Sustaining Agricultural Change Through ecological engineering and Optimal use of natural resources

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BiodivERSa/FACCE-JPI joint call on “Promoting synergies and reducing trade-offs between food supply, biodiversity and ecosystem services”
Partners & Financiers

**Germany:**

**UFZ** - Helmholtz-Centre for Environmental Research
*(Josef Settele, Anja Schmidt et al.)*

**LfULG** - Saxon State Agency of Environment, Agriculture & Geology
*(Isabelle Besuch, Walter Schmidt et al.)*

**LMS** - Landratsamt Mittelsachsen
*(Kai Pönitz)*

**(BCE** - Butterfly Conservation Europe)
*(Sue Collins)*

**DLR** - Project Management Agency
Partners & Financiers

Bulgaria:

**AU** - Agricultural University Plovdiv
  (Tatyana Bileva, Julieta Arnaudova et al.)

**IBER-BAS** - Bulgarian Academy of Sciences Sofia
  (Vlada Peneva et al.)

**Pensoft**
  (Lyubomir Penev, Pavel Stoev)
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Romania:

**Sapientia** Hungarian University of Transylvania  
* (Tibor Hartel et al.)

**UBB - Babeș-Bolyai-University Cluj**  
* (Laszlo Rakosy, Cristina Craioveanu et al.)

**Fundăția ADEPT Transilvania**  
* (Razvan Popa, Nat Page et al.)
Partners & Financiers

Sweden:

**SLU** - Swedish University of Agricultural Sciences Uppsala  
*Erik Öckinger, Riccardo Bommarco et al.*

**Lund** University  
*Johanna Alkan Olsson, Juliana Dänhardt*
Partners & Financiers

Switzerland:

**WSL** - Swiss Federal Research Institute

*(Niklaus E. Zimmermann, Rafael Wüest et al.)*
Partners & Financiers

Spain:

**UAB** - Autonomous University of Barcelona

*(Beatriz Rodríguez-Labajos et al.)*
Overall objectives

• Quantifying sensitivity of EcoSystem Services (ESS) & Functions (ESF) to environmental pressures in representative agriculturally dominated landscapes in Europe

• Selection of a subset of ESF and ESS of particular relevance for the land use systems concerned
ESS/ESF considered

Based on the Millennium Ecosystem Assessment (MEA):

• **Provisioning Services (PS):** Primary production, Plant diversity, Crop yield, Nutrient status

• **Regulating Services (RS):** Invertebrate diversity & interactions, Biocontrol of crop pests, Crop pollination

• **Cultural Services (CS):** Aesthetics/Beauty, Recreation, Cultural Identity
Interlink these ESS with the most relevant pressures impacting upon them

1) land use intensity
2) biodiversity loss
3) climate change
4) inputs and outputs of the socio-economic system in which they are embedded

and with the changes of these pressures over time (i.e. the impacts of global change).
Study design

- landscapes shaped by annual crops and semi-natural grasslands
- 10 field sites / country
- along a gradient of 0 % to 20 % (semi-)natural habitats in surrounding landscape reflecting changing geo-climatic and land use intensity and socio-economic conditions
- 1 field site = 1 semi-natural grassland + 1 oilseed rape
Study design

Field Site
Study design

Field Site

Field Site
Study design

Field Site

Structural richness (semi-natural habitats)

0% 20%
Study design

Field Site

Semi-natural grassland

Crop field

Field Site

100-500m

Structural richness (semi-natural habitats)

0%

20%
Sites - Bulgaria

Parvomaj
Sites - Romania
Sites - Romania
Sites - Germany
Field work - data acquisition

- Butterfly diversity
- Butterfly parasitism
- Pollen beetle parasitism
- Adult pollen beetle abundance
- Carabidae (Ground beetles)
- Staphylinidae (Rove beetles) and spiders
- Grasshoppers
- Bees
- Plants
- Flower density

- Soil fauna
- Litter decomposition
- Soil chemistry
# Socio-ecological data collection

## Questionnaire

<table>
<thead>
<tr>
<th>Questions about the farmer (Categorical)</th>
<th>Farm size</th>
<th>Time of dedication to farming</th>
<th>Tenure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers’ perceptions on ... (Rating → Ordinal)</td>
<td>CES</td>
<td>Changings in the areas (including LUC)</td>
<td>Outcome of the change</td>
</tr>
<tr>
<td>Farming practices (Categorical, numerical)</td>
<td>Cropland</td>
<td>Grassland</td>
<td>Abandonment</td>
</tr>
<tr>
<td>- Period since land abandonment / reason</td>
<td>- Crop / yield / price (study year, previous year)</td>
<td>- Use of grassland</td>
<td>- Use of crops / use of residues</td>
</tr>
<tr>
<td></td>
<td>- Fertilised used / amount of fertiliser / cost</td>
<td>- Date of cutting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Pesticide used / type / dates of application / cost</td>
<td>- Grazing: period of grazing / type of livestock / number of animals</td>
<td></td>
</tr>
</tbody>
</table>
Stakeholders: agriculture related

• Farmers and their families
• Municipal administrative agents: agricultural officers, extension workers
• Crop production ‘chain agents’: middlemen and traders (e.g. in charge of drying, cleaning, milling and marketing)
• Crop production ‘input providers’: traders of seeds, fertilizers and pesticides
• Higher level administrators: provincial agricultural officers, agricultural administration
STACCATO - core approach(es)

- analyses based on **input** from and **exchange** with the relevant stakeholders
- consider different **land use** and **climate change scenarios** and their effects on environmental threats in the future
- results are to be implemented again in close collaboration with relevant stakeholder
- particular focus on **Ecological Engineering (EE)** as core mechanism of eco-functional intensification
STACCATO - work flow

WP 1 Multi-Stakeholder Analysis

WP 2 Provisioning Services

WP 3 Regulating Services

WP 4 Cultural Services

WP 5 Integration

WP 6 Implementation

WP 7 Dissemination & WP 8 Coordination
STACCATO - work flow

 WP 1 Multi-Stakeholder Analysis

 WP 2 Provisioning Services
 WP 3 Regulating Services
 WP 4 Cultural Services

 WP 5 Integration

 WP 6 Implementation

 WP 7 Dissemination & WP 8 Coordination

http://staccato-project.net/
Thank you!
SusTaining AgriCultural ChAnge Through ecological engineering and Optimal use of natural resources - the STACCATO project

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