

Landbouw en landgebruik in internationaal perspectief

Voorwoord

Inleiding

Het huidige en te verwachten landgebruik, waaronder de landbouw, is op wereldschaal niet duurzaam: *'We are living beyond our means'*. Nederland is medeverantwoordelijk voor de problemen die hiermee gepaard gaan: uitputting van energie- en watervoorraden, verlies aan biodiversiteit en vervuiling van het milieu (water, bodem, lucht). De oorzaken zijn complex en gelegen zowel in productie en consumptie als in beleid en bestuur.

De Raad voor het Landelijk Gebied heeft samen met andere adviesraden in Europa (EEAC1) gezocht naar oplossingsrichtingen voor een duurzamer landgebruik. Onder voorzitterschap van de RLG heeft de EEAC-werkgroep Landbouw en landgebruik in juni 2009 het seminar 'Land Use in an Era of Global Change' georganiseerd. Het verslag van dit seminar is bijgevoegd. Voor het slotakkoord van de raad zijn onder meer de volgende onderwerpen uit dit verslag van belang geweest.

Landgebruik staat onder druk

De financiële crisis en economische recessie krijgen nu alle aandacht, maar de mondiale voedsel-, energie-, water- en biodiversiteit en klimaatproblemen zijn verre van opgelost. De behoeften van de bevolking aan zoet water, voedsel en energie leiden tot een grote druk op het landgebruik. Hierachter gaan demografische ontwikkelingen en welvaartsveranderingen schuil.

Landbouw maakt gebruik van ecologische processen, en levert ook milieudiensten (bijvoorbeeld door groene en blauwe diensten). Het belang van deze diensten wordt steeds meer erkend. De ontwikkeling van het landgebruik vraagt oog voor basiscondities. Goed beheer van deze basiscondities houdt opties voor de toekomst open. Milieudiensten dragen bij aan het veiligstellen van de voedsel-, water-, biodiversiteit- en energievoorziening van een groeiende wereldbevolking.

Naar een duurzame exploitatie en een duurzaam beheer

Voedselvoorziening en milieu vragen mondiaal gecoördineerd beleid. Landen, of groepen van landen, moeten hun hulpbronnen duurzaam exploiteren en beheren. Hiervoor is het nodig om bodemvruchtbaarheid en -kwaliteit, waterkwaliteit en -voorzieningen, luchtkwaliteit en (agro)biodiversiteit veilig te stellen door een geïntegreerd en duurzaam landbeheer te introduceren dan wel verder te ontwikkelen op alle schaalniveaus.

We moeten slimmer, zuiniger, bewuster en efficiënter worden, als consumenten, producenten én overheden. Gecombineerd met nieuwe vormen van maatwerk, slimme combinaties van technologieën, en nieuwe allianties kan dat óók door natuur en landbouw te verweven. Hierbij kunnen op zijn minst de volgende strategieën worden gevolgd:

- het vergroten van de efficiëntie van inputs door ze meer gericht te gebruiken zoals in precisielandbouw en geïntegreerde gewasbescherming;
- het terugdringen van het gebruik van pesticiden, kunstmest en energie door toepassing van ecologische processen, zoals in biologische bestrijding, ziektebestrijding, symbiotische stikstofvastlegging, mycorrhiza, mengteelt.

Borging van publieke belangen

Verstandig gebruik van land uitgaande van ecologische processen vraagt bestuurlijk ingrijpen en samenwerking tussen overheden, maatschappelijke organisaties en bedrijfsleven op verschillende bestuurlijke niveaus, oftewel multi-level governance. Als borger van publieke belangen vervullen overheden hierbij belangrijke rollen: niet alleen als regelgever en handhaver, maar ook als marktmeester (voor nieuwe markten van emissies, wetlands etc.), als belastinginnehmer (ecotax, tobintax etc.), en als coördinator en bemiddelaar (tussen bestuurlijke niveaus). De wisselwerking tussen top-down en bottom-up is belangrijk voor het realiseren van nieuwe integrale doelen voor landgebruik. De nationale en regionale niveaus hebben een belangrijke rol in de afstemming van beleidssectoren die van invloed zijn op landgebruik en beheer, en zullen zeker voor klimaatadaptatie van cruciaal belang zijn.

Rol van Nederland

Nederland is medeverantwoordelijk voor de nodige verschuiving (shift) om de levering van ecosysteemdiensten tot doel te verheffen en niet slechts als resultante te zien. Die verantwoordelijkheid begint in eigen huis en op eigen bodem. De keuzes van overheden, bedrijven en burgers in consumptie (waaronder voeding) en gebruik van ruimte, land, water, bodems en natuur werken internationaal door (*ecological footprint*).

Nederland is een kraamkamer voor innovaties op het terrein van landbouw en landgebruik (waaronder natuurbeheer). De hoge bevolkingsdichtheid, hooggeschoolde bevolking, ruime, nabije en diverse markten, sterke bestuurlijke cultuur gericht op samenwerken, vruchtbare bodems, ruime watertoevoer, rijke natuur door een diversiteit aan gradiënten en bodemsoorten, en de hoge milieudruk lokken innovaties uit met een internationale uitstraling, zoals landaanwinning, de Ecologische Hoofdstructuur en de energieproducerende kas.

Oplossingen voor het landgebruik moeten worden gevonden in innovatie en veranderingen binnen het productiesysteem, het ketenbeheer, de consumptie/leefwijze en in het beleid op verschillende niveaus. Alle partijen, waaronder marktpartijen, overheden en de samenleving, zeker ook wetenschappers, zullen op verschillende schaalniveaus moeten bijdragen.

Hervorming van het Gemeenschappelijk landbouwbeleid

Mede in EU-verband moet Nederland werken aan een duurzamer beheer van de levensvoorwaarden van mens, dier en plant. Hoe we omgaan met land is een cruciaal aspect van een duurzame samenleving. Niet alleen geopolitiek gezien maar ook vanuit milieuoverwegingen is op EU-niveau een bepaalde mate van zelfvoorziening aan te bevelen.

Het Gemeenschappelijk Landbouwbeleid biedt de mogelijkheid voor het borgen van basiscondities door een voorwaardelijke vergoeding voor het beheer van cultuurgrond (combinatie van *flat rate* en *cross-compliance*). Hier bovenop kunnen gerichte betalingen

worden gedaan voor publieke diensten (bodem, agro-natuur, water, vasthouden CO2/broeikasgassen). Het agrarisch natuurbeheer dient op zijn brede effecten beoordeeld te worden, zoals gerealiseerde natuurwaarde, beheer van bodem en watervoorraden, bescherming van cultuurgrond, continuïteit van het beheer, arbeidsvoorziening en dergelijke.

Ten slotte

Voor een duurzaam landgebruik, waaronder een productieve en winstgevende landbouw die tegelijkertijd belangrijke milieudiensten levert en de biodiversiteit beschermt, zijn zowel publieke als private investeringen nodig. Landbouworganisaties enerzijds en natuurbeheerders anderzijds moeten zich niet beperken tot de behartiging van hun eigen belangen. Met het oog op de publieke belangen is een nauwe onderlinge samenwerking dringend nodig.

Huib Silvis, raadslid RLG

Achtergrond

Aan het eind van zijn zittingsperiode heeft de Raad voor het Landelijk Gebied een advies uitgebracht over de toekomst van het Nederlands landelijk gebied. In dit advies staat de relatie tussen landbouw (profit), natuur en landschap (planet) en maatschappij (people) centraal. De raad verwacht dat hiertussen een nieuwe verbinding nodig is om tot een Duurzame Groene Delta te komen.

Voor het eindadvies zijn negen deelstudies opgesteld over potenties van iconen, landgebruik en landbouw, innovatie in de landbouw, klimaatverandering en natuur, demografische ontwikkelingen, verburgerlijking, voedselproductie voor de stad, kwaliteit van besluitvorming, omgaan met schaarste en communicatie.

In dit deelrapport **Landbouw en landgebruik in internationaal perspectief** ligt de focus op landbouw en landgebruik in een internationaal perspectief. De voedsel- en economische crises, de snel stijgende energiebehoefte, het drinkwatertekort en de klimaatverandering doen een nieuw maatschappelijk beroep op het landelijk gebied. Het huidige landgebruik komt onder druk te staan. Conflicterende claims op het land dreigen de duurzaamheid op het spel te zetten. Dit speelt op het niveau van de wereld maar speelt ook door tot op het lokaal niveau. In dit deelrapport worden vraagstukken rond het landbouw en landgebruik verkend.

Dit deelrapport is mede tot stand gekomen door de Europese activiteiten van de Raad voor het Landelijk Gebied. De raad is actief binnen het netwerk van Europese omgevingsraden, het EEAC. Huib Silvis, raadslid, zit de EEAC werkgroep landbouw en landgebruik voor. Deze werkgroep heeft samen met de werkgroep duurzaam landgebruik van het Europees samenwerkingsverband van natuur en milieuagentschappen, ENCA, in juni 2009 het seminar 'Land Use in an Era of Global Change' georganiseerd.

Duurzaam geïntegreerde landbouw, dynamiserend natuur- en milieubeleid en klimaatbeleid zijn belangrijke onderwerpen voor advisering. **Landbouw en landgebruik in internationaal perspectief** draagt hopelijk bij aan inzichten die nodig zijn voor die advisering.

Land Use in an Era of Global Change

Seminar 5 June 2009
Scotland House, Brussels

EEAC Working Group Agriculture and Land Use
ENCA Interest Group Sustainable Land Use and Agriculture

Responsible organizations

European Environmental and Sustainable Development Advisory Councils (EEAC)

The EEAC is a network of councils appointed by national and regional governments to provide independent, scientifically-based advice on environment and sustainable development. Within the network six Working Groups deal with specific issues of common interest.

e-mail: info@eeac-net.org

website: www.eeac-net.org

EEAC Working Group on Agriculture and Land Use (WG Agriculture)

The Working Group on Agriculture and Rural Development is chaired by Huib Silvis, council member of the Dutch Council for the Rural Area (RLG), assisted by Agneta Andersson, project leader from the RLG secretariat.

Council for the Rural Area (RLG)

The Council for the Rural Area advises the Dutch Government and both Chambers of Parliament on strategic policy questions concerning agriculture, nature, forestry, landscape, outdoor recreation and fisheries in rural areas, as well as on strategic questions that are related to or have influence on those functions.

