

Research

Participatory futures thinking in the African context of sustainability challenges and socio-environmental change

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ABSTRACT. Futures thinking is a key competency in sustainability studies, and the field is currently experiencing a strong surge in participatory scenario development and visioning approaches. Sub-Saharan Africa has a particularly long history of participatory approaches to development; however, the same participatory approaches have often faced critique for lacking the potential to stimulate empowerment and social change. To explore these contradictions, I systematically review the use of participatory scenario development and visioning in sustainability and socio-environmental change research in the region between 2011 and 2021. The analysis is structured around three key questions: Who participates, in what, and for whose benefit? Of the 23 reviewed studies, most focused on exploratory scenarios and aimed to understand trade-offs and future risks to identify sustainable pathways to alternative futures. Fewer scenarios were normative and aimed to imagine futures beyond current societal structures and values, and thereby radically challenge the status quo (e.g., business as usual, current socioeconomic systems) by including solutions to power imbalances and injustice. Most scenario development processes engaged a wide range of participants (in terms of power and agency) because this strategy was meant to facilitate knowledge co-production and understanding between (sometimes) conflicting stakeholders. In the end, most scenario development processes strived for consensus and compromise regarding which futures were wanted and which futures were to be avoided. Based on this review, I challenge what is often considered “best practice” in sustainability discussions by raising some limitations of mixing a wide range of stakeholders in the futures thinking process. Although such mixing is considered to enhance mutual understanding and conflict resolution, it might also limit the potential to stimulate radically different futures that would benefit the vulnerable and marginalized through challenging the status quo. My findings provide guidance for researchers and other actors who intend to use or develop methods for exploring innovative solutions for more just and sustainable futures in different areas and contexts of sustainable development.

Key Words: *justice; social change; stakeholder participation; sustainable futures; transformation; visions*

INTRODUCTION

Futures thinking is a key competency in sustainability studies (Clark and Harley 2020, Brundiers et al. 2021) and is imperative given the urgency to solve persisting sustainability challenges such as environmental degradation, poverty, and inequality. Although participatory scenario approaches are not new for development practitioners, there has been a strong surge recently for participatory scenario development and normative visioning in research (Beck and Forsyth 2020, Fazey et al. 2020, Rana et al. 2020, Wyborn et al. 2020). In this context, participatory futures thinking (including explorative scenario development and normative visions) has gained growing popularity in the search for alternatives to persistent sustainability challenges, especially since the Brundtland Report was released in 1987 (Kishita et al. 2016). This idea is particularly imperative in the African context, where such challenges tend to escalate because of high levels of poverty and socioeconomic injustices, rapid population growth, ecosystem degradation driven by land-use change, high and differentiated vulnerability to climate change, and high levels of horizontal institutional fragmentation (Jiren et al. 2020). Participatory futures thinking has often been initiated for knowledge sharing to alleviate risk and for imagining more inclusive futures and sustainable pathways for people, the environment, and the economy (Oteros-Rozas et al. 2015). Such approaches, therefore, are important in countries where people have little influence on decision making such as in authoritarian regimes with weak democracy, which are common throughout the African continent (except the south; EIU 2020). Engaging

different representatives of society in scenario development research is also expected to have greater political plausibility and public acceptance than purely expert-driven scenarios (Kassa et al. 2009).

Ranging from the most likely to radically different futures, futures thinking can be usefully divided into three types: predictive, explorative, and normative. Predictive scenarios attempt to indicate what might happen by exploring the most likely development of the future, for example, through trend exploration and forecasting to predict long-term effects of climate change (IPCC 2018). Most planning efforts privilege the predictive empirical approaches because they are instrumental and rational modes of forecasting the future based on regressions, cross-impact analysis, or simulation models (Inayatullah 1990).

