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SCENARIOS FOR MODELLING TRADE POLICY EFFECTS ON THE MULTIFUNCTIONALITY OF EUROPEAN AGRICULTURE

**JANET DWYER, DAVID BALDOCK, HERVÉ GUYOMARD
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This series of Working Papers is published by CEPS for ENARPRI (European Network of Agricultural and Rural Policy Research Institutes). Janet Dwyer and David Baldock are with IEEP in London, Hervé Guyomard is with INRA in Rennes, and Jerzy Wilkin and Dorota Klepacka are with IRWIRPAN in Warsaw. Unless otherwise indicated, the views expressed are attributable only to the authors in a personal capacity and not to any institution with which they are associated.

ISBN 92-9079-553-0

No. 10/January 2005

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Abstract

The ENARPRI partners agreed in February 2004 to prepare a precise specification for the scenarios that partners would attempt to model in their own national contexts, to examine the impacts of trade-related changes upon the multifunctionality of EU agriculture. This paper outlines a suite of five scenarios covering anticipated domestic (EU) policy under different possible outcomes from the Doha round, broadly based upon the status quo (with mid-term review), full decoupling of domestic support and full decoupling plus reductions in (decoupled) domestic support, with variants in relation to export subsidies and the scale of pillar 2 measures. In all cases it is recognised that national or sub-national models will require an additional level of national or regional specification before they can be run, and that each national team will be required to do this drawing upon their own domestic knowledge and discussion with relevant experts. Each of the models that will be used to undertake these analyses is then briefly reviewed to identify its general approach and the multifunctionality indicators that can be covered. These indicators are then set in the broader context that considers other potential indicators of multifunctionality and their rationales. The paper concludes with some additional commentary about the significant differences, and thus the difficulties, of attempting to undertake this exercise for any of the new member states.

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Introduction and the purpose of this paper

The ENARPRI partners agreed in February 2004 that it was necessary to prepare a precise specification for the scenarios that partners would attempt to model in their own national contexts, under ENARPRI work package 3.3 and in preparation for work package 4.3 of the programme, to examine the effects of trade-related changes upon the multifunctionality of EU agriculture. The basic principles underpinning the scenario development are as follows.

- To date, we believe that with the exception of Ireland's FAPRI model, no research institutions in the EU have developed models that directly link the outcomes of international trade agreements with specific impacts upon the multifunctionality of EU agriculture, as expressed in terms of its provision of social and environmental goods and services to society.
- Nevertheless, several of the ENARPRI partners have access to national or regional models that can explore the multifunctionality implications of domestic policy changes to varying degrees (e.g. models linking policy changes to input use or nitrate and greenhouse gas emissions, or to rural employment or other social variables).
- In attempting to explore these relationships through existing models we must therefore adopt a two-stage process:
 - i) identify the domestic policy change scenarios that might result from new agreements in international trade; and
 - ii) model the potential multifunctionality implications of these domestic policy changes, as far as is possible, using existing models.

This paper attempts to fulfil step one of this process by describing, at the European level, *alternative scenarios* for future EU policy that could reasonably result from the conclusion of the Doha multilateral trade agreement round. This will then enable the ENARPRI partners involved to:

1. identify the precise ways in which these EU-level scenarios would most likely be manifested *in their own national and/or regional contexts* (i.e. specifying the domestic policy change(s) that would result from each scenario and that they could model);
2. identify the specific *indicators of multifunctionality* that they are able to examine in national- or regional-level model runs of these specified national/regional policy responses to the EU scenarios; and
3. *prepare to undertake model runs*, based upon these scenarios, which should provide (particularly once the results are compared across the ENARPRI partnership) some interesting indications of the potential impacts of trade agreements upon the multifunctionality of EU agriculture, in their varied national and regional contexts.

It has been suggested by the European Commission and others¹ that complete trade liberalisation could pose a serious threat to the ‘European model of agriculture’, in which the concept of multifunctionality plays a significant role. It is thus important to see the multifunctionality of agriculture in the context of the main phenomena shaping the global and European order at present, including those below.