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Scottish Natural Heritage (SNH)

The natural heritage is one of Scotland's biggest assets. The role of Scottish Natural Heritage is to look after the natural heritage, help people to enjoy and value it, and encourage people to use it sustainably.

e-mail: enquiries@snh.gov.uk

website: www.snh.org.uk

European Network of Heads of Nature Conservation Agencies (ENCA)

The main purpose of the network is to share information, best practice and research findings in order to develop a strategic view on nature conservation issues with regard to the reform of the Common Agricultural Policy and the design of Integrated Rural Development policies.

website: encanet.eu

Preface

This report summarizes the results of the seminar 'Land Use in an Era of Global Change' held in Brussels on 5 June 2009. The seminar aimed to develop a better understanding of global land use and discuss questions about how to govern land use at a landscape level. More specifically the objectives were threefold:

- sharing views on the role of land use and land management in sustainable development;
- identifying land use issues for the Annual Conference of EEAC in 2010;
- contributing to the review of the EU Sustainable Development (SD) Strategy and to the SD process in general.

The seminar was organised by the EEAC Working Group Agriculture and Land Use¹ in cooperation with the EEAC Working Group Biodiversity, and the ENCA Interest Group Sustainable Land Use and Agriculture². The seminar was hosted in Brussels by Scottish Natural Heritage.

Many participants have contributed to this report. Apart from the contributions of speakers, commentators and reporters for the different sessions, some additional authors have reflected on the results. I would like to thank all of them very much.

Huib Silvis

Chair EEAC Working Group Agriculture and Land Use

1. For information on the European Environment and Sustainable Development Advisory Councils (EEAC) see the website www.eeac-net.org. The EEAC WG Agriculture and Land Use published an Activity Report 2007: Globalisation, Land Use Change and the Common Agricultural Policy, which can be found on www.rlg.nl.

2. ENCA is a European Network of Heads of Nature Conservation Agencies. The ENCA Interest Group Sustainable Land Use and Agriculture is developing visions and proposals for sustainable land use and agriculture in relation to the Common Agricultural Policy.

1. Land use in an era of global change: an economic perspective

José Lima Santos

1.1 Introduction

In an era of rapidly shifting problems, it is crucial to make sure we are still asking the right questions. If not, we risk getting the right answers to the wrong questions. After all, science-based analysis for sustainability is about asking the right questions and taking the answers seriously. These, I hope, are the right questions to be asking about land use in an era of global change:

- Why are our major land use dilemmas shifting so rapidly and what are the consequences for our analyses of land use problems?
- How do we go beyond the intensive versus extensive farming debate? Is there a new, more sustainable technological model?
- How can we deliver ecosystem services? Can we safeguard and reward these services through market creation, or do we still need more classical policy tools?
- How should we handle scale and governance? How can we overcome long-term hurdles to achieve effective, integrated landscape and ecosystem management?

1.2 The rapidly shifting nature of our land use dilemmas

Since the 1980s you can discern three distinct periods, each with very different perceptions of the nature of land use dilemmas:

- from the 1980s to 2003, in Europe we apparently believed in a multifunctional, post-productive countryside. This was a space for leisure, nature or culture. It was a place for consumption rather than production, and land was seen as part of our quality of life;
- after 2007, dealing with global food, energy and ecological risks became a major land use concern; land was seen as a globally scarce, fragile and irreplaceable capital asset on which we all depend;
- most recently, we have learned from the current financial crisis that a working economy is not just about competition and abstract financial assets. It is also about trust, cooperation, collective rules (and their enforcement), as well as concrete, material assets. We have returned to basic, material facts of life and the role of governments and collective choice.

How was it possible that, within a 5-year period, we twice changed our basic perceptions of the economic and ecological terms of the land use debate? As argued below, economic facts have had an important role in triggering these shifts in perception.

From the 1980s to 2003: land as quality of life - a multifunctional, post-productive countryside

This vision had much to do with the economic success of Europe in raising general standards of life, as well as agricultural productivity and production levels after World War II. The story is already well known. Richer people with more leisure time became more concerned with their quality of life. The environment and, in particular, the quality of rural landscapes, their wildlife richness and cultural meaning became valuable societal assets. We should not forget that the environment as quality of life was a major rationale for a common environmental policy in Europe, at the Paris Summit 1972. Food security was no longer an issue after the

success of post-war productive agriculture - after all, we could always import our food from the world market. From the 1980s it became clear that modern agriculture was jeopardizing the quality of the countryside, and producing more, surplus food.

Modern agriculture was also efficient at using both land and labour, leaving a surplus of rural people and creating employment problems, particularly in poor, agriculture-dependent rural areas. A surplus of land also emerged, particularly in marginal agricultural areas, eventually creating a land abandonment problem.

New functions were actively sought for that land, such as landscape quality, wildlife richness and cultural meaning for both new residents and visitors, with part of the countryside becoming a multifunctional, consumption space for the urban middle classes.

After 2007: land as globally scarce, fragile and irreplaceable natural resource on which our lives depend - the strong sustainability view

Between 2005 and April 2008, the world was surprised by dramatic price increases for cereals and food generally. These price rises reversed a long-term decline in real prices that had been evident at least since the beginning of the 1970s. Food riots by the poorest people of the world opened TV news bulletins and occupied the front pages of newspapers. The rise in food prices was primarily linked to low levels of pre-harvest grain stocks, following 7 years out of 8 in which the global grain harvest was insufficient to cover demand (Figure 1).



Figure 1 World grain stocks as days of consumption 1960-2007 (L. Brown (2008), based on USDA data)

This raised concerns about our global ability to keep feeding the world, and two narratives appeared about rising food prices. In the first, OECD and FAO emphasised the combination of events leading to the crisis, particularly poor yields in major exporting countries and the entry of speculative funds into the cereals futures markets. In addition, structural pressure from growing demand by emerging economies, high oil price and increasing demand for biofuels also contributed to the crisis (OECD and FAO, 2008). In the second narrative, food prices were seen as a symptom of our global environmental crisis. Brown and others perceived the food-price crisis as a small warning of bigger crises to come (Brown, 2004, 2008). It was argued that the structural factors leading to the crisis would stay with us. These included falling water tables worldwide, declining response of crop yields to fertiliser use, rising temperatures, soil being lost at an increasing rate to deserts, land being taken for cities and roads, rising energy prices, a declining stock of unused yield-increasing technologies, demographic growth, changing diets and demand from the biofuels sector.

In this second narrative land is viewed as a globally scarce, fragile and irreplaceable resource that should be managed to reduce food, energy and ecological risks. Land is a special resource because it is:

- global, as there are global markets, for example in food and energy raw materials;
- scarce, because the same land globally is used for biofuels, food, biodiversity and important ecological processes;
- fragile and irreplaceable because the risks are globally inter-related.

Thus land use needs to be globally managed to reduce food, energy and ecological risks. If not, it will be left to markets and domestic public policies to determine how the global supply of land will be used. The consequence will be the failure of the global market to deliver global prosperity.

Most recently: land as a basic, concrete, material fact of life - lessons from the financial crisis

Farmers, in common with other economic actors, were hit by the current crisis in three basic ways:

- increased difficulty in obtaining access to credit;
- shrinking markets and falling output prices; and
- input prices dropping less than output prices.

These falls in food and commodity prices, including oil, seemed to contradict most price trends which had been interpreted, just days before the crisis started, as structural signs of the global scarcity of land and natural resources, but as with all crises, this one has also been a learning experience.

As regards our concern with land use and related issues, we are learning that a sound economy is not only about competition, markets and abstract financial assets. It is also about trust, cooperation, collective rules and their enforcement - in other words, sound public policy for the common good. It is also about concrete, material assets and thus also about the basic material (ecological) foundations of our economic and social lives.

We are also learning that sound public spending is crucial to alleviate the immediate effects of the crisis on people and to make sure that, after the crisis, we have a more energy-efficient, ecologically safe and food-secure economy - a more sustainable economy. After all, oil, food and other commodity prices may rise again after the crisis!

What are the implications for the future of this 5-year double shift in what we perceive as the fundamentals of our land use dilemmas? I think we ought to:

- be more humble about our forecasts, and not rely so much on modelling stochastic processes as a way of dealing with uncertainty;
- be cautious, as we could be predicting - with increasing precision - what might be completely irrelevant;
- remember that what will be crucial in the future is possibly outside our current understanding of the problem to be modelled (like in N. N. Taleb's Black Swan).

Is this pessimistic turn a big blow to the contribution of analysts and scientists to prospective public debates on different possible futures? No, I think it is really not so dramatic. Out of these rapidly changing perceptions, however, a common sense picture is emerging. It is one that we were not able to see 5 years ago, illustrating the learning effect of crises. This common sense picture is about us as humans:

- trying to improve our wellbeing (the post-productivist multifunctional countryside story);
- depending on ecological systems (the strong sustainability view which followed);
- whose behaviour should be guided not only by markets and competition, but also by cooperation and public policy for the common good (learning the lessons from the current crisis).

1.3 Beyond the intensive versus extensive farming debate

If we define farming intensity as per-hectare output, intensity might be the key to preventing further conversion of natural habitat into farmland anywhere in the world (given the increasing pressure of our demands for food, feed, energy or bio-materials). But intensity has been also linked to rises in per-hectare inputs, such as fertilisers, pesticides, water and energy. These rises usually lead to less efficient uses of those inputs, and eventually also lead to environmental problems (eutrophication, destruction of ecological food-chains, depletion of groundwater or river flows, and increased CO₂ emissions). The extra input costs also lead to agriculture becoming less competitive.

Therefore it is crucial for sustainable land use that rising per-hectare outputs can be decoupled, as far as possible, from the levels of per-hectare inputs. This would allow us, at the same time, to be both more competitive and environmentally friendlier. The extent to which this is possible is open to debate. There are certainly limits to this new technological strategy aimed at getting win-win solutions. These limits are powerful in the medium-term, due to technological lock-ins. For example, the full expression of the genetic potential of current plant varieties depends on growing them in simple ecosystems, with reduced competition (but also reduced levels of predators) and abundant nutrients in the soil; this means an increased need for pesticides and fertilizers.

There are at least two strategic ways of decoupling per-hectare output from per-hectare input levels:

- much more efficient use of inputs by applying them in a more targeted way, for example by adopting precision farming techniques, new irrigation methods and integrated pest management;
- copying or using ecological processes (for example, predation, diseases, symbiotic nitrogen fixation, micorrhizae, mixed annual and perennial crops) to substitute for purchased inputs of pesticides, fertilisers and energy.

