Agrinatura and Climate Change

Agrinatura is fully committed to contributing to the achievement of the Sustainable Development Goals and recognises the urgency of combating climate change and its impacts (Goal 13). These impacts are becoming increasingly evident in agricultural systems and vulnerable groups and communities are the most severely affected. Furthermore, agriculture itself is contributing to the problem through the release of greenhouse gases and more sustainable ways of growing food are needed to minimise its ecological footprint.

Member organisations of Agrinatura have prioritised climate change in their own research and teaching programmes and many have designated climate change units. These units draw on the expertise of scientists from a wide range of disciplines as there is a growing realisation that inter-disciplinary approaches are needed to understand and respond to the complex issues associated with climate change. Member organisations also work together in a range of research platforms, projects and teaching programmes. They also have strong partnerships with agricultural research and development organisations outside Europe, especially in developing countries where are work is focussed. The large and diverse nature of our membership enables us to lead or contribute to climate change initiatives across all continents, although the bulk of our work is conducted in Africa and Asia.

We specialise in bringing knowledge-based solutions to global challenges such as climate change. One example of this is the involvement of several Agrinatura members in initiatives to support the development of Climate Smart Agriculture (CSA) initiatives. There is an increasing emphasis in our work on the importance of integrating agroecological approaches into CSA policy and practice as interventions need to be sustainable in the longer term.

There are potential synergies and trade-offs in in addressing climate change issues; for example, with other environmental issues such as biodiversity and desertification which strongly influence agricultural development. With this is mind Agrinatura promotes the use of integrated assessment models to study complex interactions that affect agricultural systems and to assess the likely outcomes of specific policy measures and practical interventions.

We work in close association with national governments in Europe and support our international partners to influence policy processes in their countries. Agrinatura members are making important contributions to the global dialogue on climate change through representation on scientific and advisory panels such as the Inter-governmental Panel on Climate Change. They participate in key events such as the annual United Nations Conference of the Parties on Climate Change and convene international meetings at which the latest scientific findings are presented. One such event, held in Montpellier in 2015, led to the influential Montpellier Statement on Climate Smart Agriculture: Towards Sustainable Landscapes and Food Systems.

Finally, Agrinatura has a large number of highly skilled specialists in a wide range of climate-related disciplines who are available to contribute to research, training and teaching activities. We have a large body of knowledge resources and offer research and consultancy services and policy analysis and advice.

- ***Climate modelling, scenario development and vulnerability mapping***
    - Basic research in atmospheric science to enhance understanding of environmental change processes and how these influence natural and managed systems, including

agriculture, forestry and fisheries. Examples of research centres engaged in this work are:

National University of Ireland: Centre for Climate and Air Pollution Studies (C-CAPS) http://www.nuigalway.ie/c-caps/ Contact: Prof. Colin O'Dowd (colin.odowd@nuigalway.ie)
University of Helsinki: Centre of Excellence in Atmospheric Science https://www.atm.helsinki.fi/FCoE/ Contact: Prof. Markku Kulmala (Markku.Kulmala@helsinki.fi)
University of Copenhagen: Centre for Ice and Climate, Niels Bohr Institute http://www.iceandclimate.nbi.ku.dk/research/climatechange/ Contact: Susanne Munk Andersen susanne.andersen@nbi.ku.dk

Project: Drivers and projections of global fire activity and intensity under future climate and societal changes (HESFIRE) Research to improve our understanding of fire drivers through innovative observation data assimilation methods. Deployment of this knowledge in multi-disciplinary settings to provide the first assessment of future fire regimes under economic, agricultural and climate scenarios. https://cordis.europa.eu/project/rcn/195867_en.html
ISA

- ***Increasing carbon storage and enhancing productivity through sustainable soil management***

    - *Investigating climate change impacts on soil structure and function and exploring ways to increase carbon storage*.

Examples of this include research on sustainable intensification of agriculture through agroforestry and the coordination of a multi-actor platform to encourage practical actions to enhance carbon storage.

Platform: "4 per 1000" initiative https://www.4p1000.org/ **CIRAD** 'An annual growth rate of 0.4% in the soil carbon stocks, or 4% per year, would halt the increase in the CO2 concentration in the atmosphere related to human activities.'

Project: Sustainable intensification of agriculture through agroforestry (SIGNAL) http://www.signal.uni-goettingen.de/ **University of Göttingen** Prof. Dr. Edzo Veldkampeveldka@gwdg.de

Product: HYDBOS – A guidance tool for utilization and protection of hydromorphic soils under changing climate conditions https://www.agrar.hu-berlin.de/en/institut-en/departments/dntw-en/bodenkstandortl/research/completed_research/hydbos
Humboldt University of Berlin (Note: Project ended in 2014)

    - *Assisting farmers to reduce soil losses and enhance productivity*.

