Design of a MEA-compatible multifunctionality concept

Deliverable 2.3

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Design of a MEA-compatible multifunctionality concept
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Executive Summary

The task of this deliverable is the further development of the MEA-based concept of multifunctionality of agriculture to a theoretical framework which can be made operational in the MEA-Scope project design towards the development of an impact assessment tool.

In order to fulfil this task, research activities on three levels had to be linked. They refer to

- the state of the art of multifunctionality and the Model of European Agriculture (MEA)
- the MEA-Scope theoretical basis
- the MEA-Scope operational implementation.

Based on a comparative analysis of the relevant concepts, objectives and policies of multifunctionality, an implementation related theoretical approach was developed, that allows for consistency both to theory and the (project) operational implementation within the MEA-Scope project integrating different work steps of different work packages. Table 1 gives an overview on the MEA-Scope analytical framework bridging from theory to operation. At the same time this table provides the structure of the report at hand as the respective subjects are linked up.

Table 1: The MEA-Scope approach from multifunctionality analysis to an operational framework

<table>
<thead>
<tr>
<th>Task</th>
<th>Multifunctionality and MEA: state of the art</th>
<th>MEA-Scope theoretical basis</th>
<th>MEA-Scope operational implementation</th>
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<tr>
<td>Task</td>
<td>Review of multifunctionality concepts</td>
<td>MEA-Scope theoretical framework</td>
<td>MEA-Scope tool development</td>
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<tr>
<td>MEA-Scope project activity</td>
<td>Literature survey on • FAO concept • OECD concept • MEA objectives • CAP and RD objectives</td>
<td>Definition of a common understanding based on a • Static economic view • Demand – supply view • Focus on NCOs</td>
<td>• Multifunctionality impact simulation by hierarchical linking of the three models, applied in the case study areas (supply side) • Stakeholder participation (demand side)</td>
</tr>
<tr>
<td>WP, deliverable in charge</td>
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<tr>
<td>result</td>
<td>Comparative analysis (Figure 2)</td>
<td>The MEA-Scope approach for NCO identification and assessment (Figure )</td>
<td>• Multi-scale tool for multifunctionality impact assessment (Figure ) • Identification of gaps to the supply side</td>
</tr>
</tbody>
</table>

According to the description of work (DoW) of the MEA-Scope project, in section one the current outline of the Model of European Agriculture (MEA) with respect to the analytic
dimensions presented in Multiland (Barkmann et al. 2004) has been analysed. Since the Model of European Agriculture is a synonym for the policy reforms that started under Agenda 2000 and are going to be continued by the latest reform of the CAP, the current outline of the CAP and the further development of rural development policy are presented as well.

The second section of this report introduces the MEA-Scope understanding of multifunctionality. The preliminary idea for this MEA-Scope theoretical approach was as follows: An operable multifunctionality framework has to integrate the functions and criteria, which are addressed in existing concepts for sustainability and multifunctionality (agri-environmental issues) and their assessment. While the dimensions in the view of multifunctionality as a policy goal in a normative sense refer to social, environmental and economic functions, the dimensions by an economic theory view (fields of action from policy) concentrate on questions of distribution, allocation and stabilisation as well as on the positive viewpoint of joint production. Since both views have to serve different expectations in a concrete situation there is no clear decision in favour of one or the other analytical approach to multifunctionality. The MEA-Scope project, finally, decided for a framework split in two parts: a demand based theoretical approach based on the functions of agriculture to find the representative indicators on the one hand and a supply oriented economic modelling approach on the other hand. In this way, multifunctionality is regarded from two sides. Obviously, in a specific region, their might be a difference between the Non Commodity Outputs (NCOs) society wants the region to provide and what agriculture or the rural sector in turn supplies. The gap must be understood as a clue for the further development of the MEA.

The scope of operational implementation by the project work steps towards the MEA-Scope tool development is briefly outlined in the third part of this report. The operable approach, applied in the MEA-Scope project work steps towards the tool development, is characterized by a selection of potential non-commodities and the stepwise reduction of the number of NCOs and feasible indicators at different fields of implementation while ensuring their validity and transferability through a complex, multilevel approach. The results showing the chosen indicators are presented in deliverable 2.4 (Waarts 2005).

The conclusion poses open questions that became obvious when developing the MEA-Scope operational approach, but appear to be prevailing for similar developments on multifunctionality impact assessment as well.
1 Model of European agriculture (MEA): objectives

The discussion about multifunctionality has led to several multifunctionality interpretations: the term first came up in 1996 as a characteristic of European agriculture that is already provided by farmers and in danger of being reduced if full market liberation would take place (Durand and van Huylkenbroeck 2003).

The “Model of European Agriculture (MEA)” was introduced into the dictionary of the Common Agricultural Policy (CAP) with the Agenda 2000 reform (CEC 1998). It is based on the suggestion that European farming provides multifunctional, non-market side-effects. Multifunctional effects are generally associated with positive attributes and may include food security, food safety, animal welfare, cultural landscape, biodiversity and rural development (Glebe 2003).

Definition of the “Model of European Agriculture (MEA)”

Actually, MEA is an overall coverage term for the existing EU agricultural policy based on fundamental principles which are to allow for
(1) a modern and competitive farming sector, capable of occupying a leading position on the world market, while safeguarding domestic producers’ living standards and income
(2) a sustainable, efficient farming sector that uses hygienic, environmentally friendly production methods and gives consumers the quality products they desire
(3) a farming sector that serves rural communities, reflecting their rich tradition and diversity, and whose role is not only to produce food but also to guarantee the survival of the countryside as a place to live and work, and as an environment in itself
(4) a simplified agricultural policy, where the lines are clearly drawn between what is decided at Community level and what is the responsibility of the Member States.

The European model implies an agricultural policy that is more transparent to the public, and which works to create the sort of farming sector that society wants and expects, both today and in years to come (COM 2005a).

