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How can an integrated landscape approach contribute to the implementation of the Sustainable Development Goals (SDGs) and advance climate-smart objectives?

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Highlights

- Sustainable Development Goals (SDGs) and their targets articulate the global priorities for accelerating progress toward a more sustainable and just world, and subsequently the appropriate means of implementation for reaching those targets are of paramount importance
- The integrated landscape approach that has evolved over the last several decades facilitates the implementation of actions across social, economic and environmental dimensions and offers the possibility to address climate-smart objectives at scale
- The approach, which also builds upon functioning governance arrangements that meet diverse stakeholder objectives, should be considered as a means of implementation for achieving multiple inter-related SDGs and a broader set of targets as they play out, often simultaneously, at the local level
- Drawing on the evolution of proven technologies and approaches to food security and improved livelihoods, a framework is needed to better integrate the social, economic and environmental dimensions of sustainable development in a practical and coherent way
- The integrated landscape approach is proposed to bridge science, practice and policy to overcome barriers and accelerate action for achieving the SDGs and associated targets

1. Introduction

Global environmental and development agendas are now converging into a shared framework that addresses the three dimensions of sustainable development (economic, social, and environmental) and their governance requirements. At the landscape scale this includes the dual need for efficient production systems and environmental sustainability while addressing food, nutrition and economic security. Underpinning this convergence

is a greater understanding of the interrelationships of poverty alleviation, food security, a healthy natural resource base and functioning ecosystem processes. Current trends in agriculture and food systems have proved inadequate and unsustainable (Gaffney, 2014a), illustrated by continued hunger and malnutrition, recurrent humanitarian crises, and unprecedented environmental degradation stemming from loss of forests and biological diversity, and deterioration of land, water and other natural resources (Alexandratos & Bruinsma, 2012; SDSN, 2014). To meet growing food and nutritional demands in the context of sustainable food systems, production must increase substantially, and at the same time, agriculture's environmental and carbon footprint, must be reduced dramatically (Foley et al., 2011; Sayer & Cassman, 2013).

Many governments and societies have argued the importance of sustainable development over the last 30 years. Innumerable attempts have been made to intervene within social, economic and environmental dimensions to advance toward agreements cast in Agenda 21 and associated conventions that were articulated as targets within the Millennium Development Goals (MDGs), restated in negotiations during Rio+20, and soon to be reframed formally as the Sustainable Development Goals (SDGs). While the intention and priority has been made clear, it has been challenging for the international community to realize sustainable development objectives due to a lack of integration across the social, economic and environmental dimensions, incoherence in institutional goals, and limited political determination (Bogardi et al., 2012).

The SDGs build upon and supplement the MDGs creating what is being termed the post-2015 development agenda. The emerging development agenda will depend greatly upon achieving environmental sustainability that reinforces the capacity to achieve associated social and economic dimensions. The means of implementation will have to place particular emphasis on the tradeoffs and synergies between and among the different dimensions and assess the sustainable development returns on investments.

Evidence of numerous environmental challenges have been highlighted through the Millennium Ecosystem Assessment (MEA, 2005) and the Global Environmental Outlook 5 (UNEP, 2012) and more recently revisited within the context of resilience through the introduction of the concept of planetary boundaries (Rockström et al., 2013). In order to establish planetary boundaries, environmental threats were synthesized into three major domains: depleting non-renewable fossil resources (energy and water), threats to the living biosphere (ecosystems and biodiversity), and human waste flows (greenhouse gases and toxic products). The challenge now is to undertake alternative sustainable development pathways while addressing the unprecedented risks of abrupt, irreversible environmental changes, with potentially catastrophic implications for human development. The transformation towards sustainability will require re-thinking the national and international development structures through better governance, partnerships and knowledge sharing for an explicit integration of environmental and human development agendas at all scales (SDSN, 2014).

It is anticipated that many countries will not be able to achieve their economic and social development goals without modifying practices, policies, and investments to fully encompass environmental sustainability. Current agricultural production systems are either too intensive—high levels of inputs decoupled from ecological objectives—creating many negative consequences on existing environmental resources, or are too extensive—

low levels of inputs or cycling of resources, slash and burn approaches, deforestation or inappropriate land use conversion—with negative side effects on the ecosystem (Haberl et al., 2014). The emerging SDGs will, *inter alia*, seek to increase efficiency in the use of land, water and agricultural inputs to better contribute to environmental goals while bridging the gap between current yields and the projected requirements to feed the Earth’s population throughout the rest of the 21st century. Productivity is necessary but not sufficient alone to ensure food and nutrition security, generate necessary income, and maintain the health of the natural resource base.

