scales [farm to EU] while keeping the GHG targets?

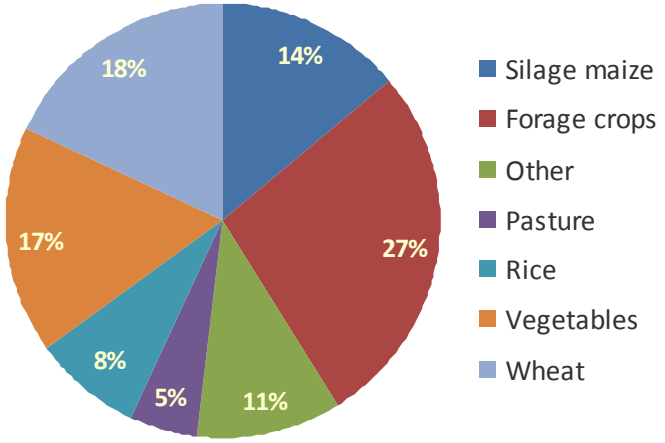
Why the Oristanese case study?

- One of the six case studies in Italy within the Agroscenari project (www.agroscenari.it)
  - Interdisciplinary team @work
  - Context data available from other projects
- Very diversified agricultural district in a Mediterranean context
  - Irrigated and rainfed farming systems
  - Variety of cropping systems, intensity levels, farm size
- Multiple stakeholders
  - Cooperative agro-food system
  - Producers' organizations (rice, horticulture)
  - Variety of extensive pastoral systems

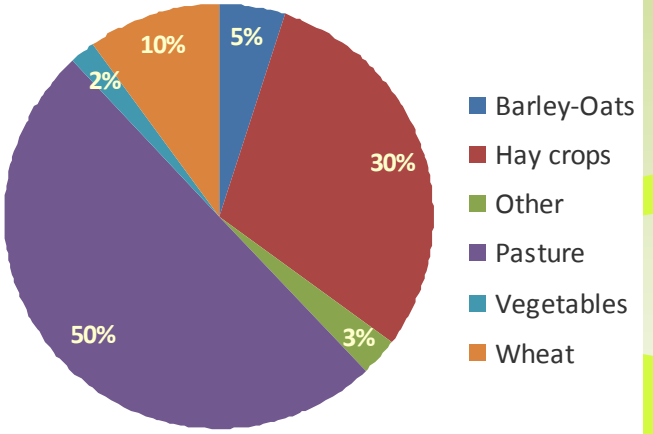
Oristanese



Infrastructured area for irrigation: 36,000 ha



Rainfed area: 18,000 ha







Farming system typologies

	Represented farms (n)	Farm land size (ha)	*Typology % total land area*	Family Labour Units	Gross sales (€ 000)	Net Income per farm (NI - € 000)	*Typology % total NI*
Irrigated crops (WUA)			***57.7***				***82.5***
Rice	*24*	115	***5.2***	2.0	303	139.5	***4.2***
Citrus	*68*	13	***1.6***	1.7	74	45.7	***3.9***
Dairy cattle A	*130*	31	***7.6***	4.4	507	199.2	***32.6***
Dairy cattle B	*40*	32	***2.4***	6.3	453	112.7	***5.7***
Greenhouse	*46*	13	***1.1***	3.5	147	29.7	***1.7***
Vegetables - Cereals	*562*	22	***23.5***	1.7	98	34.2	***24.2***
Cereals - Forages	*55*	146	***15.2***	1.2	236	126.3	***8.7***
Tree and arable crops	*100*	6	***1.1***	2.0	44	11.8	***1.5***
Rainfed crops			***42.3***				***17.5***
Vegetables - Fruit	*100*	4	***0.8***	1.7	65	18.2	***2.3***
Cereals - Forages	*94*	25	***4.4***	1.2	41	16.9	***2.0***
Sheep A	*45*	87	***7.4***	2.1	111	43.6	***2.5***
Sheep B	*188*	41	***14.6***	1.5	35	16.1	***3.8***
Sheep C	*129*	62	***15.2***	1.6	82	42.5	***6.9***






Major farm types (seamless categories)

- Irrigated area
  - Farm **size**
    - Small: 0.0 %
    - Medium: 9.8 %
    - Large: 90.2 %
  - Farm **intensity**
    - Low: 0.0 %
    - Medium: 62.5 %
    - High: 37.5 %
  - Specialization
    - Dairy cattle (temp. grass)
    - Arable: cereals incl rice, forage crops
    - horticulture

- Rainfed area
  - Farm **size**
    - Small: 0.0 %
    - Medium: 74.5 %
    - Large: 25.5 %
  - Farm **intensity**
    - Low: 0.0 %
    - Medium: 82.0 %
    - High: 18.0 %
  - Specialization
    - Dairy sheep (permanent grasslands, temporary grasslands)
    - Arable: cereals, forage crops

