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Agriculture can meet the challenge of climate change



What other sector than agriculture is more dependent on the weather and climate?

This is a blessing and a curse at the same time: dealing with a sector so much held in the hands of nature – and its predicaments.

With climate change, these predicaments are becoming more serious and above all more unpredictable, and have an impact far beyond rural areas per se. Everybody is affected by climate change – this is the bad news. But everybody can do something about it – this is the good news.

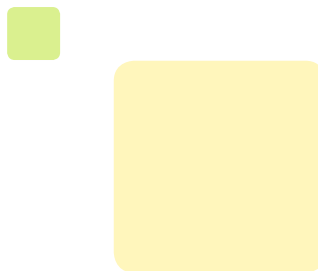
Agriculture can and should join the fight against climate change, but also adapt to it, when and where it becomes unavoidable.

Farmers and other rural stakeholders can play a vital role in both the mitigation – protecting important environmental resources – and the adaptation to climate change – maintaining the viability of rural areas in changing environmental circumstances.

European agriculture has demonstrated its ability to meet this challenge. Between 1990 and 2007, it reduced its greenhouse emissions by 20% compared with 8% in other sectors. There is a significant scope for carbon sequestration in rural areas. Farmers manage the landscape. And landscape, in all the glory of its diversity across Europe, is one of the assets that our policy can and should protect.

Environmental sustainability is a vital goal for all EU rural development actions. While the Commission has an important role to play in its policy-making, it does so in addition to Member States' own measures.

The overall policy framework for EU rural development is well positioned to facilitate targeted actions by Member States for mitigating and adapting to climate change.



Financial support is significant. Member States' Rural Development Programmes (RDPs) contain a number of measures that can be used for these purposes. Recent amendments to the RDPs have seen an additional €4 945.7 million of rural development funds provided following the CAP Health Check agreement and EU Economic Recovery Plan.

These new resources target priority areas like *environmental actions, broadband roll-out and dairy restructuring*. Some €704.2 million of these new funds have been allocated for direct climate change support. An additional €275.4 million is earmarked for *renewable energy investments*. *Biodiversity* will benefit from a further €1 542 million and €1 332.2 million has been made available for *water management* projects.

This work needs close coordination and networking between all rural development stakeholders.

I look forward to seeing the benefits and the opportunities that these funds will provide, both for EU rural areas, as well as their wider global contributions to climate action.

But money is not everything. We need to do more in terms of information and communication, to better explain to taxpayers how this money is spent, and also to share best practices and to exchange experiences about effective climate change actions. For that, we will use the full potential of the European Network for Rural Development to continue transferring know-how and experience about our progress in achieving these critical objectives.

The current Issue of the *EU Rural Review* explains the contribution that the rural development policy brings to the EU's climate action agenda. It interprets key policy perspectives and highlights tangible progress that has been made by Member States in terms of rural development climate actions. It explores different climate change issues affecting different parts of rural Europe through case studies, and it provides some examples of the types of responses that RDPs can support.

And we can do more, by providing the RDPs with better-tailored tools supporting the modernisation of agricultural systems, enhancing renewable energy supply and demand, and preserving and developing environmental resources.

The Commission's broad policy objectives for emerging from the economic crisis – the so-called EU2020 strategy – embraces the three concepts of sustainable growth, SMART growth and inclusive growth, all of which will be relevant with regard to addressing climate change.



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Mr Dacian Cioloș

Commissioner for Agriculture
and Rural Development

Rural development and climate change: implications from the Copenhagen Summit



The United Nations Climate Change Conference in Copenhagen last December raised a number of important issues that have implications for EU rural development policy and rural life in general.

The Copenhagen conference was a unique moment in history - with 110 world leaders present, the conference redefined the debate between countries in terms of awareness of climate science and support for action. The Copenhagen Accord, negotiated by 30 countries in the last two days of the Conference, can be seen as a stepping-stone to a more ambitious future, and a basis for further international co-operation.

For the first time, it unites the US, China and other developed and major developing countries in an effort to curb global greenhouse gas emissions - something which the Kyoto Protocol did not achieve - and it offers financial support from the developed countries to the poorer nations. Yet despite these markers of progress, there remain uncertainties. The Accord was only "recognised" by the 193 nations at the Copenhagen summit, rather than approved unanimously, and there is no legally binding deal (nor a commitment to reach one), no global target for emissions reductions by 2050 and a lack of clarity on some key points, such as finance.



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Key points of the Copenhagen Accord

- A recognition of the need "to reduce global emissions so as to hold the increase in global temperature below 2°C" and to achieve "the peaking of global and national emissions as soon as possible" (*but this is not a formal target and, according to scientific assessment, emissions must peak within the next 10 years to retain a probability of limiting the temperature rise to 2°C*).
- Developed countries must make commitments to reduce greenhouse gas emissions, and developing countries were required to report their plans to curb greenhouse gas emissions to the UN by 31 January 2010 (*countries producing at least two-thirds of global emissions have done so but their pledges are likely to achieve a reduction of around 13-18% compared to 1990, well below the 25-40% that scientists advise is needed by 2020 to prevent a rise of more than 2°C. The same experts recommend a reduction of 80% compared to 1990 in developed countries by 2050, but the Copenhagen Accord did not require long term commitments*).
- New and additional resources "approaching \$30bn" will be channelled to poorer nations over the period 2010-12, with an annual sum of \$100bn envisaged by 2020 (*this gives island states and the least developed countries much needed help in adapting to the risks of a changing climate*).
- A Copenhagen Green Climate Fund will be established under the UN convention on climate change, to direct some of this money to climate-related projects in developing countries (helping them to limit rises in emissions).
- Projects to reduce greenhouse gas emissions in developing countries will be subject to international monitoring if they are internationally funded (*a welcome move to transparency, although projects funded by the developing countries themselves will simply be reported, not verified*).
- Programmes to provide developing countries with financial incentives to preserve forests - REDD and REDD-plus - will be established immediately (*this is significant progress, but the details are yet to be agreed*).
- Implementation of the accord will be reviewed in 2015 and an assessment made of whether the goal of keeping global temperature rise within 2°C needs to be strengthened to 1.5°C (*but, on current predictions, 2015 could be too late to achieve a 1.5°C reduction*).

Important issues related to rural development were raised, including the land use, land use change and forestry (LULUCF) sector of the Kyoto Protocol. The complexity of current reporting practices for LULUCF were discussed, and there was support for simplifying and improving the accounting process, which should provide incentives for increased mitigation efforts in this sector.

At the Summit's Agriculture and Rural Development Day more than 300 policymakers, farmers and scientists strongly acknowledged agriculture's vital role in adaptation and mitigation and endorsed the proposed '2C target' (to restrict global warming to 2°C). Farmers and researchers are already finding climate change solutions to contribute to climate targets, but substantial additional financing and investment will be needed, and this must be accessible to all stakeholders across the entire rural value chain. They urged negotiators to set up an agricultural work programme under the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA) (www.agricultureday.org/exhibitions-and-events.html#3).

A mandate for SBSTA to work on agriculture and climate change was nearly completed in Copenhagen but not finally adopted.

Although absent from the Copenhagen Accord, negotiations on agriculture are important in the climate negotiations because the sector is responsible for about 14 % of global emissions, and will be affected by the unpredictable weather associated with global warming. The current negotiating text on agricultural trade emphasises the relationship between climate change and food security.

What does this mean for the EU?

The EU has committed to increase its emission reduction target to 30% by 2020 if other industrialised countries make comparable efforts. The level of effort required to meet the current 20% target varies among the 27 Member States, depending on relative wealth and previous efforts – but meeting a new 30% target will be a major challenge. There will need to be a discernable adjustment

in Europe's policies, emissions, economies and societies by 2014. We face three key challenges:

- responding to an international commitment with a rapid review of EU action, shifting from a possible 20% to 30% emission reduction target
- delivering on the ambition of the 2008 climate and energy package by ensuring effective implementation and oversight
- addressing the next generation of challenges by: strengthening existing policy measures; a more concerted approach to adaptation; refocusing the EU budget; and addressing emissions and sequestration associated with land use change and management

Current European policy on climate action dates back over a decade, with the EU Emissions Trading Scheme (ETS) operational for carbon dioxide (CO₂) emissions from specific sectors since 1st January 2005. In 2008, the European Council and Parliament adopted a package of measures on climate and



energy designed to provide a foundation for delivering the 20% reduction by 2020. Efforts under this package largely focused on the reduction of emissions associated with energy production, industrial energy use and transport, including new binding targets for the adoption of renewable energy technologies (to deliver 20% of energy across the EU by 2020, with specific targets for each Member State) and the use of biofuels (10% of all transport fuels by 2020). Key aspects related to biofuels sustainability, financing of renewable energy and CCS (carbon capture and storage), and the EU ETS, remain to be agreed in the coming year.

Rural areas' contribution to climate change mitigation and adaptation

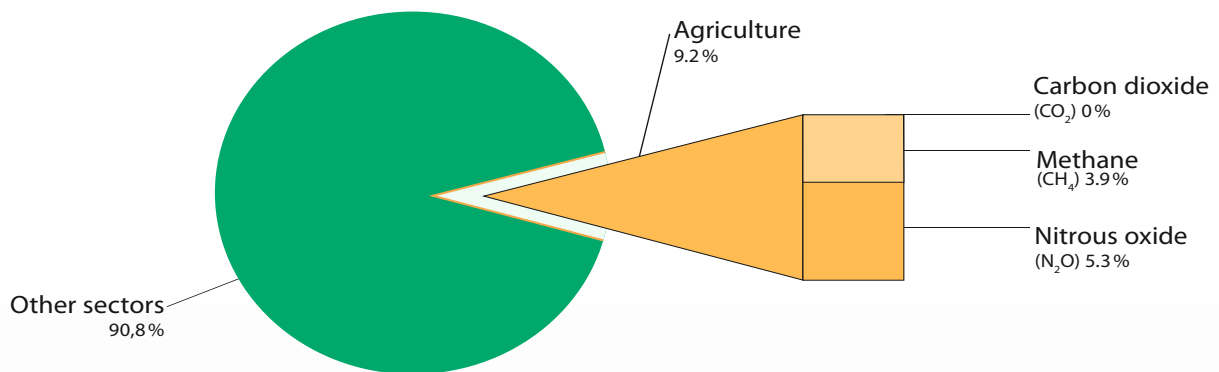
Land use is key to both climate mitigation and adaptation. The land represents both a source of, and a sink for, emissions. If well managed it also offers the opportunity to limit the impacts of climate change on agriculture and water availability.

Agriculture is crucial to meeting global reductions, particularly in the face of the necessity to increase food and feed production by a massive 70% if the world is to be able to feed its population in 2050. Most of the capacity for

increased food productivity and carbon mitigation measures in agriculture lies outside the EU, especially in relation to soil carbon and the land pressures linked to agriculture and deforestation. Nevertheless, agricultural mitigation in the EU will be very important because non-CO₂ emissions from agriculture (mainly nitrous oxide from soils and methane from livestock digestive processes) accounts for 9% of total EU emissions, as shown in Figure 1.

In some parts of the EU the proportion of national emissions is much higher as shown in Figure 2.

Figure 1. Share of agriculture sector in total GHG emissions – 2005



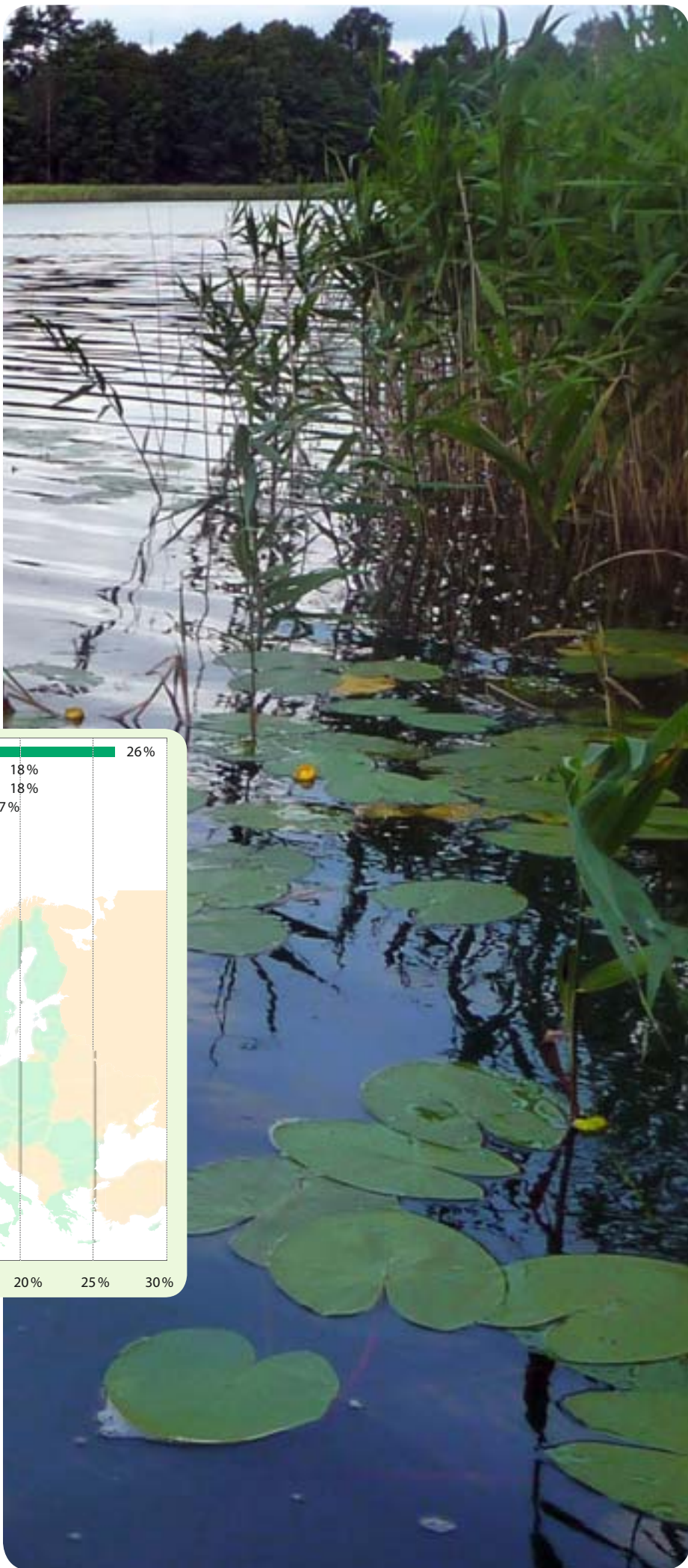
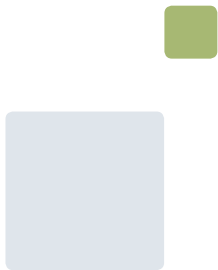
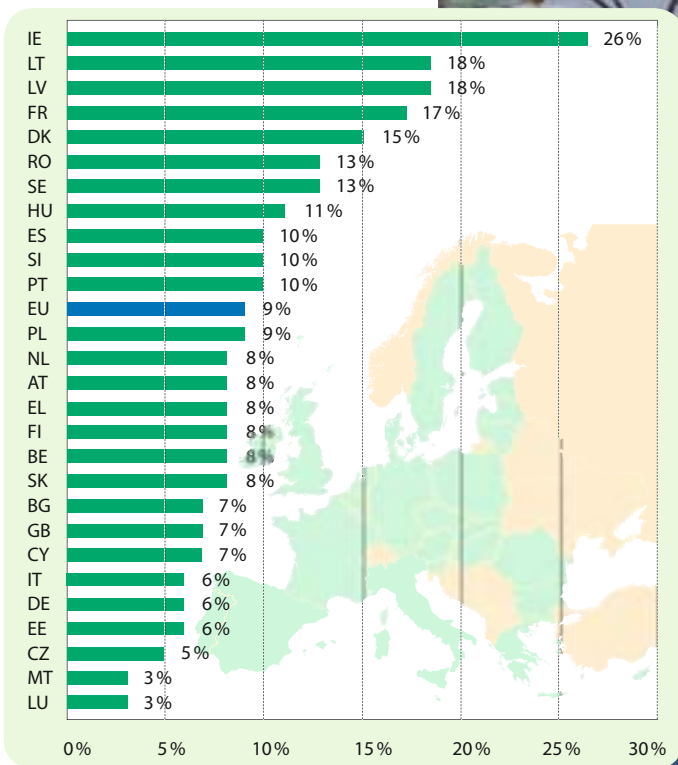


Figure 2. Share of agriculture sector in total GHG emissions (by EU-27 Member State) – 2005



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Soil management in agriculture (including peaty soils which have a high carbon storage/loss potential) and the role of trees and forest soils in carbon storage will be particularly important. CO₂ emissions from soils are included in the LULUCF sector of the Kyoto Protocol. One of the outcomes of the international negotiation process should be new rules for accounting for emissions and removals from LULUCF for the period after 2012.

The threats and opportunities offered by the land depend fundamentally on the adequacy and appropriateness of our management and use of it. We shall need to consider carefully the future of European land use and management; the impacts of European choices on land use in third countries; and how best to support the retention of terrestrial carbon stocks, both in vegetation and soils.