- The role of agriculture and farmers is changing in the European economy and society, and there is a growing importance of the non-trade outcomes of agricultural activities and an emerging new foundation for the legitimacy of public support for agriculture, based broadly upon the notion of public goods provision.
- There is a continuing social dialogue on the appropriate balance of market choice and public (collective) choice in relation to agriculture, rural areas and other parts of the rural economy and rural society. For example, meeting the challenge of competitiveness whilst at the same time trying to preserve the social and cultural values of rural life is a part of this debate.
- Trade liberalisation and globalisation are leading to the emergence of new power structures in the international arena. Decreasing government control over agriculture, as a result of trade liberalisation, will increase the influence of large international companies both delivering inputs to agriculture and processing and trading in agri-food products. The implications of such a shift of control in relation to multifunctionality issues are also pertinent.
- Rapid changes in international food markets owing to growing demand for agri-food products in large, rapidly developing countries (especially China and India), may change the profitability of European agriculture and the deployment of agricultural resources in the EU-25.
- The implementation of the Lisbon strategy within the EU, which places strong emphasis upon economic competitiveness, is a key goal. Agriculture and agricultural policy is not directly included in this strategy but its implementation will create a new institutional framework and new economic environment for European agriculture.
- The specific situation of the new EU member states is pertinent in relation to agricultural support and the intensification of agricultural production – these countries are on a ‘phasing-in’ track of agricultural support and are seeking to recover agricultural production levels that declined significantly during the post-communist transformation. Rapid growth in outputs and incomes in the agricultural sector have been predicted in many of these countries, as a result of EU accession.

1. Policy scenarios

The ENARPRI partners initially agreed that the broad focus of the EU-level policy scenarios should derive from the following three general directions of domestic policy change, in response to international trade pressures and the possible conclusion of the Doha round.

1. **Status quo** – i.e. the EU agrees that there will be no change to any of its currently agreed domestic policies for agriculture as a result of the Doha round. This would mean it implements in full the Agenda 2000 reforms along with the so-called ‘mid-term review’ (MTR) and subsequent reforms to regimes as agreed in Luxembourg in July 2003 and in Brussels in April 2004.
2. **Full decoupling** – i.e. the EU agrees to make a further shift of existing domestic support under pillar 1 of the policy, away from any measures that could be regarded as either moderately or strongly trade-distorting (amber or blue box) and towards fully decoupled income-support measures as represented by the single farm payment (SFP) approach agreed under the MTR, which would qualify as green box under the current definitions of support within the WTO.
3. **Significant cuts in all domestic support** – i.e. the European Union agrees to reduce its domestic support to producers to enable greater liberalisation of the EU market.

¹ See for example C. Doyle, S. Ashworth and D. McCracken, *Agricultural Trade Liberalisation and its Environmental Effects I*, Scottish Agricultural College, Auchincruive, July 1997.

2. Refining the scenarios

In further discussion among the ENARPRI partners in July 2004, the following refinements to the scenarios were agreed. First, in order to harmonise analyses, we will consider a time horizon of **2013–15 for all scenarios**. Each one is then defined as follows.

Scenario S1. The ‘status-quo’ scenario assumes that the next WTO agreement will not cause the EU to revise the common agricultural policy further, and that the June 2003–April 2004 CAP reforms will be fully compatible with the expected WTO Doha round agreement. In that context, and as regards multifunctionality issues and indicators, the task is then to evaluate to what extent these CAP reforms are likely to have positive or negative impacts on multifunctionality indicators, notably those reforms concerning:

- the decoupling of agricultural income-support direct aids (with the possibility for each member state to maintain part of these direct aids as coupled support); and
- cross-compliance, modulation and thus increased funds available for pillar 2 of the CAP.

According to various quantitative analyses, one can expect that the price, quantity and market effects of the 2003–04 CAP reforms are likely to be very small. Yet it should be noted that to a large extent (and to our knowledge) these quantitative exercises do not take into account (or only in a very crude way) cross-compliance requirements and the potential impacts of these requirements on the environment and environmental indicators. In the same way, the quantitative exercises do not include (or again, only in a very crude way) impacts on land use, potential agricultural land abandonment, farm numbers, farm size, agricultural employment, etc. In other words, they do not include any impacts on agricultural structures. One can, however, expect that the effects of the reforms on multifunctionality will vary from one member state to another depending on the way the reform is implemented, especially with regard to:

- i) the degree of re-coupling of income-support direct aids, a degree that varies as a function of national or sub-national choices, and
- ii) the degree of significance of cross-compliance and good agricultural and environmental condition (GAEC) criteria adopted in the member state.

So, the first task for each partner involved in this work package is the following:

- According to national choices made in the selected country (notably in terms of decoupling/coupling and cross-compliance criteria), ‘define’ the likely effects of the 2003–04 CAP reform on the agricultural sector of that country in terms of prices, quantities, incomes, farm numbers, farm size, agricultural employment (family and hired labour) and environmental impacts.