Main farming systems

Cnr Ibimet

RAMS scenarios forced by sea T coupled with atm (2000-10 vs 2020-30)

WXGEN

Social learning

150 years PC vs FC

Calibration

Local weather dataset (59 yrs)

NRD Uniss

Calibrated EPIC model for main cropping systems

Calibration

Local cropping system dataset

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P distributions of performance of main crops and net ET under CP vs FC

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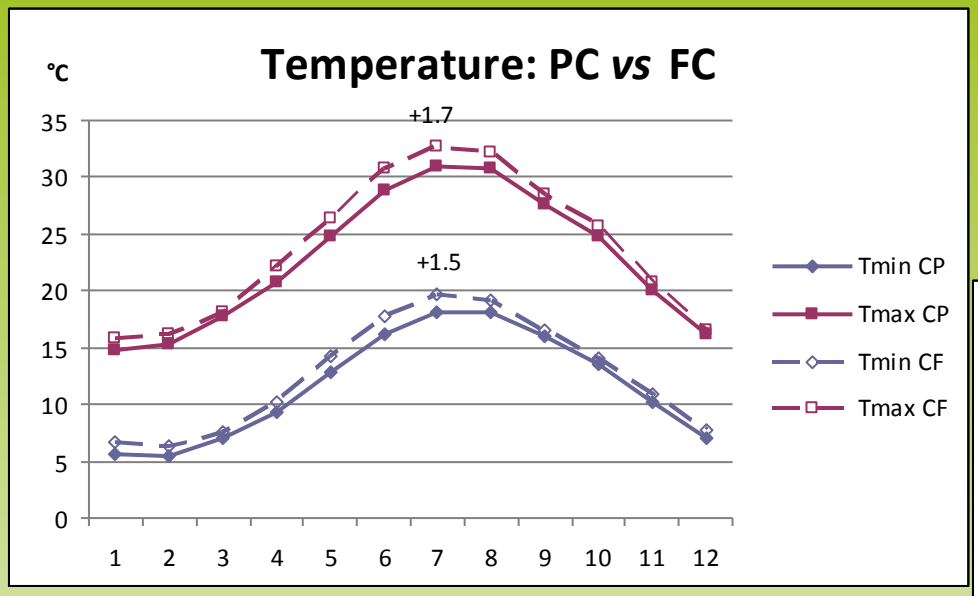
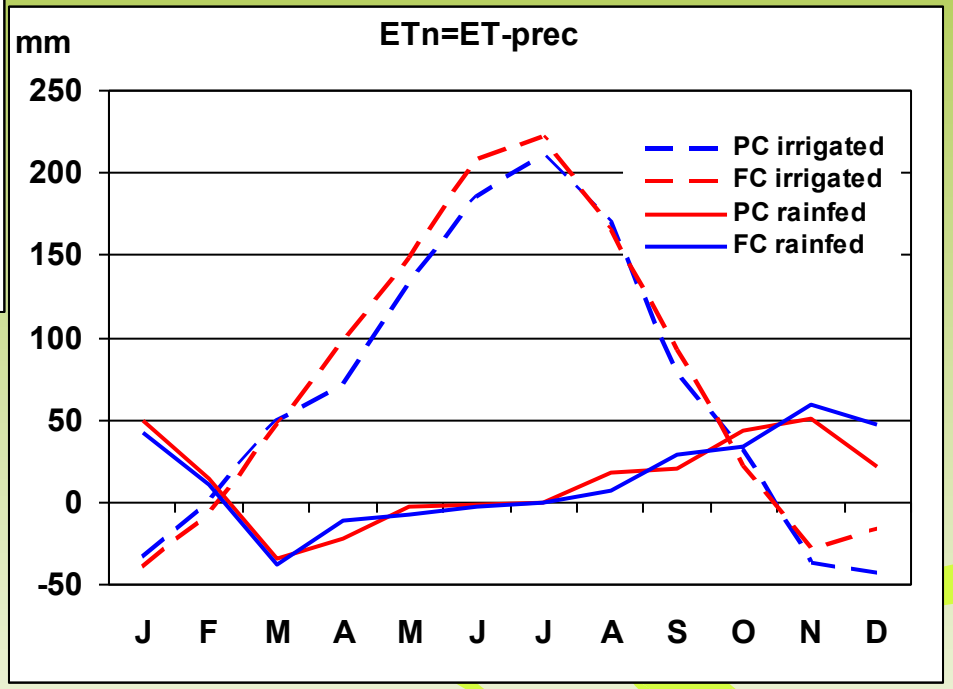
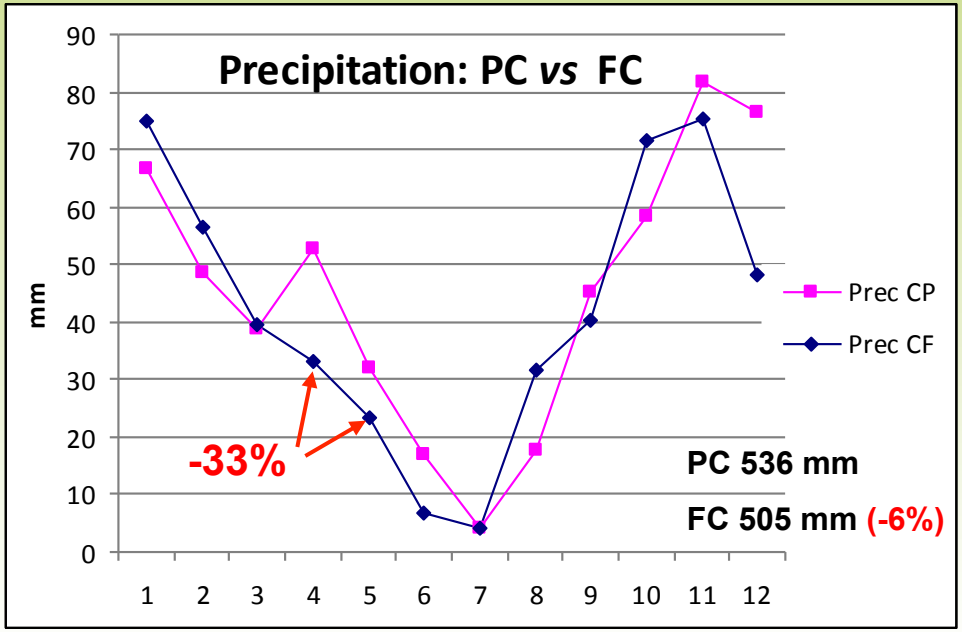
Climate change signals







