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Using Scenario Building and Participatory Mapping to Negotiate Conservation-Development Trade-Offs in Northern Ghana

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Abstract: In multifunctional landscapes, expanding economic activities jeopardise the integrity of biodiverse ecosystems, generating conservation-development trade-offs that require multi-stakeholder dialogue and tools to negotiate conflicting objectives. Despite the rich literature on participatory mapping and other tools to reveal different stakeholder perspectives, there is limited evidence on the application of such tools in landscape-scale negotiations. This paper addresses this gap by analysing a participatory mapping process in Ghana's Western Wildlife Corridor, where a community-based landscape governance system called the community resource management area (CREMA) exists. Data from three participatory mapping workshops and focus group discussions with community and institutional actors reveal that increasing demand for food and natural resources and climate change impacts are drivers of landscape degradation, resulting in declining faunal and floral biodiversity and reduced ecosystem services. Meanwhile, community actors prioritise the expansion of farming land, while institutional actors prioritise forest conservation. However, scenario building and participatory mapping helped communicate each other's aims and reach a negotiated consensus. Finally, power relations, cultural and traditional rules, and differences in knowledge affected deliberations and decision-making. We conclude that scenario building and participatory mapping can contribute to an inclusive landscape approach, provided that well-functioning multi-stakeholder platforms are in place and facilitators adequately navigate power imbalances and recognise different kinds and degrees of knowledge.

Keywords: conservation-development trade-offs; consensus-building; participatory mapping; scenario building; integrated landscape approach; community resource management area (CREMA); northern Ghana

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1. Introduction

Effective governance of multifunctional landscapes requires decision-making processes that consider divergent views, values, interests, and expectations. Such processes require balancing the influence and power of diverse stakeholders to formulate and maintain a common vision in the face of dynamic socio-ecological changes at the landscape scale [1]. A multitude of stakeholders have important roles in managing landscapes and natural resources, and as such a broad spectrum of views should be taken into account [2]. Therefore,

there is a growing willingness and commitment to include previously marginalised groups, such as smallholders, women, Indigenous peoples, and local communities, in decisions concerning sustainable landscape governance and management [3]. Often, the people who have traditionally been excluded from decision-making are those who depend on resources the most.

Beyond the technical challenges of managing conflicting interests and finding compromises regarding land and resource use, landscape governance involves reconciling knowledge and considerations of key stakeholders, defining responsibilities, and concerted planning that expresses priorities in terms of objectives, needs, and challenges [4–6]. This typically requires a multi-stakeholder dialogue process [3,5,7]. Against this background, integrated landscape approaches that promote multi-stakeholder dialogue for land-use decision-making and practice are increasingly endorsed and widely implemented [8,9]. Compared to sectoral approaches, integrated landscape approaches place a greater emphasis on making land-use trade-offs explicit and subject to negotiation in multi-stakeholder platforms [5,8,10,11]. However, multi-stakeholder platforms and forums are often idealised as frameworks for collaboration and consultation. Equality of voice and realising equitable outcomes within such processes are often challenging [3]. Tools for identifying different stakeholder perspectives are needed to achieve inclusive negotiation of trade-offs with all relevant parties. Therefore, place-based planning is increasingly supported by spatial tools such as participatory mapping and scenario building [10]. Indeed, the use of participatory spatial tools in natural resource governance has become common due to their potential to stimulate more inclusive processes that consider social, cultural, and professional differences as well as diverging interests [2,12]. The findings of studies conducted by Robinson et al. [13], Aggrey et al. [14], and Asubonteng et al. [15] demonstrated the potential of these tools to bring landscape stakeholders together to define common concern entry points and to encourage critical consultation and collective knowledge co-production among various landscape stakeholders.

Participatory mapping is the process whereby local communities visualise a landscape pictorially with the assistance of technical partners, such as government agencies, non-governmental organisations, research institutes, and other actors involved in the development and land-related planning [16]. The resulting participatory maps reflect the priorities and concerns of the stakeholders who produce them and can be used to shape new spatial realities. It is, therefore, important that all those who will be affected by maps of their landscape actively participate in their creation [17]. A well-designed and facilitated multi-stakeholder process can enhance the inclusion of all key stakeholders in the mapping process. Participatory scenario building aims to discuss plausible futures of complex and dynamic systems among stakeholders with diverging interests to enhance the inclusion of local voices in decision-making, knowledge exchange, and social learning [18–20].

In Ghana, the Wildlife Division of the Forestry Commission initiated Community Resource Management Areas (CREMAs) that devolve natural resource decision-making to the community level and emphasise consultation and collaboration between key landscape stakeholders [21]. The CREMA system stresses the need for synergy of actions and consensus in decision-making between government agencies, NGOs, the private sector, community leaders and traditional chiefs, district assemblies, and relevant technical and financial partners [21]. This requires the effective participation of these actors in landscape decision-making and negotiation of trade-offs. However, CREMA governance faces constraints, including the often low capacity of governing bodies to lead discussions among stakeholder groups, particularly intercultural and inter-professional processes with divergent interests [22,23]. To make these diverging interests explicit, this paper analyses how scenario building and participatory mapping can help uncover actor aspirations for landscape and livelihood change and support consensus-building on land and natural resource use. Furthermore, it seeks to understand what happens during the process of trade-off negotiations in participatory mapping. Most studies involving the production of participatory maps focus on the final product (the map) and its interpretations, documenting little of the

discussions and interactions between participants [13–15], with the process of consensus building rarely described [24]. Furthermore, attempts to operationalise integrated landscape approaches can engage different actor groups separately without joint negotiations hence failing to address power dynamics and their role in landscape decision-making [15].

The main question guiding this study is: What is the potential of participatory scenario building and mapping to support multi-stakeholder negotiations of landscape change in the Western Wildlife Corridor (WWC) CREMA governance system? Sub-questions are:

- How do local actors perceive changes in the landscape and their impacts on conservation and livelihoods?
- How do local actors visualise their desired future landscape and the underlying conservation and livelihood objectives?
- What factors influence negotiations of trade-offs and consensus on a common desired landscape?
- What lessons can be learned from the mapping process in relation to the operationalisation of integrated landscape approaches in the WWC?

After outlining the research methodology, this paper elaborates on the trade-offs and consensus concepts. It then analyses the landscape changes perceived by local stakeholders, their impacts on conservation and livelihoods, how they impact landscape composition and configuration now and in stakeholders' desired future, and the factors involved in negotiating potential trade-offs. After discussing the implications of the findings, the concluding section presents lessons and recommendations emerging from the multi-stakeholder participatory mapping process.

2. Methodology

2.1. Study Area

This study is a component of the Collaborating for Operationalising Landscape Approaches for Nature, Development and Sustainability (COLANDS) initiative, coordinated by the Centre for Forestry Research (CIFOR) in collaboration with the universities of British Columbia and Amsterdam and local organisations in the countries where it is implemented, namely Ghana, Zambia, and Indonesia [25]. The study was carried out in the Western Wildlife Corridor (WWC) in northern Ghana, including six communities spread among three CREMAs selected from the six within the WWC landscape (Figure 1). Builsa Yenning (BY), Moagduri Wuntanluri Kuwomsaasi (MWK), and Sanyiga Kasena Gavara Kara (SKGK) CREMAs were selected because they already had their devolution certificates and functional governance structures in place at the outset of the study (2019) [26]. Furthermore, studying three different CREMAs allows for a diversity of views on the evolution of the landscape and provides a representative spatial sample of the landscape. The communities are Fumbisi and Kunyinsa in the Builsa Yenning CREMA, Yizesi and Zukpeni in the MWK CREMA, and Nakong and Kwapun in the SKGK CREMA. They were chosen for their proximity to forest reserves, their role in the CREMA as the seat of the CREMA Executive Committee (CEC), and accessibility.

Located in the northern part of Ghana, the WWC belongs to the savannah ecological zone. Despite significant pressure on natural resources, this area harbours a rich biodiversity of flora and fauna, important for local livelihoods [27]. However, northern Ghana is characterised by a contentious socio-economic context and a high vulnerability to climate change, compounded by the extreme poverty faced by the majority of the rural population [28]. Local communities strongly depend on natural resources, resulting in high pressure on natural ecosystems, leading to landscape degradation and fragmentation [29]. The main livelihood activity is agriculture, which is essentially rainfed and depends on the maintenance of soil fertility [30]. Alongside agriculture, local people earn a living through hunting, charcoal production, mining, livestock, the sale of forest products, and petty trade (food processing and weaving) [31]. Thus, savannah landscapes such as the WWC are multifunctional areas supporting the local economy and achieving biodiversity conservation goals [26]. Such tropical, multifunctional landscapes are characterised by a

mosaic of fragmented forests, areas of agroforestry and monocultures, as well as human settlements, which offer the potential to combine livelihood development and biodiversity conservation [32]. In terms of landscape governance, the WWC CREMAs, which were created relatively recently (between 2016 and 2019), face difficulties related to the functioning of governance bodies, financial and technical resources, and conflicts between various resource users [26].

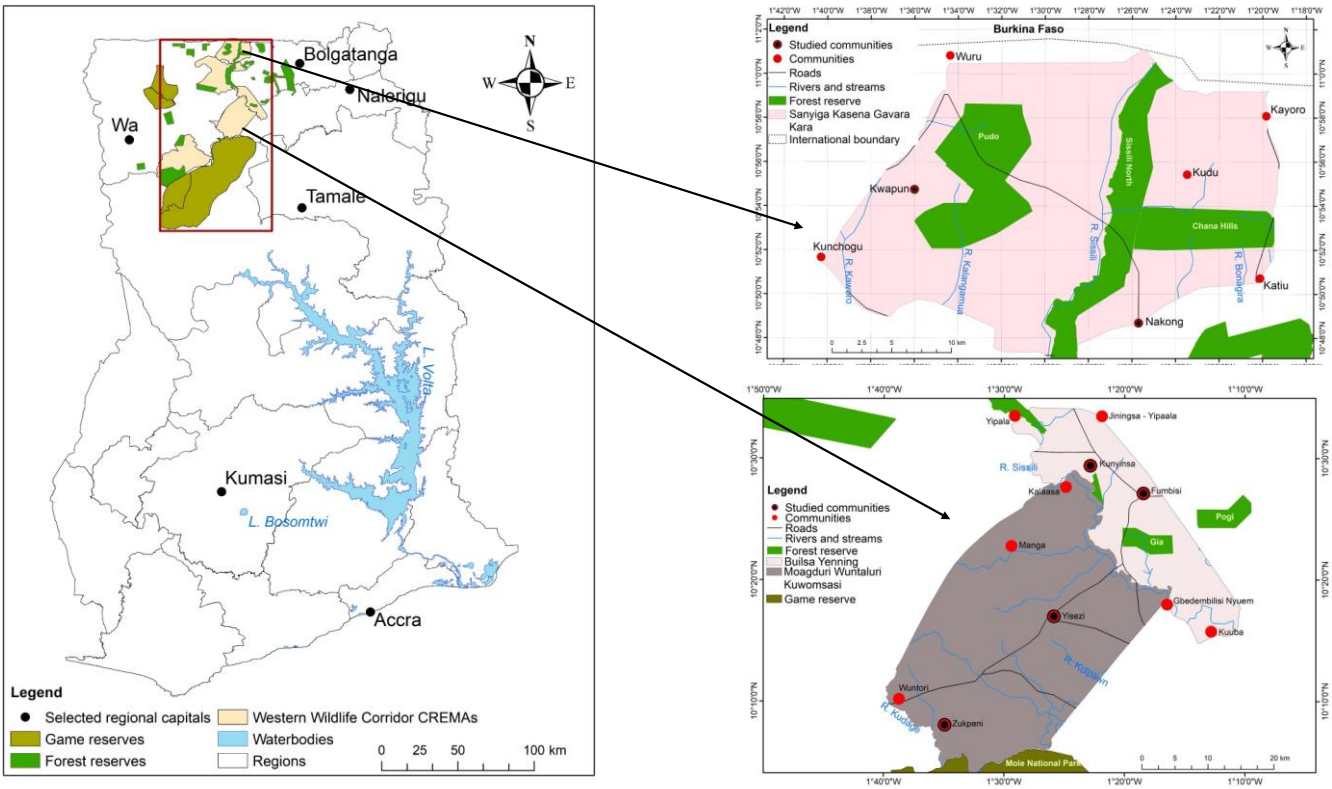

Figure 1. Location of the study area (Source: Authors).

