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LANDSCAPE CHANGE – CAUSES AND CONSEQUENCES (K PIGEON, SECTION EDITOR)

What Hampers Implementation of Integrated Landscape Approaches in Rural Landscapes?

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Abstract

Purpose of Review In rural areas, frameworks of integrated landscape approaches are increasingly being used to reconcile conflicting objectives of stakeholders and sectors, such as agriculture and conservation. In accommodating multiple land uses, social, economic, and environmental trade-offs need to be balanced. Different social processes underly integrated landscape approaches. The aim of this review is to provide an overview of the barriers described in peer-reviewed case studies to better understand what hampers the implementation of integrated landscape approaches. To this purpose, we conducted a systematic literature study. We clustered the barriers into the following barriers groups: (1) participation problems, (2) interaction problems, (3) resource problems, and (4) institutional problems, and analyzed how these barriers hindered implementation of the following key landscape processes: planning and visioning, developing and implementing practices, establishing good governance, and monitoring and evaluation.

Recent Findings We analyzed barriers described in 56 peer-reviewed papers that document 76 cases of integrated landscape approaches in 35 countries worldwide. Main stakeholder problems were related to absence of specific stakeholder groups, varying levels of engagement, or lack of stakeholder experience and skills. Interaction problems included a lack of communication, collaboration, or coordination, a lack of agreement due to different stakeholder visions, and power relations. Institutional problems were related to incompatible (national) policies and institutional structures hindering integration, and resource problems included limited availability of financial resources and a lack of data. These barriers hampered the implementation of the key processes needed to transition towards integrated landscape approaches in different ways. This paper provides an overview of the main barriers found for each landscape process.

Summary Rural landscapes are often characterized by a variety of stakeholders and land use sectors, such as agriculture and natural resource conservation. Landscape approaches aim to integrate different goals such as conservation, production, and livelihoods simultaneously, but their implementation appears to be challenging. In this study, we take stock of the barriers described in the literature and analyze how different types of challenges related to stakeholder engagement, interaction between stakeholders, resources, and institutions hinder implementation of landscape approaches. According to this analysis, we demonstrate why particular problems pose challenges to the implementation of specific elements of landscape approaches. Few barriers were related to testing and implementing sustainable business practices since business stakeholders were often not involved. Most approaches were still in an early stage of development. The continuity of approaches is mostly not secured and calls for better institutionalization of landscape approaches. The set of identified barriers and their relations to key processes can be used as a diagnostic tool to enhance learning and improve the performance of landscape approaches in the transition towards integrated landscape management.

This article is part of the Topical Collection on *Landscape Change – Causes and Consequences*

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Keywords Landscape approach · Integrated landscape management · Landscape processes · Transformation · Barriers · Stakeholders · Governance

Introduction

Deforestation, land degradation, pollution, and climate change are considered important drivers of biodiversity loss, decline in livelihoods, and reduction of food security [1–7]. Sectoral policies, related to forestry, agriculture, or water management, are usually not suitable to address these interconnected sustainability challenges, e.g., [8]. For example, top-down spatial planning of land-use systems to conserve biodiversity has had very limited success [9, 10] and forest cover loss continues across the globe [3]. Landscape approaches have emerged as a means to integrate social, economic, and environmental objectives simultaneously [11,12]. Reed et al. [8,13••] define a landscape approach as "A framework to integrate policy and practice for multiple land-uses, within a given area, to ensure equitable and sustainable use of land while strengthening measures to mitigate and adapt to climate change". Hence, landscape approaches seek to solve conservation and development trade-offs by engaging with diverse stakeholders across multiple spatial scales and sectoral interests [11,12••,14]. They therefore combine conservation perspectives with economic development and poverty alleviation objectives [12••].

Shifting towards a landscape approach may be attractive from a conceptual perspective, but also appears to be challenging. Various barriers to successful implementation are described in the literature, such as the inherent need to shift from project- to process-oriented activities [12••], the necessity to cope with the dynamic nature of landscape processes, the need for cross-scale adaptive governance, and inequalities in resource distribution that affect vulnerable groups [15, 16]. Participatory co-creation processes are needed to tackle issues such as land rights and responsibilities [12••]. Weak systems of justice and imbalances in power can jeopardize the envisaged land transformation trajectories. Lack of monitoring and weak stakeholder engagement are other examples of barriers identified [13••].

Landscape approaches are geographically embedded and therefore influenced by local histories and path dependencies [13••,17,18]. Reed et al. [13••] postulate that due to these context-specific conditions in landscapes, there are no blueprint solutions or panaceas. However, some guiding principles can be identified as previous reviews highlighted several generic key processes and features during implementation. Among others, the importance of establishing clear and shared objectives, developing good and adaptive governance, engaging stakeholders, continued learning and support, and sound evaluation of progress has been emphasized. Based on [12••,13••], we zoom in on the key processes underlying a landscape approach, as depicted in Fig. 1 and adapted from the "landscape process wheel" developed by [19•].

Building on this landscape process wheel [19•], we identify five key processes (1) planning and visioning, (2) developing and implementing practices, (3) establishing good governance, (4) monitoring and evaluation, and (5) supporting processes as depicted in the center of the wheel, which in turn facilitate the other four key processes (Fig. 1). The latter processes include (i) participation (stakeholder engagement and capacity building of the stakeholders involved, for example by learning and training); (ii) multi-stakeholder negotiation; and (iii) in addition to [19•] Mobilization of resources, e.g., attracting funding as a supporting process. Execution of the key processes takes place in the context of the local institutional environment [13••]. This is depicted by the outer shell in Fig. 1. Each key process is characterized by a number of attributes (Fig. 1).

A landscape approach is defined by distinct operational phases. The key process of planning and visioning is mostly linked to the design phase, while during implementation, the key processes of establishing good governance and developing sustainable practices are most relevant. The monitoring phase is a key process in itself, while the central supporting processes are operational during the full landscape approach cycle. We added "Institutionalization of the new trajectory" as output to the "wheel," which should secure the continuity of the approach. This involves the routinization of new practices, embedding institutional structures, formal agreements on stakeholder involvement, and securing long-term funding [20].