Explorative scenarios are characterized by storylines or narratives that are open to several possible events and developments that challenge conventional assumptions, and therefore, they can deal with high levels of uncertainty and ambiguity (Malinga et al. 2013). Although there are multiple methods for scenario development, different futures are commonly explored in a “double uncertainty” matrix in which important drivers of future change are compressed into two themes over which a set of scenarios is developed (Curry 2012). Explorative scenario planning has been the most widely used approach in scenario development and for anticipating possible futures by investigating a combination of different driving forces and paths they could take (Mshale et al. 2020). Such scenarios are often ranked from

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less to more desirable, which is useful for understanding considerable uncertainties and risks associated with future trajectories in complex systems, and such exercises are often seen as instruments of reflexivity, learning, and risk reduction (Badjeck et al. 2011).

Normative scenarios involve taking desirable goals into account and then exploring the paths that lead to these goals, for example, through visioning or imaginaries. Visions attempt to imagine futures that go beyond current socioeconomic and cultural structures and limitations and thereby tend to be more “radical” than other scenarios. Visions can reveal barriers in existing socioeconomic and cultural mechanisms and can help to identify opportunities for grassroots initiatives to expand by linking to existing initiatives for sustainable transformation (Bennett et al. 2016, Pereira et al. 2020a, Sellberg et al. 2020). Imaginaries can also be defined as collectively held visions of good or attainable futures that serve to envision the possible and motivate action toward new development pathways (Clark and Harley 2020). Backcasting is often part of both exploratory scenario development and normative visioning and can be used to assess the relative feasibility of future scenarios and to create strategic action plans for how to reach them (van der Voorn et al. 2012, Wiek and Iwaniec 2014). Other approaches crucial to foresight can be categorized as imperative and critical (Inayatullah 1990). Imperative approaches value culturally self-aware interpretations and creations of the future, with the goal to discern what different cultures think the future will be like. In this way, it is possible to learn from competing images of the future, which might be imperative given that future development has long been colonized by “Western” and capitalist views of modernity (Inayatullah 1990). Critical futures methods are anchored in the deconstruction and analysis of power to reflect further on who benefits from realizing certain futures.

While often conducted at the frontier of sustainability research, such methods are not immune to problems related to Western views and ideals that have characterized development or participation in the past. The narrative that poor people drive environmental degradation is mainly a result of a long history of top-down “development” through colonial and neo-colonial processes, that is, policies and practices that support heavy resource extraction for the benefit of colonial powers, along with Western views and ideals of development (Gray and Moseley 2005, McMichael 2016). In the African context, many sustainability challenges are linked to issues of persisting poverty and socioeconomic injustices. Social and environmental challenges tend to reinforce each other given that socioeconomic injustices also produce different types of vulnerabilities and abilities to adapt to climatic and economic turmoil (Hoegh-Guldberg et al. 2018). Such vulnerabilities are also worsened by environmental degradation such as deforestation due to farmland expansion (Johansson and Abdi 2020) and extraction of charcoal and firewood (Johansson and Isgren 2017). Government institutions (with the power to exercise control) often highlight economically disadvantaged groups (with little or no agency to influence their situation) as the main agents behind these environmentally degrading activities while ignoring similar (or even worse) environmental effects caused by industrial development such as the promotion of powerful and influential

commercial large-scale agribusinesses or infrastructure development (Belhabib et al. 2019, Henri-Ukoha et al. 2019, Sulle 2020). In these contexts, where development and visions have long been dominated by Western ideals, it is critical to make explicit the relevance of local cultures and the importance of the past for navigating the future (Pereira et al. 2018). In fact, it specifically might be interesting to experiment with methods to spur social change in such contexts, where there is historically low trust in the status quo (Pereira et al. 2020b).