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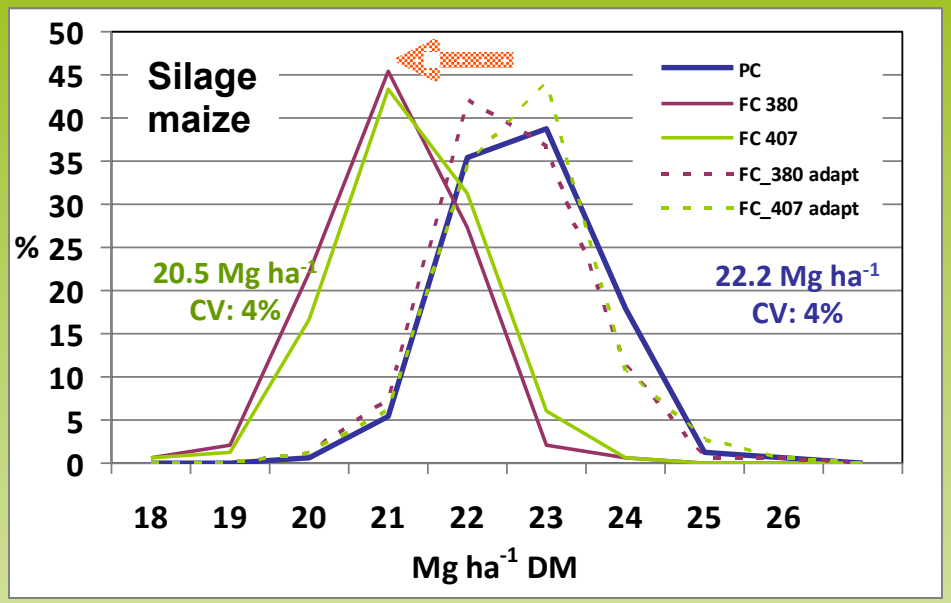
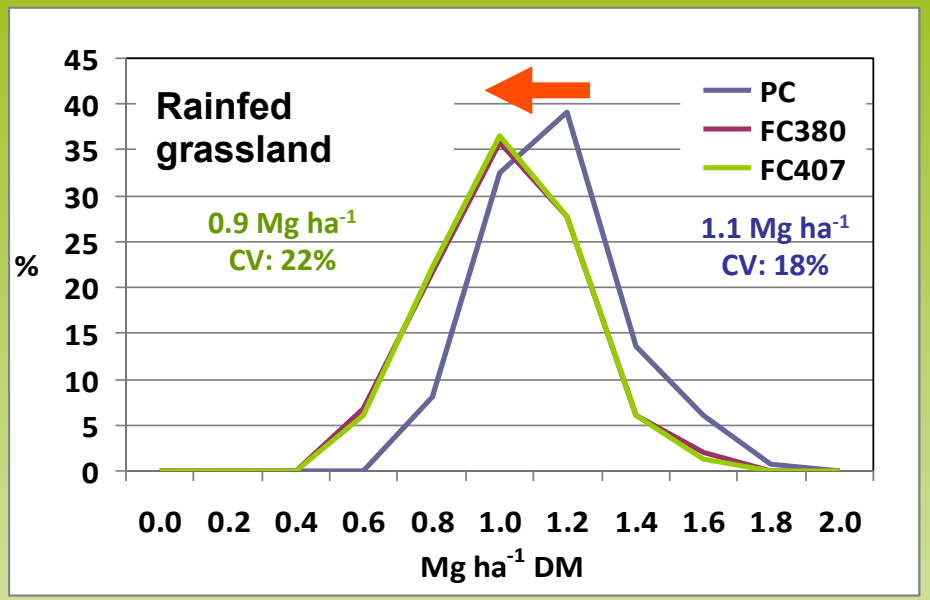
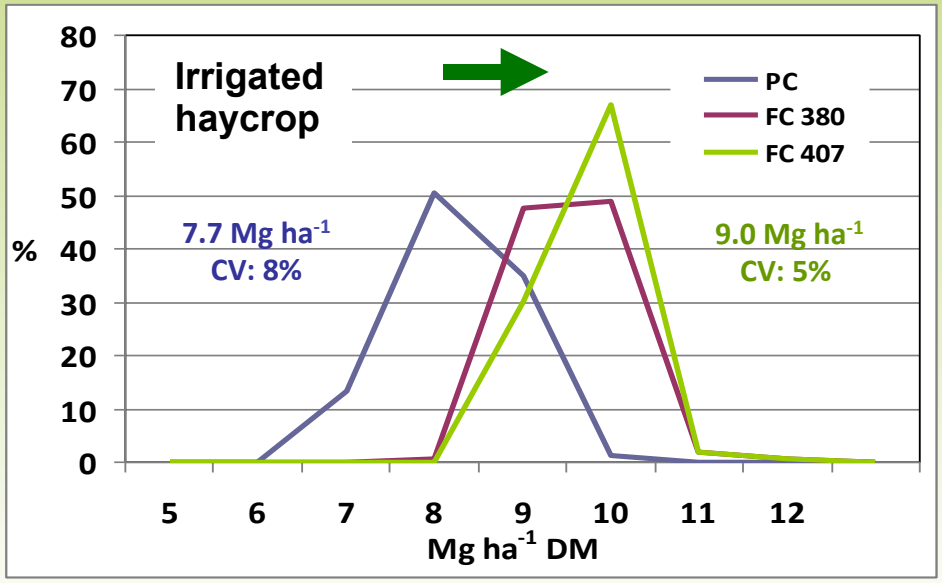
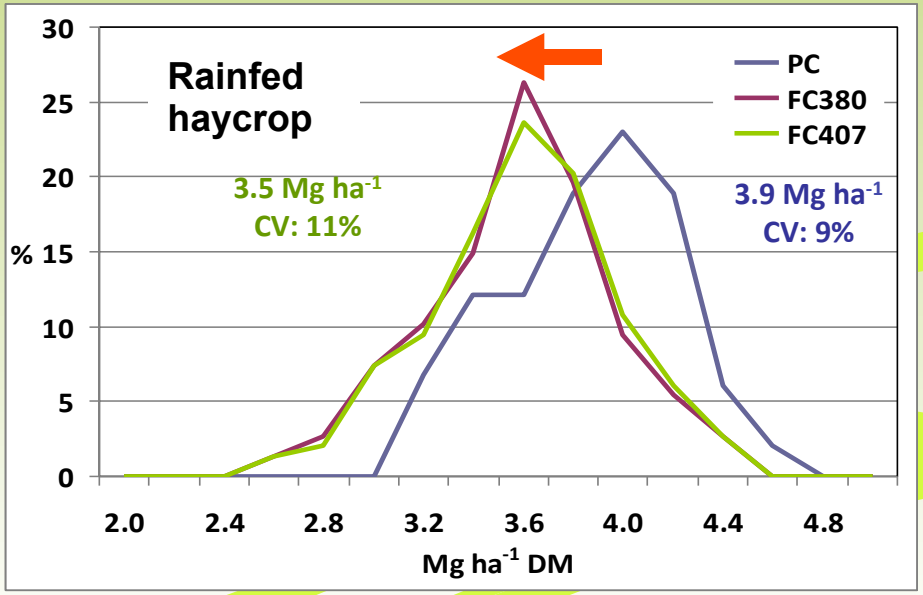