The necessity for integration of sustainability dimensions is becoming clearer and more urgent. This integration has proved difficult to achieve using existing governance systems and cadastral approaches that define boundaries, ownership and rights and land use in terms of farms and fields rather than the landscape that they form part of. Agricultural and conservationist communities have found it difficult to come up with common solutions to achieve their objectives, as demonstrated in the debates promoting land sparing versus land sharing (Phalan et al., 2011). As a result, researchers and development professionals have begun to turn their attention to achieving integrated approaches within naturally-defined ‘landscapes’ (Frost et al., 2006). The term ‘landscape’ is widely used to describe the mosaics of land uses, flora, fauna, people, and infrastructure that exist in definable geographical locations. It is a valuable concept for understanding how people, agriculture, forestry and fisheries, non-agricultural livelihood systems, biodiversity and infrastructure can co-exist. Integrated landscape approaches “... deliberately support food production, ecosystem conservation, and rural livelihoods across entire landscapes” (Scherr et al., 2012). Thus landscape approaches promote land use management schemes to achieve development and environmental objectives based on shared values and co-benefits (Sayer et al., 2013; Bustamante et al., 2014). Landscape approaches could allow – within the normative framework of the SDGs – for a practical cross-sectoral implementation strategy. This includes clear metrics that can be integrated to represent biophysical, economic, social, and cultural changes. Such a strategy should account for policy-relevant institutional and governance arrangements (Kozar et al., 2014) to enhance their coherence and sustain success.

More recently, the concept of climate-smart landscapes has emerged and is gaining traction as a practical way to achieve mitigation, adaptation and agricultural production objectives while ensuring that important synergies continue to be generated among different and biologically diverse land uses, livelihood strategies and food and nutrition security priorities (Scherr et al., 2012). In this way, the climate change agenda is compatible if not fused with the overall sustainable development agenda, as these two cannot be tackled by separate means. It is therefore timely to discuss the means of implementation. In this chapter, we argue that integrated landscape approaches provide effective ways of achieving them.

2. The integrated landscape approach as a framework for implementing the Sustainable Development Goals

The integrated landscape approach has been advanced as a response to increasing societal concerns about environment and development tradeoffs within sustainability initiatives.

Adverse effects on landscapes have been caused by directive ‘forcing regimes’ that have affected environmental processes as diverse as the dynamics of disease, wildfire, carbon destocking, invasive species, and biogeochemical cycles (Leadley et al., 2014). There have been unanticipated outcomes from numerous development projects, including, for example, the loss of native species or the introduction of exotics that have proven not only deleterious to the environment and related livelihoods, but extremely difficult to remedy (Estes et al., 2011; Phelps et al., 2013). Under the integrated landscape approach, the objectives are not only production or biodiversity conservation for ecosystem services, or to select a particular land use structure rather over another, but to see how to manage heterogeneity at all scales to prevent those changes that limit *de facto* environmental sustainability (Sayer & Cassman, 2013; Sayer et al., 2013). The integrated landscape approach has therefore emerged as the most widely advocated means to address growing pressures on land, water and other resources to achieve sustainability (e.g., Bogardi et al., 2012).

Unanticipated negative outcomes of development activities are not limited to the environmental dimension, but have also taken their toll on social and economic dimensions (Tripp, 2012). Across all three dimensions, most of the failures to date can be attributed to inappropriate technical interventions and ineffective governance frameworks (Bogardi et al., 2012). Landscape governance is indeed a crucial component of successful and sustained integrated landscape management in order to integrate divergent values and interests of different actors, clarify appropriate rights and resources, and overcome inequities and power dynamics in decision-making. These challenges relate to a misalignment between ecologically defined landscapes and administrative and political boundaries (Kozar et al., 2014). These challenges of landscape management at scale were addressed through new governance arrangements by the Model Forests Network, Landcare International, and the Northern Rangelands Trust (Neely et al., 2014). The integrated landscape approach is therefore a framework for negotiating needs for production and access to resources, minimizing conflicts and promoting learning by all parties to accelerate the achievement of beneficial impacts. Landscapes provide the workable space for understanding, intervening and monitoring coupled socio-ecological systems (Holmgren, 2013; Milder et al., 2014).

