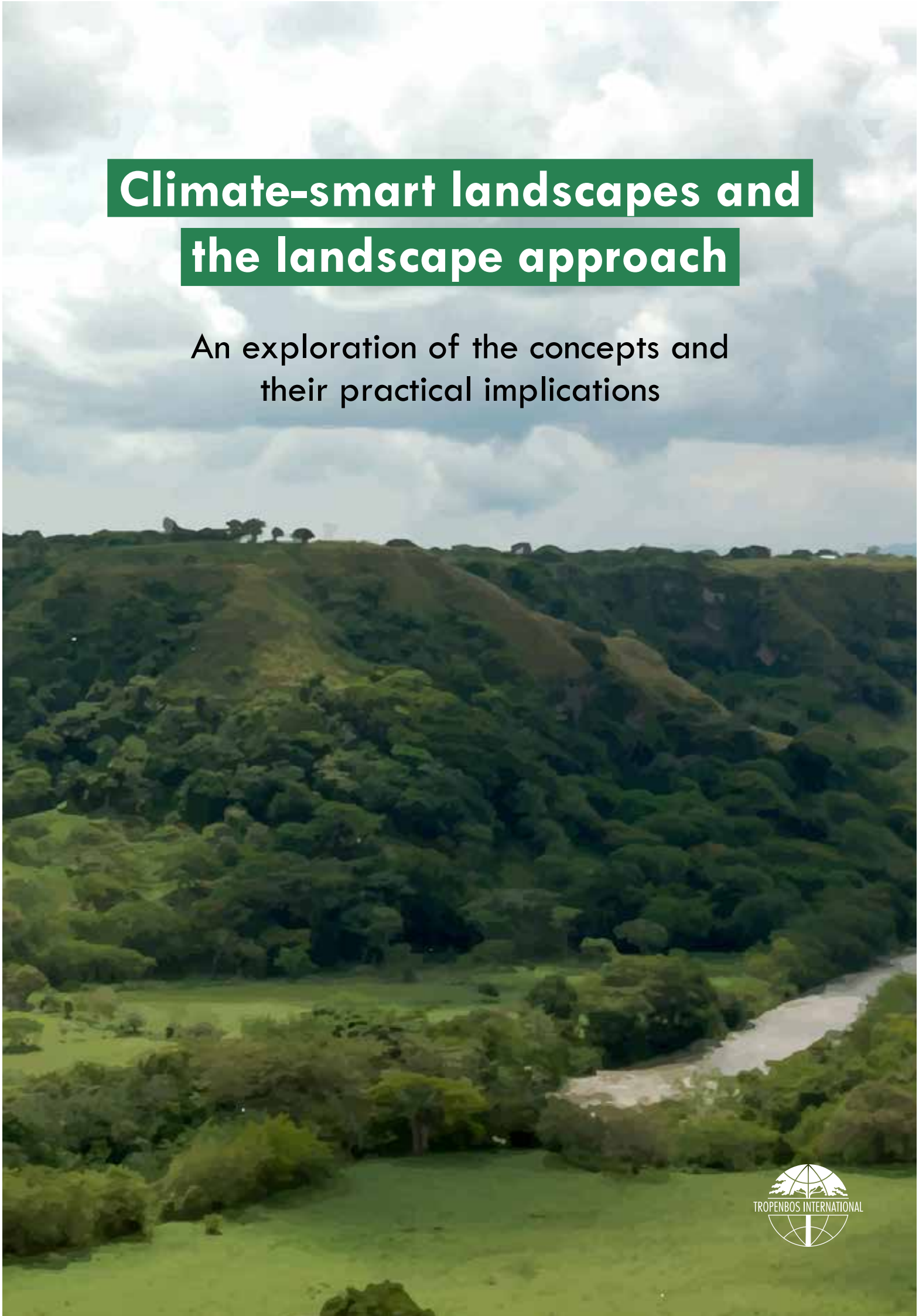
Climate-smart landscapes and the landscape approach

An exploration of the concepts and their practical implications



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Koen Kusters

Author: Koen Kusters

Publisher: Tropenbos International

Suggested citation: Kusters, K. 2015. Climate-smart landscapes and the landscape approach – An exploration of the concepts and their practical implications. Tropenbos International, Wageningen, the Netherlands.

English editing: Andy Brown

Design and layout: Juanita Franco

Photos: Tropenbos International

Tropenbos International
P.O. Box. 232
6700 AE Wageningen
the Netherlands
www.tropenbos.org

Contents

Summary 5

1 Introduction 8
- 1.1 Objectives 8
- 1.2 Why a landscape perspective? 9
- 1.3 A focus on agricultural landscapes 10
- 1.4 Structure of the report 11

2 The climate-smart landscape 12
- 2.1 Adapting to and mitigating climate change 13
- 2.2 Agricultural production 17
- 2.3 Local livelihoods 21
- 2.4 Biodiversity conservation 22
- *Interview with Freerk Wiersum* 24

3 The landscape approach 27
- 3.1 Elements of integrated landscape management 28
- 3.2 Integrated landscape initiatives 33
- *Interview with Sara Scherr* 37

4 Landscape governance 40
- 4.1 Forms of landscape governance 41
- 4.2 What works? 42
- 4.3 Governance challenges 43
- *Interview with Cora van Oosten* 47

5 Measuring the effectiveness of integrated landscape initiatives 50
- 5.1 Performance assessment 50
- 5.2 Landscape Measures Framework 52
- 5.3 The LPFN global review of Integrated Landscape Initiatives 54
- 5.4 Outcomes assessment based on the capitals framework 54
- 5.5 Including climate and governance dimensions 58
- *Interview with Christian Mensah* 59

6 Conclusions 62
- 6.1 Diversity as a key element of the climate-smart landscape? 62
- 6.2 The landscape approach as a set of guiding principles 64
- 6.3 The success of integrated landscape initiatives and a future research agenda 66

References 68

Endnotes 80

List of Tables

Table 1. Practices with adaptation and mitigation benefits at the plot, farm and landscape level 16
Table 2. Agricultural intensification on the farm and landscape scale 17
Table 3. Effectiveness measures versus status measures 51
Table 4. The Landscape Performance Scorecard 53
Table 5. Indicators used in the LPFN global review of ILIs 55
Table 6. Selected indicators by Endamana et al. (2010) 57
Table 7. Good governance criteria and indicators for landscape-level initiatives 58

List of Boxes

Box 1. Industrial agriculture 19
Box 2. Alternatives to industrial agriculture 20
Box 3. Foundations of the landscape approach 31
Box 4. Participatory spatial planning and community mapping 32
Box 5. Private sector involvement 35
Box 6. The case for landscape restoration 36
Box 7. Financial incentives 45
Box 8. Promoting a climate-smart landscape in western Ghana 46
Box 9. Examples of indicators to measure landscape performance 52
Box 10. The role of civil society organisations, companies and the public sector 65

Summary

Introduction

Global challenges related to poverty, food security, environmental degradation and climate change converge in the rural areas of the tropics. That is where competition for land and resources is high, poverty and environmental degradation are persistent, and climate change is directly threatening people's livelihoods. In recent years, there has been growing recognition that these challenges need to be addressed in an integrated manner, and at landscape level. This has given rise to a growing body of literature on the 'landscape approach' and 'climate-smart landscapes'. These terms represent powerful narratives that are quickly being adopted by organisations working at the interface of agriculture, forestry and biodiversity conservation. At the same time, however, there is no consensus about the practical implications and limitations of the concepts. Based on a review of scientific literature on climate-smart landscapes and landscape approaches, and on interviews with experts, this report focuses on the following questions: What is a climate-smart landscape? What does the landscape approach mean in practice? How can a landscape approach be implemented? And, how do we know if it works?

The climate-smart landscape

Literature on climate-smart landscapes mostly focuses on agricultural production areas in the forested tropics. In that context, a climate-smart landscape is presented as a landscape that simultaneously supports climate, development and conservation objectives. The reviewed literature devotes relatively little attention to the prospects of technological innovations in the agricultural sector and the possible advantages of spatial specialisation. Instead, it stresses diversification. Diversity at the landscape level enables functional interactions between different landscape components and fosters socio-ecological resilience, i.e., the ability to deal with and recover from stressors or shocks, such as droughts, floods and severe weather events. There is an emphasis on maintaining or restoring trees and forest patches in agricultural landscapes. Trees and forests support local livelihoods by providing sources of food, fuel and income – particularly important when other crops fail – and help mitigate climate change by maintaining above- and below-ground carbon stocks. They also provide environmental services such as soil and water conservation, needed for

long-term agricultural production, and contribute to biodiversity conservation by providing a habitat for forest species outside of protected areas.

The landscape approach

The landscape approach represents a set of principles for landscape management. These are not new. The approach builds on the rich experiences of conservation and development initiatives during recent decades and effectively frames a wide range of existing concepts and principles under one banner. A large number of authors have published about what they see as the main elements of the landscape approach, which are presented as principles that should be taken into account when implementing integrated landscape-level initiatives. These include basic principles (such as the need to include all stakeholders in decision-making), process features (such as adaptive management and working across sectors), and general conditions (such as the need for a supportive regulatory environment). Many authors, explicitly or implicitly, stress the need to ensure that more powerful actors in a landscape do not override the interests of less powerful stakeholders (including future generations), and the need for good governance, including accountability and transparency. This adds a normative component to the approach.

The challenges of implementing a landscape approach

Efforts to build governance arrangements to implement a landscape approach have so far been mostly experimental. They usually involve the development of some kind of multi-stakeholder platform. Some of these platforms may be designed as formal government entities, while others operate as informal and flexible networks. Some have an external initiator, while others grow spontaneously from local initiatives. As yet, there is no systematic evidence on the effectiveness of different types of arrangements. What is clear, however, is that these arrangements present new challenges. There are various reasons for this. First, multi-stakeholder platforms are time-consuming for their facilitators and participants, while the immediate benefits are not always clear. This can discourage some actors – the private sector in particular. Second, the interests of actors in the landscape can vary greatly, which makes it difficult to find common objectives and identify optimal trade-offs. Indeed, developing a multi-stakeholder platform will not always lead to consensus about the desired landscape and how it should be managed. In practice, the outcomes of a multi-stakeholder decision-making process will depend on which actors are represented, and how they are able to defend their interests. Lastly, the long-term outcomes of landscape governance arrangements will ultimately depend on the existence of functioning government institutions that have the legitimacy to make decisions, integrate agreements into legal measures, and enforce them. In many remote rural areas, however, the effectiveness of government institutions is hampered by unclear or overlapping mandates, conflicts of interest, unclear property rights, corruption, and a lack of resources. Despite the above-mentioned limitations, an

ever-growing number of organisations are adopting at least some elements of the landscape approach, and this has undoubtedly increased the possibilities for stakeholders in the landscape to discuss, work and learn together. Now is the time to learn from these experiences.

How do we know if it works? A future agenda

With development and conservation organisations investing money in integrated landscape initiatives to promote climate-smart landscapes, there is a need to assess the effectiveness of these interventions. Developing such methods not only requires identifying indicators on the various dimensions of climate-smartness (in terms of, for example, local livelihoods, agricultural production, biodiversity conservation, resilience, institutional capacity, adaptive capacity and mitigation potential), but also on the more normative dimensions of the landscape approach, such as good governance (in terms of, for example, participation, transparency and accountability). Such methods can then be used to explore the relationships between landscape features, landscape initiatives and their performance. As the landscape approach implies an ongoing process of negotiation, decision-making and evaluation, the value of assessment methods particularly lies in their potential to be used as tools to generate discussion and negotiate trade-offs, as an integral part of integrated landscape management. This requires metrics that are easy to use, comprehensive and adaptable. Together with local, national and international partners, Tropenbos International is committed to help develop, test and implement such methods in the years ahead.

Introduction

"Thinking at the landscape scale does not simply mean thinking over wider areas [...], but mainly thinking in terms of heterogeneity of land characteristics"
(Torquebiau, 2015:21)

1.1 Objectives

Over the past decade, it has become increasingly common for scientists, policymakers and practitioners alike to stress the need for integrated approaches at the landscape level to simultaneously address environmental degradation, climate change, food insecurity and poverty. This has led to a proliferation of publications, seminars and conferences on the landscape approach and integrated landscape management. More recently, the term 'climate-smart landscape' was added to the standard vocabulary. However, there is risk that such terms become part of the jargon, without a good grasp of their practical implications and limitations. There is

no consensus about the meaning of the concepts and practitioners and policymakers may still be searching for straightforward answers to more fundamental questions, such as:

- What is a climate-smart landscape?
- What does the landscape approach mean?
- How can it be organised?
- How do we know if it works?

This report explores these questions on the basis of a review of a selection of recent academic literature on climate-smart landscapes and landscape approaches, complemented by interviews with international experts.[1] This serves two broad purposes. First, it summarises state-of-the-art knowledge and opinions for practitioners and policymakers working at the interface of forest conservation and agricultural development. Second, it serves as a scoping study to identify some of the questions that still need answering, giving direction to future work on climate-smart landscapes.

1.2 Why a landscape perspective?

Scherr, Shames and Friedman (2013:2) define a landscape as "a socio-ecological system that consists of a mosaic of natural and/or human-modified ecosystems, with a characteristic configuration of topography, vegetation, land use, and settlements that is influenced by the ecological, historical, economic and cultural processes and activities of the area". It is a fluid concept; rather than a clearly defined spatial entity, a landscape is in the eye of the beholder. The landscape of interest depends on the management goals. It may be a national park and its surrounding areas when one's objective is to conserve large mammals, while it may be a watershed when the objective is to provide clean water to urban residents. The landscape is thus usually defined on the basis of the phenomenon of interest or a problem that needs solving (Minang et al., 2015c).

The term has its origin in the word *landschap*, which was used by Dutch painters in the 16th century to refer to rural scenery (Olwig, 1996). Their paintings depict views of agricultural land, rivers or lakes, groves of tree, sometimes a farms, and an occasional windmill. Today the term landscape is still commonly used to refer to the diversity of land units and users. A landscape typically consists of different components (e.g., agricultural fields, woodlots, tree plantations, fallows, riparian areas, rivers and settlements), which are used by various stakeholders (e.g., farmers, foresters and fishermen, community organisations and NGOs, businesses of all sizes, and government agencies).

In scientific literature, the landscape is usually conceived as a complex social-ecological system, with different components and stakeholders that are interdependent. Such

a system is characterised by a certain level of unpredictability, as a result of non-linear relationships, feedback mechanisms and constantly changing external drivers (Parrott and Meyer, 2012). Landscape configurations thus result from the continuous interactions between ecological, social and economic processes (Minang et al., 2015b). Adopting a 'landscape perspective' implies acknowledging the presence and interdependence of different components, stakeholders and interests in a given area. In Torquebiau's words (2015:21), "Thinking at the landscape scale does not simply mean thinking over wider areas (which is what most people think), but mainly thinking in terms of heterogeneity of land characteristics".

A related feature of landscapes is that no single actor is in charge. The landscape is the result of the decisions of multiple actors. As such it refers to collective rather than individual decision-making. As Zagt and Chavez-Tafur (2014:viii) put it, "Both commodity farmers and conservationists feel that the 'landscape' starts where their ability to address and influence actors and the environment stops, which is more or less at the border of the farm and protected area, respectively".

1.3 A focus on agricultural landscapes

There are many types of landscapes. Some are dominated by one type of land-use, while others are mosaics of different uses. Some are relatively stable, while others are highly dynamic, and experience rapid change. Some are characterised by deforestation and forest degradation, while others may have a forest cover that is increasing (Wiersum, 2014). Chomitz (2007) introduced the following simplified typology[2] to categorise the wide variety of landscapes in the forested tropics:

- Areas beyond the agricultural frontier: These are remote areas, with a low population density and large tracts of natural forest. People – often indigenous communities – are mostly subsistence-oriented farmers, living near or in the natural forest.
- Forest-agriculture mosaic lands: These are agricultural areas interspersed with fragments of forests. They contain a substantial number of the world's forest-dependent people, as their population density tends to be relatively high. Forests are an important source of both income and environmental services.
- Frontier and disputed areas: These areas tend to lack clear property rights and are subject to conflicts over land and forest resources. Large-scale agriculture is expanding rapidly at the expense of natural forest and small-scale agriculture. There are often conflicts between the users, including long-time residents, migrant farmers and large-scale commercial interests (logging and agriculture).