Silage maize
PC
FC 380
FC 407
FC_380 adapt
FC_407 adapt
20.5 Mg ha-1
CV: 4%
22.2 Mg ha-1
CV: 4%
%
Mg ha-1 DM


Rainfed grassland
PC
FC380
FC407
0.9 Mg ha-1
CV: 22%
1.1 Mg ha-1
CV: 18%
%
Mg ha-1 DM


Irrigated haycrop
PC
FC 380
FC 407
7.7 Mg ha-1
CV: 8%
9.0 Mg ha-1
CV: 5%
%
Mg ha-1 DM


Rainfed haycrop
PC
FC380
FC407
3.5 Mg ha-1
CV: 11%
3.9 Mg ha-1
CV: 9%
%
Mg ha-1 DM

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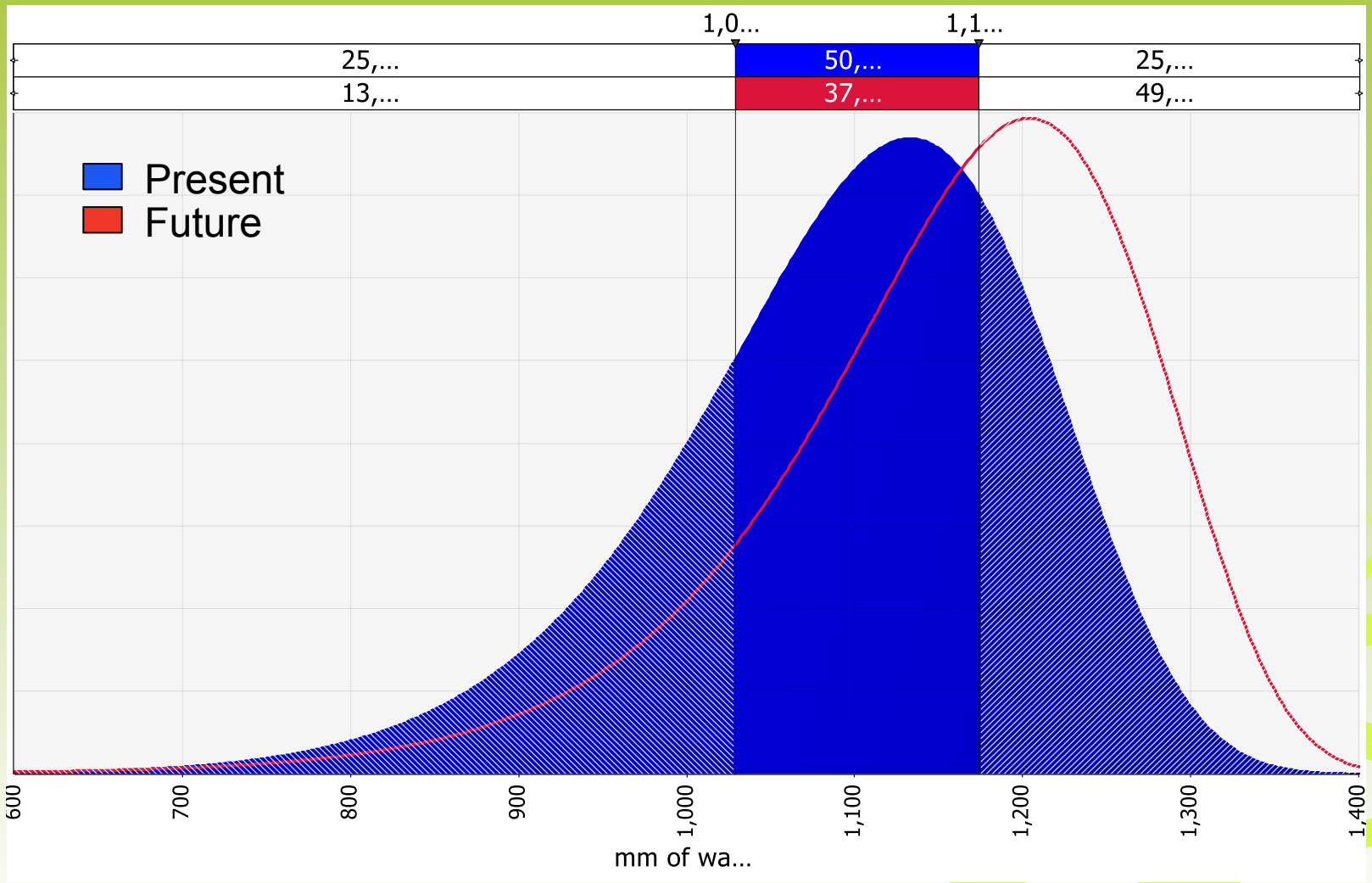
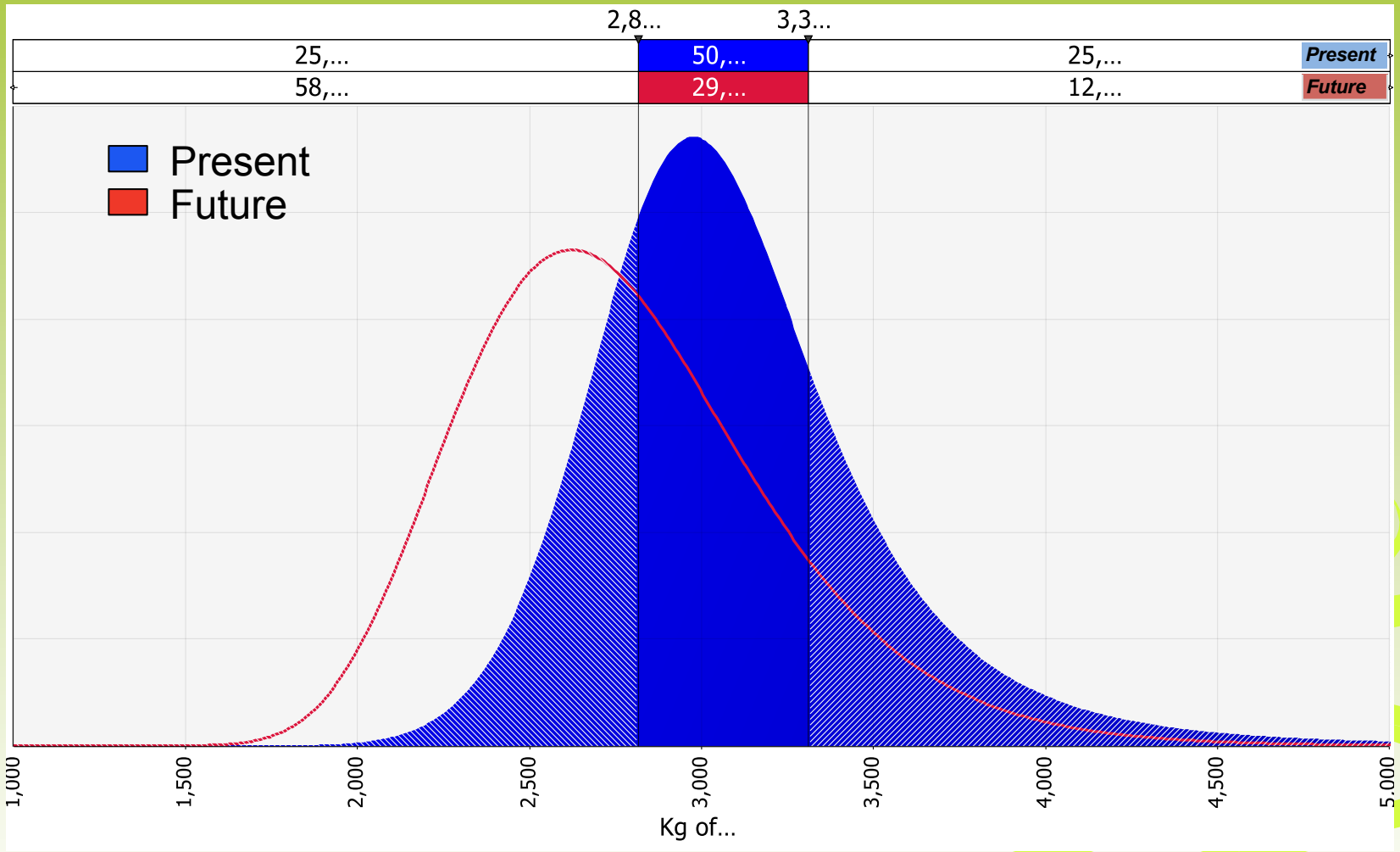
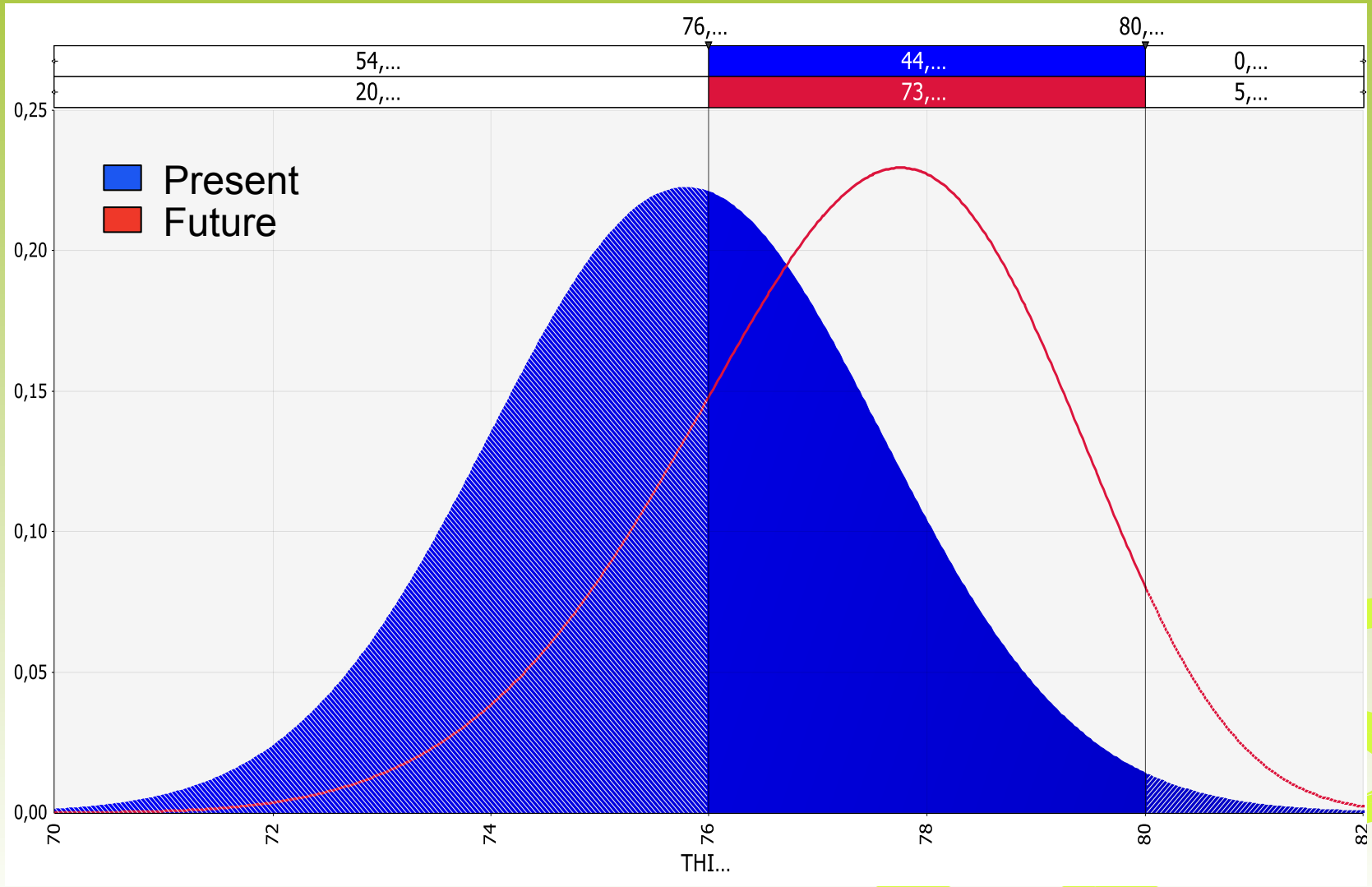
Cumulative ETn in April-October