Scenario S1b. This is a ‘fully decoupled 2003–04 CAP reform’ scenario where one assumes that each member state chooses the full decoupling option for those sectors where the choice exists. In practice, the idea underlying country comparison in S1 is to analyse the spatially differentiated impact of the CAP reform as a result of national choices in terms of coupling/decoupling or cross-compliance criteria (or both). Then by comparing the potential effects on market and non-market indicators of scenarios S1 and S1b, one should be able, at least in theory, to ‘say something’ about the relative advantages/disadvantages of full decoupling (S1b) versus partial decoupling (S1) for a given country.

Following the WTO framework agreement of summer 2004 in Geneva, it appears that S1 is not very realistic, notably because the Geneva agreement includes the phasing out of export subsidies (at a date that still has to be negotiated) and increased market access through tariff reduction or tariff rate quota increases (or both). The agreement should not force the EU to revise its main domestic support policy as the SFP is included in the green box and the blue box is maintained. There are, however, significant implications for further reform to a number of key regimes, including dairy and sugar (and to a lesser extent beef and cereals), arising from this framework. Thus we have devised a scenario S2 along these lines.

Scenario S2. As far as domestic support is concerned, scenario S2 assumes, as scenario S1b does, full decoupling of pillar 1 measures. A conservative option would be to implement this decoupled support policy on a historical basis (S2 conservative). A more innovative option would be to assume that the SFP is implemented on a flat-rate basis at the national or regional levels, depending on the country and its size (S2 innovative). To simplify analysis and be consistent with the likely outcomes of the Doha round based on the framework agreement, we also assume that sugar and milk reforms have been fully implemented (production quotas are maintained but they are fully and freely transferable between the member states; domestic support is granted through decoupled direct aids only). We assume that export subsidies are suppressed and European market access is increased gradually over the six-year period (January 2007–January 2013) by forcing the EU to open its domestic market through quotas at reduced tariffs, at levels corresponding to 10% of domestic consumption.

With respect to scenario S1b, it is likely that scenario S2 will lead to decreases in domestic prices (through three mechanisms – decreased price support, suppression of export subsidies and increased imports). The main objective of this scenario S2 is then to assess the likely impacts of full decoupling in a context of reduced producer prices (relative to S1b) and also in a context of decoupling being extended to all European agricultural sectors and products.

One can expect from scenario S2, relative to scenario S1b, an increase of the rate of decrease in farm numbers and more land abandonment, notably in intermediate zones or less favoured areas. One can also expect more extensive (less intensive) farm practices and hence some positive environmental impacts. Yet, as one can also anticipate a decrease in farm numbers and an increase in farm size, negative impacts in terms of rural viability in areas where agriculture still plays an important role are likely, and this in turn could have negative environmental impacts.

Scenario S2b. Scenario S2b assumes, in addition, that pillar 1 decoupled measures are reduced by 20% by the 2013 horizon. Thus by comparing S2 and S2b, one should be able to say something about the ‘relative’ efficiency of decoupling, as regards multifunctionality.

Scenario S3. The assumptions for scenario S3 are those of scenario S2b, except that in place of the cuts in SFP, the EU transfers these funds (i.e. funds saved through a 20% decrease in pillar 1 measures) into pillar 2 measures specifically targeted to address environmental and social goals. In that context, the objective is then to evaluate the potential impact of this scenario on market indicators (prices, quantities and incomes), as well as multifunctionality indicators including farm structures (farm size, farm number and agricultural employment) and environmental indicators.

One can consider that the scenarios briefly described above are ‘additive’.

Scenario S1 can be used to analyse the likely impact of the 2003–04 CAP reforms on multifunctionality, relative to a benchmark situation corresponding to a policy where support is coupled to production choices (even if it is, for a large part, decoupled at the intensive margin) and cross-compliance requirements are weak. In that context, the question is whether the 2003–04 CAP reforms have had a positive impact on multifunctionality through reduced negative externalities (e.g. fertiliser and pesticide use), increased positive externalities (e.g. biodiversity enhancement and landscape preservation) and increased rural viability (e.g. through the maintenance of a ‘sufficient’ number of farms and a ‘sufficient’ level of agricultural employment). It would be very useful to link impacts to their main determinants, even if the link is only qualitative.

Scenario S1b should be used to complement scenario S1. More precisely, while scenario S1 compares the differentiated effects of CAP reform application in respect of national choices, scenario S1b addresses the same issue for a given country by contrasting a situation of full decoupling (S1b) versus partial decoupling (S1). Of course, these impacts also depend on cross-compliance criteria as well as pillar 2 measures, notably those directed at addressing environmental issues. For this reason, it is particularly important to describe the mechanisms that lead to results, notably the mechanisms that depend on policy instruments.