Most publications on climate-smart landscapes and landscape approaches (as well as this report) focus on the latter two categories of Chomitz' typology, i.e., areas

located within the agricultural production zone. It is in these areas where different interests meet explicitly. The growing global demand for agricultural products is putting pressure on land and natural resources, and threatening the provision of other goods and services by the landscape (e.g., forest products, water regulation, pollination, carbon sequestration, biodiversity conservation). The challenge is to manage these landscapes in ways that balance agricultural production and other landscape functions.

1.4 Structure of the report

The report first introduces the climate-smart landscape as one that contributes to production, livelihoods, conservation and climate objectives (section 2). The subsequent sections focus on integrated landscape management as a way to achieve such a landscape (section 3), challenges related to landscape governance arrangements (section 4), and ways in which the effectiveness of integrated landscape initiatives can be assessed (section 5). The last part reflects on the main findings and suggests questions for further research (section 6). Interspersed throughout the report are interviews with international experts, addressing some of the questions that arise from the literature.

The climate-smart landscape

Measures to promote adaptation and mitigation are likely to be more effective when implemented on a landscape scale

Landscapes are subject to climate change, which affects the delivery of goods and services. The high urgency of the climate agenda at international level combined with increased attention for landscape approaches has given rise to the concept of the climate-smart landscape. Narrowly defined, it refers to a landscape that supports people's adaptation to climate change, while helping to reduce greenhouse gas (GHG) emissions (mitigation). Although the term emphasises climate-related functions, in the literature on climate-smart landscapes these are usually not prioritised over other landscape functions. Instead, climate objectives are viewed together with objectives related to agricultural production, local livelihoods, and biodiversity conservation. The connection between these agendas is stressed, as is the potential for synergies.

A climate-smart landscape is thus a landscape that contributes simultaneously to climate objectives, increased agricultural production, improved local livelihoods and the conservation of biodiversity. The section below will first address objectives related to climate change and their implications for the configuration of the landscape. This is followed by short reviews of desirable landscape features in the light of production, livelihood and conservation goals.

2.1 Adapting to and mitigating climate change

Agriculture and forestry together contribute almost 25% to total global anthropogenic GHG emissions (Smith et al., 2014). At the same time, the livelihoods of smallholders in rural areas are threatened by the manifestations of climate change, such as a growing unpredictability of rainfall patterns and increased frequency of extreme weather events. People's vulnerability to these changes depends on their ability to cope with shocks and adapt to gradual changes. Clearly, the agricultural and forestry sectors have crucial roles to play in efforts to mitigate further climate change and promote people's capacity to adapt. This requires efforts on various spatial scales. A climate-smart landscape is characterised by climate-smart practices at the farm level, a high diversity of land uses at the landscape level, and the deliberate management of land-use interactions (Scherr, Shames and Friedman (2012). The latter is particularly relevant to achieve synergies between mitigation and adaptation objectives (Duguma, Minang and Van Noordwijk, 2014).

Climate-smart agricultural practices at the farm level

Climate-smart agriculture refers to a set of agricultural practices that diversify livelihoods and protect environmental services in order to increase people's capacity to adapt to climate change, while also reducing GHG emissions (Harvey et al., 2014; FAO, 2013). It includes many of the practices that are promoted as forms of sustainable or environmentally friendly farming. The following list gives examples of climate-smart approaches derived from various publications (Milder et al., 2015; Hobbs, 2007; Harvey et al., 2014; Scherr, Shames and Friedman, 2012; EcoAgriculture Partners, 2012):

- Improved tillage, to increase the organic carbon in soils while reducing erosion during extreme weather events.
- Incorporating trees and other perennials in agricultural systems, to increase soil carbon stocks and above-ground biomass, while diversifying farmers' incomes and reducing financial risks.
- Crop residue management, to increase the soil organic matter, while supporting biological process and nutrient cycling.
- Improved water management (water harvesting, irrigation, terrace systems, etc.) to improve water-use efficiency. This is important for adaptation, as rainfall patterns are changing. It can also help to reduce the GHG emissions

that are currently associated with conventional irrigation systems (e.g., through the use of machinery for ground and surface water pumping).

- Integrated nutrient management (e.g., through the use of green manures and planting nitrogen-fixing crops) to improve soil quality, while increasing the amount of carbon and nitrogen retained in the soil, and decreasing the need for agrochemicals.
- Crop diversification to reduce risks for farmers when faced with unexpected weather conditions.
- Rotational grazing of livestock to enable the regeneration of vegetation and prevent degradation, while also storing carbon in vegetation and soils
- Improved manure management, e.g., using manure as fertiliser and for biogas.

Diversity at the landscape level to increase resilience

Until recently, interventions to promote climate-smart agriculture were mostly confined to development projects by NGOs focusing on farming practices at the plot and farm levels. However, making a landscape climate-smart also requires efforts beyond the farm level, for example by maintaining or increasing the diversity of land-use components and natural systems (Table 1) (Milder et al., 2015). A variety of natural systems in the landscape can help mitigate damage from shocks; for example, wetlands that store water during floods, and natural vegetation on slopes that can protect against landslides during heavy rains (Buck et al., 2006). Diversity also contributes to resilience, meaning the capacity of a system to deal with changes or shocks (Buck and Baily, 2014), including those induced by the climate.

Resilience is an attribute of both ecological and social systems. Ecosystem resilience is defined as "a measure of how much disturbance (like storms, fire, or pollutants) an ecosystem can handle without shifting into a qualitatively different state" (Stockholm Resilience Centre, 2007). Social resilience can be defined as "the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change" (Adger, 2000). The notion of socio-ecological resilience combines both, stressing the interactions between ecological and social systems, which is especially apparent in agricultural livelihoods, where the two systems are directly linked (Buck and Baily, 2014).

Diversity is key for resilience, because it reduces the risk of production losses due to climatic stressors and increases the possibilities for local people to access a variety of food, feed and employment, which may be particularly important in times of adverse climatic conditions (Scherr, Shames and Friedman, 2012). Put simply: when farmers plant several crops, they are less vulnerable to food scarcity if one crop fails. As Kofinas and Chapin state, "diversity provides the raw material or building blocks on which adaptation can act. It increases the range of options, at least some of which are likely to be successful under whatever new conditions arise,

thereby reducing the likelihood of radical degradation of the system" (Kofinas and Chapin 2009, cited in Buck and Baily, 2014). Diversity also increases functional redundancy within a system. Functional redundancy refers to the presence of multiple components that can all fulfil the same function. When one component fails, others can compensate. For example, a region that has only one source of water is vulnerable when a natural disaster affects that particular source.

The resilience of a socio-ecological system is helped by diversity not only in terms of a variety of ecological components, but also a variety of actors (such as government departments, NGOs and community groups). These actors may fulfil overlapping functions, but are likely to respond differently to changes. Resilience is all about increasing the variety of possible responses to changes: the more components, the more options. Furthermore, when multiple actors in a landscape are involved in elements of landscape management, this will stimulate knowledge sharing and learning (Biggs et al., 2012; see also www.stockholmresilience.org).[3]

Managing synergies between mitigation and adaptation

Mitigation and adaptation are often addressed by different organisations and in separate projects. The focus tends to be on complementarity between both objectives (e.g., a mitigation project providing adaption co-benefits), and much less on possible synergies (Duguma, Minang and Van Noordwijk, 2014).[4] However, treating mitigation and adaptation separately may lead to trade-offs. For example, the use of agrochemicals could maintain production under a changing climate (adaptation), but lead to higher GHG emissions (no mitigation). Or, monocultures of fast-growing tree species might increase carbon stocks (mitigation), but could decrease access to water by farmers downstream, reducing their capacity to diversify their production systems (no adaptation). Recognising such trade-offs is complicated because they can occur over time, for example when a change of agricultural practices decreases yield in the short term, but results in higher production and carbon sequestration in the long term (Harvey et al., 2014).

Thinking at the landscape level opens a dimension in which synergies between mitigation and adaptation can be achieved, as it places the emphasis on multi-functionality and interactions among components. Duguma, Minang and Van Noordwijk (2014) propose a 'synergetic approach', meaning seeking a mix of interventions to achieve both objectives simultaneously. One example could be restoring a degraded landscape, leading to carbon sequestration, REDD+ benefits, and increased adaptive capacity of local people through new economic opportunities. Another example is the conservation of natural tree cover in the landscape (e.g., in hedgerows, woodlots and forest fragments) to ensure the provision of environmental services like pollination, pest control and water regulation, while at the same time maintaining carbon stocks (Harvey et al., 2014).

Table 1. Practices with adaptation and mitigation benefits at the plot, farm and landscape level (Adapted from Harvey et al., 2013)

Scale	Practices that primarily confer adaptation benefits	Practices that provide both adaptation and mitigation benefits	Practices that primarily confer mitigation benefits
Plot	• Use of new crop varieties or livestock breeds that are drought-tolerant, or bred for specific environmental stresses • Adjustments in irrigation practices and systems • Changes in timing of planting, pruning or harvesting • Adjustments in cropping sequence and timing of irrigation or application of fertilisers and pesticides • Changes in timing, duration and location of animal grazing • Conservation of crop and livestock genetic diversity	• Integrated soil and water conservation efforts • Incorporation of organic fertilisers and cover crops • Reduced or zero tillage • Maintenance of crop residues • Breeding crop varieties for shade tolerance • Use of agroforestry	• Reduced or more efficient use of fertilisers and pesticides • Adjustments in the type of feed provided to cattle • Reduced frequency or extent of fires • Improved management of cultivated wetland rice areas to reduce methane emissions
Farm	• Changes in rotation or production systems • Improved water harvesting and retention through ponds, dams, etc. • Increased water use efficiency through improved irrigation practices • Conservation of agro-biodiversity • Use of seasonal and multiyear forecasting • Farm insurance or crop or livestock insurance	• Diversification of crops and livestock systems on the farm • Soil conservation practices, including terracing and land contouring • Improved residue management and use of cover crops • Integrated nutrient management • Use of agroforestry • Use of silvo-pastoral systems (e.g., trees in pastures, live fences, fodder banks) • Appropriate animal rotation practices • Use of conservation agriculture (i.e., minimal soil disturbance, maintenance of mulches, use of crop rotations and intercropping, integrated pest management) • Use of multi-cropping, intercropping and crop rotations	• Reduced or more efficient use of agrochemicals • Planting of biofuels and trees for fuel wood • Planting of fast growing tree plantations • Reduced use of machinery and fossil fuels • Generation of biogas from manure • Use of improved feeding practices for livestock
Landscape	• Maintenance of habitat connectivity to ensure pollination and pest control • Development of water collector systems, irrigation infrastructure and other engineering solutions to reduce risks of floods, water scarcity and other climate-related risks • Targeted location of intensive livestock production within the landscape to reduce water contamination • Diversification of farmer income options	• Land-use planning at the landscape level for multiple objectives • Maintenance of landscape diversity - including a mosaic of agricultural land and natural habitat • Conservation and restoration of riparian areas within the agricultural landscape • Conservation and restoration of remaining forest habitat surrounding landscape - including formal and informal protected areas • Establishment of agroforestry and silvo-pastoral systems • Sustainable intensification of livestock production and crop production in some areas to reduce pressure on fragile areas • Increases in the duration of fallow periods in shift and burn cultivation • Restoration of degraded or fragile lands • Conservation and restoration of wetlands and peatlands • Reduced expansion of cropland into remaining natural habitat	• Planting of biofuel feedstock • Careful management of fires

2.2 Agricultural production

The demand for agricultural land is growing due to population growth, changing consumer preferences, increasing production of non-food crops, urbanisation and degradation of existing agricultural lands. Especially in the tropical regions of Asia, Africa and Latin America, the competition for land is increasing, with farmers, agri-businesses, conservation NGOs, mining and logging companies, and the tourism industry claiming land and resources. With the world's population expected to reach over nine billion in 2050, the production of sufficient quality and quantity of agricultural produce will be a major challenges in the years ahead. The question is, what type of agricultural development will best fit this purpose, and how this will impact on landscapes.

Since the 1960s, the conventional approach to agricultural development has been to invest in mechanisation, agro-chemicals and improved seed varieties. Agricultural intensification has been taking place both at the farm and at the landscape level (Table 2, see also Box 1) and has led to impressive productivity increases. One way to safeguard future food production could be to invest in further intensification, controlling external factors as much as possible (e.g., by producing in greenhouses and developing pest- and drought-resistant crops). According to some scholars investments in industrial and high-tech intensified agriculture are indispensable to achieve the increase in agricultural yield needed to ensure global food security (e.g., Fresco, 2009). The literature reviewed for this report, however, devotes little attention to the possibilities offered by such technological innovations. This may be explained by a professional predisposition, as the literature is heavily rooted in disciplines that study ecological processes and multi-functionality in complex socio-ecological systems (e.g., agroforestry, ecology, geography), with a much smaller representation of disciplines that focus on agricultural innovations (e.g., bioengineering).

Table 2. Agricultural intensification on the farm and landscape scale

Farm intensification	Landscape intensification
• Shortening crop rotation cycles • Decreasing crop diversity • Increasing input of mineral fertilisers and pesticides • Deep ploughing and drainage • Cultivating monocultures of high-yield varieties • Increasing size of arable fields • Machine-driven farming	• Farmers specialise on one or few crops, increasing landscape homogeneity • Removal of edge habitats (hedges, field boundaries, buffer zones along creeks) • Reallocating land to increase field size • Abandoning fallow systems • Lowering landscape-wide water tables

Source: Adapted from Tscharntke et al., 2005

In the literature that focuses on alternatives to industrial agriculture (Box 2), industrial agriculture is criticised for its negative environmental and social effects. These include soil compaction due to the use of heavy machinery, depletion of groundwater, contamination of water with residues of fertilisers and pesticides with negative effects for people and the environment, reduced biodiversity, and increased vulnerability of crops to pests. These scholars argue against further homogenisation and in favour of structural diversity, which they consider necessary to maintain functional interactions between different components. Hence, they expect higher diversity within a system to lead to better performance of the individual components and the system as a whole (e.g., Tscharntke et al., 2012; Torquebiau, 2015; Öborn et al., 2015). Landscape-level diversity supports agricultural production in several ways, including:

- Forests and wetlands in the immediate surroundings of agricultural fields help regulate water flows. Forests help rainwater to infiltrate into the soil, recharging groundwater levels, and are therefore important in ensuring access to water through the year.
- Non-agricultural landscape components may be important for farm production in terms of nutrient supply. In the case of shifting cultivation systems, for example, nutrients from fallow plots will benefit their use for agriculture over time, while permanent cropping systems may benefit from nutrients from other landscape components e.g., when a river floods and deposits sediments, or through fine soil distribution in hilly areas.
- Surrounding landscape components influence agricultural production by providing a habitat for functional agro-biodiversity, i.e., biodiversity that performs functions and delivers services that help to sustain agriculture (Öborn et al., 2015). Although the term agro-biodiversity is often used to refer to beneficial interactions between biodiversity and agricultural production, there are also negative relations between biodiversity and production purposes (e.g., livestock parasites, crop pests, and wild animals destroying crops).
- A variety of land uses within a landscape allows for genetic diversity, for example in the form of land races, crop wild relatives, and locally adapted cultivars. Such agro-biodiversity is important for future food production. The development of food crops will rely not only on wild species but also on old varieties of agricultural crops (Sunderland, 2011; Wiersum, personal communication).