2.2. Data Collection

The study employed focus group discussions and integrated scenario-building and participatory mapping in workshops for gathering data. A total of 34 focus group discussions were held from April to June 2021 with farmer groups, Fulani pastoralists, forest operators, women, youths (18–40 years)[1], and elders (60 years and over) in the three CREMAs. The aim was to capture the perceptions of each stakeholder group on the changes in the landscape, the drivers of change, and the resultant impacts on conservation and livelihoods. In collaboration with the Community Resource Management Committee (CRMC) leaders—community representatives in the CREMA governance structure—the participants (six per actor group) were chosen by convenience sampling based on availability and knowledge of the CREMA's functioning.

The integrated scenario-building and participatory mapping methodology used for this study adapted the approach developed by Asubonteng et al. [15]. It consisted of organising three participatory mapping and scenario-building workshops to discuss the past and anticipated changes, desired future landscapes, and stakeholders' underlying conservation and livelihood aims. This comprised scenario-building exercises and participatory mapping, first by each stakeholder group separately and then by all the stakeholders together (this last step was not conducted by Asubonteng et al. [15]). For the mapping, the Builsa Yenning (BY) and Moagduri Wuntanluri Kuwomsaasi (MWK) CREMAs were put together to form one landscape due to their proximity, while the Sanyiga Kasena Gavara Kara (SKGK) CREMA, which is more distant from the others, formed another landscape.

Basic maps (A1 map frames) of the respective CREMAs, showing landmarks such as forest reserve boundaries, rivers, roads, and well-known villages, were provided to facilitate the mapping process (see Figures A1 and A2 in the Appendix A). Then, symbols representing key land-cover types in the landscape were printed and cut out to allow participants to create their maps by sticking them onto the frame maps. These working materials, glue, and markers were made available to each group to map the composition and spatial configuration of the landscape in its current and desired future state. A time step of 20 years was considered for the scenarios and mapping with reference to the beginning of the CREMAs initiative. In addition, we considered that 20 years is sufficiently long to perceive changes and simulate future landscape dynamics (see [27,33–35]). The objective was, therefore, to understand the changes in the landscape from the beginning of the creation of the CREMAs (in the 2000s) to the present day (2021) and the perspectives of the stakeholders in terms of desired future landscapes in 20 years (the 2040s). Furthermore, the purpose was to identify stakeholders' land-use priorities and suggested scenarios to balance conservation and development objectives, which could contribute to the consensual and inclusive future planning of natural resource use in the area. Indeed, participatory scenario building allows for the inclusion of stakeholders' suggestions for pathways towards good landscape governance and integrated development [12,36].

Each workshop started with a PowerPoint presentation given by the research team (consisting of the first two authors) to harmonise understanding of the study's objectives and some concepts such as landscape, landscape composition, configuration, ecosystem services, landscape approaches, trade-offs, and consensus. This presentation was an opportunity to put the participants in the mood for the study. The moderator had a good sense of humour, sharing stories and jokes, and the explanations helped participants feel confident about the work and mapping to be done. It was also an opportunity to discuss the concept of CREMA and its objectives.

The first workshop was held with only local community representatives in Fumbisi on the 5th of December 2021 and attended by 12 participants (including representatives of farmers, youth, women, and CREMA leaders) from the three CREMAs targeted for the study. The participants comprised four representatives per CREMA (two per target community), selected by the CREMA leaders, ensuring a good spread across gender and age and good knowledge of the CREMA area. Unfortunately, attempts to include representatives of the Fulani pastoralists were unsuccessful due to tense relations between the population groups [37,38]. The second workshop involved only institutional actors and was held in Bolgatanga on the 6th of December 2021. It involved 12 participants, including representatives of public agencies (nine), the private sector (one), a research institute (one), and NGOs (one). The final workshop involved local communities and institutional actors together. This workshop, which took place in Navrongo on the 7th of December 2021, brought together 16 participants (10 from communities and six from public agencies and NGOs). In this last workshop, the representatives of the private sector and researchers were absent. Table 1 summarises the type and number of participants in the three workshops.

The three workshops enabled data collection on perceptions of the current state of the landscape; perceptions of desired landscapes by institutional actors and communities; and factors influencing trade-off negotiations such as power dynamics, knowledge, and culture. With participants' consent, photographs were taken, and the workshop processes were audio recorded, both during participatory mapping exercises and plenary discussions. Notes were also taken based on observations of participants' attitudes during the discussions.

Table 1. Type of participants in the workshops.

Type of Participant	Institution/Group	Number of Participants
	First Workshop	
Local community	Farmers	3
	Women	3
	Youths	3
	CREMA Executive Committee (CEC)	3
Total	-	12
	Second Workshop	
Public agencies	Builsa South District Assembly	1
	Forest Services Division (FSD) of the Forestry Commission	1
	Wildlife Division (WD) of the Forestry Commission	1
	Ministry of Food and Agriculture (MoFA) (Regional office)	4
	Environmental Protection Agency (EPA) (Regional office)	2
Private sector	Organisation for Indigenous Initiatives and Sustainability (ORGIIS)	1
NGO	Tree Aid	1
Research Institute	Forestry Research Institute of Ghana (FORIG) (Regional office)	1
Total	-	12
	Third Workshop	
Public agencies	Builsa South District Assembly	1
	Forest Services Division (FSD) of the Forestry Commission	1
	Wildlife Division (WD) of the Forestry Commission	1
	Ministry of Food and Agriculture (MoFA) (Regional office)	1
	Environmental Protection Agency (EPA) (Regional office)	1
NGO	Tree Aid	1
Local community	CREMA Executive Committee (CEC)	3
	Farmers	2
	Women	2
	Youths	3
Total	-	16

2.3. Scenario Building and Mapping Process

The scenario-building exercise was conducted following five main steps (see Figure 2). After the PowerPoint presentation in plenary, the workshop participants were asked first to describe the perceived changes in their landscapes since the creation of CREMAs; second, to identify the main drivers of these changes; third, to represent the current perceived key land-cover types (composition) of their landscapes; fourth, to give their perceptions on how their landscapes would evolve under a business-as-usual scenario; and fifth, to give the composition of their desired future landscape. Hence, the scenario-building exercise combined predictive forecasting (what will happen under a business-as-usual scenario) to make participants aware of how the landscape will likely look without interventions, and normative scenario building, focusing on participants' desired future landscapes [39]. The exercise was undertaken in plenary at each of the workshops, and each participant gave opinions regarding their respective landscapes (SKGK or BY-MWK for the community representatives and both landscapes for the institutional actors). It was organised in such a way as to focus on one landscape at a time. For example, while the SKGK represen-

tatives had discussions about their landscape at the local communities' workshop, the BY-MWK representatives silently observed and waited their turn. The same was the case in the joint workshop, except that institutional actors participated in the discussions on both landscapes.

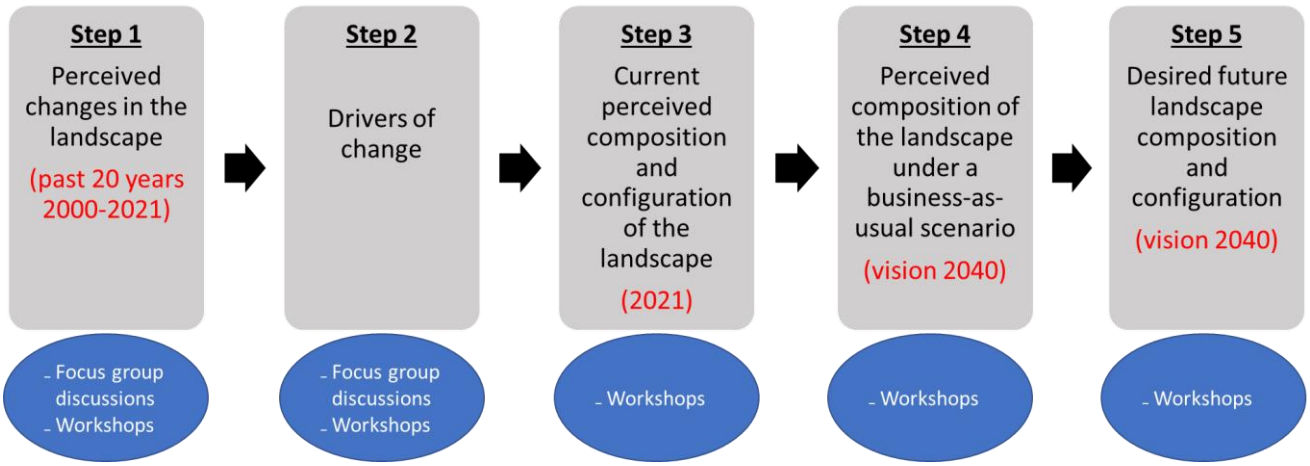

Figure 2. Participatory scenario-building methodology.

The land allocations for each land cover were displayed in a pie chart and projected for participants to visualise and generate discussion. The proportions of land-cover types in each landscape were only retained when all participants concerned with that landscape agreed. There was more debate and negotiation about future landscapes than about current landscapes. This was because participants did not easily agree on what they wanted for the future and land proportions to allot, and unsurprisingly, one could see that everyone was trying to push through a scenario that favoured their interests, with others sometimes trying to impose their own (see Section 4.5.2).

After this exercise, the participants organised themselves around the map that concerned them, following the moderator's instructions, to start the mapping. Participants had to agree on the desired configuration based on the composition of their current and future landscapes, which had been discussed in the plenary. The communities used the current state of the landscape configuration and the difficulties associated with it as a basis for deciding on the desired changes. The institutional actors, guided by national policies and laws, focused on what they considered a balanced landscape (in terms of a balance between conservation and livelihood activities). Each participant explained their point of view, trying to convince the others of the relevance of the proposed configuration. Discussions could go on for quite some time before the group agreed and started to paste the symbols of the land-use types on the map frame. This exercise was not without disagreement, which at times escalated to heated exchanges of opinion. For example, two women entered into a verbal dispute at the local community workshop because they had conflicting opinions and could not agree. The moderator had to intervene to reduce the tension (he encouraged the two women to apologise to each other and then, using small jokes, restored a good working atmosphere) and helped the participants to listen to each other to understand each other better. The joint workshop between institutional actors and local communities had moments of tension (see Section 4.5.2). The moderator's intervention always calmed the situation and allowed each participant to express themself (teasingly encouraging the more timid to offer their point of view).