Scenario S2 should be used to ask whether the effects of the 2003–04 CAP reforms will be different in a situation where market prices in the EU are likely to be lower and more volatile. Further, scenario S2b should also be used to address the same issue in a situation where, in addition, decoupled payments are reduced (here by a significant percentage, such as 20%).

Scenario S3 then completes the story by analysing to what extent a shift of funds from pillar 1 to pillar 2 could ameliorate the situation viewed from a multifunctionality perspective (under the premise that scenarios S2 and S2b would not be ‘first-best’ scenarios in that respect).

All these options are now explored in more detail.

2.1 Scenario 1: Status quo

This is the easiest of the three scenarios to specify at the EU level (although the same cannot yet be said for national or regional levels), since it involves the implementation in full of the most recently agreed CAP reforms. This means, under the Luxembourg agreement:

- the adoption of partial or full decoupling for the main commodity regimes of beef, arable crops, sheep and goat meat (with member state discretion about the degree of decoupling selected and whether or not to use ‘national envelopes’);
- a series of staged price cuts in the dairy regime accompanied by the introduction of direct payments for this sector, which may or may not be rolled into the fully decoupled ‘single farm payment’ being introduced for the other main regimes at the member state level;
- the application of compulsory annual modulation of 3% in 2005, rising to 5% for 2007–13, of all direct payments under the commodity regimes in order to provide additional funds for pillar 2 rural development programmes under the CAP, with a franchise exempting the first €5,000 per beneficiary from this modulation; and
- the redistribution of funds raised by compulsory modulation back to the EU-15 according to objective criteria based on agricultural area, agricultural workforce and relative GDP per capita, but with the proviso that no individual member state should receive back less than 80% of its modulation contributions for use in its rural development programmes, subject to the required co-financing rules for such measures.

In addition, for the accession states joining the EU in May 2004, the status quo scenario involves implementing the recently agreed details of the accession treaties in respect of agriculture and its support in each of these countries. This will generally include:

- the introduction, in phases, of direct payments under the main CAP regimes to all eligible producers in these countries, with most countries opting to deliver these through a ‘simplified aid scheme’ that is fully decoupled from current production decisions (all but Malta and Slovenia have opted to use this);
- the application of agreed quotas and reference quantities specifying the global entitlement of producers in each country to the various CAP aids under the commodity regimes; and
- the implementation of new programmes for rural development in each of the countries using new funds agreed under the existing CAP budget, comprising both the rural development programmes of accompanying measures funded by European Agricultural Guidance and Guarantee Fund (EAGGF) guarantee budgets and the EAGGF guidance funded non-accompanying measures for rural development, which form part of the Operational Programmes for Objective 1 regions under the EU Structural Funds, 2004–06.

Furthermore, the status quo scenario will need to incorporate the most recently agreed reforms to some of the main southern regimes under the CAP, as agreed by the EU Council on 22 April 2004. These include:

- a partial decoupling of aid in the olive oil regime of at least 60%, to be offered to producers in the form of an area payment under the new SFP in respect of historic areas of olive trees in production, for all holdings over 0.3ha, and complete decoupling for all holdings under 0.3ha; the remaining aid is to be offered through national envelope ‘olive grove payment’ schemes;
- a partial decoupling of aid in the tobacco regime over a four-year transition period starting in 2006, leading to a minimum of 40% decoupling, then from 2010 to a complete decoupling, with 50% of aid going into the SFP and 50% moving into pillar 2 restructuring programmes;
- the 65% decoupling of aid in the cotton regime that is to be available for decoupled income aid, from which 35% is to be paid as a direct area premium for cotton; and
- a complete decoupling of hop aids from 2005 but with scope for creating national envelopes to target up to 25% of the aid.

In the light of current strong resistance to earlier Commission proposals, the status quo scenario would probably involve no reform of the sugar regime. Also, it seems reasonable to assume:

- no change to other key commodity regimes whose most recent major reform was completed prior to July 2003 – most notably, the wine regime and the regime for fruit and vegetables – and no *a priori* removal or elimination of export refunds and import tariffs to any commodity sector where these may currently apply; and
- no major change to pillar 2 policies, in line with the Luxembourg agreement of July 2003, enabling them to continue to support a diverse range of rural development and environmental management goals in each member state, but with a slowly growing budget and simplified implementation procedures (along the lines of the pillar 2 budget proposals set out in the Commission’s draft financial perspective and adding modulation monies in the case of the EU-15).