Participation has almost become a prerequisite for current development interventions and policy making, with promises of giving “the poor” a voice and choice. It has long been widely adopted across a range of actors, from research institutions and nongovernmental organizations (NGOs) to local government bodies and the World Bank (Cornwall 2008). Participation is also crucial for action research, in which all involved engage in a democratic dialogue as coresearchers (Heron and Reason 1997). For such approaches, all participants collaborate to define the research context and questions. They also articulate which methods to use and apply them in their practices to obtain new experiences and understandings of the initial research questions. The underlying principles for participation can be linked to goals of deep social change, but participation can also be used to maintain the status quo (Leal 2007). Here, social change refers to the way in which human interactions, behavior, and cultural norms change over time and, in turn, reshape cultural and social institutions, concepts, rules, and power relations in society. In contrast, status quo refers to the maintenance of social structures and values to hinder social change. Because of a wide range of (often conflictual) uses and users of participatory approaches, the concept can be broadly defined as almost anything that involves people (Cornwall 2008). Participatory research is often developed with the intention to “empower” or “raise the voice” of marginalized groups by making their knowledge, views, and aspirations heard in scientific and societal (e.g., policy) debates and thereby spur sustainable and inclusive social change. As such, different interpretations and uses of participation can either hinder or support sustainable development (Pretty 1995). However, it is challenging to evaluate the outcomes of participatory research because such projects are rarely followed up to ascertain whether project intentions were realized or whether the participants, or only the researchers, benefitted from such processes (Oteros-Rozas et al. 2015).

Given that sustainable scenarios and future visions are increasingly imperative within participatory research tools and methods, the main objective of this review is to examine why and how this method has been used in the African context of socio-environmental change and sustainable development. Inspired by Cornwall (2008), I pose the overarching research questions of who participates, in what, and for whose benefit, to structure the analysis of different types of participatory futures thinking processes and to discuss the main strengths and weaknesses in relation to the initial motivations of using such research approaches. Finally, I discuss how participatory futures thinking can be used to imagine sustainable futures that are just and fair, which is increasingly requested in sustainability debates (Newell et al. 2020). I next briefly introduce the historical and conceptual understanding underlying the review.

Participation in the context of development

Participation is generally agreed to be “good” and an essential cornerstone for democracy, but the idea of participation is challenging from the leader’s perspective, as it often evokes ideological and political opposition (Arnstein 1969). It can also evoke frustration among participants, especially “marginalized” citizens because of their powerlessness, despite participation, to deal with inequalities and injustices that are part of their everyday lives. Likewise, engaging people with little agency to make change happen can cause ethical challenges by giving empty promises of change through participatory research approaches. This situation highlights a fundamental challenge with participatory approaches for development: without redistribution of power the process may become empty and frustrating for the powerless (Arnstein 1969).

Brief history of participation in the African context

In the African context, participation has historically been desired by different actors for many reasons. Participation has not always been used to raise the voices of vulnerable groups. It has also been used as a means for powerful actors to maintain the status quo by claiming that all “sides” were considered (Arnstein 1969, White 1996). Despite the potential of participation to bring about social change, its main drawbacks can be linked to power relations between those that lead communities and those who are led, and its failures to create ways for those with little agency to deal with these relations (Kyamusugulwa 2013).

Although participation is said to have hit the development mainstream in the 1970s, the use of participation for development can be traced back nearly a century (Cornwall 2006, Kyamusugulwa 2013). Popular participation was part of what shaped the United Kingdom’s *Colonial Development Act* of 1929, which, in turn, formalized and standardized the development of British colonial territories. Popular participation grew out of a “moral” responsibility of colonial powers that responded to people under their rule who were asking for protection against exploitation, protection of their tribal lands, and for some involvement in the shaping of their own destinies (Cornwall 2006). Although participation might have taken different forms in different colonial territories, it was heavily based on the idea of “civilization”, whereby certain functions and powers of institutions were delegated to traditional leaders, who, in turn, were supervised by colonial officials. “Civilization” was instrumental for the colonial powers to continue extraction with approval of local leaders. In the 1930s, participation continued to be based on such ideas of development, with aspects of “modernization” and “governmentality” through participatory policy processes becoming more visible in the 1940s and 1950s. In the 1960s, participation was emphasized in the context of democratic institutions, and foreign aid to post-colonial states was committed to support education and training for effective civil participation in political processes essential to self-governance (Cornwall 2006).