2.4. Data Processing and Analysis

Some data processing commenced on-site during the workshops. Data on perceived land-cover types and their estimated proportions in current and desired future landscapes displayed as pie charts during discussions was the first layer of analysis [15]. Not all

recordings could be transcribed due to the poor quality of some (poorly captured voices and incomplete sentences) and because others were in local languages (sometimes, local actors used languages not understood by the research team during mapping sessions; to ensure that we did not miss essential debates, we asked questions to receive explanations in English and noted them down). Thus, quality audible portions of discussions made in English and field notes taken by the first two authors were used for the analyses. The maps were examined separately by two members of the research team, who then discussed to harmonise their findings [15,40]. This was conducted based on a visual comparison of maps, considering the spatial distribution of land-cover types, the dominant land-cover types, the arrangement of these land-cover types, and the status of forest reserves in the landscape. The data collected during the focus group discussions and the notes taken during the workshops were compiled thematically to facilitate the analyses. Themes included: perceived changes in the landscape, drivers of change, and effects of changes on livelihoods and conservation.

3. Key Concepts: Trade-Offs, Compromises, and Consensus

Reaching consensus requires listening to and considering all viewpoints and facilitating the participation of all stakeholders in the discussion and deliberations, thus increasing the quality and legitimacy of decision-making [24]. This usually involves compromise from the actors involved, resulting in new trade-offs when a decision on an action or initiative benefits one aspect or actor at the expense of another [41]. Trade-offs can therefore be seen as the result of a disagreement when people resent having made concessions, the choice of one outcome at the expense of another, or the abandonment of the desired situation in favour of another, depending on the evolution of circumstances, contexts, and realities [42].

Related to landscape approaches, trade-offs mainly refer to those between conservation and development [25,43–45], between landscape multifunctionality and agricultural productivity and profits [32,46], and between ecosystem services [47,48]. According to Galafassi et al. [41], dealing with trade-offs requires being informed about the advantages and disadvantages of a particular choice. This can be achieved through a relational learning process involving actors with different knowledge so that the full range of visible and hidden trade-offs can be revealed [41]. However, decisions are often made without being aware of the full potential repercussions, hence the need to undertake a prior analysis of trade-offs, taking into account social and landscape dynamics in time and space to identify possible implications [41]. Therefore, landscape governance requires stakeholders to make informed choices, and participatory mapping and scenario building can help in this process [15]. Even though they have been criticised for not necessarily leading to changes in the landscapes [49,50], these processes provide opportunities for stakeholders to generate and share knowledge, discuss challenges and priorities, make future projections, and agree on shared visions for the future of the landscape [15,19].

However, as landscape stakeholders have different interests and visions, what may be seen as a loss by some may be seen as a gain by others, and what appears to be a rational decision for one stakeholder may not make any sense at all for another [8,41]. Thus, depending on interest or motivation, different people perceive trade-offs differently [42]. Given the recurrent conflicts between conservation and livelihoods, conservationists and natural resource users must understand each other by discussing all perspectives, including biodiversity and socio-economic needs [51,52]. Understanding the motivation of stakeholders is necessary to negotiate a consensus that is satisfactory to all actors to foster their commitment to the implementation of the decision taken and the sustainable governance of the landscape [53,54].

Figure 3 illustrates the iterative and adaptive nature of the sustainable landscape governance process, highlighting five major steps related to stakeholder participation, negotiation of trade-offs and consensus, and genuine stakeholder engagement in governance. Mobilising all key landscape stakeholders within a common consultation platform is a crucial step to initiate inclusive trade-off negotiations and deliberations on land use.

The aim is to reconcile various interests, which is a prerequisite for achieving consensus among stakeholders on the use of their landscape resources. When stakeholders agree on a common vision and adopt consensual decisions, their commitment to implementing actions is more meaningful. This promotes inclusive and sustainable governance of landscape resources and balances conservation and development objectives.

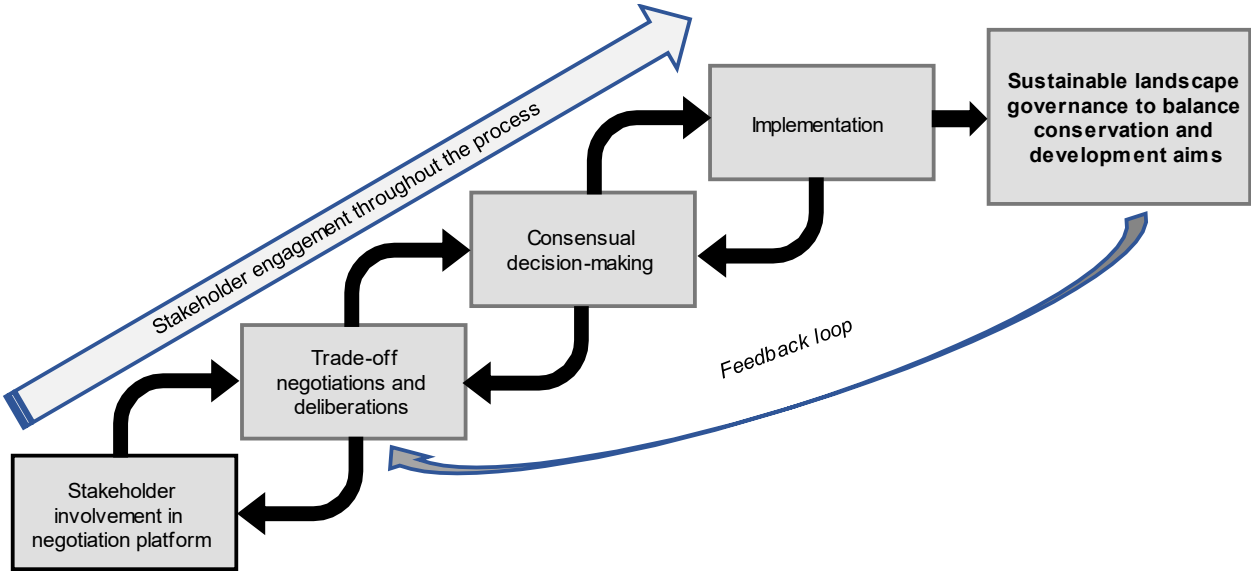

Figure 3. An iterative and adaptive conservation-development reconciliation process for sustainable landscape governance (Source: Authors).

4. Results

This section presents the perceived changes in the landscape over the last 20 years and those desired over the next 20 years. In addition, it discusses the perceptions of likely changes under a business-as-usual scenario. The study participants identified seven main land-cover types, namely, forests, waterbodies, farmlands, grasslands, tree crops, settlements, and mining, and represented them in the participatory maps. For ethical considerations, we have avoided disclosing any information that could help identify the study participants.

4.1. Perceived Changes in the Landscape, Their Drivers, and Impacts on Conservation and Livelihood

According to the actors interviewed in the WWC landscape, the significant changes include increased farmland, decreased forest, the impoverishment of soils, and the progressive siltation of water bodies. This evolution in time and space results from a growing demand for food and economic resources due to demographic growth, leading to an increase in the number and size of agricultural fields. In addition, the interviewees highlighted many other causes, namely indiscriminate bushfires, overgrazing, excessive removal of trees (for farms, charcoal, and trading), and mining. Beyond anthropogenic actions, a major cause of these changes is the amount, timing, and spatial distribution of rainfall. Most elderly groups attribute this to abandoning certain traditional rituals previously performed to attract rainfall and benefit from prosperous agricultural seasons. They also blamed it on the blatant breaches of taboos (due to the influence of new religions and modern knowledge). In contrast, young people and institutional actors attribute the decline in rainfall to climate change.

Regarding wildlife, many species are reported to have become rare in the area (Table 2). Both local communities and institutional actors view the increasing proximity of human settlements to wildlife habitats, the increasing population of hunters and poachers, and the intrusion of domestic animals and livestock into protected areas as the factors contributing to the reduction of wild animals.

Table 2. The perceived scarcity of wild animal species and declining plant species.

Common Name	Scientific Name *
Animal species	
Grasscutter	*Thryonomys swinderianus*
Crocodile	*Crocodylus niloticus*
Rabbit	*Cricetomys gambianus*
Bush fowl	*Numida meleagris*
Deer	*Cervus elaphus*
Patas monkey	*Erythrocebus patas*
Baboon	*Papio anubis*
Green monkey	*Cercopithecus aethiops*
Roan antelope	*Hippotragus equinus*
Partridge	*Alectoris rufa*
Buffalo	*Syncerus caffer*
Elephant	*Loxodonta africana*
Hyena	*Crocuta crocuta*
Bushpig	*Potamochoerus larvatus*
Plant species	
Dawadawa	*Parkia biglobosa*
Rosewood	*Pterocarpus erinaceus*
Baobab	*Adansonia digitata*
Kuka	*Kaya senegalensis*

Source: Field data, 2021. (* https://www.csir-forig.org.gh/tikfom/database (accessed on 22 December 2022); [55,56]).

Local communities perceive medicinal plants such as baobab, *kuka* (made from dried powdered baobab leaves), *dawadawa* or locust beans (*Parkia biglobosa*), and other plant-based food items (baobab fruits, *dawadawa* seeds), to have become rare due to the degradation of the forest. They also see a reduction in the population of the shea tree (*Vitellaria paradoxa*), the fruits and nuts of which are highly valued for food and trade. Women indicated that it is increasingly difficult to develop their income-generating activities based on non-timber forest products[2], especially fruits, and leaves, because of the significant decline in availability; "*Trees don't yield much anymore because they are old and few now*", they observed (Women FGD-3)[3]. In addition, many other ecosystem services have reduced significantly over time, according to the elders. These include fertile land, fish, wild fruits, clean water, protection from strong winds, and honey. The scarcity of wild animals has also negatively impacted people's livelihoods, such as hunting which is no longer able to meet market demands. Meanwhile, farmers complain that soil depletion has led to a decrease in agricultural yields, forcing them to expand their farms, whereas pastoralists lamented that the expansion of agricultural areas has reduced grazing areas.

4.2. Perceptions of Current and Future Composition of Landscapes' Future under a Business-As-Usual (BAU) Scenario

The SKGK CREMA stakeholders—representatives of different social groups, including women, youth, farmers, and CREMA leaders—perceive their present landscape to comprise 45% forest, 25% farms, 10% grassland, 10% settlements, 6% tree crops, 2% waterbodies, and 2% mining (Figure 4a). Similarly, BY-MWK stakeholders view their landscape to be dominated by forest (30%), followed by farms (21%), grassland (18%), settlements (19%), tree crops (7%), waterbodies (4%) and mining (1%) (Figure 5a). Notably, BY-MWK participants perceived approximately twice the proportions of settlement and grassland than those from SKGK. The community workshop participants unanimously agreed that their landscape would dramatically change in the next 20 years if the current rate of resource degradation continued. *"The landscape will be seriously destroyed if things continue like that. We are not happy with the current trend already"*, said one participant at the workshop with communities. Additionally, according to a group of young people during the focus group discussions, *"The forest occupies too much land; we want it to reduce, but not to disappear"*.[4]