The recent financial perspectives document from the Commission envisages a total budget for 2007–13 for pillar 2 of around €5 billion for the EU-25, which (allowing for the impacts of enlargement) represents a modest overall increase in the budget available for these measures by comparison with the period 2000–06. The precise criteria to be used for the allocation of these resources between member states for the 2007–13 period is still to be decided, however, so it will be necessary to make some assumptions on this point for the purposes of modelling this scenario on national or regional levels. In most cases, modest or no real growth in pillar 2 budgets might be a reasonable assumption for the EU-15, with steady growth for the acceding countries.

2.2 Scenarios 1b and 2: Full decoupling and elimination of export subsidies

Under these scenarios the WTO agreement would involve the EU agreeing to adapt its current policy by implementing the full decoupling of its entire pillar 1 income- and production-support policies, but not reducing the size or significance of fully decoupled supports. In more detail, this would entail:

- the removal of amber box supports in those regimes where these still feature significantly – notably in respect of guaranteed prices, export refunds/import tariffs and production quotas for dairy products, sugar, tobacco and, to a lesser extent, for beef, olive oil, cotton and certain arable crops;
- the removal of all remaining direct payments for beef, dairy, arable crops, sheep and goat meat, olives, cotton and the removal of distillation supports and other similar, partially decoupled supports in the wine regime;
- by way of compensation for these changes, the significant growth of decoupled income support in all the member states that have not yet taken the decision to decouple completely, but following the agreed system for the SFP as described in the new legislation following the Luxembourg agreement.

2.3 Scenarios 2b and 3: Reduction of decoupled income support aids under pillar 1

Scenarios 2b and 3 would involve the EU agreeing to cut both amber and blue box support as in scenario 2, and in addition to reduce its decoupled income support to farmers by 20% over the period to 2013–15. Under scenario 3, it would simultaneously shift this share (20%) of pillar 1 support into payments that are more explicitly targeted to environmental and other social goals, as represented by the current pillar 2 of the CAP. The aim of such a move from the WTO perspective would be to remove the possibility that large income support payments, which are otherwise not strongly linked to the explicit delivery of public goods, would distort agricultural trade between EU producers and those in other countries. This shift of funds between CAP pillars would of course be in addition to the 3% per year compulsory modulation of funds already agreed for the EU-15 member states under the MTR reforms from 2005.

Given the uncertainties surrounding this final scenario 3, we suggest that it needs to be fairly crude. Thus in total, we suggest that the EU pillar 2 budget might be increased from its anticipated scale of roughly €3 billion for the EU-25 together 2007–13, to around €150 billion over seven years, or around €21 billion per year. At the same time, the decoupled income support as modelled for scenario 2 would be reduced by 20%.

The distribution of these funds between member states is, however, unlikely to exactly mirror the current distribution, given an expected rising share to be devoted to the new member states beyond 2007 and a probable adjustment of shares among the EU-15 countries to reflect policy developments since Agenda 2000. Thus, assumptions will need to be made for each country about the precise scale of increase of their pillar 2 budget, under an overall scenario in which the total EU-25 budget for rural development increases to €21 billion per year.

The likely range is probably between a less than 1.2-fold increase (e.g. for Austria) and a three-fold increase (e.g. for the UK) on the current annual spend for EU-15 countries, and a much greater increase for the new member states, to perhaps five times the current Rural Development Regulation spend for 2004–06 in total (under both EAGGF guidance and guarantee funded programmes combined).

3. Overview of existing models and multifunctionality indicators

Most of the existing models used for assessing the impact of trade negotiations focus on prices, incomes, production and environmental outcomes. The multifunctional aspects of policy reforms are usually reduced to a relatively narrow set of indicators mostly linked with environmental issues.

The *Finnish model DREMFIA* includes several indicators linked with the multifunctionality of agriculture. The list of indicators applied in the model is longer than in any of the other models described/used by our ENARPRI partners (Table 1).

In the case of *Greece*, two models were reported as usable for this exercise: both models are based on the Social Accounting Matrix technique, with the ability to model at both national and regional levels in Greece. The multifunctionality indicators that can be handled (directly and indirectly) by these models include: farm output and income levels, farm employment, rural income and employment, number of farms, agricultural land use and livestock density. There is also a possibility of deriving some indicators of pollution emissions by linking to another available model.