The extent to which landscape approaches will achieve successful implementation, depends on how key processes are being stimulated or hampered. Although recent reviews [12••,13••] identified a number of barriers, it remains unclear how certain problems can obstruct specific key processes. More specifically, problems can occur when supporting processes are not functioning properly. For instance, a lack of participation or a lack of financial resources could hamper implementation of other key processes. Knowledge on how the implementation of each key process is hindered can provide a basis for more specific interventions. Case studies can provide such insights. As Reed et al. [13••] pointed out, until a few years ago, studies on such landscape approaches in practice were scarce and did not address monitoring and evaluation. Moreover, recent reviews [12••,13••] were restricted to tropical regions while landscape approaches may have been applied in temperate regions as well.

The aim of this review is to provide insights into types of barriers that hamper the specific key processes of landscape

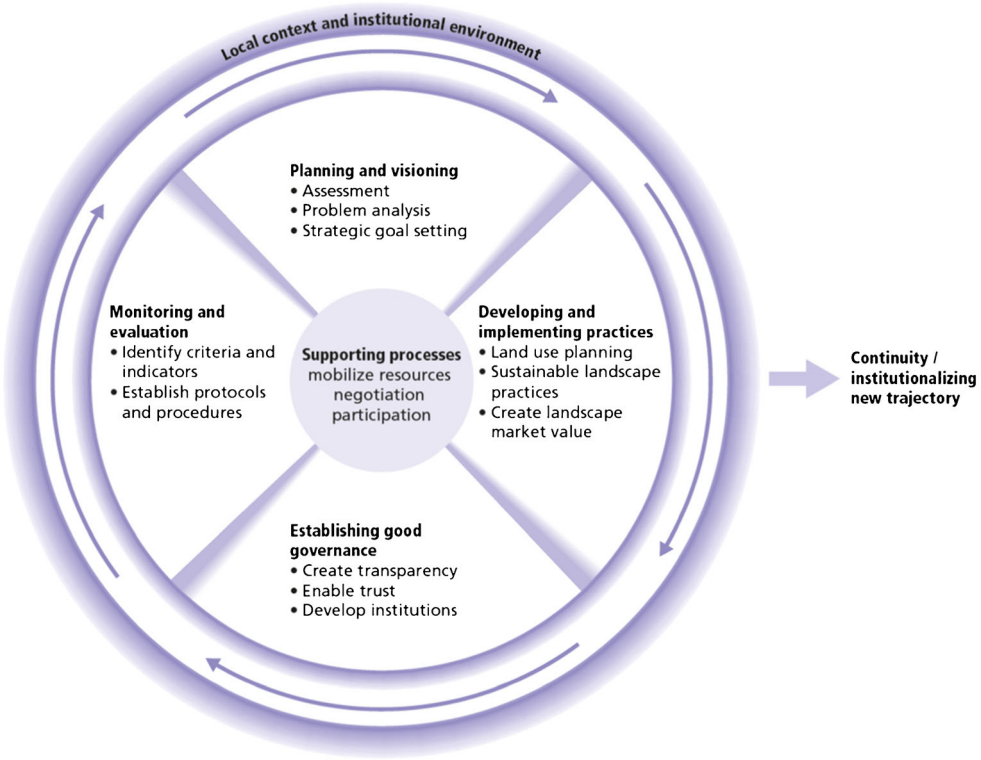

Fig. 1 The "landscape process wheel" adapted from [19•]. Key landscape processes are described in bold: (1) planning and visioning, (2) developing and implementing practices, (3) establishing good governance, (4) monitoring and evaluation, and (5) supporting processes, such as participation, negotiation, and mobilizing resources. Important attributes of these landscape processes are described in bullets. The outer shell represents the local context and institutional environment in which landscape approaches are embedded

approaches. To this purpose, we conducted a systematic literature study on peer-reviewed case studies. The review consists of two parts. First, a quantitative analysis is conducted to provide insight into the type of data derived from cases across the globe reported in scientific literature. Furthermore, we take stock of the types of stakeholders involved in landscape approaches, as well as the types of land uses. The second part of the review entails an analysis of the types of barriers. Specifically, we are interested in problems related to supporting processes and the institutional environment, and how these hinder the other identified key processes (as depicted in the spokes of the "landscape process wheel," Fig. 1). We therefore focus on four types of problems related to: (1) participation, (2) resources, (3) institutions, and (4) interactions. The latter category of interaction problems includes issues related to negotiation, communication, and collaboration.

Materials and Methods

Search Strategy and Selection Criteria

We applied the protocol of the Preferred Reporting Items for Systematic review and Meta-Analysis (PRISMA) [21] to identify and select relevant scientific papers. To obtain our corpus material, we developed search strings in Scopus and Web of Science (WoS) and applied it to (English) peer reviewed scientific papers published from January 2014 until September 2019 to Title OR Abstract OR Key Words (Identification step). We applied different search strings in an iterative manner, to retrieve an adequate number of relevant cases. After several tests, the final search string (see supplementary material) resulted in retrieval of 627 records from Scopus and 493 from WoS on landscape approaches applicable to rural areas. After pooling both sources and removing duplicates, we obtained 690 unique records. We analyzed these further in the screening test according to the PRISMA protocol, using various criteria to remove non relevant papers from the corpus. These exclusion criteria were (1) records solely based on urban or marine systems, (2) records that did not include landscapes with an ecological dimension (e.g., fitness landscapes, molecular landscapes), non-relevant subjects (e.g., ancient or pre-industrial landscapes), (3) records that did not focus on multiple stakeholders and a landscape scale, for instance studies on a specific farming system without a landscape context, (4) records that provided a literature review on landscape approaches, and (5) papers that lacked an abstract that could be accessed. Screening according to these criteria was conducted solely on the content provided in the abstract of the paper. The screening resulted in exclusion of 175 studies (see Fig. S1 for information flow, supplementary material).

In the eligibility step, we further analyzed the corpus according to three additional exclusion criteria. This led to removal of records that did not include at least two types of

stakeholders (e.g., two or more farmers represented one type of stakeholder, but one farmer and one NGO were two types of stakeholders) and at least two land use sectors (e.g., conservation and agriculture represented two land use sectors, but various types of agricultural land use just a single land use sector). Finally, we excluded some papers that did not analyze (ongoing or completed) landscape initiatives or approaches, as indicated for example by a collaborative forum, or governance structures for participatory approaches. Application of these additional criteria resulted in a selection of 56 papers for the final review. Of these 56 papers, six reported on multiple cases of landscape initiatives based on interviews with members of multi-stakeholder platforms. We included these six papers only in the analysis of barriers.