There might already be some empirical evidence of this decoupling. The EEA (2006) indicators show, for the 1990s and for EU-15 as a whole, a 2% increase in the proportion of land managed by low-input farms and a 7% decline in the share managed by high-input farms; a decline in water abstraction rates for irrigation, despite a 12% increase in irrigable area; and a 16% decline in gross nitrogen balance. These trends are combined with significant yield increases. For example cereal yields increased by 14%, and milk yields per cow by 16%, although stocking density (cows per hectare) did not decline. There is, however, still a slight

decline in farmland bird diversity. Finer-scale research at regional or sector level is required, to show if these macro trends are empirical evidence of decoupling (and not of many other change processes at work such as specialization and concentration patterns).

1.4 Delivering ecosystem services - market creation and more classical policy alternatives

Market failure in a land use context is related to the fact that some ecosystem services, such as food or raw materials for biofuels, have a market price while others such as water purification or pollination, although extremely valuable, do not have a price. Services with a value but no price are usually undersupplied by the market system. Private land users typically optimize their systems taking into account those ecosystem services that command a market price, for which value can be captured as a monetary inflow. The levels of non-priced services are usually a side effect of those decisions, falling far below the levels that would collectively be the most appropriate. This is exactly what we call a market failure. In this context, creating markets for unpriced ecosystem services seems a quite intuitive solution. But things are not so simple. There are barriers to market creation and these barriers differ across goods and services. It is not simply by chance that we have markets for food, housing or shoes but usually not for pollination or predation services by wild animals, or for flood control services by upstream forests.

There are good reasons for that. For a market to exist at all, there needs to be:

- both buyers and sellers interested in buying and selling at a price that covers production and transaction costs;
- confidence and trust in the quantity and quality of the product or service delivered;
- guaranteed long term delivery; and
- the possibility of exclusion and of 'no pay, no service', which requires property rights.

These conditions help us understand that it is not simply by chance that we have markets for some goods and services but not usually for others. If we want to create markets for ecosystem services we have to overcome barriers, including the:

- complexity of services (biodiversity conservation);
- volatility of services (carbon sequestration);
- risks of future losses;
- the need for long-term monitoring of services;
- impossibility of exclusion for pure public goods (aesthetic quality of large-scale landscapes, air quality, climate); and
- significant transaction costs, beyond the costs of providing the service.

But these barriers do not make impossible to create markets for ecosystem services. Indeed, some such markets already exist, such as those for carbon or biodiversity. In addition, barriers to market creation vary across different ecosystem services, which therefore have different market potential. Governments need to intervene for a market to emerge. For example, exclusion of non-payers means that there are no markets without clear and enforced property rights, which is usually a core business for the State.

In some cases, such as the European Carbon Emissions Market, the role of government is crucial in determining and enforcing a common cap on emission permits. Only an effectively

enforced cap generates the level of scarcity that is required for a permit to command a positive market price. Too generous permit levels drives prices down to zero. In these cap-and-trade markets (as with wetland and species banking in the US) it is actually the government, not the market, which determines - in setting the cap - the precise level of environmental quality to be achieved by the workings of the market. So these are special, incomplete markets where the final outcome (the level of biodiversity conserved or carbon emitted) results from an initial collective choice, and not from the workings of the market (Bromley 1997).

When market creation doesn't work, there are two alternative options. One is to accept the inadequate levels of unpriced ecosystem services provided as side-effect of private land users' decisions (that is, accepting a certain level of market failure). The other is to recognize that, beyond market creation, there is a broad range of policy tools available to governments. These include regulation, planning constraints, green taxes, environmental liability, and public payments for ecosystem services.

1.5 On scale and governance - the long-term hurdles to integrated landscape and ecosystem management

Managing the land use dilemmas described above is a complicated governance issue with at least two dimensions.

Firstly, we are faced with a multi-level governance system that has some crucial omissions. Land users make decisions according to market conditions, which depend on global as well as EU and national rules and requirements. We have land use tools in place at the EU level (including financial mechanisms such as the CAP), and at the national and local planning authority levels. But at the global level we have no adequate mechanism to regulate land use economically and, as discussed earlier, this is the only level at which we can handle multiple economic pressures, from different sources, on land use.

The WTO rules, for example, are not helpful for mixing market goals with environmental goals. There is another important omission at a lower level of governance. Ecosystem services are provided by ecological processes working at the landscape level. This is usually above the individual farm or forest ownership level, but below (or above) the planning authority level, depending on the services. We obviously lack mechanisms for integrating landscape and ecosystem management at this level, which would be crucial to optimize the bundle of ecosystem services from each particular landscape.

Secondly, we sometimes do have a multitude of spatially overlapping, individually integrated managers. From this perspective we are faced with the question: how to integrate multiple overlapping managers? Each has its own distinct integration logic (for water management, nature conservation, fire prevention, or the rural economy) and its own 'catchment' boundaries. There are at least three problems in having multiple, overlapping integrated managers:

- How many of them can we support in the same area?
- How do we integrate their different integration logics?
- How can we reconcile their different 'catchment' boundaries?

This leads to my final conclusion, that integrated management is not simply a logical and analytical procedure. It requires a complex, political process of negotiation and leadership, but institutional actors often do not exist at the appropriate levels.

Comments

Peter Nowicki

Land use issues basically have not changed in the last 20 years. We still need to manage natural resources, especially soil; protect biodiversity; maintain the cultural-historical attributes of landscapes; increase the productivity of agriculture, which means coping with GMOs (not just herbicide and pesticide tolerance but also new traits of drought and salty soil tolerance) and keeping extensive grazing; address the problem of outmigration from rural areas, in particular as manifested through rural exodus and land abandonment; and cope with the demand for recreation, because tourism-induced pressures are often beyond the carrying capacity of visited areas.

The food crisis highlights the fact that population is growing faster than productivity, that our diet is changing, and that our governance systems are perhaps deficient. The issues concern policy (grain stocks, food reserves), economics (purchasing power), technology (productivity) and governance (the integrator of politics, markets and technological models).

We are facing simultaneously a poverty trap and a hunger trap. With regard to poverty, there is a need for employment; this requires trade; this requires infrastructure; this requires public investment; and thus the role of governance. With regard to hunger, there is a need to increase food production; this requires skills; this requires education (advisory services); this requires research and development; this requires public investment; and thus the role of governance. On the other hand we have a large reserve of rain-fed land (547 million hectares) that can be cultivated, and there are techniques that can respect natural resources while increasing productivity.

New technology does indeed exist, and not just in agriculture. Precision farming techniques are well known of course, but there is also product substitution, which alleviates demand for agricultural commodities. Algae can replace wheat, corn and soybeans; algae and cyanobacteria can be used as a source of ethanol, bio-diesel and biogas, as well as for the production of hydrogen.

Sustainable delivery of ecosystem services and food security in a market economy has to be a matter of joint production and public policy. Market intervention by itself makes commodities more expensive and distorts trade (for example, rice hoarding in 2008). The current credit crisis may reduce capacity to plant crops, buy livestock and invest in farm equipment, or to diversify activities. Strategic (public) reserves should be at a stock-to-use ratio of 30%, but these have gone down to 15% (enough for two months of feeding the world).

Ecosystem services can be associated with the management of mineral and organic matter, through joint production. With regard to new markets, what is the price for a kilo of butterflies? Or rather for the number of different species of flowering herbs and grasses per square metre in a pasture or field margin, that gives rise to insect diversity and population size?

Governance is the BIG issue, and the two critical aspects are politics and land use planning. Politics is about getting resources to where they are needed, particularly the key resources of infrastructure, research and development, and advisory services. With planning issues, land use constraint and suitability analysis is one direct way of both protecting prime agricultural land and avoiding inappropriate land use (such as overgrazing, cultivation of slopes or fertilising land in aquifer recharge zones). In conclusion, an economic perspective (including the technology involved) requires us to put markets and politics into focus. Markets cannot resolve political issues, while politics can both facilitate and disturb the functioning of markets. Appropriate technology is the fruit of far-sighted policy applied to a well-functioning market.

2. Land use in an era of global change: an environmental perspective

Henk Westhoek

2.1 Introduction

This contribution addresses a number of important drivers for global land use and land use changes, as well as the impacts of these changes on environmental issues. Although land use is related to many environmental issues, the focus here is on greenhouse gas emissions and biodiversity, concluding with a number of challenges.

2.2 Land use change: a local or a global issue?

Although land use seems a typical local issue, in fact many of the drivers of land use change are global. The main 'connectors' between local land use and global drivers are commodity prices and income (the opportunity costs of labour). For example, high commodity prices, like those provoked by the recent biofuel policies, can lead to conversion of pastures or forests into arable land (Eickhout et al., 2008). On the other hand, high labour costs can lead to land abandonment in marginal areas, a process that has taken place in many parts of Europe. Where farmland is of High Nature Value, land abandonment can lead to loss of traditional biodiversity (Baldock et al., 1996; Paracchini et al., 2008). Urbanisation is another important driver of land use change, and is a driving force with both local and global aspects.

2.3 Environmental effects of land use change

For the environmental effects of land use change the opposite is (partly) true - the sum of local changes has a global effect. The greenhouse gas emissions or loss of biodiversity associated with the conversion one hectare of forest are not significant on a global scale, but what counts is the sum of all the changes. Land use is also affected by global changes, notably by climate change. Changes in rainfall and temperature can lead to the loss of potential for agriculture in some areas, such as the Mediterranean region, while agriculture benefits in other regions such as the Nordic countries.

2.4 Land use change and biodiversity

Over recent centuries, biodiversity loss in natural biomes has dropped from a potential 100% to 73% in 2000, and is expected to drop further to 62% in 2050 in a baseline scenario (Figure 2). Since the rate of decrease for the period 2000-2050 is higher than for the period 1970 to 2000, it is very likely that we shall not reach the Convention on Biological Diversity goal of reducing the rate of loss by 2010. The major reasons for the continued loss of biodiversity are expansion of infrastructure, expansion of agriculture and climate change (Bakkes et al., 2008). However, expansion is not the only risk that agriculture poses to biodiversity. Intensification of agriculture might also, through different processes, cause significant reduction of biodiversity. Intensification can not only lead to the loss of landscape elements and the enlargement of parcels, but also to increased emissions of nutrients to surface waters, with severe risks for the quality of surface waters and coastal zones (Millennium Ecosystem Assessment, 2005).