In the 1970s, participation was redefined as something that required voluntary and democratic involvement of people in contributing to development efforts and fairly sharing the derived benefits. In the global arena, the United Nations urged governments to adopt public participation in national development processes and decision making in development

(Cohen and Uphoff 1980). Participation thereby became increasingly important for setting goals, formulating policies and plans, and implementing economic and social development programs (Cornwall 2006). As participation became an increasingly integral part of development, the U.S. *Foreign Assistance Act* of 1973 stressed the importance of involving the “beneficiaries” in various American Aid initiatives to share the gains of development (Cohen and Uphoff 1980). During the 1980s, neo-liberalism redefined participation, and participants were no longer seen as passive recipients of development aid, but rather as “beneficiaries” expected to be active in implementing and in meeting the costs of development (Cornwall 2006). Heavily influenced by marketizing regimes such as the UK and the U.S., cost-sharing and co-production of services became mainstream in global development, and the discourse of self-reliance came to promote more individualistic public participation not only to do it by yourself, but also for yourself (Cornwall 2006). Self-help efforts such as establishing village development committees were used by governments in former British colonies to meet rural demands for basic services with minimal investment (Vengroff 1974). Self-reliance and local participation in development was also used to mobilize rural people, which made it possible to provide the masses with a broader understanding of national development efforts and thereby increase support for the regime (Vengroff 1974). Participation was actively fostered by international agencies such as the World Bank during the 1980s to counter grassroots resistance to reforms (Leal 2007).

In the 1990s, participation in development was increasingly promoted as a novel, common-sense way to address a range of development ills. Many mainstream development organizations promised a new approach that would give the poor more voice and choice in development (Cornwall 2006). The United Nations Development Programme’s (1993) Human Development Report included statements about people’s urge to participate, and situated people’s participation within an overall development strategy that enabled people to gain access to a broad range of opportunities. During this time, “civil society” participation was emphasized, as civil society associations were seen as autonomous from the state and thus able to represent the interests of the marginalized (Cornwall 2006). Another model for participation that became popular around this time was the introduction of “stakeholder” language and “stakeholder participation”, with the acknowledgement that stakeholders have varying degrees of power to influence outcomes (Cornwall 2006).

Thus, during the last century, participation has emphasized empowerment, democratic governance, rights-based approaches, and social accountability. However, on closer inspection, the potential for using participation to shift the underlying causes and power dimensions, and its effects on poverty, inequity, and injustices, have remained limited (Cornwall 2006, Kyamusugulwa 2013).

Different participation typologies

Because it is difficult to democratize all steps of the participatory research process (i.e., define questions and methodology, apply in practice, present new understandings), most participatory projects are mainly shaped by researchers, and the democratization is often limited to include the content and not the methods (Heron and Reason 1997). Pretty (1995) and White

(1996) have developed typologies of participation that are helpful for developing a framework to analyze the type of participation and to determine to what extent the stakeholders were engaged in the futures thinking process in specific published projects. Here, stakeholders are defined as any group of people that have a common interest or stake in a particular issue (Grimble and Chan 1995).

To understand the motivations of those who adopt and practice participatory approaches, I draw on Pretty's (1995) normative typology with seven categories (Table 1). It starts with four types of participation that are unlikely to have positive and lasting effects on people's lives: "manipulative", "passive", "consulting", or for "material incentives". "Functional" participation is slightly better and is associated with efficiency arguments to reduce costs of projects by reaching objectives more effectively. This type of participation may be interactive and may involve shared decision making, but often within a predetermined agenda defined by the facilitator. Better types of participation are "interactive", in which participants are generally part of joint analysis and development of action plans that can help strengthen local institutions. The interactive process is described as a structured learning process that seeks to bring together multiple perspectives; by doing so, a group can take control over local decisions and determine how resources should be used and thereby have a stake in maintaining structures and practices. Finally, "self-mobilization" is categorized as the ultimate participatory process, in which people participate by independently taking initiatives to change systems and to develop contacts with external institutions for resources and technical advice, but retain control over how resources are used. However, such self-mobilization may or may not challenge existing power distributions.