Renewable energy and rural areas

Member State	Proportion of energy from renewable sources in 2005 (%)	Proportion of energy from renewable sources by 2020 (%)	Required increase in proportion of energy from renewable sources (%)
United Kingdom	1.3	15	13.7
Denmark	17	30	13
Ireland	3.1	16	12.9
France	10.3	23	12.7
Germany	5.8	18	12.2
Italy	5.2	17	11.8
Netherlands	2.4	14	11.6
Spain	8.7	20	11.3
Greece	6.9	18	11.1
Belgium	2.2	13	10.8
Austria	23.3	34	10.7
Portugal	20.5	31	10.5
Cyprus	2.9	13	10.1
Luxembourg	0.9	11	10.1
Malta	0	10	10
Finland	28.5	38	9.5
Sweden	39.8	49	9.2
Slovenia	16	25	9
Hungary	4.3	13	8.7
Lithuania	15	23	8
Poland	7.2	15	7.8
Slovakia	6.7	14	7.3
Latvia	34.9	42	7.1
Estonia	18	25	7
Czech Republic	6.1	13	6.9
Bulgaria	9.4	16	6.6
Romania	17.8	24	6.2

The EU target of 20% of energy use to be sourced from renewables by 2020 is split into binding targets for each Member State, as shown in the adjacent table. This approach promotes increased effort by all, but allows the scale of future effort to be based on a country's ability to pay for the new technologies, with requirements adjusted to reward early action. In rural areas renewable energy services may be embedded within agriculture, by establishing wind and solar power plants on farms, using agricultural products and waste to produce bio-energy.

Farmers will be rewarded by the market for renewable energy (either by selling it or by reducing the cost of energy used on the farm) but other important climate mitigation measures are less easy to market, and the complexities of carbon capture and storage on farmland are not easily integrated into a carbon market. Soil management may in some cases be a 'win-win' for both farmers and the climate (for example increasing organic matter in agricultural soils both sequesters carbon and improves fertility) but other changes such as afforestation of farmland and re-wetting peaty soils (for carbon and water management purposes) will, in many cases, need public support. Improvements in livestock management will be needed to reduce methane and nitrous oxide emissions while taking advantage of the carbon sequestration potential of grassland.

Figure 3. Projected impacts from climate change in different EU regions (DG Agriculture 2008)



Adapting to climate change

Agriculture and forestry, which use around 90% of Europe’s land surface, are particularly exposed to the direct effects of climate change. Climatic variability from year to year is a main cause of varying crop yields and this inherent risk of farming will be exacerbated by man-made climate change. The effects will be very variable across Europe, and not all negative

(at least with a relatively small rise in temperature), as shown in Figure 3 above. Other risks to rural livelihoods include flooding; forest fires and outbreaks of pests and diseases; and water shortages, especially in southern Europe. Impacts on tourism are predicted to range from loss of snow cover in EU ski resorts, to landscape degradation elsewhere.

Adapting to these threats and opportunities will require research and development of land and livestock management, dissemination of new technologies, investment in infrastructure, wider use of advisory services and capacity building in rural communities.



What is the role of rural development policy and funding?

Rural development policy explicitly rewards farmers and other land-managers for environmental goods and services that they provide. It also supports their efforts to adapt to various challenges and make use of possible tools for managing risks and crises. Meeting the demanding targets of a 30% reduction in emissions whilst coping with the effects of climate change could mean devoting more CAP resources to supporting farmers to provide specific 'land services' such as carbon storage in soils and vegetation, management of peak flood flows; and to help them adapt by growing more 'dryland' crops and improve efficiency of water and energy use on farms.

Revisions in the framework of the CAP Health Check have made a start. However, even more ambitious changes may be needed for the next programming period if the EU is to demonstrate to the rest of the world that it can both set and deliver demanding targets.

2010 will see new developments in this area as the European Council follows up on its earlier work set out in two Commission working documents examining the role of agriculture and rural development in addressing climate issues. The European Parliament is also actively involved in establishing its

position on the topic, following debate of a recent report by MEP Stéphane Le Foll.

EU rural development policy is flexible, adaptable and designed to focus on local priorities – this is going to be very important as we cope with the challenges of the coming years. The articles which follow, illustrate the range of impacts that climate change is already having in our rural areas – and some of the innovative solutions that are already being used in different areas.

Further information

COP 15 Copenhagen Summit and 'Copenhagen Accord':

http://unfccc.int/meetings/cop_15/items/5257.php

Agriculture and rural Development Day at COP 15 Copenhagen Summit:

www.agricultureday.org/

European Commission perspectives on climate change, agriculture and rural development:

http://ec.europa.eu/agriculture/climate_change/index_en.htm

http://ec.europa.eu/agriculture/climate_change/workdoc2009_en.pdf

http://ec.europa.eu/agriculture/climate_change/sec2009_1093_en.pdf

http://ec.europa.eu/environment/climat/home_en.htm

http://ec.europa.eu/climateaction/index_en.htm

European Parliament perspectives on climate change, agriculture and rural development:

www.europarl.europa.eu/meetdocs/2009_2014/documents/agri/pr/794/794091/794091en.pdf

**The role of rural development policy
in tackling climate change :**
climate-related
actions in the RDPs



Addressing climate change is a high level priority of rural development policy and Members States have recently amended their Rural Development Programmes (RDPs) to place more emphasis on actions that make positive climate-related contributions.

RDPs that were agreed at the beginning of the 2007-2013 programming period already included a range of climate change actions. These were highlighted in a review of RDPs, carried out by the European Network for Rural Development (EN RD) Contact Point on behalf of the European Commission. The review screened RDPs before amendments were introduced, following agreement of the Health Check of the Common Agricultural Policy (CAP).

Findings from the review of the pre-Health Check RDPs were incorporated in a Commission staff working document, "The role of European agriculture in climate change mitigation" that was produced for an informal meeting of Member States' agriculture (and fisheries) ministers in Växjö, Sweden in September 2009. On the table for discussion was the question of what can be done to reduce greenhouse gas emissions from the agricultural sector and how to mitigate the impact of a changed climate. The informal meeting was designed to pave the way for future work and to allow ministers to discuss the issues more freely than at the regular Agriculture and Fisheries Council.

The Commission's staff working document, presented an overview of the current CAP instruments that facilitate climate change mitigation, and this included considering how the (pre-Health Check) RDPs for 2007-2013 contribute to this objective.

Discerning climate-related actions from other rural development activities has not always been straight forward as often the objectives of programmed measures serve multiple purposes which require a more qualitative rather than quantitative assessment.

Some important results

The results of the screening exercise of pre-Health Check RDPs indicated that climate change has been increasingly addressed in the rural development strategies and baseline analysis for most RDPs in all the Member States surveyed. Mitigation was a key objective of approximately half of the rural development strategies and renewable energy of some 30% of them.

" The EU has a pro-active role to play in promoting effective responses to climate change. And in order to reduce emissions of greenhouse gases from agriculture, knowledge must increase at local level, among farmers. "

Stated Sweden's Minister for Agriculture, Eskil Erlandsson, at the informal meeting of ministers in Växjö.

About one-third of RDPs have measures specifically tailored towards climate-related actions. Approaches vary, reflecting the fact that all three thematic axes of the Rural Development Regulation provide possibilities to help in curbing methane and nitrous oxide emissions, reducing CO₂ emissions from energy use, promoting climate-friendly production and use of renewable energy.



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In most RDPs, emission reduction activities were before predominantly or exclusively supported by two measures, namely: modernisation of agricultural holdings and agri-environment. This reflects the fact that effective mitigation can be achieved not only by supporting investments and technical modernisation of farms but also using farming practices with high environmental and climate benefits.

While some national and regional programmes focus on mitigation objectives on farms, others give a more prominent role to supporting production and use of renewable energies; for example, promoting renewable energy is more common in the forest-rich countries.

The measures relevant to climate change that appeared most frequently in the pre-Health Check RDPs thematic axes, either as direct and/or indirect effects, included the following:

Farm and forest modernisation

- Support was often targeted at climate objectives, in particular the improvement of energy efficiency of farm buildings. Additional types of modernisation measure support covered **investments** delivering energy savings or allowing agricultural holdings to develop small scale renewable energy capacity (mainly biogas from animal waste, but also use of **vegetable oil and biodiesel** for machinery, as well as solar and wood biomass installations). Energy efficiency was supported in almost three-quarters of the programmes and is explicitly targeted at climate change in almost one-third of them.
- A large number of RDPs also supported **improved manure management**; a quarter of them target these actions at better controlling emissions of greenhouse gas methane from livestock farms.
- The processing of **agricultural and forest biomass for bio-energy** was included in most RDPs, along with a focus on promoting the use of agricultural and organic by-products for bio-energy. However, before the Health Check, support for the cultivation of specific energy crops has been available only in a few RDPs. The support for renewable energy is closely related to the national and regional resources available in the agricultural and forest sectors.

Agri-environment

- These measures are a compulsory part of RDPs and have been allocated a large proportion of the overall EU rural development budget. Whilst climate objectives are rarely explicit, most of the actions supported are beneficial for the protection and sustainability of the environment, all of which contribute to climate mitigation and protection objectives.
- Importantly, two-thirds of all RDPs include actions to improve the **efficiency of fertiliser use** thereby reducing its use and potential negative effects.
- **Soil management** is another important priority, with almost 90% of the programmes including such actions, of which 40% are targeted at helping to increase the amount of organic carbon retained in soils. However, there is no assessment in place to measure the effectiveness of these measures in terms of maintaining or increasing carbon content.
- **Organic farming** is another widely supported action, being included in almost all RDPs. More than half report that organic farming contributes to mitigation.
- Many RDPs mention **extensive management of livestock** (e.g. reducing stocking densities or grazing densities) and pastures as actions contributing to greenhouse gas reduction as well as benefiting the whole environment. In some cases, support is offered for continued management of low- profitability pastures, conversion to grasslands, and permanent set-aside to protect the rural environment as well as to maintain carbon-rich areas, especially grasslands.

Afforestation on agricultural land is a very common measure in many RDPs and it appears to be predominantly targeted at climate objectives in half of the programmes.

Some RDP measures are oriented towards **technology, product development, and cooperation**. Often these look to add value to the agricultural and forest products sectors by encouraging the development of new products, processes and technologies in the field of bio-energy.

Training and communication actions are frequently programmed and can be highly relevant to improving awareness and attitudes of farmers and other rural actors towards climate-conscious management. Capacity-building measures rarely focus specifically on climate change but in many RDPs there are identifiable actions designed for improving the overall environmental planning of agricultural activities. There are also rural development funds that contribute to the development of farm advisory services but these are sometimes limited in scale.

Axis 3 measures have considerable potential for contributing to efforts against climate change by supporting **diversification** of farms into bio-energy activities and local investment in renewable energies. In a number of RDPs, mainly in the 'older' EU Member States, axis 3 measures are relatively well oriented to climate objectives, although the picture varies both between and within Member States. The production or use of renewable energy is most commonly supported by the measure 311 (diversification into non-agricultural activities) and measure 321 (basic services for the economy and rural population) can support provision of energy, but not its production. While some RDPs strongly emphasise agricultural and forest biomass processing (biogas, biofuels), others envisage support for a wider range of energy installations.

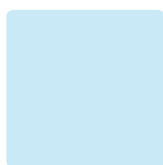


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RDP amendments

The full potential of this RDP climate action portfolio was increased recently by an injection of additional funding. Overall, €3.9 billion¹ was released following agreement of the CAP Health Check and a further €1.0 billion was provided for rural development actions from the European Economic Recovery Plan (EERP). These additional funds were channelled into a list of new priorities presented by the revised Community Strategic Guidelines. They included direct support for climate change actions as well as related investments in renewable energy, water management and biodiversity. RDP budget allocations for dairy restructuring and broadband support have also increased.

¹ Including additional funds coming from voluntary modulation and transfers according Art. 136 of Regulation (EC) No 73/2009.



Some 87 different RDPs were amended to reflect the new priorities and the outgoing Commissioner for Agriculture and Rural Development, Mariann Fischer Boel, highlighted how "The CAP Health Check and the European Economic Recovery Plan have both put new money on the table to help deal with pressing problems such as fighting climate

change. It's up to Member States and regions to use this money wisely."

Many countries welcomed the new financial opportunities for direct climate change adaptation and mitigation actions. RDP amendments here re-enforced Member States' investments in a variety of fields such as precision agriculture,

reduced use of fertilisers, increased energy efficiency by use of construction materials and reducing heat loss, soil management practices, afforestation, coastal and interior flood protection, plus many others. These types of RDP actions during 2010-2013 will help maintain the leading role that European agriculture plays in curbing greenhouse gas emissions.

Water management was another recipient of the additional RDP funds, which acknowledged that sustainable water management remains an essential element for European farmers and agriculture. Investments in this area will include, among others, water saving technologies, water storage, water saving production techniques, installations for waste water treatment on farms and in processing and marketing, creation of natural banks and wetland restoration.

The supplementary amounts will also encourage better use of natural and renewable energy sources. Such support is scheduled to help achieve European objectives for sustainability. EU farmers will further contribute to this objective by investing in biogas production using

organic waste, processing of agricultural and forest biomass for renewable energy, growing of perennial energy crops. The creation of infrastructure in rural areas for renewable energy using biomass, solar and wind power, and geothermal energy sources is also planned to increase following the RDP amendments.

Last but not least, EU biodiversity is set to benefit from the CAP Health Check and EERP. This is particularly important since attaining biodiversity preservation targets remains a high international priority. Issues such as water management and climate change are major influencing factors on the status of EU biodiversity and the new RDP funds are being made available to boost efforts for conserving genetic diversity, increasing integrated and organic production, supporting land use changes and establishing meadow orchards, construction and management of biotopes or habitats within and outside Natura 2000 sites.

Figure 1 opposite provides a breakdown of how the new RDP financial resources have been allocated within the amended RDPs.

The data shows that Member States have prioritised environmental actions within their allocations of new RDP funds and these will result in an increased capacity to support climate change adaptation and mitigation projects throughout Europe's countryside.

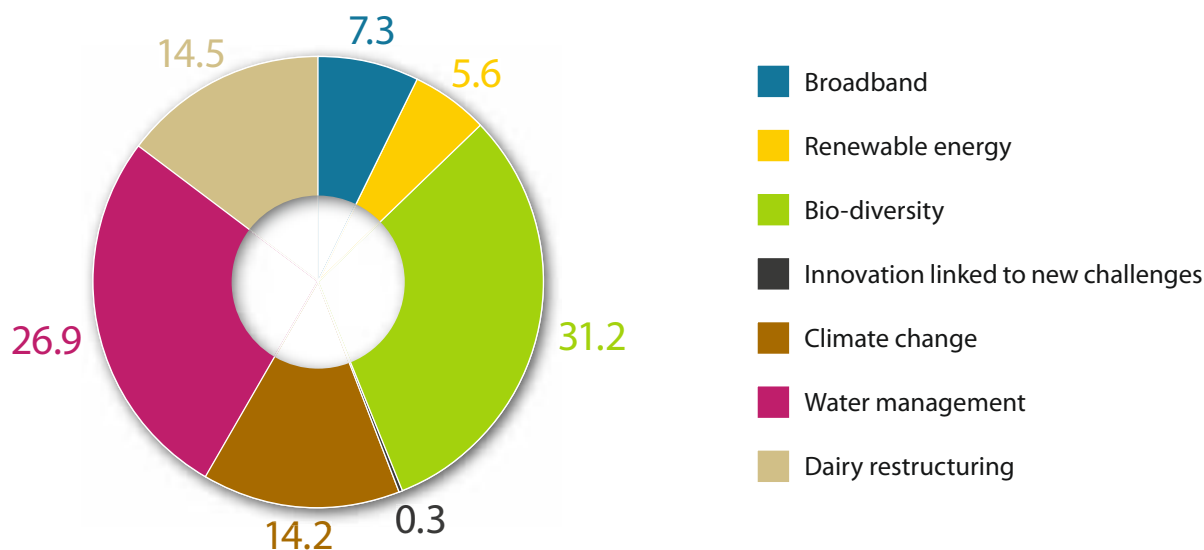
Building capacities in rural climate action

Speaking on behalf of the EN RD Contact Point, Team Leader, Haris Martinos, says that "The EN RD can play a key role in helping Member States and the European Commission strengthen RDP contributions to climate action. Its main means of doing this will be by analysing and exchanging best practice in climate actions that are underway and being developed throughout rural Europe. Covering all 27 Member States, the EN RD is in a unique position to do this and our support can both add value to national RDP climate efforts, as well as create synergies through facilitating knowledge transfer at the national rural network level."



Figure 1. Overall distribution of CAP Health-Check and EERP funds across priorities based on the approved RDP modifications (%)

Distribution of Health-Check and Recovery funds among priority areas, % of all HC & RP funds (EUR 4.95 billion), Source: DG AGRI/G1



T. HUDSON



Rural Developments



Specific examples of Rural Development Programme contributions to tackling climate change

Now melts and sea-level rises, floods and forest fires, droughts and water stress. These are increasingly common facts of life facing rural Europe and all are related to the changes that continue to occur in our climate. The importance of local actions that address climate change impacts is clear and Member States' Rural Development Programmes (RDPs) represent vital tools for implementing climate actions in rural areas.

Different actions are required in different parts of Europe's countryside and the European Commission is aware that Member States are introducing solutions tailored to their territory's specific climate needs. The following articles aim to

feature a small selection of this localised climate action. Four articles have been produced to reflect different EU climate change impacts in different rural areas, and explain the types of RDP responses that are being applied as a result.

Spain is used as a case study to highlight Iberian impacts from reduced rainfall and rising sea-levels. The effects on mountain economies are also noted in this article which identifies Spanish approaches to tackling climate challenges.