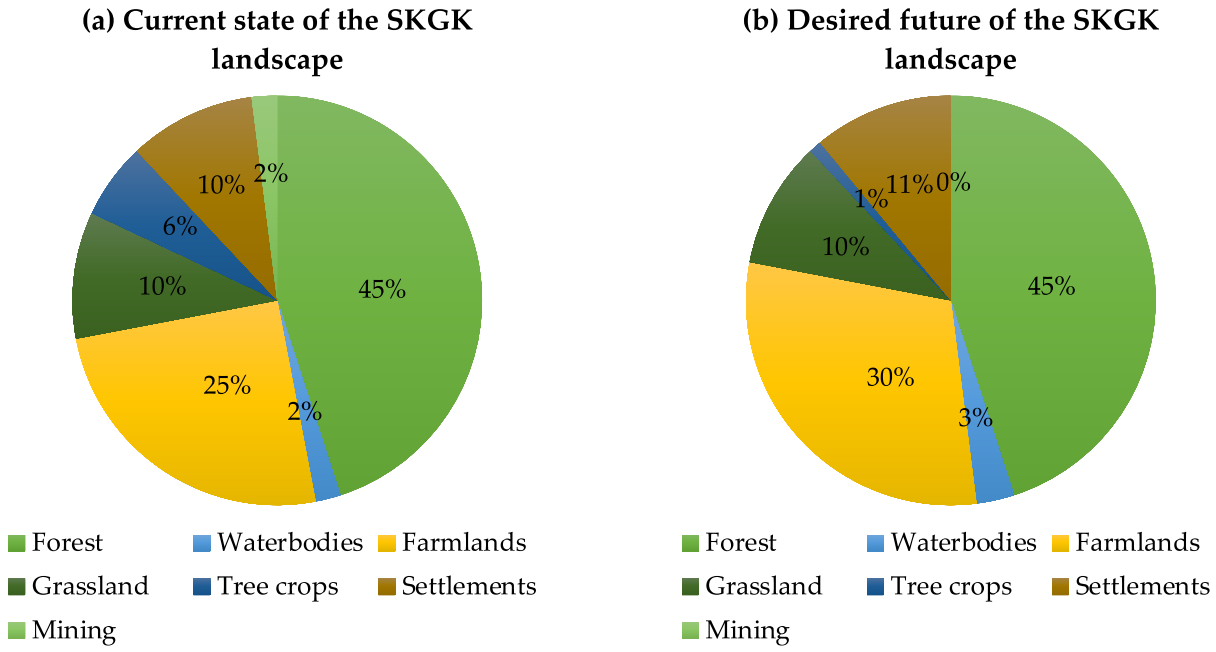

Figure 4. The current state (**a**) and desired future composition (**b**) of the Sanyiga Kasena Gavara Kara (SKGK) landscape as perceived by community actors.

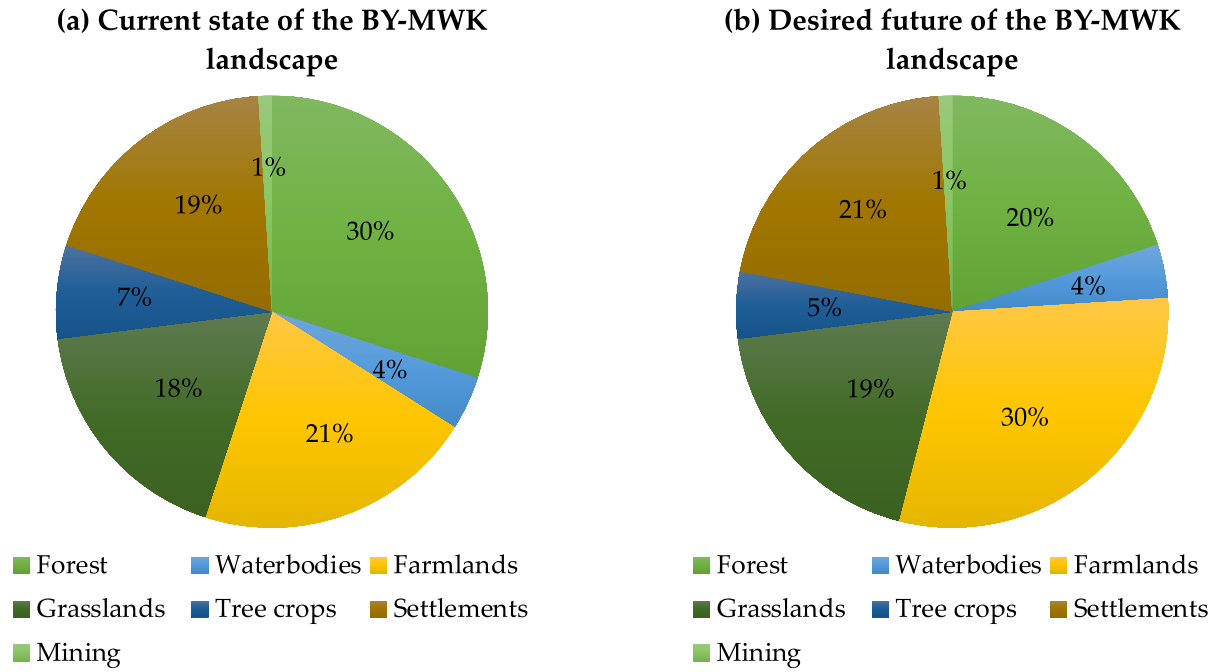

Figure 5. The current state (**a**) and desired future composition (**b**) of the Builsa Yenning (BY)-Moagduri Wuntanluri Kuwomsaasi (MWK) landscape as perceived by community actors.

Local communities envision their future landscape as heavily dominated by agricultural fields, human settlements, and tree crops under a BAU scenario. They foresee these expansions to be at the cost of forests, given that logging, farming, and mining activities are intensifying over time. Furthermore, given the projected extent of population growth, the demand for livelihoods will increase and require a larger area of agricultural land. This will contribute to deforestation through logging for timber, charcoal production, and mining that is already taking place, especially in the SKGK and MWK CREMAs. According to these communities, even the forest reserves in the area (Gia, Pudo, Chiana Hills) will be

heavily destroyed, making life more difficult because there will be few ecosystem goods and services to support their survival. Settlement areas are expected to expand and densify to become more urbanised, characterised by increased road networks, buildings, and administrative services, as signs of this urbanisation process are already noticeable in Fumbisi, Nakong, Chiana, and Kayoro. In addition, there is an increasing interest in tree cash crops such as mango and cashew plantations.

Institutional stakeholders estimate the current composition of the SKGK sub-landscape to be 30% forest, 41% farmlands, 5% grassland, 15% settlements, 1% tree crops, 3% waterbodies, and 5% mining (Figure 6a), and that of the BY-MWK sub-landscape to be 40% forest, 35% farmlands, 6% grassland, 13% settlements, 2% tree crops, 3% waterbodies, and 1% mining (Figure 7a). They believe that urban development in the area will create more demand for forest products in the next 20 years. Fumbisi and Chiana already have significant markets for these products, which will probably intensify in the future. However, these actors do not see the future of the landscape under BAU as pessimistically as community actors. According to them, flora and faunal resources will decline due to agricultural, mining, and logging activities, leading to degrading natural ecosystems (forest and water bodies). However, they expect forests will always be among the dominant land-use types in the landscape, given the ongoing conservation efforts by public agencies and NGOs. In common with the local communities, they expect the area of tree crops to increase, as well as that of settlements, mines, and farms, while the area of forests, grassland, and waterbodies will decrease, but for them, all these changes are not considered to be very alarming.

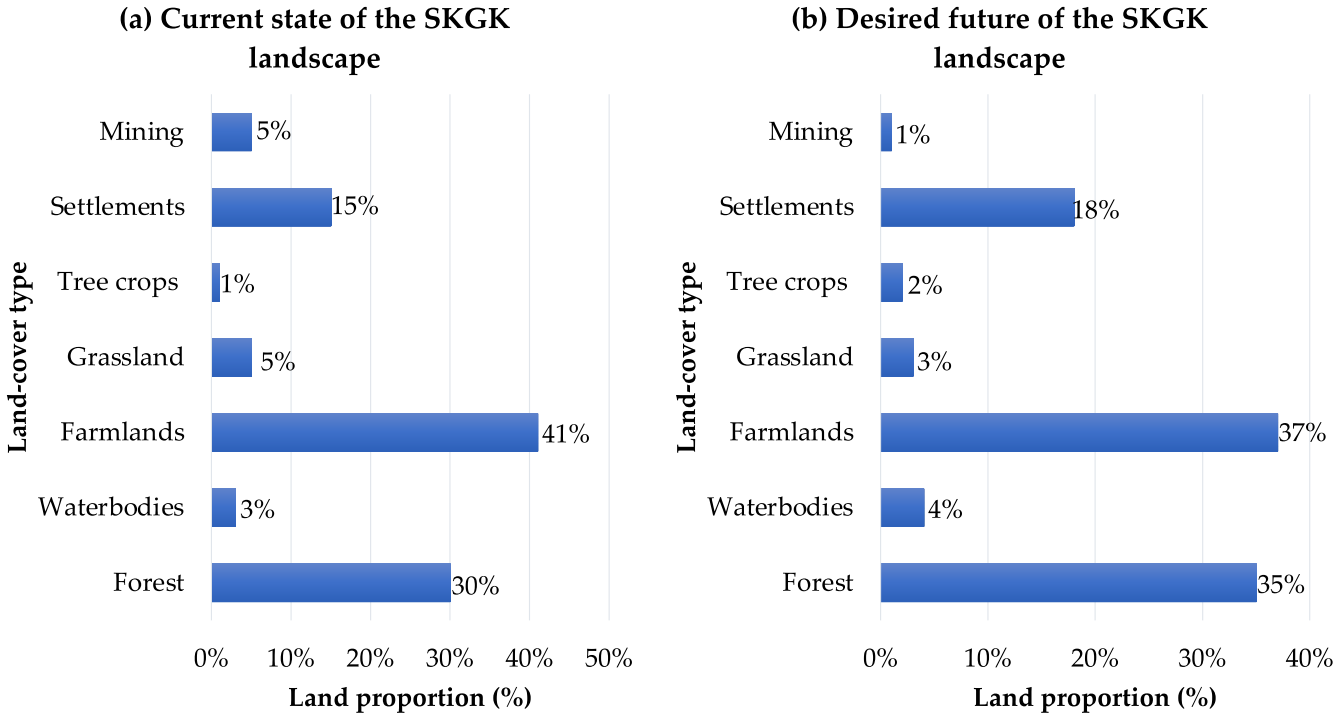

Figure 6. Perceived current state (**a**) and desired future composition (**b**) of the Sanyiga Kasena Gavara Kara (SKGK) landscape as visualised by institutional actors.

Among many other suggestions, such as promoting proper livestock-rearing practices to avoid indiscriminate grazing, good agricultural practices (sustainable agriculture, i.e., agroforestry), designing and enforcing by-laws, and greater involvement of traditional leaders, community and institutional actors supported the idea of a land-use plan that would allow for more sustainable resource use at the landscape level. The next sections, therefore, explore how stakeholders in three community management areas (CREMAs) negotiate the trade-offs and arrive at a consensual landscape scenario that allows them to achieve their objectives.

