TradeM - steps for regional pilot studies
MACSUR workshop, 5-7 June

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Issues for interaction with other Themes

- We do not aim to link each model with each other, but there will be an effort towards model integration.

- Partners will have to make the choice which model-integration is preferred given their situation.

- Cloud tools may help to facilitate interaction. However most important is the personal dialogue between partners across themes.

- Out of the box thinking is necessary: existing models represent the observed world – but what will be the major protein sources in 2050?
Observations on knowledge gaps

interaction with other themes: most important issues

- The partners involved in MACSUR are mainly experts on supply side issues

- We know too little about the demand side (e.g. changing food consumption patterns) and nutrition. They are important components of the food security debate. Traditionally, trade modellers have specified consumption.

- The missing expertise: can other themes provide it or has it to come from TradeM? We need to clarify some relevant aspects of food security.
Observations on knowledge gaps

Setting boundary conditions:

• We know little about other driving forces than climate change. They are important components of the food security debate.

• We need to agree on which driving forces we address and on the boundary conditions we set.

• Answering the question may also require agreement on which users we have in mind for the research done in MACSUR.
Understand driving forces for food security

Increased Food needs
- Population growth
- Dietary changes in transition countries (China) - more meat

Reduced land resources
- Land degradation, urbanisation
- bioenergy production

Reduced land productivity
- Climate Change
  - land degradation
  - biodiversity decline (genetic resources depletion)

Increased production costs
- oil/energy scarcity
- land speculation

Obstacles to productivity gain
- Water scarcity (quantity and quality)
  - Property rights
  - Environmental and consumer concerns
  - innovation barrier of farming communities (knowledge, image)
  - access to capital and knowledge
How to fill knowledge gaps

focus of TradeM: most important issues

• TradeM offers many different models at various (regional) scales – from farm models to global models

• This constellation provides unique opportunities to generate an added value not available in other projects

• We adopt a pragmatic approach: run different models with a homogeneous set of exogeneous assumptions

• In order to achieve this, it will be necessary to design the set-up of regional models in a flexible manner
How to fill knowledge gaps

still open questions: most important issues

• Over the long time horizon that is under consideration: many adaptation and mitigation measures are not yet practically applied

• The combination of crop / livestock / farm models will give the opportunity to identify new measures

• These results can be used in a bottom-up approach to enhance global models
How to fill knowledge gaps

- Regional case studies need to be set up in a coherent manner. Need to avoid straightjackets that suppress the peculiarities of each pilot region.

- Some global models (e.g. MAgPIE, GLOBIOM, MAGNET) have results based on agreed upon base line scenarios – selected results can be made available.

- Other approaches, not yet considered like results from econometric analysis will be available at the next meeting.
How to fill knowledge gaps

TradeM offers ....

• A baseline scenario of agriculture with production, consumption and key macro-economic indicators (including prices), for input into WP3 in TradeM. We will know more on this after the workshop in Braunschweig (June 5-7), but there are several candidates for a baseline scenario, with key economic figures for 2010, 2030 and 2050, available this year for use in MACSUR (e.g. CAPRI, MAGNET, GLOBIOM)
With CropM and LiveM we will

- Yield response for covered crops from climate change (2010, 2030, 2050) and input requirements
- Agree on common (average) farm management practices (both current and in the future, considering climate change)
- Quantify livestock-related greenhouse gas emissions for existing management practices (e.g. cattle and grassland; focus on CH4 and N2O), current and in future for in-house and grassland production
- Quantify reduction of greenhouse gas emissions of different feeding regimes (low, medium and high) in cattle production, considering current yield changes and cost responses
survey among partners of TradeM

details on the survey:
• opened on 8th of May, closed by 22th May
• answered by 17 partners
• input for workshop in Braunschweig

topics
• readiness to work with a common baseline scenario
• requested information from CropM
• requested information from LiveM
• policies and scenarios going to be analysed
what TradeM requests from CropM

information most urgently requested (not necessarily consistent):

• yield response to changing climate conditions / effect on productivity: not just crops but also grassland
• forecasts on yield levels dependent on distribution of climate/weather parameters
• long term genetic and technological progress
• elasticities of substitution of various inputs (land, labour, fertilizer), in particular of water (with various quality)
• crop yields changes from various GCM/RCP combinations for major crops with global coverage over time
• yields during coming ten year average: 2020, 2030, 2040, 2050
• pathogens and epidemiology issues
• various types of crop management (not just irrigation / non-irrigation)
what TradeM requests from LiveM

information most urgently requested (not necessarily consistent):

