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European Topic Centre on
Biological Diversity

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European Ecosystem Assessment scenario analyses

Background document for the EURECA Scenario Workshop on 13 and 14 October 2008

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The European Topic Centre on Biological Diversity (ETC/BD) is a consortium of nine organisations under a Framework Partnership Agreement with the European Environment Agency for the period 2004-2008
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INTRODUCTION

The following report has been prepared upon request from the European Environment Agency, as part of the 2008 work programme of the European Topic Centre on Biological (ETC/BD), task 3.2.5: European Ecosystem Assessment. The work has been entrusted to ECNC, as a partner of the ETC/BD

The loss of biological diversity is inextricably linked to the degradation of ecosystem services, the natural production capacity and regulating processes that are essential for sustainable use of the earth's resources and, ultimately, human well-being. Therefore the European Environment Agency has set up the EURECA process (European Ecosystem Assessment) of which the objective is to assess the state of ecosystems in Europe in 2010 and their possible development beyond 2010. EURECA should be an eye-opener, making policy makers and the wide public aware of the significance of well-functioning ecosystems for human well-being.

In order to assess ecosystem service flows, scenarios based on different assumptions regarding major drivers for biodiversity change have been developed as part of the EURECA process. The following report aims at analysing and assessing existing scenarios in relation to the relevance and potential application of the methodologies they employ. This scenario analysis is therefore intended to facilitate, and provide potentially valuable input to, this process. ECNC has compiled this inventory document which gives an overview of the selected scenario studies.

The contact persons of the different scenario studies were contacted and requested to set aside a small amount of time to provide the information regarding the scenario analysis that they had been or still are involved in. An explanatory document on the '*Indicators relevant to biodiversity*' criterion was sent along with the blank scenario study table to be completed by the respondent.

The following scenarios were subjected to the analysis:

- **ACCELERATES**: *Assessing climate change effects on land use and ecosystems: from regional analysis to the European scale.* This FP5 project studied the impact of climate change on land use and biological resources in managed ecosystems.
- **ALARM**: *Assessing LArge scale Risks for biodiversity with tested Methods.* FP6 Integrated project which aims at developing an integrated large scale risk assessment for biodiversity as well as terrestrial and freshwater

ecosystems as a part of environmental risk assessment, focusing on risks consequent on climate change, environmental chemicals, rates and extent of loss of pollinators and biological invasions.

- **ATEAM**: *Advanced Terrestrial Ecosystem Analysis and Modelling*. FP5 project whose main objective was to assess the vulnerability of human sectors relying on ecosystem services with respect to global change.
- **BioScore**: *Biodiversity impact assessment using species sensitivity scores.* This FP6 project aims to assess the impacts of Community policies on biodiversity in a cost-effective way. by developing a tool for linking pressures from policy sectors to the change in the)state of biodiversity as measured by the presence and abundance of individual species.
- **Bioscene**: *Scenarios for reconciling biodiversity conservation with declining agricultural use in the mountains of Europe*. Options for conservation of priority mountain species and habitats are configured into three conceptual policy scenarios.
- **BRANCH**: *Biodiversity requires adaptations in northwest Europe under a changing climate*. An INTERREG IIIB funded project, BRANCH brought together planners policy makers and scientists from England, France and the Netherlands, to show how spatial planning could help biodiversity to adapt to climate change.
- **CCE:** *Coordination Centre for Effects***.** The Data Centre of the International Cooperative Programme on Modelling and Mapping of Critical Levels and Loads and Air Pollution Effects, Risks and Trends in support to the work of the Convention on Long-range Transboundary Air Pollution (LRTAP) of the United Nations Economic Commission for Europe (UNECE).
- **COCONUT**: *Understanding effe**C**ts **O**f land use **C**hanges **ON** ecosystems to halt loss of biodiversity due to habitat destr**U**ction, fragmen**T**ation and degradation.* COCONUT is the sister of the MACIS project (see below). It synthesizes existing data about land use change and habitat fragmentation and the effects on biodiversity. With this information COCONUT develops decision tools and policy option - jointly with MACIS – for stopping biodiversity loss.
- **EnRisk:** *Environmental Risk Assessment for European Agriculture*. FP5 Concerted Action. Development and use of agri-environmental indicators and European datasets to identify the main environmental risk areas in Europe.
- **EUruralis**: EUruralis is a scenario study starting from four contrasting world visions for the EU27 for the next 30 years.
- **GLOBIO:** *Global Methodology for Mapping Human Impacts on the Biosphere*. The GLOBIO consortium aims at developing a global model for exploring the impact of environmental change on biodiversity. It is

designed to support UNEP's activities relating to environmental assessment and early warning.

- **IMAGE*:*** *Integrated Model to Assess the Global Environment*. An ecological-environmental framework developed by MNP[1] (NL) that simulates the environmental consequences of human activities worldwide.
- **MEA scope:** *Micro-economic instruments for impact assessment of multifunctional agriculture to implement the* Model of European Agriculture*. FP6 project which aims at* developing an integrated framework for the assessment of the multifunctionality impacts of the CAP reform.
- **MIRABEL**: *Models for Integrated Review and Assessment of Biodiversity in European Landscapes.*
- **PRELUDE:** *Land-use scenarios for Europe: Qualitative and quantitative analysis on a European scale***.** Based on input from key 'stakeholders' from across Europe, such as farmers, non-government organisations (NGOs), scientific researchers and policy makers, PRELUDE presents five future scenarios following the social knock-on effects of contrasting land use policy.
- **Scenar 2020:** *Scenario study on agriculture and the rural world.* A DG Agriculture survey which aims at identifying future trends and driving forces that will be the framework for the European agricultural and rural economy on the horizon of 2020.
- **SEAMLESS**: *System for Environmental and Agricultural modelling; Linking European Science and Science* is an FP6 project to develop a computerized framework to assess and compare, ex-ante, alternative agricultural and environmental policy options.
- **SENSOR:** *Sustainability Impact Assessment: Tools for Environmental, Social and Economic Effects of Multifunctional Land Use in European Regions*. FP6 Integrated project to develop science based ex-ante Sustainability Impact Assessment Tools (SIAT) to support decision making on policies related to multifunctional land use in European regions.

However, not all project coordinators or contact persons have responded to our request. The evaluations of BRANCH and MEA scope are therefore missing.

[1] Milieu en Natuur Planbureau (MNP) from April 2008 known as Planbureau voor de Leefomgeving (PBL) (in English known as Netherlands Environmental Assessment Agency)

OBJECTIVES

The objectives of the survey are:

1. To review the various scenario studies on biodiversity relevance compiled under different European frameworks
2. To suggest options for the most relevant scenario studies showing the state of European Ecosystems

ANALYSES OF THE SCENARIO STUDIES

The template of the scenario exercise is illustrated below (Fig. 1). Most of the descriptive fields need no explanation as the questions which are described in the fields on the right should be clear enough. However, some of the descriptive fields might be a little unclear and therefore these have been explained in brief:

- ***Driving forces addressed:*** Which environmental (or other) issue was the reason for this scenario study? (E.g. European agricultural intensification, increasing air pollution, etc.)

- ***Input parameters:*** Parameters that had been put into the model or study (e.g. fertilizer application, soot emissions, etc.). Since some studies included many parameters, not all of them have been listed, but only those that were considered to be the most relevant ones in relation to European biodiversity and ecosystems.

- ***Indicators relevant to biodiversity:*** Which of the 26 SEBI 2010 indicators, concluded from the first phase of SEBI 2010, have been (more or less) addressed in this scenario? These 26 SEBI2010 indicators were listed in a separate document, sent to the respondents, and were mentioned as follows:

    1. *Abundance and distribution of selected species: a) Common birds b) European butterflies*
    2. *Red List Index for European species*
    3. *Species of European interest*
    4. *Ecosystem coverage*
    5. *Habitats of European interest*
    6. *Livestock genetic diversity*
    7. *Nationally designated protected areas*
    8. *Sites designated under the EU Habitats and Birds Directives*

9. *Critical load exceedance for nitrogen*
10. *Invasive alien species in Europe*
11. *Occurrence of temperature-sensitive plant species*
12. *Marine trophic index of European seas*
13. *Fragmentation of natural and semi natural areas*
14. *Fragmentation of river systems*
15. *Nutrients in transitional, coastal and marine waters*
16. *Water quality in freshwater*
17. *Forest: Growing stock, increment and fellings*
18. *Forest: Deadwood*
19. *Agriculture: N-balance*
20. *Agriculture: Area under potentially sustainable management*
21. *Fisheries: European commercial fish stocks*
22. *Aquaculture: Effluent water quality from finfish farms*
23. *Ecological Footprint of European countries*
24. *Percentage of European patent applications for inventions based on genetic resources*
25. *Financing Biodiversity Management*
26. *Public awareness (title to be confirmed)*

TEMPLATE - NAME OF SCENARIO EXERCISE	
Short Description	
State of play	*Initiated, in progress, finished, publication date*
Summary	*Short summary of background and main features of this scenario exercise.*
Thematic focus	***What is the main thematic focus, topics addressed?***
Number of scenarios	*How many scenarios have been addressed?*
Spatial scale	*Which region is covered? At which resolution?*
Temporal scale	*For which time horizon are scenarios presented? Which time-steps?*
Driving forces addressed	
Input parameters	
Output	*Indicator tables, maps (land use, biodiversity, pressure)*

Indicators relevant to biodiversity	*Which indicators relevant to biodiversity are explicitly addressed and/or quantified?*	
Methodology		
Approach	***What methods were applied? Inductive (storyline-based) / deductive (logical matrix)***	
Participation of stakeholders	***Number, extent of involvement***	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futures
Models used	*Which models are used for quantification?*	
Organisation		
Initiators	***Framework of the survey (RTD project? DG Environment request or DG Agriculture?, national initiative …)***	
Leading organisation		
Participating organisations		
Contact person(s)		
Available information	*Links to websites, web publications, reports, articles etc.*	