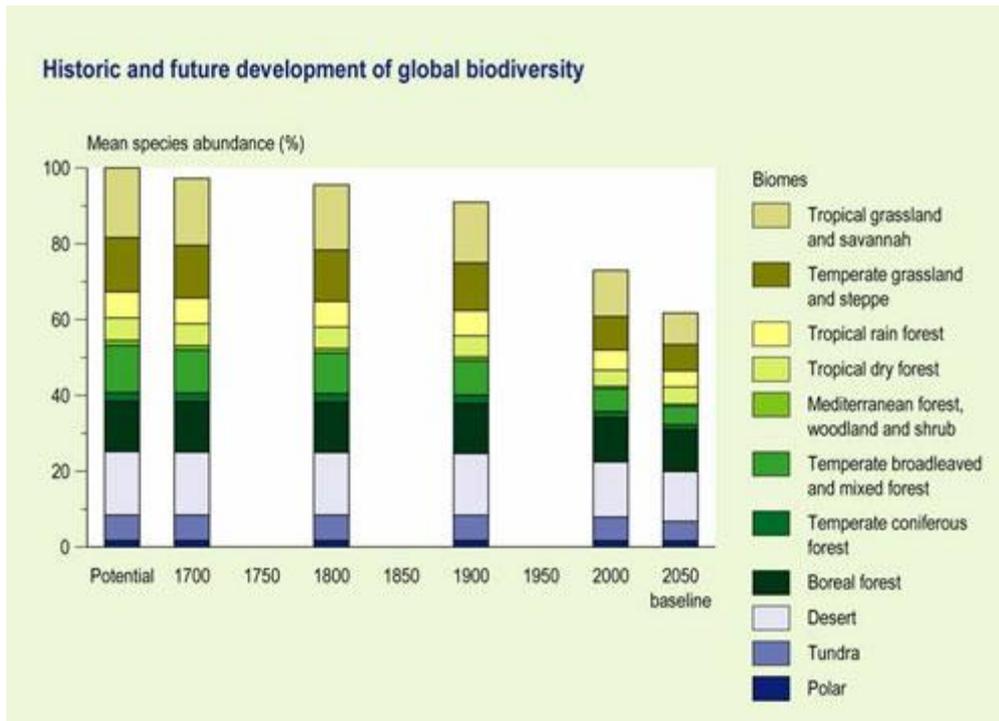


Figure 2 Development of global terrestrial biodiversity from 1700 to 2050 (Bakkes et al., 2008)

2.5 Land use change and greenhouse gas emissions

Agriculture is a major contributor to the emission of greenhouse gases. The combination of CO₂ emissions (from forest fires, post-harvest burn and peat decay) and N₂O and CH₄ emissions (from soils and animals) accounted for approximately 22% of global greenhouse gas emissions in 2005 (Figure 3). This figure does not even include sources like the production of fertilizers and use of fossil fuels in agriculture. It must be stressed that the exact amounts of many of the emissions related to agriculture are quite uncertain.

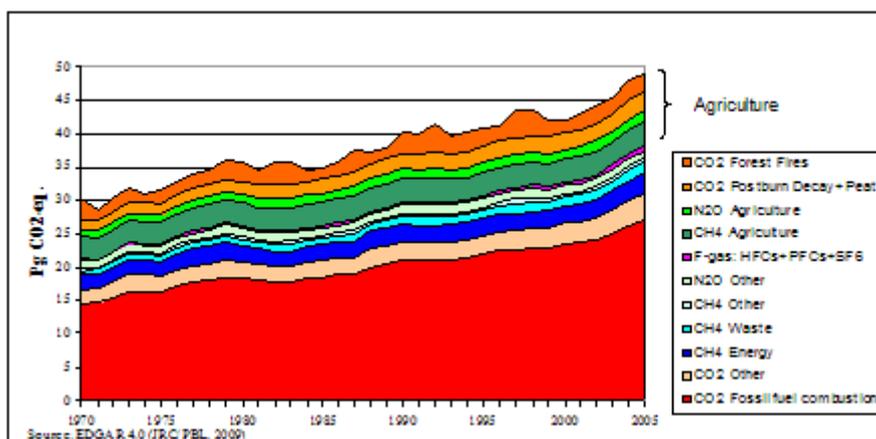


Figure 3 Development of greenhouse gas emissions 1970-2005

2.6 Demand for agricultural products

The continually increasing demand for agricultural products is one of the major driving forces for land use change. This increase in demands stems partly from population growth, but other important reasons are changing diets and the policy-driven demand for feedstock for biofuels. The consumption of proteins from animal origin (meat, dairy, fish) is projected to increase by roughly 50% between 2000 and 2030 (based on Bruinsma, 2003). However, if the whole world population in 2030 switched to a North American diet, the global consumption of animal products would be almost four times the level it is now. The rapidly increased demand for cereals and oil crops following newly imposed biofuel policies is a significant factor on the demand side, and has been at least one of the factors leading to the sharp increase in food prices in 2008.

Continuing malnutrition, hunger and poverty are major problems still to be solved. The Millennium Development Goal target of halving hunger by 2015 will not be met. Because of high food prices, hunger and malnutrition have become more widespread over recent years, notably in South Asia. It must be stressed that hunger and malnutrition are not problems caused by physical limits to crop production, but are caused by poverty, impeded access to food and lack of opportunities.

2.7 Effects of possible loss of croplands and yields: land as balancing factor

Projections and scenario studies usually assume a certain level of productivity growth. Although assumed growth rates are usually lower than historic growth rates, values of 50% to 150% yield increase are quite common, with large differences between different studies and regions (Kok et al., 2008). Potential yield increases are usually based on expectations of improved genetics, increased inputs (like fertilizers) and improved management. But what would be the effect if yield increases were significantly higher or lower than projected? Higher yield increases might be feasible with technological breakthroughs, but could also be the result of successful policies. Notably in Sub-Saharan Africa, yields are presently very low and major opportunities exist for drastic yield increases, based on already available technologies. But taking a pessimistic view, there are a number of factors which might lead either to loss of cropland or to lower yields (Figure 4, Nellemann et al., 2009). If these reductions in crop yields actually happened, this would result in higher food prices. The loss of food production capacity in certain regions would have to be compensated either by further yield increases or by cropland expansion.

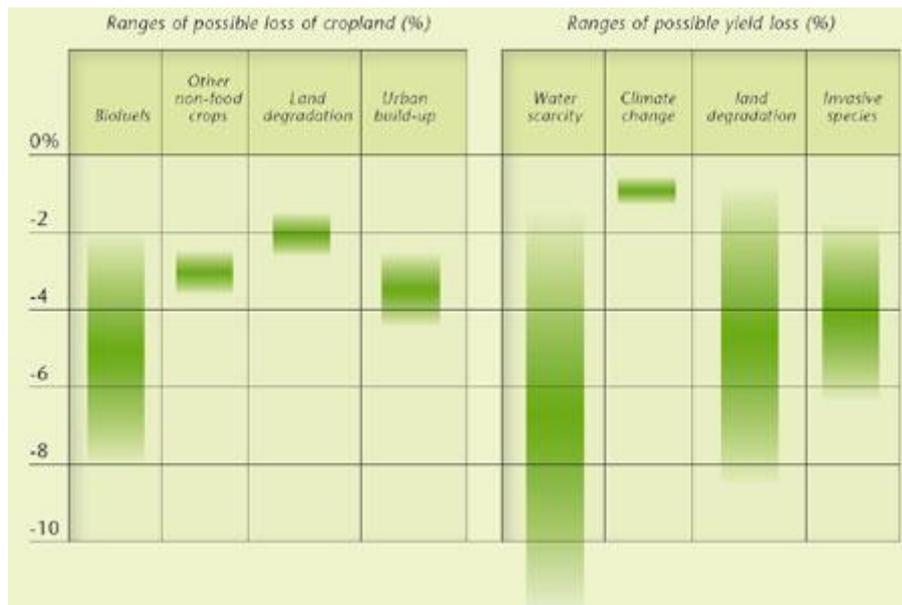


Figure 4 Ranges of possible loss of croplands and yield (Nellemann et al., 2009)

2.8 Global challenges

The development of the less developed countries is a not only a key to reducing poverty and malnutrition, but probably to biodiversity protection as well. The IAASTD¹ states that *'an increase and strengthening of agricultural knowledge, science and technology towards agroecological sciences will contribute to addressing environmental issues while maintaining and increasing productivity'* (IAASTD, 2008). This might be achieved by a combination of different policy instruments and funding geared towards education, capacity building, and improved market access (infrastructure), plus significant investment in research. This combination might lead to increased resilience of rural populations.

As these developments will take several years or decades, in the meantime targeted policies and funding will probably be needed to protect biodiversity. The EU already plays a significant role in the process, but of course this could be further enhanced.

2.9 Challenges within the EU

Different EU policies, like the CAP, the Water Framework Directive, the Birds and Habitat Directives and rural development policies have an influence, directly or indirectly, on rural land management. Long term, sustainable land management could benefit from a comprehensive EU strategy for land management. But the EU could also stimulate sustainable land management in more practical ways. As at the global level, investments in agricultural research and development might create new pathways of combining enhanced agricultural production and sustainable land management. Land managers, farmers and foresters could be encouraged by targeted payments to produce more public goods and thus improve the multifunctional character of agriculture and forestry. Another way of reducing the global pressure on land would be to reduce EU consumption, notably of products which require a lot of land, such as livestock products and biofuels.

Comments

Karin Holm-Mueller

It is hard to disagree with most of what has been presented. So let me first stress one point that arose out of the contribution from José Lima Santos and partly also from that of Henk Westhoek. It was said that food production must be organized on a global scale. But this is precisely what happens now, through globalized markets. We may find a global regime for greenhouse gases and this may also help to alleviate the trade-off between food, feed, energy and the environment. It may be necessary to think about increasing buffer stocks for the most important staples, but otherwise I feel that it would be wrong to found new global organisations. We already have one global institution, the WTO, although I doubt that the rules of the WTO are sufficiently adapted to the global challenges of climate and biodiversity protection that the world is now facing. In my opinion we need to discuss the WTO rules again, in order to protect global public goods even if these are delivered at the local level. WTO rules place constraints on biodiversity payments, for example in paying for grazing land. We need to address that!

One, point that was made very clearly was that all experts think that land scarcity will continue to increase, which poses a threat not just to food security, but also to biodiversity. This is a trade-off presented to environmentalists quite often nowadays, at least by producers in Germany: *'We need all the land we can get and we need to make the most productive use of it. If you prevent us from doing so by posing restrictions on the use of land because of biodiversity concerns, you are at least indirectly responsible for undernourished people in other parts of the world.'* This alleged trade-off has an appealing simplicity, so we must present good arguments against it. Of course we know that there is no direct link between food production and hunger or malnutrition. As Henk Westhoek has shown, food production per capita has increased dramatically in the last 30 years with almost no effect on the number of people who are undernourished.