Consistency Checks

Consistency checks on potentially erroneously excluded records followed the interrater reliability principle (IRR) [22]. This states that transparent and objective selection criteria can lead to different outcomes due to interpretation decisions made by multiple researchers. We first applied a "training round" by jointly assessing 5 papers to fine-tune the exclusion criteria. We then applied the IRR in the screening step, by applying the exclusion criteria to the information in the abstracts of the papers. For this, each author independently tested a pool of 35 randomly selected papers. The IRR conducted revealed a consistency of 88% of mutually excluded papers.

In the eligibility step (using multiple-stakeholder, multiple-land use criteria), the authors jointly discussed and refined additional criteria. First, although papers reported on multiple stakeholders or multiple land uses, these were not always part of the study. This led to refinement of the criteria "multi-stakeholder" and "multi-land use" as applied to the methods and results sections of a paper, to include at least two types of stakeholders and two types of land uses. We applied these criteria to extract the final corpus material for analysis.

Review Design

To collect quantitative information on types of stakeholders and land use sectors, we applied a pre-defined categorization of stakeholders and land uses. For each case, we recorded the presence of different stakeholders, such as farmers, local communities, governments, business actors, financial actors, and education or research institutes. We separated governmental actors into local and regional, national, or international actors. For business actors, we distinguished actors from local industry (e.g., mining, forestry, agricultural companies) and value chain actors (actors within the supply chain of commodities). Land use types included nature areas (defined as natural resources and conservation), agriculture, forestry, water, mining, tourism, energy, urban areas (within rural landscapes), and roads and infrastructure. For each case, we recorded and stored this information in a database, in addition to the geographical focus (see supplementary material).

In the analysis of barriers, we explored the richness in challenges described in the literature. To take stock of barriers, we applied text mining on the full text of each case study, using various search strings for "barrier," such as "constraint," "conflict," "limitation," "challenge," and "problem," but this did not always result in an adequate list of barriers per case study. Therefore, we also read each paper entirely and noted each barrier, or our interpretation of such, together with the context (specific sentences before and after the described barrier) in the case study papers, and stored this in the database. After analyzing all records, we categorized the barriers mentioned, using a coding framework. The use of this coding framework in our analysis generated insights in underlying reasons that inhibit implementation of key processes. The barrier types in the coding framework included the following categories: stakeholder participation, interactions between stakeholders, and resources (finance and knowledge). Next to this, we included the category of institutional problems [18, 23]. In line with the framework of [24], we specified for each barrier category whether (1) one of these elements is lacking (e.g., a lack of stakeholder participation, or a lack of financial resources) or (2) the element is present, but there is a problem associated to it (e.g., stakeholders do participate, but they have limited capabilities, or institutions are present, but they are not steering towards integrated management). Table 1 describes the applied categories of barriers. In the final step of the analysis, we assigned all recorded barriers to the key processes, as depicted in Fig. 1. Finally, our methodology did not allow for a quantitative analysis of barriers, since the peer-reviewed literature review included papers with different theoretical and analytical approaches.

Results

Stocktaking of Landscape Initiatives

The corpus included 76 unique landscape initiatives (cases) from 35 countries reported in 50 scientific papers (see supplementary material). We merged case results when published in different papers. These cases are located in Africa (22), Asia (16), and Latin America and the Caribbean (9) ($n = 47$, "global South") and Europe (16), North America (USA and Canada, 7), and Australia and Solomon Islands (6) ($n = 29$, "global North") (Fig. 2).

Landscape approaches addressed by the cases were restricted to rural landscapes and included various ecosystems and land uses such as forests, natural grasslands, and agriculture. The countries most frequently studied were Indonesia (10), South Africa (8), USA (6), and Brazil and Australia (5). The

Table 1 Coding framework of barriers to implementation, adapted from [24]. The problem typology distinguishes between problems related to stakeholder participation, interactions between stakeholders, resources, and institutions. For each of these elements, we distinguish between (1) the problem being a lack of one of these elements, or (2) the problem is related to the quality or capacity within one of these elements. For each of the categories, coding examples are described

Type of barrier	Explanation	Example
Participation problem	(1) Lack of participation/presence of stakeholders (2) Problem with stakeholder engagement	- Relevant stakeholders are absent from an initiative - Stakeholders involved may lack competence, or the capacity, to develop strategies or visions, or identify their needs
Interaction problem (negotiation, collaboration, and communication)	(1) Lack of interaction between stakeholders (2) Problem with existing interactions (negotiation and collaboration)	- Interactions between stakeholders may be completely missing - Weak connectivity between stakeholders, or some stakeholders are dominant (e.g., power inequalities)
Resource problem (finance and knowledge)	(1) Lack of resources (knowledge, financial) (2) Problem with existing resources	- Specific resources are missing (funding, data) - Resources available are not sufficient, or inadequate
Institutional problem	(1) Lack of institutional arrangements (2) Problem with existing institutional arrangements	- Specific institutions required are missing - The current institutions do not foster integrated landscape approaches

assessment therefore also revealed that landscape initiatives and approaches were not solely confined to tropical regions. In 87% of all cases, various types of government stakeholders (local-international) were involved, while NGOs were involved in 74%, local communities in 67%, and farmers and producer groups in 59% of the cases. Most cases included natural vegetation (93%) and agriculture (70%) as the main land uses. Forestry and water were present in respectively 42% and 32% of the cases, and other land use sectors in less than 20%.

We found regional differences according to type of stakeholder involvement (Fig. 3a). Farmers were more frequently present in cases from the South (66%) than from the North (48%). The same applies to NGOs (83% in cases from the South and 59% from the North). In most cases, government stakeholders were present: 55% of the cases from the North and 69% of the cases from the South mentioned regional, national, and international governmental bodies. In about half of the cases business stakeholders were present, of which between 34% (North) and 49% (South) were business stakeholders from local industries (forestry, mining, etc.). Value chain stakeholders, i.e., stakeholders involved in the supply chain of commodities, were only present in 15% of cases in the South, against 7% in the North.

