Agriculture, forestry and climate change globally

Despite lots of efforts during the last 20 years from local to international levels, global CO2 concentration has increased in the atmosphere by 35% since 1990, and is still growing. Now we came to the point when, if the CO2 level could be fixed within five years, climate change would still unfold in the coming decades with approximately 2 degrees Celsius warming according to pre-industrial level. This is underpinned by recent assessments, stating that we are very close to approaching 450 ppm concentration of CO2 equivalents (including all greenhouse gases), which is corresponding to two degrees warming according to IPCC. Two degrees is considered to be a threshold, above which climate change very likely turns uncontrollable.

Therefore, it is essential not only that climate change commitments are intensified globally, but also that adaptation measures are implemented. In this direction, land use management is a decisive factor. Most of the world’s land is either covered by forests or used for agriculture. In 2011, agricultural land spread over 35% of world’s total surface, while forests covered 26.8% (FAO, 2012). Soils are active carbon sinks with significant uptake and long-term storage of carbon. On the other hand, land use changes such as intensification of agriculture or converting grasslands into plough lands often turn them into carbon sources, releasing huge amount of carbon into the atmosphere. The time scales of the source and sink function of soils are fundamentally different: whereas building up carbon sources, soils turn into carbon sinks, releasing huge amount of carbon into the atmosphere. The time scales of the source and sink function of soils are fundamentally different: whereas building up carbon sources, soils turn into carbon sinks, releasing huge amount of carbon into the atmosphere.

The soil factor in the EU

The amount of carbon stored in European soils is 15 times as much as Europe’s annual GHG emission. It is also 2.5 times bigger than the carbon stored in aboveground biomass, and 7 times bigger than what is stored in oil and gas fields in Europe. Peat lands are especially important, considering that together with permafrost they store 50% of soil carbon globally, in spite of their relatively small cover of 16% of terrestrial land (European Commission, 2008). Restored peat lands act as climate coolers for the first period of intensive growth. But due to land use change and warming climate, peat lands are also potentially the most significant terrestrial GHG emitters besides tropical deforestation.

Currently, soils throughout the EU are facing severe erosion and consequently there is a risk of European soils turning from carbon sinks to carbon sources. In many parts of Europe soils are threatened by urban sprawl, land sealing and intensification of land use, erosion and degradation of ecosystem services. Soil quality is decreasing due to salinization, compaction and contamination, decrease of soil organic matter and loss of soil structure. These can result in losing carbon capture and storage capacity of the soil or even in emission of huge amounts of soil C to the atmosphere (JRC, 2008).

Climate change in the EU

The key role of forests in climate change mitigation and adaptation is widely known. They act as the biggest carbon stores above ground, absorbing greenhouse gases and preventing their release into the atmosphere. Estimates place carbon sequestration from world’s forests between 3,300 MtCO2/yr (IPCC, 2007) and 11,670 MtCO2/yr (IPCC, 2001). Nevertheless, world’s forests decreased by 8.9% between 1990-2000 and by 7.3% between 2000-2005, with a 12.9 million ha/year deforestation rate for the latter period (FAO, 2006). Deforestation was mainly due to conversion of forests into agricultural land, but also as a result of expansion of settlements, infrastructure and unsustainable logging practices (MEA, 2005). Maintaining healthy, well managed forests are essential not only in tropical countries but all around the world: besides storing carbon, they are home to thousands of species, and protect soils and watersheds from erosion.
Agriculture and Forestry in the context of climate change in the EU

Agriculture is one of the most exposed sectors due to its dependence on weather conditions. This affects everyone in Europe as farmland, woods and forests cover approximately 90% of the EU’s land surface. Climatic variability year-by-year is one of the main causes of variability in crop yields and the inherent risks of farming. Farming is thus in the front line of the battle against climate change impacts (see Fig.2). It is worth mentioning that in terms of GHG emissions, EU’s agriculture contributes with only 8% and its influence is diminishing (EU Commission, 2008). Total EU agricultural emissions actually fell by 20% in the period 1990–2005, largely due to changed farming techniques such as reduced use of nitrogen fertilisers, and fewer livestock. This compares to a global increase in farming emissions of nearly 17%. The reduction of farming emissions is considerably higher than the overall reduction in emissions in all EU sectors of about 8% (EU Commission, 2008). Moreover, for better protection of European soils, the European Commission has adopted the Soil Thematic Strategy in 2006, establishing a 10-year work programme of the EC. It proposes for a Framework Directive for protecting soils across the EU. However, political agreement has not been reached on the Directive since 2006, due to the opposition of a number of Member States. Most of the concerns come from the agricultural sector and the Ministries of Finance, and the arguments against the Directive often refer to the principle of subsidiarity, considering soil protection to be primarily a local agenda issue.