Figure 1. Scenario exercise template

1. ACCELERATES

Assessing climate change effects on land use and ecosystems: from regional analysis to the European scale	
State of play	*Completed (6/30/2004)*
Summary	*The proposed project will study the impact of climate change on land use and biological resources in managed ecosystems. The integration of existing impact models of agriculture, forestry, species distribution and habitat fragmentation within a common framework will enable impacts to be synthesised across sectors, disciplines and global change problems. The principal deliverable will be a method for the integrated assessment of ecosystem vulnerability arising from environmental change in Europe. Vulnerability will be assessed using key physical and economic indicators at both the European and regional scales. Critical stress factors (or thresholds) of climate change will be derived from the integrated models. This will assist in the development of strategies for the sustainable management of land use change and nature conservation. The research will provide information supporting the conventions on climate change and biological diversity.*
Thematic focus	***Integrated assessment of climate change impacts on agricultural land use and species.***
Number of scenarios	*16 climate change scenarios were constructed from four global climate models (CSIRO2, HadCM3, CGCM2, and PCM) each considering the four 'marker' scenarios (A1FI, A2, B1, and B2) of the Intergovernmental Panel on Climate Change (IPCC) Special Report on Emissions Scenarios (SRES).*
Spatial scale	*Europe at a 10 minute lat/long resolution and six case study regions: Belgium, Denmark, the Belluno Valley, Italy, Almeria, Spain, the island of Lesvos, Greece, and East Anglia, UK at a 1km x 1km resolution.*
Temporal scale	*Consecutive 10-year mean time slices starting with the period 2001–2010 through to 2091–2100. Application of the impact models focused on three time slices: 2020, 2050 and 2080 which were based on a period of 10 years before the target years of 2020, 2050 and 2080.*
Driving forces addressed	*Climate change, land use change, socio-economic change (European scale scenarios of socio-economic development were constructed within the global framework of the IPCC SRES storylines including quantitative inputs to the agricultural land use change model, see Abildtrup et al., Env Sci & Policy, 9, 101-115).*
Input parame	*Climate (cloud cover, diurnal temperature range, precipitation, mean temperature and vapour pressure), land use (urban, cropland, grassland, bioenergy crops, forests and abandoned land), socio-economic (a long list including costs of fertiliser,*

Methodology		
Approach	***Scenarios were exploratory based on the SRES storylines***	
Participation of stakeholders	***Interviews with experts were used to create the quantitative socio-economic scenarios for Europe (see Abildtrup et al., Env Sci & Policy, 9, 101-115).***	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futures
Models used	*Models used for creating scenarios: GCMs for climate change scenarios. Land use change scenarios came from the ATEAM project (see Rounsevell et al., 2005, Agr Ecosyst Env, 107, 117-135), socio-economic scenarios based on downscaling SRES using expert judgement and pairwise comparison.*	

2. ALARM	
Assessing Large scale Risks for biodiversity with tested Methods	
State of play	*Started 2004, will end 1/2009, so far some 800 publications*

Organisation	
Initiators	***Funded by European Commission FP5***
Leading organisation	*Universite Catholique de Louvain - Departement de Geologie et de Geographie – Faculte des Sciences*
Participating organisations	*Silsoe Research Institute, UK; The Chancellor, Masters and Scholars of the University of Oxford, UK; National Institute of Meteorology and Hydrology, Bulgarian Academy of Sciences, Bulgaria; Universita degli Studi di Padova, Dipartimento di Agronomia Ambientale e Produzioni Vegetali, Italy; Research Institute for Soil Science and Agrochemistry, Department for Soil Physics and Technology, Romania; Szent Istvan University, Faculty of Economics and Social Sciences, Hungary; Mendel University of Agriculture and Forestry, Czech Republic; Danish Research Institute of Food Economics, Farm Management and Production Systems, Denmark; Institute of Agrophysics, Polish Academy of Sciences, Poland; Consejo Superior de Investigaciones Cientificas, Estacion Experimental de Zonas Aridas, Spain; University of the Aegean, Department of Environmental Studies, Greece*
Contact person(s)	*Mark Rounsevell* *T ++44 (0) 131 651 4468* *F ++44 (0) 131 650 2524* *E mark.rounsevell@ed.ac.uk*
Available information	*Links to websites, web publications, reports, articles etc.* *http://cordis.europa.eu/data/PROJ_FP5/ACTIONeqDndSESSIONeq112362005919ndDOCeq166ndTBLeqEN_PROJ.htm*

Summary	*Based on a better understanding of terrestrial and freshwater biodiversity and ecosystem functioning ALARM will develop and test methods and protocols for the assessment of large-scale environmental risks in order to minimise negative direct and indirect human impacts.* *Research will focus on assessment and forecast of changes in biodiversity and in structure, function, and dynamics of ecosystems. This relates to ecosystem services and includes the relationship between society, economy and biodiversity. In particular, risks arising from climate change, environmental chemicals, biological invasions and pollinator loss in the context of current and future European land use patterns will be assessed.* *There is an increasing number of case studies on the environmental risks subsequent to each of these impacts. This yields an improved understanding on how these act individually and affect living systems. Whereas the knowledge on how they act in concert is poor and ALARM will be the first research initiative with the critical mass needed to deal with such aspects of combined impacts and their consequences.* *Risk assessments in ALARM will be hierarchical and examine a range of organisational (species, ecosystems, biomes), temporal (seasonal, annual, decadal) and spatial scales (habitat, region, continent) determined by the appropriate resolution of current case studies and databases.* *Socio-economics as a cross-cutting theme will contribute to the integration of driver-specific risk assessment tools and methods and will develop instruments to communicate risks to biodiversity to end users, and indicate policy options to mitigate such risks.*
Thematic focus	***Risks to biodiversity from climate change, land use, chemicals, invasive species and pollinator loss, and their interaction, under three policy scenarios.***
Number of scenarios	*Three core scenarios, three shock scenarios*
Spatial scale	*We combine global climate and econometric models with European land use and smaller scale biological models. The results are presented on a larger scale, but the calculation base is a 1° grid*
Temporal scale	*Econometric models work with annual data, seasonal variations are part of the land use models, and the climate models have even finer tuning. The econometric model is calculated up to 2020 and extrapolated to 2050, the land use runs to 2080 and the climate models to 2100.*

Driving forces addressed	*Three levels of drivers are distinguished, from general trends (e.g. ageing society and population) via policy orientations (neo-liberal, pragmatic muddling through, sustainability to policies (transport, infrastructure, agriculture, economic, social, trade, nature conservation, chemicals, …))*	
Input parameters	*For the econometric model; exchange rate, energy price. It provides data to the land use model and vice versa. Nitrogen deposition is dependent on land use, the climate models are essentially SRES IPCC models*	
Output	*Scenarios, Risk Assessment Toolkit (Maps showing land use, climate, water deficit change, plus the risk for species groups and ecosystem types resulting from pressure families (under each scenario for 2020, 2050 and 2080. Invasibility criteria. Risk distributions and interactions. Damage cost calculations, Case studies of extinction risks, …*	
Indicators relevant to biodiversity	*Indicator field test of socio-economic indicators showed little relevance of accessibility, ownership structure and the general availability of knowledge. Energy balancer and regional material flows may be more important, a Land Use Intensity LUI indicator has been developed and tested in a limited number of field sites.* *3. Species of European interest* *4. Ecosystem coverage* *5. Habitats of European interest*	
Methodology		
Approach	***Essentially SAS approach, with some modifications. The climate scenarios were predefined, but we made no use of the SRES storylines. For land use, MOLLUSC, a scenario generator was developed.***	
Participation of stakeholders	***Regular consultation with the Consultative Forum, including scientists, decision makers, consumer organisations, environmental NGOs and trade unions***	
Type of Scenarios	Qualitative/narrative: all include qualitative storyline	Quantitative: all scenarios
	Anticipatory/normative: SEDG Scenario (sustainability)	Exploratory: GRAS scenario (liberal)

	Baseline and policy variants Base: BAMBU (Business as might be usual), SEDG and GRAS as policy variants	Range of alternative futures: wide including the three shocks: environmental – TRHC collapse (modelled), economic – Peak Oil, Social - Pandemic
Models used	*Several IPCC models for climate, GINFORS for econometric, Mollusc for landf use, others for biodiversity risk and nitrogen deposition*	
Organisation		
Initiators	***DG RES FP 6 IP***	
Leading organisation	*UFZ Helmholtzzentrum für Umweltforschung, participating 68 institutes from 35 countries (about 250 scientists)*	

Participating organisations	*Centre for Environmental Research Leipzig-Halle, Germany; Lund University, Sweden; Catholic University of Louvain, Belgium; National Environmental Research Institute, Denmark; University of Milano Bicocca, Italy; Natural Environmental Research Council, Centre for Ecology and Hydrology, UK; Institute of Botany, Academy of Sciences of Czech Republic, Czech Republic; Georg-August University of Göttingen, Germany; University of the Aegean, Greece; Sustainable Europe Research Institute, Austria; Estonian Institute for Sustainable Development, Estonia; Centre for Cartography of Fauna and Flora, Slovenia; University of Leeds, UK; Biomathematics & Statistics Scotland, UK; OLANIS Expert Systems LTD., Germany; Finnish Environment Institute, Finland; Finnish Meteorological Institute, Finland; University of Castilla-La Mancha, Spain; University of Hannover, Germany; University of Umea, Sweden; Swiss Federal Institute of Technology, Switzerland; Center for Ecological Research and Forestry Applications, Spain; University of Evora, Portugal; University of Vienna, Austria; Potsdam Institute for Climate Impact Research, Germany; Jagiellonian University, Poland; Bourgas University, Bulgaria; Lancaster University, Environmental Science Dept., UK; Utrecht University, the Netherlands; University of Stockholm, Sweden; University of Bern, Switzerland; Klaipeda University, The Coastal Research and Planning Institute, Lithuania; Zoological Institute of the Russian Academy of Sciences, Russia; CAB International, UK; Marine Organism Investigations, Ireland; University of Reading, School of Agriculture, UK; National Institute of Agronomic Research; France; Martin-Luther-University Halle-Wittenberg, Germany; Swedish University of Agricultural Sciences, Sweden; University of Haifa, Israel; University of Versailles Saint Quentin en Yvelines, France; Autonomous University of Barcelona, Spain; PENSOFT Publishers, Bulgaria; Katholieke Universiteit Leuven, Belgium; Institute of Nature Conservation, Polish Academy of Sciences, Poland; Tartu University, Inst. Of Botany and Ecology, Estonia; Institute of Biological Research, Romania; L.U.P.O. GmbH, Germany; Centre for Ecological Research, Polish Academy of Sciences, Poland; University of Concepcion, Chile; Argentinean Institute of Arid Lands Research, Argentina; Procter & Gamble European Technical Centre, Belgium; The Natural History Museum, London, UK; University of York, UK;*