In 96% (South) and 90% (North) of the cases, conservation of natural areas was the most frequent land use type (Fig. 3b). Agriculture played a role in 77% of the cases in the South and 59% in the North. Water, tourism, and urban land-use sectors were more frequently present in cases from the North. Roads and infrastructure were present in higher percentages in the South.

Assessment of Barriers

In this section, we elaborate on the types of barriers found related to supporting processes and the institutional environment: (1) stakeholder participation, (2) interactions between stakeholders, (3) resources, and (4) institutions, and how these resulted in problems to implement the following key processes of the "landscape wheel:" (1) planning and visioning, (2) developing and implementing practices, (3) establishing good governance, and (4) monitoring and evaluation (see Table 2).

Stakeholder Participation Problems

Absence of specific stakeholders, or lack of participation, presented a problem for different processes [17, 25–29]. In several cases, the lack of engagement of local stakeholders such as communities and farmers was problematic [27, 28, 30–34]. They were often not well represented in multi-stakeholder forums, or only indirectly represented through NGOs. Other studies reported problems related to the lack of engagement of powerful actors such as commercial businesses and governments [25, 35].

More specifically, in the process of planning and visioning, the lack of engagement of relevant stakeholders was problematic since plans developed were not inclusive and representative for the relevant landscape stakeholders [25, 29]. For instance, in one case, the multi-stakeholder platforms consisted of a few state-level agencies, NGOs, a labor union, and a timber industry association, but farmers were not involved. This could result in a disconnect between goals of sustainable

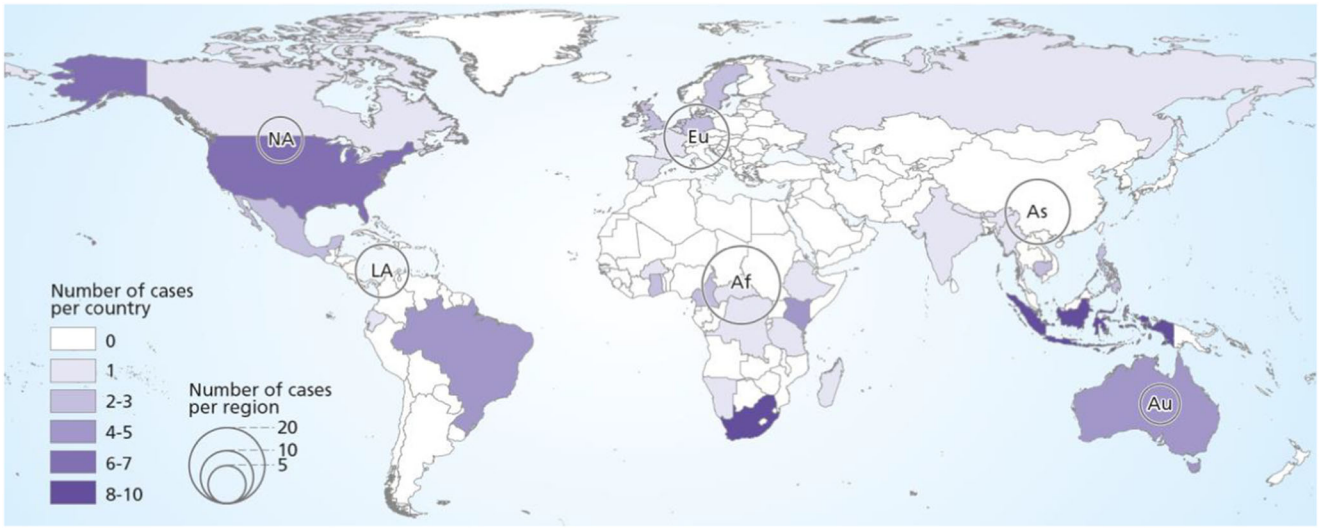

Fig. 2 Spatial distribution of analyzed landscape initiatives between 2014 and 2019. Total number of cases = 76. Af, Africa; As, Asia; Au, Australia; Eu, Europe; LA, Latin America and Caribbean; NA, North America