Multifunctionality and MEA

A theoretical multifunctionality background and up to now the most cited framework created by the OECD was established in 2001 (OECD 2001). It is an economic approach that uses the multifunctionality framework for discussing different policy instruments used for the internalisation of external effects, with strong focus on the agricultural sector in the context
of WTO negotiations, defining non-commodities as joint products with poorly functioning markets in some cases.

Between the OECD concept and the MEA objectives, there is a kind of proportion demonstrated in Figure 1 below. OECD’s multifunctionality concept delivers obviously a theoretical background, while the MEA represents the effective agricultural and rural policy in the EU.

**Figure 1:** principle of relation between the OECD multifunctionality concept and the MEA

Another conceptual approach on multifunctionality has been developed by the FAO (2000a). The FAO concept describes the situation from a system-theoretical point of view, an argumentation based on the functions agriculture has to fulfil. These functions are social, economic and ecological and contribute to the superordinated goal of producing food. This approach does not deliver an economic basis as the OECD did nor does represent an already existing policy as the MEA does.

A detailed description and comparative analysis of both the OECD and the FAO conceptual approaches is presented by Casini et al. (2005) in the MEA-Scope Deliverable 2.2.

### 1.1 Analytical Multifunctionality Framework according to Multiland (2004)

A framework for the analysis of agricultural multifunctionality interpretation with respect to sustainable development of rural areas has been developed in the EU project MultiLand (Barkmann et al. 2004): The MultiLand analytical approach distinguishes 5 dimensions (cf. Casini et al. 2004):

1. **mode of application and purpose**: there are different meanings of the multifunctionality concept according to the scale dimension, and the sustainability dimension of the agriculture at different levels (farm, region, global).
2. **descriptive-factual dimension**: statements based on the NCOs and their joint-production characteristics are the core of this dimension. Their combination with standard economic theory leads to the factual-descriptive ‘model’ of the interpretation of multifunctionality.

3. **spatio-temporal dimension**:
   The spatio-temporal dimension of multifunctionality has to be analysed through an explicit definition of gain and extent in time and space. Furthermore, this question can apply to the entire interpretation of the concept as well as to the descriptive-factual models it uses.

4. **sectoral dimension**:
   Here, a strictly sectoral view is focussing on agricultural production and international trade concerns.

5. **normative/governance dimension**: a descriptive multifunctionality model is used for an analysis of the interdependencies of agricultural joint production. The economic framework used for an assessment of this question, in connection with the mode of application, can use efficiency-based measures and a free trade frame of reference.

Although the term MEA is often used and its fundamental principles are often mentioned, yet its theoretical concept is still being formed and there is no unified official EU position up to now (Durand and van Huylénbroeck 2003). This vagueness and in-concreteness makes the application of the Analytical Framework according to Multiland (Barkmann et al. 2004) difficult.

![Figure 2: Analytical Multifunctionality Framework AMF according to Barkmann et al. (2004)](image-url)
**Mode or purpose of application**

For the ‘mode or purpose of application’ (first dimension), a positioning is clearly to make since the MEA “represents the policies and measures which were agreed in 1999” (COM 2000). So its first dimension according to the AMF can be characterized easily: to justify the European agricultural policy as designed and implemented.

**Table 2:** Dimensional analysis of multifunctionality conceptual frameworks – cross table

<table>
<thead>
<tr>
<th>Purpose</th>
<th>MEA</th>
<th>OECD</th>
<th>FAO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose justification of the current agricultural policy e.g. compensatory programs</td>
<td>assessment of trade policies</td>
<td>rising international, national and local awareness of agricultural sustainability</td>
<td></td>
</tr>
<tr>
<td>descriptive-factual dimension</td>
<td>not truly existing, partly adopted from OECD generalized statements on the disadvantages of the European farming sector, livelihood of farmers, socio-cultural development, symbolic importance of EU landscapes, standards expectations of consumers, principle of subsidiarity</td>
<td>generalized statements on NCOs and joint-production combined with standard economic theory</td>
<td>Environmental, economic and social functions of multifunctional agriculture among the primary role of provision of food security</td>
</tr>
<tr>
<td>Spatio-temporal dimension</td>
<td>Not possible</td>
<td>Not possible</td>
<td>General spatial patterns of the sustainability developing process in developing and developed countries; temporal dimension of outcomes</td>
</tr>
<tr>
<td>Sectoral dimension</td>
<td>agriculture and rural development</td>
<td>agriculture</td>
<td>agriculture and rural development</td>
</tr>
<tr>
<td>Governance</td>
<td>“essential and normative”, simplified in application; principle of subsidiarity</td>
<td>claims to be descriptive and not normative but its framework concentrates on efficiency based measures and uses a free trade frame as reference</td>
<td>Not referred to</td>
</tr>
</tbody>
</table>

**Sectoral dimension**

The term European model of agriculture shows that the regarded sector is obviously the agricultural sector but there is also a strong relation to rural development and with regard to the governance dimension – "it is an essential and normative concept" (EEAC 2000). Therefore, activities coming from agriculture and aiming towards multifunctionality, may also effect trans-sectoral impacts (on tourism, local trade, etc.). From the theoretical view, it is
relevant to agree whether the sectoral definition is based on an input oriented view (caused by input of production facilities the agricultural sector) or output oriented view.

**Descriptive/ factual dimension**

For the descriptive/factual dimension, the application of the AMF becomes more difficult since there is no real theoretical fundament when it comes to definitions. Surely, it is oriented on rural development not only on the agricultural sector, but it seems that the few existing expressions and principles have been adopted partly from OECD and FAO. In the context of benefits from agriculture and rural areas that are not automatically provided by the market, the MEA prefers the use of system-theoretic expression “functions” similar to the FAO while the OECD as an economic approach speaks of “non-commodities”.

**Spatio-temporal dimension**

Another problem occurs when one is expected to fill the spatio-temporal dimension with life since the statements on MEA do not allow for spatio-temporal conclusions.