Contact person(s)	*Project contact person:* *Josef Settele* *T ++49 (0)345-558-0* *E Joasef.settele@ufz.de* *Scenarios contact person:* *Joachim Spangenberg* *T +49 (0)221-2168-95* *E Joachim.Spanmgenberg@ufz.de*
Available information	*http://www.alarmproject.net/alarm/*

3. ATEAM	
Short Description	
State of play	*Finished and published in 2004.*
Summary	*Ecosystems provide a number of vital services for European people and society. Global environmental changes such as climate change, land use change and atmospheric pollution can have significant effects on these ecosystem services. For example, the capacity of European ecosystems to provide fresh water, agricultural products, biodiversity and recreational opportunities is likely to be affected by global change.* *Many people and organisations in Europe have a direct interest in the well-functioning of ecosystems. The ATEAM project is concerned with the risks that global change poses to the interests of these stakeholders. By assessing the vulnerability to global change of sectors relying on ecosystem services, ATEAM will support stakeholders in their decision-making and will promote sustainable use of ecosystems.*
Thematic focus	***Effects of global change on ecosystem services.***
Number of scenarios	*Multiple scenarios of global change.*
Spatial scale	*EU15 plus Norway and Switzerland.*
Temporal scale	*Baseline 1990, future time slices 2020, 2050 and 2080.*
Driving forces addressed	*Global change.*
Input parameters	*The input included a range of data sets (climate, atmospheric CO2 concentration, nitrogen deposition, soil properties, terrain, land cover, land use, land use scenarios, land use history, socio economic scenarios) which were based on a large amount of parameters which have been utilised in these scenarios.*

Output	*Figures, tables and maps.*	
Indicators relevant to biodiversity	*1. Abundance and distribution of selected species: a. Common birds b. European butterflies* *3. Species of European interest* *7. Nationally designated protected areas* *17. Forest: Growing stock, increment and fellings*	
Methodology		
Approach	***What methods were applied? Inductive (storyline-based) / deductive (logical matrix)***	
Participation of stakeholders	***A total of 58 stakeholders (corporation representatives and consultants, policy advisers, environmental resource/park managers, farmers/foresters, NGOs, journalists and academics) were involved from the very beginning through a number of workshops and other interactions and this has been continued, intensified and evaluated.***	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futures
Models used	*Land use change scenario, SUNDIAL, ROTHC, IMAGE, GOTILWA+, EFISCAN, LPJ, Mac-pdm, statistical niche modelling and RHESsys.*	
Organisation		
Initiators	***EC FP5 Project***	
Leading organisation	*Potsdam Institute for Climate Impact Research, Germany (PIK)*	

Participating organisations	*Centre d'Ecologie Fonctionnelle et Evolutive, France (CEFE); Eidgenössische Technische Hochschule, Switzerland (ETH); Wageningen University, The Netherlands (WU); Max Planck Institut für Biogeochemie, Germany (MPI-BGC); Lund University, Sweden (LU); Université Catholique de Louvain, Belgium (UCL); Centre de Recerca Ecològica i Aplicacions Forestals, Spain (CREAF); Institute of Arable Crops Research, United Kingdom (RES); University of Southampton, United Kingdom (SOTON); Universidad de Castilla-La Mancha, Spain (UCLM); European Forest Institute, Finland (EFI); Finnish Environment Institute, Finland (SYKE); Laboratoire des Sciences du Climat et de l'Environnement, France (LSCE); Silsoe Research Institute, United Kingdom (SRI); Tyndall Centre for Climate Change Research, United Kingdom (UEA); University of Sheffield, United Kingdom (US); University of Georgia, USA (UGA)*
Contact person(s)	*Prof. Dr. Wolfgang Cramer (project leader)* *T +49-331-288-2521/2637* *F +49-331-288-2600* *E Wolfgang.Cramer@pik-potsdam.de* *Dagmar Schröter* *E Dagmar.Schroeter@pik-potsdam.de*
Available information	http://www.pik-potsdam.de/ateam/

4. Bioscene	
Scenarios for reconciling biodiversity conservation with declining agricultural use in the mountains of Europe	
State of play	*Finished*
Summary	*Europe's mountain biodiversity is central to Natural 2000 and the European Biodiversity Strategy. Decline in agricultural use in mountain areas has dramatic biodiversity consequences including threats to priority species and semi-natural habitats but also opportunities for reintroduction of large mammals and habitat restoration. The project objective is to develop and evaluate strategies for reconciling conservation of mountain biodiversity with declining agriculture. Options for conservation of priority species and habitats are configured into three conceptual policy scenarios; business as usual, managed decline and biodiversity enhancement. Biodiversity consequences are predicted using advanced ecological modeling. Scientific, economic and policy feasibility and public acceptability are evaluated through an innovative sustainability appraisal. Practical outputs are ensured through the participation of stakeholder panels.*
Thematic focus	***Biodiversity conservation in mountain agricultural landscapes***
Number of scenarios	*3 scenarios: Business as usual, Liberalization, Nature conservation*
Spatial scale	*The case studies in 6 countries: France (Causse Méjan), Norway (East Jutenheimen), and Switzerland (Mid Grisons), Scotland (Cairngorms), Slovakia (Bukovské vrchy mountains), Greece (Pindos mountains). The size of individual studied areas varied, generally can be said that typical size was several hundreds km^2. The target resolution for landscape analysis was 1:25 000, some partners worked in more detailed scale (up to 1:5.000).*
Temporal scale	*25 years – scenarios are for year 2030*
Driving forces addressed	*Agriculture decline, agriculture liberalization, subsidies to agriculture, funding of nature conservation.*
Input parameters	*Land cover maps, habitat and species distribution, socio-economic analysis, maps of environmental parameters (relief, geology, geomorphology, climate etc.)*

Output	*Predictive land cover maps, predictive habitat and species distribution maps, landscape visualisation, conversion table for land cover changes, strategy for sustainable development, economic assessment*	
Indicators relevant to biodiversity	*1. Abundance and distribution of selected species* *4. Ecosystem coverage* *5. Habitats of European interest* *13. Fragmentation of natural and semi natural areas*	
Methodology		
Approach	***Ecological modelling on levels of landscape, habitats and species using several statistical and modelling methods (logistical regression, classification and regression trees, Ecological Niche Factor Analysis), narratives of socio-economic development, sustainability strategy development***	
Participation of stakeholders	***In each study area, 3 meetings with stakeholders were organised in different periods of the project duration***	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futures
Models used	***Logistical regression, classification and regression trees, Ecological Niche Factor Analysis***	
Organisation		
Initiators	***Framework Programme 5 project***	
Leading organisation	*Imperial College of Science, Technology and Medicine, UK*	
Participating organisations	*Centre National de la Recherche Scientifique, France; University of Macedonia, Greece; Aristotle University of Thessaloniki, Greece; Norwegian University of Science and Technology, Norway; Centre for Rural Research, Norway; Fundacao da Faculdade dde Ciencias e Tecnologia da Univesidade Nova de Lisboa, Portugal; Natural Environment Research Council, UK; Swiss Federal Institute for Forest, Snow and Landscape Research, Switzerland; Intitute of Landscape Ecology of the Slovak Academy of Science, Slovakia*	

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Available information	http://cordis.europa.eu/data/PROJ_FP5/ACTIONeqDndSESSIONeq112362005919ndDOCeq1641ndTBLeqEN_PROJ.htm

5. BioScore	
Biodiversity impact assessment using species sensitivity scores	
State of play	*In progress*
Summary	*Biodiversity indicators and monitoring frameworks are currently developed at global and European levels. A key tool for monitoring progress in achieving the EU target to halt the loss of biodiversity by 2010 is the set of EU headline biodiversity indicators. A requirement by the EU is to complement the indicator set and the development of biodiversity monitoring frameworks with tools that are able to assess the impacts of Community policies on biodiversity in a cost-effective way.* *The BioScore project responds to this requirement by developing a tool for linking pressures from policy sectors to the (change in the) state of biodiversity as measured by the presence and abundance of individual species. The BioScore tool contains a database with information on the ecological preferences of individual species in relation to individual sectoral pressures and relating to selected Community policies as well as the EU headline biodiversity indicators. This tool is applied for assessing impacts and the effectiveness of biodiversity conservation policies based on historic data as well as for forecasting future impacts based on existing scenario studies. The results of these assessments are presented in European maps. The BioScore tool will be integrated into existing biodiversity monitoring frameworks and incentives for uptake will be formulated. Furthermore, the tool will be made freely accessible on the Internet.*
Thematic focus	***Biodiversity impacts of EC policies***
Number of scenarios	*Two biofuel scenarios addresses in case studies. Numerous scenarios can be designed by the user of the tool by modifying individual environmental variables.*