An article about Nordic agriculture sets out the main factors affecting northern farmers and points to the benefits which warmer winters may bring, but also focuses on important considerations

for crops and livestock from shifting temperature patterns.

Several countries from south east Europe are explored in a joint article that identifies key risks for regional biodiversity from forest fires and droughts. Water shortages are a particular problem in this part of Europe and RDP actions are tackling threats to essential water supplies, such as underground aquifer resources.

A fourth and final article in this section presents a picture of climate change concerns in Poland's countryside, and highlights different adaptation and mitigation methodologies that are being deployed by Poland's RDP stakeholders.





Climate change effects and climate-related Rural Development Programme support in Spain

Climate actions in rural Spain typify many of the mitigation and adaptation requirements that are common place in other Member States containing coastal communities, mountain areas or semi-arid environments. All 17 of the regional Spanish Rural Development Programmes (RDPs) offer climate action opportunities to help rural areas mitigate and adapt to warmer and drier weather conditions.

Spain is blessed with a rich array of rural areas that stretch from the snowy peaks of the Pyrenees to the sun soaked beaches of Andalucía. The country's mosaic of mixed geography provides the backbone for a growing rural economy but changes to the Iberian region's climate patterns pose risks that residents, businesses and visitors in Spain's countryside could consider with care.

Climate Impacts

Different climate change impacts affect different Spanish rural areas in different ways. For example, rural areas in Southern and Eastern Spain are gradually becoming more arid (warmer and drier). Agricultural activity here will be affected by these changes creating risks for farm

productivity and profitability. Water ecosystems remain the most vulnerable natural asset and important wetland environments, including the Ramsar Convention protected Tablas de Daimiel national park, face increasing threats as the availability of future water supplies remains uncertain.

In Spain's mountain areas, key challenges for climate action focus on mitigating the impacts of higher temperatures and shorter snow seasons. Biodiversity and landscape assets are influenced by these climate changes which can also present economic difficulties, often associated with a downturn for winter tourism businesses.

One of the most dramatic effects of climate change globally is the rise in

sea levels, and this trend remains highly relevant for Spain's coastal rural areas. Under the most conservative scenario of a 0.5 meter sea level rise by 2050, it is expected that 40% of the Atlantic beaches in the Cantabrian Sea area may disappear, and as much as 50% of the Ebro River Delta in the Mediterranean Sea could become flooded. Likewise, other low-laying territories are at risk of future flooding and these take in some of Spain's most productive agricultural land, such as in Cádiz and Murcia.

Prominent natural heritage resources are also considered threatened by rising sea levels and impacts are anticipated on important sites including UNESCO Biosphere Reserves at Doñana National park and Cabo de Gata-Níjar.

Improving water management in irrigated agriculture

Irrigated agriculture plays a fundamental economic and social role in Spain. However climate change poses a significant threat to its viability as it compromises the availability of water resources. To confront this threat, RDPs in Spain foresee support to improve irrigation infrastructures and technologies under measure 125. An example of the action being financed under this measure can be found in the irrigated district of Guadalquivir (Andalusia).

Traditional open-air irrigation channels are being substituted by pipes and a centralised water reservoir has been constructed. These modernisation investments have led to a better control of irrigation, allowing high-tech monitoring of water consumption. Andrés del Campo, Head of the district's irrigation authority, believes that "with this investment substantial water saving can be achieved and the impact of climate change will be tempered as the same area can be irrigated with fewer resources".

These ideas are also shared by Celsa Peiteado from Spain's branch of the World Wildlife Fund, who points out that "resources saved from irrigation will also contribute to improve the resilience of ecosystems within a climate change framework". However, she also feels that further actions should be adopted in order to assure that water savings actually take place, such as training in new irrigation technologies, implementing volumetric water pricing and reducing water allotments to irrigators. All these instruments would reinforce the incentives to assure adaptation to climate change, and RDPs may be able to provide further axis 1 co-finance for building irrigation capacities through the proposed schemes.

More information is available at:
www.regantesguadalmellato.es and www.wwf.es



COMUNIDAD DE REGANTES DEL GUADALMELLATO



Temperatures in Spain are forecast to increase by 2.5°C by the year 2050 and rainfall may be as much 8% lower. The combined effects of both phenomena are expected to result in reductions of water availability on a nationwide basis close to 20%, and in island communities water availability could be halved compared to current levels.

Reducing forest fire risks

Climate change in the Mediterranean area is leading to higher temperatures and longer drought periods, two facts that increase the risk of forest fires. Spain's RDPs are already taking action to reduce these risks through measures 225 and 226. As Pablo Zuazua, policy officer for forest prevention in Castilla y León, explains "RDP co-financing is provided both for reducing the risk of forest fires occurring and for minimising their impacts if they occur".

To achieve the former, research about the causes of fires and educational and awareness raising programmes try to limit behaviours that may lead to their occurrence. Preventive forestry practices and infrastructure maintenance are vital actions to assure the latter. Mr Zuazua is

proactively involved in promoting such climate action and he notes that "these measures provide a double dividend, not only do they increase the adaptation potential of Spanish rural areas to fire threats but they also mitigate the risk". He however also stresses the highly pertinent fact that, "Forests sequester huge amounts of CO₂. If they burn they do not just stop this process, they reverse it as their CO₂ content is released back in to the atmosphere".

These views are also shared by environmentalists. Joaquín Reina from Ecologistas en Acción (a Spanish environmental NGO) who claims that climate change forces us to increase our

ability to deal with forest fires. However, society needs to be involved if a long term sustainable solution to forest fires is to be achieved, "without participatory planning in the prevention of forest fires, additional resources will not be enough to vanquish such threats from our forests".

RDPs' roles in this type of inclusive approach to territorial management planning are well suited to the support that is available for mainstreaming Leader methodologies across the thematic axes.

More information available at: www.jcyl.es/web/jcyl/MedioAmbiente and www.ecologistasenaccion.org



JOAQUÍN REINA, ECOLOGISTAS EN ACCIÓN



Promotion of rural small and medium sized enterprises

Diversification of economic activity in rural areas can also provide opportunities for fighting climate change. The Spanish company AGROCOMP S.L. is a good example of this. Created in Murcia with previous support from EU funds (through the Leader + Programme), it offers useful demonstration value to show what could be done within existing possibilities in this area.

AGROCOMP S.L produces a fertiliser made from composted agro-food industry residues. This 'bio-fertiliser' is a high quality product, easily absorbable by crops and can be used in conjunction with localised irrigation. As Francisco J. Carmona, Managing Director of the company states, "these two characteristics of our product allow up to 50% savings in fertiliser use". Their contribution to climate change mitigation is two-fold, as the product reduces CO₂ emissions that would be generated during the conventional waste treatment and its production process emits far less CO₂ than traditional fertiliser production.

Moreover, reducing the amount of fertilizer used also contributes to maintain groundwater quality through reducing the nitrogen load. AGROCOMP S.L. is already developing additional products that can help to reduce agriculture's contribution to climate change, "the new challenge is to develop biological sanitary products, and our research department has nearly completed the technological process. However getting administrative approval is a long process. The administration should keep up its efforts to cut red tape".

This type of climate-friendly rural development project could be replicated in other areas and with other technologies. A number of axis 3 actions offer similar opportunities through funds for business creation and development work, or support for diversification into non-agricultural activities.

More information available at:
www.agrocompost.com/.



AGROCOMP

Rural resource impacts

Resources in rural areas are expected to be widely affected by higher Spanish temperatures. This will have a major influence on future priorities and potential for rural development in Spain. Water availability is the most prominent challenge for climate actions to address, at the national and local level. The worse affected regions will be those located in semi-arid territories in the South and East (basins of Guadiana, Guadalquivir, Segura and Júcar), as well as the Balears and the Canarias islands.

Spanish soils will inevitably bear the brunt of drier climatic conditions and an important proportion of the countryside is now threatened by desertification processes following forest fires and erosion. On-going climate change projections indicate a worsening of this desertification problem, especially in Mediterranean Spain, where both causes could be exacerbated.

As noted previously, forest fire predictions are particularly acute and rural areas are expected to experience more regular fires of greater intensity and magnitude. In addition to fire hazards, Spanish tree stocks are also threatened by water-stress, erosion and invasive species. Woodlands in mountains, arid environments and riversides are considered most at risk. In these areas the forest systems could be replaced by bushes or other less developed vegetation. In all cases the production of wood resources is likely to decrease.

Changes in vegetation cover also represent a growing problem for Spain's rich collection of biodiversity and associated habitats, many of which are already being affected by climate change. Increased migration is predicted as plants, animals and all other species modify their distribution patterns in order to maintain lifestyles within their desired climatic conditions. Some species of reptiles and fish, with much more limited mobility, will have a more uncertain future because of the changes in their ecosystems. These species may risk becoming endangered or even

extinct, especially if their favoured habitat become colonised by invasive species from warmer climates. Similar concerns also present a threat for many plant species, including agricultural crops and forest timber resources.

Rural economy impacts

The aforementioned climate change impacts on rural resources indicate a number of possible scenarios in the future for Spain's rural economy. These often translate into less favourable environments for development, growth and prosperity in rural areas. Agriculture and tourism are forecast as being notably affected sectors, but some new opportunities are also probable.

The effects of climate change on agriculture will likely vary according to latitude.

In the semi-arid territories in South and South-eastern Spain, climate impacts are expected to become increasingly problematic for current farming systems. Higher temperatures will require an increase in water needs for crops but there will be less water available. For rain-fed agriculture, these concerns could convert into lower yields or even non-pro table agricultural production, while for irrigated agriculture this

will mean higher water demands and resource costs.

On the other hand, in Northern Spain, where agricultural potential is sometimes limited due to lower temperatures, the effect of climate change on farming could be more positive. In these cases, warmer temperatures will allow the increase of vegetative activity during the winter, and thus an increase in crop production. However, this may be accompanied by increased risk of disease for crops and livestock, although the extent of such potential impacts remains difficult to determine.

Climate change will also modify Spain's significant rural tourism sector. The attractiveness of key visitor areas may alter over time, as may the length of tourist seasons. In this sense, some of the most vulnerable areas are those located in mountainous regions, where leisure activities are centred on snow resources. The snow season risks being drastically shortened, as does Spanish tourism associated with game and fishing, which will be also modified as a result of the impact on terrestrial and aquatic ecosystems that these activities rely upon.

Adaptation and mitigation measures are therefore a high priority for Spain's rural economy and opportunities exist to take

advantage of RDP support for actions that help address climate concerns.

Spanish rural policy and climate action

Spain cannot tackle its climate issues alone and this is acknowledged by the Spanish Ministry of Environment, Rural and Marine Affairs. A Ministry spokesperson notes that "There are many different policies and policy instruments, at global and sectoral level, that will achieve compliance with the commitments assumed by Spain in climate change and successfully address the problems of adaptation to the impacts generated by it. The Spanish 'Strategy for Climate Change and Clean Energy. Horizon 2007-2012-2020 (EECCCEL)' is the main tool for tackling climate change in Spain. The EECCCEL addresses different measures contributing to sustainable development in the field of climate change and clean energy."



PLATAFORMA EN DEFENSA DE LAS MONTAÑAS DE ARAGON

Developing an energy efficient culture and promoting renewable energy use in rural areas

Climate change is increasingly becoming part of the mainstream Leader agenda in Spain and this is illustrated by achievements gained by the TEDER Local Action Group (LAG) from Navarre. Here the TEDER LAG is coordinating national inputs into an international consortium implementing the 'EURENERS' project, which promotes energy efficiency and renewable energies.

Partners in Spain (Sierra de Cazorla and Tierras de Libertad), France (Pays de la Provence Verte) and Portugal (Beira Serra) have worked together on the EURENERS project for two years to increase energy efficiency in rural areas and develop renewable energy sources based on biomass. "The overall goal of assuring an economic, social and environmental sustainable development in rural areas cannot be understood without energy efficiency and renewable energy" says Irache Roa, manager of the EURENERS project.

The project published a booklet with energy saving tips for rural dwellers, compiled a catalogue of best practices available in the partner territories, supported energy audits in agro-food industries and organised a pioneering international biomass congress. "Each single action implemented means less CO₂ emissions, it is the sum of many small actions that can make a change" says Ms Roa.

EURENERS will be continued in the future (using national funds) and the partner territories have already applied for a follow-up project where more innovative actions to reduce CO₂ emissions will be designed and implemented. The TEDER LAG will thus be able to add value to their local strategy's priorities regarding environmentally sustainable approaches to bottom-up rural development.

More information available at:
www.teder.org/docs/Webeureners/.

"Especially in the area of rural development, through the 2007-2013 programming period financed by the European Agricultural Fund for Rural Development (EAFRD), various measures have been included to complement the EECCEL. The Directorate-General for Sustainable Development of Rural Areas of the Ministry of Environment and Rural and Marine Affairs included in the initial National Rural Development Framework 2007-2013 (NF) measures to mitigate climate change impacts, which have been reinforced by the latest change of the national strategy

in the context of the Common Agricultural Policy Health Check."

EAFRD measures within Spain's 17 regional RDPs are nowadays one of the most fundamental policy frameworks for climate action in the Spanish countryside, and the Ministry goes on to explain that the "NF establishes specific measures and common elements, to be developed in the regional RDPs, for drought mitigation (prevention of forest fires), aid for the first afforestation of agricultural land and carbon sinks."

Other specific NF objectives are being realised by support for "fighting against climate change and promoting renewable energy, which accompanies, as operational objectives, the reduction of greenhouse gases, production of renewable energy, energy recovery from agricultural waste, livestock, forestry and agribusiness, building the capacity of sinks for agricultural and forestry systems and the incorporation of energy efficiency measures in the agricultural and livestock production in the industrial sector."

Further information sources

Rural development policy in Spain:
www.mapa.es/es/desarrollo/desarrollo.htm

Effects of climate change in Spain:
http://www.mma.es/secciones/cambio_climatico/documentacion_cc/estrategia_cc/pdf/cle_ene_pla_urg_mea.pdf



Climate change adaptation and mitigation measures for Nordic rural areas

A combination of different climate factors is forecast to influence future changes for agricultural production systems in Sweden, Finland and other Nordic countries. EU rural development support is available to help Member States' farmers facilitate the necessary transitions in response to warmer overall weather conditions.

Europe's Nordic countries are often associated with their long winters and snowy climates but such Scandinavian stereotypes may soon be changing as temperatures rise and seasons shift. Farmers from the north are already seeing the effects of climate change and have been using assistance from the Rural Development Programmes (RDPs) to make positive climate action contributions.

Climate change will affect rural areas in Nordic countries in several ways linked to changing temperature patterns. The average annual temperature for Member States such as Sweden and Finland is forecast to increase, and the shifts in temperature should also vary between seasons. The greatest increase will appear during the winter as warmer conditions

alter the characteristics of the existing Nordic environment. Key differences are anticipated in upland and coastal areas, particularly around the coastline of the Bothnia bay, Gulf of Finland and eastern

Finland. Warmer winters are predicted to result in a shorter snow season and fewer freezing days. It is even possible that the southern part of Sweden may not have a snow season at all in a couple of decades.

Figure 1

Temperature increases above 1990 levels predicted for period 2011 - 2040

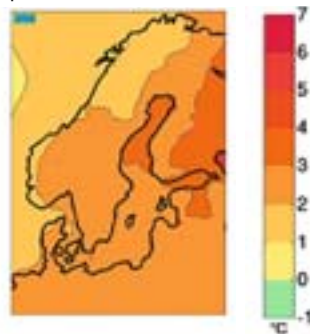
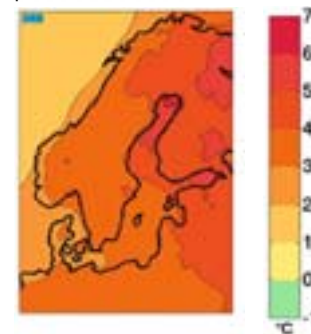


Figure 2

Temperature increases above 1990 levels predicted for period 2041 - 2070



Source: Swedish Meteorological and Hydrological Institute

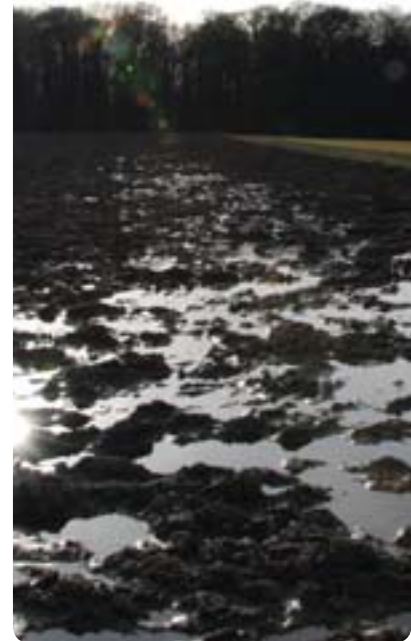
Warmer winter impacts

Warmer Nordic winter predictions are illustrated in figure 1 and figure 2. Figure 1 models temperature rises anticipated between 2011 and 2040, above baseline data from the 1961 to 1990 period. Figure 2 indicates even hotter average winter climates between 2041 and 2070.

Nordic soils will experience a difference in their annual freeze-thaw cycle as temperatures rise, which can have a direct impact on the soils' agricultural potential. This is due to the fact that large areas of Sweden and Finland are covered by clay soils and farmers' rely on winter freezing periods to prevent soil compaction, which in turn helps improve the structure of these clay soils for summer crop production. Warmer winters will thus mean less freezing-days

which may affect the soil structure in a negative way.