Box 1. Industrial agriculture

Industrial agriculture refers to various types of land use, ranging from monoculture plantations stretching over thousands of hectares to so-called factory farms with thousands of chickens on less than one hectare. In this report, the term industrial agriculture is used to refer specifically to crop cultivation relying on the application of synthetic fertilisers (nitrogen, potassium and phosphorus) and pesticides. It typically uses improved seed varieties with higher yields and shorter growing cycles. In industrialised countries this type of agriculture was driven by the growth of urban markets and scarcity of labour in rural areas. In areas with land abundance (e.g., the US) the emphasis was usually on mechanisation, while the application of fertilisers was particularly important in areas with land scarcity (e.g., Japan). From the 1960s onwards, industrial agriculture spread rapidly in less-industrialised countries, resulting in an enormous boost of cereal production – known as the 'green revolution'. That led to a significant increase of the available calories per head and made cheap food available to a growing urban population. Indeed, people spend less income on food today than ever before. However, the green revolution also had negative effects on the environment. According to some authors, these effects can be (and are being) minimised using modern technologies (e.g. Fresco, 2009). Others, however, are less positive, arguing that the ongoing expansion of industrial agriculture is still causing environmental problems, such as soil compaction due to the use of machinery, contamination of water sources with residues of pesticides and fertilisers, reduction of ecological biodiversity, increased vulnerability to pests and depletion of groundwater levels. Moreover, because of the capital investments required for purchasing machinery and agro-chemicals, industrial agriculture is said to favour large-scale farming, leading to land concentration and undermining the livelihood opportunities of small-scale farmers (Horrigan et al., 2002). Also, there are worries about the heavy reliance of industrial agriculture on fossil fuels for machinery, transportation and the production of agro-chemicals (Woodhouse, 2010).

Box 2. Alternatives to industrial agriculture

In response to the negative environmental effects of industrial agriculture, alternative modes of farming are promoted, based on the premise that biodiversity conservation, agricultural production and livelihood security can and should go hand in hand, in the same geographical space (e.g. Dorrough et al., 2007; Vandermeer and Perfecto, 2007; Green et al., 2005). A great variety of terms are used, including agroforestry, conservation agriculture, agro-ecology, wildlife-friendly farming, organic/biological agriculture, ecological agriculture, evergreen agriculture, sustainable agriculture and eco-agriculture. These approaches and concepts differ in the details, but share several main features. They typically promote agricultural systems that: (i) make use of naturally occurring ecological processes, such as nutrient cycling and predator-prey interactions; (ii) make limited use of agro-chemicals; and (iii) combine more than one (tree)crop, either over space or over time. Diversity is key. It increases the opportunities for beneficial interactions between different components of the agricultural ecosystem and allows more efficient use of resources. Diversity is also expected to reduce the risks of farming in unpredictable environmental and market conditions. A much-debated question is whether 'environmentally-friendly' agriculture makes efficient use of the land. Experts appear to have diametrically opposed views on this matter. There are several studies suggesting that low external-input technologies in diverse agricultural systems can improve agricultural productivity (Pretty et al., 2006; Badgley et al., 2007; Foley et al., 2011). Others argue that such studies do not compare the alternative technologies against appropriate control systems, e.g., organic best practices versus conventional best practices (Phalan et al., 2011b) and claim that the promotion of smallholder systems with limited external inputs will compromise yields, and thus threaten food security (e.g., Godfray, 2011). The differences are partly explained by differences in levels of analysis, criteria, and types of cases studied. This in turn is related to professional backgrounds, conceptual models and values (Kusters and Lammers, 2013).

2.3 Local livelihoods

Most farmers in the tropical world belong to the poorest segments of their societies. Developing a modern agricultural sector has been heralded as an important method for fighting rural poverty while at the same time boosting national economies. But while the development of an intensified and technologically advanced agricultural sector may spur the GDP of developing countries, it is less clear what the impacts are of such development on rural livelihoods. Higher GDP does not automatically translate into more secure livelihoods for the majority of the rural population. Although the introduction of industrial agriculture since the 1960s has led to productivity increases, it has been associated with the exacerbation of rural poverty (and migration to cities). Industrial agriculture often favours larger scales of farming due to economies of scale and in some areas this has resulted in land concentration in the hands of corporations and increasing landlessness among the poor (Horrigan et al., 2002).[5]

Large-scale agricultural companies typically seek to expand their plantations in frontier areas where land is cheap and tenure is insecure. Numerous cases have been reported of smallholders being moved from their land – with overt or covert force (e.g. Zakaria et al., 2007; Colchester, 2010; Biofuelwatch, 2007; Lakew and Shiferaw, 2008; Sirait, 2009; Ginting, 2011). Sometimes local people are included in plantation schemes as labourers or as outgrowers, but some of these systems have been criticised for the unfair treatment of labourers and smallholders, and for making them vulnerable to market and price fluctuations (e.g., Rietberg, 2011). There are also worries related to local people's food security, as the expansion of industrial mono-crop plantations for export may replace rice fields and other agricultural systems that used to produce food for local consumption (Löffler et al., 2014).

Considering the above, what type of landscape would best fit local livelihood objectives? The literature on the relationships between agriculture, forests and food security suggests the following desirable landscape features:

- A variety of land-use systems. This is thought to increase the number of livelihood options, decreasing – at least on a collective level – the risks of market failure or climatic impacts. When farmers no longer produce a variety of products for local trade and subsistence purposes they become increasingly dependent on food products sold in shops with limited nutritional value (Sunderland, 2011).
- Presence of forest patches and tree-based systems. When expansion of large-scale industrial farms happens at the expense of forests and tree-based systems in the landscape this could mean the loss of important sources of nutrients for local people in the form of fruit, bush-meat and other forest products (Stills et al., 2012; McGarry and Shackleton, 2009).

- Control over land-use decisions by smallholders. This relates to the concept of food sovereignty, which has recently gained prominence. It encompasses not only food security (the right of people to have access to food) but also the right of people to choose for themselves what and how they produce food (Altieri et al., 2012).

Whether or not expansion of monocultures in the landscape is per definition detrimental for local livelihoods is, however, disputed. Budidarsono (in Löffler et al., 2014) shows, for example, that the spread of industrial agriculture can lead to higher cash incomes, leading to the diversification of rural economies when people are investing money in non-farm activities. An indirect argument used in favour of industrial agriculture is that many young people in rural areas have little interest in becoming farmers, and prefer to migrate to urban areas in search of a higher quality of life (see, for example, the interview with Fresco in Kusters and Lammers, 2013).

2.4 Biodiversity conservation

Few would disagree with the need to reduce agricultural encroachment on natural areas of high conservation value, or deny that forest fragmentation is a huge and growing threat to biodiversity (Sheil et al., 2004; Hadad et al., 2015). There is, however, much discussion about the type of agricultural development that fits biodiversity conservation objectives, often referred to as the sparing-sharing debate (see, e.g, Kusters, 2014). Some scientists argue that biodiversity conservation is helped by the intensification of agricultural production as it ensures that scarce lands are used as efficiently as possible. It essentially enables the 'setting aside' and giving protected status to as many intact ecosystems as possible, while intensively growing crops on remaining land.[6] This approach has been labelled as *land sparing* (e.g. Green et al., 2005; Aratrakorn et al., 2006; Phalan et al., 2011a). Others argue that agriculture and nature need to *share* the same space, stressing the need to invest in smallholder, environmentally friendly farming in heterogeneous landscapes. The sharing approach emphasises the ecosystem services that forests provide for agricultural production, while the sparing approach is based on the replacement of those services by technical interventions.

In literature on climate-smart landscapes and landscape approaches, the pendulum swings towards arguments for a sharing approach. A common argument is that the system of protected areas is not sufficient to protect the world's biodiversity, because much of that biodiversity is found outside of protected areas in forests and agricultural landscapes occupied by people (Padoch and Pinedo-Vasquez, 2010). Central American agroforests, for example, are known to be a habitat for migratory birds, arriving from North America, and the habitats of large carnivores such as the tiger, lynx and wolf extend over enormous areas, which include both

nature reserves and agricultural land (Tscharntke et al., 2012). An estimated 20% of 3,896 threatened vertebrates are not included in any protected area (Rodrigues et al., 2004).

Whether a landscape performs well in terms of biodiversity conservation depends not only on the intactness of natural and semi-natural areas, but also on the relative habitat value of different land uses across the landscape for native biodiversity, and the functional connectivity between different land uses (Buck et al., 2006). Interactions between patches in a landscape are facilitated by landscape units that connect them, such as hedges, ditches, windbreaks, rivers, etc. (Torquebiau, 2015). A landscape that forms a fine-grained mosaic of land uses that vary in degree of management intensity, including patches of natural vegetation, is therefore often regarded advantageous to biodiversity conservation, as it helps to extent the habitats of natural species, and provides for connectivity between areas of natural vegetation.

Interview with Freerk Wiersum

"We should attribute greater value to synergy"

Freerk Wiersum has been studying natural resource management in rural areas of Asia and Africa for more than 30 years. He takes a firm position in the sparing-sharing discussion. The land sparing approach, he says, reflects a typical Western view of nature. Nature is conceived as 'wild' and 'untouched', while agriculture is seen to represent an anthropological land use with little environmental value. Wiersum takes another perspective. The concept of biodiversity, he stresses, refers not only to threatened species, but also to the diversity in landscapes, ecological systems and varieties of agricultural crops. He points to the landscape mosaics that exist in many parts of the tropics, which harbour high levels of both natural biodiversity and agro-biodiversity. During an interview at Wageningen University, Wiersum explains that it is time to step away from the traditional nature-culture dichotomy.[7]

You have been studying community forests, home gardens and agroforests. What are the benefits of such diverse systems? Diverse systems allow farmers to spread their risks, and provide a wide variety of products for subsistence purposes, including food products and materials for shelter. Farmers appreciate a variety in agricultural crops because it gives them the opportunity to harvest different crops in different seasons while enjoying a varied diet. Another important advantage is that these systems are locally embedded, based on existing land-use practices and cultural heritage. Mosaic landscapes, moreover, provide an immaterial value: the emotional value of diversity. People value the diverse landscapes created as a result of their own agency – not only because they contribute towards diversified livelihood practices, but also because they provide a sense of place and identity.

And from an environmental point of view? First, a farmer who manages a diverse system will have to consider and protect the diversity, which means that he or she cannot apply chemical products generically. The risk of over-using dangerous chemical products is therefore much smaller compared to monoculture plantations. Second, diverse systems have many ecological filters and buffers built in. For example: soil erosion is prevented because the soil is covered with organic material and nutrients are less easily leached from the soils due to the multi-layered root systems. Third, a diverse system provides options for synergetic processes. For instance, in Dutch hothouses, maintaining insects that prey on other insects causing pests and diseases stimulates horticultural production.

Still, the diversity of land-use systems may decrease over time, when farmers decide to specialise in the cultivation of one product. There are indeed many examples of complex agricultural systems that move into the direction of simple systems over time. This is because new crop varieties are being developed for monoculture conditions. You could argue that such a development is related to the dominant discourse in agricultural research and development. As long as agricultural scientists do not pay attention to synergy, we are stuck with an agricultural development paradigm that favours monoculture plantations. I really think we should attribute greater value to the concept of synergy. There are many ecological processes that encourage production in biodiverse production systems. People who argue for intensified monocultural production, in my opinion, still think like Henry Ford in his early years: a factory producing thousands of the same black automobiles. This approach is long past in the automobile industry. They are now mass-producing diversity in cars as a means to optimally fulfil a diversity of human demands.

Notwithstanding the advantages of diversity, in many areas of the world large-scale monoculture plantations of oil palm and soy are expanding at the expense of small-scale agriculture. Yes, this trend is visible in some regions. The expansion of large-scale plantations is a reality that reflects the power of large companies and the dominance of an agricultural development paradigm that favours monocultures. But it doesn't mean that land-use is moving in the direction of large-scale agriculture in *all* tropical regions. There are many other trends. In plenty of areas of the world, people value their diverse landscapes and do not opt for large-scale conversion to monocultures. So you should not base rural development on a simple hegemonic agricultural model, but rather on location-specific realities and dynamics.

According to your colleague Louise Fresco, large-scale mechanised agriculture is required to ensure global food security. To me this is a one-sided rhetoric discourse. Several arguments invalidate her viewpoint. In the first place, it ignores the fact that food security is as much a question of distribution as of production. The basic question should not be what production system ensures the highest production, but which farming and landscape systems enable an optimal combination of production and local livelihoods.

Do the developments in tropical forest areas not demonstrate that farmers switch to the cultivation of monocultures, such as oil palm, as soon as it becomes more profitable than the alternative? That may be the case, but it does not have to result in a landscape that is a sea of oil palm, as small-scale farmers will also use their land for other purposes, for example, for plots with staple food crops, vegetables and fruit trees. So you will still have a patchy pattern that includes, but is not limited to, small-scale monoculture plantations. This will of course be different when a large-scale company owns all the lands. It makes a huge difference whether monoculture plantations are part of a mixed farmer-managed system, or belong to a large-scale commercial plantation owner: not only from an environmental perspective, but also

in terms of the socioeconomic outcomes. The question is not one of either intensifying production systems or adhering to traditional production systems, but rather what type of intensification should take place in different types of production systems. Too little attention is given to the question of whether modernised forms of agrarian production can be incorporated in diversified farming systems. A landscape of small farmers producing rubber in monocultural plots that complement additional crop lands and home gardens has quite different characteristics than a landscape with large-scale commercial rubber plantations only. One should be careful not to limit the discussion to the level of specific production systems only, without taking into account the dimensions of farming systems and landscape systems.

Can the way in which agricultural landscapes develop be steered? Rural development is not just influenced by government and commercial actors, but also by civil society organisations and local communities. There is a need to identify location-specific development trajectories rather than adhering to ideal-type development rhetoric. Location-specific land-use dynamics are the outcomes of both globalisation and localisation. Examples of new globalisation processes influencing tropical land-use are the development of new programmes for payments for environmental services and increased interest in environmentally friendly production. These developments create new possibilities for farmers to maintain diverse landscape mosaics. In several countries, we are already witnessing a stabilisation of forest mosaic landscapes. Land-use dynamics in the tropics cannot be simply modelled along the lines of rural development in Western countries.

So you favour a conservation approach that focuses on diverse landscapes over one that emphasises the segregation of nature conservation and agriculture? Yes, absolutely. In the first place it reflects the empirical reality that, in many tropical regions, forest mosaic landscapes exist and that their development contributes towards the stabilisation of forest frontiers. In the second place it reflects a more nuanced approach towards conservation as not just involving wilderness reserves, but as reflecting biodiversity and biocultural diversity.

Dr. Freerk Wiersum is an international expert on community forestry and agroforestry. In March 2012 he retired from Wageningen University and Research centre (WUR), but he remains active as an associate researcher. His work focuses on processes of co-evolution between man and nature and the scope for conservation of biocultural diversity with specific attention to indigenous forest management and community forestry development in tropical countries.

The landscape approach

"Shaping landscapes is more a process of negotiation than of planning"
(Sayer, Maginnis, Buck and Scherr 2008:2)

The landscape approach encompasses the concepts, tools and methods for planning and managing a landscape in order to achieve multiple economic, social and environmental objectives (Minang et al., 2015d). It combines elements of a range of existing concepts, approaches and disciplines (see Box 3), but puts particular emphasis on the need to address landscapes as socio-ecological systems, working across sectors, and for adaptive co-management.

More than anything else, the landscape approach refers to a way of doing things. It is a process-oriented approach towards management that involves all stakeholders (Zagt and Chavez-Tafur, 2014). In line with that, Sayer et al. (2013) argue that the

approach implies a shift from project-oriented actions to process-oriented activities. They stress that it does not provide a ready-made operational framework for landscape-level planning, but instead refers to an iterative, flexible and ongoing process of negotiation, decision-making and re-evaluation.