**Conclusion for implementation**

Therefore, at closer inspection, it might be appropriate to go the other way round which means not to analyse the non-existing theoretical foundation of MEA but first to look at existing policy programs, standing in connection to the modification of the CAP. From that point it should be possible to derive a theoretical model being consistent with the MEA. This means that all policies subordinated to the Model of European Agriculture are at the stake, which concerns since MEA is synonym to the reform of the CAP starting under Agenda 2000, first pillar price support changes as well as second pillar programmes, e.g. agri-environmental programmes.

### 1.2 CAP und Rural Development objectives

The Common Agricultural Policy (CAP) of the EU has undergone tremendous changes in the recent years. The key redirection of the CAP is that it aims to integrate higher international trade compatibility with better targeting of social, environmental and consumer concerns, while seeking to ensure the sustainable development of EU agriculture (COM 2004b). The aim of the CAP is thus to establish what has been known as the multifunctional European Model of Agriculture (MEA). The MEA is multifunctional in the sense that agriculture supplies more than food and fibre but takes the function of a producer of such diverse outputs as landscape, environmental benefits, food security, rural employment, or cultural heritage.

In principle the multifunctional MEA consists of two aspects relating to individual farmers and agriculture as a whole. One is the explicit recognition of the production of both commodity
and non-commodity outputs (NCO). The other refers to increase of the various functions of agricultural and non-agricultural activities that satisfy different societal demands (Durand and van Huylvenbroek 2003). In the latter view, multifunctionality becomes a policy objective in itself.

The evolution of the CAP over the past decades has shown a steady change of focus away from pure market and income support policies – the first pillar of the CAP – and increasing attention to rural development. The importance of rural development already becomes obvious by the narrow interrelation between the Cork Declaration and the Rural Development regulation (Council Regulation (EC) No 1257/1999). The latter document directed towards implementing four of the five main lines of the MEA: sound and environmentally friendly production methods, diverse forms of agriculture, which seek also to maintain the visual amenity of the countryside and vibrant and active rural communities; a simpler, more understandable agricultural policy, which makes clear that expenditure is justified by the services which society expects farmers to provide (Cardwell 2004).

To accompany the further reform of market policy, Agenda 2000 explicitly introduced rural development as the second pillar of the CAP. In this sense, the role of agriculture is redefined within the framework of rural development (Durand and van Huylvenbroeck 2003). In particular, the second pillar recognises farmers as the producers of public goods in their environmental and rural function in rural areas by providing financial support to engage in non-commodity production (COM 2004b).

With the introduction of the Midterm-Review-Reform of the CAP the complementary position of rural development became even more accentuated with the introduction of decoupling, modulation, and cross-compliance. The latest reform of the CAP is expected to provide EU farmers with a clear policy perspective to go with the financial framework until 2013 for agricultural expenditure and to make European agriculture more competitive and market oriented, to promote a substantial simplification in the CAP as well as to facilitate the enlargement process and to better defend the CAP in the WTO. Further, it shall allow maximum flexibility in farmers’ production decisions while removing or improving environmentally negative incentives of the current policy to provide encouragement for more sustainable farming practices (COM 2003).

Thus, on the one hand, the essence of the new CAP is to decouple subsidies from the volume of production which should give EU farmers the freedom to produce what the market wants while providing some basic income support at the same time. Payments are bound to fulfilling good agricultural practices and they are continuously reduced in favour of rural development. On the other hand, to comply with the multifunctional MEA, the EU is
increasingly shifting its policy focus and funding towards rural development, which is the second, still much smaller pillar of the CAP. (thus only around 10% of the CAP expenditures are dedicated to rural development policy (COM 1999)). This overall policy development continues in the proposal for rural development support by the EAFRD, which underlines the position of farming as being of overriding importance within the scope of an integrated rural sustainability development (COM 2004a).

Following the fundamental reform of the first pillar of the CAP in 2003 and 2004, the major focus for policy reform in the new financial period (2007 to 2013) will be rural development (COM 2004b).

The main areas needing consideration in future rural development policy are agriculture and forestry, the wider rural world, food quality and safety, access to public services, covering the EU territory, cohesion, stakeholder participation, partnership between public and private organisations and civil society as well as simplification of the policy.

“The EU’s rural development policy evolved as part of the development of the CAP, from a policy dealing with the structural problems of the farm sector to a policy addressing the multiple roles of farming in society and, in particular, challenges faced in a wider rural context” (COM 2004b).

In order to continue this evolution and improve it according to the situation in rural areas as well as to the results from stakeholder consultations the measures under EU’s future rural development policy will be build around three thematic axis, namely competitiveness, land management, wider rural development and additionally there will be a leader axis (Table 3).
Table 3: Proposed EU rural development policy 2007–2013