The point is noted by Catharina Rudolphson, a cereal producer from eastern Sweden, who explains that the problem could be naturally countered since "A drought during the summer can compensate for the lack of frost for two winter seasons". Even though drier summer climates are another possible result of climate change in Nordic areas, and so could help reverse some soil compaction, it is of great importance that farmers continue to consider the risk of more compact soil in the future. This will be especially relevant for their rural development decisions regarding cultivation equipment and water conservation techniques.



T. HUDSON

Wetlands – irrigation, flood prevention and more

Another option for Nordic farmers to avoid impacts from drier summers is to create a wetland as a storage basin for irrigation. Swedish and Finnish farmers can get financial support from their RDPs for wetland construction (measure 216, non-productive investments), as well as cost-free guidance from advisory services (measure 111, vocational training and information actions). Management of wetlands can also be supported by agri-environment schemes through measure 214.

RDP support for multi-functional wetlands on agricultural landholdings address several environmental problems simultaneously. As well as facilitating nutrient retention and increased biodiversity, RDP funded climate actions that invest in the development of wetland ecosystems can also help improve irrigation systems, provide flood protection functions and be used for the production of bioenergy fuel sources. Wetland development projects thus offer opportunities for Nordic farmers to mitigate the risks of climate change and also adapt to the potential opportunities that may arise in the future.

Increasing knowledge levels about these multifunctional farm opportunities is important and the RDPs' assistance for rural advisory services remains a vital and valuable developmental tool. Such advice has already led to a large number of wetlands being created in rural areas in the Nordic countries. Between 2000 and 2008, 5 600 hectare of wetland have been constructed or restored, of which 85 % was financed by rural development funds. Evaluation, by the University of Halmstad, of the effects of these wetlands show that they can remove up to and above 1 000 kg of nitrogen per hectare if properly designed and located. The latter location factor was confirmed as a key determinant of the wetland's nitrogen retention capacity.

Eligible Swedish farmers can receive as much as 90 % of the construction cost for wetland developments (with an upper limit of 200 000SEK/ha [equivalent to around €190 500]) and additional RDP support may also be available for work involved in managing the wetland.

Establishment costs for multifunctional wetlands in mainland Finland are able for co-financing up to €11 500 per hectare of

wetland. The amended RDP also provides up to €3 226 as a fixed payment for setting up small wetland sites, when the area of the wetland is between 0.3-0.5 hectares.



JOHN SRAND

Management of multifunctional wetlands is another eligible action noted in the mainland Finland RDP and payments of up to € 450 per hectare are available.

Read more at:

www.wetlands.se

www.ymparisto.fi/download.asp?contentid=111294&lan=fi

Longer growing season

The cultivation of several crops in Sweden and Finland is limited today by the length of the growing season. With an increased temperature the area of wheat production will increase in both Finland and Sweden. A longer growing season also means potentially greater yields per hectare of several crops, for example sugar beets, maize for silage and grass for silage. "I think we will have higher yields of grass. Even if the summer will be drier, which will temporarily reduce grass production, the long and warm autumns will compensate for that and the net effect will be high yields overall," said Martin Larsson, a milk producer in the south west of Sweden.

Warmer summers may be accompanied by more frequent heat waves. This can cause heat stress for Nordic livestock varieties which may represent a threat to the commercial viability of some traditional husbandry systems.

Rural development support

Rural Development Programme (RDP) support is available to help farmers modernise and remain competitive. Such assistance may be used to help adapt livestock systems to new climate conditions by helping to increase ventilation in livestock sheds or make adjustments to the fodder content. Even simple measures such as chilling the animals' drinking water can be used to mitigate against negative impacts of climate change.

In Sweden, €38 million is set aside for support to modernise farms of which €1.9 million is ring-fenced for greenhouse gas mitigation and climate change adaptation investments. Other capital investments can also have a positive effect on the climate adaptation process. In the Swedish and Finnish RDPs, €17.5 million and €3.5 million respectively were originally earmarked for different climate mitigation and adaptation work.

Additional RDP funds for these types of rural development actions in Nordic Member States have been allocated from the CAP Health Check and EU

Economic Recovery plan. In Finland these included €2.5 million of new funds for climate change actions, €3.4 million for renewable energy investments, €31.1 million for water management works and €1.1 million for bio-diversity conservation. In Sweden the RDP amendments led to an addition: €18.67 million for direct climate change actions; €34.33 million for renewable energy; €13.27 million for water management; and €30.67 million for biodiversity (the biodiversity funds include €27 million of unspent funds from CAP Pillar I payments).

Farmers need to know more about how these different support sources can help them adapt their production systems and what technical solutions are available. Seminars, group consultations and study circles on how to adapt farm production methods to a changed climate are planned in Sweden. In Finland, an informative brochure has been sent out to all farmers and the TEHO project (2008-2010) on agricultural water protection has highlighted the benefits of farm-specific, tailored advisory services for tackling water pollution from Finnish agriculture. (www.ymparisto.fi/default.asp?contentid=292198).

Longer and warmer Nordic autumns are likely to encourage farmers to increase the share of winter crops. The crops sown in the autumn will be able to use the moisture during the early spring and should develop well. Spring sown crops may experience problems with a higher temperature and an earlier dry period.

Seminars, study circles and group consulting

The challenge of climate change requires local action to create global solutions. These local adaptation and mitigation actions need to be based on a firm foundation of reliable knowledge about how the climate is predicted to change in each specific territory. Availability of such knowledge allows stakeholders to design appropriate responses.

Capacity building seminars, study circles and group consultations on adaptation to climate change are planned in Sweden to help rural areas increase awareness about future climate trends, plus required responses. In some parts of Sweden there is already a tradition of participating in study circles. "Study circles are great ways to get information. We learn from each other during the conversation, and it is also important for the social life." says Claes Åkerberg, the leader of a group of farmers who has lead study circles for many years.

Such information projects are good examples of how different RDP measures can link to other climate change projects at national, regional and local level. Results from many projects can be used to add value to the RDP information projects. For example, support for farm advisory services and capacity building training can help farmers identify climate action opportunities linked to modernisation and competitiveness investments that may be eligible for funding from other RDP measures. The advisory services can also build farmers' technical skills which will benefit the quality of climate action projects and enhance value for money from improved outcomes.

More information on Swedish study circles can be found at:

www.sv.se (in English, Spanish Swedish and other Nordic languages)

www.ruralfinance.org/servlet/BinaryDownloaderServlet?filename=1119479343759_The_Study_Circle_Method.pdf



Advisory services in both countries are also promoting a wide range of positive climate action options for farmers and these include increasing the effectiveness of water use to create farm gains from better drains. For example, Finland provides financial support to farmers for drainage related projects through the RDP (measure 214, agri-environment) and in Finland about 70 000 ha now have controlled drainage according to Rauno Peltomaa at Finnish Field Drainage Centre.

“Controlled drainage is beneficial for the farmer, as well as the environment and the RDP measure is considered effective and relevant”, said Kjell Brännäs from Finland’s Ministry of Agriculture and Forestry. Similar types of assistance is available from the Swedish national RDP from 2010 through measure 216, for non productive investments, and Thérèse Ljunquist at the Swedish Board of Agriculture explains that their goal is to help implement rural development projects that cover around 2 000 ha with new types of controlled drainage by 2013. Any proposals for drainage actions in

peat-land areas will have to be carefully considered since even controlled drainage here may cause heavy CO₂ emissions during land use changes.

Pest problems

Warmer climate conditions predicted for Europe’s Nordic areas will also increase risks from new pest-related problems and rural development stakeholders now have to consider appropriate adaption strategies in response. Particular pest problems are anticipated from weeds, insects and pathogens.

It is expected that new pests will establish and existing pests will spread to new areas. There will be an increased risk of crop and environmental damage from such pests since the warmer climate will enable the pests to complete a greater number of generations during a year and a higher number of them will survive the winter. Higher numbers of pests may be controlled to a degree by natural predation, but other interventions are also considered necessary to help

maintain as much of a stable ‘status quo’ as possible. The new pressures from weeds and pests can be managed, but will probably result in an increased use of agro-chemicals if no organic methods are implemented or possible. Additional in-field inputs may therefore be required and wetter autumn or winter conditions will also increase the risk of damage from different microbes during the storage of fodder.

Practical climate action measures

A variety of practical support measures are available from the RDPs to help Nordic agricultural sectors address such pest problems and the other climate change challenges noted above. These will continue to increase in importance as essential rural development tools for helping farmers from Finland and Sweden mitigate or adapt to the warmer conditions that are predicted for the future in their potentially less snowy part of Europe.

Controlling farm field drainage

The concept of controlled drainage involves enabling farmers to decide on whether the water should leave the field through the drainage pipes or if the water should stay in the soil.

During the winter, farmers can close the drainage system and retain the maximum amount of water within the field. This prevents soil erosion and losses of phosphorous. In addition, such drainage control actions affect the fate and losses of nitrogen. Less nitrogen will be lost via the drainage water, but nitrogen may be emitted to the air mainly as nitrogen gas (N₂) or to a small extent as nitrous oxide (N₂O).

In the spring, the water level is lowered, which allows the soil to dry up and makes the soil more stable and feasible to plough. When the summer is dry, the farmer can close the drainage system. By doing that, the water stays in the soil profile and the risk of lack of water for the crop is reduced. The system can also be used for subsoil irrigation.

Controlled drainage is not as established in Sweden as in Finland, but during 2010-2013 farmers in Sweden can apply for RDP support for the establishment of controlled drainage (measure 216) following RDP amendments after the CAP Health Check. Other modifications to measure 216 in Sweden provide support for introducing new sediment ponds and the measure also now places emphasis on restoration of existing wetlands.

In mainland Finland the amended RDP includes assistance for special agri-environment assistance under ‘runoff water treatment’ methods. Furthermore, Finnish controlled subsurface drainage projects can receive up to €54 per hectare, controlled irrigation initiatives are eligible for up to €108 per hectare, and the recycling of drainage water attracts RDP support at a grant rate of up to €140 per hectare.

Read more at:

www2.slu.se/forskning/fakta/faktajordbruk/pdf02/Jo02-13.pdf
(in Swedish)

www.maaseutu.fi/attachments/verkostoyksikko/5HZolvv6g/reglerad_dranefing_kevyt_resoluutio.pdf
(in Swedish)



Biogas production

Production of biogas is one of the most effective ways to reduce the emissions of greenhouse gases from farms.

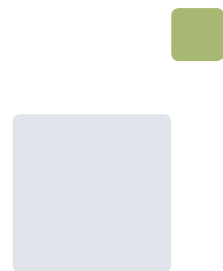
Biogas plants use agricultural waste materials, such as manure and other farm by-products, as fuel during controlled natural digestion processes that result in the production of energy-rich methane gas. The gas can be used for heating, for combined heat and electricity production, or upgraded and converted as a vehicle fuel.

An advantage of digesting manure is that the nutritional value of the residues increases which decreases the need for extra mineral fertilisers. Another advantage is that the digested manure smells less when spread in the field, compared to conventional manure.

There is a great interest in biogas production in both Finland and Sweden at farm level as well as at government level. In both countries farmers can receive financial support from the RDPs for the construction of farm-based biogas plants. Ragni Andersson from the Swedish Board of Agriculture predicts that “a realistic goal for our RDP is about 150 new farm based biogas plants by 2013”.

These new renewable energy sources will help reduce dependencies on fossil fuels and complement other rural development projects, such as an initiative in Östergötland County which is supported by a Local Action Group and aims to lay the foundations for a ‘climate adapted’ food supply strategy. The project has been co-financed by axis 4 of Sweden’s RDP and is investigating the practical requirements involved in improving the coordination of transport systems between, farmers, food processors and consumers in Östergötland County. Objectives include integrating green transport technologies via vehicles fuelled by bio gas from the Swedish Biogas plant in nearby Linköping.

More information about Nordic biogas can be found at:
www.sbgf.info (in Swedish)



Further information on Nordic climate actions

Useful links:

https://portal.mtt.fi/portal/page/portal/mtt_en/sustainableproduction/changingclimateandagriculture
(Agrifood Research Finland, in English)

www.smhi.se/cmp/jsp/polopoly.jsp?d=9315&l=sv
(portal for national climate adaption, in Swedish)



Climate change and rural areas in South East Europe

South-Eastern Europe will be affected by climate changes resulting from reduced precipitation and increased temperature. Rural development stakeholders in the region acknowledge this reality and are acting to tackle adverse environmental and socio economic impacts.

The main climate action issues facing rural areas in South East Europe focus on adapting to water scarcity and mitigating loss of important rural resources, such as those associated with income generating opportunities or biodiversity. For example, many Southern European countries already have difficulty in providing water to their farms, which in some cases account for around half of national water consumption, while drought forecasts linked to higher temperatures will make the situation much worse.

Furthermore, most of the region's traditional irrigation systems use relatively inefficient methods involving high water losses. Worsening water scarcity here will therefore be aggravated, particularly in island areas (e.g. Greek islands, Cyprus and Malta) where underground water and rainfall are already scarce and where almost 30% of the surfaces are irrigated. Adaptation measures such as balanced crop rotations, by incorporating crops that are less water demanding, and efficiency improvements in water use and irrigation will be necessary to avoid the most dramatic effects to farm incomes and the wider rural economy.

Inefficient municipal water supply systems can also contribute to water stress for rural communities. In Bulgaria, for example, the average water leakage rate from water supply networks is 60%. Here, funds from the national Rural Development Programme (RDP) are earmarked to address these issues and provide assistance for reconstruction of outdated water supply networks in rural municipalities. Such projects will not only help rural residents and businesses adapt to climate changes but they will also lead to improvements in quality of life.

Malta – adapting to climate change threats on island water supplies

Climate change predictions in Malta include impacts related to reduced quality and quantity of water supplies on the islands. The shortage of water supplies is expected to be further exacerbated by additional deterioration of groundwater quality due to sea level rise and saline water intrusion leading to further dependence on non-natural sources, such as desalination. The latter consequently impacts on energy budgets and greenhouse gas (GHG) emissions.

To mitigate the adverse effects of climate change on water supplies, the Maltese RDP supports investments in modernisation of holdings, particularly regarding improvements in irrigation equipment, collection and storage of rainwater and restoration of dams for aquifer recharge. The RDP assistance is not available for projects seeking to use underground water sources and manure storage facilities are promoted to prevent nitrate contamination of the islands' aquifers.

By November 2009, over 180 RDP contracts had been signed with farmers involved in integrated approaches to modernising agricultural holdings. Projects have been prioritised based on the extent to which they involve water conservation techniques, primarily rain water reservoirs so as to reduce the dependency on aquifers and increase water storage capacity at farm level. Large scale water conservation projects at national level are foreseen by the Maltese managing authority for 2010 under the RDP measure that supports infrastructure for the development and adaptation of agriculture.

More information about Malta's climate change actions can be viewed at: www.phys.um.edu.mt/CLIMATE/



MINISTRY FOR RESOURCES AND RURAL AFFAIRS, MALTA

Rural vitality risks

The overall vitality of rural areas in South East Europe is also expected to be affected by reduction in crop yields (predicted to range from 10% to 30% in the long-term if no adaptation measures take place) possibly creating domestic food supply risks. By 2050 there may be modifications in the planting of crops (e.g. spring crops) from southern areas to higher latitudes as a result of climate change. It may be difficult to find suitable crops to cultivate under conditions of high temperatures and drought in South East Europe with negative consequences on the economic situation of traditional farms and the availability of food supplies in subsistence and semi-subsistence farming areas.

Rural tourism is another sector expected to be affected and tourism in South East Europe is projected to decline if temperatures continue to rise. Factors driving this negative economic impact include the degradation of traditional rural landscapes which currently attract many visitors and represent valuable economic resources.

Fire, erosion and land abandonment (fuelled by reduced yield and profit potentials) all present risks to the preservation of scenery in South East Europe's countryside, and all these problems are expected to be increased by drier, hotter climatic conditions. RDPs have an important role to play in maintaining traditional farm landscapes and this can be achieved by a variety of agricultural support schemes.



SONYA MIKOVA

Bulgaria – adapting to the effects of forest fires

In Bulgaria, afforestation of agricultural land is used as a measure to maintain landscape diversity, avoid erosion and adapt to adverse effects of rising temperatures and forest fires.

Over a third of Bulgaria's land mass is covered by forests. The main natural hazards faced by this extensive forest resource are fires, floods, wind blow and insect infestations. These problems are expected to increase in the future as weather conditions worsen and temperatures could rise by as much as 3.1 degrees before 2050.

As with other parts of southern Europe, forest fire risks in Bulgaria continue to be inflamed by hotter drier environmental conditions. Bulgaria's RDP supports forest fire restoration and prevention actions. Restoration actions include clearing of forests damaged by natural disasters, reforestation of damaged forests using indigenous tree species and establishment and improvement of timber depots in case of disasters. Prevention actions cover: fire protection facilities (e.g. fire precaution strips); provision of heliports and water points for fire fighting; fire monitoring and communication services; construction and improvement of forest roads in areas with high fire risk; and diversification of the vegetation structure by transforming coniferous plantations into broadleaves or mixed varieties.