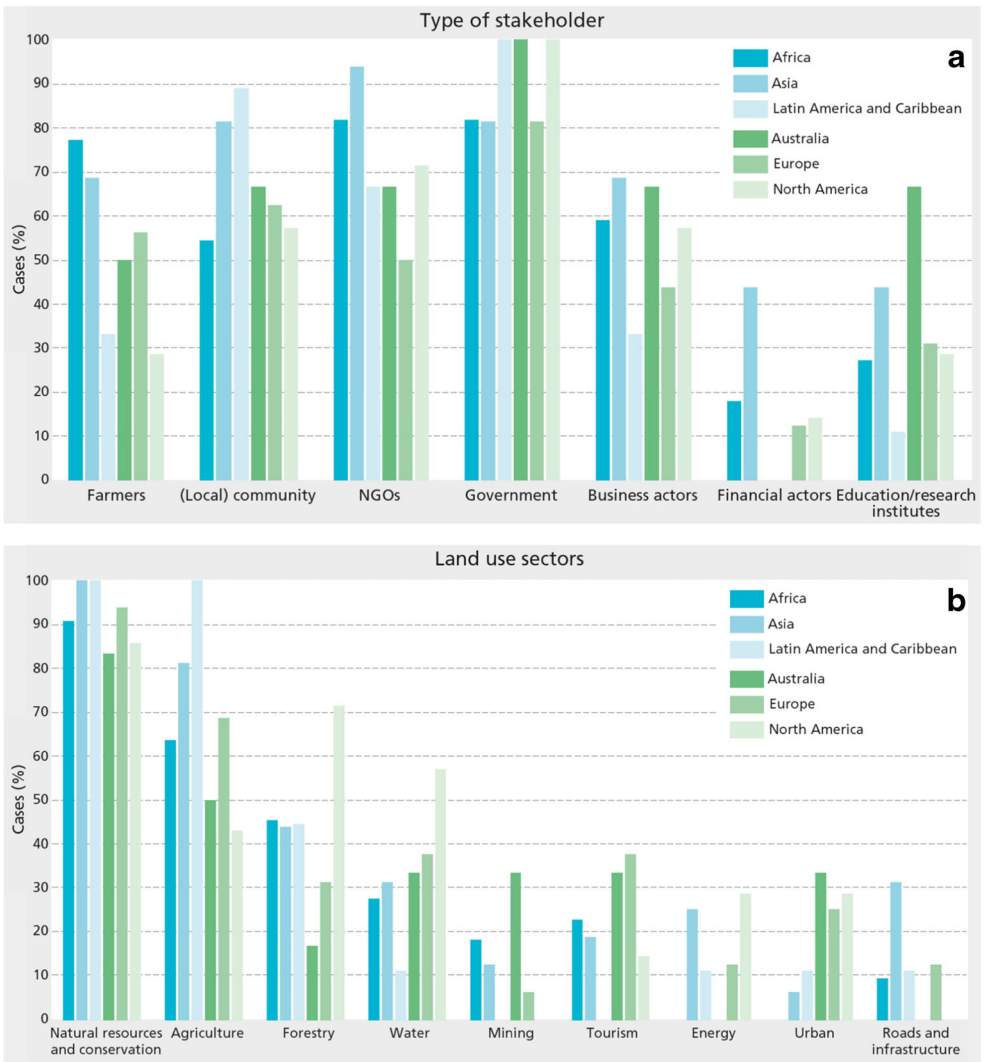

Fig. 3 Presence of stakeholder types (**a**) and presence of land use sectors (**b**) in 76 landscape initiatives analyzed between 2014 and 2019, expressed as percentage of cases across regions. Number of cases: Africa (22), Asia (16), Latin America and the Caribbean (9), Australia and Solomon Islands (6), Europe (16), and North America (7)

Table 2 Types of barriers identified in relation to the following key processes constituting landscape approaches. The rows describe the problem typology used. We distinguish between problems linked to supporting processes and the institutional environment: stakeholder participation problems, interaction problems, resource problems, and institutional problems. For each of these problems in turn, we distinguish between (1) the problem being a lack of one of these elements, or (2) the problem is related to the quality or capacity within one of these elements. We studied how these problems hindered the following key processes, as described in the columns: (1) planning and visioning, (2) developing and implementing practices, (3) establishing good governance, and (4) monitoring and evaluation. See supplementary material 2 for list of case studies and papers. The table lists examples of papers that document these barriers

Type of process	Subtype problem	Planning and visioning	REFs	Developing and implementing practices	REFs	Establishing good governance	REFs	Monitoring and evaluation	REFs
Type of problem									
Stakeholder participation problem	Lack of participation	Lack of specific stakeholders involved hinders inter-sectoral negotiation required in developing plans for landscape approach. Lack of stakeholders with the right skills to model or project future conditions.	[25, 29–31, 36, 37]	Lack of specific stakeholders involved hinders implementation of activities and developing sustainable landscapes. Stakeholder involvement is uncertain, for instance due to voluntary participation mechanisms.	[28, 31 36]	Lack of specific stakeholders involves the risks of ignoring decision-making structures by powerful stakeholders who were not part of the decision-making process. Low participation rates during meetings in multi-stakeholder platforms.	[25, 29]	Lack of stakeholders with the right skills for monitoring.	[17, 37]
	Problem with skills of stakeholders involved			Stakeholders lack the experience to implement activities (results in simple upscaling of pre-existing management activities). Stakeholders steer towards 'wrong' interventions with little potential for long-term improvements (e.g.: aid agencies favor micro--interventions). Lack of capacity building focused on farmers' negotiation capacity and empowerment.	[34, 37, 44–47]			Stakeholders are engaged and have the skills to engage in monitoring, but due to varying skills of people who engage in participatory monitoring, rigorous methods for monitoring are complicated.	[17, 37]

Table 2 (continued)

Type of process	Subtype problem	Planning and visioning	REFs	Developing and implementing practices	REFs	Establishing good governance	REFs	Monitoring and evaluation	REFs
Interaction problem	Lack of interaction between stakeholders	Lack of communication between stakeholders: no reciprocal flow of information.		Lack of collaboration between sectors and stakeholders (e.g., social interlinkages between stakeholders from different sectors (farmers and fishers) are limited). Lack of coordination of activities, for instance between sectors, or between neighboring stakeholders.	[43, 53–55]	Stakeholders who are not present during meetings in decision-making are not informed, and decisions are made without them. (Weak) local institutions are poorly connected to external organizations.	[27 29,56]		
	Problem related to interactions between stakeholders	Power relations (e.g., stakeholders have limited space to negotiate conditions, since they are dependent on donors who fund partnerships). Lack of agreement between stakeholders on where to go and how social and ecological objectives can be integrated (lack of a common vision).	[37, 45, 48–52]	Conflicts between stakeholders (e.g., long standing conflict between agriculture and conservation).	[43]	Power relations, inequality (e.g., a lack of willingness to reform on behalf of government decision-makers with vested interests in status quo.)	[65]		
Institutional problem	Lack of institutional arrangements	Lack of interaction platforms for negotiation.	[43,50, 57,58]	Lack of required institutions in place (e.g., no institutional structures that cross administrative boundaries, lack of policies that regulate REDD+)	[25, 26, 28, 39, 47, 51, 60, 61]	Lack of required institutions in place (e.g., lack of decision-making structures (platforms) present).	[50, 57] [43, 50, 57]		
	Problem with current institutional arrangements	Sectoral planning traditions Governance complexity: different land	[47, 59] [52]	Narrow and restrictive policies that hinder growth of initiative Lack of integration between sectoral	[26, 28, 29, 47, 51, 52, 59, 62, 63]	Governance power of landscape multi-stakeholder platforms is insufficient (e.g.,	[43, 61]		

Table 2 (continued)

Type of process	Subtype problem	Planning and visioning	REFs	Developing and implementing practices	REFs	Establishing good governance	REFs	Monitoring and evaluation	REFs
		ownership, complex set of rules, and procedures defined in laws and regulations, administrated by different ministries		policies (e.g., objectives and strategies of different sectors (agriculture, conservation, water) are not integrated). Conflicting policy measures (e.g., between REDD+ mechanisms and other policy measures) Weak governance (e.g., corruption, unclear land tenure regulation, or a lack of individual rights of community members)		landscape level multi-stakeholder platforms have not received formal recognition from government, or changing regulations have led to lower decision-making power for local multi-stakeholder platforms). Hierarchical governance arrangements impede transformation towards collaborative decision-making, power sharing, and institutional diversity. Weak/poor governance (e.g., conflicts and land-grabbing).			
Resource problems: knowledge	Lack of knowledge resources	Lack of data (e.g., to estimate impact of land use management changes). Lack of methods to plan and assess multi-stakeholder platform performance.	[29, 63]					Lack of data (e.g., for instance on effectiveness of multi-stakeholder platforms). Lack of research methods for monitoring (e.g., difficult to measure indicators).	[29, 63]
	Problem with available (knowledge) resources							Difficult to adapt monitoring methods over the years since this interrupts long-term measurements of trends	[25]
Resource problems: financial	Lack of financial resources	Creating a shared vision/consensus takes much time and resources	[49]	Voluntary participation mechanisms through which stakeholder involvement is uncertain.	[17, 28, 48]			Lack of funding for monitoring and data management (e.g., establishing base-lines).	[17, 36]