<table>
<thead>
<tr>
<th>Objective setting</th>
<th>EU strategy</th>
<th>National strategy</th>
<th>RD programmes</th>
</tr>
</thead>
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<tr>
<td><strong>Axis 1</strong></td>
<td><strong>competitiveness</strong></td>
<td>measures</td>
<td>Human resources:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Young farmers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Use of advisory services (including for meeting standards)</td>
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<td></td>
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<td></td>
<td>Setting-up of farm management, relief and advisory and forestry advisory services</td>
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<td></td>
<td></td>
<td>Physical capital:</td>
<td>Farm / forestry investments</td>
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<td></td>
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<td></td>
<td>Processing/marketing</td>
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<td></td>
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<td></td>
<td>Agricultural / forestry infrastructure</td>
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<td></td>
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<td></td>
<td>Restoring agricultural production potential</td>
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<td></td>
<td></td>
<td>Quality of agricultural production and products (2003 CAP reform):</td>
<td>Meeting standards temporary support</td>
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<td></td>
<td></td>
<td></td>
<td>Food quality incentive scheme</td>
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<td></td>
<td></td>
<td></td>
<td>Food quality production</td>
</tr>
<tr>
<td><strong>funding share</strong></td>
<td>minimum 15%</td>
<td><strong>EU co-financing rate</strong></td>
<td>maximum 50/75%</td>
</tr>
<tr>
<td><strong>teritorial application</strong></td>
<td>territorial application all rural areas</td>
<td></td>
<td></td>
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<tr>
<td><strong>Axis 2</strong></td>
<td><strong>land management</strong></td>
<td>measures</td>
<td>Sustainable use of agricultural land:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other areas with handicaps</td>
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<td></td>
<td></td>
<td></td>
<td>Agri-environment/animal welfare (compulsory)</td>
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<tr>
<td></td>
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<td>Sustainable use of forestry land:</td>
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<tr>
<td></td>
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<td></td>
<td>Agroforestry</td>
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<td></td>
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<td>Forest environment</td>
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<td></td>
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<td>Support for non-productive investments</td>
</tr>
<tr>
<td><strong>baseline (agriculture)</strong></td>
<td>cross-compliance</td>
<td><strong>funding share</strong></td>
<td>minimum 25%</td>
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<tr>
<td></td>
<td></td>
<td><strong>EU co-financing rate</strong></td>
<td>maximum 55/80%</td>
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<tr>
<td><strong>teritorial application</strong></td>
<td>all rural areas</td>
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<tr>
<td><strong>Axis 3</strong></td>
<td><strong>wider rural development</strong></td>
<td>measures</td>
<td>Quality of life:</td>
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<td>Renovation and development of villages, protection and conservation of the rural heritage</td>
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<td>Vocational training</td>
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<td></td>
<td>Capacity building for local development strategies</td>
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<td>Economic diversification:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Diversification to non-agricultural activities</td>
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<td>Support for micro-enterprises</td>
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<td>Encouragement of tourism activities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Preservation and management of the natural heritage</td>
</tr>
<tr>
<td><strong>implementation</strong></td>
<td>preferably through local development strategies</td>
<td><strong>funding share</strong></td>
<td>minimum 15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>EU co-financing rate</strong></td>
<td>maximum 50 /75%</td>
</tr>
<tr>
<td><strong>teritorial application</strong></td>
<td>all rural areas</td>
<td></td>
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<tr>
<td><strong>Leader axis</strong></td>
<td>implementation</td>
<td>Leader approach for selected territories within the scope of the 3 thematic axes</td>
<td><strong>funding share</strong></td>
</tr>
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<td></td>
<td>reserve</td>
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<td></td>
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<td></td>
<td><strong>EU co-financing rate</strong></td>
</tr>
<tr>
<td><strong>teritorial application</strong></td>
<td>all rural areas, selected territories</td>
<td></td>
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</tr>
</tbody>
</table>
2 Theoretical framework: MEA-Scope understanding of multifunctionality

The reforms for the Agenda 2000 as synonym for the MEA reviewed agricultural market organisations and went further to meeting the economic, social, and environmental goals that Agenda 2000 set for the Common Agricultural Policy (CAP) being in line with the objectives of the Sustainable Development Strategy addressed by the European Council in Göteborg in 2001, where it was agreed that the CAP should continue to contribute to achieving sustainable development by increasing its emphasis on encouraging healthy, high-quality products and environmentally sustainable production methods (COM 2003). This guideline is continued by the Midterm-Review-Reform of the CAP.

According to this, in the understanding of the MEA-Scope Project, the overall frame for agricultural policy as well as rural development in the EU is formed by the concept of sustainability which the model of European agriculture or the concept of multifunctionality itself is subordinated to, expressed or implemented by the EU sustainable development strategy with rural development as the scope of application (Figure 3).

Figure 3: The MEA-Scope theoretical framework integrating multifunctionality concepts and policies and the operational task of tool development
Subordinated to this overall frame, the concept of multifunctionality is to be understood as a framework concept of agricultural sustainability. This concept is expressed through the policy measures divided into first and second pillar introduced through Agenda 2000 reform and the Midterm-Review Reform of the CAP with the main focus on agriculture and indirectly rural development as well.

Given the MEA-Scope project objectives, first a suitable analytical framework is needed fulfilling the project requirements. Such an analytical framework should on the one hand be operable in the sense that it can be connected to the modelling steps of the project. On the other hand, the framework should comply with the international trade negotiation requirements without sacrificing its normative basis in sustainable development and the promotion of rural areas (MEA-Scope Description of Work, p. 11).

The review of existing theoretical approaches detected the differentiation between a supply-oriented, or positive, and demand-oriented, or normative, approach to analysing multifunctionality, if we don't focus on revealed preferences (Casini et al. 2004). The positive view on multifunctionality recognises agricultural activity as a multi-output activity involving the joint production of commodities (CO) as well as non-commodity outputs (NCO) with some of the NCOs having the characteristics of public goods. This approach to analyse multifunctionality from the point of view of joint production has been widely adopted e.g., by OECD (2001), Blandford and Boisvert (2002), Boisvert (2001), or Romstad et al. (2000). It stresses multifunctionality as an inherent characteristic of rural landscapes with an emphasis on the specific production relationships between CO and NCO.

On the other hand, there is also a normative component to the analysis of multifunctionality in the sense that 'more multifunctionality should be achieved'. In this particular point of view, agriculture is given the objective to fulfil certain functions that society demands. This approach is put forward mostly by FAO (FAO 2000a, 2000b) and the EU (e.g. COM 2004a, COM 2004b). Following this view on multifunctional agriculture, three main functions of agriculture can be distinguished: the economic, environmental and social functions. The concept is based on the assumption that agricultural systems are intrinsically multifunctional and have always fulfilled more than just their primary aim of producing food, fibre and fuel (Maastricht, Netherlands, September 12-17, 1999). Multifunctional agriculture refers to the multiple goods and services that are provided both by the agricultural sector itself and land use related other sectors. The multifunctional role of agriculture is understood as the entire range of associated environmental, economic and social functions of agriculture.
2.1 Static economic view

2.1.1 Joint production of COs and NCOs

When these two main directions of analysing multifunctionality are looked at in the light of the objectives of MEA-Scope, there is no clear decision in favour of one or the other analytical approach to multifunctionality.

On the one hand, the demand by the EU for a quantitative model-based tool that shows the interaction between multifunctionality and policy instruments is clearly driven by normative concerns. The MEA-Scope tool, on the other hand, consisting of bio-economic simulation models presupposes functional relationships between CO and NCOs. The resulting simulation output provides the basis for a positive analysis of results. Moreover, the focus of MEA-Scope and the history of the used models are strongly founded in agricultural activities.