Project: Fertile Grounds Initiative: a concerted action to improve soil fertility, increase yields and adapt to climate change. Ethiopia, Uganda, Burundi. Ends Dec 2018. **WUR**. http://www.fertilegroundsinitiative.com/

Project: Climate Smart Agriculture on Organic Soils (CAOS) – Research on how water management on semi-wet organic soils can buffer future climate risks for biomass

production while maintaining soil quality. **WUR**. https://www.wur.nl/en/Research-Results/kennisonline/CAOS.htm Jan van den Akker

- ***Optimising water allocation and management***

  Conducting research to assist planners to make informed choices about the allocation of water for agriculture and to increase water use efficiency in agricultural systems.

  Project: Water and Energy Security for Africa (WESA) provides support for the Institute of Water and Energy Sciences, including climate change (PAUWES) in Algeria which is one of the four hubs of the Pan African University. **University of Bonn**. Ends 31 Dec 2019. https://www.zef.de/projects/project-details.html?project=92&contact=1332&cHash=ae13a6abd786dce49e127df54f9cf240 Dr. Navneet Kumar nkumar@uni-bonn.de

  Project: Digital soil mapping for enhancing crop water productivity in the Zambezi river basin. **KV Leuven**. https://researchportal.be/en/project/digital-soil-mapping-enhancing-crop-water-productivity-zambezi-river-basin Stephane Dondeyne stefaan.dondeyne@kuleuven.be

- ***Crop response to climate stress; breeding varieties that tolerate drought, heat or flooding***

  Exploiting the natural variability in varieties, landraces and wild relatives of crop species to reduce the impact of abiotic stresses on crop performance.

  Project: Modcarbostress - looking at how crops respond to climate stresses, including enhanced CO2. https://www.faccejpi.com/Research-Themes-and-Achievements/Climate-Change-Adaptation/ERA-NET-Plus-on-Climate-Smart-Agriculture/MODCARBOSTRESS **Aarhus** Carl-Otto Ottosen coo@food.au.dk

  Project: Integrating plant microbiome to increase quality and water use efficiency of major crops in sub-Saharan Africa. https://www.slu.se/en/ew-news/2017/12/more-knowledge-on-microbiomes-will-increase-quality-of-crops-in-africa/ **SLU**. Salme Timmusk salme.timmusk@slu.se

  Network: Labex Agro Agronomie et Développement Durable – includes research on adaptation of plants to changing environmental conditions. http://www.agropolis-fondation.fr/fr/communaute-scientifique-de-montpellier/un-reseau-scientifique-de-premier-rang-mondial/labex-agro.html **Agropolis/SUPAGRO**.

- ***Managing pests and diseases of plants and animals (and people?)***

  Some pests and diseases are becoming more serious due to climate change either by exploiting changing conditions in areas where they have been present for a long time or by extending their geographical range. Climate change is also providing opportunities for invasive species to establish themselves in new areas.

Project: Whitefly control for African Smallholders http://www.cassavawhitefly.org/ **NRI** Prof. John Colvin j.colvin@greenwich.ac.uk
Research team: Characterization and Integrated Management of Biotic Risks team (CARABE) https://ur-aida.cirad.fr/en/research-teams/carabe/context-and-challenges **CIRAD** François-Régis Goebel carabe@cirad.fr

Publication: Özkan S et al. (2016) Challenges and priorities for modelling livestock health and pathogens in the context of climate change. Environmental Research 151(1):130–144.

- ***Livestock and fisheries***

Project: A comparative study of the link between land ownership and the capacity for climate change in three semi-arid regions in Kenya dominated by pastoralism. **SLU** Göran Bostedt, Department of Forest Economics goran.bostedt@slu.se

Project: Capacity building in lake quality monitoring and sustainable fisheries and research in lake functioning and productivity (CLEAT) **Aarhus** Peter Anton Stæhr pst@bios.au.dk

Project: The future of Mediterranean Livestock Farming Systems: Opportunity and efficiency of Crops – Livestock Integration (CLIMED) https://climed.cirad.fr/ **SUPAGRO**. Charles Henri-Moulin moulinch@supagro.inra.fr

Platform: Ecological intensification of livestock systems - The joint research unit 'Mediterranean and Tropical Livestock Systems' (UMR SELMET – CIRAD, INRA, Montpellier SupAgro) **Agropolis** https://umr-selmet.cirad.fr/ Alexandre Ickowicz dir-selmet@cirad.fr

- **Enhancing resilience for smallholder farmers**

Agrinatura seeks to identify ways to enhance the resilience of smallholder farmers through a range of possible interventions such as improved germplasm and cultivation practices for crops (see above). We also work with developing country partners to develop, test and promote risk management tools which help farmers to manage their risks.