The problem here is an inequitable distribution of purchasing power. Consumers with the highest income determine what the resources are used for. Land has been used directly and indirectly for meat consumption in industrialized countries in the past. More recently it is our demand for 'carbon neutral' mobility using biofuel that is taking more land and thus (inter alia) increasing food prices to a level that is unaffordable for the poorest.

Instead of biodiversity versus food, the trade-offs may just as well be mobility or meat consumption versus food security, and then perhaps meat consumption versus biodiversity. In my view food security and biodiversity are of the highest priority, meat consumption and mobility are not. These are the two big demand factors that have to be reduced.

This leads us to the question of lifestyles and changing behaviour. I know it is hard to change behaviour just by appeals, but then it ought to be just as hard to change environmentalists' demand on land. And if we stand firm, pricing for biodiversity protection as well as for climate protection may help to make the necessary changes in consumption.

Henk Westhoek also gave us some hints on possible measures to reduce hunger. I agree with him in saying that development in the poorest countries is an important key to reducing poverty and biodiversity loss. Although I agree that the EU should abandon export subsidies, I am not so sure that - at least in the short run - this will help to reduce the trade-off between

undernourishment and biodiversity. For net producers (like many small-holders in developing countries) higher prices and less competition from subsidized goods are helpful. But for net consumers living mostly in towns (as more than 50 % of the world's population now do) higher prices are a big problem.

Furthermore, higher prices will also increase pressure on land in developing countries, where productive land is perhaps even scarcer than in Europe. I feel that instead of fostering the export of land-based agricultural products it would be more helpful to support the manufacturing sector , thus making use of unemployed manpower in those countries. This is one measure that could help reduce pressure on land, at least for as long as consumption patterns do not change dramatically because of rising income levels.

1. International Assessment of Agricultural Knowledge, Science and Technology for Development

3. Integrated landscape management to safeguard food, feed, fuel and natural resources in an era of global crisis

Sara J. Scherr¹

3.1 Introduction

Integrated landscape management - ecoagriculture² - provides a rational way forward to address current challenges.

Agricultural production is now faced with a number of challenges, of a magnitude that the agricultural institutions of today are unable to meet. In the 21st century we need to reduce rural food insecurity and poverty; secure urban food supplies; meet a global demand for food that will rise by 50-100% by 2030; contribute to sustainable energy production through biofuels; adapt to climate change; restore degraded resources that are critical for production; and reduce our ecological footprint.

We have to become a net contributor to ecosystem services, and to meet these challenges we must invest in the natural infrastructure that provides ecosystem services. This means a whole set of instruments and measures to protect air quality, watersheds, soil formation and fertility, and wild species and habitats; to control pests and diseases; and to safeguard plant pollination, carbon sequestration and fertility. We must do this in the face of climate change, which will dramatically affect all human activities in the coming decades, and in already degraded landscapes that need intense rehabilitation to be able to sustain farming as well as important biodiversity.

3.2 Agriculture and conservation area management

Agriculture dominates more than 30% of the world's land. Another 10-20% is under extensive livestock grazing. If we include the natural forests that are used for food and fibre, between 80% and 90% of the habitable earth is affected by some form of productive activity. Many publicly protected areas - like national parks and watershed protection areas - are still farmed, as are the surrounding areas. 1.1 billion people live within the world's biodiversity 'hotspots' and most of them rely on agriculture for their livelihoods.

This has led to the conclusion that the model of segregated land use is relevant in some parts of the world, but in many other places it is no longer appropriate. Ecoagriculture emerged from the recognition that in many places the different demands can be met only if addressed together through land use systems that manage agriculture, ecosystem conservation and rural livelihoods in the same geographical area.

3.3 Climate change: the integrator of land use

There are huge opportunities to mitigate climate change, by shifting food and forestry production systems and conservation area management in ways that also increase sustainability, improve rural incomes, and ease adaptation to a warmer world. Until recently the people involved in the Intergovernmental Panel on Climate Change (IPCC) paid very little attention to the fact that 30% of greenhouse gas (GHG) emissions come from land use (Figure 5). However we do now see a growing awareness of this.

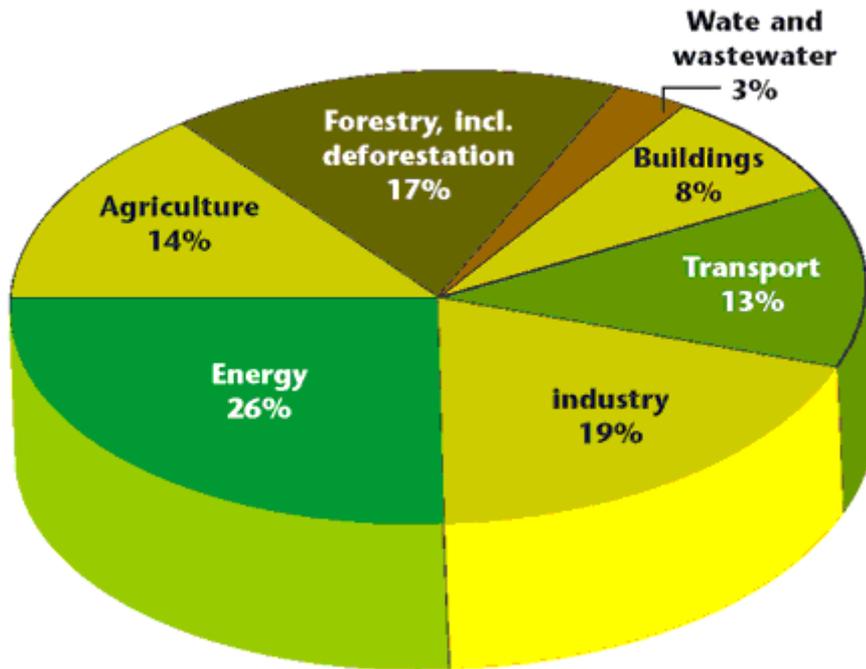


Figure 5 Agriculture and land use - global greenhouse gas emissions

Furthermore the target recommended by the IPCC in 2007, of stabilizing green house gas (GHGs) concentrations at 450 parts per million CO₂ equivalent, has been questioned. Many scientist find 350 parts per million the safe upper limit. To achieve this would require large-scale carbon sequestration. Within 10-20 years the major sequestration will be by land use, but public administrations all over the world have not yet grasped this. Land use will also have to protect biodiversity, and increase agricultural production to feed the growing world population. These are very different agendas, but climate change can be the integrator! For example, reductions in GHG emissions and improved sequestration of carbon can be achieved in working landscapes through the restoration of degraded lands, the enrichment of soil carbon, the protection of natural habitats, and by farming with perennials and using sustainable livestock production systems.

3.4 Biodiversity and ecosystem services for rural livelihoods and for wildlife

Surprisingly, the provision of biodiversity and ecosystem services for rural livelihoods in and around the farm has been excluded from most agricultural models. So far the models have focussed on trade-offs, not on synergies, but now we must shift the curve through finding synergies instead of figuring out how to handle trade-offs. Direct synergies between biodiversity and rural livelihoods need to be taken into account. These include providing nutrition (by direct consumption of wild plants and game, as sources of micro-nutrients, and as a 'safety net'); providing sources of medicines, fuel and construction materials, and farm inputs (fodder, fertilizer, packaging); providing income from sale of wild species, quality water supplies for domestic use, reliable supplies of irrigation water, pollination of crops, key wild species and cultural, spiritual, aesthetic value. Biodiversity and ecosystem services also provide indirect synergies like maintaining soil fertility, healthy human habitats and microclimates for crops; controlling pests and diseases, cycling nutrients, detoxification and wild crop and livestock genetic resources.

Undisturbed areas remain essential to provide for the needs of wildlife (safeguarding nesting sites, protective cover and predator balance) but ecologically compatible agricultural production can also enhance the efficacy of conservation area management, for example by improving the effectiveness of biological corridors across unprotected areas, and providing smaller patches of critical habitat in uncultivated and farmer-protected spaces. Agricultural landscapes can also support in situ conservation of crop and livestock varieties and of wild species that are necessary for sustainable agricultural production and rural livelihoods (Figure 6).

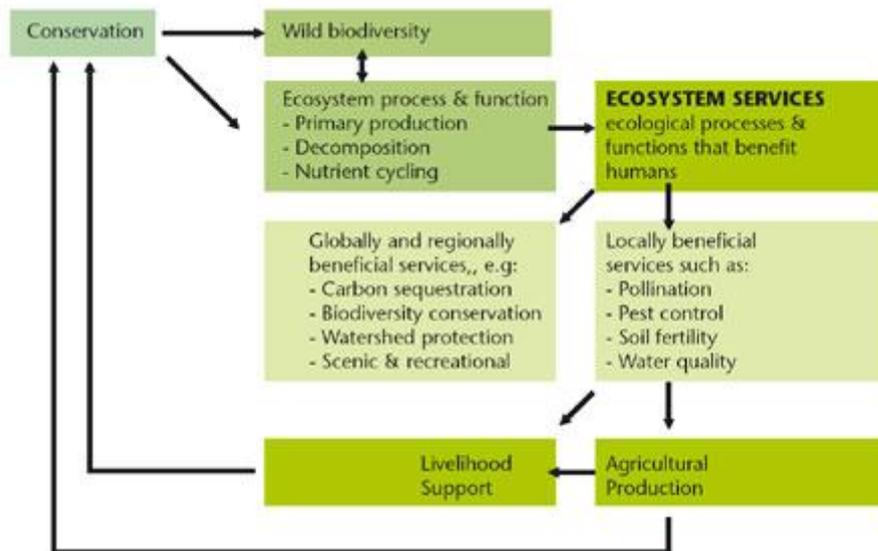


Figure 6 Inter-dependence of agriculture, ecosystems and livelihoods

3.5 Moving towards ecoagriculture

We need new paradigms and methods to manage agricultural landscapes to enhance both rural livelihoods and sustainable production (of crops, livestock, fish and forest), while at the same time conserving or restoring ecosystem services and biodiversity (McNeely and Scherr, 2003; Scherr and McNeely eds, 2007). Landscape goals and strategies vary between regions and generate different combinations of mosaics for production-biodiversity and livelihoods. These new agricultural systems require generation-long, multi-stakeholder initiatives plus new markets and policies. We need to get rid of subsidies promoting large-scale monocultures.