This, naturally, implies the analysis of multifunctionality aspects to focus more on the supply side and joint-production of CO and NCOs directly associated to agricultural activities. What is therefore needed is a pragmatic approach that integrates demand and supply issues in one analytical framework. In the following, a simplified static framework is presented which represents one possible approach that aims to recognise the demand and supply side within one analytical framework.

Figure 4 gives a graphical representation of this approach. At the outset it is assumed that multifunctional agriculture is characterised by the joint production of CO and NCO. The COs
depict those outputs for which functioning markets, and therefore a monetary demand, exist. NCOs in this context are products and functions of the landscape and of rural areas jointly generated by agricultural production which fulfil private or public needs (Barkmann et al. 2004). In this sense, the concept of multifunctional land use implies that agriculture develops towards an aware joint production of COs and NCOs. Some of the NCOs take the characteristics of a public good for which a functioning market, and hence a monetary demand does not exist. Other NCOs exhibit the characteristics of a private good and hence they can be treated just like CO. Because of jointness, the supply of CO is accompanied with a provision of NCO - despite of no direct monetary demand with regard to public goods. In this situation, income from agricultural production can only be earned from CO and NCO with functioning markets. Nevertheless, the production of NCO, which includes avoiding negative external effects like nitrogen leaching, is - just like the production of CO - connected with (social) costs. In the case of public goods, however, this provides a possible case for policy intervention (OECD 2001).

In view of changing preferences and consumer needs, public demand for the provision of NCOs exhibiting the characteristics of public goods increased. Policy makers reacted to the changing consumer preferences by providing payment schemes which created a new "market potential". On the one hand, the payments remunerate farmers for an unpriced output that has a social value (Blandford and Boisvert 2002). On the other hand they stimulate the provision of positive externalities that would not be produced otherwise. This requires a production of NCO – either (if possible) as a (in a technical sense) separate production of NCO or as a joint production of NCO and CO. Optimal production schemes are depending on the relative prices of CO and NCO, on the nature and degree of jointness of production, and on the production technologies/management schemes available. The market potential of such NCO-production depends on several factors: the spatial dimension of NCO in a given region, individual and aggregated individual preferences with respect to NCO and corresponding monetary demand for such "new" products, and the efficiency of established economic institutions to allocate supply and demand of NCO. Overall income of farmers is no longer only determined by sales revenues and costs of production of CO and private NCO but also by revenues generated from 'quasi-markets' for NCO. To maximize profits, a farmer can choose between different technologies of production (production schemes) which are connected with different quantities of CO and NCO. Operationalising this particular simple framework would require information with respect to (i) the nature and degree of jointness between CO and NCO for different production schemes available, (ii) the private and public demand for NCO, (iii) the relative prices of CO/NCO.
2.1.2 Comments to the static view

The static approach has some advantages, particularly when it comes to showing the joint production of two outputs and possibilities for income generation. Nevertheless, in reality, the picture is much more complicated and a straight line between cause and effects cannot be drawn any longer.

First of all, the approach presented above makes no reference to a possible operationalisation. Joint production may be a useful theoretical concept, but in practice it is difficult to establish the true nature of jointness between CO and NCO. Hence, there is a need for an empirical foundation of functions relating NCOs to agricultural commodities or reasonable hypotheses about the nature of physical production relationships (Boisvert 2005). In addition to empirical data, bio-economic programming or simulation models may represent a possible way.

Second, although direct incentives for the provision of NCOs lead to a dissociation of NCOs and COs (OECD 2001), there are nevertheless repercussions on commodity production which may lead to undesired effects, either on the farm itself, in other sectors or countries (if trade is taken into account). Hence, the follow-up costs and benefits of direct NCO payments have to be taken into account. The links between NCO and CO productions, therefore, have to be seen (and analysed) within a dynamic context, in which one influences the provision of the other.

Third, dynamics may also play a role if the degree and nature of jointness is concerned. The static framework moreover neglects the time it needs until non-commodity outputs are produced. For example, we cannot viably consider the very moment that agricultural producers respond to incentive payments and carry out the necessary measures. Moreover, adjustment patterns on the side of the farms and the time it takes to adjust are not clear. On the demand side, changing preferences may also impact on the system of joint production.

Fourth, the question of the spatial and scale dimension of multifunctionality remained untouched in this approach. Depending on the location (e.g. production conditions, soil quality, climate), it is for sure that the relationship between CO and NCO will not always be the same for all areas. The same may hold true with regard to the scale of analysis (e.g. national, sector, region, farm, field site). Regarding policies, spatial and scale differences may reduce the usefulness of a particular set of policies if applied to all areas and scales alike (OECD 2001).
In view of the mentioned issues, the modelling and simulation approach being followed in MEA-Scope aims to overcome some of these limits. For example, AgriPoliS introduces dynamic aspects into the analysis by considering structural change and adjustment reactions. MODAM introduces trade-off functions between different COs and NCOs. To determine the impact of spatial differences, MEA-Scope operates in seven different case study areas within the enlarged EU.

Thus, the MEA-Scope project decided for a refined, more complex and enlarged view on multifunctionality which is presented in the next section.

2.2 The demand and supply view

2.2.1 Demand for decision support towards the implementation of multifunctional agriculture

Demand from the European Commission
The demand for ex-ante assessment of the impact of future policy options is a specific interest of policy makers in the European Commission. Not only because the policy programmes underlie an evaluation process, of which the ex-ante assessment is a key element, but also because a type of governance is more and more implemented, which intrinsically builds upon the principle of bottom-up driven national, respectively regional implementation. As a result, several research projects are launched within the FP6 for development of ex-ante impact assessment tools for this issue. MEA-Scope is one of them, responding to FP6 Priority 8, B.1.1. Task 5 „Developing further the multifunctionality concept and making it operational as a policy instrument“.