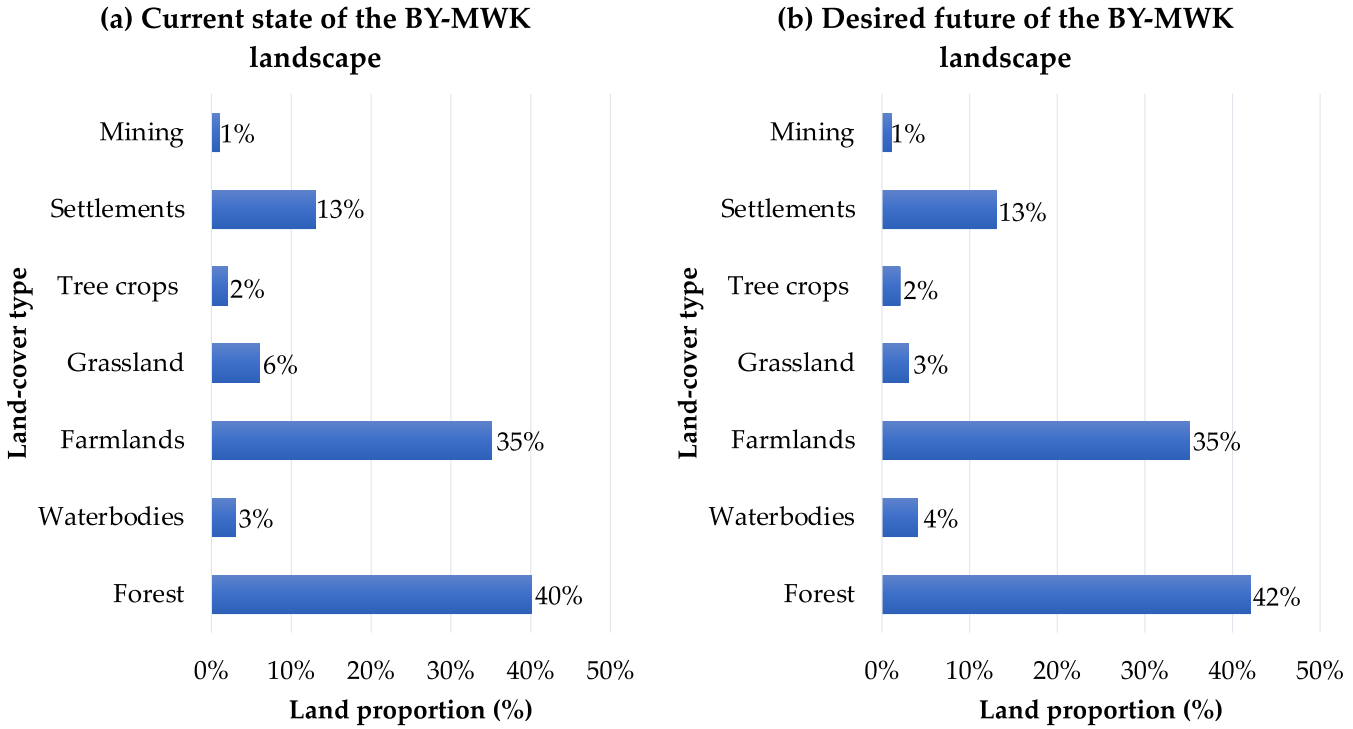

Figure 7. Perceived current state (**a**) and desired future composition (**b**) of the Builsa Yenning (BY)-Moagduri Wuntanluri Kuwomsaasi (MWK) landscape as visualised by institutional actors.

4.3. The Envisioned Composition of Desired Future Landscapes

This section analyses the composition of the future landscapes desired by local communities (Section 4.3.1), institutional stakeholders (Section 4.3.2), and the two groups together (Section 4.3.3). The desired configuration of future landscapes will be analysed in Section 4.4.

4.3.1. Desired Future Landscapes by Local Communities

The consensus among community stakeholders on the desired future SKGK landscape shows an increase in agricultural areas of 5%, and minimal increases of 1% in waterbodies and settlements, while the areas of forest and grassland remain unchanged. However, they anticipate a decline in the percentage of tree crops and total abandonment of gold mining. This is almost the same for the BY-MWK, where community stakeholders expect the projected areas of farmlands, settlements, and grasslands in the desired future landscape to increase by 9%, 2%, and 1%, respectively. In contrast, community actors hope that the forest area will decrease by 10% and that of tree crops by 2%, while waterbodies and mining will remain unchanged.

These results reflect the importance and priority local communities give to livelihoods over conservation: growth in farmland is prioritised over an increase in forest areas. It also suggests that they do not see forests as offering viable livelihood strategies now or in the future. Hence, the desire to convert portions of conservation areas (areas demarcated under the CREMA initiative) into agricultural and grazing areas. In doing so, local people hope to meet their needs for fertile land for agriculture (in the BY-MWK and SKGK) and pastoral areas (in the BY-MWK). The desire for increased water sources, particularly in the SKGK, is linked to the problems of the availability of resources in the area for off-season agricultural and pastoral activities. Communities hope this increase will be achieved by creating permanent water sources such as dams. This is likely to happen because of the current political initiative being implemented by the Government of Ghana, titled "Infrastructure for Poverty Eradication Programme", one of the projects of which is "one village, one dam" [59]. Furthermore, local communities want an increase in the area

allocated for settlements, arguing that population growth in the next 20 years will require an expansion of settlement areas, necessarily encroaching on areas of lower priority in terms of livelihoods, such as forests and tree crops.

4.3.2. Desired Future Landscapes by Institutional Stakeholders

Figures 6 and 7 show the desired landscape changes of institutional actors in the WWC area in the next 20 years. Unlike local communities, the institutional actors opted for a reduction of cultivated areas in favour of an increase in conservation areas. The diagrams show a desired SKGK landscape future characterised by a decrease of 4% in the area dedicated to farmlands, 2% in that of grasslands, and 4% in that of mining activities, while the area of forest would increase by 5%, that of settlements by 3%, and that of tree crops and water resources by 1% each.

The desired composition of the BY-MWK landscape shows a 3% decrease in the area of grasslands, while the areas of farmlands, tree crops, settlements, and mines remain unchanged. On the other hand, the institutional actors wish to see a 2% increase in forest area and a 1% increase in water resources in the future BY-MWK landscape. Although the projected changes seem minimal, they suggest that institutional actors prioritise conservation aims, whereas community actors prioritise livelihood aims. This indicates a need to negotiate trade-offs and find synergies between different objectives and land uses.

4.3.3. Consensus about the Composition of Desired Future Landscapes between Institutional and Community Stakeholders

The discussions between the community and institutional stakeholders led to the elaboration of a consensual composition of the landscapes and the desired future land-use types. Figures 8 and 9 are illustrations of this.

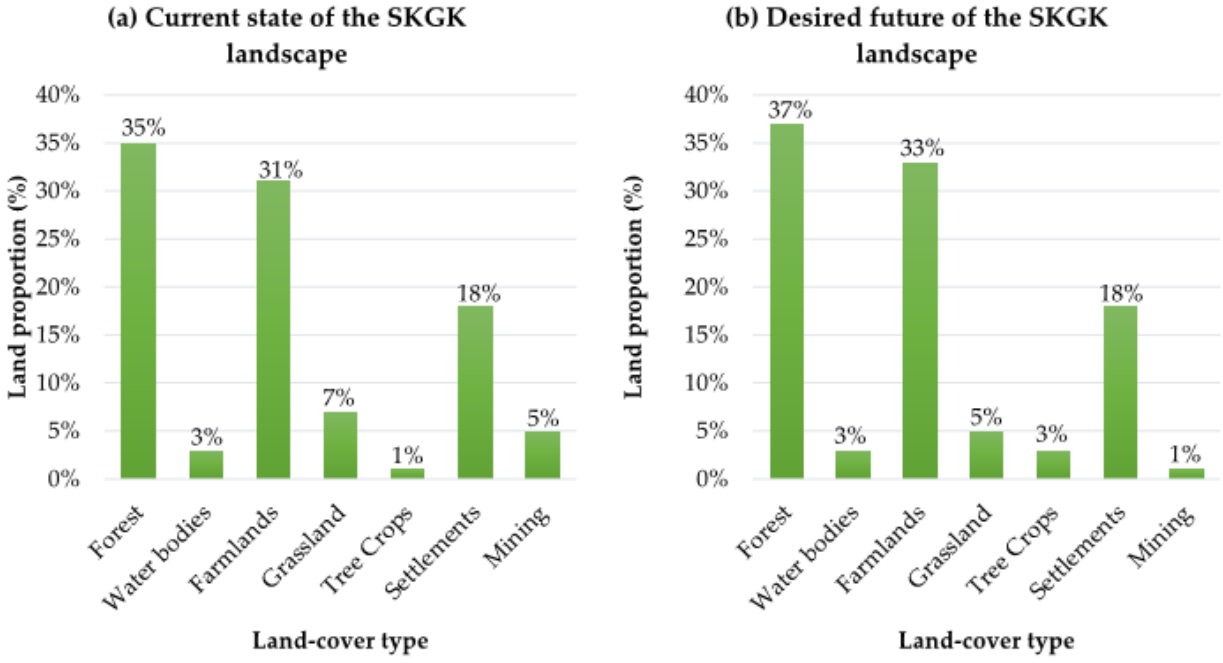

Figure 8. Consensus perception of the current state (**a**) and desired future composition (**b**) of the Sanyiga Kasena Gavara Kara (SKGK) landscape.

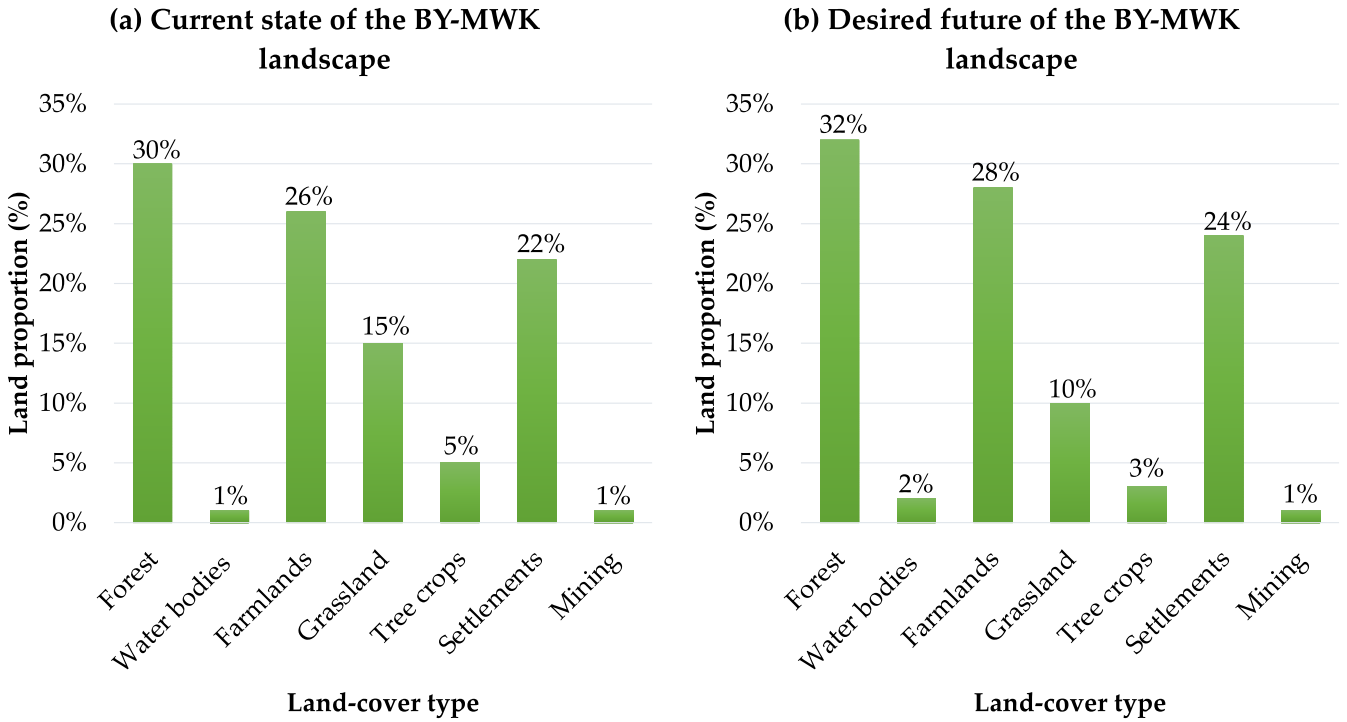

Figure 9. Consensus perception of the current state (**a**) and desired future composition (**b**) of the Builsa Yenning (BY)-Moagduri Wuntanluri Kuwomsaasi (MWK) landscape.