The *Ireland FAPRI model* can produce indicators for greenhouse gas emissions, forestry carbon sequestration, ammonia emissions and fertiliser usage, and is capable of dealing directly with the outcomes of international trade agreements rather than having to transform these into domestic policy changes. Yet the Irish model is less readily able to deal with the implications of some of the domestic policy scenarios outlined in this paper, especially where they involve making assumptions about CAP pillar 2 spend and its effects.

Table 1. Applied indicators derived from the DREMFIA model in the agricultural policy scenario analysis

Applied indicator	Measured quantity	Indicator reflecting	Strategic goal of indicator
Total number of animal units up to 2020	Animal units	The scale and long-term economic viability of aggregate animal production	To determine the relative economic viability of animal production in different policy scenarios
- Number of bovine animal units	Animal units	The scale and long-term economic viability of dairy and beef production	To determine the relative economic viability of dairy and beef production in different policy scenarios
- Number of pig animal units	Animal units	The scale and long-term economic viability of pig production	To determine the relative economic viability of pig production in different policy scenarios
- Number of poultry animal units	Animal units	The scale and long-term economic viability of poultry production	To determine the relative economic viability of poultry production in different policy scenarios
Total cultivated area (excluding set-aside) up to 2020	Hectares	Incentives for active crop production	Changes in incentives for active crop production
- Set-aside area	Hectares	Incentives for fulfilling cross-compliance criteria and minimising costs	Changes in incentives in fulfilling cross-compliance criteria and minimising costs in different policy scenarios
- Unused area	Hectares	Share of abandoned agricultural land owing to unprofitable production	Changes in the share of abandoned land owing to unprofitable production in different policy scenarios
- Grass area	Hectares	The scale of grass-feed production; incentives for grass-feed use and bovine animal production	Changes in the scale and incentives for grass-feed production in different agricultural policy scenarios
- Grain area	Hectares	The scale and incentives for grain production	Changes in the scale and incentives for grain production in different policy scenarios
Nitrogen balance on cultivated area ¹	kg/ha	Nitrogen-leaching potential from cultivated land	Changes in the nitrogen-leaching potential in different policy scenarios
Phosphorous balance on cultivated area ¹	kg/ha	Phosphorous-leaching potential from cultivated land	Changes in the phosphorous-leaching potential in different policy scenarios
Agricultural income	€millions	The level of economic activities in agriculture	Changes in the level of economic activity in different policy scenarios
Profitability coefficient ²	–	Profitability of agricultural production	Changes in the profitability of agricultural production in different policy scenarios
Labour hours in agriculture	Million hours	Social sustainability of farmers, the working conditions of agricultural labour	Changes in the number of people employed in agriculture in different policy scenarios
Agricultural income per hour of labour	€/hour	Economic and social welfare of farmers	Changes in the economic and social viability of agriculture in different policy scenarios

¹ The soil surface nitrogen and phosphorus balances are calculated as the difference between the total quantity of nitrogen or phosphorus inputs entering the soil and the quantity of nitrogen or phosphorus outputs leaving the soil annually, based on the nitrogen or phosphorus cycle.

² The profitability coefficient is a ratio obtained when the agricultural surplus is divided by the sum of the entrepreneur family's salary requirement and the interest requirement on the capital invested.

Source: Lehtonen, H., J. Aakkula & P. Rikkinen, *Alternative Policy Scenarios, Sector Modelling and Indicators: A Sustainability Assessment. Journal of Sustainable Agriculture*, forthcoming in 2005.

In *Poland*, agricultural policy has been modelled using the *i-sim model* prepared by a Bonn University team in cooperation with Polish, Czech and Hungarian partners, working together in the IDARA project. Indicators used relate to the volume and value of production, agricultural prices, land use, labour input, farm revenues and consumption levels. With the exception of labour input and possibly land use (depending upon the detail available), few of these would normally be useful as indicators for multifunctionality.

In *the Czech Republic*, farm-level modelling using linear programming methods has been used to examine policy-induced changes to a number of potential indicators of multifunctionality in Czech agriculture. These include grassland cover, stocking densities, farm labour force and farm incomes.

As an overview, it is clear that the ENARPRI partners involved in this work package would not be able to formally to model all the scenarios outlined in section 2 above with their current models (i.e. models that are currently used or under development in their institutions). The biggest modelling difficulties clearly apply to the later scenarios and to scenario 3 in particular because few models incorporate pillar 2 measures. Thus where this is the case, we will need to be more modest, by trying not only to use model results/simulations but also ‘ad-hoc’ information and qualitative/policy evaluative expertise (of partners and other relevant academic and stakeholder experts) to examine the multifunctionality implications of these scenarios.