The landscape approach has gained considerable momentum in recent years, helped by several international initiatives, including Landscapes for People, Food and Nature (LPFN), the Global Partnership on Forest and Landscape Restoration (GPFLR) and the Global Landscape Forum (GLF). Its rising popularity results from the failure of sectoral approaches to natural resource management and agricultural development to deal with extra-sectoral constraints (Frost et al., 2006). For example, conservation efforts will have limited effect when farmers are faced with progressively declining soil fertility and a lack of access to credit needed to invest in their farms, causing them to migrate to the forest frontier. Moreover, all too often policies and regulations related to one sector (e.g., agriculture, forestry or water) are not well aligned with those in other sectors, as responsibilities lie with different ministries or government departments.

3.1 Elements of integrated landscape management

The landscape approach calls for integrated landscape management, which can be defined as the long-term collaborative process of different stakeholders to achieve multiple objectives in a landscape (Scherr, Shames and Friedman, 2013). The terms 'landscape approach' and 'integrated landscape management' (ILM) are often used interchangeably.[8] A large number of authors have published about what they see as the main elements and principles of landscape approaches and ILM. These provide a basis for efforts to integrate conservation and development objectives at the landscape level, and are presented as principles that should be taken into account when implementing integrated landscape-level initiatives or reforming landscape management institutions. The list with principles presented below is a synthesis of the main elements found in eleven publications (Frost et al., 2006; Sayer, Buck and Scherr, 2008; Hart et al., 2010; Scherr, Shames and Friedman, 2012; Sayer et al., 2013; Sayer et al., 2014; Kozar et al., 2014; Minang et al., 2015b; Dewi et al., 2015; Wambugu et al., 2015; Van der Horn and Meijer, 2015). They are reorganised in basic principles, process features of integrated landscape management and conditions.

Basic principles

- Integration of objectives and scales: Landscapes provide multiple goods and services related to agricultural production, local livelihoods, biodiversity conservation and climate change. These are used and valued differently by

actors on various scales, but need to be managed in an integrated manner. Reconciling different objectives may imply trade-offs, but there may also be opportunities for synergies.

- Inclusiveness: Stakeholders in the landscape may have conflicting interests, and different levels of power and resources. All stakeholders need to be included in planning and decision-making, taking account of the variety of interests and perspectives, with special attention to marginalised groups.

Process features of integrated landscape management

- Adaptive management: Landscape management refers to a dynamic and complex process, which necessitates continuous learning, reflection and adjustment. People need to learn from each other, to find out what works and what not, and adapt accordingly. This requires a great deal of time, patience and pragmatism, and the long-term commitment of people who can listen, explore, adapt and work together with other stakeholders.[10]
- Participation and collaborative processes: When all relevant actors participate in discussions and negotiations, and experience some level of ownership over the process, this can lead to collective action. Special attention should go to marginalised groups, to discover the areas where capacity building may be needed. An external actor can act as the facilitator, but would need to earn a seat at the negotiating table rather than enforcing top-down solutions.
- Identify shared objectives: The interests of various stakeholders in a landscape may conflict. To have all stakeholders agree on all objectives might therefore be unrealistic, but it may be possible to identify objectives that are shared by all stakeholders (a common concern entry point), such as the need to address decreasing productivity, water shortage, or pollution. This can provide a basis to build trust, start negotiating, and agree on collective action. Negotiations on goals, challenges and opportunities have to be transparent and ideally lead to consensus about the logic, legitimacy and justification for action. This requires a shared understanding of the issues at stake. Participatory tools (such as participatory planning, see Box 4) can be used to build an understanding of landscape dynamics and drivers of change and to explore scenarios. This will help reach agreement amongst stakeholders on what actions are needed to address common objectives, and what the possible trade-offs might be. Action research can be used to understand problems and find solutions in a collaborative manner.
- Participatory and user-friendly monitoring: Monitoring indicators of progress is necessary to inform adaptive management. Local stakeholders can help select easily measurable indicators of the state of the landscape that is desired in the future. Indicator selection and measurement can also be used as a tool to generate discussion (see section 5 of this report).

- Clarification of rights and responsibilities: When landscape management is based on negotiation processes between multiple stakeholders, it is essential that all actors are fully aware of, and accept their rights and responsibilities related to, e.g., tenure and conflict resolution procedures.

Conditions

- Inspired leadership and long-term commitment: Leadership can come from local leaders, private sector actors, civil society organisations and/ or research organisations. Long-term commitment is essential, because engaging different stakeholder and changing behaviour takes time.
- Supportive resource tenure and governance: Integrated landscape management works best in a context in which land rights are clear, cadastral records are in place, and agreements are enforceable by law. This is often not the case. As a minimum, local stakeholders must have a certain level of control over landscape management decisions, and national and local government agencies must support participatory processes.
- Finance: Integrated landscape initiatives are likely to have certain start-up costs as well as continuous and long-term process costs. Public and private investors can help finance these. Funds for food security and agricultural development are often disconnected from those aimed at adaptation and mitigation. Climate funds could potentially be used to influence agricultural investments and support integrated landscape management, leading to more efficient use of the resources.

Box 3. Foundations of the landscape approach

Conservation and development organisations have long been looking for ways to integrate conservation and development objectives. Since the 1970s, the dominant paradigm in many of the major conservation and development agencies has gradually shifted from one that separates people from nature towards one that emphasises their interconnectedness. Henkemans (2008, unpublished) shows how his paradigm shift has manifested itself in various concepts and approaches, including:

- *Integrated Conservation and Development Programmes*. ICDPs became the standard approach to combine conservation and development objectives in the 1990s. They were usually biodiversity conservation projects with a rural development component.[9]
- *Community-Based Natural Resources Management*. CBNRM focuses on community action for natural resources management. The term loosely encompasses a number of other concepts, including community forestry, collaborative forest management and community fisheries.
- *Integrated Natural Resource Management*. INRM focuses on research to improve livelihoods, agroecosystem resilience, agricultural productivity and environmental services. It emphasises experiential and participatory learning, action research and the integration of research and management.
- *The Ecosystems Approach*. The Ecosystems Approach was adopted as the main approach to implement the Convention on Biological Diversity (CBD). It emphasises interdependence between humans and ecosystems, the need to operate across a range of spatial scales, the need for participation in decision–making, and adaptive management.
- *Landscape Ecology*. Landscape Ecology is a scientific discipline studying the ways in which land units in landscapes are functionally related to each other and in which natural and cultural subsystems co-evolve over time.
- *The Protected Landscape Approach*. This approach has its origins with the International Union for the Conservation of Nature (IUCN) and aims to foster the stewardship of people living in the landscape. It stresses that cultural and natural values of landscapes are inextricably linked, and that the communities living in or near these landscapes are central to sustaining them.
- *Farming Systems Approach*. This is a cross-sectoral approach to land-use planning developed by the Un Food and Agricultural Organization (FAO), based on the idea that conservation and development outcomes depend on the daily decisions of local land users in a farming system. A farming system is conceptualised as a combination of individual farms that share a resource base and certain basic characteristics.

Box 4. Participatory spatial planning and community mapping

Spatial planning is a crucial component of integrated landscape management, as it guides and controls land-use decisions in the landscape. It usually results in a plan for future development in an area, often accompanied by land-use regulations. Many governments are trying to make land-use planning more participatory and transparent, to make sure that the interests of all stakeholders are taken into account. Experience with the COMDEKS project (Salvemini and Remple, 2014) highlight the role of participatory planning as a potential starting point for landscape-level initiatives and building social capital. Hecht (2011) reports on the implementation of a participatory planning process in the Brazilian Amazon area, which involved community groups, indigenous people and extractors, government officials, activists, scientists, NGOs and churches. Together they successfully developed a regional plan, composed of a mosaic of land uses from annual crop agriculture to protected areas. A major obstacle for participatory planning can be the lack of willingness of local government actors to reform planning procedures and allow for meaningful participation of other stakeholders. Another obstacle can be the lack of documentation of customary boundaries on official maps. Community mapping (i.e., community members mapping their own village territories using GPS technology) may enable local people to communicate their perceptions about land rights and resource management systems with the government and this can help communities gain recognition of their natural resources management systems and associated tenure rights (Kusters et al., 2013).

3.2 Integrated landscape initiatives

Without necessarily labelling it integrated landscape management or the landscape approach, practitioners have long been experimenting with initiatives that bridge traditional sectors and involve multiple stakeholders on the landscape scale.[11] EcoAgriculture and Partners conducted continental reviews of a large number of Integrated Landscape Initiatives, or ILIs in short (see Milder et al., 2014, for a review of African initiatives and Estrada-Carmona et al., 2014, for a review of Latin American and Caribbean initiatives). Hart et al. (2015) synthesise the results of Africa, Latin America and the Caribbean, including a total of 191 such initiatives. They used the following three criteria to select the cases: (i) the initiative seeks to advance multiple goals related to agricultural production, local livelihoods, and the environment; (ii) it is implemented on the landscape scale; and (iii) it supports multi-stakeholder processes.

Most of the reviewed initiatives had an explicit biodiversity conservation objective, and were initiated by international NGOs. The studies show that agricultural organisations involved in ILIs tend to support agro-ecological approaches (aimed at conserving agricultural biodiversity and local ecosystem functions), while investments in conventional crop intensification and irrigations are rare. In many of the reviewed cases, the institutional and political contexts failed to provide a supportive environment or even provided disincentives for inter-sector collaboration, such as subsidies promoting agricultural expansion into natural areas. Investments in coordination bodies and participation of women were correlated with positive outcomes. The studies show that ILIs are effectively providing platforms for stakeholders to collaborate, bringing together perspectives and interests, both from within the landscape and from outside. However, despite broad and strong multi-stakeholder representation, the authors warn that private sector involvement is lagging behind. Failure to include the private sector was often reported as one of the least successful aspects of the initiatives. It appears difficult to set project objectives that commercial actors agree upon, and most initiatives do not succeed in generating incentives for businesses to become involved (Box 5).

Incomplete, inconsistent or shallow stakeholder participation is an indication that the benefits of participation do not outweigh the costs in terms of time and effort, at least in the view of those stakeholders. When powerful stakeholders (those with a lot of influence on land management decisions) are not willing to participate, this will weaken the initiative's effectiveness. Hart et al (2015: 99) conclude that "It remains to be demonstrated that the benefits of integrated approaches outweigh their transaction costs, and if the magnitude of benefits that they provide to diverse stakeholders is greater than single sector strategies for development and conservation."

Based on a review of experiences with seven landscape initiatives in the Congo Basin, Eastern Indonesia and Northern Australia, Sayer et al. (2014) stress that landscapes initiatives are often processes of 'muddling through'. In none of the cases they reviewed did the multi-stakeholder process result in a spatial plan that was accepted by all. It was common for actors to pursue their own aspirations, which were not always shared by others. The authors conclude that the landscape initiatives were seldom fully transparent and evidence-based processes, but did provide a framework for discussions and negotiations between actors. They write: "Power differentials between stakeholders always exist and decisions are made on the basis of anecdotes and beliefs. Landscapes are the product of multitudes of decisions by stakeholders which all appear rational to those taking them but may not make sense to other stakeholders. Landscape approaches are still relevant but in most situations muddling through prevails over grand design" (Sayer et al., 2014).

In addition to the above-mentioned reviews, there is a rapidly growing body of literature reporting on experiences with a range of landscape-level initiatives (see, e.g., www.ecoagriculture.org). Interesting global initiatives include FAO's Forest and Landscape Restoration Mechanism (McGuire, 2014), the International Model Forest Network (Ho et al., 2014), and the COMDEKS project (Salvemini and Remple, 2014). Examples of individual countries with integrated-landscape initiatives include Mexico, with an important role for a civil society organisation (Madrid and Deschamps, 2014), Ethiopia, with a key role for the national government (Deichert et al., 2014), and Ghana, with a strong guiding role for an international NGO (Noponen et al., 2014, see also Box 8). Although reports on these initiatives are generally positive, evidence remains mostly anecdotal, and they seldom provide a systematic analysis of costs and benefits.

Box 5. Private sector involvement

Some companies that depend on natural resources recognise that their future depends on the sustainable sourcing of raw material and an increasing number of private companies are therefore looking to increase the sustainability of their supply chains. Unilever, for example, has set ambitious targets, aiming for 100% sustainably sourced agricultural raw material by 2020 (Unilever, 2010). Other large multinationals have also made commitments to purchase 'sustainable' agricultural products, such as Nestlé, Tesco, McDonalds and Walmart. These efforts often involve certification and standard-setting (Kissinger et al., 2015). Most certification schemes and standards, however, tend to focus on improving the environmental and social performance of operations within a certain supply chain and cannot adequately address challenges located outside the chain, such as risks due to water shortage, climate change, and conflicts with communities (Namirembe and Bernard, 2015). Standards that include considerations related to biodiversity, livelihoods and ecosystem services at the landscape level could potentially provide an incentive for companies to invest in integrated landscape management. A typical example of the incorporation of landscape-level standards in private sector planning is the identification of high conservation value (HCV) forests within the landscape in which a company has its concessions (Kissinger et al., 2015). Other potentially interesting tools are the certification of landscapes instead of individual products and landscape labelling (Hart et al., 2014; Ghazoul et al., 2011). Vertical integration (e.g., through establishing outgrower schemes to replace ad hoc trade arrangements) may give companies the possibility to include landscape-level sustainability indicators in production processes (Gyau et al., 2015). However, such landscape-level standards are complex to implement, and come with high costs, as they require companies to monitor impacts beyond the production unit (Kissinger et al., 2015).

Why would a company want to invest money in landscape-level management? The most often heard argument is that investments beyond the production unit can be a way to mitigate certain operational risks. In the case of coffee production in Oaxaca, Mexico, for example, a coffee-trading company (AMSA) identified several risks to their business that were beyond the production unit – such as degradation of forests, soils and waterways. This was an incentive for them to engage in a landscape-level carbon-coffee project in collaboration with the Rainforest Alliance and a smallholder cooperative (Kissinger, et al. 2015). In addition to the reduction of operational risks, Gyau et al. (2015) list four (partly overlapping) incentives for companies to become involved in landscape initiatives: (i) corporate social responsibility (CSR); (ii) capturing markets (through improved CSR); (iii) reducing reputational risk; and (iv) increasing partnerships (in multi-stakeholder platforms) through which risks are shared and conflicts are reduced.

Box 6. The case for landscape restoration

Implementing the landscape approach seems particularly promising for landscape restoration efforts. Many areas in the forested tropics are degraded and the benefits of efforts to regenerate such areas are relatively easy to demonstrate to different stakeholders. In other words: there is a clear common concern entry point. Moreover, restoration is currently high on political agendas, because of its potential to mitigate climate change. In 2011 a coalition of international organisations and governments (the Global Partnership on Forest and Landscape Restoration – GPFLR) launched the Bonn Challenge, which aims to restore 150 million hectares of lost forests and degraded lands worldwide by 2020 (http://www.forestlandscaperestoration.org). The coalition adopted the landscape approach through the concept of Forest Landscape Restoration (FLR). FLR refers to integrated efforts to restore the forest's ability to deliver ecological services in a degraded landscape (see, e.g., Van Oosten, 2013). FLR differs from conventional restoration approaches in several ways: (i) it takes a landscape-level view; (ii) it aims to simultaneously improve ecological integrity and human well-being; (iii) it implies a collaborative process involving a wide range of stakeholder groups that collectively decide on the most technically appropriate and socio-economically acceptable options for restoration; and (iv) it is applied to both forest lands and agricultural areas (ITTO/IUCN, 2005 cited in Henkemans, 2008).

Interview with Sara Scherr

"The government cannot do it alone"

Sara Scherr is one of the most prominent scholars on Integrated Landscape Management and the landscape approach. She is the founder and President of EcoAgriculture Partners, and co-founder of the Landscapes for People, Food and Nature initiative. As such, she is positioned at the heart of a large and growing community of scientists and practitioners committed to improving the management of landscapes in the tropics. She emphasises that ILM requires long-term collaboration among different groups of stakeholders to achieve the multiple objectives required from the landscape, such as agricultural production, the delivery of ecosystem services, biodiversity conservation and human well-being. Below she explains what the landscape approach means in practice.