Table 1. Interpretation and summary of Pretty's (1995) typology of participation.

Typology	Characteristic
Manipulative participation	Participation is a pretence, e.g., a board representative with no power
Passive participation	One-directional information sharing, e.g., people being informed of what has already been decided or has already happened without being able to give a response
Participation by consultation	Participation by answering questions about problems already defined by external actors, but participants have no control over analysis and no share in decision-making
Participation for material incentives	Participants provide resources for experiments or innovations, e.g., labor or a field, in return for food or cash, but have no stake in prolonging practices when incentives end
Functional participation	Participation to serve external goals, e.g., external actors engage people to achieve project goals and reduced costs
Interactive participation	Structured learning process as a primary driver
Self-mobilization	Initiatives are taken by the participants themselves

To highlight further the political nature of participation and analyze the diversity of forms, functions, and interests of participation, I use a second typology by White (1996). This typology proposes a set of categories that can be used to identify conflicting ideas about why or how participation is being used at any particular stage in a process (Table 2). The typology includes

categories for: (1) what participation means to the implementor; (2) what participation means for those at the receiving end; and (3) if the form of participation is nominal (e.g., for display), instrumental (e.g., a means to achieve cost-effectiveness), representative (e.g., to give people a voice in determining their own development), or transformative (e.g., to enable people to make their own decisions and take action).

Table 2. White's (1996) framework for analyzing the diversity of form, function, and interest within participation. Adaptations by Cornwall (2008) in brackets.

Form	Top-down perspective (what "participation" means for the implementor)	Bottom-up perspective (what "participation" means for those on the receiving end)	Function (what "participation" is for)
Nominal	Legitimation (to show they are doing something)	Inclusion (to retain some access to potential benefits)	Display
Instrumental	Efficiency (to limit funders' input, draw on community contributions, and make projects more cost-effective)	Cost (of time spent on project-related labor and other activities)	Means (to achieve cost-effectiveness and local facilities)
Representative	Sustainability (to avoid creating dependency)	Leverage (to influence the shape of the project and its management)	Voice (to give a voice in determining their own development)
Transformative	Empowerment (to enable people to make their own decisions, work out what to do, and take action)	Empowerment (to be able to decide and act for themselves)	Means/end (a continuing dynamic)

METHODS

To assess and compile the main features of participatory futures thinking in the African context of socio-environmental change and sustainability, I performed a literature review of 23 peer-reviewed articles published between 2011 and 2021. I use the conceptual framework outlined above for thinking about the research processes and to evaluate the type of participation that the projects employed. Thereafter, I use theories of participation to discuss trade-offs between different types of stakeholder involvement in the participatory futures thinking processes, and how participant inclusions or exclusions either enable or hinder the initial motivations or aims of the respective studies.

Article selection

I performed a topic search in Web of Science to review peer-reviewed research papers that have engaged with participatory scenario development and visioning in Africa, particularly focusing on socio-environmental change and sustainability challenges. Search terms enabled me to find as many studies as possible and thereafter select papers that were appropriate to include in the review using a set of inclusion and exclusion criteria. The terms searched for were: TS = (participatory AND scenario* AND *Africa AND environment*) OR TS = (participatory AND scenario* AND *Africa AND ecol*) OR TS = (participatory AND vision* AND *Africa AND environment*) OR TS = (participatory AND vision* AND *Africa AND ecol*). I purposely excluded the term "future" from the search because the

words scenario* and vision* imply a focus on the future, and an additional word would rather limit the search. The search was last updated on 3 November 2020 and returned 167 papers. I purposively also excluded reports and other grey literature published by development practitioners because I wanted to focus on how participatory futures thinking has been used within research.