New paradigms and methods evolving

Green Revolution	→	sustainable agriculture, agroecology, agroforestry, organic agriculture
Integrated Pest Management	→	integrated management of natural resources
Protected areas	→	community forestry
Integrated rural development	→	participatory development
Land use planning	→	multi-stakeholder planning
Monocultures	→	polycultures
Geographic Information Systems	→	Google Earth

We see agricultural production and ecosystems achieving positive synergies through increased input efficiency, enhanced biological and ecological synergies, improved spatial organization of species, fields and farms, management of wild species to benefit farming, realisation of economies of scale through collective action, and substitution of natural capital for financial capital.

Ecoagriculture has developed different strategies to meet diverse goals within the landscape. Conservation areas have been expanded or enhanced when local farming communities have benefited from creating conservation reserves and improving the connectivity of native habitats through non-farmed areas, and where land conversion has been reduced or reversed by increasing farm productivity. On the farmed areas agricultural pollution has been minimized, ecologically-compatible management of soil, water, and vegetation has been introduced and the diversity of crop species and varieties has increased. To support ecoagriculture strategies it is necessary to create new markets and policies.

These include eco-certified agricultural commodities, natural resource-based products, marketing innovations to enable diversification, payments for ecosystem services (PES) and reduced subsidies for large-scale monoculture. Multi-stakeholder planning and action is the key to ecoagriculture landscapes.

Changes are underway that favour ecoagriculture strategies. Ecosystem disruption increases risks (for example of pollinator losses, epizootic diseases, drought and bioterrorism) and leads to the need for regulation. Land-based mitigation and adaptation to climate change (including biofuels) is a pressing issue. Supply chains are being restructured to reduce energy costs and to provide environmental friendly procurement and biosafety. Eco-certification and local foods create new markets. Livestock systems are being restructured to reduce greenhouse gas emissions and produce more 'sustainable' meat. Farmers are increasingly paid for ecosystem services (through the Farm Bill, by municipal and state authorities, and private offsets). Agriculture plays a growing role in international environmental conventions, such as the Convention on Biological Diversity.

3.6 Public and private investments are both needed

Both public and private investments are needed to support ecoagricultural landscapes.

From the public sector we need:

- to develop profitable and productive agricultural systems with high levels of ecosystem services and biodiversity benefits (you can't just 'save the forest'). We need a tenfold increase in these kind of investments!
- the knowledge to structure and manage production and conservation mosaics in agricultural landscapes, for the benefit of both ecosystem services and production;
- market mechanisms that provide incentives and enable ecosystem stewardship by farmers and the agricultural community;
- institutional models for ecoagriculture (multi-stakeholder processes, norms, capacities, cross-sectoral planning, farmer organizations and NGOs).

From the private sector we need:

- to develop crop varieties with traits benefitting ecosystems (shade tolerant, deep-rooting, high-yield polycultures);
- to develop technologies to make crop-diverse landscapes profitable (improved minor, wild and perennial crops; multi-species product marketing; machinery for polycultures and precision farming);
- knowledge and information services about farm and ecoagriculture landscape management. We need 'landscape literacy'!
- products and processes to facilitate rehabilitation of land, water and habitats, and payments for ecosystem services (PES);
- spatial analysis for ecoagriculture monitoring (for PES, regulation, certification and ecological footprinting).

The key to all of these actions is leadership. We need visionary conservationists who can look beyond protected areas to find partners in the agricultural community; visionary farmers and agricultural business leaders who can mobilize their communities to take a leading role as environmental stewards, as well as food producers; and visionary public leadership to provide the framework for these groups to work together.

Comments

Karin Robinet

Sara Scherr left no doubt that nature conservation strategies focusing on strictly protected areas will fail to meet the environmental challenges of 21st century, and I share this view. It was only recently that the EU had to admit that we shall fail to deliver the 2010 target of stopping the loss of European biodiversity, despite the impressive 17 % of European territory designated as Natura 2000 areas. Nearly 50% of the biodiversity of Germany depends on traditional or low-intensity forms of agricultural land use. Since we are going to fail the European biodiversity goals two questions arise - is it a lack of 'political will' as Tom Long, director of WWF recently indicated, or is it a lack of nature conservation strategy as Sara Scherr suggests? I doubt the latter because what she describes as ecoagriculture has much in common with what we call multifunctional land use and are trying to achieve through the

tools of a Common Agricultural Policy. However, nature conservation strategy in a European context is dependent on a successful integration strategy.

Common European rules for agricultural markets are necessary. I share the view that to achieve the biodiversity targets it is necessary to use market mechanisms such as eco-certification and payments for ecosystem services, thus rewarding farmers when they deliver benefits for the environment, which under market conditions would otherwise not exist. I agree it is also necessary to reduce subsidies for 'large scale monocultures'. In Europe the agricultural subsidies are not well targeted, therefore there is a lot of scope for improvements focussing on what we want to see.

Equally important is the need for public investments in what Sara Scherr calls multi-stakeholder planning and action - although we have to be aware that instruments such as the LEADER approach and its national equivalents in Europe already exist. However we should also be aware, that the complex topic of integrated land use management needs qualification and structures. For example in Germany we fund NGOs to help them to be successful in programme planning for sustainable rural development. We also have to ask if structures such as local action groups are additional complementary structures (leaving existing structures untouched) or whether these will gradually replace other planning instruments in order to support sustainable rural development. I raise these questions because there has been disappointment with the existing European integration strategy, in the light of experiences in recent years of the national strategies for rural development. The question that arises is 'for whom is it an incentive to integrate?' Article 6 of the Amsterdam treaty states that 'Environmental protection requirements must be integrated into the definition and implementation of the community policies in particular with a view to promoting sustainable development'.

Integration is most important for environmentalists, because the management of Natura 2000 areas is dependent on the existing EU agricultural and structural funds. But is integration important for all farmers and other land users, too? That is why ENCA - the European Network of Nature Conservation Agencies - was founded. As ENCA Interest Group Sustainable Land Use and Agriculture we want to develop a strategic view on nature conservation issues with regard to the reform of the Common Agricultural Policy and the design of Integrated Rural Development policies. We are currently working on a common vision for CAP and exchanging information on financial demands and efficient agri-environmental measures³.

1. President of Ecoagriculture Partners, Washington DC (www.ecoagriculture.org)
2. The 'ecoagriculture landscape' approach was first described by Jeffrey McNeely and Sara J. Scherr in their 2001 report Common Ground, Common Future: How Ecoagriculture Can Help Feed the World and Save Wild Biodiversity (Future Harvest and IUCN, Washington).
3. For further information: encanet.eu

4. Group session - environment

Astrid Schippers and Jos Gysel

The scope of this session covered two major questions. What are the driving forces for land use in relation to environmental change at different levels - global, European and local? How can we achieve the multiple, integrated agricultural and environmental goals of providing food, feed and fuel alongside ecosystem services and biodiversity?

The group discussed different approaches to achieving sustainable land use. Pricing measures are a good option for influencing consumption patterns, for example of meat and transport. Instruments like education and involvement are also possibilities, but likely to be less successful. Ecosystem Services (ES) may be a good unifying concept if related to sustainable development and ecological footprints. Quantifying and valuing ES can be a useful way of making explicit the effect of human activities on the environment. But we have to be careful. We must not quantify partially (for example quantifying the CO₂ effects without involving other environmental effects). If all aspects could be quantified, a market for ecosystem services could be created, but at present the right instruments to quantify ES are not yet available. Land use planning is important and the EU influence on spatial effects of policies has to be considered. There is a need to coordinate different EU policies with a spatial impact (for example Natura 2000 networks and transport networks). Bottom-up decision processes are important (for example Leader groups) but multi-stakeholder consultation has to take place at the right decision-level.

Finally the group discussed possibilities for influencing the debate, and suggested that some of these could be issues for consideration at the 2010 EEAC conference:

- discuss the possibilities for spatial planning at the EU level;
- provide input to the CAP reform debate in 2010;
- evaluate the EU Biodiversity policy in the target-year of 2010;
- identify lessons to be learnt from successful climate change policies and measures;
- emphasize the huge influence of land use on climate change; about 30% of GHG emissions come from agriculture, but agriculture also has great potential for absorbing CO₂;
- consider using multi-stakeholder consultation as a tool for integration, and inviting land-users to participate in the preparation of the EEAC conference in 2010.

5. Group session - sustainable development

Brian Pawson, Pieter Decruynaere and Ursula Vavrik

Land use is interlinked with many other policy issues including climate change, urban planning, transport and biodiversity. Many land use changes are largely irreversible and can have a major impact on sustainability. An integrated approach to policy making is therefore necessary. The EU Sustainable Development Strategy (EU-SDS) can provide a cross-cutting tool for improving the orientation of various EU policy mechanisms (such as the CAP and Structural Funds) towards the emergence of a more sustainable Europe. The current financial crisis has placed even more emphasis on the need to ensure that public money is used in ways that deliver maximum public benefits. The planned review of the EU-SDS is particularly important in the context of the ongoing EU budget debate. In particular, the EU-SDS should provide a framework for the key decisions that have to be made in the run-up to the new EU financial perspective in 2014.

Decisions on land use at both local and global levels are interconnected. Within the EU, high-level policy decisions can have significant implications at both local and global scales. The example of the EU Biofuels Strategy, with its implications for both land use and food security in Europe as well as in developing countries, shows that the EU-SDS has not always succeeded in delivering against its aspirations.

In considering the use of land for agriculture, and the promotion of sustainable development more generally, there should be a much greater emphasis on synergies and win-win situations. These must be capable of delivering increased yields alongside enhanced social outcomes and reduced environmental impacts. This suggests a need for greater EU investment in research and development to drive the adoption of 'smart' agricultural technologies. At the same time, safeguarding local knowledge of agricultural techniques, sustainable land management practices and genetic resources is important, not least because of their potential to help in developing climate change adaptation strategies. A much larger proportion of the CAP budget should be devoted to securing specified outcomes in the form of increased yields coupled with reduced (or preferably positive) environmental impacts. For example, more use could be made of grants, loans and knowledge transfer, in comparison to income support. The EU could also set a clear target to stimulate sustainable agriculture and to help to achieve the stated goals (such as a 10% target for the area covered by biological/organic agriculture).

Recent spikes in food prices coupled with an ongoing global financial crisis suggest a need for greater government intervention within basic commodity and other markets. The development of virtual food stocks by international bodies is one way in which this might be done. At the same time, the EU needs to pay more attention to the risks inherent in continuing to convert large areas of agricultural land to urban uses. The protection of high value agricultural soils is linked to the application of the 'proximity principle' under which products are both produced and consumed within the local economy. At the same time, however, it is important to realise that certain goods can be produced more efficiently at some distance from the market, even after transport costs (in the form of GHG emissions) are taken into account.