What's new about the landscape approach? Landscape-wide approaches have been applied for several decades, namely in forestry and watershed management. From that perspective it is not new. At the same time I would argue that something truly new is happening in the everyday practice of many organisations. For the last 150 years, governments, NGOs and researchers have been focusing on partial functions that were spatially divided. Foresters were in charge of forests on mountain slopes. Agriculturists looked at the production of annual crops in the lowlands. Water managers focused their attention solely on water-catchment areas. We are now seeing a shift in thinking. Projects that used to be organised on a purely sectoral basis have adopted multiple objectives, including agricultural production, livelihoods, biodiversity and the climate. They no longer just address forests, or water, or agriculture. Organisations are moving away from a single-entry point, towards an approach that focuses on multi-functionality.

Would you say that the acknowledgment of multi-functionality is the key feature of the landscape approach? The shift in thinking is based on the realisation that a landscape needs to be managed in a way that takes into account all the functions and services that a landscape provides. Once you start doing that, everything changes – also for professionals within a certain sector. It means that they need to understand how different components of the landscape interact. But recognising multi-functionality also calls for different institutional arrangements. It calls for arrangements that promote collaboration and negotiations.

How do you organise that? You will have to put new processes in place, such as multi-stakeholder dialogues. And you will have to set the rules of the game. These rules can relate to the ways in which actors are represented in a multi-stakeholder platform, and who facilitates the process of negotiations. You could say these are

rules for democratic governance. The problem is that such democratic processes take time.

What is the role of the local government in these processes? EcoAgriculture Partners staff and collaborators have conducted a review of hundreds of integrated landscape initiatives and found that most of them involve local governments as partners. Sometimes they are leaders and sometimes they are followers. You have all kinds of constellations, but you see that local governments are increasingly initiating multi-stakeholder platforms themselves.

Is that a good thing? I have some reservations. When different actors get together on a voluntary basis, you have a special type of dynamic, and you may lose that dynamic when the government takes charge. It is important to look at the relationships between the actors. What are the power relations? Are the various actors really independent? So far, there has been little research on this.

The government has the mandate to protect the public good, superseding the interests and responsibilities of individual stakeholders in the landscape. Does that imply that the government is an indispensible partner in any landscape initiative? A problem is that large landscapes may fall under various levels of jurisdiction. Different levels of government are in charge of different aspects of the landscape. Another problem is that governments usually do not collect enough tax money to adequately manage natural resources. The government may have the responsibility over public goods, but they do not have the means. The government cannot do it alone. Multi-stakeholder platforms can help them reach their objectives. It is clear that supportive local policy is essential. It will be hard to achieve your vision, if the government is going in the opposite direction. Especially when initiatives grow in size, it becomes more important to have government support. That reminds me of a case in India, where a group of people started rehabilitating their landscape to address water shortage. They essentially got their river running again. But when they wanted to expand their activities to other locations, the Ministry of Water told them to stop, because it considered water management the sole task of the government.

How does formal spatial planning fit in? Ideally, formal spatial planning is the outcome of negotiations in a multi-stakeholder platform. This means that government planners should be involved in integrated landscape initiatives and work together with other stakeholders, for example on the development of scenarios. How do we want the landscape to look 25 years from now? This could then result in a spatial plan.

What is the role of civil society organisations? The engagement of civil society is central. They include all kinds of groups: environmental organisations, farmer groups, user groups, chambers of commerce, etc. In the last 20 years it has been the

increased engagement of civil society that has made all the difference in natural resource management. They have been the drivers of the landscape approach.

Are they the preferred initiators of integrated landscape initiatives? There is no one preferred initiator. It all comes down to whoever has the energy to do it. I know of successes and failures under all the models. The question is: As soon as you have leadership, to what extent does the leading party dominate the others. Ideally you have a champion organisation from more than one sector. That will prevent one organisation and interest from becoming dominant.

How do you prevent such initiatives from being dismantled when one of the champion organisations pulls out, for example when project money is finished? Integrated landscape initiatives may require initial support, but eventually they will have to function independently from external organisations. For this you need to involve groups with intrinsic long-term commitment. They must become the core members. These can be local universities, businesses, farmers, governments and civil society organisations.

In publications on the landscape approach much emphasis is placed on the participation of local people in decision-making processes. Does the approach have an explicit moral component? Yes, I would say that the approach that we promote with EcoAgriculture Partners is based on several ethical principles, such as democracy, stewardship, sustainability and inclusion. This means, for example, that we will devote extra attention to giving a voice to the marginalised in multi-stakeholder processes. But not all landscape-level initiatives are necessarily based on principles of democracy and participation. There are also top-down landscape approaches, where a small elite group decides how to manage the landscape. Such approaches towards landscape restoration are seen in Vietnam, China and Ethiopia. They may involve local people, but often minimally – just enough to prevent strife. This concerns me. As the landscape approach becomes more mainstream, you start seeing flows of money from outside actors with a particular interest, for example REDD programmes, biodiversity conservation organisations and large companies. They all have their own agendas. They may call their interventions landscape approaches and develop multi-stakeholder platforms, but the question is to what extent they actually stimulate participation and negotiation on an equal basis.

Dr. Sara Scherr is an agricultural and natural resource economist specialising in land management policy in tropical developing countries. She is the founder and President of EcoAgriculture Partners and led the founding of the Landscapes for People, Food and Nature Initiative. She also serves on the boards of several international organisations and scientific journals.

Landscape governance

Landscape governance arrangements are public policy spaces where multiple actors can discuss their respective agendas

How can a landscape approach be organised? In other words: what types of governance arrangements are needed? Based on the principles of the landscape approach, governance arrangements ideally enable the 'co-design' of a landscape in a collaborative process of public, private and civil society actors, allowing for continuous learning and adaption. Governance arrangements would also need to allow for coherence and complementarity between the roles of state and non-state actors, and need to prevent one particular actor from becoming more powerful than others (Kozar et al., 2014). Moreover, governance arrangements should not only involve stakeholders within the landscape itself, but also actors at higher levels of scale. Landscape initiatives may for example be embedded in national programmes, such as REDD+ strategies (Minang et al., 2015d).

Developing landscape governance arrangements is challenging. Based on a study in the Congo Basin, Endema et al. (2010) conclude that there is a lack of effective frameworks to foster negotiations between different stakeholders active in the landscape, and that ambitions of landscape approaches tend to exceed the capacity of the organisations involved – especially when applied to large areas with many stakeholders. Nevertheless, although landscape governance is inherently complex, Kozar et al. (2014) argue that the conditions for it to succeed have been improving. Many countries have been undergoing a transition from state-centred government control of land and natural resources towards the distribution of power among civil society, private sector and local governments.

Ros-Tonen et al. (2014) stress that effective landscape governance requires a certain level of social capital, such as trust, shared rules and norms, and connectedness within and between stakeholder groups. Without this, complex cross-scale and multi-level learning and negotiation processes are not likely to succeed.[12] They also emphasize that effective landscape governance is greatly helped by the presence of bridging organisations (e.g., NGOs or research organisations), which create linkages between different actors. Such organisations can play a key role in facilitating multi-stakeholder negotiations, collective learning and conflict management, and can also function as knowledge brokers.

4.1 Forms of landscape governance

A landscape governance arrangement may be formal or informal/ad hoc. It can be embedded in an existing organisation (e.g., a dedicated agency of a local government), or take the form of a network of various actors. Arrangements also vary according to the number and types of stakeholders involved, and how they are represented. Van Oosten et al. (2014, based on Treib et al., 2007) distinguish between three types of governance arrangements:

- The development of management tools on the basis of professional knowledge and binding regulations. Management responsibilities may be shared with other actors – the government may for example train other stakeholders to become co-managers, or may allow for greater participation in land-use planning processes – but the arrangement is based on a central locus of authority.
- Creating platforms for multi-stakeholder decision-making. Attention is specifically paid to forming new interactions between stakeholders, so as to arrive at joint decision-making, involving complex processes of negotiation, conflict mediation and trade-offs.
- Creating new institutional space. This means that actors from different levels and scales together create a new and hybrid institution, implying the creative combination of traditional institutions with new governance mechanisms. It requires that policymakers provide flexibility in their centrally designed rules.

Three Indonesian cases explored by Van Oosten et al. (2014) demonstrate that governance arrangements can be dynamic. They, may, for example, evolve from typical professional management approaches, with the government in charge of rules and regulations, towards arrangements that allow for multi-stakeholder involvement, with more attention for local interests. In the cases described, these changes were initiated by stakeholders through informal processes. Changing the formal arrangements into more flexible ones resulted in new arrangements with a more horizontal process of spatial decision-making. It proved, however, difficult to then embed these new arrangements into the vertical structures of the state, i.e., the formal planning mechanisms.

Based on a review of landscape-level governance arrangements, Kozar et al. (2014) show that many of the existing arrangements operate as voluntary and informal networks, with a certain degree of self-organisation. They are typically intended to promote innovation, collaboration and mutual learning. Different institutional constructions are possible, such as multi-stakeholder platforms, forums, and co-management structures. These make it possible to bridge different scales and include multiple types of actors. They are public policy spaces where multiple actors can discuss their respective agendas, allowing for the joint development of principles and plans for action.

4.2 What works?

In the literature, opinions vary about the effectiveness of different types of governance arrangements. Some authors emphasise the need to embed landscape initiatives within existing jurisdictional structures (e.g., Rodrigues de Aquino and Griffin, 2014), while others argue for flexible and informal arrangements in which local governments are but one of many equal partners, for example by developing a framework in which different stakeholders can discuss choices and trade-offs and together develop solutions (e.g, Ho et al., 2014).

Van Oosten (2013) argues that the top-down nature of formal planning structures makes it hard to integrate them with more bottom-up and open-ended processes of planning. She argues for a view on landscape governance that moves away from formal state institutions towards informal networks and coalitions and public-private partnerships based on mutual learning. Experiences with COMDEKS – a project run by UNDP aimed at community-based landscape management in 20 countries – also suggest that forming flexible and informal 'communities of interest' at the landscape level can be more effective than the establishment of formal state institutions at the landscape level (Salvemini and Remple, 2014). Zagt and Chavez-Tafur, however, note that flexible informal government arrangements may be confronted with the same challenges as formal arrangements when it comes to matters of equitable representation and participation, and the position of vulnerable and marginalised

groups. They also warn that informal arrangements may lack the legitimacy and mandate needed to be able to enforce agreements.

Kozar et al (2014) synthesised experiences with government arrangements at the landscape level and conclude that no particular arrangement is more favourable than the other, but propose the following eight building blocks for effective landscape governance systems:

- Choose arrangements that encourage innovation and learning;
- Foster complementary roles among state and non-state actors;
- Distribute responsibilities, rights and authority among actors;
- Assign governance responsibilities to appropriate levels;
- Ensure a key role for local governments;
- Embrace complexity where needed;
- Choose arrangements for various functions in a landscape;
- Address issues of accountability and legitimacy.

Landscape-level interventions that are often presented as successes are cases of landscape restoration, aimed at rehabilitating formerly degraded areas, such as farmer-led regeneration in the Sahel (Buck and Baily, 2014), landscape restoration in Ethiopia (e.g., Deichert et al., 2014) and rehabilitation of the Loss Plateau in China (Soltz, et al., 2013). The latter two have largely been driven by central governments. Although local farmers were activity involved, the rehabilitation programmes were implemented with relatively little negotiation power for local stakeholders. These examples highlight that the interpretation of success depends on the value attributed to various criteria. The Ethiopian and Chinese cases, for example, may score high on ecological and production criteria and low on participation and democratic criteria.

4.3 Governance challenges

Setting up and maintaining landscape governance arrangements is challenging for a number of reasons, including:

- High transaction costs: Effective landscape governance arrangements are likely to involve lengthy processes (e.g., multi-stakeholder negotiations) and will incur high costs. Their success depends on the quality of stakeholder engagement, the extent to which the various concerns of different stakeholders are acknowledged, and the level of trust between different stakeholders (Sayer et al., 2013).
- Possible disconnect with jurisdictional boundaries: Ecologically and socio-cultural defined landscapes often cut across administrative and political boundaries, and sometimes even across national borders (Van Oosten, 2013).
- Questions of accountability and representation: Voluntary and self-organised arrangements in networks have the benefit that they can be co-

owned by different actors, which may foster synergies and collective action. The disadvantage is that they lie outside formal democratic structures, which can raise questions concerning accountability and representation. Are the actors active in landscape governance structures truly representative for the group they claim to represent, and can they be held accountable by them? Moreover, the arrangements may not be recognised as viable governance systems by governments.

- Power imbalances: There may be power differences between actors in the landscape. And landscape governance arrangements will need to make sure that the most powerful actors (e.g., large plantation companies) are not dominating the decision processes (Kozar et al., 2014), or refrain from participating in multi-stakeholder arrangements.
- Addressing different scales: Landscape governance arrangements will have to find ways to address linkages between different scales. Many drivers of landscape change originate from outside the landscape (e.g., markets and migration). Moreover, what happens within a landscape can have consequences on larger scales. The actions in one landscape may, for example, displace certain activities to other landscapes, known as leakage (Minang et al., 2015d).
- Balancing objectives: One of the main challenges of landscape governance is related to the fact that livelihood benefits are valued at the local level, while many ecosystem services are valued at higher levels of scale. For example, urban populations downstream will value the provision of clean water, while the international community will value the conservation of threatened species. Reconciling these objectives is highly complex, because they do not always coincide. A related question is who represents global public goods like climate and biodiversity, and how. Global interests are often represented by international NGOs and donors, but these tend to be involved for a limited period of time (Kozar et al., 2014)

Related to the last point, Van der Horn and Meijer (2015) warn that not all initiatives that adopt a landscape approach attribute equal weight to the various objectives. The authors distinguish between people-driven, profit-driven and planet-driven landscape initiatives and argue that each has its 'blind spots'. People-driven initiatives may promote empowerment of smallholders vis-à-vis other stakeholders in a landscape such as large companies, but tend to focus only on those ecosystem services that are of direct and short-term interest. Likewise, long-term biodiversity conservation may not be high on the agenda of profit-driven initiatives that are initiated by large-scale commercial interests, while planet-driven initiatives run the risk of being top down, as they are based on a global concern.

Box 7. Financial incentives

Mankad (2014) distinguishes between three types of financial incentives, which can be used in sequence (stacking) or simultaneously (bundling). First, banks, investment funds or private companies may provide credit to encourage actors to shift to sustainable management practices. Second, financial incentives can come from product markets that stimulate integrated landscape management, e.g., through certification. Third, the stewards of ecosystems that provide environmental services can be linked to the users of these services through Payments for Ecosystem Services (PES). In the last category, programs for reducing emissions from deforestation and forest degradation (REDD+) may be interesting (see Rodrigues de Aquino and Griffin (2014) for an example of this in Oromia, Ethiopia), but the risk with such programmes is that they are externally driven, without sufficient consultation and buy-in of local actors. To avoid top-down interventions, existing projects in the field of PES and REDD+ would need to adopt the basic principles of the landscape approach (see, e.g, Namirembe and Bernard, 2015; Kissinger et al., 2015).

Box 8. Promoting a climate-smart landscape in western Ghana

In 2010, the Rainforest Alliance and Olam (an international food company and major cocoa trader) started a project to promote a climate-smart landscape in the Juabeso-Bia District of Western Ghana. The project focuses on an area of roughly 36,000 hectares, made up of cocoa agroforests, croplands and remnant forest, located in between two large protected areas. The productivity of cocoa farms is decreasing, and cocoa cultivation is leading to deforestation. The project aimed to reverse these negative trends by supporting climate-smart cocoa cultivation and other livelihood options, while limiting encroachment on the natural forest, and promoting the restoration of forest remnants in the landscape. An additional objective was to prepare communities for future REDD+ projects in the area.