In the MEA-Scope project work plan the involvement of the end-users of the tool to develop is an important issue. In a series of workshops the policy makers in Brussels are queried on their specific demands and expectations for the tool development with regard to the field of application, thematical issues and the technical handling of the tool. Additionally they give clues which future policy trends to consider. They are informed on the project work progress and results.

Demand from regional administration and from agricultural practice
The realisation of multifunctional land use in rural areas leads to a higher importance of the agricultural production of NCOs. Such as farmers decide the scale of production of COs by anticipating the associated income effects, they should do for the NCOs. However, farmers’ behaviours are not driven only from economic aspects (e.g. compensatory payments) but
also from individual ideals and the anticipated impacts on farm organisation (Vanslembrouck et al. 2002). The decision making whether to increase the NCO production activities is, from the farmers side, mainly driven from the potential NCO yield. Currently the agri-environmental programmes (AEP) act as a quasi-market for NCO production. Subsidies are paid for the implementation of production practices that lead to the provision of desired positive externalities (outputs) respectively to the prevention of negative externalities (outputs). Due to the fact that the AEP mostly introduce horizontal measures, the amount of payments per hectare is spatially equal. The farmers’ decision making therefore depends on the relative economic performance of AEP compared to that of the present production practice. In so far in terms of site specification, the farmers decision for NCO production is mainly determined by the (varying) CO-production conditions.

By principle nevertheless, the level of subsidies paid by governmental programmes for the achievement of a specific NCO, should reflect the societal demand. In the case of public supply of public goods, it is crucial to differentiate two kinds of transactions, in which policy makers play a dual role (Figure 5): as those who developed the regional AEPs they act as the demand side of NCO production in their relationship toward the farmers, who react as supply side of NCO production. On the other hand, in the case that externalities are public goods, the related NCOs can be addressed as societal demand. Here policy makers represent the supply side by defining appropriate AEP that meet the requirements for a better provision of public goods. Policy makers therefore have a specific demand in an ex ante policy impact assessment that covers the wider range of multiple agricultural outputs.

Figure 5: Transactions on NCO supply and demand
The CAP reform clearly set the course for a development of agricultural and rural development from a bottom up approach. Especially the agri-environmental programmes within the second pillar by providing the finance instruments of the European Agricultural Guidance and Guarantee Fund (EAGGF) and for the upcoming period. The European Agricultural Fund for Rural Development (EARFD) focus on the development of policy measures for a regional, “spatially individualised” implementation.

Therefore a substantiated knowledge of the site specific potentials, comparable to the available data on CO production and providing the basis for decision support systems, are also needed for the identification of site specific potentials for NCO production and the development of feasible production techniques.

From two directions scientific challenges emerge on this issue, focussing on the delivery of data and tools for decision support. From the administration side there is a demand for

- knowledge support for the prioritising of multifunctionality objectives
- identification of target areas for specific measures (delivery of site characteristics data in user friendly surfaces)
- definition and adaptation of management practices for achievement of multifunctionality objectives
- tools for ex-ante (and ex-post) impact assessment

But also from the farmers side decision support is demanded:

- knowledge support for NCO production potentials ("NCO market information")
- decision support for economic impact assessment
- improvement of/ guidance for management practices for achievement of multifunctionality objectives
- tools for impact assessment

While the majority of administration side demands aims at a multifunctionality impact assessment at a regional scale (districts, landscapes), the production side ask for an assessment at single farm level. Therefore the requirements of a multi-scale approach in the development of impact assessment tools can be deduced.

### 2.2.2 Theoretical approach of integrating demand and supply view

The following considerations provide the theoretical background for the identification of NCO demand and supply within the MEA-Scope project (
The MEA-Scope analytical framework distinguishes between the potential and revealed societal demand for non-commodities on the one hand and the supply of non-commodities on the other hand. The concept of multifunctional land use implicates that agriculture develops towards an aware joint production of commodity outputs (COs) and non-commodity outputs (NCOs). In the MEA-Scope approach scientific questions on multifunctionality outputs by means of the NCO-production are focused. This allows to bridge from theory to operation: the more general level of landscape “functions” becomes substantiated by the identification of a broader spectrum of related NCOs (the potential public demand side of NCO production). Coevally according to their nature as joint products NCOs usually outcrop as positive or negative externalities of CO production, depending on the intensity of management practice and on the site specific natural conditions (the supply side of NCO production). By a set of selected indicators each NCO is made operable for the impact assessment.

The societal demand for NCOs, being jointly produced with typical agricultural COs, expresses itself by two lines. First, the potential demand, that may differ between regions by the site characteristics and by the overall rural development objectives. MEA-Scope makes interviews with regional stakeholders and analyses them by expert valuation method (EVM). Secondly, the revealed demand can be identified, for example, by the existence of agri-environmental programmes (AEP) respectively agri-environmental schemes (AES) which are offered/ implemented in a specific region. However, the mere presence of these programmes does not directly imply that they are implemented at the intended levels as the programmes are voluntary. Thus, the realised societal demand can be analysed by matching the AEPs/

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**Figure 6:** Theoretical background for NCO demand/supply identification
AESs with the herewith produced NCOs, e.g. the area under respective agreements or the amount of payments. As well the revealed societal demand is analysed by setting the relevant AEPs/ AESs as the low intensity levels of the production schemes, which are modelled by MODAM and FASSET in order to quantify the corresponding NCOs. The supply of NCOs, which is the key issue of the MEA-Scope project’s scientific activities, can be defined as a function of the production schemes of COs and NCOs, at which their relation is depending on the degree of jointness. In the modelling approach of MEA-Scope such (trade-off-) functions between resource use, farm economics and the achievement of environmental goals will be determined in order to assess the degree of jointness and the related social, economic and environmental impacts of the CO and NCO production in typical farms and production schemes of different intensity. Admittedly the scope of NCOs, addressed in the MEA-Scope modelling, is quite “conservative”, due to the models capabilities, the potential impacts of current production schemes and the available databases. An important result expected from the analysis of NCO demand on the one hand and NCO supply on the other is the identification the gap between both sides. The models of the MEA-Scope modelling approach do not allow to simulate the processes between demand and supply of NCOs. But it is expected that depending on the region (case study area) and the kinds of NCOs, gaps will be identified between the societal demanded NCOs and the NCOs which are supplied by the current agricultural practice. The study of institutions to close this gap are not at the centre of the MEA-Scope project but only treated marginally. Nevertheless certain aspects of governance will be covered. Overall, this gap nevertheless is not a point of weakness of our approach, but a relevant result, as it indicates the agenda for future research necessities.