The integrated landscape approach is not by any means new and in many ways has served as a light or invisible backdrop for the many technologies and stakeholder-based interventions that have been implemented over the last 20 years. And, while the aspirational practices and approaches noted in Figure 8.1 is not an exhaustive list, one can readily see how the underlying principles related to the social and environmental dimensions evolved alongside the political negotiations (Neely & Moore, 2014). The term ‘landscape’ begun to appear in these political decisions since 2000 and the SDGs are an ideal opportunity to combine the evolving multiplicity of ideas into a working paradigm for action. People, economies and the environment live together while conflicting priorities can be resolved and resource use optimized for the greatest benefit of humans.

More recently, there has been much more focus on the need to feed a growing population and the term ‘sustainable intensification’ has come into use, which according to the FAO (2011) “... aims to increase crop production per unit area, taking into consideration all relevant

| | 1992 | 1996 | 2000-2002 | 2008-2010 | 2012 |
|--|--|--|---|--|--|
| Political decisions trend | Earth Summit | World Food Summit | MDGs, World Summit on Sustainable Development (Rio+10) | MDGs Summit | Rio+20, SDGs |
| Sustainability science and practice trend | Sustainable agriculture, farming systems, farmer-to-farmer knowledge, participatory approaches, landscape approach | Ecosystem, landscape, holistic approaches, organic agriculture, biodiversity conservation, combat desertification, sustainability indicators | Sustainable livelihoods, eco-agriculture, sustainable land management, climate change mitigation and carbon dynamics, ecosystem services, decision-making, knowledge sharing, innovation support, good agricultural practices | Sustainable intensification, climate-smart agriculture, innovation platforms, evidence-based decision-making, landscape system approach, conservation agriculture, sustainability principles | Governance, natural capital in development, green economy, universality of sustainability principles, landscape smart landscapes, sustainable intensification, research in development, resilience |

Figure 8.1 The evolution of approaches within the scientific and development contexts (adapted from Neely & Moore, 2014).

factors affecting productivity and sustainability, including social, political, economic and environmental impacts. With a particular focus on environmental sustainability through an ecosystem approach, Sustainable Crop Production Intensification aims to maximize options for crop production intensification through the management of biodiversity and ecosystem services”. At the same time it has been recognized that climate change is both a risk to agriculture and a result of agriculture as agriculture contributes 10-12% of global anthropogenic greenhouse gas emissions (Smith et al., 2014).

The term ‘Climate-Smart Agriculture’ was coined to link agricultural and climate change policy together with a view to reduce the impact of agriculture on climate while ensuring that agriculture adapts to the effects of climate change. Climate-smart agriculture is “... an agriculture that sustainably increases productivity, resilience (adaptation), reduces/removes greenhouse gases (mitigation) while enhancing the achievement of national food security and development goals” (FAO, 2010; 2013). As a result, in 2014, formal political agreements were made to create the Global Alliance for Climate-Smart Agriculture as well as an African Alliance for Climate-Smart Agriculture. Many of the practices in Figure 8.1 are being revisited and tested for their ‘climate-smartness’. Using the same parameters that define climate-smart agriculture, others have demonstrated that climate-smart landscapes may not only provide greater opportunities for accelerating mitigation, adaptation, food security and development goals by capitalizing on their synergies, but in some cases landscape-level efforts will be required to meet these demands (Scherr et al., 2012; Harvey et al., 2014).

The landscape approach, taking into account the institutional and governance structures, to address the complexities associated with meeting multiple land use objectives, has a proven track record that should be taken seriously as a means of implementation for addressing SDGs and climate-smart objectives. In the next section, a framework is presented to underpin this statement.

3. Towards a normative framework linking landscape approaches to the SDGs

The implementation of Agenda 21 and subsequent agreements on sustainable development have foundered on a lack of common definitions and framework for implementation and a clear deficiency of political will. In principle, achieving one target should not be at the expense of achieving any other (Gaffney, 2014b). As described above, there is an emerging coherence of aims to achieve sustainable development. Applying landscape approaches is a valuable and vital pathway for bringing these development aspirations together to practically manage development initiatives and achieve the SDGs while at the same time advancing climate-smart objectives (Mbow et al., 2014a). In this context, the question is how to accelerate the implementation of the integrated landscape approach to support the SDGs (Scherr et al., 2014; SDSN, 2014). A starting point could be the list of landscape principles regimented by Sayer et al. (2013) (see Box 8.1) that could be used as a basis for defining hierarchy and entry points on how landscape approaches can be used in the implementation of SDGs.