The RDP measure concerning the restoration of forestry potential and the introduction of prevention actions supports projects related to forest fire prevention and restoration of forests damaged by fires. By the end of 2009 a total of 18 different projects, representing around €850 000, had been contracted and were being implemented. Most of these projects involve restoration actions such as clearing of forests damaged by fires and other natural disasters and reforestation of damaged forests by planting indigenous tree species. Several other RDP projects are assisting Bulgarian rural areas to build capacity for preventing forest fires, via co-financing equipment costs for anti-forest fire stations.

For general information about climate change impacts on the Bulgarian environment see: www.bluelink.net/climate/e_index.shtml

Concerted climate action responses

Climate change is now a reality for rural areas in South East Europe and the phenomenon requires concerted coordinated action if it is to be tackled effectively.

EU rural development policy has a role to play in coordinating climate actions in rural areas. A range of measures in the RDPs of South East Europe countries cover operations that address climate change.

Climate change mitigation in these countries is addressed by investments in energy saving equipment, the conversion of agricultural land into forests, organic farming and soil conservation techniques. In Italy for instance, the objective is to reduce GHG emissions through a change in agricultural practices. In Slovenia, there is special emphasis on protecting fruit tree plantations which are a special feature of the Slovenian landscape and contribute significantly to the environment and biodiversity. In Bulgaria, there is emphasis on improved harvest of agricultural and forest biomass in order to mitigate climate change.

Climate adaptation actions in the RDPs of EU Member States from South East Europe are dominated by water management objectives aiming to upgrade the efficiency of irrigation systems and improve the effectiveness of water storage capacities, as well as prevent the depletion and possible degradation of existing underground reservoirs through saline water intrusion.

The primary goal is to address the water scarcity problem, as demonstrated by the previous Maltese case study, and countries such as Malta and Cyprus have RDP commitments to improve water management by reducing reliance on groundwater supplies, collecting more rainwater and reusing treated waste waters for irrigation.

Other RDP climate actions are foreseen for the conservation of genetic resources, forest fire prevention, habitat preservation in the agri-environment landscape (wetlands, hedgerows, etc.) and modifying cultivation practices. In Slovenia, for example adaptation actions include using nets to protect fruit orchards against hail damage and mitigation projects contain actions such as a horticultural business using geothermal energy to heat orchid production systems.

“ Integrating climate change policies into broader sustainable development strategies and policies within the South East European region makes implementation easier and more efficient. ”

The Zagreb Declaration, from October 2009's International Workshop on 'Climate change in South East European countries IV: Adaptation strategies for economy and society'.

Slovenia – climate-friendly horticulture

Ocean Orchids is a high-tech horticultural business located in north-east Slovenia, close to the Hungarian border. The company's greenhouse covers three hectares and produces 1 300 000 orchids each year. Some €1 million of RDP funds were awarded to help Ocean Orchids purchase and install state of the art production facilities, modernise their agricultural holding and take advantage of naturally occurring heat from local geothermal sources. Funded by measure 121 of the Slovenian RDP, the project has helped to maintain competitiveness and created 19 new jobs.

Opened in June 2009 by the President of the Republic of Slovenia, this environment-friendly extension to the orchid production facility provides heat from a geothermal well that extends more than 1.5 kilometre underground and provides hot water at around 60°C. This is used to maintain a stable greenhouse temperature of 28°C.

Ocean Orchids' RDP project builds on a history of geothermal horticulture in Slovenia which dates back to the 1960s, when the earth's natural heat started to be used on a commercial basis in Čatež to help power the production of flowers and vegetables.

Geothermal heat offers important savings in terms of energy prices and especially CO₂ emissions. The technology to extract and harness this renewable energy is now suitably advanced and offers opportunities in different parts of Europe for mitigating climate change impacts, in an economically sustainable manner.

Find out more from: www.oceanorchids.si



OCEAN ORCHIDS

Renewable energy emphasis

The production of renewable energies has been given high attention in the Italian rural development strategy, especially the bio-energy sector. Operations to support the production of renewable energies include investments in local energy supply and agricultural and forest biomass processing, with a clear focus on wood biomass. The rural development strategy in Slovenia foresees a tenfold increase in the territory devoted to the production of renewable energy. In the Bulgarian RDP there is a focus on the development of biomass collection and utilisation, and on development of other renewable energy sources under axis 3 (e.g. solar).



FILIPPO LABATE

Italy – renewable energy responses in the fight against climate change

Italy's national rural development strategy and its regional RDPs prioritise the uptake and production of renewable energy, particularly bio-energy. Making the most of wood biomass from forests, without generating pressures on biodiversity, soil and water resources is a consistent RDP goal.

New funds made available from the CAP Health Check will finance additional Italian RDP actions in the field of renewable energies. An illustrative example is the Calabria region which will finance three of these new actions. Under the measures for modernisation of agricultural holdings and adding value to agricultural and forestry products, the regional RDP will finance business investments aimed at the production and consumption of biogas

from organic waste aimed to meet the business needs. Furthermore, under the diversification measure, the RDP will support technology investments of up to 1MW potential for the production of biogas from organic waste, energy from sugar biomass and solar energy, for commercial purposes. These actions are expected to have an impact on the substitution of fossil fuels and the reduction of methane (CH₄) emissions.

Another example of a rural renewable energy project is the "Agroenergetic Integrated District 'Valle dei Latini' initiative that is being supported by the United Nation's Food and Agriculture Organisation. This aims to tackle environmental pollution problem in the Sacco River Valley (caused by local industries) through an integrated strategy of agricultural and rural development. Such a strategy involves the implementation and integration of several agro-energetic value chains

which produce wood-energy, biodiesel and biogas from local farm and forest products (short rotation forestry, sunflower oil, manure digestion, valorisation of wine and olive oil pruning waste). The project supplies heat for public buildings from the 'climate-friendly' energy, which provides an important economic diversification opportunity for local farmers.

For more information about Italian rural climate changes issues and renewable energy matters see:

<http://en.agricolturaitalianaonline.gov.it>

www.climagri.it

www.fiper.it/en/about-fiper/association.html

www.iea.org/textbase/pm/?mode=cc&action=view&country=Italy

http://ec.europa.eu/energy/energy_policy/doc/factsheets/renewables/renewables_it_en.pdf



Help from the Health Check and the Economic Recovery Plan

Rural development policies have been complemented recently by additional funds emerging following agreement of the Common Agricultural Policy (CAP) Health Check. These combine with other new funds from the EU Economic Recovery Plan and result in more rural development opportunities to finance climate change, renewable energy, water management and biodiversity actions. For example, Italian RDPs were awarded an additional €131.8

million of new funds for co-financing project work supporting climate action, biodiversity, renewable energy and water management. Slovenia received €7.4 million for similar new RDP activity and €1.1 million of additional RDP money was awarded to Cyprus for co-financing biodiversity conservation. In Bulgaria, the amended RDP results in €11.6 million more for renewable energy projects and €18.6 million additional funds for water management.

This new funding offers South East European countries with a pragmatic set of climate action solutions. These offer a practical range of opportunities to reinforce the RDPs' capacity to address climate change challenges and respond effectively to the increasing range of adverse effects that stem from rising temperatures in the region.

Further reading about climate action issues in South East Europe:

Climate Change III in South-Eastern European Countries: Causes, Impacts, Solutions 18th and 19th September 2008 Graz, Austria:

www.joanneum.at/climate/Workshop%20Graz/Presentations.html



Changing weather patterns in Poland's countryside: rural development responses

Rural parts of Poland are predicted to experience an increasing number of impacts as seasons shift, storms worsen and floods become more frequent. Agricultural impacts will be noticeable and rural development actions can help Poland both adapt to the changes as well as help mitigate their sources.

Analysis of data from meteorological stations in Poland shows that average annual air temperatures increased during the last century. Analysts predict that if the country becomes more than 1-2°C warmer on average than at present, the initially favourable net impact on food production could be replaced by detrimental effects.

In many part of rural Poland the basic conditions for agriculture could deteriorate dramatically, especially if warming is accompanied by reduced precipitation, although there is as yet no firm evidence of the latter. Climate change in Poland is also considered to present risks for the countryside due to the more frequent occurrence of extreme weather conditions. These may result in more storm and flood damage to farms, homes, businesses and biodiversity habitats.



Protection of biodiversity on agricultural land

Biodiversity, and in particular the large diversity of habitats, is considered to be at a relatively high level in Poland, as a result of favourable natural conditions, high forest cover levels and patterns, and farming traditions and practices. However, over the last decade the biodiversity of rural areas in Poland has been threatened by excessive intensification of agricultural production, landscape structure alteration and the abandonment of habitats with low value to rural production.

Poland's National Strategic Plan for Rural Development 2007-2013 stated clearly that "the problem of the protection of biodiversity in rural areas in Poland does not lie in the intensification of agricultural production, but in maintaining the preserved resources in good condition and avoiding environmental effects of intensification or abandoning of agricultural land."

2004-2006 rural development strategy provided support for bio-diversity related activities under its agri-environmental activities. The current Rural Development Programme (RDP) has extended these activities under the axis 2 agri-environmental scheme. This scheme consists of nine packages, including sustainable agricultural practices, land structure management and restoration of assets or maintenance of valuable habitats, protection of endangered bird species within and outside the Natura 2000 areas, soil and water resources protection, and protection of genetic resources of endangered plants and farm animals.

By the end of 2009, more than 20 500 applications had been approved for a total amount of €42 million. The two regions which lead uptake of the funds are Warminko-Mazurkie and Kujawsko-Pomorskie.

For more information please see www.arimr.gov.pl



LESZEK ŚLIPSKI

Future farming predictions

Poland's farmers are expected to bear the brunt of new weather patterns. Predictions for future farming impacts include a variety of factors that will require adaption measures from within the agricultural community. Opportunities are also forecast and these include making the most of mitigation-related action, such as increasing renewable energy sources from biomass. Table 1 summarises some of the main impacts anticipated on Polish agriculture in the short and medium term future.

Table 1. Predictions for climate change effects on agriculture in Poland (positive +, negative - and neutral 0)

Effects on Polish farming systems	Next decade	After 2020
Basic conditions for agriculture	-	--
General conditions of agriculture land	+	0/-
Heat-absorbing plants	+	++
Wintering plants	-	--
Energetic (biomass) plants	++	++
Breeding	-	--
Pasture productivity	+/-	0/-
Grass productivity	0/-	-
Irrigation	-	--
Water supply	-	-
Local floods	-	--
Wind erosion	0	-
Water erosion	0	+

Some of the positive features highlighted in table 1 indicate that milder winters and higher temperatures during the spring and summer will help favour farmer's ability to grow a wider variety of crops. However, as also noted in the article about Nordic countries, pest migration following warmer climate patterns remains a very real threat for farmers in Poland's countryside. New pests, such as western potato beetle, have already been discovered in six voievodships of southern Poland. Other threats to crop cultivation are expected from *Ostrinia nubilalis*, as well from pathogenetic forms of green-fly carrying the yellow dwarf barley virus. Weed species including *Galium aparine* and *Veronica persica* are identified, among other pests expanding their ranges northwards, as further negative impacts from climate changes on Polish agriculture.

Floods and storms

Published in 2007, the Intergovernmental Panel on Climate Change's Fourth Assessment Report points to the risk of increased flooding in Poland and forecasts that large scale flooding incidents, previously called '100 year floods' will become a far more frequent occurrence. Problems are predicted throughout the country which is traversed by a network of large river systems and also includes vulnerable low laying land around the Baltic Sea. Areas such as the fertile Vistula delta remain at risk both from marine storm surges but also from heavier downstream flows following torrential down pours of rain and hail.



STEFAN JOHANSSON

Management of agricultural water resources

Over the last two decades flood risk has become a real issue in Poland. Climate variability is one of the factors contributing to this situation. Floods are becoming more frequent, and climate change models predict that they will become more severe over the next years.

The devastation brought by the floods of 1997 and 2002 as well as an increased risk of flooding has resulted in increased vigilance and the planning of prevention measures. A great deal of effort and funding is being put into forecasting, impact analysis and risk management by the Polish authorities for rural areas.

There are a number of EU programmes and projects which have targeted the problem. These include: INTERREG (IIIB Transnational Action Program – Spatial Planning for Preventive Flood Protection in the Oder Catchment Area - OderRegio); Projects funded under the 2004-2006 Sectoral Operational Programme (SOP): Restructuring and Modernisation of the Food Sector and the Development of Rural Areas; the 2007-2013 Infrastructure and Environment Operational Programme; and the 2007-2013 RDP.

The RDP will spend €440 million through axis 1, Measure 125, Scheme II on management of agricultural water resources. The aim of the measure is to improve flood protection of farmlands as part of a climate change adaptation process. Examples of the actions to be financed include reconstruction of the Lake Resko Przymorskie levees near Kolobrzeg, and reconstruction of levees in Narew in Sikory-PAN Gora. Both projects will result in increased protection of neighbouring farmlands.

For more information please see www.arimr.gov.pl

Storm damage in Poland is another escalating problem for farmers to face but Polish agriculture has a proven ability to rapidly revise its crops and methods to changes in external circumstances. This will be particularly useful to help make positive contributions towards mitigating climate change drivers by increasing renewable energy opportunities from biofuels. Farmers' flexibility will also be tested by their ability to implement key climate change adaptations.

Speaking during the COP 15 Summit events, Dr Tomasz Stuczyński, from Poland's Institute of Soil Science and Plant Cultivation stressed that "Results of modelling work based on IPCC data for Europe indicates that climate conditions in Poland are less favourable than in most of the EU countries – potential productivity is about 20% lower".

Agricultural adaptation

A variety of options are available to help the agricultural sector adapt to offset problems associated with climate change, and so remain competitively viable. These include, among others:

- planting crop varieties or species that are more resistant to water shortages and temperature stress
- protecting soils against erosion, especially wind erosion by growing cover crops and using forestry to provide wind breaks
- introducing new early warning systems to monitor and tackle pest problems effectively
- installing protection measures to safeguard high value vulnerable crops, such as fruits
- providing appropriate infrastructure to shelter livestock from hotter summers and more extreme storms
- establishing hydrological features to manage and minimise flood risks in sensitive areas
- building capacity of all rural stakeholders to understand how to operate successfully in new climatic conditions

It is acknowledged that Poland's large proportion of small and semi-subsistence farmers may experience more difficulty in adopting these types of modifications than the country's larger farms. However, Poland's Rural Development Programme (RDP) provides scope for both small and large farmers to work, either together or individually, to tackle climate change.



Whilst climate change adaptation actions were not previously prominent in the RDP, rural development assistance was available to help farmers modernise and invest in actions that reinforce competitiveness. A new emphasis, emerging from the Common Agricultural Policy Health Check agreement and European Economic Recovery package, has now amended the Polish RDP and injected fresh funds that include an additional €33.8 million for water management works. These offer opportunities for flood protection, improved drainage and efficient irrigation.

“ We know today that there is a certain role for agriculture and agricultural policy to be played [in tackling climate issues]. So we should all continue to accomplish work that will ensure a comprehensive approach to climate change challenges through agriculture and its policies beyond Copenhagen. ”

Andrzej Dycha, Former Undersecretary of State in the Polish Ministry of Agriculture and Rural Development

Climate change mitigation through afforestation schemes

Farmland afforestation is a priority in the Polish national programmes for sustainable development and environmental protection. These include the National Woodland Extension Plan, the Infrastructure and Environment Operational Programme, and the 2007-2013 RDP.

Some parts of Poland are characterised by a surplus of low quality, degraded farmlands, and landowners have been encouraged – through a number of government-funded initiatives – to convert them into forests. The process will add to the economic value of the forested land and increase the overall forest cover indicator, whilst also providing long term benefits such as carbon sequestration and biodiversity improvement, water balance improvement and wind-caused soil erosion mitigation, thereby contributing to reducing the impacts of climate change.

Farmland afforestation was promoted as one of the priorities of Poland’s 2004-2006 rural development strategy. More than 9 000 farmers successfully applied for afforestation grants which covered 42 000 hectares of farmland. The value of the grants provided was approximately €61 million.

Within the 2007-2013 RDP, measures 221 and 223 also promote afforestation activities, maintenance of afforested areas, remuneration for lost agricultural earnings, and afforestation of non-agricultural areas. The eligible applicants for these measures are mainly individual farmers and cooperatives.

Out of the total €653 million planned to be spent in 2007-2013, €20 million has already been allocated to farmers who successfully applied to the Agency for Reconstruction and Modernisation of Agriculture. The schemes are becoming increasingly popular, and the two regions which continue to attract most applicants are Mazowieckie and Podkarpackie.

For more information please see www.arimr.gov.pl

The amended RDP also includes a further €10 million for biodiversity and this can assist Poland's important mix of farm wildlife cope with shifting climate patterns. A smaller amount of new RDP funds, totalling €3.8 million, has been made available for new renewable energy projects in the Polish countryside.

Biomass and biofuel opportunities have always been prominent in Poland's rural development strategy. These are connected to the country's wider strategy for reducing green house gas emissions and mitigating against climate change sources. RDP support for different bioenergy-related projects (via measures 121, 221, 223, 321) also offers beneficial support for sustainable supplies of local rural energy.

An example of the climate change mitigation benefits available from RDP support for Polish bioenergy sector stakeholders is presented in the following case study, which demonstrates RDP links with a number of climate adaptation actions underway in rural Poland.

Innovative rural areas

Investments into renewable energy sources have been given priority in the context of new strategic development programmes in Poland. A number of programmes, including the 2007-2013 RDP and Infrastructure and Environment Operational Programme, offer support with regard to production, distribution and supply of energy from alternative, renewable sources including wind, water, solar, geothermal and biomass.