The initial topic search was narrowed down to 23 papers in a two-step process. In the first step, I manually screened the abstracts of the 167 papers to keep only those that specifically used participatory methods for scenario development or visioning in the context of socio-environmental change in Africa. Therefore, articles that, for example, only focused on computer models or used the word visions in other contexts than for developing visions were excluded, along with papers that covered themes beyond socio-environmental interactions (e.g., medicine). This process resulted in 60 articles to be read in full. In this second step, the sample was further refined to include only articles that described how research using a participatory futures thinking design was conducted (i.e., in which the research was initiated and conducted by the authors of the article), which meant that reviews or other articles that built on comparing and evaluating cases were excluded. For practical reasons, I also excluded two articles written in French, which resulted in a slightly anglophone selection. Finally, I chose to focus on articles published the past 10 years (since 2011), which excluded another 9 articles out of the 60. This process left 23 articles for review, all of which aim to understand societal, economic, and environmental aspects of future development and use participatory futures thinking as a way to imagine and explore alternative futures and pathways.

Article analysis

The 23 articles were analyzed by setting up a review protocol (Table A1.1 in Appendix 1) to answer the overarching research questions and to explore key features of how such studies have been designed over the last decade. To understand who is participating, in what, and for whose benefit, the different themes of the review protocol were: (1) context (country, theme, spatial scale), (2) rationale (purpose or intention of conducting the study), (3) participants included in scenario making (who was included in what and why, e.g., workshops, focus-group discussions, scenario making, validation), (4) scenario types (time horizons, features), (5) methodological approach (e.g., explorative, visionary, predictive, or other), (6) material benefits of the research (e.g., maps, images, narratives, action plans), and (7) immaterial benefits of the process (e.g., knowledge transfer, joint learning, guidance, capacity). These themes were developed in consultation with other researchers who have experience with participatory research to understand how such participatory futures thinking initiatives are generally designed.

Each reviewed article was assigned a participatory category based on the typologies developed by Pretty (1995) and White (1996), but translated to fit the participatory futures thinking process (Table A1.2 in Appendix 1). All papers were thereafter plotted in a two-dimensional matrix, with Pretty-categories on the y-axis and White-categories on the x-axis. This visual exercise made it possible to see the type of participation offered in the futures thinking process for each paper, and studies were color coded based on location where they were conducted to provide a geographical overview.

RESULTS

General features of the scenarios and visions

All reviewed articles focus on socioeconomic and environmental challenges in the context of Africa over the last decade, specifically involving issues related to land-use change and climate change (Table 3). Most of the participatory futures thinking initiatives used exploratory approaches, whereas only a few studies were normative (e.g., Pereira et al. 2018). Themes covered a range of sustainability challenges related to intersections between environmental and socioeconomic change, e.g., food security and biodiversity (Jiren et al. 2020); ecosystem services, biodiversity or deforestation, and livelihoods (Muhati et al. 2018, Capitani et al. 2019); agriculture and water or climate change (Faysse et al. 2018, Schmitt Olabisi et al. 2018); wildlife conservation and land use (McCloskey et al. 2011, Sandker et al. 2011); and large systemic transformation to combat challenges of poverty, inequality, and food security (Pereira et al. 2018).

The time horizon for the futures was justified in different ways. Shorter time frames (< 10 yr) were chosen because of their suitability for considering both feasibility for action and ability to foresee changes (Mshale et al. 2020). Longer time spans (> 30 yr) often remained unjustified, but, in some cases, were selected to align with national development visions or to conform with United Nations sustainable development goals (United Nations General Assembly 2015; Capitani et al. 2016).