A comparison between the composition of the future landscape preferred by the community and institutional actors separately and the one discussed by the two actor groups together indicates that the negotiated trade-offs mainly concern agricultural and conservation areas. Initially, institutional stakeholders supported the idea of either decreasing agricultural areas (in SKGK) or keeping them unchanged (in BY-MWK) for the next 20 years to increase forest areas. This differs from the vision of the communities who prefer to reduce the extent of conservation areas or to keep them unchanged and increase the farmland. Thus, to reach a consensus, both groups of actors had to agree on reducing the areas dedicated to other land-use types, such as grasslands, mining activities, and tree crops, in favour of farmlands and forests, which are the focus of interest.

In general, and as shown in Table 3, in the SKGK, the local communities have made more concessions than the institutional actors regarding the composition of the desired future landscape. Of all the land-use types, only the consensus on the farmland corresponds to their initial preferences. For the rest, they have revised their position. This contrasts the institutional actors, who made few concessions: of the seven land-use types, they made concessions on three (water bodies, farmlands, settlements). The other four (forest, grassland, tree crops, and mining) remain consistent with their initial selections.

In the BY-MWK, on the other hand, all stakeholder groups made several concessions regarding the composition of the consensually desired future landscape. The difference lies in the types of land use on which concessions are made. For example, community actors made concessions about forests, water bodies, grassland, and mining, whereas institutional actors made concessions on farmland, tree crops, settlements, and mining (see Table 3).

Table 3. Comparative table of changes desired by institutional and community actors.

Land-Use Types	Change Wished by Communities		Change Wished by Institutional Actors		Consensus between Community and Institutional Actors	
	SKGK	**BY-MWK**	**SKGK**	**BY-MWK**	**SKGK**	**BY-MWK**
Forest	No change	Decrease	Increase	Increase	Increase	Increase
Water bodies	Increase	No change	Increase	Increase	No change	Increase
Farmlands	Increase	Increase	Decrease	No change	Increase	Increase
Grassland	No change	Increase	Decrease	Decrease	Decrease	Decrease
Tree crops	Decrease	Decrease	Increase	No change	Increase	Decrease
Settlements	Increase	Increase	Increase	No change	No change	Increase
Mining	Abandonment	No change	Decrease	No change	Decrease	Decrease

Source: Field data, 2021.

4.4. Configuration of Desired Future Landscapes

Concerning the future SKGK, communities prefer a more heterogeneous landscape with a large continuous block of forest surrounded by mixed areas of agriculture, settlement, and grassland, indicating a preference for a multifunctional landscape. This reflects a desire for a significant change from the current landscape they have mapped, which shows a homogeneous configuration with large strips of grassland surrounding forest reserves and small areas of farms and settlements distributed across the landscape.

In contrast, the map of the future landscape produced by institutional actors featured a relatively homogeneous area of forest and linear strips of farmlands. Grasslands and settlements are smaller, spotted in isolation next to agricultural lands for easy food supply. This indicates a slight difference from the current configuration presented by these actors, which shows a less homogeneous landscape with a mixture of small-sized farms, grassland, and settlements, next to large forest and mining areas.

The map of the future landscape jointly produced by institutional actors and communities shows a landscape configuration that draws on the two maps generated by both actor groups. The consensus map maintained existing forest reserve boundaries while adding new forests interspersed with medium settlement areas surrounded by agricultural land of almost the same size. Grasslands are rather small and dotted across the landscape (Figure 10).

It is worth noting that both the institutional and community actor groups expressed a desire for a future landscape in which forest corridors were created to connect to two forest reserves lying east and west to allow easy movement of animals. However, while the jointly conceived consensus map suggested the same, the configuration in the connecting areas is much more heterogenous with mixed forest, agriculture, and settlement areas.

As for the BY-MWK, the communities prefer a homogeneous landscape configuration for the next 20 years (Figure 11b). Indeed, the map of the desired future landscape is characterised by extensive farmlands adjacent to the settlements, which also occupy large proportions, and small forests scattered across the landscape. This configuration differs from the current landscape mapped by these communities, which presents a heterogeneous landscape marked by a mix of farms, grassland, tree crops, and settlements.

The future landscape map produced by the institutional actors (Figure 11d) shows a preference for a more homogeneous landscape with wide strips of forest interspersed with a relatively smaller size of farms, grasslands, and settlements. It also indicates a trend towards reinforcing existing forest reserves surrounded by additional forests. This contrasts somewhat with the current landscape map (Figure 11c), where farm and grassland sizes are larger, and forest blocks are fewer.

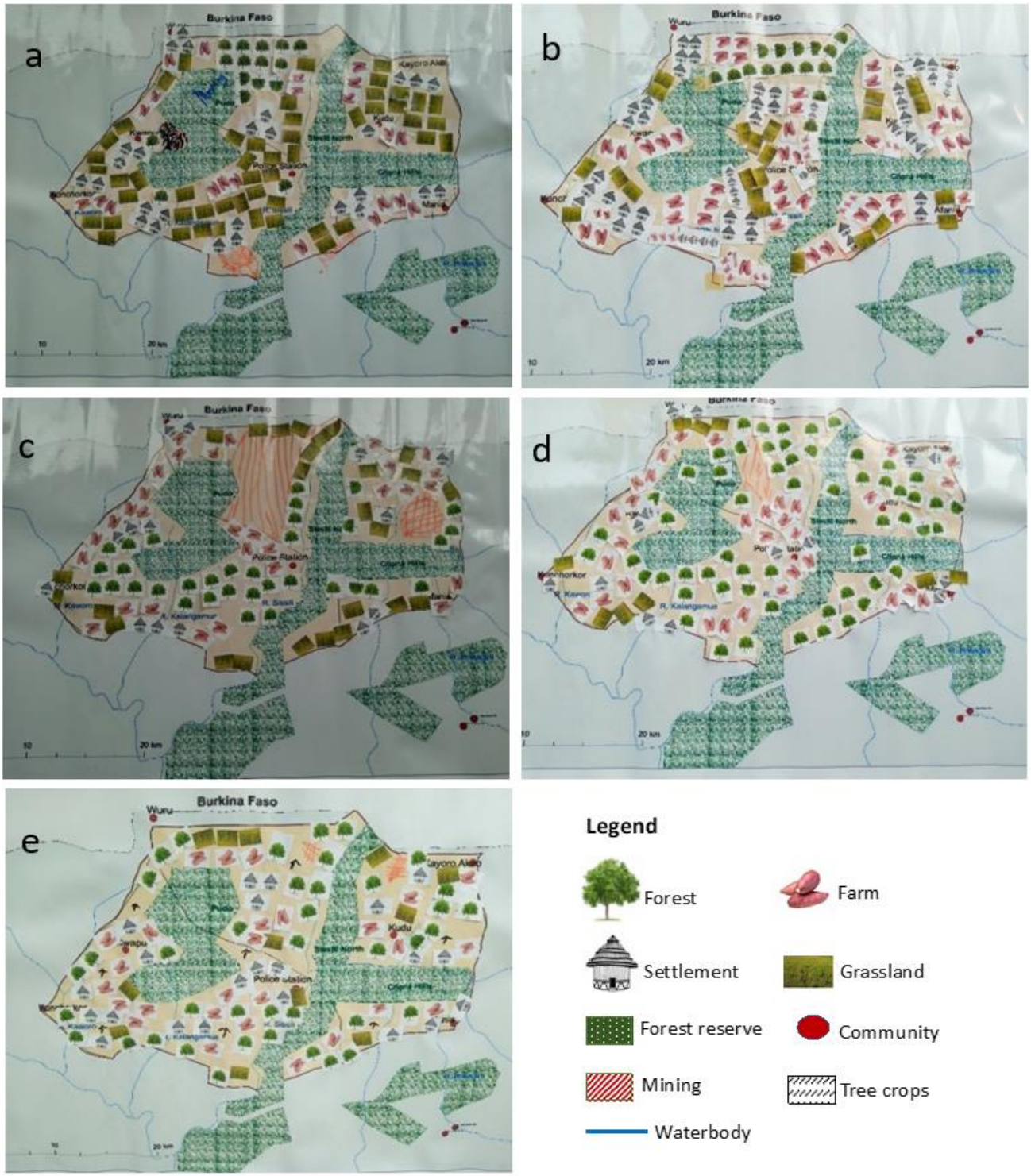

Figure 10. Participatory maps of current and desired futures of the SKGK landscape by community actors (**a** = current; **b** = future), institutional actors (**c** = current; **d** = future), and the consensus view of the future landscape (**e**).

Figure 11. Participatory maps of current and desired futures of the BY-MWK landscape by community actors (**a** = current; **b** = future), institutional actors (**c** = current; **d** = future), and the consensus view of the future landscape (**e**).

The jointly conceived map representing the future desired landscape (Figure 11e) shows that the institutional and community stakeholders have agreed on a homogeneous landscape, with a wide forest strip constituting a corridor that runs from one end of the landscape to the other and a second forest block interspersed by small grasslands. The

map also shows large areas on either side of the forests, with a concentration of farms and grasslands close to the settlements.

The 'consensus' was not entirely satisfactory for some participants (mainly women and elders). They felt that they were somewhat more disadvantaged with their views not sufficiently taken into account. Indeed, while women and elders pleaded for a total abandonment of gold panning because of the disastrous social and environmental consequences (insecurity, immoral behaviour, decimation of trees, and pollution), others, such as the institutional actors and the local youth, saw it as an opportunity to be exploited if the activity is well monitored and controlled. However, as everyone had an interest in the proposed scenario, concessions were made to reach a consensus.

The participants in this participatory mapping and scenario-building process expressed their satisfaction with such an initiative, as it allowed them to consult each other and harmonise their visions. Furthermore, they indicated a desire for subsequent similar experiences, noting that:

> *"This methodology of work (participatory mapping) helped us to see the picture of our area, and now, we understand better some challenges"* (A CREMA leader); *"We got a lot of insights on how realities are in the landscape on a broader way"* (NGO representative); *"Our (institutional actors') vision and community vision were different. But coming together, we were able to solve many of our differences and come out with a shared vision about the future landscape"* (public administration representative).[5]

4.5. Factors of Influence in the Trade-Off Negotiations

The study results allow us to identify three major factors influencing negotiations and consensus-building, namely culture, power, and knowledge (Table 4). We briefly elaborate on these factors below.

Table 4. Factors influencing trade-off negotiations by type of actor.

Type of Actor	Factors
Local actors (communities)	Culture; traditional norms Authority/power
Institutional actors	Knowledge
Local and institutional actors	Conflict of authority Traditional norms

Source: Field data, 2021.

4.5.1. Cultural Factors

According to tradition, women must comply with the decisions of men, who are more empowered to decide on community matters and natural resource use. These cultural factors certainly impacted their ability to effectively engage in elements of the participatory mapping process, which involves decision-making. Their contribution to the exchanges was timid during the discussions between local communities and institutional actors. However, they were much more active in defending their points of view during the discussions between community actors. The women interviewed explained this attitude by the fact that they were intimidated by the presence of institutional actors who are strangers to them, whereas among community actors, they are less intimidated because they are familiar with each other.