2.3 The central role of Non Commodity Outputs

Based on the analysis of the multifunctionality concepts of FAO and OECD the MEA-Scope operational approach is conducted in a dual direction: The functional approach of the FAO concept, distinguishing between economic, environmental and social functions is taken to define the main categories for the classification of multifunctionality impacts. These three functional categories are each divided into selected NCOs representing the outcome of joint production relationships (Table 4). The level of NCOs is determined as the "operational playing field" for the MEA-Scope project: the selection (which NCOs?) and their specification, by case study area (where?) and by
indicator (what?), is determined, according to the task and objective of a given project activity.

**Table 4:** Categorisation of selected NCO by functions (Waarts 2005)

<table>
<thead>
<tr>
<th>functional category</th>
<th>selected NCO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic</td>
<td>Employment/generation of income</td>
</tr>
<tr>
<td></td>
<td>Rural entrepreneurial activities</td>
</tr>
<tr>
<td>Environmental</td>
<td>abiotic resources</td>
</tr>
<tr>
<td></td>
<td>biotic resources</td>
</tr>
<tr>
<td></td>
<td>Landscape and land use</td>
</tr>
<tr>
<td>Social</td>
<td>Cultural heritage</td>
</tr>
<tr>
<td></td>
<td>Non-farming activities</td>
</tr>
<tr>
<td></td>
<td>Social infrastructure</td>
</tr>
<tr>
<td></td>
<td>Recreation in rural areas</td>
</tr>
<tr>
<td></td>
<td>Healthy food/food safety</td>
</tr>
</tbody>
</table>

### 2.4 Impact assessment framework

In a stepwise procedure a framework for the assessment of multifunctionality impacts was developed on the basis of established impact assessment and indicator systems. For the selection of the NCOs and indicators, the structure of the MEA-Scope theoretical framework according to figure 3 was taken up.

For the initial framework an assessment system was chosen that allowed for an analogous understanding of the concept of multifunctionality as integrated within the concept of sustainability: The handbook for impact assessment in the Commission (COM 2002) respectively the updated version of the Impact Assessment Guidelines (COM 2005b). They set procedural rules for the impact assessment in the Commission and are developed to identify whether an issue is related to the EU sustainable development strategy. The guidelines provide a list of possible economic, environmental and social impacts and name relevant key questions on these issues. This list is already in practical use by the potential end-users of the MEA-Scope tool.

In the first step such impacts and key questions which are related to multifunctional agriculture have been selected from the impact assessment guidelines list (EC 2002, 2005) and paraphrased into NCOs (table 5).
In a second step this list was narrowed down for the project purpose of the stakeholder surveys on the demand on multifunctionality in the case study regions involved in deliverable D6.3.

Table 5: Steps of development of the NCO lists and indicator lists

<table>
<thead>
<tr>
<th>step</th>
<th>Impact assessment framework</th>
<th>addresses</th>
<th>NCOs</th>
<th>indicator</th>
<th>units of measurement</th>
<th>Criteria for/steps of adaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Impact Assessment Guidelines (COM 2005b; table 1) (&quot;end-users list&quot;)</td>
<td>policy demand</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>Selection of impacts related to agriculture</td>
</tr>
<tr>
<td>2</td>
<td>NCO list for stakeholder interviews (D6.3) (&quot;regional stakeholders list&quot;)</td>
<td>regional demand</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>aggregation from step 1 with regard to regional performance</td>
</tr>
<tr>
<td>3</td>
<td>regional NCO and indicator list (&quot;regional partners list&quot;)</td>
<td>regional supply</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>substructuring of NCOs from step 1 by indicators; selection of NCOs with regard to regional potentials and problems from the scientific experts’ view</td>
</tr>
<tr>
<td>4</td>
<td>MEA-Scope NCOs and indicators (modelling list)</td>
<td>revealed supply to be modelled</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>Selection from step 3 according to the models’ capabilities (existing and to be developed)</td>
</tr>
</tbody>
</table>

In parallel step three was carried out for a survey of the supply side. At this level the NCO list was joint with a compilation of indicators which have been selected from the most relevant (mainly environmental) indicator systems in use. Details on this procedure are described in the MEA-Scope deliverale report D2.4 by Waarts (2005). The researchers from the seven case study regions carried out a selection of the NCOs with relevance to the specific problems and potentials from the scientific view on the region.

In step four this list was linked to the capabilities of the three models of the MEA-Scope tool. It was differentiated between given situation and the NCOs and indicators that can be/ will be integrated in further development of models.
3 The MEA-Scope operational approach

In this section it is shown how the theoretical considerations outlined before, are translated to the operational approach of the MEA-Scope project.

Figure 7 presents, how we aim to achieve consistency at the different level of aggregation, by starting from the superordinate framework used in the Commission by the end-users. A subset of this superordinate instrument, the MEA-Scope NCO-list is defined, covering different degrees of specifications, as relevant for different implementation issues that stand for societal demand respectively agricultural supply of NCOs. A detailed report on the selection of NCOs and indicators for the different fields of application within the MEA-Scope project is given in Deliverable 2.4 by Waarts (2005).