Using Olam's supply network, the project engaged about 2,800 farmers. Through farmer field schools, farmers were trained in climate-smart agricultural practices (e.g., maintaining shaded cocoa farms, which hold more than twice the carbon volume of non-shaded cocoa). The project supported additional income-earning activities such as bee-keeping. Farmers were assisted with ecosystem restoration, fallow enrichment and forest protection, and received training in ways to calculate on-farm carbon stocks. Teachers were trained in climate education and a carbon accounting tool was developed that could be used at the landscape level. The project helped to set up producer groups, a farmers' cooperative and a Landscape Management Board consisting of representatives of communities in the area (nominated by the communities themselves). The Landscape Management Board has been involved in each step of the project, and functioned as liaison between project management and the local people.

More than 6,000 hectares of land are now certified, following standards of the Sustainable Agriculture Network (SAN) and its additional voluntary Climate Module. The company pays premium prices for the certified cocoa, and offers predictable market access. Based on interviews with farmers, it is estimated that yields increased between 15% and 30% on certified farms, resulting in an average income increase of 25%. In total about 50,000 shade trees were planted on farms, and another 50,000 trees in fallow areas. All 2,800 farmers are organized in a cooperative. The Landscape Management Board remains active and is expected to play a key role in coordinating future REDD+ activities.

The project has had significant success in terms of the area under certified production, capacity building and organisational development. Incomes have increased, and the communities are better prepared for future REDD+ pilots. From the perspective of the company, however, a different picture emerges. The costs for the company have been more than double the costs of a normal business venture of similar scale. The return on investment has been too low. Olam intends to learn from the project by identifying what worked and what did not, and which elements can be replicated elsewhere (Brasser, 2013; Noponen et al., 2014; Christian Mensah, personal communication; see also the interview with Christian Mensah elsewhere in this report).

Interview with Cora van Oosten

"Landscape governance is about networks"

As a human geographer, Cora van Oosten emphasises the importance of taking into account the particularities of each and every place. Since every landscape has place specific characteristics, she argues that the place itself should be seen as the starting point for natural resource management and planning. In line with this, she puts her trust in 'landscape leaders'. These are the local people who decide to take action because they want to be in charge of directing the future of the landscape they consider to be theirs. This 'sense of place', so she says, is an important driver for collective action and change. Van Oosten works at Wageningen UR, and has been in charge of several research projects on landscape governance arrangements. Below she explains what she learned from those studies.

You have studied various landscape governance arrangements. Can you say what works and what doesn't? No. We have been sending students out to trace and study landscape governance arrangements in various countries, and they all came back with completely different examples. I think that this is illustrative of the essence of the landscape approach. It rules out any blueprint. You will often hear about scaling up or replicating landscape approaches, but that is completely beside the point, as it does not do justice to the uniqueness of place. The landscape approach is a perspective that helps you discover the particular strengths of a landscape.

How is that new? Many existing approaches have a thematic or sectoral focus, and do therefore not depart from the inherent relations between themes and sectors within a landscape. Conservation organisations emphasise the importance of the ecological functions of a landscape. Agro-businesses tend to focus on their productive functions. And civil society organisations may look at them from a human rights perspective. But in my view the landscape is a spatial concept. It is traditionally used by geographers who are not thinking in topics or sectors, but in spatial terms.

Does the landscape approach imply a certain method? Implementing a landscape approach requires true decentralisation. That is, bringing the process of spatial decision-making to the lowest levels possible. But it also requires strong collaboration at the landscape level, as most landscape issues exceed the strictly local. This is often problematic, as political-administrative decentralisation follows administrative boundaries, which rarely coincide with the socio-ecological boundaries of landscapes. Strong collaboration across administrative boundaries, levels and scales is therefore a prerequisite to make landscape approaches work.

In recent publications you argue that effective landscape management calls for informal and flexible governance arrangements. Do such arrangements require an initiator? When there is an outside initiator it is usually called an Integrated Landscape Initiative – or ILI. Most attention currently seems to go to such institutionalised initiatives, while I want to draw attention to informal local initiatives that already exist in the landscape. In many landscapes, there are traditional management systems and governance arrangements deciding over the allocation of rights and resources. Around the globe, historically evolved management systems have regulated access to rights and resources, and land use. In West Africa, for example, agriculturalists and pastoralists have always had informal agreements which regulated agro-pastoral migration patterns and seasonal land uses. In the dry season, the pastoralists are allowed to enter the fields where the manure of their animals fertilises the soil. They have to leave again during the wet season, when the farmers cultivate their crops. Such arrangements are perfectly adapted to the specific ecological and socioeconomic conditions and should form the basis of landscape management. It is what you should build on.

Who needs to build on this? NGOs, or government planners, or private companies which are looking to source their produce sustainably. They all have to understand the workings and dynamics of a place, and use locally developed mechanisms as the basis for their actions. Of course, these mechanisms will have to be adapted and adjusted to changing conditions. This requires highly interactive planning, blending old arrangements with new legislation, and creatively crafting new institutional arrangements. Francis Cleaver calls this process 'institutional bricolage' [Cleaver, 2012]. This covers exactly what I mean with newly crafted do-it-yourself arrangements, suited to current socioeconomic conditions, but firmly rooted in place. Sometimes, such a process requires the input of outsiders, but external actors have to be careful not to take over responsibility, and institutionalise more than necessary. I know several ILIs which, because of formalisation, have disrupted existing arrangements and disempowered local actors. I think that outside actors should never be the driving force, but should help strengthen what is already there. The local landscape's stakeholders are the most important. So you will have to understand their role. How do the landscape's inhabitants and businesses make a living, and how do they see this evolving over time? How well connected are these local actors to networks operating at higher levels and scales? And, who are the landscape leaders? These are the local actors who are able to mobilise people, and make the connections to political and business networks.

Many ILIs are started by companies or conservation agencies, which means that the initiator has a stake in the landscape. If you have a stake, you also have a responsibility. If you derive your core business from a landscape, you have to realise the impact of your business on the landscape. You have to know not only the ecological, but also the social consequences of your presence in the landscape. Moreover, one landscape can host several ILIs, initiated by different groups of

actors. There might be one initiated by Coca Cola, another by WWF, another based on the self-organisation of fishermen, etc. None of these can claim to be the sole governing force. That is how I see landscape governance: not as just one platform or network, but as a constellation of partly overlapping networks, each of which plays a particular role, and together making up a landscape governance system. Landscape governance is about networks.

When each ILI represents a certain interest, who will take responsibility for the long-term collective interest? Is that the task of the government? It is not just the government that represents the long-term collective interest, but companies and people too. In my view, local governments are just one of the many actors that shape landscape governance. The problem with the government is that it is tied to administrative borders, while ILIs and informal governance arrangements will often transcend these borders. The main problem with formal planning is that it is based on establishing rules and regulations that are fixed, while landscapes are dynamic and require flexible governance arrangements.

Are you saying that planning should become more flexible? Exactly! The most difficult thing for a planner is to un-plan. At universities, students learn how to make rules, but the next step is to learn how to let them go. Planners need to learn to look at the landscape and its dynamics. There is no need for new planning institutions, but we need to make existing ones more open and more flexible.

Flexible arrangements are difficult to enforce. Well, yes, there may always be actors that do not act responsibly. So you need NGOs to function as watchdogs. And you need a government to set conditions and enforceable rules. A completely informal and flexible arrangement may be wishful thinking.

Is some form of top-down regulation inevitable? We should not be thinking in terms of top-down, or bottom-up. We need to connect the bottom and the top. Bringing them together into multi-actor networks, cutting across boundaries, levels and scales, but strongly rooted in place.

Cora van Oosten is Senior Advisor on Natural Resources Management with the Center for Development Innovation at Wageningen UR. She is a human geographer, with more than 20 years of experience in natural resources management, landscape approaches, natural resource governance and participatory spatial planning.

Measuring the effectiveness of integrated landscape initiatives

"Conservation history is littered with ambitious monitoring systems that have been abandoned"
(Sayer, Buck and Dudley 2008:16)

5.1 Performance assessment

With development and conservation organisations investing in integrated landscape initiatives, there is a need to assess the outcomes of these interventions. Many authors stress the need for assessment methods to measure the performance of landscapes and integrated landscape initiatives (e.g., Scherr, Shames and Friedman, 2012; Sayer et al., 2013; Harvey et al., 2014; Kozar et al., 2014; Sherr et al., 2014; Hart et al., 2015; Kissinger et al., 2015; Bernard, 2015; Minang et al., 2015d; Wambugu et al., 2015; Namirembe and Bernard, 2015; Van der Horn and Meijer, 2015).

Conservation and development organisations have monitoring and evaluation (M&E) systems in place, but these tend to be for internal auditing, and often report on project deliverables and outputs. Moreover, most of these instruments are not designed for assessments on a landscape scale, and are ill-equipped to explicitly deal with heterogeneity within the landscape or with trade-offs between conservation and development outcomes (Sayer et al., 2006). There have been efforts to develop impact assessment approaches that go beyond standardised project-level monitoring and evaluation. All too often, however, these have not been implemented on any significant scale, which may be related to their elaborate nature and consequent high costs of implementation. As Sayer, Buck and Dudley (2008: 16) write, "Conservation history is littered with ambitious monitoring systems that have been abandoned".

One challenge for performance assessment tools at the landscape level is to keep them simple, easy to adapt, and cost-effective. Another is related to how assessment of a particular intervention (using effectiveness measures) can be combined with assessment of the performance of the whole landscape (using status measures).[14] A focus on status measures has the advantage that it can reveal indirect or unexpected effects of project interventions and the interactions among various project interventions and other external factors; the disadvantage is that it requires more data than targeted effectiveness measurements and does not yield information about the relationship between system changes and individual interventions. Table 3 presents the main differences between effectiveness and status measures (Buck et al., 2006).

Table 3. Effectiveness measures versus status measures

Effectiveness measures	**Status measures**
Evaluate the outcome of a project • Is the project helping? How much and in what ways? • Direct assessment of cause and effect	Assess a system without specific reference to a project • How is the performance of the entire system changing over time? • Cause and effect may be difficult to demonstrate given complex systems and interactions • Direct assessment of the landscape
The evaluation is focused on aspects of the system that the project is designed to influence	The evaluation considers the interactions and cumulative effects of various projects, and tries to discern system changes attributable to other factors
Conducted at a scale commensurate with the scale of the project Data is generated at the project level Context can be understood by referencing landscape-level status measures	Conducted at the landscape scale Data from the project level is transferred to the landscape level and supplemented with other landscape-level data

Source: Adapted from Buck et al. (2006).

Box 9. Examples of indicators to measure landscape performance

Sherr et al. (2014) suggest five general indicators that can be used to assess the performance of a landscape:

- The number of integrated landscape initiatives.
- The proportion of agricultural area that is managed with water, climate and biodiversity friendly practices.
- The area that has continuous vegetative cover.
- The strength of national policy support for integrated landscape management.
- Improvements in the multiple dimensions of human well-being.

For more elaborate attempts to do develop indicator sets to monitor developments on the landscape scale see, e.g., Dumanski, 1997; Sheil et al., 2004; Tongway and Hidley, 2004; Cassatella and Peano, 2011; Milder et al., 2015; the Vital Signs monitoring system (http://vitalsigns.org); and CIFOR's Criteria and Indicators Toolbox Series (http://www.cifor.org/acm/pub/toolbox.html).

5.2 Landscape Measures Framework

The Landscape Measures Framework was developed by EcoAgriculture Partners and Cornell University. It provides resources and tools that can be used by local stakeholders working in a landscape to assess outcomes of landscape-scale management practices on biodiversity conservation, sustainable production and rural livelihoods. One of the main tools they developed is the Landscape Performance Scorecard (LPS), based on four objectives and 20 criteria for assessing landscape performance (see Table 4). The method intends to combine effectiveness measures of individual interventions with status measures of the landscape as a whole. To this aim the method integrates data and monitoring results from the variety of initiatives in the landscape with additional data on the landscape. The assessment is intended to be repeated at regular intervals (Buck et al., 2006).

In addition to biodiversity conservation, agricultural production and local livelihoods, the Landscape Measures Framework identifies 'institutions' as a separate dimension of performance. The framework addresses institutional capacity as an explicit goal of integrated landscape initiatives, because the future of a landscape depends on the quality of institutions. In other words: a landscape may perform well on conservation, production and livelihood indicators today, but if the right institutions are lacking, it is likely to deteriorate in the future. The inclusion of this dimension in the assessment framework thus helps to predict the trajectory of the landscape over time (Buck et al., 2006).

Table 4. The Landscape Performance Scorecard

Goals	Question
Conservation goal: Conserve, maintain, and restore wild biodiversity and ecosystem services.[15]	• Does the landscape contain an adequate quantity and suitable configuration of natural and semi-natural habitat to protect native biodiversity? • Do natural and semi-natural habitats in the landscape approximate the composition and structure of the habitats historically found in the landscape? • Are populations of important species within the landscape biologically viable? • Does the landscape provide locally, regionally, and globally important ecosystem services? • Are natural areas and aquatic resources adequately buffered from productive areas and activities?
Production Goal: The landscape provides for the sustainable production of crops, livestock, fish, forest, and wild edible resources.	• Do production systems satisfy demand for food and agricultural products by consumers inside and outside the landscape? • Are production systems financially viable and can they adapt to changes in input and output markets? • Are production systems resilient to disturbances, both natural and human? • Do production systems have a neutral or positive impact on wild biodiversity and ecosystem services in the landscape? • Are species and varietal diversity of crops, livestock, fisheries and forests adequate and maintained?
Livelihoods Goal: The landscape sustains or enhances the livelihoods and well-being of all social groups who reside there.	• Are households and communities able to meet their basic needs while sustaining natural resources? • Is the value of household and community assets increasing? • Do households and communities have sustainable and equitable access to critical natural resource stocks and flows? • Are local economies and livelihoods resilient to change in human and non-human population dynamics? • Are households and communities resilient to external shocks such as flooding, draught, changes in commodity prices, disease epidemics and others?
Institutions Goal: The landscape hosts institutions that support the planning, negotiation, implementation, resource mobilisation, and capacity-building needed to integrate conservation, production and livelihood functions.	• Are mechanisms in place and functioning for cross-sectoral interaction at landscape scale? • Do producers and other community members have adequate capacity to learn and innovate about practices that will lead to integrated landscapes? • Does public policy support integrated landscapes? • Are market incentives conducive to integrated landscapes? • Do knowledge, norms, and values support integrated landscapes?

5.3 The LPFN global review of Integrated Landscape Initiatives

As part of the Landscapes for People, Food and Nature (LPFN) Initiative a large number of ILIs was reviewed, including an assessment of their outcomes (see Milder et al., 2014; Estrada-Carmona et al., 2014; Hart et al., 2015). For each ILI, a leader, manager or participant judged the effects of the initiative on: (i) agriculture; (ii) conservation and ecosystem services; (iii) livelihoods and the poor; and (iv) governance, institutions and social capital. Table 5 presents the indicators that were used. The assessor was asked to indicate whether or not the change took place, and if yes, whether or not this was the result of the initiative. For each dimension, the assessors could also indicate other benefits that were not mentioned in the list.

This method has a number of implied limitations. All the data is based on self-reporting by a person involved in the initiative, which means its accuracy depends on the knowledge of only one respondent, and is susceptible to bias – be it intentional or not. Moreover, the data gathered on outcomes does not provide details on their magnitude and reach, and the outcomes are not assessed relative to a baseline or counterfactual scenario. However, as the aim of the review was to provide a general overview of initiatives, rather than in-depth assessment of individual cases, such trade-offs were unavoidable.