Table 2 (continued)

Type of process	Subtype problem	Planning and visioning	REFs	Developing and implementing practices	REFs	Establishing good governance	REFs	Monitoring and evaluation	REFs
				Limited amount of resources through which only small-scale interventions are possible, or farm interventions that due to a lack of resources result in low quality products. Lack of sufficient and sustained financing to guarantee benefits (e.g., community co-benefits via existing financial mechanisms) Availability of resources is temporary (e.g., temporary funding of activities and coordination processes).					

development developed in the platforms, and the "business-as-usual" paradigm of the mainstream agricultural sector [30]. When the design did not include community members, their valuable knowledge on the ecosystem (e.g., on forests, species) was missing [31]. Another problem was related to a lack of stakeholders with the right skills to model and project future conditions [36, 37]. For the process of developing and implementing new practices, it appeared that some activities cannot easily be implemented without the involvement of particular stakeholders [28]. For example, one case highlighted the importance of business actor engagement as follows: "The absence of a strong agribusiness sector interested in engagement limits the potential to shape REDD+ (reducing emissions from deforestation and forest degradation) landscapes around commodity production areas, and implement initiatives such as deforestation-free supply chains" [28]. In addition, Atela et al. [31] showed that the exclusion of communities in the design of REDD+ posed risks to community participation in the further implementation of outcomes. The voluntary nature of participation could also hinder implementing processes, which led to variable levels of engagement [36]. For the process of establishing good governance, a lack of participation posed the risk of governance not being sufficiently inclusive and that stakeholders did not respect decisions since they were not represented during the decision making process [25, 29]. Kusters et al. [29] described that only about 50% of members attended meetings of a multi-stakeholder platform. As Kusters et al. [29] state: "This was considered problematic, as decisions are made during meetings without informing the other members". An earlier review [25] stated that the absence of commercial actors and governments in integrated landscape initiatives resulted in risks that "major decisions made by powerful actors outside of such processes" overruled decisions made through multi-stakeholder negotiation. Regarding the monitoring process, a lack of stakeholders with specific monitoring skills could hamper the monitoring activities [37]. In one case described by Sayer et al. [37], local people stopped using monitoring tools when a researcher with relevant skills left the initiative. Monitoring was also challenging since the stakeholder population changed over the years, and this variation in participation resulted in a lack of continuity in monitoring [37]. In some cases, participation ended when funding stopped [38], or the interest of local stakeholders to participate declined in the absence of an NGO bringing in resources [17].

When relevant stakeholders were involved, we found specific participation problems related to their capabilities. In general, a lack of relevant skills among stakeholders was problematic, for example skills to bring in sufficient funding or implement particular activities [39, 40]. Several studies highlighted the importance of empowerment of farmers by extension services or technical assistance of governmental agencies [41, 42]. However, barriers included the lack of empowerment and proper capacity building, as illustrated by a lack of learning programs for participants [31] and a lack of organized learning among stakeholders [36]. Another case mentioned that training did not focus on learning from past mistakes but only on transferring skills, while capacity building to develop resilient systems for adaptive management was failing [38, 43].

For the process of developing and implementing new practices, stakeholders sometimes steered towards the "wrong" interventions in the sense of not being effective, or stakeholders lacked the experience and knowledge to implement activities [37, 44, 45]. For instance, stakeholders had little experience and thus focused on "simple" upscaling of pre-existing management practices, which might not be sufficient to tackle the complex landscape challenges [44]. Cases also reported aid agencies using only micro-interventions that had little impact on improving livelihoods of local stakeholders on the long-term [31, 34, 46]. Due to a lack of rights or authority, stakeholders sometimes lacked capabilities to engage in conservation activities, such as patrolling protected areas [34, 47]. For the process of participatory monitoring, challenges were linked to the variable skills of the stakeholders involved, which complicated the comparison of indicators and evaluation of progress; stakeholders had variable skills in rural survey techniques, and interpreted indicators differently across different sectors [17, 37].

Interaction Problems

In the planning process, there was often a lack of agreement between stakeholders on where to go and how social and ecological objectives could be integrated (common vision) [37, 45, 48, 49]. As Slotterback et al. [49] put it: "Different community groups often have strongly divergent perspectives on the nature of the problem situation and feasible options for addressing it. Consequently, progress towards collaborative and participatory planning and design is notoriously difficult". One case reported on a failing attempt to establishing a protected area and difficulties with achieving common agreements and objectives between stakeholders in the area. Some stakeholders focused on conserving the area, but most stakeholders did not have conservation of the landscape as a main goal [50]. Consensus building between stakeholders was thus challenging and power inequalities posed difficulties [49]. For instance, dependencies on donors resulted in a limited space to negotiate the funding conditions. Short-term goals of decision makers (democratic election cycles, associated donor project cycles) did not match with the time horizon of landscape goals and therefore posed problems regarding the planning of the trajectory of change [51]. Another case showed how the dominant role of large industrial and state forest companies left little space for participation of other stakeholders in integrated spatial planning [52]. In the process of developing and

implementing practices, there were problems of limited communication and collaboration between stakeholders (for instance of different sectors), or conflicts between sectors [43, 53–55]. As an example, Spiegelberg et al. [53] found that social interlinkages between farmers and fishermen across a watershed were limited, as they formed different clusters. A lack of coordinating activities may therefore result from a lack of coordination between sectors or neighboring stakeholders in a landscape [55].