**Figure 7**: The MEA-Scope operational approach for NCO identification and assessment

### 3.1 Identification of demand for NCOs

The societal demand for NCOs is identified at different levels and by different groups: At the regional level a survey of stakeholders’ demand and assessment on the role of agriculture for rural development towards multifunctionality in four of the seven case study areas are carried out. Additionally the issue of governance is surveyed. As the methodological approach, the expert valuation method was chosen. In a two stages procedure elected representatives and stakeholders from administration are first interviewed in individual face-to-face interviews, later the results will be reported in a workshop for the participants.
This survey on the societal demand side is expected to deliver a broad spectrum of “potentially demanded” NCOs (Figure ). In contrast, the “revealed demand” of NCOs is deduced from the objectives addressed by the Agri-Environmental Programmes (AEPs), which exist in the case study regions. For these NCOs a sub-structuring with feasible indicators, compiled from the common indicator conceptions, was attached.

3.2 Identification of supply of NCOs

In the next step the NCO and indicator list was contrasted to the supply side. The supply of NCOs will be identified by the results from modelling agricultural management practice of typical farms in seven case study regions. Arable and grassland production systems at different levels of intensity will be simulated and economic and environmental impacts will be assessed. Agricultural policy options of the first and second pillar are taken as scenarios.

A selection of NCOs was made by the MEA-Scope researchers in the case study regions, considering i) the regional natural conditions (based on GIS data and others) and ii) the regional production schemes and priorities (based on expert knowledge/ scientific interests) (Figure 7). For the selected NCOs the suitable indicators are identified, which fit to the models´ capabilities. In the next step the NCOs and indicators are allocated to the different models. Based on the results of the data demand inventory for the three models the data requirements were defined.

3.3 The challenge of tool development

Structured according to the work steps taken for developing the final product, the MEA-Scope tool, the following set-up is given (Figure 8).

First, basic framework conditions are clarified and fixed. Such are the common understanding of multifunctionality within the project consortium, the identification of end-users´ and stakeholders´ demands and the models capabilities and needs for the simulation of the supply side. This issue and also the second level, the selection of NCOs, COs and feasible indicators is subject of the report at hand as well as of specific reports (D2.1, D2.2, D 2.4, D3.1: available; D6.3, D6.4: to come).

The next three levels address the survey and adaptation process of regional data to the three models and their hierarchical integration. The challenge of integration is posed by three items: the impact assessment has to consider different scales, to refer to the jointness of COs and NCOs and to be valid for the different conditions of the 7 case study areas. In parallel the technical performance is developed in order to construct a feasible internet accessible “communication system” for the tool. Both together, the scientific outcome and
the technical solution are aimed to provide the MEA-Scope tool, that provides a multi-scale example, for beef production systems in case study regions which stand for typical European realities, of an EU-wide adaptable ex-ante policy evaluation instrument.

Figure 8: Structure of the MEA-Scope tool development process

4 Conclusions

When developing and implementing the presented MEA-Scope approach, several limitations, but also possibilities became apparent, both with regard to the general possibilities of simulation tools for impact assessment and the development process. Our approach appears to be limited with regard to the following issues:

Equivalent to the fact that the theoretical background of multifunctionality provides different concepts and possibilities of interpretation, also approaches for the tool development vary. First to mention is the general problem of ex-ante simulation: the forecast of future policy scenarios is connected with generalization and tentativeness, and the appreciated flexibility of the agricultural policy programmes makes a forecast even more difficult. Nevertheless, the great merit of an approach such as MEA-Scope is the possibility, to elucidate complex interactions between local actors respectively between actors and the environment in a
dynamic setting. Still, it is important to clearly communicate the possibilities and limits of such approaches.

Given the fact that each of the three models is complex by itself, in MEA-Scope we did not opt for a nested tool. Nested tools make it increasingly difficult to comprehend the implications of the models and to connect causes with effects. Instead, we favoured a hierarchical linking approach of the models, being aware of time restrictions and limits to sensibly validate and analyse results of complex models. Moreover, the project is limited with regard to the scale of application: we focus specifically on mixed farms and beef production. Other farm types and interactions between farm types are considered in the context of structural change. Even though the general MEA-Scope approach aims to be generalized in the future for implementation on the EU-25 scale, the specific adaptation of the models input (e.g. data on farming practices and their validation) is optimized for the seven European case study regions.

Although it is evident that such tools are not designed to deliver assessment results at a high level of precision, it nevertheless is essential, to use reproducible input data of a standardized quality. Additionally, today we still have to cope with deficiencies regarding data availability and comparability in the New Member States (e.g. FADN).

However we are optimistic about the possibilities of assessment tools such as MEA-Scope: The tools will provide relevant information in an easily comprehensible way. This is an important advance for the perception of information, in terms of comprehension and handling of manifold results. They allow for an analysis of the main impacts at different levels of detail. This is closely linked with the insight of the kind and degree of jointness of production between different COs and specific NCOs. So, an operational and scientific challenge lies in the development of multi-scale and multi-objective tools. Furthermore, the multi-objective presentation of information will simplify the comprehension of impact assessment results. At the end of the Mea-Scope tool development we will provide an internet accessible surface, which is designed to meet the demands of policy makers and other stakeholders.

As presented in this report, it is obvious, that the MEA-Scope project target will only be able to make exemplary contributions for advancement in multifunctionality implementation. The development of a theoretical framework and the assessment tool are driven by pragmatic considerations, directed to ensure the operability. Currently, various questions remain open. These concern bridging from theory to (societal) implementation, data quality and feasible and tractable modelling approaches. One more result which may appeal to the scientific community is, from our point of view, the perception of the following questions and deficits:
How to cope with the lack of social impact assessment criteria, indicators and data? Do we need assessment and monitoring systems that better integrate or even specifically refer to agricultural activities, respectively specify on farmers as "rural players"?

How to address time related issues? We simulate and assess dynamic processes, which vary a lot, depending on site and other framework conditions, between regions and temporally. This also will affect the interactions between impacts. How can we deal with time lags related with NCO production and interdependencies between different NCOs?

How can we reproduce jointness in a dynamical way? On what issues a more detailed analysis is needed, and where is acceptable it to abstract from this in favour of a static approach?

What is the level of integration we aim at for the different fields of applications? How much tacit knowledge is lost due to the integration of different models? How much knowledge is gained additionally?

We aim at discussing these points during the upcoming end-user workshops and also will put forth the scientific discussion on these issues within the community of researchers.
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