Spring Hay yield from rain-fed crops



THI max in May-September



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Gross Margin (GM) per typology and farm

	Hectares per farm	Present (000 €)		Near Future (% changes over *baseline*)
		Typology	Farm	
Rice	115.3	3,876	161.5	-0.7
Citrus	12.6	2,768	40.7	-7.1
Cattle A	30.9	35,546	273.4	-6.4
Cattle B	31.9	10,100	252.5	-6.1
Greenhouse	12.9	1,865	40.5	0.3
Vegetables	22.2	26,041	46.3	-1.2
Cereals	146.4	4,940	89.8	1.0
	5.8	2,766	27.7	-0.9
Vegetables - Fruit	4.1	1,381	13.8	-0.1
Cereals - Forages	24.5	3,672	39.0	0.0
Sheep A	86.9	2,748	61.1	-9.0
Sheep B	41.2	4,579	24.3	-5.1
Sheep C	62.4	7,060	54.8	-7.4

Impacts on net income

	Present (000 €)			Near Future (% changes over baseline)		
	Total area	*WUA facilities*	*Rainfed*	*Total area*	*WUA facilities*	*Rainfed*
Total revenue	203,564	177,876	25,689	-4.9	-5.2	-2.4
Variables costs	125,867	112,460	13,407	-4.7	-5.6	2.7
Feeds	18,731	16,639	2,092	9.2	9.3	8.4
Gross margin	107,343	87,903	19,440	-4.1	-3.9	-5.2
Net income	**67,471**	**56,031**	**11,441**	**-6.5**	**-6.1**	**-8.8**

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Levels of responses for adapting to CC

Response level	Attitude	Investiments
1. No reponse	Reluctant	None
2. Compliant	Tick-box	Minimum as prescribed by norms
3. Efficient management	Low-level, active	To achieve a target state (eg. ISO 14001)
4. Breakthrough projects	High level, strategic	Explore issues and options in depth seeking “win-win” opportunities
5. Strategic resilience	Strategic, all levels of management	CC adaptation key for strategic management to ensure resilience
6. Champion organization	Visionary, influential	Focus on influencing the political, social, legal and tech level towards sustainability

Level 2 - Compliant

- Listen to farmers, **involve** actors
- Increase access to **credit** for youngs
- Invest on risk **insurances**
- Extend **access to land and farming** independently of age

Level 3 – Efficient management

- Invest on agrometeo, weather forecast and extension **services**
- Adapt **cropping & livestock systems**
- Invest on monitoring and **open access** data
- Increase **farm size** (eg dairy cattle)
- Integrate income with **renewable energy**
- Invest in **marketing** strategies
- …..