Following OECD (2001),² multifunctionality indicators can be classified as follows:

- i) economic indicators (prices, product supplies, factor demands, production costs, value added and farm income);
- ii) primary factor use (agricultural land, arable land and meadows along with agricultural labour, family labour and hired labour);
- iii) environmental indicators (nitrate from manure, nitrate from mineral fertilisers, nitrogen and phosphorous balance, greenhouse gas emission, carbon storage in soil, biodiversity indexes, etc.);
- iv) farm structures (farm number, farm size, etc.); and
- v) farm management indicators (percentage of organic farms, soil cover in winter, livestock unit per hectare, etc.).

From our own expertise within the ENARPRI network, we would add another category to this list, namely cultural and social indicators (e.g. the maintenance of cultural heritage, the contribution of agriculture to the livelihood of rural areas, diversity of agricultural systems, field structures and settlement patterns). Table 2 attempts to give a first analysis of how all these kinds of indicators may be applied in the context of multifunctionality.

In principle, the impact of trade agreements on indicators such as these could be analysed using methods other than formal quantitative models, including case studies, cluster analyses and so on. In addition, there are at least four relevant scales for observing policy impacts on multifunctionality: the EU level, national level, regional level and single product level.

We have some instructive cases showing the consequences of trade liberalisation and policy changes on particular products and rural areas. For example, the abandonment of grassland as a result of the low profitability of cattle production and its impact on wildlife in north-east Poland, and the consequences of the collapse of sheep production in mountain areas on local culture and rural livelihoods.

Ideally, scenario development related to multifunctionality should use a range of methods, including conventional and non-conventional scenario building, to explore likely outcomes.

² See the report by the OECD, *Multifunctionality: Towards an Analytical Framework*, April 2001, Paris.

Table 2. Cultural and social indicators of multifunctionality

Category of indicator	Multifunctionality concern	Indicators used/potential indicators	Desired direction of change for multifunctionality
Economic	Agriculture makes a significant contribution to broader economic performance and viability in rural areas, sustaining rural communities.	Prices Product supplies Factor demands Production costs Total value added (TVA) Farm income	Prices are not directly relevant to multifunctionality Ditto Ditto Ditto As a measure of sector wealth/health, increases in TVA and farm income would be desirable (although household income would be a better measure than farm income, given pluriactivity).
Primary factor use	Agriculture has an important role in maintaining the rural landscape and providing rural employment.	Total agricultural land area Arable land versus permanent cover (meadows, etc.) Agricultural labour usage Family labour/hired labour, full and part-time or casual	Stability in the total land area is sought. No rapid or significant shifts between permanent and arable areas are sought, but in many cases, steady increases in permanent cover are desired to reverse past declines. Generally, retention or the increase of employment is desirable, although this depends upon the situation <i>vis-à-vis</i> other sectors and general trends (in a buoyant rural economy, decreases can be beneficial). Also, more permanent forms of employment are generally favoured and family labour is seen as culturally important in some areas (retention of the ‘family farm’).
Environment	Agricultural management has important effects upon the quality of the natural environment, including the protection of air, soils, water and biodiversity and affects broader environmental issues such as climate change.	Nitrogen balance Phosphorus balance Greenhouse gas emissions Area of land under erosion Grassland area Number of species per hectare Species diversity index	For most areas, decreases in nutrient balances (surpluses) are desirable as well as decreases in greenhouse gas emission from agriculture. A decrease in the area of land suffering soil erosion is desirable. Stability or small increases in grassland area are desirable (see box above for rationale). In most large-scale ecosystems, increases in the number of species per hectare or the diversity index are desirable. At a micro-level, however, certain ecosystems require relatively low numbers of species/diversity to preserve rare assemblages or individual species (oligotrophic lakes, upland moors, etc.).