Spatial scale	*EEA region, potentially up to 1 km* ^{2}	
Temporal scale	*Case studies with biofuel scenarios up to 2030, no intermediary steps*	
Driving forces addressed	*Numerous, to be selected by user (e.g. biofuels production, afforestation, air pollution, water pollution)*	
Input parameters	*14 environmental variables, species distribution data, species sensitivity to environmental variables*	
Output	*Maps of potential distribution of suitable habitat, tables with affected species (groups), graphs with relative numbers of affected species*	
Indicators relevant to biodiversity	*1. Abundance and distribution of selected species: a) Common birds b) European butterflies* *3. Species of European interest* *4. Ecosystem coverage* *5. Habitats of European interest* *9. Critical load exceedance for nitrogen* *11. Occurrence of temperature-sensitive plant species* *13. Fragmentation of natural and semi natural areas* *16. Water quality in freshwater* *19. Agriculture: N-balance*	
Methodology		
Approach	***Deductive***	
Participation of stakeholders	***9 project partners (science); 15 steering group members (policy and end users)***	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futures
Models used	*?*	
Organisation		
Initiators	***RTD project***	
Leading organisation	*ECNC-European Centre for Nature Conservation*	

Participating organisations	*Project team:* *MNP - Netherlands Environmental Assessment Agency; INBO/BCEurope - Research Institute for Nature and Forest/Butterfly Conservation Europe, Belgium; WI - Wetlands International; Alterra - Green World Research, the Netherlands; NINA - Norwegian Institute for Nature Research; UniRoma1 - University of Rome, Department of Animal and Human Biology, Italy; EFI - European Forest Institute; EKBY - Greek Biotope/Wetland Centre, Greece* *Steering group:* *European Commission DG Environment; European Commission DG Research; European Commission DG Agriculture; European Commission DG Energy & Transport; European Commission DG Eurostat; European Commission DG Joint Research Centre; European Environment Agency; UNEP World Conservation Monitoring Centre; BirdLife International; Plantlife International; Finnish Forest Research Institute; EUMon project; BioPress project; Eurolimpacs project; MACIS project: Ingolf Kuehn*
Contact person(s)	*Mark Snethlage* *E* Snethlage@ecnc.org *Ben Delbaere* *E* Delbaere@ecnc.org
Available information	*Links to websites, web publications, reports, articles etc.* http://www.ecnc.org/Bioscore/ www.bioscore.eu

6. BRANCH

7. CCE	
Coordination Centre for Effects	
State of play	*The Coordination Centre for Effects (CCE) is the programme centre of the International Cooperative Programme on Modelling & Mapping (ICP M&M) of Critical Levels and Loads and Air Pollution Effects Risks and Trends under the Convention on Long-range Transboundary Air Pollution (http://www.unece.org/env/lrtap/welcome.html). CCE products are used in support of the review and revision of effect based protocols of air pollutants under the Convention LRTAP and of the Thematic Strategy on Air pollution of the European Commission.*
Summary	*The Coordination Centre for Effects (CCE) was offered by the Dutch Ministry of Housing Spatial Planning and the Environment (VROM) to the Convention on Long-range Transboundary Air Pollution (LRTAP Convention), which established the CCE in 1990. The CCE develops modelling methodologies and databases of critical loads and indicators for air pollution effects on European natural areas. More detailed information about the methods, data and results of the CCE, about its mandate and international network and about its publications is provided at www.mnp.nl/cce until 2009 and www.pbl.nl/cce afterwards.*

Thematic focus	***The thematic focus of the CCE is on the development of modelling methodologies for - and databases of – air pollution effects on biodiversity of natural areas in Europe. Critical loads for acidification, eutrophication and heavy metal deposition are modelled and mapped by the CCE in collaboration with a broad European network of scientific institutions and National Focal Centres. CCE results are used in integrated assessment models that are used in support of European air pollution abatement policies of the UNECE Convention on LRTAP and the European Commission.***
Number of scenarios	*Critical loads are not scenario dependent. A Critical load is a quantitative estimate of an exposure to deposition of an air pollution compound below which harmful effects in ecosystem structure and function does not occur according to present knowledge. European critical loads and other CCE results are used to assess scenario dependent risks of air pollution effects. These assessments have recently been made in support of recent scenario analyses for the revision of the EC-NEC Directive and are currently being prepared for the revision of the "Protocol to abate acidification, eutrophication and ground-level ozone, done in Gothenburg (1999)" under the LRTAP-Convention. CCE results have earlier been used in scenario analyses that supported policy developments under the EC-Acidification Strategy, under the "Protocol on the reduction of sulphur emissions" (Oslo, 1994) and under the Gothenburg protocol mentioned earlier.* *CCE results have also been used in support of one of the EEA Core Set Indicators and "Streamlining European 2010 Biodiversity Indicators" (SEBI2010).*
Spatial scale	*The 2008 European database of Critical loads consists of about 1.1 million data points distributed over European natural areas that are classified according to the European Nature Information System (EUNIS), covering about 4 million km^2 in the European domain under the Convention LRTAP domain and about 2 million km^2 in the European Union of 27 Member States.*

Temporal scale	*Critical loads are time independent. The risk of effects of the deposition of heavy metals, acidifying compounds or eutrophying compounds (i.e. exceedance of critical loads) can be assessed in a comparative-static way for any target year for which information on deposition is available. In addition to the use of critical loads, Dynamic models (of soil chemistry) are available to provide information on time delays of damage and recovery caused by emission- scenario dependent changes in critical load exceedances. Assessments of critical load exceedances and of the dynamics of soil chemistry can cover a period that starts in 1880. Important years for the integrated assessment of emission reductions are 1990, 2000, 2010 and 2020.*
Driving forces addressed	*Critical loads are computed using information on soil chemistry and inputs regarding meteorology (precipitation, temperature) and land cover. Scenario analysis in support of European air pollution abatement policies includes energy use, energy mix and national emissions as important driving forces.*
Input parameters	*Information on input parameters for the CCE computation and mapping of critical loads can be found in e.g. Appendix B of CCE Progress Report 2007, pp.191-197, downloadable from www.mnp.nl/cce until 2009 and www.pbl.nl/cce afterwards.*
Output	*Tables and European maps of critical loads, emission scenario dependent exceedances of critical loads and preliminary maps of scenario dependent species richness*
Indicators relevant to biodiversity	*3. Species of European interest* *9. Critical load exceedance for nitrogen* *(Exceedance of critical loads for acidification (eq $ha^{-1}a^{-1}$), Exceedance of critical loads of nutrient nitrogen (eq $ha^{-1}a^{-1}$) and species richness (%))*
Methodology	
Approach	***See the "Mapping Manual" at www.icpmapping.org. Also see the report on the interim modelling methodology of the "European Consortium for Modelling Air pollution and Climate Strategies (EC4MACS) at http://www.ec4macs.eu/home/reports.html?sb=18***
Participation of stakeholders	***Participation of stakeholders is operated in (a) yearly CCE workshops that are attended by representatives of 29 National Focal Centres,***

	research institutions and policy analysts, (b) yearly meetings of the Task Force on the Modelling and Mapping of Critical Levels and Loads and Air Pollution Effects Risks and Ttrends (c) meetings of the Task Force on Integrated Assessment Modelling, and (d) other meetings and workshops under the LRTAP Convention.	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futures
Models used	*The CCE Environmental Impact Assessment methodology is used for the calculation of critical loads and effect indicators. The Greenhouse Gas Air pollution Interactions and Synergies (GAINS) model at IIASA is used for the integrated assessment of emission abatement scenarios.*	
Organisation		
Initiators	***The Convention on Long-range Transboundary Air Pollution and the Dutch Ministry of Housing Spatial Planning and the Environment.***	
Leading organisation	*The CCE is located at Netherlands Environment Assessment Agency (PBL).*	
Participating organisations	*Working Group on Effects (WGE) of the UNECE Convention LRTAP; Alterra, the Netherlands**;** International Institute for Applied Systems Analysis, Austria; Dutch Ministry of Housing, Spatial Planning and the Environment (VROM), the Netherlands; EMEP/MSC-W**,** Norwegian Meteorological Institute, Norway; EMEP/MSC-E, Russia; National Focal Centres and other international research institutions.*	
Contact person(s)	*Dr. Jean-Paul Hettelingh, Head Coordination Centre for Effects* *T +31 (0)30 274 3550 or +31 (0)30 274 3147 (Secretariat CCE)* *F +31 (0)30 274 4433* *E j.p.hettelingh@mnp.nl until 2009 and j.p.hettelingh@pbl.nl afterwards.*	
Available information	*Links to websites, web publications, reports, articles etc. http://www.mnp.nl/cce/ until 2009 and www.pbl.nl/cce afterwards.*	

8. COCONUT	
Understanding effeCts Of land use Changes ON ecosystems to halt loss of biodiversity due to habitat destrUction, fragmenTation and degradation	
State of play	*In progress. Project end date 2009-04-01*

Summary	*To stop biodiversity declines and meet future challenges, a better understanding is needed on how biodiversity is affected by historic and current land use changes. In the COCONUT project we will (1) gather existing and new data on both historic and current species richness and land use (GIS) across Europe, (2) synthesise these data and perform meta-analyses to assess the extent of biodiversity loss and to understand how land use change affects biodiversity change, 3) use the results to parametrise predictive models to project future land use and biodiversity change in response to socio-economic scenarios, 4) based on these results, and in close collaboration with key policy makers at the European level throughout the project, develop decision tools and policy options for main EU-policy areas for mitigating biodiversity loss. Relevant policy areas are agriculture, environment, rural development, transport and energy.* *Historic time lags in extinction patterns (extinction debts) will be investigated. For this purpose, detailed data will be collected in five case study areas on extent of habitat loss, fragmentation and degradation and impacts on biodiversity as a result of historic land use changes dating up to 100 years back. European scale effects of habitat loss will be explored by data mining of Natura 2000 and other available data bases on biodiversity and land use. Meta-analyses of existing data on land use and diversity of plants, invertebrates and birds will be performed in synthesis workshops to which external data holders are invited. These results, that are largely lacking today, will be used to parametrise biodiversity models that predict risk of species extinction in land use scenario models. Policy experts and stakeholders will be involved early on and throughout the project. Policy oriented workshops together with a policy advisory board will provide a framework for continuous dialogue between scientists and policy makers throughout COCONUT. We aim to develop support tools and deliver scientific results to underpin policy options that will minimize and mitigate biodiversity loss resulting from future land use changes.*