4.5.2. Power Relations and Knowledge

Having some authority within the community confers weight in decision-making about community resources. This was particularly noticeable in discussions between community actors. The leaders always tried to impose their views, giving little or no consideration to those of other participants, thus giving the impression that the views of others did not matter. The social position of these leaders made them dominant members

in the deliberations, and until the propositions were to their liking, a decision could not be made. This seemed to be an accepted norm among the other participants.

The discussions between the institutional actors were based on intellectual, balanced, and organised exchanges, guided by forest and wildlife conservation laws, and above all, on knowledge of the terrain. The participants who were more familiar with the landscapes dominated the exchanges and succeeded in having their points of view front and centre. There were no serious conflicts of view because all were unanimous on the need to balance local development and conservation, but also on the fact that the existing agricultural areas are largely sufficient and could be reduced in some places in favour of reforestation.

However, the exchanges between the institutional and community actors were tense, marked by incomprehension and authority conflicts. Community leaders tried to impose their visions of the future, essentially based on prioritising livelihoods over conservation, while institutional actors, notably foresters, supported the opposite ideas, aiming to give more importance to conservation areas. In addition, each of these actors, feeling vested with authority based on their status of community leader or public administration officer, had difficulty accepting any opposition to their opinions. After extensive explanations by institutional actors of the benefits of biodiversity conservation and the need for sufficient forest space, stakeholders began to consider making concessions. In turn, the community actors expressed their motivations. Thus, the knowledge exchange facilitated the negotiation of compromises between the two groups of actors.

5. Discussion

5.1. From Conflicts of Interest to Trade-Offs and Consensus

This study showed that local and institutional actors have experienced significant degradation of the WWC landscape's natural ecosystems over a 20-year time spam, driven by a high demand for natural resources for people's livelihoods. Hence there is an urgent need to find a better balance between conservation and local development by negotiating trade-offs between the various stakeholders operating in this landscape; consensual decision-making is needed to ensure the sustainability of this multifunctional landscape. In this sense, the participatory mapping and the focus group discussions carried out in this study provided the stakeholders with an opportunity to express their respective views and knowledge, negotiate trade-offs, and find consensus on desired future landscapes that would be sustainable and beneficial to conservation and local development. The results of the mapping undertaken by the institutional and community stakeholder groups show minimal changes in the composition of desired future landscapes. This is certainly related to the specificity of the WWC as a biodiversity conservation area, and as such, it does not offer much potential for profound change. In terms of configuration, the maps show that institutional actors prefer more homogeneous landscapes. This is probably motivated by the will to have a more organised landscape that separates biodiversity conservation from livelihoods. The preferences of the communities depend on the current configuration of the landscape in which they are situated. Those who consider themselves to be in a heterogeneous landscape aspire to a homogeneous landscape and vice versa. This result shows their desire to benefit more from the landscape, and changing the configuration is seen as an appropriate solution. However, institutional and community stakeholders agreed on more homogeneous landscapes for the future and increasing agricultural and conservation areas at the expense of other land-use types. This reflects their desire to improve community livelihoods while enhancing biodiversity conservation. Managing and negotiating biodiversity-livelihoods trade-offs entails maximising food security benefits while minimising environmental damage [60]. This consensus indicates a willingness and ability to work with stakeholders with different statuses and interests towards a common vision and a sustainable and mutually beneficial landscape. This result implies that a governance model is needed that allows all key stakeholders to equitably participate in negotiations on how to achieve the desired changes in their landscape, including traditionally absent or marginalised actors whose interests have often been ignored or undermined.

The results further indicate that knowledge is a contributing factor to consensus building in that the decision of one stakeholder can be influenced by knowing the motivations of other stakeholders [8]. Similarly, Galafassi et al. [41] state that knowledge plays a role in consensus building because the decision to accept a trade-off requires a minimum of information as a guideline. However, even when consensus is achieved, inequities remain, as decisions at the landscape level are often influenced by the most powerful and knowledgeable actors [61].

5.2. Do Trade-Offs and Consensus Fall under the "Win More, Lose Less" Principle?

Most landscapes are affected by power differentials between stakeholders, beliefs, and traditional norms [8]. With large gaps in the capacity of stakeholders to participate and have their voices heard, decisions are not always made on an equal footing in many contexts [62]. Consensus may therefore be biased in favour of the most powerful actor. A power position implies respect and loyalty in most cultures, thus constituting a permanent source of influence [63]. Thus, no matter how well efforts are made, those with power will typically assert influence, either directly by imposing themselves or indirectly by their mere presence in decision-making [11]. This could prevent some members present around the negotiation table from expressing their views frankly and accepting the views of the influential members out of convenience, thus making the consensus skewed to the preferences of those more dominant. This attitude is usually seen in women when making decisions in the presence of men, in general, and their husbands, in particular. In Ghana, for example, traditional norms give men more power than women, particularly regarding access to natural resources and decision-making on their management [64,65], hence the low participation of women in decision-making processes. Furthermore, in many societies, decisions made by authorities with power have more weight and are more influential than those without the same power [63]. Thus, in the presence of an authority, people tend to give them priority in decision-making, as was the case in the consultation between community actors.

The results of this study also show that the expression of authority can be a constraint for the negotiation of trade-offs but also an asset for reaching a balanced consensus. Negotiations can become difficult when two (or more) authorities seek to affirm themselves, with the risk of never reaching a consensus. However, such a situation can also lead to a negotiated outcome satisfactory to both parties if the power balance is not in favour of one authority and leads to trade-offs where each party gains more and loses less. The oft-promoted win-win principle in conservation suggests that the decisions taken satisfy all landscape stakeholders and that everyone benefits from landscape governance. However, in negotiating consensus and adopting a rational decision, each stakeholder must make compromises, i.e., accept losing something to gain something else. In the debate on conservation approaches, many authors consider win-win initiatives to be elusive because rarely have they succeeded in achieving an optimal balance between conservation and development objectives [43,66–68]. In addition, because governance decisions frequently result in losers and winners, the principles of equity, equality, and win-win in conservation are often considered to be the exception [10,45,69]. This highlights the utopian nature of win-win conservation and, consequently, of fully harmonious decision-making related to landscape governance. Thus, this study claims that in landscape planning and decision-making, the principle of a negotiated "win more, lose less" [8,25,69,70] should prevail. In this respect, integrated landscape approaches offer a better chance than sectoral approaches of making equitable cross-sectoral decisions on landscapes and land uses [69]. They facilitate the creation of spaces for negotiating trade-offs between several actors to make decisions on the desired future landscapes [8,69]. The idea behind this is that the negotiation process implies compromises in terms of conservation and development. Therefore, the merit of integrated landscape approaches is that they involve a process of deliberation of trade-offs between different landscape actors with different interests and visions, thus raising awareness of

multiple needs, knowledge, and beliefs, building trust among stakeholders, and promoting adaptive management in which stakeholders win more than they lose [44,69].

Nevertheless, integrated landscape approaches should not be seen as a panacea or silver bullet that can solve all landscape challenges but rather as iterative models of governance that adapt according to local, dynamic contexts and embed the necessary mechanisms to adjust as these contexts evolve [25]. Such approaches will be strengthened by good leadership and a robust governance mechanism, including sufficient financial and technical capacity and a verifiable monitoring and evaluation system [8].

This study made clear that participatory plans are not always the result of fully unanimous decisions where all stakeholders are fully satisfied. Consensus does not mean that all the expectations of the landscape stakeholders have been met. However, in the face of differing opinions, visions, cultures, personalities, and contexts, stakeholders strive to find mutually acceptable solutions to resolve conflicts and ensure the sustainable use of natural resources and the sustainability of the landscape [63]. To this end, scenario-building and participatory mapping methods in a multi-stakeholder setting offer great potential for stakeholders to engage in direct dialogue and better harmonise their respective visions, interests, and expectations.

5.3. Methodological Considerations

Participatory scenario-building and mapping were useful in harnessing place-based knowledge, creating awareness of landscape change, and making decision-making more inclusive. It embodies indigenous practices, tacit understanding and values, and knowledge held by state institutions of national laws [14,15,71,72]. However, insights into the composition of stakeholders and implementation approach are as important as outputs derived from the processes to reduce the exclusion of socially vulnerable groups [71]. Depending on the research objectives, existing studies have engaged relatively homogenous stakeholders with common interests and knowledge regarding their circumstances and future aspirations [14,73], mixed stakeholders for knowledge triangulation and confirmation [13,19], and different stakeholder groups with conflicting interests separately to identify trade-offs [15,72]. The latter studies usually do not bring together stakeholders with conflicting interests. This study has tried to fill this gap by adapting the methodology of Asubonteng et al. [15] applied in the Eastern Region of Ghana, which consisted of facilitating separate workshops with community and institutional stakeholders to discuss and map the current status and future desired landscapes. In the original methodology, there was no confrontation between the two groups of actors. The adaption consisted of conducting separate workshops first and then a joint workshop including local communities and institutional actors to allow them to discuss their visions and reach a consensus. Bringing these stakeholder groups together created a different dynamic, and contradictions became clearer. Moreover, it offered the possibility to simulate negotiations and to see what happens when people with different power positions and knowledge sit together in a negotiation process. Furthermore, we did not pay much attention to the BAU future landscape scenario, as did Asubonteng et al. [15], not only because of time constraints but also because the focus was more on the deliberation of trade-offs regarding the future desired landscapes, especially between institutional actors and local communities.

Similar to any scientific approach, the method used in this study is not without constraints. The stakeholder composition was compromised by the unwillingness of some stakeholders to participate in such processes. It was impossible to involve pastoralists in the workshops due to the ongoing tensions between farmers and pastoralists in the area (see [37,38]). Similarly, private companies that assumedly had appropriated most farmlands in the Eastern Region of Ghana excluded themselves from the participatory scenario process [15]. This shows that some actors may willingly exclude themselves from inclusive decision-making processes. Yet, in landscape governance, and especially in participatory mapping and planning, all key stakeholders should be involved because each of them has an interest in, and influence on, the landscape [2]. The presence of the

pastoralist group would certainly have influenced the importance given to grasslands in future landscapes.

In addition, the current landscapes mapped by each stakeholder group display different proportions of land-use types. This makes it difficult to compare the desired future landscapes, especially with regard to the desired amounts of land. Another option would have been to use remote sensing to produce maps of the current state of each landscape (c.f. Siangulube et al., this issue), and each stakeholder group would have worked based on the same maps to project their future landscapes. This could be the subject of future studies. However, the exact proportions are not the focus of this study, but rather a means to better appreciate the evolutionary trend of land-use types, which the different stakeholders wish to have in their future landscapes. The advantage of the method is that it allows each group to visualise their landscape and represent what they believe the proportion currently occupied by each land-use unit to be in the future. In this way, participants feel more involved in the mapping process and less influenced by a pre-designed map imposed on them. To minimise inter-professional, inter-generational, and gender influences, it may be interesting to conduct participatory mapping only with each of the community groups separately (farmers, pastoralists, women, youth, elderly, and forest operators), and then a separate workshop with institutional actors before doing a joint workshop. However, this option can be very costly and time-consuming.

One of the difficulties in this study was the distance between the target communities. The communities had to come from far away to participate in the study. Therefore, participants arrived late in the morning and had to leave before it became dark for security reasons. This did not leave much time for discussion and mapping. Therefore, for the joint workshop held in Navrongo town, we had to rent hotel rooms to enable community participants to come a day before the workshop (the nearest target community was about 42 km away and the most distant was about 85 km, and the institutional actors are mainly based in Bolgatanga which is 30 km away). This is an additional cost on top of the organisational costs (materials for mapping such as the printed map frames, venue hire, meals, and fuel for participants' travel). Therefore, the financial aspect is also a factor to be considered in this and similar studies.