Power inequalities resulted in difficulties to establish good governance, for example in a case in Aceh where government decision makers with vested interests in the status quo lacked the willingness to reform [56]. In this case, government officials did not want to collaborate with the landscape level council since they were afraid they would lose their governing authority. Due to this, the landscape level council was not able to obtain long term funding from the government [56]. General interaction problems were related to weak linkages between those stakeholders who needed funding and those able to mobilize funding, which resulted in difficulties to mobilize resources [27].

Institutional Problems

In the planning and visioning process, a lack of landscape institutions in place posed problems to negotiation [43, 50, 57]. As Ros-Cuéllar et al. [50] and Chia and Sufo [58] reported, a lack of multi-sectoral platforms hindered information sharing among stakeholders, and this hampered the development of collaborative strategies for adaptive management. Moreover, sectorial planning traditions [47, 59] and governance complexity presented challenges [52]. Different institutional problems were found to hinder the process of developing and implementing practices. A frequently reported problem was the presence of sectorial policies and planning traditions, which increased difficulties in developing inter-sectoral collaboration and coordination needed in integrated landscape initiatives [28, 52]. Other challenges were related to a lack of institutional support and required institutional structures in place [26, 60, 61]. Examples are the absence of institutional structures that cross administrative boundaries. A lack of supportive policies was also problematic, such as policies that supported combatting deforestation and REDD+ policies [25, 28, 39, 47, 51]. Moreover, narrow and restrictive policies [26] and lack of integration between policies and conflicting policies were among the problems identified [47, 51, 59, 62]. Other problems were inadequate land use planning, which did not satisfy all stakeholders, or insufficient planning to meet biodiversity or stakeholder targets [63]. Lastly, corruption and unclear land tenure regulation were problematic in implementing new practices [29, 51]. Problems related to establishing good governance were also identified. Similar to the planning and envisioning process, a lack of (coordinating) institutions, such as landscape level councils in place posed a problem for negotiation and decision-making [50, 57]. Another problem identified for this category was that the government did not formally recognize existing landscape level councils and platforms, which resulted in lower decision-making power for these multi-stakeholder platforms [43, 61]. In one case, this led to a disconnect in decision-making processes between national government on the one hand, and decision making of the landscape level council, which hindered effective sustainable management [61]. Hierarchical governance arrangements impeded transformation towards collaborative decision-making [43]. Furthermore, conflicts and land-grabbing hindered stakeholders in the development of good governance. Institutional problems also resulted in issues related to participation. For instance, one case mentioned that due to the voluntary nature of programs, participation of farmers in sustainable management was low, and when the scheme changed, farmer involvement ended [36].

Resource Problems

Resource problems comprised of knowledge and financial problems, which were found for many of the key processes. First of all, a lack of knowledge was a problem to implementation of the planning and monitoring process. A lack of methods (e.g., to plan and assess multi-stakeholder platform performance) and lack of data (e.g., to estimate impact of land use management changes) presented challenges for the planning process [29, 63], as reflected by this quote: *"*Appropriate data for estimating the impact of changes in land use management, even in data rich regions, are rare" [63]. Problems linked to the monitoring process also included a lack of research methods for monitoring, and difficulty in measuring indicators, for example on the effectiveness of multi-stakeholder platforms [29, 63]. Moreover, continuity in monitoring was important since a proper understanding of changes in landscapes and consequences of management can only be understood over time. According to Milder et al. [25]: "Only at the decadal timescale may it be possible fully to assess whether ILIs provide a more sustainable or resilient approach to food security, poverty alleviation, and ecosystem conservation than other types of strategies and investments.". Next to a lack of data and methods, difficulties with measuring and quantifying certain cultural or ecosystem services hindered representation of these values for indigenous communities in decision-making [37, 64].

The lack of financial resources and the challenges to get long-term support often posed problems. In the planning and visioning process, high costs were involved in creating a shared vision or consensus among stakeholders [49]. Limited amounts of resources hampered the development and implementation of practices, such as a lack of sufficient and sustained financing to guarantee community co-benefits via existing financial mechanisms [28]. In other cases, NGOs involved did only have enough financial resources to implement small-scale practical interventions [17], or the resources were just sufficient to develop low quality farm products [17, 48]. Temporary funding of activities and coordination was another problem identified. In the process of monitoring, a lack of funding for data management was an observed barrier, among others to establish base-lines [17, 36]. A lack of financial resources also posed problems to engaging stakeholders and maintaining participation, e.g., in supporting long-term scientific or NGO involvement [37, 43, 57]. Some cases described that when funding finished, programs stopped and participation ended [17, 38]. As Ros-Tonen et al. [38] writes: "Integrated approaches and multi-stakeholder negotiation involve high transaction costs which are not readily available in a developing economy". Temporary and unstable funding therefore also negatively affected the continuity of landscape processes.

Discussion

This review paper provides insights into the types of barriers found within operational landscape initiatives. Using the "landscape process wheel" [19•] as an analytical framework, we identified various barriers hindering the implementation of landscape approaches and categorized them into specific types of problems related to participation, interactions, institutions, or resources. We studied how these were further linked to the following key landscape processes: planning and visioning, developing and implementing practices, establishing good governance, and monitoring and evaluation.

Typical Problems Identified for Different Key Processes

Although many barriers may appear similar on a higher level of abstraction (e.g., "a lack of relevant stakeholders"), the in-depth study of processes demonstrated more specifically why such issues posed specific problems, differentiated at process level. For example, in the monitoring process, participation problems were due to a lack of specific stakeholders with monitoring and modeling skills, whereas for establishing good governance, the absence of particular stakeholders hampered inclusive decision-making [29, 36, 37]. These examples show the importance of analyzing barriers on a process-level, to gain a higher level of detail in terms of the problems encountered.

Weaknesses in Supporting Processes

Our analysis showed how weaknesses in supporting processes hamper the other processes within the landscape process wheel. When supporting processes, such as stimulating participation and mobilizing resources are not functioning properly, this leads to limited engagement of relevant stakeholders and limited financial resources. Many problems were related to stakeholders' absence or their capabilities. A lack of participation of relevant stakeholders was problematic for the planning and visioning of the landscape approach, the development of new landscape practices, the establishment of good governance and monitoring. Moreover, a lack of interaction between stakeholders, the poor quality of these interactions (e.g., conflicts), and a lack of financial support and knowledge were common denominators for a large share of the barriers. This highlights the importance of a deeper understanding of how supporting processes can be fostered. This in turn is expected to have positive effects on the implementation of other landscape processes.