5.4 Outcomes assessment based on the capitals framework

Sayer et al. (2006) developed a set of performance indicators to assess the livelihood and environmental outcomes of integrated landscape initiatives. They based their method on the capitals framework, which distinguishes between five types of capital.[16] The method was implemented in three African landscapes – the Chaouen region in Morocco, the Usambara Mountains in Tanzania and the Sangha area in the Congo Basin – in collaboration with conservation organisations active in the respective areas. Workshops with representatives of all relevant stakeholders were used to build common understanding of the landscape and to identify locally relevant indicators. Activities during these workshops included the participatory identification of the main drivers of landscape change, discussions about desired future scenarios, and the selection of potential indicators. Indicator selection was an 'open' process, allowing participants to challenge the initial assumptions of the conservation projects. As such, it became a process of negotiation of desirable outcomes between the various stakeholders. The underlying idea was that it is not enough to get people engaged with a project's agenda. Instead, the goal was to define a common agenda together. Finally, participants went into the field to discuss indicators with local people and to check the practical feasibility of measuring them,

Table 5. Indicators used in the LPFN global review of ILIs

Dimension	Indicator
Effects on agriculture	• Agricultural yield per unit of land area (e.g., tons per hectare) increased • Agriculture became more profitable • Total area under agriculture and pasture increased • Environmental impacts of agriculture were reduced • Agricultural biodiversity (agro-biodiversity) was protected or enhanced
Effects on conservation and ecosystem services	• Rare, threatened, or endangered species were better protected • Overall biodiversity of the region was better protected • The amount or connectivity of natural habitats was increased • Water quality, quantity, or regularity improved • Ecosystem services that support agriculture (e.g., irrigation water supply, pollination, soil fertility) were restored or protected • Other ecosystem services (e.g., urban water supplies, flood control, carbon storage) were restored or protected
Effects on livelihoods and the poor	• Food security or nutrition for landscape inhabitants were improved • Household cash income for low-income residents was increased • Non-cash measures of livelihoods (e.g., greater material assets, cleaner or more reliable water, better educational resources) were improved • Communities became less vulnerable to shocks and disasters (e.g., landslides, floods, droughts, epidemics) • Access to health services improved
Effects on governance, institutions and social capital	• Local communities gained capacity to sustainably manage agriculture and natural resources • Local communities became more empowered to negotiate and participate in political decisions • Coordination and cooperation among stakeholders (e.g., local communities, district government, private sector) improved • Coordination and cooperation among sectors (e.g., agriculture, environment, health) improved • Women gained power or capacity to improve their wellbeing • Traditional and local knowledge on agriculture and natural resources has been preserved and used

Source: Estrada-Carmona et al. (2014), supplementary data.

leading to refinements in the indicator set. Indicator selection was thus dynamic and a process of constant revision.

During the development of the method, Sayer et al. (2006) found that the types of natural capital considered of high value by conservation organisations (e.g., undisturbed natural habitat and globally threatened species) were usually not priorities for local populations, which were more interested in natural assets that were of direct use, such as non-timber forest products, soil fertility and water quality. It was therefore decided to distinguish between local and global natural capital.

Table 6 presents the final set of indicators selected in Sangha in the Congo Basin. Reflecting on their experience, Endamana et al. (2010) report that finding agreement on relevant indicators between the stakeholders involved was harder than initially expected, because of the scale of the landscape, the diversity of interest groups, and the difficulty of collecting data. Furthermore, discussing indicators on the landscape scale proved difficult, as it was usually not the unit that stakeholders depend on, or are responsible for. Moreover, the participatory mode of indicator selection complicated the ambition to keep the number of indicators to a minimum, as stakeholders wanted to make sure that their own special concerns were covered.

The indicator sets selected in the other two landscapes were fairly similar to those identified in the Congo basin. Nevertheless, Sayer et al. (2006) argue that a generic set of indicators will never be optimal, and that participatory processes are useful in developing or refining indicator sets to suit the local context, while at the same time stimulating dialogue and shared learning about trade-offs and synergies. Based on this experience, they conclude that the development of performance indicators should not only be seen as a tool for accountability, but should be used as part of the process of negotiating conservation and development objectives. As such, it can form the basis for adaptive management. A participatory performance assessment method helps to make the trade-offs explicit, which is necessary in order to meaningfully negotiate the various interests. This may include questions such as 'How much natural forest can be used for agricultural expansion?' and 'Is it justified to restrict local people's access to certain natural areas of high conservation value?' Such questions cannot be answered by a conservation agency alone based on their assumptions about what is good and bad for local people. More objective and equitable processes are therefore needed, and the monitoring of landscape performance can be used as a tool in this process (Sayer et al., 2006).

Table 6. Selected indicators by Endamana et al. (2010)

Capital group*	**Selected indicators**
Local natural assets	Availability of non-timber forest products Availability of bush meat Progress in certification Water pollution by liquid waste Siltation of water courses
Global natural assets	Rate of deforestation Populations of elephants Populations of gorillas Populations of bongo
Physical assets	Number of cassava mills Quality of housing Number of water sources Journey time to the capital by road Number of tourist visits Number of sport hunting permits Employment of local people in wood processing industries Price of 3 staple foods
Social assets	Functioning of local nrm organisation Extent of community-based natural resources management initiatives Effectiveness of state institutions Traditional governance Perception of corruption in public and private sectors Level of activity of local ngos Involvement of indigenous people in community-based natural resources management initiatives Participation of indigenous people in decision making Local reinvestment of forestry taxes in social infrastructure
Human assets	Access to health care Quality of education Number of people with technical and professional employment Adoption by youth of rites, ceremonies and traditions Use of traditional medicines

** During the workshops it appeared that measuring financial assets was found excessively intrusive, considering the lack of possibilities for people to accumulate cash. Financial capital was therefore omitted from the final set of indicators.*

5.5 Including climate and governance dimensions

The above examples provide valuable lessons for the development and use of tools to measure the effectiveness of integrated landscape initiatives and improve management. Criteria and indicators related to climate change mitigation and adaptation could be added. Next to that, Minang et al. (2015d) point to the need to assess the quality of participatory processes. This could be done on the basis of good governance and democracy dimensions including legitimacy and participation, empowerment, ownership of information and knowledge & processes, respect for local people and knowledge, equity, and effectiveness and competence (Table 7).

Table 7. Good governance criteria and indicators for landscape-level initiatives

Good governance dimensions	**Criteria**	**Indicators**
Legitimacy and participation	Representation and involvement of all actors	• Planning • Monitoring
	Involvement in decision-making	• Land-use allocations decisions • Land-use practice choices • Choice of M&E indicators
Empowerment	Empowerment of actors	• Evidence of actor learning • Actor involvement in training
Ownership of information and knowledge & processes	Management of information	• Access to information • Control of information
	Use of information	• Individual and group decision-making • Negotiation • Use of information for action
Respect for local people and knowledge	Respect for Indigenous Technical Knowledge (ITK) and Local Ecological Knowledge (LEK)	• Evidence of actors' use/ exploration of ITK/LEK
Equity	Choice in power and control	• Actors gain in resource control rights and responsibilities • Loss of resource control or access to rights in process
Effectiveness and competence		• Satisfaction with outputs

Source: Minang et al., 2015d

Interview with Christian Mensah

"If you want to go far, go together"

Between 2011 and 2014, Christian Mensah managed the 'Climate Cocoa Partnership' in the Juabeso and Bia Districts of Western Ghana. The project was a unique partnership between the Rainforest Alliance and Olam – one of the world's largest agribusinesses – and is presented as a flagship example of a landscape approach. It aimed to improve local livelihoods by promoting climate-smart cocoa cultivation, while also developing other livelihood options. At the same time efforts were directed at limiting encroachment on natural forest, promoting the restoration of forest remnants in the landscape, and preparing communities for future REDD+ projects. The project resulted in over 2,800 cocoa farms achieving Rainforest Alliance Certification and verification to the Sustainable Agriculture Network (SAN) climate module, and significant areas were reforested. See Box 8 for more information on the project and its outcomes. Below Christian Mensah reflects on his experiences as manager of the project.

What makes the Climate Cocoa Partnership a typical example of the landscape approach? I can think of several factors. First of all, the project focused not only on production at the farm level, but also on forest protection and reforestation at the landscape level. Secondly, although cocoa was our common entry point, we explored other agricultural commodities and additional livelihood options, such as bee-keeping and small animal-raising to diversify incomes and promote food security for farmer families. Thirdly, we tried to reach as many people in the area as possible. By involving community extension officers from the Ghana Cocoa Board, for example, we were able to provide technical assistance to a large number of producers. We also involved teachers and helped develop school activities. In fact, through climate education for school children in the landscape, we believe we have found an effective way to build awareness for the next generation of farmers. Fourthly, we recognized and engaged local communities as key stakeholders from the beginning. To this end, we set up a Landscape Management Board with representatives of communities in the area. They have been closely engaged throughout the project and functioned as a liaison between project management and local people.

How did you promote dialogue between local communities and other stakeholders? The Landscape Management Board only represented the communities. It was the key vehicle for implementing the project, helping us to pursue activities that had been agreed upon after negotiations with different communities. Although representatives of other stakeholders were sometimes invited to the meetings of the board, one of my lessons is that there is a need for more coordination and cooperation with other

stakeholders that influence the landscape, like the local government and timber companies. In the future, we want to make sure that the Landscape Management Board includes a larger variety of stakeholders. However, there would be cost implications.

What other challenges did you encounter? They say: If you want to go fast, go alone; if you want to go far, go together. Going together means you have to be patient and slow down, because you have to bring everyone along. This has been the main challenge and dilemma. We needed to involve the communities from the beginning, and this took a big chunk of our time and resources. We needed to communicate with them and develop and nurture mutual trust and respect to be able to make progress. But this did not come easy. For example, we had to visit all the communities involved in the project to share and discuss its objectives and activities. We agreed on a time to meet, but then there would be a sudden funeral, or the Chief would be travelling, or the Assemblyman was called into an emergency meeting, and our meeting would have to be cancelled. So we had to start the process of agreeing on a time all over again. Such simple things took enormous amounts of time – not least because many of the communities are difficult to reach. Still, I believe we were able to lay the foundation for a successful landscape project.

Did working with a large company present specific challenges? I think it would have been difficult to convince most private companies to invest in activities that are not part of core business. Luckily, Olam is a forward-looking company. They understood that in addition to cocoa, farmers need to focus on other livelihood activities to guarantee food and income security. Moreover, they understand that both the supply of raw materials for their company and the livelihood security of cocoa farmers depend on responsible management of the natural resources in the landscape.

A report by Andre Brasser shows that the costs for the company were twice as high compared to business as usual. He concludes it has not been profitable for the company. Is Olam frustrated with the outcomes? I think Olam is both satisfied and frustrated. Their key challenge has been to recover the costs of the investments in this project, and so far they have not succeeded. This is mostly related to their inability to find traction in the market for climate-smart cocoa and to realize carbon benefits. A large part of the investments were aimed at making cocoa production climate-smart, anticipating that this would lead to premium prices, but this has not yet materialised. The company continues to support the production of climate-smart cocoa, and still hopes that it can tap into the carbon market in the future.

How did you measure the effectiveness of the project? We developed participatory and user-friendly tools for monitoring technical progress in the project. One of the objectives was to help farmers meet the standards of the SAN and its additional climate module. These standards provided the main criteria and indicators that

were used to monitor progress at the farm level. Internal inspections and third party audits provided the means for measuring, monitoring and evaluating performance of farms in the project. Mapping farms was found to be one of the most efficient ways to gather data and monitor their expansion and encroachment on forest areas. Many of the measurements were made by farmers themselves. We had one person in the project dedicated to Monitoring and Evaluation, who made sure that results from monitoring were used to re-strategise and adapt project activities. We also did a baseline study at the landscape level in the beginning of the project and are planning to conduct an impact assessment in 2016.

What will the impact assessment focus on? For the baseline study, we conducted an ecosystem assessment for which we obtained high resolution satellite images and did ground truthing. There was also a socioeconomic survey of the communities in the area. In 2016, these studies will be repeated to assess environmental and socioeconomic changes in the area. Attribution will of course be difficult.

Is there a need for different types of tools to assess performance? We did not develop tools to measure the effectiveness of multi-stakeholder engagement, or to assess whether the Landscape Management Board was the most efficient platform for community engagement. We used common sense, I think. Even for projects that only focus on agricultural practices at the farm level, most assessment tools are complicated and expensive to implement. I know of a programme that spent twice as much on Monitoring and Evaluation than on actual implementing activities. So you can imagine that when you use a landscape approach things may easily get way too complex. It would also have to involve measures of the effectiveness of efforts to develop multi-stakeholder platforms, engaging local communities, working with the government – just to mention a few. There definitely is a need for affordable methods to measure the effectiveness of landscape approaches.

Christian Mensah is Manager for West Africa with the Rainforest Alliance, based in Accra, Ghana. He is responsible for sustainable agriculture projects, and relationships with national and international stakeholders, including the private sector.

Conclusions

The outcome of the landscape approach depends on which actors participate in the process, and their interests

6.1 Diversity as a key element of the climate-smart landscape?

Much of the literature on landscape approaches and climate-smart landscapes focuses on agricultural areas in regions with tropical forests. In that context, the emphasis lies on finding synergies between agricultural production, improving local livelihoods, biodiversity conservation and climate objectives. Most of the publications reviewed for this report emphasise that diversity of land uses is a key feature of the climate-smart agricultural landscape, because it enables functional interactions

between different landscape components. Diversity is thought to contribute to ecological resilience, i.e., the ability of the landscape to deal with or recover from climatic and other stressors. Diversity is also thought to contribute to social resilience, as it decreases people's vulnerability, for example when the price of one crop drops, or when a crop fails due to adverse climatic conditions.

Many of the publications on climate-smart landscapes pay particular attention to the role of trees and forest patches in the landscape. They provide environmental services that help to maintain long-term agricultural production, and support local livelihoods by providing sources of food, fuel and income. These functions help increase local people's adaptation capacity. Maintaining or increasing tree cover in the landscape also provides a habitat for forest species, and helps to mitigate climate change by maintaining above- and belowground carbon stocks. Agricultural homogenisation is often seen as a risk, because it increases vulnerability to change. Moreover, taking out some of the components of a complex system may have unpredictable effects on the system as a whole.

But a cautionary note is required. There is only limited scope for generalisations about what type of landscape configuration would best fit objectives related to agricultural production, livelihoods, conservation and the climate. There are at least three reasons for this. First, landscape options depend on contextual factors, such as local ecology, topography, current land uses, population density, land-ownership patterns (the spatial grain), the state of natural forests, and the level of urbanisation. Second, there are different opinions in society about the values of the various goods and services that landscapes provide. Not everyone shares the same ideas about which species need to be conserved, or which elements of human well-being are more important. Such values are seldom made explicit in scientific debate. And third, there is a lack of systematic scientific evidence on how landscape features are related to landscape performance on the different dimensions.

Related to the last point, there are scientists who contest the idea that diversity within agricultural landscapes leads to better performance. They argue for spatial specialisation, leading to higher efficiency per area of land, and high-tech technological innovations, for example developing drought-resistant varieties to increase farmers' adaptive capacity. This view receives little or no attention in the literature on climate-smart landscapes, which seems to reflect a biased interest in tree-based agricultural systems and mosaic landscapes. This may be related to the disciplines and professional backgrounds of the scientists involved. Ideas about the desired attributes of a climate-smart landscape will vary between different scientific disciplines, because of the different conceptual models that are used. Furthermore, values and worldviews also play a role; for example, opinions may differ about the role of markets and technological innovation, the intrinsic value of diversity within the landscape, and the future of the countryside in relation to urbanisation. For a constructive discussion, scientists would need to be explicit about

and reflect upon their conceptual models, values and worldviews, and how these inform their research questions and designs.