It is important to promote the concept of sustainable development (SD) in a positive way, identifying win-win situations and demonstrating how the adoption of healthier lifestyles can bring personal benefits to the individual, as well as wider SD gains to society. There needs to be more emphasis on reducing the poverty gap by ensuring that producers obtain fair prices.

This means promoting the concept of fair trade; reducing the length of supply chains; convincing consumers and the retail sector of the importance of sustainable land use practices and providing more support for end users who make sustainable choices. This could be done using positive economic incentives such as reducing the level of tax applied to sustainably produced and retailed products.

Finally, further work is required to address governance issues at both EU and Member State levels. On the one hand it is important to ensure the relatively uniform implementation of EU Regulations within the single market. Failure to do so would encourage producers from those parts of the EU with relatively strict regimes to move their activities to those parts of the EU that might deploy a less rigorous approach. This applies particularly to producers in older Member States, who may have greater access to capital. On the other hand, the rigorous application of EU sanitary regulations would appear to be restricting the production of traditional local foods in some places. This reduces the opportunities for smaller, locally-based producers to remain in production, and runs counter to many of the principles underpinning both sustainable development and integrated rural development.

In light of the problem described above, it would be beneficial to reduce the regulatory burden at EU level in the field of food processing and handling. This could be achieved either by revising existing legislation (without compromising basic environmental and health issues) or by the use of derogations issued by the European Commission. Such action would help to support sustainable land use, thereby ensuring the long-term sustainability of rural communities across Europe.

6. Group session - governance

Rob Cooke, José Lima Santos and Karin Robinet

Governance is the central challenge in policy integration and the upcoming key question is how to handle long-term pressures. Instruments to promote integration are already available, such as incentives, institution building, contracts and payments for environmental performance. This was a broad ranging and very informative group discussion, with examples from several countries. The group thought that land use should explicitly include both urbanisation and sea use (where governance issues are particularly challenging because international cooperation is needed). This was because pressures from these two environments can help to mitigate or to increase the pressures on rural land. It was recognised that not all land is equally productive, and productivity is not always the same as fertility. The group discussed how different methods of land assessment could be integrated, for example through GIS mapping, and questioned whether there is in fact any real risk of land abandonment in Europe.

The group discussed the following specific governance issues:

- the importance of developing an ecological approach to planning, monitoring and reporting;
- the importance of both scale and temporal issues in landscape planning, and also in economic forces;
- most planning systems are about consenting to operations, rather than encouraging particular activities;
- broad-scale approaches are often used, but these can be crude. However, more sensitive approaches often have high transaction costs;
- ecosystem based approaches would be helpful;
- performance based approaches can encourage innovation.

The key issue that we need to understand is what, if any, trade-offs there are between food production and land use impact. We need to be able to measure and assess impacts, and take a consistent approach to their evaluation. This would help determine what an appropriate level of trade-off might be, or conversely what opportunities there are for synergy.

7. Plenary session

Brian Pawson

For the plenary discussion, participants were joined by Marcel Haag¹ from the European Commission.

Policy integration debate is timely

This is a good time in Europe to discuss the policy integration issues raised by the debates over land use. We have a new European Parliament and, after the new Commissioners have been confirmed, the Commission will set out a five-year programme. Whilst it is still too early to reflect on the details of what this may look like, issues sure to be on the agenda include the low carbon economy, resource efficiency, climate change and biodiversity loss (which may possibly be accorded the same level of importance as climate change). An opening up of older agendas is possible, too. There is a strong awareness that we have to face global challenges and that irreversible processes could be pushed to a tipping point.

Review of the EU Sustainable Development Strategy (EU-SDS)

In response to the European Council's request for a second progress report on the EU Sustainable Development Strategy, the Commission is publishing a review², to be followed later in the year by a Eurostat report measuring progress of the EU-SDS against quantitative indicators. Different questions are in the air. Should the priorities be more tightly focused than is the case with the current seven priorities? Should the approach to governance be rather more strict or kept relatively loose as at present? There seems to be a consensus that there is no point in trying to merge the EU-SDS with the Lisbon Strategy as they fulfil different functions. The EU-SDS fulfils a useful long-term role, focusing on trying to ensure the delivery of environmental, social and economic outcomes. Responsibility for economic rural development is currently located within both Pillar 2 of the CAP and the Structural Funds. This dichotomy could possibly also be covered in the forthcoming review of the EU-SDS.

Land use policy issues at EU level

There are constitutional difficulties in trying to handle spatial policy issues at EU level. The Commission structure reflects the allocation of EU competencies under the EU Treaty - competencies that specifically exclude land use planning. Regulatory powers over land use are divided into local, regional, national and EU responsibilities. The EU Soil Strategy and the draft Soils Directive illustrates how institutional demands can override policy goals - no one disputes that soils issues need to be tackled, but there is disagreement over whether soils are an EU or a Member State competency. Land use issues should feature in the review of the EU-SDS, but the Commission has to be smart about tackling these issues at EU level - the Soils Directive illustrates that land use issues can be highly contentious. One possible way of circumventing the problem would be for the EEA to be made responsible for monitoring the spatial impacts of EU policies. The EU could deal with many land use issues via the CAP, and the Commission is looking at all the options, but cannot second guess what the new European Parliament will do. In many places, biodiversity loss could be dealt with by the same tools as are needed to tackle climate change, but in other places a different approach will be necessary. The Water Framework Directive also addresses land use tools. The land use debate should not

be confused with the Territorial Cohesion debate, which has a social as well as a land use component.

Research and development

The role of research and development in furthering the development of EU policy cannot be overestimated. For example, lack of scientific evidence is a major obstacle to improving the existing EU approach to biofuels. More work on climate change is needed to supplement the evidence gathered by the IPCC and to help in convincing the US, China and the developing countries of the need to take action. The idea of developing virtual food stocks, as a way of avoiding major fluctuations in commodity prices and in access to basic foodstuffs, has recently been promoted by the World Bank, amongst others. However, there are major knowledge gaps when it comes to determining just how such an approach might actually work in practice.

Communication

Communicating the SD message is a huge problem, and for many citizens integration of the seven priorities is complicated by the paperwork and language involved. Land use issues could provide a way of communicating SD issues more readily, purely because the problems can be illustrated using maps. However, land use as a whole may still be too abstract a concept. Individual SD issues such as energy and food are much easier for citizens and politicians to engage with. A particular difficulty in using regionalised approaches to promote engagement with SD concepts in the European Parliament is that such issues will only be relevant to a small number of MEPs (for example, integrated management of the Baltic Sea region). European policy is made in Brussels, but delivered locally. The Committee of Regions functions as a consultative body, but key decisions are taken by the Council of Ministers. Local administrations have no voice at EU level, and there is need to reinforce the process by which the EU communicates with local levels of governance. Inconsistencies are felt not in the capital but at the local level.

1. SG-D-2 Strategic Objective Solidarity, Secretariat-General, European Commission
2. COM(2009) 400

8. Summing up

Peter Pitkin

We are only just beginning to understand how global factors are influencing land use in Europe, how economic and environmental systems interact at the global scale, and what the environmental consequences of future changes might be.

The original idea for this workshop, which we discussed at the EEAC conference in Bordeaux in October 2008 just as the scale of the global financial crisis was becoming apparent, was to consider the consequences of a global recession for European land use and the European environment.

The global recession is the newest among several major new drivers of land use change at the global scale - climate change, energy security and food security. Although it has received less attention in this workshop than these other influences, it is likely to be more immediate in its effect. The land use economy may be buffered against some of the impacts of the crisis, but it will be affected by the availability of credit to rural businesses and the interest they are charged - many farms in the UK depend heavily on borrowed money. The crisis is likely to reduce the influence of speculation in markets for agricultural produce, but the indications are that agricultural prices will continue to fluctuate. Any recession is likely to result in a change in demand for agricultural produce, with more demand for cheap, staple foods and less for quality and 'specialist' products. This will certainly have environmental consequences.

The 'new' global drivers for change bring greater weight and complexity to the environmental agenda. We are now seeing some of our earlier concerns about the protection of nature, clean air and water and a pleasant countryside - things to do with the quality of life - being overtaken by issues that relate (or are more perceived to relate) to human survival. For example, many European farmers (if Scotland is typical of Europe) who might a few years ago have justified their receipt of the Single Farm Payment in terms of caring for the countryside, now invoke the need for food or energy security.

This change to the agenda may affect how we perceive aspects of the environment. Biodiversity, for instance, if defined as something that enriches the quality of life will differ (probably quite a lot) from biodiversity specified as a requirement for human survival. The emphasis moves from the plants and animals we see and enjoy, to the ones that feed us, house us, clothe us and cure us.

The new awareness brings the increased likelihood of a trade-off between environmental objectives, with the real possibility that some measures intended to counteract climate change could result in significant losses to biodiversity. Where such tensions arise, the odds seem stacked against biodiversity, much of which could disappear anyway if we don't arrest climate change. I believe all this requires us to keep in sight and in balance the cultural and aesthetic attributes of the environment.

Much of the focus of the discussion at this seminar has been about a new and very different model of land use. This model changes our perspective because it establishes the management of ecosystem services as a primary function of land use. It no longer presents ecosystem services as a by-product of economic land management, and it pushes at the boundaries of multifunctionality. So, in some instances, the management of ecosystem services will become

the first objective of land use, with agricultural production in the conventional sense as the secondary objective. This could have profound implications for many parts of Europe where agriculture is inherently unprofitable and only maintained by public support.

Several contributions to the seminar have described other potential attributes of this model - Sara Scherr's maxim of 'getting biomass in, rather than taking biomass out', and the notion of substituting natural capital (the capacity for producing ecosystem services) for financial capital. There is much to be done to develop and refine the model, and perhaps even more to communicate it - because it will count for very little unless it can be shared by land users, policy makers, and preferably by the wider European public.

Markets have a vital function in meeting our objectives for mitigating climate change and achieving food security and energy security. We need to recognise this and use market forces constructively. The seminar has drawn attention to how market mechanisms can be developed as a way of incentivising the management of ecosystem services. In particular there appears to be strong general support for a much expanded system of environmental taxation.

If some of these ecosystem services, particularly those responsible for the stability of the climate, are issues of human survival, perhaps they should cause us to reconsider our approach to regulation and how we intervene in markets. If something is so very important, can we afford to leave it to a voluntary approach where land managers make free choices in response to largely unregulated markets?