Impeding Institutional Environment

A group of barriers hampering landscape initiatives was related to national policies, institutional structures, or inadequate institutional environments. Examples are conflicting policy measures, a lack of integration between sectoral policies, unclear land tenure regulation, a lack of rights for community members, and corruption. Our analysis showed how shortcomings in the institutional environment could hamper each key process. For example, a lack of formal recognition from the government hampered the development of landscape institutions (e.g., multi-stakeholder forums). Since these problems were related to the broader institutional environment at different scale levels, they might be more difficult to tackle.

Importance of Context in Determining Specific Problems and Problem Solving

Earlier literature already emphasized the importance of local context in determining the performance of landscape initiatives [13••,17]. Differences in local conditions can also explain the broad range of barriers found for each process. Local context, e.g., the stakeholder constellations present, institutional settings, and specific initial landscape conditions, determine the changes needed to transition towards more integrated forms of landscape management, and this in turn determines the problems that can be encountered [23]. If specific governance instruments are already in place (e.g., local

natural resource management schemes), these might need adaptations towards better integration, but when there are no adequate institutional structures yet, development of new ones, such as new committees or multi-stakeholder forums, is needed [43]. In some cases, global policy instruments such as REDD+ supported local initiatives in setting up and promoting landscape approaches, but sometimes, these also resulted in specific local barriers related to establishing good governance. Context should also be considered in identifying ways to overcome barriers or failure in doing so. Whereas in some cases interest in participation faded due to a lack of funding, in other cases, multi-stakeholder groups continued to exist in the absence of funding because the stakeholders found it worthwhile to invest their time in it [37]. This points at the importance of context-specific conditions.

Limited Knowledge on Testing and Developing New (Economic) Practices

The data did not show many barriers related to testing and implementing new economic activities (e.g., establishing new business models, developing market value and incentives). The limited amount of barriers identified could be explained in several ways. Firstly, we found that business stakeholders, and especially business actors in the supply chains, were often not involved. In only nine of the 76 studied cases, value chain stakeholders were somehow involved. Since these stakeholders have an important role in creating market value within the landscape, this could explain the lack of focus on this activity, and as yet, a lack of related barriers found. Secondly, a bias in literature may have led to a lack of barriers observed. Studies have mostly focused on facilitating processes (negotiation, governance, stakeholder involvement, learning), rather than implementation processes related to new economic and business activities.

Continuity and Institutionalization of Different Landscape Approaches

The study of key processes implemented and related barriers can shed more light on the social-ecological transformations needed towards sustainable landscapes. Many barriers found are related to the first phases of landscape transformation. Problems were frequently related to the trajectory of change (e.g., barriers to planning and integrating visions), but only a few cases in our dataset have entered a next phase where barriers related to continuity occurred (see for instance [37]). These barriers provide key insights into which problems are hampering the phase of institutionalizing new trajectories, by embedding institutional structures and stakeholder constellations, strengthening relationships, and securing continuous funding [20]. Whereas in early phases barriers are often related to spatial planning [65], barriers after implementation can be entirely different: e.g., donors not adapting their strategies when desired impact is not achieved, certain skills and capabilities being lost over time when specific stakeholders leave the initiative, or challenges occurring due to lack of continuity in funding. In one case, researchers were monitoring an initiative, but then left after a few years, which resulted in the loss of specific skills [37]. This raises the question of how to secure capacity building and resource mobilization on the longer term, and how to address this in the design phase of landscape initiatives.

Recommendations for Further Research

Landscape initiatives are complex, and entail multiple sectors, multiple goals, and multiple values. When researchers study landscape approaches, they usually depart from a specific theoretical angle—which often implies a focus on specific types of barriers. For example, social scientists may focus on social barriers, and underestimate the importance of ecological conditions. Studies with a focus on value chain integration, business, and economic perspectives are currently lacking and would be helpful to better understand changes towards sustainable economic landscape practices. In future studies, we recommend participation of scholars from different disciplines, to ensure more integrated reporting and analysis.

Secondly, more empirical studies are needed on the development of initiatives over time, and on initiatives in implementation and monitoring phases. This can provide insights into different types of barriers that are not found when only studying the first phases of development.

Thirdly, in further research, the ways in which barriers to implement landscape approaches are overcome deserve more attention. Currently, this is not straightforward as in some cases, the improved functioning of one key process may create new problems. For example, when stakeholder participation and engagement are well-organized, this can give rise to new difficulties in negotiation and decision-making, or new problems in participatory monitoring because of different stakeholder capabilities. Research on ways and mechanisms to overcome barriers could benefit from studying those solutions in relation to the key processes in landscape approaches.

Finally, the roles of various stakeholders, such as NGOs, donors, and governments in overcoming barriers, deserve more attention, in their contributions to the development of new sustainable business models that operate on landscape scales. Coordinating institutions and new multi-stakeholder platforms are required to shape new and shared visions of sustainable landscapes, thereby addressing the different sustainability dimensions [48].

Conclusions

This review provides insights into barriers underlying specific key processes in the implementation of integrated landscape approaches. Main stakeholder problems were found to be related to the absence of specific stakeholder groups, uncertain engagement, or lack of stakeholder experience and skills. Typical interaction problems were related to a lack of communication, collaboration, or coordination, a lack of agreement due to different stakeholder visions, and unequal power relations. Main institutional problems were related to incompatible (national) policies and institutional structures hindering integration, while resource problems were often related to limited availability of financial resources and a lack of data. Although many of the analyzed barriers may appear similar on a higher level of abstraction (e.g., 'lack of engagement of relevant stakeholders'), our study demonstrated how they posed specific problems in relation to the different key landscape processes of planning and visioning, developing and implementing practices, establishing good governance, and monitoring and evaluation.

Identifying barriers on a process level enables a better understanding of the different parts of a landscape approach that are stagnating. This can further point at more specific interventions needed to promote successful implementation. Even though some landscape initiatives are being implemented successfully, securing the continuity of the new approach is important. This review identified a first set of continuity barriers that occurred in some more advanced landscape initiatives. Adaptive management and learning are key processes for continuity, especially since landscape approaches are complex and surrounded by uncertainty. The set of barriers coupled to key processes represents a diagnostic tool to identify potential problems in an early stage, which could aid adaptive management and enhance learning.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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