Having released their Communication in 12 March 2012, the European Commission has put forward a new proposal on accounting of greenhouse gases emissions from forests and agriculture, a regulation essential for incorporating removals and emissions of these sectors into achieving the EU’s climate commitment. The European Commission has also released a reform plan for the Common Agricultural Policy (CAP), which should be greener from 2014 onwards. Some of the measures included a 90% of the direct payments from Pillar I to farmers for green measures, crop diversification, support for organic farmers, existence of a so-called Ecological Focus Area for farms larger than 10ha and more co-financing for optional greening measures for farmers. These are all a step forward in making agriculture more resilient in the face of increased climate changes and contribute at the same time to climate change mitigation by ensuring soils keep their role of carbon sinks and reducing GHGs emissions from agriculture.

An additional EU Strategy designed to combat climate change is the REDD++, an initiative of the UNFCC on ‘reducing emissions from deforestation and forest degradation, conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks’ (EU Commission, 2012). Specific objectives at EU level are targeted at:

- Slowing, halting and sustainably reversing global forest cover and carbon loss (including the enhancement of forest carbon stocks), in order to achieve long-lasting and credible GHG emission reductions, consistent with the agreed objective of keeping global warming below 2°C compared to the pre-industrial temperature;
- Preserving and enhancing other benefits of forests such as poverty alleviation, biodiversity, restoration and resilience of forests ecosystems and the services they provide, recognizing the linkages between adaptation and mitigation, in line with international commitments and objectives;
- Enabling broad participation of developing countries, resulting in wide coverage of forests to prevent international displacement of carbon emissions;
- Anticipating and encouraging further movement towards sustainable land use and resource consumption patterns as a basis for food, water and energy security, raw material supply and rural income in the context of low emission development strategies. (EU Commission, 2012)

What are the solutions CEEweb advocates for?

CEEweb for Biodiversity highly welcomes the EC’s new proposal and aims to advocate for the adoption of EU-wide rules for LULUCF accounting in the further discussions at the European Parliament, the Council as well as national governments. However, in our view the EU urgently needs to go one step further, namely towards the adoption of forestry and agriculture-specific targets at EU level, in order to reverse current unfavourable trends. These targets need to be supported by a holistic environmental policy and a new, more sustainable socioeconomic framework involving various sectors on board, such as spatial planning, land use, agriculture, forestry and water management as well. Integrated solutions applying the ecosystem-approach are inevitable in agriculture and forestry. Convergence of interests between soil conservation, climate change mitigation and adaptation, water management, food production, disaster mitigation and biodiversity conservation needs to be found.

Agriculture

Sustainable agricultural techniques enhance soil organic carbon content, increase carbon sequestration, water and nutrient retention and decrease the risk of erosion, therefore contribute to climate change mitigation and adaptation as well as to long-term food security. Therefore, the future Common Agricultural Policy needs to mainstream sustainable techniques through rewarding them via its first pillar payments. The resilience and adaptation capacity of forests against climate change largely depends on their natural dynamics as well as biological (i.e. diversity of micro-habitats, species and genetic variables within species) and structural diversity (i.e. age distribution of trees as well as mosaic structures with large trees, openings, young groups, deadwood and in certain habitat types, patches of grasslands and wetlands). Therefore, similarly to agricultural subsidies, sustainable forestry needs to be mainstreamed and widely supported by the future CAP.

Recommended measures for Agriculture:

- diversify agricultural landscapes aiming for a mosaic-like landscape, where cultivated lands alter with grazing lands and semi-natural habitats (e.g. forest patches, hedgerows, grassland stripes)
- diversify agricultural system in terms of spatial structure as well as species and breeds of crops and animals
- prefer locally adapted breeds in order to enhance crop diversity at regional scale, and also due to the fact that traditional local breeds have relatively high genetic diversity, which is a key factor for agricultural resilience
- apply techniques which enhance the soil’s natural productive capacity through increasing its SOC (examples for such techniques: integrating crop residues into the soil, reduced tillage, cover crops and crop rotation, mixed cultures, smaller field size with fields edges and hedgerows, and diversity of management)

Recommended measures for Forestry:

- avoid emission of carbon stored by European old-growth, close-to-nature forests by maintaining their natural status
- in protected areas and in special environments (e.g. riparian forests, dry forests), widely introduce non-intervention management
- in case of managed forests, support sustainable forest management systems (e.g. shelterwood) enabling natural processes and strengthening the forests’ natural resilience and adaptation capacity as well as enhancing the biological and structural diversity of forests
- in forest management plans, put a special emphasis on sufficient amount of deadwood
- protect micro-habitats in forests with a special emphasis on wetlands, since they have an important role in buffering extreme hydrological events, retaining water in periods of excessive precipitation and gradually releasing it in periods of water scarcity, thus effectively working against both floods and droughts at landscape level
- protect forest soils, as important but sometimes underestimated contributors of forest carbon storage
- in case a shift in tree composition can be expected due to climate change in the EU context of climate change in the EU

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