A system of regulation that might be able to achieve the necessary balance between the demands of food security, energy supply and the purer environmental public goods (which may or may not include action to counteract climate change) is likely to involve land use planning. This is easy to say, but at this stage most of us have only a vague notion of what a land use plan or, perhaps more importantly, a strategy for implementing it would look like. This seminar has raised many challenges that a land use plan would need to address:

- the integration of multiple functions and objectives. 'If you take ecosystem services one at a time, you get things completely wrong', as the environment discussion group pointed out;
- taking global and trans-national factors into account;
- setting targets, based on a shift from trade-offs to synergies or, at least, 'shifting the trade-off curve' (Sara Scherr);
- matching the balance of outcomes to the natural capacity for producing them - 'working with nature';
- building on the potential of new technology as the means of making more efficient use of environmental resources;
- involving stakeholders, and developing ownership of the process.

An essential prerequisite for such a plan will be the ability to attach a value to the outcomes for which we are planning - requiring not only the application of new techniques, but also the substantial adjustment of perceptions.

Returning to the global recession, even while its full impact is not yet apparent there are some lessons we can learn from it about Europe's land use and environment. First, it reinforces our awareness of land use as a global environmental issue; it shows us that there can be events on a global scale with the potential for a major influence on the environment that are beyond the reach of our modelling and scenario-building. Second, it points to continuing unpredictability

in the market forces driving the use of land for the production of food and other raw materials. And third, it raises the fear that the aesthetic and cultural aspects of the environment, insofar as they depend on land management, may come to be seen as a luxury that we can only afford in prosperous times.

Finally, building a new model that has the capacity to deliver food security and energy security, while putting the brakes on climate change - and ensuring that the natural environment is still a source of inspiration and pleasure - would be a huge challenge at the best of times. Against a background of deteriorating environmental quality it is almost overwhelming.

9. Reflections: implications for sustainable development policy

Sue Collins

This has been a wide-ranging seminar identifying many challenging issues that affect the sustainability of land use in Europe. Here I shall comment on some of those issues, and reflect on the implications for sustainable development policy.

First, the seminar highlighted the increasing pressures on land and the likely future scarcity of space both for nature and for meeting human needs and wants. A clear connection was traced between unsustainable consumption, production and the degradation of the environment. Strengthening the tools to tackle this should be given higher priority in the sustainable development discourse, in particular analysing land use and its sustainability, not just its productivity. A commitment to reducing Europe's ecological footprint, in Europe and beyond, should be considered.

Second, the importance of valuing ecosystem services and biodiversity was recognised in the seminar - the work of Pavan Sukhdev and his team is relevant here. Some natural assets are likely to be increasingly scarce in future and thus even more important to future generations than to this one. Reflecting this by assigning them a negative discount rate in cost benefit analysis is one instrument that might be useful, and could be promoted as part of a strong sustainable development policy.

Some areas of high quality wildlife habitat can be irreversibly damaged either by development or by inappropriate management. Such natural assets are irreplaceable and need to be given strict protection in principle and practice. This should be recognised explicitly in EU Sustainable Development policy, and implemented in sectoral decision-making. There have been huge losses of wildlife rich semi-natural grasslands throughout Europe and they continue to decline in extent and quality. This threatens, in particular, populations of invertebrates including butterflies, moths and bees. It is vital that a new EU Sustainable Development Strategy explicitly includes a strong commitment to reverse these losses.

Protected areas, including Natura 2000 sites and nationally protected areas, still have an important role. They often deliver hidden carbon benefits as well as supporting wildlife, and encompassing wonderful landscapes for people to enjoy. These protected areas are essential, but they are not sufficient for halting the loss of biodiversity in Europe. In addition, as was discussed, sensitive management of land at a landscape and field level can and should be incentivised to deliver multiple benefits. In the immediate future, reform of the Common Agriculture Policy is essential, so that public money is paid only for public goods.

Thirdly, the seminar identified some challenging governance issues. If we are to succeed in reversing unsustainable trends, reducing demands for energy, carbon, land and resource intensive products and services, we shall require a sophisticated combination of measures (top-down and bottom-up) and engagement. In addition, culture, personal decisions and behaviour, instruments, institutions and governance structures all need to evolve to achieve the necessary changes. Finding new forms of governance is perhaps one of the biggest challenges for Sustainable Development identified by the seminar. For instance, at the global level, world trade rules need to be reformed so they do not preclude support for sustainable grazing in Europe. At the European level there is a need to reform structures, funding, and decision-making processes, and to shift the balance of power if we are to achieve much better

integration of environmental concerns into sectoral policy making. For many years evidence has accumulated of unsustainable trends in fisheries, agriculture, transport, energy and other sectors. Despite this there has been a long period of failure to act effectively at the EU and Member State levels to reverse these trends. Part of the reason is that the governance structures in place are not fit for this purpose; new ideas and political commitment to reform are necessary.

The seminar has highlighted the need for a sustainable land use strategy. This is becoming more urgent and presents serious governance as well as practical and policy challenges. Current views on subsidiarity are jealously guarded by Member States and stand in the way of a coherent EU approach. The interesting idea, floated at the seminar, of tasking the EEA with assessing the impact of EU policies on land, water and sea use, is one low-key way into this issue. It would have to be applied to existing policies, like the CAP, not just to new ones. Serious thought about how to reform governance to support more sustainable land use needs to be a high priority for the future.

10. Reflections: towards a new European land use policy

Ursula Vavrik

The EEAC Working Group on Agriculture and Land Use has produced valuable insights for further policy development at national, European and global level. Land conversion takes place at unprecedented pace, and governance will have to be able to cope with the effects of scale, rapid urbanisation and sea use, as well as applying an ecosystem services approach. From an environmental perspective, the influence of land use on climate change deserves much more attention, both to GHG emissions and carbon sequestration. The global-local debate highlighted that local policy implementation has already caused substantial irreversible damage to fragile ecosystems and economies. On the other hand, the sum of local changes has a global effect. Hence regional, European or global policies should be prioritised not forgetting the need for the right sort of local policies.

Land Use Policy requires an integrated policy framework. In a nutshell, the seminar has once more revealed that 'land use' has been too much neglected in European policy making, notably in the context of sustainable development, both Europe-wide and globally. While some EU policies may not always have a positive influence on land use changes, such as transport policies or the Biofuels Directive, other policies such as the Water Framework Directive or the Common Agricultural Policy (CAP) could have more positive effects. Nevertheless, land use is not only an important cross cutting theme related to several policy areas including water, air, climate, agriculture, biodiversity, transport, urban planning. Land use is a policy area in its own right and hence requires a more comprehensive, consolidated and integrated policy framework.

Quoting from the Mid-Term Review Report on the European Sustainable Development Strategy, the authors noted that land use as such has hardly been mentioned in the EU-SDS. For the forthcoming review of the EU-SDS, it is strongly suggested that a separate chapter should be devoted to land use policy issues. This could provide an in-depth analysis of how a new European Land Use Policy could contribute to sustainable development, both in Europe and beyond. In addition, new principles and targets could be considered in this context, such as the proximity principle and the organic agriculture target. Furthermore, the European Commission is stoutly invited to consider elaborating a legislative proposal that takes current global changes and the global crisis into account. Global warming can be curbed by adequate land use and transportation policies, and also by respecting the proximity principle. This principle is linked to lifestyles as well as to production and consumption patterns. Transport between workplace and home should be minimised and production should, to a large extent, take place in proximity to consumers, in order to avoid transportation of nutritional goods - 'produce locally, buy locally produced goods'. Less transport means less energy use and hence lower CO₂ emissions. To facilitate production and distribution in the immediate environment of bigger agglomerations implies the need for adequate land use and planning policies to preserve high quality land for agriculture close to cities.

California offers an interesting example. In 2008 the state issued SB 375 'the biggest Land Use Bill in California in the last 32 years'. The main focus is on reducing commuting and thus reducing both vehicle miles and traffic congestion. The bill should have the effect of curbing urban sprawl and trimming GHG emissions.

Last but not least, the lead should be taken at international level because land use and land reform are connected to the single biggest problem in the world, the uneven distribution of wealth and poverty. According to Susan George's book *How the Other Half Die* 'the most pressing cause of abject poverty which millions of people endure is that a mere 2.5% of landowners with more than 100 hectares control nearly three quarters of all land in the world, with the top 0.23% controlling over half'. This is a challenge for the European Commission to integrate land use policy issues into WTO negotiations and into European Development Policy. It would mean bringing land use policy into negotiations with partner countries about cooperation and association agreements, while at the same time addressing questions of social equity, fairness and inequality in purchasing power, in order to fulfil the EU's mandate to contribute to sustainable development worldwide.

11. Reflections: questions

Agneta Andersson and Karin Holm-Mueller

The process that resulted in this report did not set out to find quick answers, but instead to reflect on the rapid changes we are faced with and the role of land use in these. We found it more important to formulate 'right' or 'slow' questions than to strive for answers or recommendations. There were many sources of inspiration for this. One was the Dutch philosopher Harry Kunneman, who signalled that the dynamics of a technocratic society will generate questions that cannot be solved within the logic of permanent technological acceleration (so typical of our technocratic society) when our way of handling these problems is imprinted by this acceleration logic.

Kunneman identified three themes that cannot be solved within this logic: social exclusion, sustainable development and ethics. In our deliberations on the issues of land use in an era of global change we were also confronted with these themes, and the 'slow' questions that are embedded in our present societal pattern, but will not easily be solved within this present pattern. How can we reach beyond our technocratic logic? The first step will be to pay attention to the 'right' or 'slow' questions. We have done so in preparation for and during the seminar, and have done so also afterwards. Below you find a compilation of our questions. Some of these are urgent, but it will take time to find the answers. And many of these answers will demand system changes.

Global governance

- What can we expect from current global institutions, in terms of global governance for land use?
- Can these institutions be reformed to cover global challenges like climate and biodiversity protection?
- How to handle the constraints of WTO-requirements, for example on paying for grassland management by livestock that are also used for meat or dairy production?
- How to organise global regimes for GHG emissions and food security?
- How to handle questions of social equity, fairness and inequality in purchasing power between developed and developing countries?

Safeguarding food and environmental security at different levels of governance

- Is it necessary to monitor and assess different consumption and production patterns regarding the threat they pose to food security? Land use, ecological footprints and food kilometres could be indicators to use here?
- How can we internalise the external costs of agriculture¹?
- How can we safeguard biodiversity and ecosystem services? Is pricing for biodiversity and carbon the right way to do it? Are there other instruments?

Land use policy and other policies

- How to handle sustainable land management in relation to social and economic development?
- How to achieve sustainable food production, consumption and supply chains?

1. For further information see the WTO statement of the EEAC WG Agriculture in 1999
www.eeac-net.org

Annex 1 - List of participants

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