The RDP supports the use of renewable energy sources through its measure 321, assisting basic services for the rural economy and economy and citizens. By the end of 2009, a total of 1 938 successful applications had been submitted under the measure, and 44 of them involved renewable energy investments.

Examples of activities to be funded under the measure include:

- Construction of an ecological biomass boiler plant in Kepice, in the Pomorskie region
- Installation of solar panels and ground heat exchangers at the Neptun swimming pool in Ozarów
- Installation of solar street lights in Golina, in the Wielkopolskie region.

For more information please see www.arimr.gov.pl



Rural Citizens



Rural people play a prominent role in implementing local climate actions that address global issues. Good examples of this type of rural development work exist throughout Europe and the EU Rural Review went to find out more about rural citizen contributions to tackling climate change challenges in Austria, the Czech Republic and Italy.



Austrian wood cluster solutions to economic and climate change challenges

Dr. Waltraud Winkler-Rieder has been involved in rural development for nearly 20 years, beginning in 1990 with the specialist consultant, ÖAR GmbH, based in her native Austria. Between 1990 and 2000, Dr. Winkler-Rieder was mainly working on energy projects, in particular the development of local heating systems based on biomass or biogas. The results and know-how from the first projects were transferred to other regions, both in Austria and elsewhere in Europe.

In the late 1990s, Dr. Winkler-Rieder began teaching students in the Czech Republic, Slovakia, Slovenia and Bulgaria about saving energy and using local energy resources. She was also seconded to the Bulgarian government (from 1996-1998) to build up local networks for regional and sustainable energy consulting. Situated in Kazanluk, she helped with the planning of biogas plants and solar collectors for heating warm water systems.

In 2000, Dr. Winkler-Rieder was hired by the Government of Salzburg to develop a business cluster of wood sector companies for the whole province, a position she held until earlier this year. Wood is the second most important sector of the Austrian economy after tourism. The 'Holzcluster Salzburg' provides information on improving

methods and technologies and on product trends, as well as fostering co-operation across the whole value chain.

In May 2009, Dr. Winkler-Rieder took charge of a new network situated in Upper Austria that represents the interests of handicrafts manufacturers, the Meisterstrasse Innviertel. She also continues to work as an independent consultant for some companies in the wood cluster.

Tell us about an interesting and recent rural development project that you have worked with.

The Salzburg wood cluster has been my long-term project for most of this decade. One of the reasons I got the job in 2000 was because I had studied Forestry at the technical college in Kuchl. Perhaps this made it a little easier for me at the start than for a business cluster consultant with limited knowledge about the wood sector.

Together with an assistant I began by setting up a database of companies in the sector. This is very laborious work but without it you cannot start a network because you have to learn the factories, you have to know what are the problems, what are the successes of this sector. Setting up the database also gave us a way of getting to know the many family businesses in the wood sector here.

Unlike say in Finland or Sweden, where there are a few large companies with lots of employees, in Salzburg there are more than 1 300 companies, with 20-25 employees on average.

Some 70% of the wood sector's output goes for export. The main problem many of the small, family-run companies experience is obtaining good knowledge of these foreign markets. To this end we organised group training sessions at their mills and factories on how to do business in these markets.

This is hard work, but such was our success that more and more owners have joined the cluster and today more than 800 of the 1 300 companies are involved.

What do you find most rewarding or satisfying about working and living in your part of rural Europe?

My part of Austria is full of very beautiful landscapes and although we have also been affected by the economic crisis, the effects have not been so strong, partly because Salzburg has a firm tourist base and partly because of the many family-owned companies in the area. The owners are perhaps more committed to keeping people in work and less concerned with global markets than elsewhere.

What do you think are the main issues, challenges and opportunities for rural development in your part of Europe and area of expertise?

In particular, what opportunities and threats does climate change present to the wood industry?

The global crisis is obviously an influential factor affecting rural Austria. The effects of the economic crisis have certainly been a big challenge, particularly as the Salzburg region depends a lot on international tourism. Companies in the wood cluster are also in business with the tourism industry – building hotels, building chalets. If tourism declines, the small businesses in the wood sector also suffer.

In terms of climate change, many companies in the wood sector are already generating their own energy from biomass and manufacture wood pellets for energy for others to use. However, the biomass is a waste product of the sawmill manufacturing process. The main part of production goes to the building trade and if the building sector is in decline, there's no sawdust to make wood pellets and so on.

We hope that the climate discussion will lead more and more people to build with wood because it's a sustainable resource that can be sourced locally.

What needs to be done, and by who, and how in order to address these challenges? Is there a role for EU development policy in this area?

There is a big discussion going on in the Austrian government and the provincial governments, as well as at the European level about wood's role in sustainable development policies. Austria was one of the first countries to address these questions. The result could be good for the wood cluster because on the one hand you have energy policy, on the other building policy and maybe the climate discussion will lead to more money from local government for people who build using sustainable resources such as wood.

Local government should be taking a leading role in addressing these challenges. The local authorities should have more involvement as a go-between working with the European institutions on the one hand and local people on the other.

What types of useful lessons have you learnt during your rural development work and what would be in your 'top three' pieces of advice to other practitioners addressing climate change and using cluster approaches?

Firstly, you have to get local companies and key actors behind your project. If you don't have their support and a good standing in the local area you have no chance of being successful. It has to start from the bottom up. In Austria, the way the Leader approach (Axis 4) is implemented could in my view be improved, since the more bottom-up rural development action we can promote the more inclusive benefits we will create.

Secondly, you have to make sure that the local or the regional government is with you.

The third part is maybe to encourage people to make good use of the EU and national funding that is available for rural businesses. Securing a little support for starting up – both financially and logistically is extremely useful. Of course we cannot receive long term aid as an ongoing support but project catalyst funding is a vitally important development tool for rural economies.

“ You have to get local companies and key actors behind your project. ”

Dr. Waltraud **Winkler-Rieder**



WALTRAUD WINKLER-RIEDER



Domino effect boosts outputs from agri-environment actions in Italy's Aso valley

Mr Avelio Marini is a rural development practitioner from central Italy's Marche region. His local area is known for its natural beauty and includes land that stretches from the Adriatic Sea up to the Apennine Mountains. Mr Marini is well versed with the important challenges facing this predominantly agricultural area and he has been actively involved in promoting sustainable development approaches via political and civil roles, such as his time as mayor of Amandola, a small upland village with a population of around 4 000 people. Environmental issues have been at the forefront of his work in organisations like the National Committee of Legambiente (Italy's largest environmental association), which has strong links to the Italian National Rural Network.

Throughout the years, Mr Marini has gained expertise in promoting sustainable forms of agriculture and the valorisation of local products in both rural and environmentally sensitive areas. His specialist skills in sustainable agriculture approaches were recognised during 2004 by a nomination as the Ascoli Piceno District Councillor for Agricultural Affairs. This position provides him with increased impetus and enthusiasm for raising environmental awareness among farmers in his territory. He remains especially interested in involving farmers in rural development projects designed

to link traditional agricultural production systems with wider global goals regarding water quality preservation and desertification, biodiversity conservation and climate-friendly actions.

Mr Avelio is a strong advocate for broad, inclusive and integrated responses to these growing environmental problems and he remains firmly convinced that good quality and multifunctional agriculture systems offer the best guarantee for sustainable prosperity in his, and other, rural areas. He points to the opportunities offered by the regional Rural Development Programmes (RDPs) in Italy as important tools for tackling the current economic and climate crises, and he has first-hand experience of using RDP funds to produce tangible successes in territorial approaches to sustainable agriculture. A particularly good example of this is the 'Aso Valley Project' that involves both institutions and local private actors in the achievement of common sustainable rural development goals.

Mr. Marini, tell us about your latest project, the 'Aso Valley Project': which challenges does it address and how is it expected to tackle them?

The Aso Valley follows the path of the Aso River, which defines the structure of a very beautiful landscape where the work of nature has developed hand in hand with

that of humans. The environmental quality of the Aso River has however suffered from various types of anthropogenic pressures. For example, orchards (producing peaches, plums, apples and pears) grow all along the river banks and these are intensively cultivated through the use of chemical inputs. The local community was keen to minimise the impact of this important local economic sector on the river's water quality, which is considered equally important to the valley's long term future as an attractive place to live, work and visit.

A proposal was therefore developed to involve the farmers in a project that helped adapt their agricultural practices to include more environmental-friendly techniques. This was seen as a crucial first step of a longer rural development process that had dual objectives to reduce other environmental threats in the Aso territory, whilst also providing local farmers with new chances to gain added value from their crops.

About 80% of farms in the project area are small and cover less than five hectares each. As such it was thought important to strive for a collective approach since this was predicted to have much more potential than single farmers acting alone. "The territorial approach has been a vital element of our project's success and the RDP's encouragement of 'Agri-environmental territorial support' provided us with just the right type of

resources that we needed”, says Mr Marini who also stresses the important support provided by the Regional administration in making this innovative project happen through the RDP in the first place.

Led by the Ascoli Piceno Province, and involving Mr Marini as the project coordinator, the Val d’Aso project’s early work focused on building the partnership of farmers and institutions to work together. Technical guidelines on environmentally sensitive approaches were then developed for the farmers. Advice about these matters, plus the associated economic benefits, was disseminated through a capacity building programme which brought farmers and public agencies together in workshops and seminars to explain the proposed approaches and discuss issues involved.

This multi-sectoral and participative methodology was highly innovative for the Val d’Aso territory, as were its ability to pursue multiple agro-environmental objectives through an integrated suite of measures addressing water and soil quality, cleaner agronomic practices and healthier products. These innovative project features are stated by Mr Marini as further examples of the project’s important success factors and he notes that “this project is the first and only case in the region, so it is a sort of an experiment that has involved a lot of learning-by-doing methods, but I am convinced this is the best way and it is working well”.

What types of results has the project produced so far and what useful lessons have emerged during its implementation?

“We are very happy with our results so far and the figures speak for themselves. Some 24 municipalities are now involved in the project, which covers half of the region’s designated Nitrate Vulnerable Zones, meaning 7 612 hectares in total. By November 2009 the project has attracted interest from 110 farms that applied to participate, and these cover 65% of the target area. About 25% of the farms are run by young farmers. The project is

running for five years and by 2011 we expect additional farmers will join us in our efforts to cover 100% of the Nitrate Vulnerable Zones, and reduce NPK use in the territory by around 30%.

Our other main quantitative target relates to substituting agri-chemical inputs characterised by acute (90% cut) or chronic (85% cut) toxicity. So far we have already achieved an average 70% reduction of the chemical inputs and we believe more changes are feasible because we have seen that a kind of domino effect is occurring on the project and as more farmers join the project it gains more credibility, as well as more overall potential. This chain reaction leads to more word-of-mouth promotion of the project, which leads to other farmers becoming interested and contacting us for assistance with adopting sustainable agricultural techniques.”

Creating and maintaining such a domino-effect can be seen to be one of the noteworthy lessons that other areas can take from the Val d’Aso project. Nurturing this type of bottom-up momentum often proves highly cost effective and offers good value for money from RDP investments in agri-environmental and other rural development projects. This point is recognised by Italy’s NRN and the National Services Institute for the Agro-food Market (ISMEA), who both consider the project to be an example of innovative good practice in

agri-environment approaches.

Another useful lesson emerging from the project is the importance of getting a good balance between economic and environmental objectives, since both are mutually reliant. Mr Marini is aware of this matter and, now that the territory’s farm products have good ‘green credentials’, work will soon begin on taking advantage of this fact through new quality branding and marketing initiatives. Other RDP measures will be able to help with this and Mr Marini appreciates the way that the RDP has been designed so that different measures can complement each other.

A final word on the project from Mr Marini highlights the crucial role that Ascoli and Fermo Provinces are also playing in this project, by facilitating actions that address the long term needs of local farmers and also the municipalities’ mandate to translate national and European policy goals into concrete measures. “What I have learnt from my experience with this project and previous rural development work is that mediating among various interests may be harder at the beginning but it may also lead to more effective and long-lasting results. The outcomes are certainly worth the effort and we can see that our territorial successes in sustainable agriculture are not only making a difference to our local area but are also contributing to the bigger picture and helping promote a healthy European environment”.

“ A kind of domino effect is occurring on the project and as more farmers join the project it gains more credibility, as well as more overall potential. ”

Mr Avelio Marini



AVELIO MARINI



Czech centre demonstrates climate-conscious development

The Centrum Veronica Hostětín is a part of ZO ČSOP Veronica (Basic Organisation of the Czech Union for Nature Conservation), a civil association based in Brno, which has been operating in Hostětín and the Zlín region of the Czech Republic for more than 15 years.

The centre demonstrates that environmentally sensitive management of resources and informed interpretation of local heritage can economically stabilise the countryside and provide employment even in remote areas. It implements and monitors model projects of sustainable development in co-operation with the municipality, regional and other partners including research institutes and universities. Dr Yvonna Gaillyová, director of the Ecological Institute Veronica (the Czech nature conservation association), explains the centre's priorities and goals.

What is the particular emphasis of the model projects that are currently being carried out and what role do they play in reducing the negative impacts of climate change?

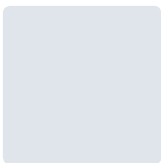
At Hostětín, a village in the White Carpathians, several pilot projects are targeting sustainable regional development. These concern a biomass heating plant, solar systems, an apple juice plant, a reed bed waste water plant, public lighting, 'passive' building i.e. those structures that use modern technologies as well as traditional materials to save energy, use rain water etc.), and landscape protection (for further details, see the website www.veronica.cz/english).

Climate protection was an important consideration for all of these projects. For example, the biomass heating plant was one of the Czech Republic's first Jointly Implemented (JI) and Activities Implemented Jointly (AIJ) projects under the Kyoto mechanism. [AIJ and JI initiatives utilise private capital in addition to public financing when it is most cost-effective to do so.] The projects are also evaluated according to their impact on climate protection.

Furthermore, the Ecological Institute Veronica runs a seminar centre, the Centre for Sustainable Regional Development, which features a 'passive house' that is home to one of the leading Czech NGOs focused on climate protection and a member of the Czech Climate Coalition. We are doing our best to connect sustainable rural development with climate protection.

Our ongoing projects are also concerned with climate protection. For example our 'Climate protection at the local level' project is developing the concept of a low carbon micro-region, and our 'Natural materials and renewable sources for development of the border area' is dealing with Slovak villages as well as Czech villages. The initiative to insulate an old nursery school in neighbouring village Pitín with straw to almost a passive standard is another recent example of our local level climate action contributions.

One of the main themes of our projects is the use of self-sustainable energy supplies that avoid external imports. The region operated in this way a century ago and we are showing how such approaches can be adapted to fit with modern day circumstances. The goal is to mitigate climate change by reducing carbon emissions and storing carbon in the earth. Adaptation, in terms of reducing the impact of climate change, is not top of our



agenda. We are promoting, however, the collection of rainwater and its use, as water scarcity in wells is a growing problem.

To a greater or lesser extent, all our projects are therefore driven by the need to mitigate climate change, even if protecting fruit tree species is more of a biodiversity initiative than it is a demonstration of how to adapt to changing conditions.

In the opinion of Dr Gaillyová, climate change is not a high priority issue for many citizens in the Czech Republic, and as a result, she believes that it is important to show attractive additional benefits for all mitigation projects in order to obtain local and regional support. Accordingly, Centrum Veronica Hostětín is expanding its education programme on climate change and has developed new awareness raising products for pupils, students and public. During 2009, this involved explaining the need to reduce carbon dioxide (CO₂) to a level that might not be considered dangerous – under 350 ppm.

One of the centre's target areas is the 'rural landscape'; how have you promoted sustainable management of resources and what would you like to see included in EU rural development policy?

The conversion of more farm production systems to organic production is an obvious need. A new tool to make this transition easier might be biochar [charcoal created by pyrolysis of biomass], which enhances soil fertility using less fertiliser inputs and reduces eutrophication risks to water sources by nitrogen and phosphorus. Storing part of the available biomass carbon as char in the earth is very important for rural areas, and such an activity should be promoted vigorously.

We would very much like to see more EU policies and funds include more emphasis on integrating climate action objectives.

How important is it to raise awareness among the local population and publicise good practice in rural development? What tools and approaches has the centre adopted?

The centre and its neighbouring buildings are demonstrating good practice; this is our main tool. For example, we show that thermal insulation must be between 0.25-0.5 m thick in our part of Europe. Anything less than this amount may lead to future energy losses and reduced energy efficiency of rural buildings. Well-insulated facades and roofs should provide heat and electricity savings. This change of look of buildings is necessary and wise. Windows can be cheaper and better if no frames are visible from outside. Visiting Hostětín is an excellent way of learning these things and we co-operate with many universities that arrange field trips and student conferences in Hostětín.

The passive building is also used by the municipality for meetings and festivities. We organise excursions for mayors and town councillors from other projects in the country and we also have good working relations with similar sustainable development projects in Austria's Guessing region.

“ We are doing our best to connect sustainable rural development with climate protection. ”

Mrs Yvonna Gaillyová



YVONNA GAILLYOVÁ

What are the legislative challenges affecting sustainable development?

Sustainable rural development requires much decentralisation. For example, legislative changes are required and hygiene standards must be adjusted to the needs of small producers in order to realise the potential of localised energy supplies that provide support for the local economy.

How can the lessons learnt from the Hostětín 'living laboratory' work be incorporated into the Czech Republic's rural development actions? What challenges will be involved and how can they be overcome?