Box 8.1

Ten principles from Sayer et al. (2013)

Principle 1: Continual learning and adaptive management

Principle 2: Common concern entry point

Principle 3: Multiple scales

Principle 4: Multifunctionality

Principle 5: Multiple stakeholders

Principle 6: Negotiated and transparent change logic

Principle 7: Clarification of rights and responsibilities

Principle 9: Resilience

Principle 10: Strengthened stakeholder capacity

We learn from the ten principles—considered here as a good starting point for implementing the SDGs—that some of them are prerequisites or enabling conditions (common concern and entry point), others are related to actions and community needs (management, negotiations, skills, participation) and finally a few address the overall objectives of integrated landscape approaches (resilience, food security) While the core idea is to avoid contradictory actions in resource management, some important cross-cutting aspects must be kept at the centre of such approaches including issues related to relative scale differences and multifunctionality (i.e., micro landscape multifunctionality aspects are different from those at macro landscape levels), both of which are very context dependent. Here, as a first step, we reorganized the ten principles in three categories, namely prerequisites, action items and aims (Figure 8.2). This framework is used as a conceptual model to identify potential areas of action to achieve sustainability goals using sustainable landscape approaches. Using this framework we attempted to link landscape approaches to the SDGs in Table 8.1 where we shows examples of outcomes and activities that contribute to the SDGs.

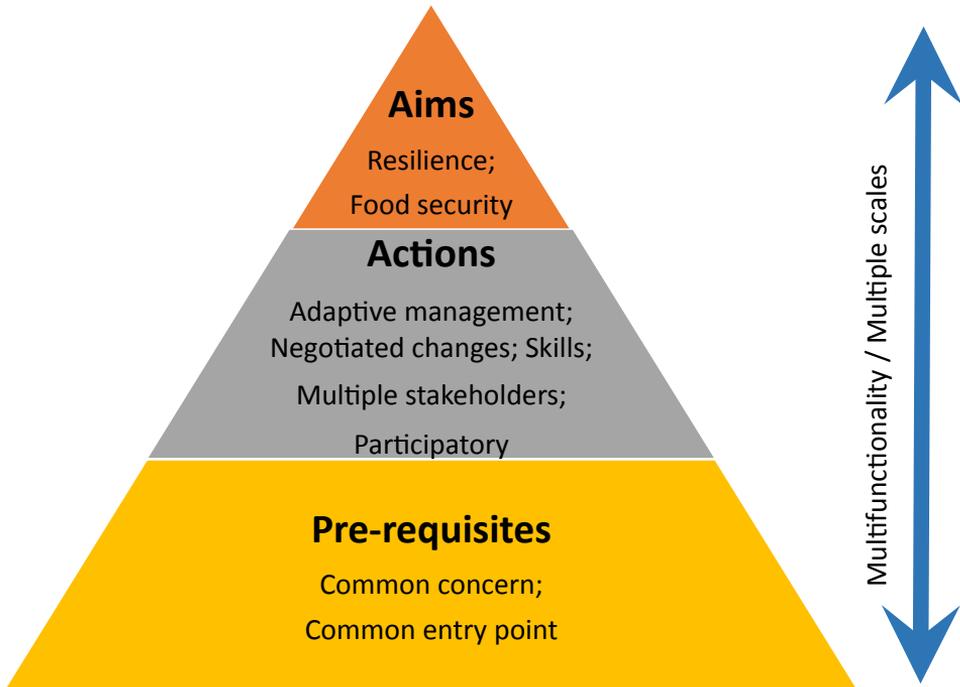


Figure 8.2 An interpretation of the various principles of a landscape approach (based on Sayer et al., 2013; see Box 8.1) described in three categories: prerequisites, action items and aims.

The set of SDGs goals is broad and yet quite inclusive. They can point to many directions, some of which are largely specified on the appended targets. The targets themselves are intentional outcomes but the means of implementation is yet to be defined for each. In Table 8.1 we suggested examples of how the landscape approach in three dimensions – necessary enabling and pre-conditions, actions to be taken, and the sustainability objectives – could be an effective tool for achieving the SDGs. By cataloguing the potential barriers, we also highlighted some supportive actions that are needed to ensure success and limit some of the inconveniences of the suggested approaches. It is important to recognize that landscapes are highly heterogeneous and their social and ecological contexts vary often along with many different impediments that limit the achievement of operational objectives. There is therefore no single approach to managing landscapes, in particular, achieving sustainability in development projects requires the integration of biodiversity and ecosystem services (Lucas et al., 2014; Mbow et al., 2014b).