6.2 The landscape approach as a set of guiding principles

The landscape approach represents a set of principles to guide landscape management and integrated landscape initiatives. Rather than bringing something new to the table, the approach successfully frames a range of existing concepts and principles under one banner, and combines elements of approaches that have been developed in recent decades as ways to integrate conservation and development objectives. It promotes a transparent and participatory process towards negotiations and decision-making, to minimise trade-offs and maximise the synergies between the various interests that may exist within a landscape. The approach also has a moral dimension, as it stresses the importance of equal power relations, collective decision-making, transparent negotiations and the inclusion of marginalised groups.

Does the landscape approach inevitably lead to landscapes that are climate smart? If all the principles of the approach (as mentioned in section 3.1) are effectively and fully translated into practice, the answer would be yes. After all, integrating production, livelihoods, conservation and climate objectives is one of its basic principles. This, at least, is the theory. In the everyday reality of integrated landscape initiatives, multi-stakeholder negotiations may not necessarily lead to consensus about the desired outcomes. The actual outcomes of the negotiations will depend to a large extent on how and to what extent the various objectives are represented. In other words: Which actors participate in the process, and to what extent are they successful in representing their interests? Clearly, such negotiations do not exist in a power vacuum. Also, the long-term outcomes of integrated landscape initiatives depend on the presence of local government institutions that can make decisions, integrate agreements into legal measures, and enforce them. In many remote areas of the tropical world, however, such institutions do not function well, due, for example, to overlapping mandates, the lack of clear property rights and a cadastre, conflicts of interest, corruption and a lack of resources. Notwithstanding these limitations, an increasing number of organisations are adopting a landscape approach to guide the design of their conservation and development initiatives. The approach unquestionably provides a powerful and appealing framework that encourages working across sectors and greater involvement of the various stakeholders in discussions and negotiations related to the future of the landscape.

Box 10. The role of civil society organisations, companies and the public sector

A key premise underlying the landscape approach is that the people who have a direct stake in the long-term delivery of goods and services by the landscape need to have a say in its management. This requires the development of multi-stakeholder arrangements. The development of such arrangements, however, involves lengthy and complex negotiations, and this is where local, national and international civil society organisations play crucial roles – both as facilitators and watchdogs. An important question is under what conditions private actors will become involved in a meaningful manner. Private actors may be reluctant to engage because of the high transaction costs and unclear direct benefits of multi-stakeholder processes. Companies may not be willing to invest time or resources in lengthy processes without predictable returns. For them the costs and scope of integrated landscape initiatives will often be too large to offset short-term profit prospects. This barrier can be reduced through a co-investment approach in which different stakeholders share responsibility, for example in public-private partnerships. Government actors may be co-investors, but they also define the rules and regulations, are in charge of allocating agricultural and forestry concessions and land-use planning, and have the mandate to enforce agreements. This makes their commitment indispensable for any form of long-term integrated landscape management.

6.3 The success of integrated landscape initiatives and a future research agenda

Several publications report on practical experiences with, and outcomes of, integrated landscape initiatives (see e.g., Chavez-Tafur and Zagt, 2014; Buck and Baily, 2014; Hart et al., 2014; Milder et al., 2014). The evidence of the outcomes remains mostly anecdotal. Reports tend to emphasise achievements, such as the uptake of agroforestry practices, improved trust, empowerment and social cohesion. However, it is often unclear from the publications how success is defined, let alone measured.

With an increasing number of organisations investing in landscape-level initiatives, the call for methods to understand and assess their success is growing. If the objective is to use a landscape approach to promote climate-smart landscapes in such a way as defined in this report, the success of initiatives should be assessed according to dimensions of agricultural production, local livelihoods, biodiversity conservation and climate objectives, and of good governance, including participation, transparency and equity. Outcome-oriented performance assessments are complicated by the fact that the landscape approach implies an ongoing process of negotiation, decision-making and evaluation. Moreover, objective measurements of optimal performance are difficult, because of the different interests that exist within a landscape: there is no single landscape configuration that will maximise the benefits for each individual stakeholder. Performance assessment methods should not only be used as tools for accountability, but should also be used to generate discussion and negotiate trade-offs, as an integral part of landscape-level initiatives.

The review of recent literature and interviews conducted for this report stresses the need for systematic methods to understand and assess the performance of landscapes and integrated landscape initiatives. This raises several questions, most of which fall into one of the following four categories:

- *How can the performance of landscapes and integrated landscape initiatives be assessed?* This includes identifying measurable and easy-to-use indicators to assess: (1) the outcomes of landscape initiatives in terms of livelihoods, agricultural production, biodiversity conservation, institutional capacity, resilience, adaptive capacity and mitigation potential; and (2) the process features of landscape initiatives in terms of good governance (including participation, transparency and accountability).
- *What is the relationship between features of landscapes and their performance on different dimensions?* In addition to existing case studies that assess the performance of land-use systems (e.g., a plot with shaded coffee) against a number of variables (e.g. yield per hectare and abundance of butterflies)

there is a need for more comprehensive assessments of different landscape types using indicators that cover the various dimensions of climate-smartness.

- *What is the relationship between characteristics of landscape governance arrangements and their performance on the various dimensions?* Questions include: How do top-down and bottom-up governance arrangements compare on the different performance dimensions, and what are the trade-offs? And how does the distribution of power influence the performance of integrated landscape initiatives?
- *How can integrated landscape management be improved?* Questions here include: How can integrated landscape initiatives address dynamics at a higher level of scale (e.g., rural-urban linkages and leakage)? What are effective points of engagement for the different stakeholders in landscape governance arrangements?[17] How can formal spatial planning be effectively integrated? And what is the potential of modern technology (e.g., in the field of remote sensing and GIS) in integrated landscape management?

Such questions are ideally addressed in a setting that allows research to be part of an iterative process of action, reflection and adaptation. If researchers position themselves strategically within landscape management processes and adopt an action-research approach, they can gather data and influence the process at the same time. In this way, research can help meet the needs of practitioners and policymakers, while practitioners and policymakers will help in answering relevant research questions. Much work is still needed to learn from and improve integrated landscape management aimed at promoting climate-smart landscapes. Together with local, national and international partners, Tropenbos International is committed to moving this agenda forward in the years ahead.

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Endnotes

1. The literature review started with four key publications: (i) Minang et al. (2015a) "Climate-Smart Landscapes: Multifunctionality in Practice"; Scherr, Shames and Friedman (2012) "From climate-smart agriculture to climate-smart landscapes"; (iii) Sayer et al. (2013) "Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses."; and (iv) Chavez-Tafur and Zagt (2014) "Towards Productive Landscapes". These publications served as starting points, and provided suggestions for additional literature.

2. Chomitz' typology does not include stabilised landscapes that consist of homogenous agricultural lands without trees, bordering natural forests.

3. Next to diversity and redundancy, the Stockholm Resilience Centre identifies several other factors that can enhance the resilience of a system in the face of change, including:
   - Connectivity: connectivity refers to the nature and strength of the interactions between the various components of a system. In ecological terms, connectivity between various patches of forest allows for quick recovery through the re-colonization of species after a forest fire, for example. However, a high level connectivity can also be a threat, because it enables disturbances to spread more rapidly. In social terms, connectivity between different social groups increases the possibilities to share information and helps to build trust and reciprocity.
   - Managing slow variables and feedbacks: Various slow ecological and social variables influence a system. Such slow changes may be accommodated by certain components through dampening feedback mechanisms, but when the capacity of those components is exceeded, negative feedback mechanisms may lead to a radical change of the entire system. Think of a gradual influx of nutrients in a fresh water lake from the use of fertilizers, which are absorbed by plants in the lake. When the plants threshold to absorb nutrients is exceeded, the nutrients lead to free floating algae blocking the sunlight, which kills the nutrient absorbing plants (Biggs et al., 2012; see also www.stockholmresilience.org).

4. Freeman (2015) distinguishes between additive synergy (the sum of the parts) and super-additive synergy (when the whole is greater than the sum of the parts). For example, there is super-additive synergy when farmers' uptake of climate-smart agricultural practices in a particular area does results not only in reduced land degradation and climate mitigation (the additive synergy), but also makes the area attractive for certification or climate financing programmes (super-additive) (Freeman, 2015).

5. In recent years concerns about land concentration have been on the rise, as the growing global demand for agricultural products motivates large-scale investors to lease or buy farmlands for food and fuel production. These arrangements are often negotiated at the expense of natural areas and smallholder agriculture – a phenomenon referred to as 'land grabbing' or 'the global land rush'. In an article on The Broker Online, Annelies Zoomers and Evert-Jan Quak provide an excellent overview of the state-of-the-art-knowledge about the effects of the recent increase in large-scale land acquisitions, also known as the 'global land rush'. http://www.thebrokeronline.eu/Articles/Untangling-the-myth-of-the-global-land-rush.

6. Phalan et al. (2011b: 67) argue that "…a landscape converted to a mosaic of agroforestry plots might appear to be more heterogeneous than one in which there are large monoculture plantations and large forest reserves, but the latter landscape might be more effective in conserving globally scarce habitats and species, thus adding to global heterogeneity".

7. This interview was published earlier in: Kusters, K. and Lammers, E. 2013. Rich Forests – The future of forested landscapes and their communities. Both ENDS / Rich Forests, Amsterdam.

8. The terms 'landscape approach', 'integrated landscape management' and 'landscape governance' are often used interchangeably. Landscape approach is the most general term, and is used as a general denominator for tools and concepts. Landscape management refers more explicitly to the actual actions and interventions at the landscape level, while landscape governance refers more specifically to the interactions between different actors in landscape management.

9. The landscape approach builds on experiences with past efforts towards the integration of development and conservation at the project level through so-called Integrated Conservation and Development Projects (ICDPs). ICDPs often intended to link development projects to protected areas, aiming to reduce pressure on the protected area. This could for example include support for eco-tourism and the commercialisation of non-timber forest products, which would allow people to generate income while leaving the natural system intact (Fisher et al., 2005). The results of ICDPs have generally been disappointing. In 1992 a study examining the early experiences of 23 ICDPs in Africa, Asia and Latin America found that the linkages between development and conservation were often unclear and that local people were treated as passive beneficiaries rather than active collaborators (Wells and Brandon, 1992). More criticism followed. It increasingly became clear that ICDPs had ambiguous outcomes and were seldom successful in achieving both objectives simultaneously (e.g. Barrett and Arcese, 1995; Oates, 1999; Wells et al., 1999; McShane and Wells,

2004). Many ICDPs failed because they were based on naïve assumptions of 'local people' as homogeneous entities, without taking account of gender, class and ethnic differentiation, and different development ambitions and priorities (Wells et al., 2004; Neumann, 1997). Referring to ICDPS, Sayer and Campbell (2004: 14) write "Projects that seek to achieve both conservation and development are common. However, the conservation component usually addresses the conservation of species or landscapes of global value not the conservation of resources or options of immediate relevance to local people." And "…there has been a notable failure for donors to accept the reality that conserving the global environment is simply not a very high priority for poor people living in rural areas in developing countries".

10. Integrated landscape management is a form of adaptive collaborative management (ACM). This means that management needs to be adaptive (so it can deal with complex evolving social-ecological systems) and collaborative (so it includes all relevant stakeholders in the process). To facilitate ACM at the landscape level, Minang et al. (2015d) propose combining it with a Systems Improvement Process (SIP) approach, which is an analytical framework for solving complex social problems putting emphasis on problem analysis, and identifying leverage points. They propose a framework for integrated landscape management called the Landscape Process Wheel, consisting of the following components:
    - Planning (this includes problem analysis and strategic goal setting).
    - Actions and practices (this includes the identification of solutions, assessment of trade-offs and synergies, and the testing of solutions).
    - Policies, institutions and capacity (this includes a review of institutions, policies and capacities, the development of policy incentives, and the development of capacity).
    - Monitoring, evaluation and audit (this includes the identification of criteria and indicators, the establishment of monitoring and evaluation procedures, verification and audit).
    - Participation and negotiations among all stakeholders throughout the process.

11. Many conservation organisations have initiated landscape initiatives, such as the Congo Basin Forest Partnership (http://carpe.umd.edu/works/landscape_detail.php?lid=8); the landscapes and livelihoods initiative of IUCN (www.iucn.org/about/work/ programmes/forest/fp_our_work/fp_our_ work_initiatives/fp_our_work_ll/), and several initiatives of the Worldwide Fund for Nature (WWF).

12. Ros-Tonen et al (2014) explain the difference between cross-scale and multi-level linkages as follows: Cross-scale linkages are […] interactions between different scales (e.g., temporal, spatial, institutional, jurisdictional), whereas

multilevel linkages are those between different organisational levels within a scale (e.g., from global to local on a geographical scale, or from constitutions to operational rules on an institutional scale) (Ros-Tonen et al., 2014:3003).

13. A range of approaches and tools for measuring the outcomes of conservation and development interventions have been developed under the general heading of 'impact assessment'. Such assessments may be ex ante, with an emphasis on predicting probable outcomes to aid planning. Or, the assessment may be done ex post to determine actual outcomes to guide ongoing interventions or to evaluate the effectiveness of projects. Impact assessment can be done by actually measuring differences over time (which requires baseline data previous to the intervention) or space (which assumes that 'with' and 'without' situations are similar except for the intervention being assessed). Alternatively, impact can be assessed using indicators that signal changes (Kusters and Belcher, 2005). Measurement frameworks generally apply a hierarchical framework that includes the following four levels:
    - Goals: These are the 'universal' principles providing a normative framework for the assessment.
    - Criteria (sub-goals): Criteria are the characteristics of the desired outcome - they provide the principles for measurement.
    - Indicators: Indicators are usually defined per indicator. They are the factors that need to be measured to understand the performance.
    - Means of measure: These are the techniques used to evaluate each indicator, e.g., land cover analysis, farmer interviews (Buck et al., 2006).

14. A common way for organisations to measure their effectiveness is to focus on the number of persons trained, meetings convened, poachers caught, etc. This does not help understand the impacts on the broader development and conservation objectives at the landscape scale. The University of Amsterdam and partners developed the PADEV method, which tries to turn things around by first identifying the general changes in the area, after which certain changes are attributed to certain interventions through local judgment (see www.padev.nl).

15. Buck et al (2006) define the reference condition for wild biodiversity as: "the condition of ecological communities prior to the advent of modern land use practices that removed or transformed natural ecosystems on a large scale, such as intensive agriculture and urbanisation. Ecological communities that approximate this reference condition still exist in many landscapes (e.g., national parks, wildlife refuges, nature reserves), and, where they do not, reference conditions may be inferred by historical records and remnant fragments. However, in some places, such as western Europe, ecosystems have been shaped by such intensive and long-lasting human use that it may not be possible or useful to define the reference condition in terms of naturally occurring patterns

of biodiversity. In such places, the goals for biodiversity conservation must be informed by cultural values, but can be heavily guided by scientific analysis."

16. The capital framework developed by DFID has been widely adopted as an organising principle. The most commonly used capital groups are: physical, human, social, financial and natural: (i) physical capital comprises the basic infrastructure and producer goods needed to support livelihoods; (ii) human capital represents the skills, knowledge, ability to work and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives; (iii) financial capital represents the financial resources that people use to achieve their livelihood objectives; (iv) social capital encompasses the social resources that people draw upon to help meet their livelihood objective, including networks, institutions and relationships of trust and reciprocity; and (v) natural capital includes the natural resource stocks from which resource flows and services are derived. Bebbington (1999) suggests considering cultural capital as a separate group, encompassing the traditions (e.g. cultural celebrations or collective labour customs) that provide people with a sense of identity and a place of belonging. The breakdown of livelihoods in capital groups allows for equal attention to both the quantifiable (monetary) elements and the more subjective and qualitative components of livelihoods. Moreover, the operationalisation of livelihoods into various components helps to make visible the trade-offs between, for example, economic growth, human development, social integration and environmental integrity.

17. Minang et al. (2015b) stress the need to identify leverage points in the landscapes. Leverage points are the places where a small change can generate a bigger change in the entire system. This can be, for example, the distribution of power between stakeholders, or the way that information flows.


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