Thematic focus	***Assessment of change in grassland biodiversity***	
Number of scenarios	*Probably 2 or 3, based on the ALARM scenarios*	
Spatial scale	*A total of approximately 110 circles with 2km radius including grassland habitat patches, in the following countries: Sweden, Finland, Spain, Germany, and Estonia.*	
Temporal scale	*2020 or 2030*	
Driving forces addressed	*Land use change, possibly including changes in agricultural management*	
Input parameters	*Present land use, climate, soil, present grassland species richness (plants, butterflies, and bees)*	
Output	*Tables, graphs, land use maps for the study sites*	
Indicators relevant to biodiversity	*1. Abundance and distribution of selected species: a) Common birds b) European butterflies* *3. Species of European interest* *5. Habitats of European interest* *8. Sites designated under the EU Habitats and Birds Directives* *13. Fragmentation of natural and semi natural areas (Land use within the study sites (i.e. surrounding the focal grasslands habitats); Abundance and distribution of selected species groups: butterflies, moths, wild bees, and vascular plants.)*	
Methodology		
Approach	***Spatially down-scaled ALARM scenarios at 250m resolution will be combined with rule-based thematic downscaling and allocation rules***	
Participation of stakeholders	***Stakeholders are not directly involved in the scenario modelling, but policy experts from IUCN, Bird Life International, EPBRS, EEA and Commission DG representatives are involved in a policy stakeholder advisory board in the project.***	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futures
Models used	*ALARM scenario framework; GAM for biodiversity modelling*	
Organisation		

Initiators	***FP6 STREP***
Leading organisation	*Swedish University of Agricultural Sciences, Sweden*
Participating organisations	*University of Bayreuth, Germany; University of Tartu, Estonia; Centre for ecological research and forestry applications, Spain; GISAT, Czech Republic; Helmholtz Centre for Environmental Research, Germany; University of Reading, UK; Suomen Ympäristökeskus, Finland; Pensoft Publishers, Bulgaria; Stockholm University, Sweden; University of Edinburgh, UK*
Contact person(s)	*Dr. Riccardo Bommarco* *T +46-(0)18-672423* *F +46-(0)18-672890* *E* Riccardo.Bommarco@ekol.slu.se
Available information	http://www.coconut-project.net

9. EnRisk	
Environmental Risk Assessment for European Agriculture	
State of play	*Completed*
Summary	*The EnRisk project – Environmental Risk Assessment for European Agriculture was finalised in October 2004 and the project report has been published. This project, coordinated by ECNC, was funded by the European Commission as a Concerted Action under the theme 'Quality of Life and Management of Living Resources' of the Fifth Framework Programme for Research, Technological Development and Demonstration Activities. This report, written by a team of international environmental experts and conservationists, describes an innovative methodology and the results of a three-year study that applied agri-environmental indicators and European datasets to identify the main environmental risk areas in Europe. It covers soil erosion, nutrient enrichment, pesticide use and their integrated risks for biodiversity and landscapes. The project aimed at answering the following questions: ·Which regions in Europe are at highest environmental risk due to agricultural practices? ·What components of agriculture cause the main harm? ·How can risks be identified and reduced? The book lists recommendations for improved data collection, monitoring and processing as well as for policy measures, and provides a useful source of information for policymakers and scientists with an interest in agri-environmental data and policies at a European scale.*
Thematic focus	***Agriculture and environment: pesticides, fertilizers, livestock density.***
Number of scenarios	*None; Risk maps were produced by combining sensitivity indicators with actual pressure maps.*
Spatial scale	*EEA region*
Temporal scale	*None*
Driving forces addressed	*Agricultural intensification*
Input parameters	
Output	*In aggregated terms: soil erosion risk maps, eutrophication risk maps, pesticide risk maps, breeding bird risk maps, landscape diversity risk maps*
Indicators relevant to biodiversity	*1. Abundance and distribution of selected species: a) Common birds b) European butterflies* *4. Ecosystem coverage (land cover)* *9. Critical load exceedance for nitrogen* *19. Agriculture: N-balance*

Methodology		
Approach	***Deductive; Map overlays of sensitivity indicators with pressure indicators***	
Participation of stakeholders	***Six key end users participated in steering group: Eurostat, EC DG Agriculture, JRC, OECD, EEA, UNEP-WCMC. Half-yearly meetings. One user workshop was held.***	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futures
Models used	*Map overlays*	
Organisation		
Initiators	***RTD project***	
Leading organisation	*ECNC-European Centre for Nature Conservation*	
Participating organisations	*IBF-Institute for Soil Research, University of Agricultural Sciences, Vienna, Austria; LEI-Agricultural Economics Research Institute, Wageningen University and Research Centre, the Netherlands; CIAM-Centro de Investigaciones Ambientales de la Comunidad de Madrid 'Fernando Gonzalez Bernáldez', Spain; LEG-Laboratory for Experimental Geomorphology, Catholic University of Leuven, Belgium; The NatureBureau, UK; BBA-Federal Biological Research Centre for Agriculture and Forestry, Germany; EUCC-the Coastal Union; Alterra, the Netherlands; NHM-The Natural History Museum, UK; UNEP-WCMC-World Conservation Monitoring Centre*	
Contact person(s)	*Ben Delbaere* *E Delbaere@ecnc.org*	
Available information	http://www.ecnc.nl/CompletedProjects/Enrisk_116.html http://biodiversity-chm.eea.europa.eu/news/NEWS1121763724	

10. EUruralis	
Short Description	
State of play	*EUruralis 1.0 completed in 2004; EUruralis 2.0 version was completed by the end of 2007. Follow up of Eururalis (possibly ending up in version 3.0 in some time) is currently being carried out.*
Summary	• *Eururalis is a scenario study starting from four contrasting world visions* • *It covers the EU27 in various detail* • *Has a time horizon of three decades, in 10 years time steps: 2000, 2010, 2020, 2030* • *Takes major driving forces to assess their impact* • *Shows impacts for People, Planet, Profit indicators and on land-use* • *Shows trade-offs between indicators, between regions and to other continents* • *Clarifies policy issues and role of policy measures* • *Aims at policy makers, interest groups and researchers* • *Provides fuel for discussion, it is no blueprint for decisions*
Thematic focus	***Focus on rural areas; Special attention for agri sector and land-use.***
Number of scenarios	*In Eururalis 1.0 and Eururalis 2.0 four baseline scenarios have been used. In Eururalis 2.0 the four baselines have been extended with strategic policy options. This has resulted in 34 policy-scenarios that have been calculated throughout the whole modelling chain and for which all indicators are available.*
Spatial scale	*Eururalis focuses on the EU27. Indicators are available at different scale levels. Land-use is available at square km grid level, most other indicators are available at HARM2 regional level (either Nuts2/Nuts3), at Member State level, at EU level. MoCreover some indicators are available at the level of global regions (e.g. Brazil, US, China). However this data has not (yet) been incorporated in the Eururalis tool.*

Temporal scale	*Eururalis has a time horizon of three decades, in 10 years time steps: 2000, 2010, 2020, 2030*	
Driving forces addressed	*Main driving forces addressed are macro economic growth and demography. Other important driving forces are climate change, technological development, consumer behaviour and policy.*	
Input parameters	*Main input data (GDP, population, technological change) is coming from FAO, CPB, Corine and UN. However for specific indicators more detailed input has been used in many cases. See the technical background report by Eickhout and Prins (2008).*	
Output	*In general indicator tables, graphs and maps of current and future situation; comparison maps (e.g. land use, biodiversity) are the resulting output. See also Eururalis tool at www.eururalis.eu or Eickhout and Prins (2008).*	
Indicators relevant to biodiversity	*1. Abundance and distribution of selected species: a) Common birds b) European butterflies (There is one specific biodiversity indicator within Eururalis that is based on the Globio approach with Mean Species Abundance as approach)*	
Methodology		
Approach	***Inductive (storyline-based).***	
Participation of stakeholders	***Stakeholders have been involved within the project from the beginning. Results have been presented and discussed at meetings of directors of Member States dealing with rural areas. A so called Policy Advisory Group has been consulted five times during the setup and preparation of Eururalis 2.0 and the first results have been discussed with them. See for description of stakeholder participation also conference paper of Rienks et al., 2008.***	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futures

Models used	*The core modelling chain consists of the LEITAP model, the IMAGE model and the CLUE model. Specific 'planet' indicators have been calculated with the modelling philosophy of specific model approaches such as MITERRA Europe, Globio, etc. See the technical background document by Eickhout and Prins (2008).*
Organisation	
Initiators	***National initiative of Netherlands Ministry of Agriculture, Nature and Food quality within the framework of the Dutch presidency of the EU in 2004 and prolonged as a means to support discussions with other Member States about the longer term future of rural areas.***
Leading organisation	*Alterra Wageningen UR, The Netherlands*
Participating organisations	*Alterra, the Netherlands; Land Dynamics group, Wageningen University, the Netherlands; Netherlands Environmental Assessment Agency, MNP, the Netherlands; Agricultural Economics Institute (LEI), the Netherlands*
Contact person(s)	*Ir. W. Rienks – Alterra Wageningen UR, The Netherlands* *T 0317-481570* *E Willem.Rienks@wur.nl* *Drs. Bas Eickhout* *T 030-274 2924* *E Bas.Eickhout@pbl.nl* *Dr. H. van Meijl* *T 070-3358169* *E Hans.vanmeijl@wur.nl* *Dr P. Verburg* *T 0317-485208* *E Peter.verburg@wur.nl* *E* eururalis@wur.nl
Available information	http://www.eururalis.eu/