The main challenge will be the management of tradeoffs and synergies between the various SDGs. When political negotiations reach the point of discussing means of implementation of agreements, reconciling various objectives often becomes difficult. There cannot be an ‘either or’ approach when it comes to solutions, but rather there needs to be principles that can be adhered to and tested against. The integrated landscape approach will provide the means for ensuring that the most appropriate practices and approaches are implemented in the right place for the right reasons to achieve the goals of sustained and sustainable development.

Table 8.1 The SDGs and the potential contribution of the landscape approach to these goals.

| | SDGs Goals ¹ | Where landscape approaches can contribute | Alignment with 10 principles (Sayer et al., 2013) | Examples of potential barriers |
|----|---|---|--|--|
| 1. | End poverty in all its forms everywhere | Sustainable intensification of agriculture, integrated resources management, climate risk management, resolving land tenure issues, diversified livelihoods | Common concern entry point, multiple stakeholders, negotiated and transparent change logic, clarification of rights and responsibilities, resilience | Poverty programmes are conventionally organized within government administrative units. Landscapes seldom follow administrative boundaries and policy boundaries. |
| 2. | End hunger, achieve food security and improved nutrition, and promote sustainable agriculture | Sustainable intensification, diversification of agricultural products, promotion of local fruits and other sources of good nutrition, agrobiodiversity, ecosystems services, ecological management of waste | Common concern entry point, multifunctionality, multiple stakeholders, resilience | Food and agriculture are conventionally the remit of agricultural ministries and departments, and other authorities (environment, water, etc.) have limited influence. This militates against the multifunctional management of landscapes. Food preferences, behaviour and diets may have to change, which will meet cultural resistance. |
| 3. | Ensure healthy lives and promote well-being for all at all ages | Production of affordable nutritional food, sustainable ecosystem goods and services | Resilience | Global, national and local farm input and production markets will need to shift from high-output models that favour inputs over integrated management approaches that achieve sufficient food production. Resistance of some private companies. |

| | | | | |
|----|--|---|---|---|
| 4. | Ensure inclusive and equitable quality education and promote life-long learning opportunities for all | Co-learning and co-design of landscapes and development options, participation and inter-generational dialogues | Strengthened stakeholder capacity, continued learning and adaptive management | Conventional learning stresses one-way transmission of knowledge. It will be important to shift to a co-learning paradigm and participatory learning, by putting local knowledge in practice. |
| 5. | Achieve gender equality and empower all women and girls | Multiple roles for men and women across landscapes, clear roles and responsibilities of social groups in achieving various landscape objectives | Negotiated and transparent change logic, multiple stakeholders, clarification of rights and responsibilities, strengthened stakeholder capacity | Landscapes will provide increased opportunities for men and women, but change will not be inevitable. Further social reform needed. |
| 6. | Ensure availability and sustainable management of water and sanitation for all | Soil and water management, watershed management, better controlled water cycles, water recycling with trees, increased water infiltration, reduction of water erosion | Multifunctionality, multiple scales, resilience | National water planning often depends upon grand master plans. There will be a challenge in developing water management strategies around numerous interconnected landscapes. |
| 7. | Ensure access to affordable, reliable, sustainable, and modern energy for all | Sustainable bioenergy from landscapes including biofuels and wood from agroforestry, integrated sustainable food, water and energy systems | Common concern entry point, resilience, multiple scales | Conventional energy policies recognize the importance of landscapes for hydropower, but seldom fully recognize the potential of bioenergy. |
| 8. | Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all | Sustainable intensification at various scales, markets for natural and place-based products, fair shares of natural resources based income, reduced food price through increased production | Common concern entry point, multiple scales, resilience, strengthened stakeholder capacity, negotiated and transparent change logic | To benefit from the multiplicity of work opportunities in landscapes it will be necessary to significantly reduce, and then eliminate, employment and income differentials between men and women. |