First, the lack of qualified and motivated leaders of municipalities is perhaps the largest obstacle to the spread of good practice. Students visiting our seminars and workshops are promising 'seeds' that could be planted wider afield. We broadened and deepened our

educational work following the opening of our new centre three years ago. We've already seen some results and hope to see much more in the years ahead.

A second major challenge is funding. Small municipalities and producers have less access to EU funds and other subsidies because of the rules of the programmes i.e. the need for pre-financing and, to some degree, co-financing. Moreover, many sustainable technologies (for example, reed bed wastewater treatment, renewable materials for construction and self-made systems) are often not eligible for subsidies.

Innovative solutions to these types of challenges are required and we at Hostětín remain pro-actively involved in demonstrating what can be possible when local people put their minds to work on mitigating climate action.



ECOLOGICAL INSTITUTE VERONICA

Researchers from around the EU are working to identify new methods for helping rural areas address the challenges that accompany changes in current and future weather patterns. Two of these research projects are profiled in the following pages.

ADAGIO: assisting agricultural adaptation to new climate conditions

Partnership work by rural research institutions has raised awareness about adaptation measures in agriculture by combining practical experience with scientific results.

Adopting adaptive measures to climate change in agriculture is extremely crucial however often also challenging. Gaps exist between scientific research on adaptation measures in agriculture and practical adoption of recommendations by farmers. The ADAGIO (ADAPtation of aGriculture in European regIONS at environmental risk under climate change) research project aimed to help bridge these gaps and received €526 300 of support for its actions, including co-finance from the Sixth EU Framework Programme for Research and Technological Development (FP 6).

Led by the Institute of Meteorology from Austria's University of Natural Resources and Applied Life Sciences, the ADAGIO project operated between January 2007 and June 2009. Its core objectives set out to identify appropriate climate change adaptation measures

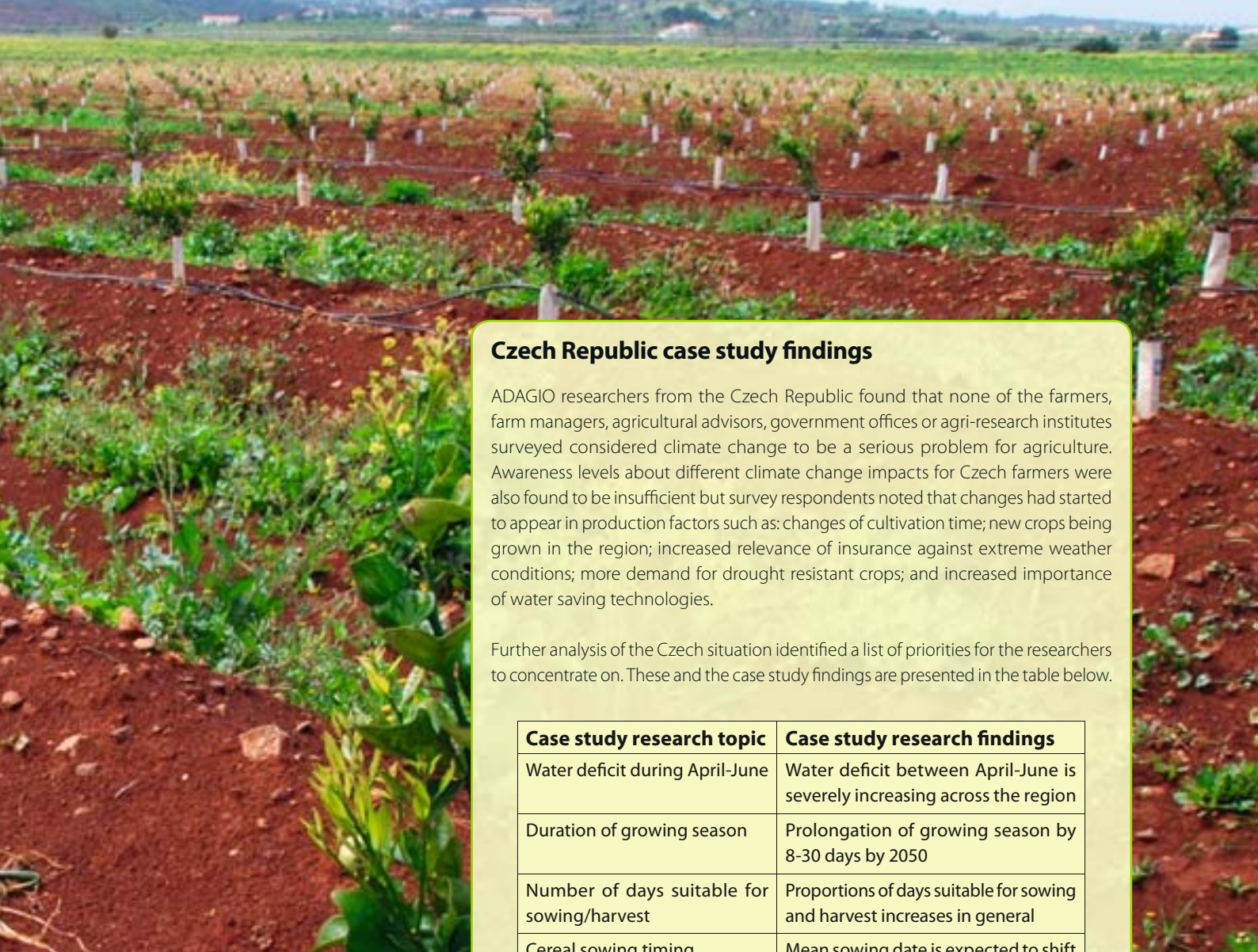
for agriculture, particularly in terms of amended production strategies and new or modified technological approaches.

It was agreed from the outset that the project priorities should investigate solutions to climate change challenges for some of Europe's most vulnerable regions. These were the Mediterranean area, Central Europe, and Eastern Europe. A total of 11 research institute partners participated in the ADAGIO project from Austria, Bulgaria, Czech Republic, Egypt, Greece, Italy, Poland, Romania, Russia, Serbia and Spain.

The project's main objectives focused on opening up direct communication lines between farmers, scientists and policy decision makers in order to increase and maximise interaction between these key climate change stakeholders. A fundamental aim for the researchers was to ensure that their outcomes represented reliable results-based actions.

This was important since the ADAGIO partners were aware from previous survey work that a large proportion of EU farmers were still not sufficiently aware about the implications of climate changes for agriculture or agro-ecosystems. Farm advisory services and government officials were also identified as a target group for increasing know-how about appropriate responses in the medium and long term. ADAGIO's own survey work confirmed that rural development stakeholders can often find time horizons of 2050 or 2100 as difficult to imagine and scientific approaches to explaining climate change concepts was also considered too academic or theoretical by farmers and policy makers.

ADAGIO's key challenge thus involved identifying approaches that moved away from theoretical models and concentrated on producing pragmatic tangible guidance for rural development actors.



Czech Republic case study findings

ADAGIO researchers from the Czech Republic found that none of the farmers, farm managers, agricultural advisors, government offices or agri-research institutes surveyed considered climate change to be a serious problem for agriculture. Awareness levels about different climate change impacts for Czech farmers were also found to be insufficient but survey respondents noted that changes had started to appear in production factors such as: changes of cultivation time; new crops being grown in the region; increased relevance of insurance against extreme weather conditions; more demand for drought resistant crops; and increased importance of water saving technologies.

Further analysis of the Czech situation identified a list of priorities for the researchers to concentrate on. These and the case study findings are presented in the table below.

Case study research topic	Case study research findings
Water deficit during April-June	Water deficit between April-June is severely increasing across the region
Duration of growing season	Prolongation of growing season by 8-30 days by 2050
Number of days suitable for sowing/harvest	Proportions of days suitable for sowing and harvest increases in general
Cereal sowing timing	Mean sowing date is expected to shift by 5-14 days
Late frost occurrence	Overall probability of frost damage might change since events with low frequency probability are increasing in some regions.
Production region changes	Change in the overall climate conditions is forecast to be substantial and rapid Some Czech regions will be faced by completely different conditions. Higher risks will occur for rain-fed agriculture in the Czech Republic.

The team knew that rural stakeholders had a good understanding that the crop productivity of an individual region is, to a large extent, determined by variation in climate and soil conditions. As such the researchers set out to demonstrate how the predicted climate change impacts would impact on farm productivity in different regions. This was considered a more appropriate mechanism for 'getting the message across'.

Case study demonstrations

Case studies were prepared on specific topics in the different target regions to assess and demonstrate farm modification requirements. The studies explored options for the types of advice required by farming businesses and policy makers. Crop cultivation and sustainable water management were investigated in the case studies which also covered issues related to storm or

flood protection, as well as addressing drought and desertification risks or impacts.



T. HUDSON

ADAGIO outputs

Cooperation between the ADAGIO partners led to a series of conclusions about the main anticipated impacts that farmers from the three project areas will have to face in the future. A selection of these conclusions is noted below.

Central Europe predictions

The main arable crop production regions will be affected by increasing drought conditions and water shortage during the summer period, leading to increased demand of water for irrigation. Permanent grasslands (in combination with dairy farming) in regions experiencing annual precipitation levels below 800mm are most vulnerable to warmer temperatures. These areas comprise relatively large regions in Central Europe. Worst affected locations will be those where a change to crop production or other alternatives is difficult due to terrain or soil conditions.

Expected Mediterranean effects

Variability in yields is expected as heat wave frequencies increase and intensify. Profitability impacts are predicted to be downbeat and increases risks of land abandonment. Negative effects are expected from new and changing occurrences of pests and diseases. Improved water management will be a high priority.

Eastern Europe impacts

Eastern European agriculture is considered to be vulnerable to more regular extreme weather events such as drought, dry winds, wet spells, intensive precipitation, frosts, heat and cold waves. Erosion and salinisation of soils, decrease of crop growing periods and occurrence of new pests and disease are also forecast. Structural problem in Eastern agriculture (lower productivity levels, limited skills, small farm sizes) will exacerbate the impacts of climate change on rural economies.

Following confirmation of the regional issues, ADGIO's team began work on preparing a dissemination strategy to address the knowledge gaps among rural stakeholders. Printed materials were produced, such as a book that has been published for the project's German speaking stakeholders from central Europe. The guidance manual sets out a selection of climate adaptation scenarios and explains appropriate response options using a non-scientific and layperson point of view.

An international symposium was also organised to help increase the transfer of ADAGIO results and discuss these in light of findings from other research activities exploring opportunities to help European agriculture adapt to changing climatic conditions. The event brought together agricultural climate change experts from around 20 countries in the European and Mediterranean area.

Topics featured and discussed during the symposium covered a broad mixture of different practical adaptation actions and related research projects. Table 1 opposite highlights a sample of the symposium's varied and interesting subject matter.





Table 1. Selection of presentations from the Symposium in June 2009 (Austria)

Austrian climate change impacts and adaptation options for agriculture in complex terrain and small scale agricultural systems
Novel approaches for assessing risks to rain-fed agriculture in the Czech Republic
Climate change vulnerability and adaptation responses for herbaceous crops in Southern Italy
Agricultural drought monitoring systems in Poland
Using modern sensor technology to improve water usage efficiency – and the 10 most common mistakes made
Reducing infiltration rates in Slovakian rigid soils following aridisation
Farm level vulnerability of the cereal production in the Central Europe – consequences, uncertainties and adaptation options
Adaptation of crop management practice to climate change in Russia
Climate change and adaptation options in Irish agriculture
Adaptation of paddy rice to different scenarios using a climate change impact model in north-western Turkey
Adaptation to diseases, pests and weeds caused by climatic changes in Serbia

These and other presentations are available on the project website (www.adagio-eu.org), which provided an important networking platform during the research project and includes links to all of the ADAGIO partners, who remain committed to continue exchanging their experiences in this ever-important field of rural research studies.

The final report is available at www.boku.ac.at/imp/agromet/ADAGIO_ScReport_1.pdf





CLIVAGRI: improving knowledge about the impacts of climate change on European agriculture

Europe's agricultural stakeholders are benefiting from information, advice and support on the possible impacts of climate change in agricultural areas gained through a pan European rural research project

EU agriculture remains highly exposed to climate change, since farming activities directly depend on climatic conditions. Agriculture is also known to both produce greenhouse gases and provide useful solutions to climate change challenges. A large number of different European research projects are targeting these issues and the COST initiative (an intergovernmental framework funding COoperation in Science and Technology) has brought together scientists and researchers from across Europe in a cooperation project involving the transfer and improvement of knowledge about the relationships between agriculture and climate change.

Titled CLIVAGRI (CLImate Variability on European AGRiculture) the project started networking Europe's rural research bodies in 2006 and includes participants from 29 countries. Its management

committee is chaired by the Department of Agronomy and Land Management at Italy's Universita di Firenze, which oversees the implementation of an integrated package of cooperation and research actions.

Growing evidence

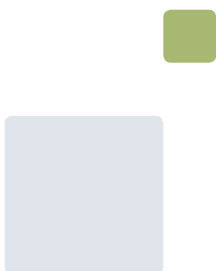
CLIVAGRI recognises the increasing body of evidence which illustrates that climate change has begun to transform agricultural systems. Examples of such changes were noted in the previous article and include the lengthening of the growing season, latitudinal shifts of plant range, earlier flowering, outbreak of plant diseases, and reduced soil water content. Drought, floods and heat waves are all also now more common place hazards for EU farmers to cope with.

Considering this challenge, it's clear that agricultural stakeholders have to adapt their planning of short and long term strategies in areas such as watering, fertilisation, plant breeding, site selection, etc. Moreover, European agriculture is oriented towards sophisticated farming techniques and the production of high quality food and is therefore highly susceptible to meteorological hazards.

Consequently, significant demand exists for more evidence on the impact of climate change and the options for agricultural adaptation. Hence, there is a need to integrate the existing knowledge available at European level concerning the evaluation of climate change and analysis of the impact of climatic hazards on agriculture. Indeed, extensive investigations have been performed to analyse this topic but a wide variation in the results and uncertainty in the quality



of future climate scenarios have made it difficult to surmise definitive conclusions. CLIVAGRI is therefore currently aiming to fill these gaps by integrating European activities in this field and providing a reliable and consistent set of definitions for current and future climate trends.



CLIVAGRI Research themes

The focus of CLIVAGRI is to target four key areas which are each addressed by a Working Group.

Working Group 1 is focusing on reviewing agroclimatic indices and simulation models. These aim to assess the effect of climate impacts on specific crops which are undergoing certain processes such as growth or disease.

Working Group 2 is conducting an evaluation of the agroclimatic indices and simulation models. By using statistical analysis, the data will be assessed to precisely separate the climate change effect from other sources of variability. This will provide a better picture of climate trends and determine the frequency of climatic hazards.

Working Group 3 is looking at developing and assessing the future regional scenarios of agroclimatic conditions in order to obtain a description of future change in climatic and hazard impacts.

Working Group 4 is seeking to provide risk assessments and foreseen impacts on agriculture. Evaluations of hazard levels for agriculture and consequences for natural resources are being carried out which are being fed into risk assessments and support to stakeholders.

Research activities

The key research output to date has been the production of a major report focusing on a 'Survey of Agrometeorological Practices and Applications in Europe Regarding Climate Change Impacts'. The results presented in the report were supported by responses to a questionnaire from 29 European countries.

One of the most important features of this work, which was carried out under Working Group 1, was the review of agro-climatic indices and models. These can be used to evaluate crop responses to climate change and variability by assessing crop varieties against multiple hazard conditions such as drought, flood and frost. Their application can provide

strong indicators for climate change and can also provide stakeholders with information to plan agricultural activity.

A significant issue identified so far is that there seems to be a strong need for more standardisation of data and indicators in order to improve the usefulness of comparative results. Moreover, there needs to be a greater emphasis on describing the consequences of hazard data and the interventions required to protect agricultural activities, as well as finding ways of making relevant local recommendations that can be provided to farmers.

In tandem with this, Working Group 4, has reinforced the research which identifies

the variability of climate change within environmental regions and the differing impact this has on various crops. For example, in the case of Winter wheat, the crop is expected to face increase risk of drought and heat stress across Europe, apart from mountainous Mediterranean areas; increase in risk of plant pathogens and pests in northern and central Europe; and higher risk of soil erosion and nitrogen leaching in regions expecting higher rainfalls such as the Atlantic North.

In the case of spring barley, the crop faces a pronounced risk from hail in South Eastern Europe; increased risks from weeds across Europe, apart from parts of Scandinavia and North Eastern Europe; and increased risk of heat stress



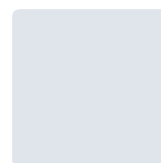
Disseminating results

across Europe, but is most vulnerable to this risk in cooler regions.

Chairman of the CLIVAGRI research partnership, Dr Simone Orlandini, notes that “the European agricultural industry is already aware of the changing climate” and is “introducing adaptations in order to mitigate negative consequences and to take advantage of new climatic conditions”. This has included preparing ground for olive production in more northern areas, or introducing early ripening fruit trees that have lower water consumption, and breeding crop varieties that are better adapted to more difficult environments.