11. GLOBIO	
Global Methodology for Mapping Human Impacts on the Biosphere	
State of play	*The model is available and operational, published in reports, scientific papers are submitted and in preparation.*
Summary	*The GLOBIO (Global Methodology for Mapping Human Impacts on the Biosphere) consortium developed a global model for exploring the impact of environmental change on biodiversity. It is designed to support UNEP's activities relating to environmental assessment and early warning. The advanced GLOBIO3 model provides an analytical framework for bringing together biodiversity and environmental change data, thereby supporting the integration of the environmental assessments in which UNEP is involved. It includes land use, exploitation (mainly forestry), infrastructure, climate change, fragmentation and pollution (N-deposition). Biodiversity is described as the relative mean abundance of original species (MSA), a measure for intactness. For global purposes GLOBIO is linked to the IMAGE 2.4 model framework.* *The model will also inform the development of scenarios on the potential impacts of environmental change, enabling the implications of different conservation and development policy options to be explored. By estimating biodiversity impacts from human activities, overviews of past, present and potential future impacts can be derived.*
Thematic focus	***Focus is environmental impact assessment on biodiversity***
Number of scenarios	*GLOBIO can be used to explore scenarios that include estimates of change of the environmental drivers land use, infrastructure, fragmentation, N-deposition and climate. GLOBIO is applied in GEO 4 (4 scenarios) GBO2 (1 scenario, 6 policy options), OECD environmental assessment (1 secnario), EUuralis (4 scenarios, many options)*
Spatial scale	*GLOBIO is a global model for terrestrial biodiversity. The resolution depends on the input. GLOBIO is applied in Europe (EUruralis) and in several countries.*

Temporal scale	*GLOBIO is a static model. Time steps depend on the models that calculate input for GLOBIO. Time steps frequently used are 5 year steps. Time horizons: 2030, 2050, 2100.*	
Driving forces addressed	*Land use, exploitation (mainly forestry), infrastructure, climate change, fragmentation and pollution (N-deposition). GLOBIO can be linked to IMAGE 2.4 or other environmental or land use models (e.g. CLUE). Using that link economic and demographic driving forces can be evaluated.*	
Input parameters	*Maps that distinguish different land use types, road maps, N-deposition and N-critical load maps, global mean temperature, map with patches of natural area.*	
Output	*Map of aggregated biodiversity indicators (MSA). Maps can be aggregated to average values for countries, regions, up to a world average; figures can be derived of the relative importance of different driving forces on biodiversity loss.*	
Indicators relevant to biodiversity	*1. Abundance and distribution of selected species: a) Common birds b) European butterflies (in GLOBIO: Relative mean species abundance of original species (MSA))* 4. Ecosystem coverage 9. Critical load exceedance for nitrogen 13. Fragmentation of natural and semi natural areas *(can be addressed using the input of GLOBIO, derived from the models linked to it)*	
Methodology		
Approach	***What methods were applied? Inductive (storyline-based) / deductive (logical matrix)***	
Participation of stakeholders	***Number, extent of involvement***	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futures
Models used	*Which models are used for quantification?*	
Organisation		
Initiators	***GLOBIO-consortium: UNEP GRID Arendal, Norway, UNEP World Conservation and Monitoring Centre Netherlands Environmental Assessment Agency (PBL)***	

Leading organisation	*Netherlands Environmental Assessment Agency (PBL)*
Participating organisations	*UNEP's Division for Early Warning and Assessment (UNEP-DEWA)*
Contact person(s)	*Dr. ir. Rob Alkemade* *T +31 302743298* *E rob.alkemade@pbl.nl*
Available information	*http://www.globio.info/* *www.pbl.nl*

12. IMAGE	
Integrated Model to Assess the Global Environment	
State of play	*IMAGE 2.4 finished and published in [MNP, 2006]; further model development in progress*
Summary	*IMAGE is an ecological-environmental framework that simulates the environmental consequences of human activities worldwide. It represents interactions between society, the biosphere and the climate system to assess sustainability issues like climate change, biodiversity and human well-being. The objective of the version of IMAGE described here (version 2.4 released in 2006) is to explore the long-term dynamics of global change as the result of interacting demographic, technological, economic, social, cultural and political factors.*
Thematic focus	***Focus on land-use and land-cover change, energy and climate change, air pollution, water stress and biodiversity pressures***
Number of scenarios	*Dozens of global scenarios for different assessments and studies. For Europe the most relevant are the baseline and 34 policy cases of Eururalis-2. Also the 4 Eururalis-1 cases and scenarios produced for EU projects like MATISSE, AG2020, etc.*
Spatial scale	*World, composed of 24 regions for socio-economic drivers and at 0.5x0.5 degree grid for land-use related issues.*
Temporal scale	*Up to 2100, often 2050. Annual time-steps, mostly reported at 5 year intervals*
Driving forces addressed	*Demography, macro-economy, energy resources, technology development, agricultural productivity*
Input parameters	*Too many to list; see [MNP, 2006]*
Output	*Indicator tables, maps (land use, biodiversity, pressure)*

Indicators relevant to biodiversity	*9. Critical load exceedance for nitrogen* *15. Nutrients in transitional, coastal and marine waters* *16. Water quality in freshwater* *(Economic activity, climatic change, land-use and land-cover change, air pollution, nitrogen deposition, nitrogen loading of surface water)*	
Methodology		
Approach	***Inductive (storyline-based)***	
Participation of stakeholders	***Highly dependent on study: EU Commission, OECD-EPOC, Board of MA, Board of Ag. Asessment (IAASTD), UNEP-GEO Governing Board, etc. See also EUruralis***	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futures
Models used	*NA*	
Organisation		
Initiators	***Netherlands Institute of Public Health and Environment (RIVM) in late 1980's***	
Leading organisation	*Netherlands Environmental Assessment Agency (PBL)*	
Participating organisations	*Agricultural Economics Research Institute, Wageningen University and Research Centre, the Netherlands; Laboratory for Environmental Monitoring, National Institute for Public Health and the Environment, the Netherlands; Landscape Ecology, Faculty of Biology, Utrecht University, The Netherlands; UNEP, World Conservation and Monitoring Centre, UK; UNEP GRID Arendal, Norway; IUCN Netherlands Committee, the Netherlands; International Food Production research Institute (IFPRI), USA; Potsdam Institute for Climate Impact Research (PIK), Germany; Oak Ridge National Laboratory (ORNL), USA; Hadley Centre, UK.*	
Contact person(s)	*E* image-info@mnp.nl	
Available information	http://www.mnp.nl/en/themasites/image/index.html	

13. MEA scope

14. MIRABEL	
Models for Integrated Review and Assessment of Biodiversity in European Landscapes	
State of play	*MIRABEL I (1998); MIRABEL II (2004)*
Summary	*For 28 European countries, MIRABEL tabulates changes in the status of threatened habitats predicted to result from 10 environmental pressures. Regional variations in the severity of the pressures and impacts are taken into account by compiling separate impact tables for each of 13 Ecological Regions. Results suggest that agricultural intensification is one of the main threats, however, differences recorded by MIRABEL in the intensity of the pressures, their rate of change and their past and expected impacts on biodiversity in the various Ecological Regions is telling evidence of Europe's biogeographical variety, and of the need to take this into consideration when assessing environmental change.*
Thematic focus	***MIRABEL I covered all general environmental pressures (pollution, climate, land use); MIRABEL II focused on 3 pressures: terrestrial eutrophication; agricultural intensification; land abandonment.***
Number of scenarios	*How many scenarios have been addressed?*
Spatial scale	*13 Ecological Regions*
Temporal scale	*Projections were made for 2010.*
Driving forces addressed	*Pollution and land-use.*
Input parameters	*Eutrophication, nitrogen deposition, acidification, climate change, urbanisation transport, farming intensification, drainage irrigation, land abandonment, afforestation, habitat defragmentation*
Output	*Maps and tables which indicate the major pressures on different habitats (e.g. forests, wet grasslands).*

Indicators relevant to biodiversity	*5. Habitats of European interest* *8. Sites designated under the EU Habitats and Birds Directives* *9. Critical load exceedance for nitrogen* *15. Nutrients in transitional, coastal and marine waters* *19. Agriculture: N-balance*	
Methodology		
Approach	***What methods were applied? Inductive (storyline-based) / deductive (logical matrix)***	
Participation of stakeholders	***N/a***	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futures
Models used	*CARMEN, RAINS, IMAGE, EUTREND, LARCH.*	
Organisation		
Initiators	***EEA (European Topic Centre on Biological Diversity, Paris)***	
Leading organisation	*Institute of Terrestrial Ecology, NERC, UK (now CEH)*	
Participating organisations	*Centre for Ecology and Hydrology Merlewood Research Station, UK; Centre for Ecology and Hydrology Monks Wood Research Station, UK; Institute for Forestry and Nature Research, the Netherlands; Norwegian Institute for Nature Research, Norway*	
Contact person(s)	*Dr Sandrine Petit* *E sapetit@dijon.inra.fr*	
Available information	http://ambio.allenpress.com/	

15. PRELUDE	
Land-use scenarios for Europe: Qualitative and quantitative analysis on a European s	
State of play	*Finished in 2007*
Summary	*PRELUDE, a highly visual presentation from the European Environment Copenhagen, explores five possible futures for a Europe experiencing major changes in the way we use our land.* *In each scenario, factors, including demographic trends, spatial planning agricultural policy, climate change and other key driving force changes in land use and land cover. This results in a range of in biodiversity, water quality, flooding, greenhouse gas emiss erosion, and landscape identity.*
Thematic focus	***Land use change and its consequences for the environment.***
Number of scenarios	*Five.*
Spatial scale	*European Union minus Bulgaria and Romania (EU25) plus Norway and Sw resolution of output 10 minute longitude/latitude (European maps), grid- (regional analysis).*
Temporal scale	*30-year scenario period. Time horizon 2035. At European scale one result Additional dynamic regional modelling (yearly increments) for northern Netherlands and Estonia.*
Driving forces addressed	*20 drivers, divided into 6 main categories:* *Environmental concern; Solidarity and equity; Governance and inte Agricultural optimisation; Technology and innovation; Population dyna economy* *http://www.eea.europa.eu/multimedia/interactive/prelude-scenarios/prelude*
Input parameters	• *demand of agricultural goods;* • *productivity (supply);* • *oversupply;* • *temperature and precipitation;* • *atmospheric CO2 emissions;* • *technology development;* • *prices and costs for agricultural production, disaggregated to the cell level;* • *location of protected areas, e.g. Natura 2000sites.*