Level 4 – Breakthrough projects

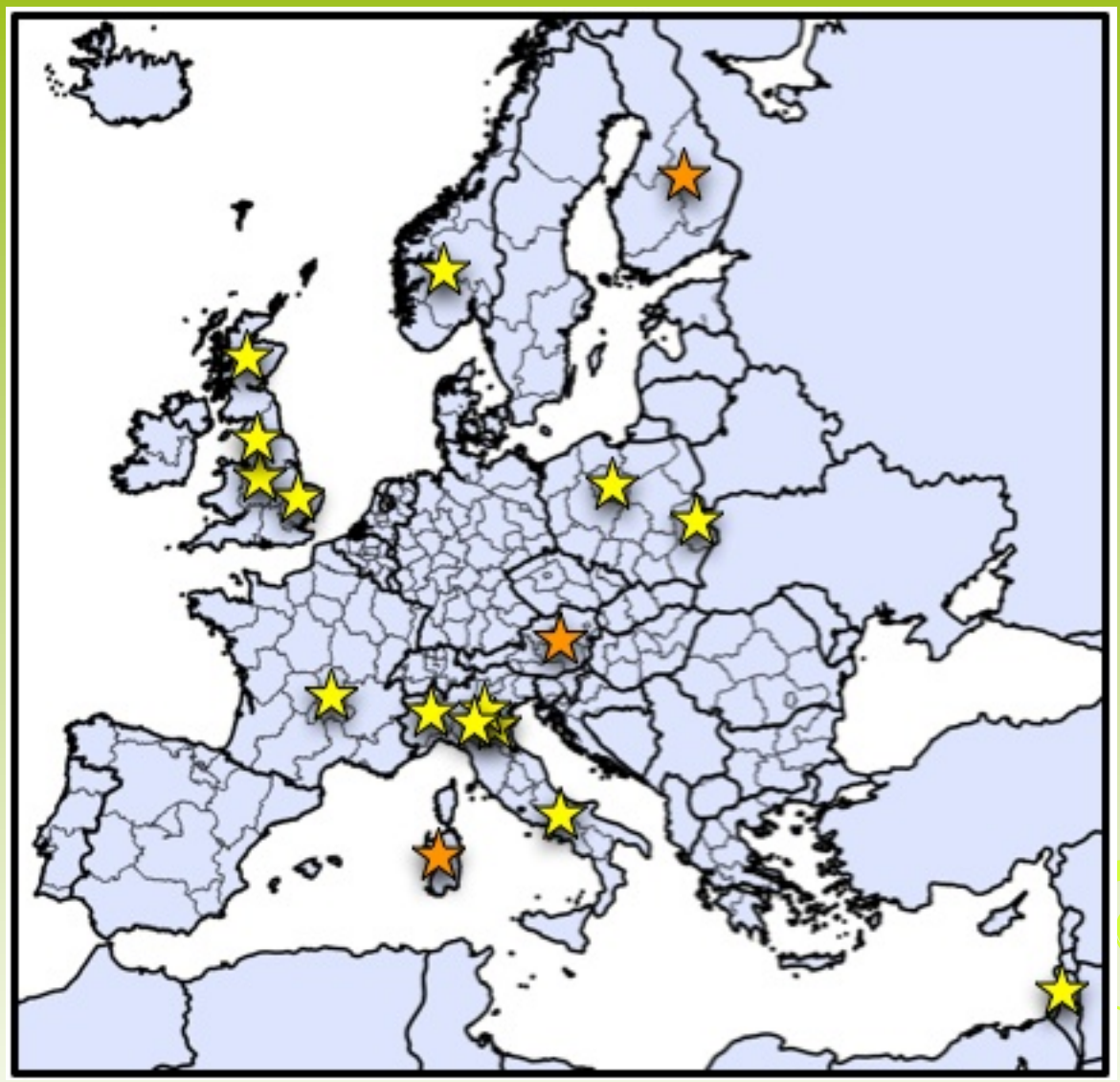
- Finalize stakeholder involvement **beyond formal requirements**
- Design **new learning spaces** around monitoring and data
- Involve **payment officers** in the design of PSR calls
- Invest on **catchment scale** actions
- …

Level 5 – Strategic resilience

- **Link complementary districts** to increase resilience…

Emerging issues

- What kind of changes…?
  - E.g. what praxes to change for designing effective research processes? (Colvin et al 2014, Research Policy)
- At what scale/level…?
- What kind of knowledge…?
- Who to involve…? And how…?



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