Project: Farm Risk Management for Africa (FARMAF) Working with farmer organisations to enhance access by their members to risk management tools such as index insurance which compensates farmers for weather–related yield losses and simultaneously eases access to production finance. http://www.farmaf.org/en/ **Agrinatura** Dr Gideon Onumah g.onumah@gre.ac.uk

Project: Bridges the Gap for Innovations in Disaster Resilience (BRIGAID). Development of novel innovation strategies to reduce climate risks. http://brigaid.eu/ and http://www.isa.utl.pt/ceabn/projecto/2/86/brigaid-bridges-the-gap-for-innovations-in-disaster-resilience **ISA** (Francisco Castro Rego frego@isa.ulisboa.pt) **LEUVEN**

- **Gender impacts and gender-responsive approaches**

Agrinatura recognises that climate change can impact men and women in different ways and that……..

Research study for UNDP: Gender and Drylands Development: Empowering Women for Change http://www.undp.org/content/undp/en/home/librarypage/poverty-reduction/empowerment-of-dryland-women.html **NRI**. Lora Forsyth l.forsythe@gre.ac.uk

PhD study: Gender inclusion in climate change adaption policies and implications for adoption of climate smart agricultural practices in Uganda and Tanzania. **WUR** Mariola Acosta Frances.

- ***Capacity development***

Most Agrinatura members offer formal undergraduate and postgraduate teaching programmes and short courses on climate change topics. Agrinatura as an entity runs a Masters programme on Agriculture & Climate Change in association with 25 partner organisations in Africa, Asia and Latin America http://master-act.eu/

In addition, capacity development activities are built into many projects on climate change. Some members have developed games and novel learning approaches which are freely available; for example:

- The Climate and Society Game – A social simulation exercise for learning about climate change and social unrest **BOKU** http://www.boku.ac.at/news/newsitem/42633/

- Climate change Massive Open Online Course (MOOC) **University of Helsinki** https://www.helsinki.fi/en/news/society-economy/open-course-to-tackle-the-basics-of-climate-change

Project: Value Chain Development for Food Security in the Context of Climate Change. A contribution through strengthening capacity in higher education in Eastern Africa (ValueSec) (https://www.agrar.hu-berlin.de/en/institut-en/departments/daoe/gp-en/projects/valuesec/descript-en/descript-en **Humbolt University** Dr. Wolfgang Bokelmann (valuesec.agrar@hu-berlin.de) Ended in 2016. EDULINK II

- ***Influencing policy***

Policy brief: Eva Wollenberg, Bruce Morgan Campbell, Peter Holmgren, Frances Seymour, Lindiwe Sibanda, Joachim von Braun (2011) Actions needed to halt deforestation and promote climate smart agriculture. http://ccafs.cgiar.org/resources/reports-and-policy-briefs#PB

Integrating environment and climate change perspectives in Swedish international development cooperation. **SLU** Göran Ek, Division of Environmental Integration (goran.ek@slu.se)

IPCC lead authors and panellists: Professor John Morton (**NRI**) Development Anthropology j.f.morton@gre.ac.uk; Professor Jørgen Eivind Olesen (**SLU**), Agroecology – Climate and Water jeo@agro.au.dk; Professor Markku Kanninen (**Helsinki**) , Forest Science markku.kanninen@helsinki.fi

- ***Partnerships and platforms***

Agrinatura members engage in a multiplicity of partnerships and platforms to enable them to contribute more effectively to research and development activities on climate change and agriculture. Examples include:

Climate Change, Agriculture and Food Security (CCAFS) https://ccafs.cgiar.org/ **Aarhus**, **Bonn**, **Copenhagen**, **Cork**, **CIRAD**, **Galway**, **Helsinki**, **Hohenheim**, **Leuven**, **NRI**, **WUR**.

West African Science Service Center on Climate Change and Adapted Land Use (WASCAL). Research-focused Climate Service Center designed to develop effective adaptation and mitigation measures to climate change for West Africa. https://wascal-dataportal.org **ZEF** Dr. Christian Borgemeister (cb@uni-bonn.de)

Several Aginatura members are partners in the Climate Change, Agriculture and Food Security (CCAFS) and the Global Coalition on Climate Smart Agriculture (GACSA).

Joint Program Initiatives such as Modcarbostress (see above under 'Crop response to climate stress').