Cultural and social	Agriculture is a longstanding activity in rural areas that has developed a unique role in influencing local culture and the values and heritage of rural social life.	<p>Agriculturally-linked customs and events</p> <p>Percentage of rural population/households connected with farming</p> <p>Proportion of locally sourced food sold in rural areas</p>	<p>Retention or increase of customs and events are generally desirable.</p> <p>A significant proportion of rural households with some connection to farming is generally seen as positive (although there are some potentially negative effects if this coincides with low incomes and few alternative employment opportunities).</p> <p>More food being sold in rural areas from local sources is desirable from a cultural perspective, preserving local identity.</p>
Farm structures	This is seen as a proxy indicator for economic, social and environmental effects, in that farm structural change is often strongly associated with significant economic, social and environmental changes in agriculture.	<p>Farm size (BSU and hectareage)</p> <p>Farm types by region/local area</p> <p>Level of diversification in farm businesses</p> <p>Balance between owner-occupancy/rented land</p> <p>Land ownership types</p>	<p>Small- or medium-sized farms are favoured over larger ones that benefit from economies of scale and may be less likely to contribute to multifunctionality.</p> <p>A diversity of farm types is better than homogeneity in most areas.</p> <p>Diversification of farm businesses is generally seen as an indicator of successful Multifunctionality.</p> <p>Contested views may claim one form of tenure is more conducive to multifunctionality than another; also the types and motivations of land owners could be relevant.</p>
Farm management	As for farm structures, this is another proxy indicator.	<p>Set-aside areas</p> <p>Land abandonment</p> <p>Livestock density</p>	<p>Land in set-aside (fallow) areas is positive in most intensively farmed landscapes but only up to a certain point.</p> <p>Small proportions of abandoned land in many areas are positive while large-scale abandonment is generally negative.</p> <p>Livestock densities should be in accordance with the environmental carrying capacity of different kinds of habitat – in many areas, decreases would now be desirable, but in a more limited range of marginal areas increases would be desirable.</p>

4. Remarks on trade liberalisation, multifunctionality and post-communist transformation in new member states

Trade liberalisation and the opening-up of the economy have played an important role in post-communist transformation in the new member states. This was a part of fundamental systemic changes in countries in transition. The systemic reforms have significantly contributed to the multifunctionality of agriculture, and it is not possible to separate the impact of trade negotiations (including GATT agreements) on the multifunctionality of agriculture in the Central and Eastern European countries (CEECs) from these systemic transformations.

In all the CEECs, a decline in agricultural production, a reduction of chemical use and the collapse of polluting industrial plants have improved environmental conditions in rural areas. The agricultural sector and rural communities have played a special and largely positive role in this adjustment process, adapting to the new systemic conditions. This phenomenon, linking agricultural adaptation with a broader economic and social transformation has been described as having a ‘shock absorber’ or ‘buffer’ role. This was a particularly important function of agriculture in those countries with a large small-farm sector. Poland is a ‘clinical’ case in this aspect of multifunctionality.

The CEECs’ integration within the EU is the next step in adjusting to a new trading regime with probably significant, but not well-defined effects on multifunctionality. Before assessing the impact of a Doha WTO agreement, it would be valuable to evaluate the impact of accession on the multifunctionality of agriculture in the new member states. For that we would need a two-stage scenario that:

- shows the CEECs’ adjustments to the present trade and policy conditions in the EU; and then
- analyses their adjustment to new trade conditions determined by the WTO negotiations.

This undoubtedly complicates any process of scenario development in our project, but would make it more realistic and useful for evaluating the impact of trade-related policy changes on multifunctionality.

ABOUT ENARPRI

ENARPRI is a network of European agricultural and rural policy research institutes formed for the purpose of assessing the impact of regional, bilateral and multilateral trade agreements concluded by the European Union or currently under negotiation, including agreements under the WTO, EU accession, Everything But Arms (EBA), EuroMed and Mercosur. It also addresses the wider issues of the multifunctional model of European agriculture and sustainable development of rural areas. Participants in the project include leading national institutes and research teams from 13 countries (11 EU member states and 2 accession countries).

AIMS

- Creation of an institutional structure linking key research institutes with major benefits for improved exchange of information and policy analysis both in the short and long run,
- Development of improved tools for impact assessment,
- More effective impact assessment of trade agreements on a variety of important social, economic, and environmental indicators and an assessment of multifunctionality, and
- Clearer analysis of the need for EU policy adjustments.

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- **AUA**, Agricultural University of Athens, Department of Agricultural Economics and Development (Greece)
- **CEPS**, Centre for European Policy Studies (Belgium)
- **FAL**, Federal Agricultural Research Centre (Germany)
- **FOI**, Danish Research Institute of Food Economics (Denmark)
- **IEEP**, Institute for European Environmental Policies (UK)
- **INEA**, Istituto Nazionale di Economia Agraria (Italy)
- **INRA**, Institut National de la Recherche Agronomique (France)
- **IRWIR PAN**, Institute of Rural and Agricultural Development/Polish Academy of Sciences (Poland)
- **LEI**, Landbouweconomisch Instituut (The Netherlands)
- **MTT**, Agrifood Research (Finland)
- **TEAGASC**, Rural Economy Research Centre (Ireland)
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The ENARPRI Network is financed by the European Commission under its 5th Research Framework Programme (contract no. QLRT-2001-02481).



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