Four people per CREMA were chosen to avoid having a large number of participants, which makes the mapping exercise difficult. In addition, COVID restrictions had to be taken into account, which forbade groupings of more than 25 people. Thus, the workshop that brought together community and institutional actors could not have more than 25 participants, impacting stakeholder composition.

6. Conclusions

The Western Wildlife Corridor faces sustainability challenges that require diverse stakeholders to reach consensual decisions that reconcile biodiversity conservation and livelihood development. According to stakeholder perceptions, the natural ecosystems of the WWC landscape have experienced significant degradation over the past 20 years due to population pressure on natural resources. This impacted conservation through the disappearance of species and the loss of ecosystem services and livelihoods due to the loss of wildlife species, non-timber forest products, and the population of shea trees. The participatory scenario-building and mapping exercise helped participants to reflect on and visualise their different desired futures while building consensus on a future scenario of land use and land-cover change [2]. As a result of the deliberations, there was a consensus among the stakeholders on more homogenous landscapes for the future and on increasing farming and conservation areas. However, decisions taken in landscape governance typically involve trade-offs due to the difficulty of fully satisfying the interests of all stakeholders. Furthermore, during trade-off negotiations, some stakeholders are subject to the power and cultural norms, forcing them to reconsider their position. The results of this study indicate that knowledge, culture, and power inequities influence trade-off negotiations and consensus-building. Integrated landscape approaches enhance

consensus-building by facilitating dialogue, negotiation, harmonising plural, and even divergent interests, and mutual understanding between stakeholders while promoting equity and power balance. A solid and inclusive platform that supports such multi-stakeholder processes is considered necessary to bring stakeholders of the same landscape to converge towards a common ideal where each stakeholder group gains more and loses less [5,7].

The lessons and recommendations that emerge from this study based on multi-stakeholder participatory mapping from the perspective of implementing integrated landscape approaches can be summarised as follows:

Firstly, consensual decision-making through a multi-stakeholder platform requires experienced facilitation of the discussions to balance the debates and enable participants to express themselves and be understood. The negotiation of trade-offs and achieving consensus in this study were largely possible due to careful moderation of the debates that enabled an open dialogue between actors and attention to and balancing of power dynamics [63]. The capacity, experience, attitude, and behaviour of the moderators are crucial to the quality of the results obtained [74].

Secondly, sufficient time must be allowed for deliberation and negotiation of trade-offs. Not all actors have the same level of understanding and may need time to discuss certain misunderstood aspects or to make themselves understood by others.

Thirdly, initiators of participatory planning through participatory mapping must ensure that they include all key stakeholders in the landscape to make the negotiation process and its outcomes as inclusive as possible. A plan may appear consensual, but if the process has not been inclusive, curtailing the interests of absent and marginalised stakeholders could perpetuate problems in the medium or long term.

Fourthly, landscape actors are often keen to engage in a dynamic of multi-stakeholder deliberation for the governance of their landscape, but multi-stakeholder processes are only facilitated and effective when there are solid multi-stakeholder platforms established to support them. Reaching a consensus on a common future landscape—through participatory mapping and other means—is a symbol of the willingness of actors to cooperate to ensure the sustainability of landscape resources and reflects the need for a multi-stakeholder framework for consultation, knowledge sharing, negotiations, and joint decision-making. The intention to provide such frameworks in community-based landscape governance systems, such as CREMAs, is expected to foster multi-stakeholder processes to address common needs and aspirations and create ecologically and socially sustainable and resilient landscapes.

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Appendix A

Basic map frames used for the participatory mapping.

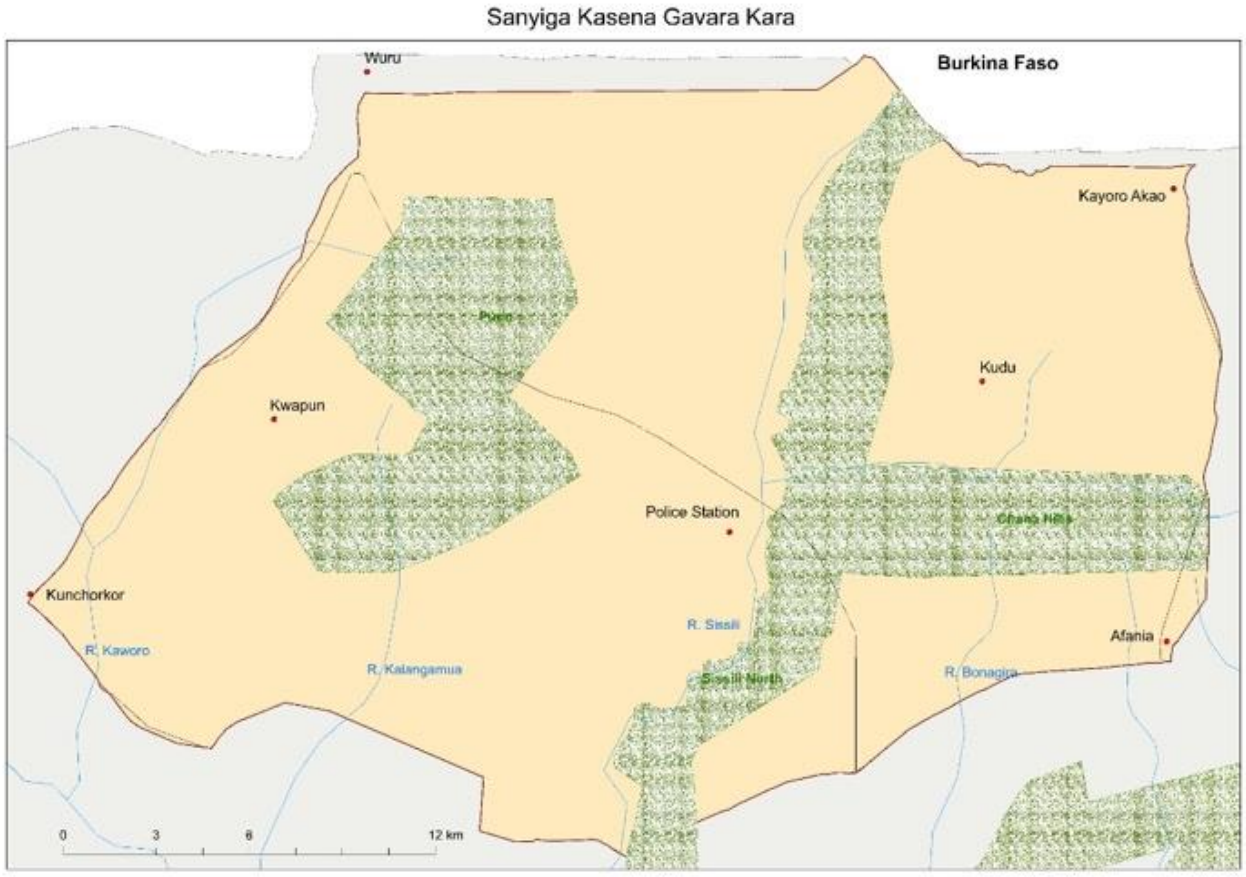

Figure A1. Map A: Sanyiga Kasena Gavara Kara (SKGK) CREMA.

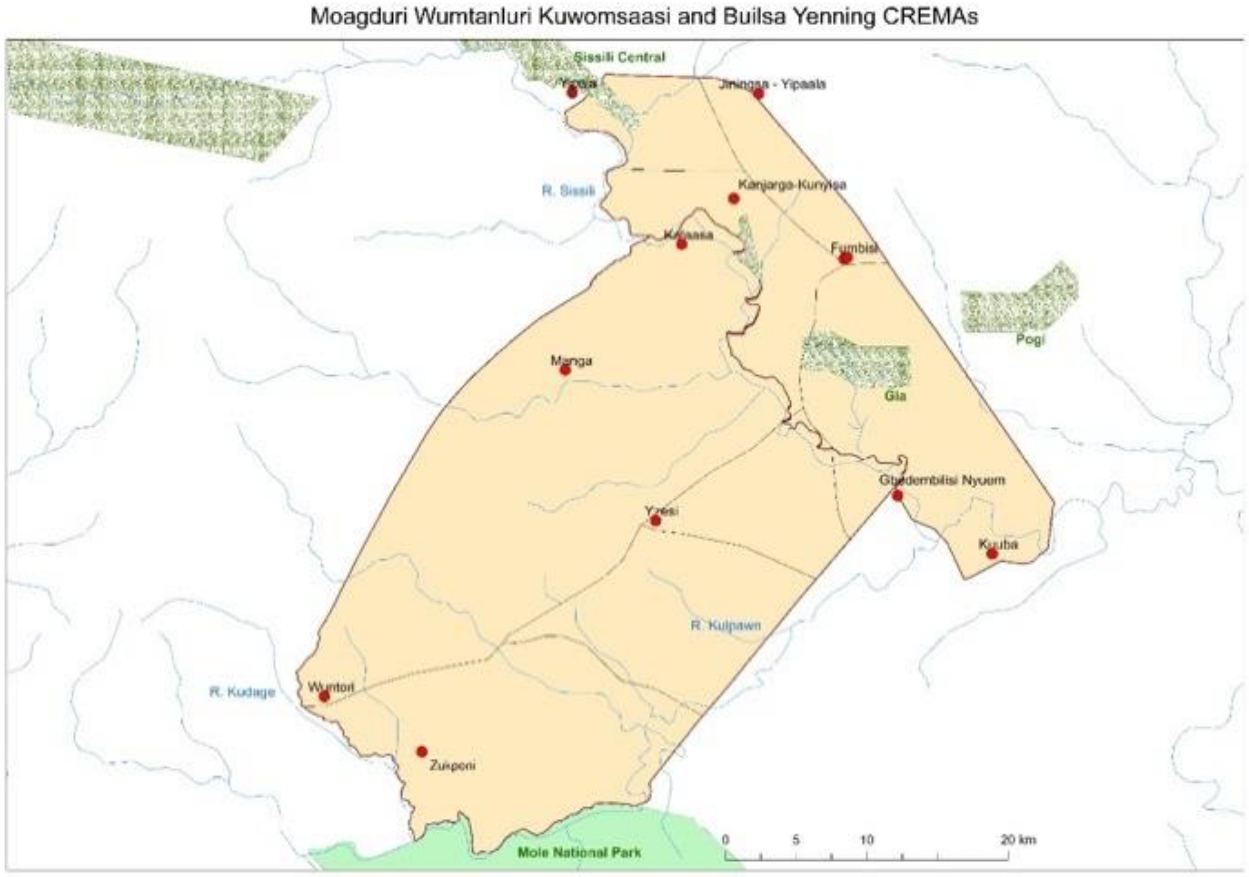

Figure A2. Map B: Builsa Yenning—Moagduri Wuntanluri Kuwomsaasi (BY-MWK) CREMAs.

Notes

[1] We asked the CRMCs leaders of the target communities to identify those they considered young and those they considered old. As a result, the age ranges obtained correspond to those suggested by the communities.

[2] Non-timber forest products are plant and animal species other than timber from forested ecosystems. They include a broad range of products, including food, fodder, medicinal and cosmetic plants, material for woodcarving and household tools, and bushmeat and other animal products [57,58].

[3] Focus group discussion held in Fumbisi on 21 May 2021.

[4] Focus group discussion held in Nakong on 19 May 2021.

[5] Workshop held in Navrongo on 7 December 2021.

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