• green-house-gas emission coefficients from livestock for validation
• expected yield with no nutrient / water limitation
• effects of heat stress on livestock productivity, changes in productivity from climate change
• elasticities of substitution on various inputs or adequate data to allow estimates
• changes in grassland productivity from various GCM/RCP combinations over time
• effects of CC on product quality, animal wellbeing
Measures in Pillar 2

- Member States need to develop programs in accordance with their national, regional or local-specific needs and priorities. Payments shall be granted to farmers who undertake, on a voluntary basis, to carry out such agri-environment-climate commitments on agricultural land.

- Improved Farm Advisory System needs to cover climate change.

- Crises reserve/Risk management toolkit (insurance scheme) will be introduced.
CAP payments and low-carbon farming

- Direct payments in Pillar One are subject to Good Agricultural and Environmental Conditions with climate-friendly measures.

- Compensatory payments in Pillar Two will include programmes with climate-friendly commitments on agricultural land.
The variance of an outcome is a measure of *uncertainty*. The variance of a preferred outcome is a measure of *risk*. Prediction uncertainty is unavoidable. Measurable within some models.

*Model uncertainty* is also so. Equally plausible models can lead to widely different predictions. Measurable within certain classes of models.

*Knightian uncertainty* is what cannot be measured as prediction or model uncertainty.
Uncertainty and risk (2)

• Equilibrium modelers fight Knightian uncertainty with (1) a theory-based model structure, and (2) calibration or estimation of model parameters from observations of the modeled economy.

• Regardless the quality of the model, utilization beyond its empirical support leads to Knightian uncertainty. MACSUR examples: (1) experiment based crop models used for farms. (2) static equilibrium models calibrated to recent years used for 20 to 40 years ahead.

• A general insight: Large complex models have no advantage to simpler constructions unless the complexities are supported by observations and/or theory.
Contribution of WP4 Capacity Building

Task 1: Capacity building on policy impact assessment
(P147 ZALF and P112 TI)
We offer training on policy assessment back to back with meetings/trainings in CropM, LiveM, TradeM and/or at summer schools etc. (0.5-1day)

Task 2: GAMS for agricultural production and environmental modelling (P208 BOKU)
1st training hold in spring 2013, next spring 2014
Value of agricultural production in EU-27 at producer prices (billion Euro)

Source: EUROSTAT, EAA
### Share of products in agricultural production in EU-27 in 2010 (%)

<table>
<thead>
<tr>
<th></th>
<th>Milk</th>
<th>Pigs</th>
<th>Fresh vegetables</th>
<th>Cattle</th>
<th>Fruit</th>
<th>Wheat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>13.8</td>
<td>8.9</td>
<td>8.7</td>
<td>8.2</td>
<td>6.5</td>
<td>6.2</td>
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<table>
<thead>
<tr>
<th></th>
<th>Poultry</th>
<th>Wine and must</th>
<th>Maize</th>
<th>Oilseeds</th>
<th>Eggs</th>
<th>Barley</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>5.0</td>
<td>4.3</td>
<td>2.8</td>
<td>2.7</td>
<td>2.1</td>
<td>2.0</td>
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</table>
# Value of agricultural production in EU-27 at producer prices (billion Euro)

<table>
<thead>
<tr>
<th>Year</th>
<th>Cereals (incl. rice)</th>
<th>Cattle</th>
<th>Milk</th>
<th>Pigs</th>
<th>Eggs and poultry</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>49.680</td>
<td>28.440</td>
<td>52.724</td>
<td>32.569</td>
<td>25.104</td>
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<tr>
<td>2010</td>
<td>42.061</td>
<td>26.618</td>
<td>47.559</td>
<td>30.841</td>
<td>24.595</td>
</tr>
</tbody>
</table>
Economic importance of activities

Some sectors not relevant for food security (e.g. wine)

Non-market values of the land use activities are not included, but they are considerable:

Environmental services:
- Maintenance of abiotic resources (soil, water, air quantity and quality)
- Maintenance of biotic resources (biodiversity)
- Maintenance of ecosystem processes (cooling, buffering, filtering, CC mitigation..)

Socio-cultural services
- Provision of jobs
- Rural development
- Human health and recreation,
- Cultural heritage and identity

'Multifunctional agriculture'