| | | | | |
|-----|---|--|---|---|
| 9. | Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation | Supply of commodity products, promotion of entrepreneurial skills at the local level, develop value chains | Resilience, strengthened stakeholder capacity | The tendency of commodity-purchasing enterprises to extract value without sharing value locally will need to be replaced by partnership approaches. |
| 10. | Reduce inequality within and among countries | Landscape approaches may have some value in reducing inter-country inequity through cross-border landscape initiatives and managing the inherent variation in natural resources distribution over time | Multiple scales, negotiated and transparent change logic, common concern entry point | The inevitable trade advantages of richer countries will take time and considerable progress to overcome. |
| 11. | Make cities and human settlements inclusive, safe, resilient and sustainable | Rural migration better managed with people offering skills and knowledge moving to cities, sustainable landscapes feeding cities | Common concern entry point, multiple scales, continued learning and adaptive management, resilience | Few countries have any functioning policies to manage the transition from rural agrarian to urban industrialized societies. |
| 12. | Ensure sustainable consumption and production patterns | Sustainable production and recycling are central to the landscape approach, agrobiodiversity, development of high value products for local consumption | Resilience | Rapid increase of population may undo some efforts in improving production and consumption. |
| 13. | Take urgent action to combat climate change and its impacts | Climate-smart land use systems, reduced climate risks, improved mitigation potential while enhancing adaptation and food security | Common concern entry point, multiple scales, resilience | Poorly-managed industrial growth and the continued use of high levels of energy in developed countries might overwhelm benefits from improved landscape management. |

| | | | | |
|-----|--|---|---|--|
| 14. | Conserve and sustainably use the oceans, seas and marine resources for sustainable development | Landscapes incorporate coastal and estuarine areas, better land management reduces pressures on coastal areas and oceans, particularly deltas and mangroves, sustainable landscape approaches incorporate geographical connections between land and ocean | Resilience, multifunctionality | Lack of integrated policies on linkages between land-based development and their marine influence. |
| 15. | Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss | Land sharing, support for agrobiodiversity, farmers' management of natural regeneration, clear plans for ecosystem services management | Resilience, multifunctionality, negotiated and transparent change logic, clarification of rights and responsibilities | The divergence of views on the relative values of land sharing and land sparing is still unresolved, which leads to challenges in making decisions on landscape use. |
| 16. | Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels | The landscape approach can provide a framework for negotiating management rules, bylaws and co-designing management options | Continued learning and adaptive management, negotiated and transparent change logic, multiple stakeholders | The ability to negotiate fair rules across landscapes will depend upon the existence of functioning rule of law, an impartial judicial system and the flexibility of national law to decentralize authority. |
| 17. | Strengthen the means of implementation and revitalize the global partnership for sustainable development | Shifting to landscape approaches could provide a genuinely new and innovative means of implementation that national and global partners can support | Multiple scales, multiple stakeholders | As long 'means of implementation' remains code for the transfer of resources, and while national sovereignty limits global cooperation, progress will remain challenging. |

1 These 17 goals were taken from the SDSN web page: <http://sustainabledevelopment.un.org/focussdgs.html>, accessed the 27th of August 2014. While the SDGs as they had been formulated at the time of drafting this chapter might be further negotiated and modified before the 2015 Millennium Summit, their overall structure and thrust is unlikely to change.

4. Conclusion

The establishment of the SDGs will be the latest step in attempting to create normative frameworks for sustainable development and applying them to development agendas. Earlier attempts to implement sustainable development agreements have been only partially successful and a major obstacle has been the difficulty in integrating the social, economic and environmental dimensions of sustainability. During the period from the Earth Summit in 1992 to the Rio+20 meeting in 2012, there have been numerous international conferences that have sought to accelerate the sustainable development agenda and the development of increasingly sophisticated knowledge of what needs to be achieved that has resulted in a spin-off of a plethora of ideas, platforms and initiatives, many of which have become part of the current development dialogue (e.g., climate-smart agriculture, sustainable intensification and others). But many of the aspirations of these initiatives remain unattained. There are many reasons for this, but one is that governance systems provide neither the means of integrating decision-making and management across sectors, nor the places where integration of social, economic and environmental objectives can be readily achieved. Landscape approaches could provide both: the close proximity of people with differing, but complementary interests should encourage integrated planning and management, and the potential for the interdependence of elements in landscapes leading to improved integration of social, economic and environmental interests. The transition from existing ways of making political decisions will not be easy, as institutions and boundaries are seldom associated with landscapes. However, the advantages of integrated landscape approaches should make it attractive to decision-makers to introduce landscape thinking into their planning and management approaches.

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