Output	*Indicator tables, maps (land use, biodiversity, pressure)*	
Indicators relevant to biodiversity	*7. Nationally designated protected areas* *13. Fragmentation of natural and semi natural areas* *16. Water quality in freshwater* *20. Agriculture: Area under potentially sustainable management* *26. Public awareness*	
Methodology		
Approach	***Storyline and simulation (SAS): inductive storyline development sup*** ***dedicated quantitative modelling. The driver logic was later interpr*** ***presented as a logical matrix.***	
Participation of stakeholders	***22 stakeholders. Fully participatory approach (in contrast to cons*** ***stakeholders provided the storylines, modellers underpinned these*** ***iteration loops.***	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futu
Models used	*European scale: Louvain-la-neuve land use model (PELCOM based), regional s* *cellular automata model RIKS*	
Organisation		
Initiators	***EEA-European Environment Agency***	
Leading organisation	*EEA-European Environment Agency*	
Participating organisations	*University of Kassel, RIKS Maastricht, PROSPEX Brussels*	
Contact person(s)	*Axel Volkery* *E axel.volkery@eea.europa.eu* *Ybele Hoogeveen* *E Ybele.Hoogeveen@eea.europe.eu,* *Teresa Ribeiro* *E Teresa.Ribeiro@eea.europe.eu* *E prelude@eea.eu.int*	
Available information	Presentation tool: http://www.eea.europa.eu/multimedia/interactive/prelude-scenarios/prelude Technical report: http://reports.eea.europa.eu/technical_report_2007_9/en/technical_report_9	

16. Scenar 2020	
Scenario study on agriculture and the rural world	
State of play	*Published in 2007*
Summary	*It identifies the impact of the main driving forces on agriculture and rural regions such as population, economic change, agricultural markets and environmental conditions as well as the CAP. It draws far reaching and differentiated conclusions on the challenges for European agriculture and rural areas. Scenar 2020 provides a thorough basis for discussions on the future of agriculture and rural regions in the EU for the coming years. The study identifies the impact of the CAP on agriculture and rural regions in three scenarios and demonstrates the differentiated impact of these changes, for example on the marginalisation of rural regions, changes in land use and agricultural production, the structural adjustment of agriculture within the regional context as well as the corresponding environmental implications. Moreover, the study identifies major opportunities and challenges for agriculture and rural areas. These consist of the impact of new products such as renewable energy, new opportunities on world markets as well as structural change and changing environmental conditions in parts of the EU. The evolving situation in the labour and land markets will play a major role in agricultural change and its regional dimension.*
Thematic focus	***The future of EU agricultural and the rural economy***
Number of scenarios	*3: Actual policy (as programmed); regional focus if no Doha agreement (with bi-lateral trade agreements); fully liberalised economy.*
Spatial scale	*EU-25, NUTS-2 & HARM-2; some cover of BG & RO also*
Temporal scale	*1990-2020; analytical periods 1990-2005 & 2006-2020.*
Driving forces addressed	*Exogenous drivers: demographics, macro-economic growth, consumer preferences, agri-technology, world markets* *Policy-related drivers: CAP (market policies, direct payments, rural development policy), biofuels, enlargement, WTO negotiations, environmental policies having an impact on agriculture*

Input parameters		
Output	*Agricultural commodity production, farm structure, land use change, migration flows, regional SWOT analysis (reaction types)*	
Indicators relevant to biodiversity	*19. Agriculture: N-balance*	
Methodology		
Approach	***Scenario s based on economic models coupled with a land-use model***	
Participation of stakeholders	***Internal referee experts from 4 organisations; Commission steering group (DG Agri, EC-FIN, DG Regio, DG Env)***	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futures (3)
Models used	*ESIM, CAPRI, LEITAP (revised version of GTAP); CLUE-s*	
Organisation		
Initiators	***DG Agriculture***	
Leading organisation	*ECNC-European Centre for Nature Conservation*	
Participating organisations	*LEI-Landbouw Economisch Instituut, the Netherlands; Leibnitz-Zentrum für Agrarlandforschung, Germany; Leibnitz Institut fúr Länderkunde, Germany; Central European University; European Landowners Organisation*	
Contact person(s)	*Ben Delbaere* *E Delbaere@ecnc.org* *Vineta Goba* *E Goba@ecnc.org*	
Available information	http://ec.europa.eu/agriculture/publi/reports/scenar2020/index_en.htm	

17. SEAMLESS	
System for Environmental and Agricultural modelling; Linking European Science and Science	
State of play	*In progress, runs till March 2009.*
Summary	*SEAMLESS-IF will facilitate translation of policy questions into alternative scenarios that can be assessed through a set of indicators that capture the key economic, environmental, social and institutional issues of the questions at stake. The indicators in turn are assessed using an intelligent linkage of quantitative models. These models have been designed to simulate aspects of agricultural systems at specific scales, i.e. point or field scale, farm, region, EU and world. Application of the models requires pan-European databases for environmental, economic and social issues. Some indicators, particularly social and institutional ones, will be assessed directly from data or via a post-model analysis.* *The smooth linkage of models designed for different scales and from biophysical and economic domains requires software architecture, and a design and technical implementation of models that allows this. The software backbone of the project, SeamFrame, serves that purpose. SeamFrame is also developed to facilitate re-use, maintenance and documentation of models.*
Thematic focus	***Agricultural systems and sustainable development***
Number of scenarios	*Baseline and Policy scenarios for each Policy impact assessment*
Spatial scale	*EU-25/27, NUTS2 regions and agri-environmental zones*
Temporal scale	*5-15 years (up to 2025)*
Driving forces addressed	*This term can have many interpretations. The baseline in SEAMLESS uses projections for driving forces such as economic growth, population growth, technological growth and already agreed policies; the policy scenario is defined by proposed policies.*

Input parameters	*Weather, soils, agro-management information, farm information, trade and policies*	
Output	*Indicator tables, maps (land use, biodiversity, pressure)*	
Indicators relevant to biodiversity	*In the present version:* *9. Critical load exceedance for nitrogen* *19. Agriculture: N-balance* *20. Agriculture: Area under potentially sustainable management (In a standalone component as part of SEAMLESS we are working on more biodiversity indicators. We have interest to expand this.)*	
Methodology		
Approach	***The methods in SEAMLESS to derive scenarios are based on proposed policies by the EC or local agencies, storylines by these users and stakeholders and logical reasoning.***	
Participation of stakeholders	***SEAMLESS User Forum (with representatives from DG Agri, DG Env, DG Econ and Fin, JRC, EEA); this group meets twice a year and bilateral meetings in between on demand.***	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futures: on demand through adaptation of Baseline
Models used	*CAPRI, GTAP; unique for SEAMLESS: APES, FSSIM, EXPAMOD.*	
Organisation		
Initiators	***RTD project, financed by FP6 (DG Research). Foreseen end users include DGs in EC***	
Leading organisation	*Wageningen University*	

Participating organisations	*Wageningen University, the Netherlands; AntOptima SA, Switzerland; Scuola Universitaria Professionale della Svizzera Italinana, Institutio Dalle Molle di Studi sull 'Intelligenza Artificale, IDSIA-SUPSI, Switzerland; Institute of System Biology and Ecology, Academy of Science of the Czech Republic; Czech Republic; VUZE, Research Institute of Agricultural Economics, Czech Republich; Humboldt University of Berlin, Germany; University of Bonn, Institute for Agricultural Policy, Germany; Leibnitz-Centre for Agricultural Landscape and Land Use Research, ZALF, Germany; Danish Centre for Forest, Landscape and Planning, KLV, Denmark; Cemagref, Centre national du machinisme agricole, du génie rural, des eaux et des forêts, France; Centre de Coopération Internationale en Recherche Agronomique pour le Développement, CIRAD, France; IAMM, Mediterranean Agronomic Institute of Montpellier Centre International de Hautes Etudes Agronomiques Méditerranéennes, France; Institut National de la Recherche Agronomique, INRA, France; National University of Ireland, Galway, Ireland; Consiglio per la Ricerca e Sperimentazione in Agricoltura, Agricultural Research Council, Italy; Joint Research Centre, Italy; Institut d'Economie Rurale, Mali; Alterra, the Netherlands; Agricultural Economics Institute Landbouw Economisch Instituut, the Netherlands; Plant Research International, the Netherlands; Norwegian University of Life Sciences, Norway; Warsaw Agricultural University, Szkola Glowna Gospodarstwa Wiejskiego, Poland; University of Évora, Portugal; LUCSUS, Lund University Centre for Sustainability Studies, Sweden; Lund University Education, Sweden; School of Geosciences, University of Edinburgh, UK; Centre for Rural Economy, University of Newcastle upon Tyne, UK; The University Court of the University of Aberdeen, UK; University of Vermont, Gund Institute for Ecological Economics, USA*
Contact person(s)	*Dr. Martin van Ittersum* *E Martin.vanIttersum@wur.nl* *E seamless.office@wur.nl* *T +31 (0)317 482382*
Available information	*http://www.seamless-ip.org/* *Van Ittersum, M.K., F. Ewert, T. Heckelei, J. Wery, J. Alkan Olsson, E. Andersen, I. Bezplepkina, F. Brouwer, M. Donatelli, G. Flichman, L. Olsson, A.E. Rizzoli, T. van der Wal, J.E. Wien and J. Wolf, 2008. Integrated assessment of agricultural systems – A component-based framework for the European Union (SEAMLESS). Agricultural Systems 96, 150-165.*