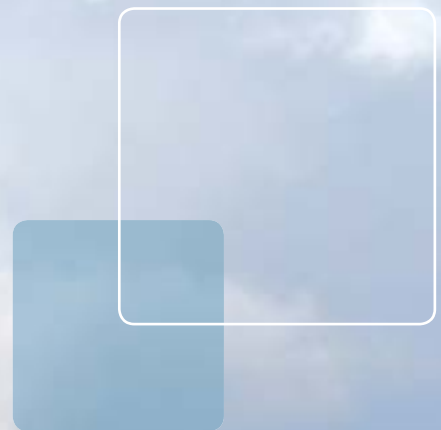
The research activities of CLIVAGRI have been well received by policy makers, stakeholders and the agricultural industry. This has included project results being presented during the World Climate Congress and COP 15 Climate Change Summit in Copenhagen. Europe’s insurance sector has shown interest in the results which will help inform risk assessment calculations regarding farm insurance fees.

CLIVAGRI will continue its work on developing climate change guidelines for agricultural stakeholders up until November 2010. More information about the project outcomes to date is available at www.cost734.eu, including the report of Agrometeorological Practices and Applications in Europe Regarding Climate Change Impacts.



Measuring climate change actions: the Evaluation Expert Network perspective

The European Evaluation Network for Rural Development (commonly known as Evaluation Expert Network) brings together experts from across Europe to establish capacity and good practice in evaluation of the 2007-13 Rural Development Programmes (RDPs). We asked them to explain why it is so important to monitor and assess how RDPs are helping to meet the new challenge of climate change.



More than ever before, the current RDPs are built around a hierarchy of objectives linked to specific intervention measures (or actions) adapted to local needs. Evaluation, which is an important part of the overall implementation of RDPs, has three roles. Firstly, it provides feedback to a range of stakeholders to help improve performance on the ground; secondly, it shows the authorities funding the programme (and taxpayers) how their money is being used to help rural areas deal with a range of issues including climate change; and finally, it assesses how well these objectives have been achieved.

For the 2007-2013 programming period, the requirements for evaluation have been reinforced, and the Common Monitoring and Evaluation Framework (CMEF) has been established. The CMEF requires Member States to assess the impacts of their RDPs during two main evaluation events - mid-term evaluation in 2010 and ex post evaluation in 2015. In order to better prepare for these main evaluation events, a system of ongoing evaluation has been set up, i.e. a range of evaluation and evaluation-related activities should be carried out by Member States over the entire programming period to improve programme management and effectiveness. This includes also the interaction between evaluation and monitoring activities and ensuring adequate capacity building.

The backbone of the CMEF is the so-called intervention logic of RDPs, linking inputs, outputs, results and impacts and relating these to the programme objectives. Within this logic, impacts represent the final link of the chain which starts with the input (intervention), producing an output whose use by the beneficiaries brings forth results, which in turn contribute to the impact.

Seven common impact indicators are included in the CMEF, and these reflect objectives established by the European Council and the Strategic Guidelines for rural development; one of these indicators relates to climate change.

'Contribution to combating climate change' (i.e. impact indicator 7) is measured by the increase in production of renewable energy, expressed in ktoe (kilotonnes of oil equivalent). It relates to net greenhouse gas (GHG) emissions reduction attributable to the substitution of fossil fuels by non fossil alternatives, such as dedicated bioenergy crops, short rotation coppice, afforestation, residues or biowaste (e.g. straw, greentops, manure), wind and hydropower capacity.

In practice it is the quantitative and qualitative change in the production of renewable energy that can be attributed to the RDP. The assessment is firstly done by the programme evaluator at the level of the beneficiaries, using output, result and other relevant data and information. Adjustments to these findings should then be made to account for what would have happened if the specific RDP measures were not available (the so-called 'counterfactual situation'). Based upon this the evaluator estimates the overall contribution of the specific RDP measures at programme area level.

However, the interpretation of this indicator as the RDP contribution to combating climate change is limited. It doesn't take into account other ways the RDP can impact on climate change. In some cases the production of renewable energy represents only a small proportion of a farm's net GHG emissions. For instance, this indicator is not suited to capture the mitigation of methane and nitrous oxide from other programme measures. Examples include RDP-induced reductions in N-fertiliser application, improvements in manure management and changes in cultivation practices. Carbon dioxide equivalent (CO₂e) is a more comprehensive indicator for capturing these impacts, along with the changes in the resilience of farms and their ability to adapt to climate change. This is the broader interpretation of policy impact likely to be made by Member States, along with aspects relating to displacement of food production.

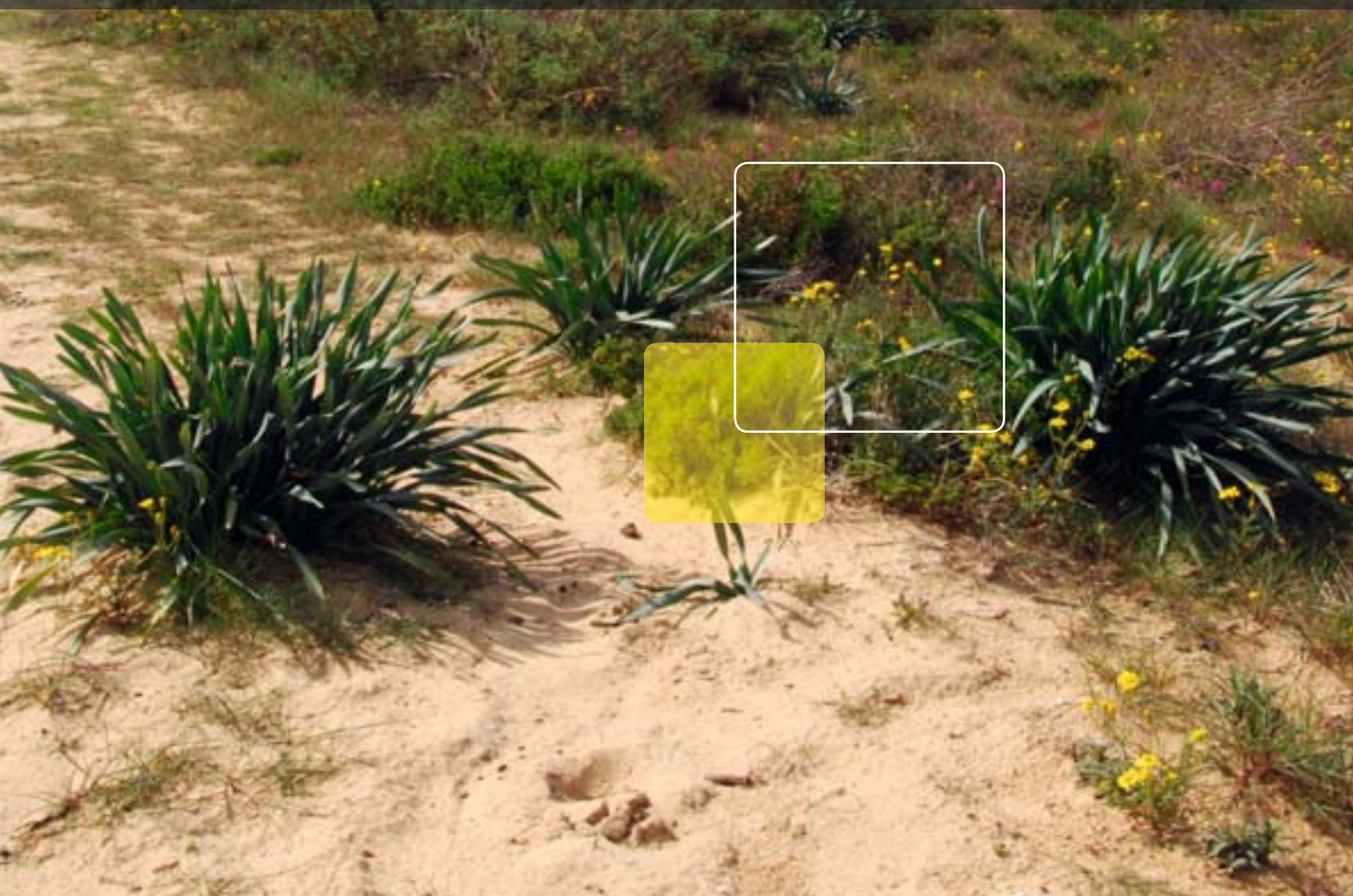
It should also be noted that the outcomes of climate change need to be considered together with water

quality and HNV indicators to derive a net picture of combined impacts. Thus, targeting nitrogen in pursuit of water quality has inevitable impacts in terms of simultaneous reductions in atmospheric emissions and vice versa. Similarly, increased biomass and biofuel cropping will have implications for water demand, biodiversity outcomes and potentially food security. However, this information does not yet fully reflect all impacts of RDP interventions in terms of combating climate change. In order to assess impacts at programme level, all measures from axes 1, 2 and 3 have to be considered.

Consideration of all this and more concerning the assessment of impacts of RDPs to combating climate change can be found in the 'Working Paper on the Assessment of Impacts of Rural Development Programmes in the context of multiple intervening factors'. This has been developed by a Thematic Working Group of the Evaluation Expert Network. It provides methodological support for quantifying the seven common impact indicators, proposes solutions how to overcome their limitations and how to close the gap between the establishment and quantification of indicators and the assessment of impacts at programme level. The Working Paper and other documents providing support on evaluation-related issues to the Member States, also in the context of the mid-term evaluation, are available on the website of the Evaluation Expert Network: http://ec.europa.eu/agriculture/rurdev/eval/network/whatwedo_en.htm

EU neighbours:

rural climate change actions from the Ukraine, North Africa and Iceland



Some of the European Union's neighbour states are actively involved in addressing climate change issues and mutual benefits can be gained from sharing this experience between rural development stakeholders.

Knowledge transfer can be used as an effective development tool for tackling climate change impacts in rural areas. The EU can learn useful lessons from Europe's neighbouring countries and regions. If southern EU Member States are to cope with desertification, for example, their authorities can look for guidance to the countries of the Maghreb. Managing environmental challenges can also benefit from cross-border cooperation, for example to manage flood risks on a river-basin level.

Rural areas in the EU can therefore help build their own resilience to climate changes by studying the outcomes of projects that have taken place in neighbouring countries. Many of these projects have been supported with EU financial assistance, such as the projects 'Improving Cross-Border Cooperation in Integrated Management of Water Resources in the Lower Danube Euroregion', and the establishment of the 'Euro-Mediterranean Clearing House for the Environment'. Both projects are two useful examples of trailblazing initiatives dealing with the EU's neighbourhood that could have useful lessons for EU rural regions.

But climate change will not just require rural areas to better protect themselves against threats such as flooding and desertification. Climate change also implies a shift in economic priorities, and this may offer benefits to some rural areas. This shift has already been seen in the EU's Common Agricultural Policy, which has moved away from subsidising production (even unwanted production) and towards subsidising good stewardship of the land and conservation. Other changes in rural areas may in the future be a drive towards more afforestation and reforestation, with landowners possibly earning carbon credits for trees planted, or use of rock formations to store carbon dioxide, thus preventing its emission into the air. A project in Iceland, CarbFix, is showing how this might be done.

Cross border cooperation increases flow of water management action

The project 'Improving cross-border cooperation in integrated management of water resources in the Lower Danube Euroregion' ran from mid-2007 to mid-2009 and concerned cooperation between Romania and Ukraine over the

management of the Danube river basin. Nearly 90% funded by the European Neighbourhood and Partnership Instrument, the project's objective was to build water management capacity and to develop a modern cross-border emergency-planning and flood-warning system – a goal requiring the building of trust and the willingness to share information on both sides of the border.

Igor Studennikov, Executive Director of Ukraine's Centre for Regional Studies (CRS), which led the project, says the focus was on the Ukrainian part of the Danube river basin. The project led to the creation of a number of management plans and cooperation structures, including, in Ukraine, the Danube River Basin Management Department and the Danube River Basin Council. This should mean Ukraine is better-equipped to deal with climate change. "The impacts of climate change on water resources have been taken into consideration when drafting the Management Plan for the Ukrainian part of the Danube delta sub-basin. We plan to increase this component in the future," Studennikov says.

Flood risk was more specifically considered in an earlier, EU-assisted, project carried out by the CRS. This project, 'Emergency Planning and Flood Protection in the Lower Danube EuroRegion' (2005-06) resulted in risk planning that emphasised wetland flood storage capacity use as a method for flood risk management in the area. Studennikov says that it was recognised that simply building dykes or barriers against flooding was not enough in the face of climate change. "Wetland restoration is seen as one of the methods for the mitigation of possible consequences of disastrous floods in the Ukrainian part of the Danube floodplain," he says.

Lessons such as this can be applied to other areas, potentially preventing the kind of damage to properties, farms and other rural businesses that has been on the increase as storms and flash floods become more intense, more frequent and less predictable around Europe. The CRS hopes to carry out further projects involving other parts of Ukraine and Moldova. Further projects would "give good opportunities for sharing the experience achieved while implementing the [initial] project," Studennikov says.

Further information

Improving cross-border cooperation in integrated management of water resources in the Lower Danube Euroregion project:
<http://crs.org.ua/en/projects/current/49.html>

Desertification information exchange

If rural areas in Europe are to understand the processes of desertification, and the best responses to them, it is vital to have access to good information. Many projects relating to desertification have been carried out but, says Tea Törnroos, coordinator of the 'Euro-Mediterranean Clearing House for the Environment project', information can be scattered and thus hard to find.

To overcome this, the EU funded through the Short and Medium-term Priority Environmental Action Programme (SMAP) a web portal giving access to a wealth of information on environmental issues in the Mediterranean region, including desertification. The objective was to have "one place where you could have

information that is pre-selected and sorted and classified," according to Törnroos.

The result is a valuable tool for decision-makers and other professionals in rural areas that face desertification and other environmental challenges. For example, the portal provides access to drought-management guidelines that have been applied in Mediterranean countries such as Morocco, Spain and Tunisia. The creation of these guidelines was partially funded by the European Commission's EuropeAid Co-operation Office under the MEDA Water programme, which ran from 2002-08, an example of cross-border cooperation involving EU and non-EU countries. Törnroos emphasises that a great deal of other information is also available through the portal, not just on EU-funded projects, but also on projects supported by national and regional authorities. Italy in particular has worked extensively on the issue of desertification, recognising it as a "crucial problem for the region," Törnroos says.

Further information

Euro-Mediterranean Clearing House for the Environment:
<http://smap.ew.eea.europa.eu/>



Carbon quick fix

CarbFix is a pioneering project in Iceland, looking into the mineralogical storage of carbon dioxide – a technology that could one day provide useful economic opportunities for rural areas, while helping mitigate climate change.

The technology works by dissolving carbon dioxide in water and injecting it into basalt rock. The injected liquid reacts with the calcium in basalt and forms calcite, a stable mineral, thus locking in the carbon dioxide potentially for thousands of years. The project manager is Hólmfríður Sigurðardóttir of Orkuveita Reykjavíkur, a utility company providing power from geothermal energy. She says CarbFix is starting small, with a limited test injection of carbon dioxide planned for early 2010. The basalt into which the carbon dioxide is injected will then be monitored to establish the stability of the calcite. The goal, however, is to develop “a practical and cost effective technology” to help fight climate change.

The research is being conducted at a geothermal energy plant in Iceland. As Iceland has great geothermal energy potential, CarbFix, if successful, could go

some way to making the country carbon neutral, as mineralogical storage may give “the option to store the main part of Iceland’s CO₂ emission in a safe way,” Sigurðardóttir says.

Success could also set the scene for export of the technology, in particular to rural areas with basalt bedrock far away from population centres. While Iceland is 90% basalt, there are many other areas where the technique could be used. In the EU, for example, the Giant’s Causeway in Northern Ireland, a coastal area of interlocking hexagonal columns, is one of the world’s most famous basalt formations. The CarbFix website notes that “most continents are surrounded by massive basalt formations

(oceanic crust), just offshore, providing local carbon dioxide storage sites easily accessible for many countries,” and that similar experiments to CarbFix are being carried out in the north-western United States. However, Sigurðardóttir cautions that mineralogical storage alone “will not save the world’s climate.” The EU has expressed interest in the project by funding through the Marie Curie grant scheme graduate researchers who participate in the project.

Further information

CarbFix: <http://www.or.is/CarbFix/>



HÓLMFRÍÐUR SIGURÐARDÓTTIR



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The European Network for Rural Development (EN RD) contributes to the efficient implementation of Rural Development Programmes throughout the European Union (EU). Each Member State has established a National Rural Network (NRR) which brings together the organisations and administrators involved in rural development. At EU level, the European Network for Rural Development ensures the networking of these national networks, organisations and administrators. [Read more about the EN RD](#)

EN RD news

15 April 2010: EN RD Seminar on Semi-Subsistence Farming in Iltia, Romania has been postponed
The planned seminar on Semi-Subsistence Farming has been postponed due to an travel disruption caused by volcanic ash. [Read more](#)

14 April 2010: CAP Public Debate Post 2013
An extraordinary meeting of the EN RD Coordination committee was held at which the members of the committee were invited to launch the public debate on the CAP after 2013 in their own country/region. [Read more](#)

25 to 26 March 2010: NIN Forum, Rome, Italy
The latest meeting of the National Rural Networks was hosted by the Italian National Rural Network in Rome, covering a wide range of thematic topics. A report from the forum will be available shortly.

05 March 2010: Transnational Cooperation Guide (TNC)
The first edition of an EN RD TNC Guide was launched including details of Member States procedures on Cooperation. [Read more](#)

25 February 2010: Launch of EN RD Thematic Working Group 1
The Commission launched a new initiative to analyse current Rural Development Programme Delivery Mechanisms. [Read more](#)

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Please note that this web site is only available in English for the moment. Other language versions will be available in the near future.

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