18. SENSOR	
Sustainability Impact Assessment: Tools for Environmental, Social and Economic Effects of Multifunctional Land Use in European Regions	
State of play	*In progress*
Summary	*The aim of land use policies on the European level is to support sustainable rural development and social cohesion, and to decouple economic growth from environmental degradation. In order to do so, policy makers require tools that allow an assessment of potential impacts of land use policies on all sectors. Over the last five years the EU has invested substantial funding in the development of a suite of computer-based ex-ante impact assessment tools to support policy-making for different sectors and at different strategic levels and spatial scales.* *One of the most innovative and ambitious of these initiatives is 'SENSOR' ('Tools for Environmental, Social and Economic Effects of Multifunctional Land Use in European Regions'), a four year project, which has brought together teams of researchers from 36 institutes in 15 European countries, as well as China, Brazil, Argentina and Uruguay. The aim is to develop 'Sustainability Impact Assessment Tools' ('SIAT') that support* ex ante *assessment of new policies on six land use sectors: agriculture, forestry, nature conservation, transport infrastructure, energy and tourism. By integrating cross-sector knowledge at a European level, the project will provide decision makers with scientifically sound information on regional impacts of land uses changes and policy effects on sustainable development.*
Thematic focus	***Scenario studies on the impact of land use policies; sustainability assessment based on the concept of multifunctional land use***
Number of scenarios	*Three macro-economic baseline scenarios; four major policy scenarios with numerous sub-settings each*
Spatial scale	*Europe 27 at NUTS-X (NUTS2-3) resolution for most indicators; land use change is at 1 km² resolution; some indicators are only at National level*
Temporal scale	*Time horizon is 2025? Time-steps are annual for scenario assumptions? Impacts are analysed for the year 2025*

Driving forces addressed	*Oil price; investment in research and development; participation in labour force; demographic developments; world demands for land use commodities; European policies*	
Input parameters	*Geophysical and socio-economic state of regions; land prices and commodity prices and demands*	
Output	*Indicator tables, maps (land use, biodiversity, water quality, air quality, soil degradation, social and economic indicators, altogether around 40); land use functions (composite indicators)*	
Indicators relevant to biodiversity	*1. Abundance and distribution of selected species: a) Common birds b) European butterflies* *5. Habitats of European interest* *9. Critical load exceedance for nitrogen* *18. Forest: Deadwood* *(Land Use; High nature value farmland; farmland birds; forest fire risk; soil erosion by water; soil erosion by wind; landscape cohesion; Nitrogen surplus; Phosphorus surplus; soil sealing; soil organic carbon; terrestrial habitat at risk to eutrophication; deadwood; pesticide use)*	
Methodology		
Approach	***Inductive (storyline-based)***	
Participation of stakeholders	***None for Scenario development; many at regional, national, European level for impact valuations***	
Type of Scenarios	Qualitative/narrative	Quantitative
	Anticipatory/normative	Exploratory
	Baseline and policy variants	Range of alternative futures
Models used	*NEMESIS, CAPRI, EFISCEN, CLUE-S, Tim, Sick, B&B, PRIMES*	
Organisation		
Initiators	***DG RTD, FP6***	
Leading organisation	*Leibniz-Centre for Agricultural Landscape Research (ZALF), Germany*	

Participating organisations	*Alterra, the Netherlands; Department of Agricultural Economics and Social Sciences, HU, Germany; Chair of forest yield science, TU Muenchen, Germany; ARC systems research GmbH, Austria; Department of Conservation Biology, Vegetations and Landscape Ecology, University of Vienna, Austria; Institutes of Soil Science and of Forest Growth Research, BOKU, Austria; Swiss Federal Institute of Forest, Snow and Landscape Research, Switzerland; National Environmental Research Institute, Denmark; Danish Centre for Forest, Landscape and Planning, Denmark; Department of Agricultural Systems, Danish Institute of Agricultural Sciences, Denmark; University of Tartu, Estonia; European Forest Institute, Finland; CENAGREF Groupement de Grenoble, France; Centre d'Observation Economique, France; Institute of Environmental Sciences, University of Western Hungary, Hungary; Institute of Environmental Management, University Gödöllö, Hungary; International Institute for Applied System Analysis; Department of Agriculture and resource Economics of Florence University, Italy; Institute for Environment and Sustainability, Italy; Plan Making and Policy Development Unit, Malta; Brandenburg University of Technology Cottbus, Germany; Agricultural Economics Research Institute, the Netherlands; Environmental Systmems Analysis Group, Wageningen University, the Netherlands; Institute of Soil Science and Plant Cultivation Pulawy, Poland; Institute of Landscape Ecology, Slovak Academy of Sciences, Slovakia; University Lund, Sweden; Social Research Unit Forest Research, UK; National Environmental Research Centre, Lancaster Research Station, UK; Department of Economics and International Development, University of Bath, UK; Centre for Environmental Management, UK; Department of Geography and Environment, UK; Institute of Geological Sciences and Natural Resources Research, Chinese Academy of Sciences, China; Chinese Academy of Social Sciences, Institute of Sustainable Development, China; Soil National Research Centre of the Brazilian Agricultural Research Corporation, Brazil; Federal University of Santa Catarina, Research Group on Environmental Monitoring and Appraisal, Brazil; University of Buenos Aires-Agronomy, Regional Analysis and remote Sensing Laboratory, Argentina; Universidad de la República, Terrestrial Ecology, Ecology Department, Faculty of Science, Uruguay*

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CONCLUSIONS

In relation to the compilation of a EURECA platform nearly all the scenario studies that were analysed have some, or even significant relevance in relation to biodiversity. In figure 2 an overview is given of the most important results. Particular emphasis is given in the summary to the main driving forces addressed by the various scenarios, the link with the SEBI 2010 indicators is highlighted and the geographical scope is mentioned.

Many of the scenario studies address multiple driving forces. For the sake of clarity, only the most important ones or the ones that showed the clearest link with biodiversity and/or ecosystems have therefore been summarised.

Another important criterion in terms of relevance for the assessment of European ecosystems in relation to the state of European biodiversity is the link with the SEBI 2010 indicators. Where the (SEBI 2010) indicators have been addressed within a scenario, they have been referenced in the third column of the table by giving their number as they appear in the list in the introduction to this report. However, it should be noted that in terms of relevance for EURECA the total amount of SEBI 2010 indicators addressed in the particular project does not assess its overall relevance. It might well be a good indication, but it should not be taken as the sole criterion of relevance because this would represent an over-simplification as the number of SEBI 2010 indicators addressed does not inherently mean that they are substantially covered. Other scenario studies address only one indicator but do that very thoroughly.

Geographical scope is the final criterion to be picked up in this evaluation. Most scenario studies incorporate between 20 and 30 countries, which are mostly represented by the EU25, the EU27, the EEA region or some kind of combination of these.

Overall, we strongly recommend that the final column be given the greatest weight. It represents a summary of the preceding columns and an effort has been made to conclude an overall relevance, illustrated in three different relevance categories.

Based on this short analysis, the most relevant scenario studies in relation to biodiversity and ecosystem assessment are therefore ALARM, ATEAM and BioScore. The extent to which these scenario studies address the state of European ecosystems is particularly relevant. Furthermore they show a clear link with biodiversity related issues (e.g. state of European biodiversity/SEBI 2010 indicators), their geographical scope is broad enough and the time horizon is also relevant. The geographical scope and time horizon of BioScore are limited in comparison with the other two, but BioScore distinguishes itself in the way that European biodiversity is addressed, which is extensively elaborated.

In short, concluding from this analysis, three scenario studies show the state of European Ecosystems with most relevance to EURECA. However, the other scenario studies may have also significant relevance/value, even though they do not fulfil as many criteria as the three that come out best. Some scenario studies for instance, cover a specific environmental issue, such as agriculture, and determine the effects of that on biodiversity. They are therefore very relevant for the area they cover, an area which can also be a substantial part of the European Ecosystems.

Scenario	Main driving forces addressed	SEBI 2010 Indicators addressed[2]	Geographical scope[3]	Time horizon	Resolution (km²)	Overall relevance[4]
1. ACCELERA-TES	Climate change, land use change, socio-economic change	1	3	2001-2100	1	±
2. ALARM	Demographic trends, policy orientations	3-4-5	4+	2020-2100	1˚ grid	+
3. ATEAM	Global change	1-3-7-17	3	1990-	225	+
4. Bioscene	Numerous e.g. agriculture decline, agriculture liberalisation,	1-4-5-13	4	2030	100+	±
5. BioScore	Numerous e.g. biofuels production, afforestation, air and water pollution	1-3-4-5-9-11-13-16-19	2	2030	1	+
6. BRANCH						
7. CCE	Critical loads, air	3-9	1	1880-	1	-
8. COCONUT	Land use change, agricultural management	1-3-5-8-13	4	2020-2030	13	±
9. EnRisk	Agricultural intensification	1-4-9-19	2	-	2500	-
10. EUruralis	Numerous e.g. macro-ec. growth, climate change, consumer behaviour	1	2	2000-2030	1	±
11. GLOBIO	Numerous e.g. land use, forestry, climate change, fragmentation	1-4-9-13	2	2030-2100	1	±
12. IMAGE	Numerous, e.g. demography, energy resources, agricultural	9-15-16	4+	2050 (2100)	(0.5*0.5)˚ grid	±
13. MEA scope						
14. MIRABEL	Pollution, land use	5-8-9-15-19	2	2010	?	-
15. PRELUDE	Numerous, e.g. environmental concern, agricultural optimisation	7-13-16-20-26	2	2035	0.15	±
16. Scenar 2020	Numerous, e.g. demographies, CAP, biofuels, env. policies	19	2	1990-2020	1/NUTS2	±
17. SEAMLESS	Numerous, e.g. economic growth, population growth	9-19-20[5]	2	2025	NUTS2	±
18. SENSOR	Numerous, e.g. oil price, investment in research, demography	1-5-9-18	2	2025	1	±

[2] Numbers refer to table of SEBI 2010 indicators given in the Introduction.
[3] Geographical scope: 1=Pan-European wide, 2=European wide (>20 countries), 3=limited to several regions (10-20 countries), 4=limited to a few regions (1-10)
[4] Overall relevance: +=probably highly relevant, ±=maybe relevant, -=probably irrelevant
[5] SEAMLESS Project team stated that: *"In a standalone component as part of SEAMLESS we are working on more biodiversity indicators. We have interest to expand this."*