Most scenario workshops dealt with issues on a regional scale, defined here as an administrative zone covering many districts, or a larger area defined by certain ecosystem features (e.g., delta, dryland forest, highland, pastoral zone) or altitude (e.g., highland vs. lowland). Many scenarios were also adopted for a certain district or county. Fewer scenarios were created for the national scale, and those cases often held subnational workshops thereafter to scale up site-specific storylines to the national scale (Capitani et al. 2016). Only one study was transnational, but participants developed scenarios for their individual countries (Badjeck et al. 2011). Only one study focused on a very local level (subdistrict), represented by a small forest area in Kenya (Farwig et al. 2014).

Who participates, in what, and for whose benefit?

Most often, the participatory futures thinking process built on multiple workshops or meetings in which a range of stakeholders were invited to share knowledge and experiences either to inform or to co-create a set of future scenarios. All studies engaged different types of stakeholders, sometimes separately, sometimes together, ranging from farmers, village leaders, and district officials to academics and representatives from NGOs and civil society organizations (Table A1.3 in Appendix 1). Only one of the reviewed articles never defined who the stakeholders were (van der Voorn et al. 2012), but referred to them as a “broad and diverse range of stakeholders”.

Different stakeholder constellations during participatory futures thinking

The average number of participants in participatory futures thinking (most often in the form of workshops) was 27 (minimum 10, maximum 35; Table A1.3 in Appendix 1). However, there were differences in how the researchers chose to mix the stakeholders (or not), and what type of stakeholders contributed to the different parts of the participatory research process. For example, in one case (Faysse et al. 2018), workshops were initially held

Table 3. Overview of scenario features in terms of location, scale, theme, scenario type, motivation, and time horizon.

Study (author and year)	Country	Scale or level	Theme	Scenario type	Motivation for participatory future scenario development	Time horizon (yr)
Pfeifer et al. 2021	Ethiopia, Burkina Faso	Regional (highland, pastoral zone)	Livestock, poverty reduction, environment	Exploratory	Communication, understanding	N/A
Newman et al. 2020	Tanzania	Regional (small islands)	Water-energy-food nexus and sustainable livelihoods	Exploratory	Communication, assessment	N/A
Jiren et al. 2020	Ethiopia	Regional	Food security, biodiversity	Exploratory	Guidance, understanding, collective action, adaptive capacity	20
Capitani et al. 2019	Kenya, Ethiopia	Regional	Ecosystem services, biodiversity, livelihoods	Exploratory	Understanding, adaptive capacity	35
Faysse et al. 2018	Morocco	Regional	Agriculture, water use	Exploratory, joint vision	Adaptive capacity, actions, communication	10
Kebede et al. 2018	Ghana	Regional (delta landscape)	Climate change	Exploratory, including RCP and SSP† scenarios	Integration, policy development	30
Muhati et al. 2018	Kenya	District	Deforestation, ecosystem services	Exploratory (four divergent but plausible futures)	Creative thinking, strategies, understanding, adaptive capacity, actions	28
Schmitt Olabisi et al. 2018	Ghana, Mali	District	Agriculture, climate change	Transformative scenario planning, exploratory	Understanding, policy development	19
Zorrilla-Miras et al. 2018	Mozambique	District	Forest degradation	Exploratory, based on Bayesian belief networks	Understanding, policy development, communication	20
Pereira et al. 2018	South Africa	National	Systemic transformation	Visions, based on “seeds of transformation”	Creative thinking, actions	N/A
Mshale et al. 2020	Uganda	District	Tenure rights, deforestation	Exploratory	Understanding, actions	10
Ravikumar et al. 2017	Tanzania	District	Carbon credits, conservation, land use	Exploratory	Understanding	20
Schmitt Olabisi et al. 2016	Burkina Faso, Nigeria, Malawi	N/A	Agriculture, livelihoods	Exploratory	Assessment	35
Capitani et al. 2016	Tanzania	National	Land-use and land-cover change	Visions with explorative pathways	Assessment	15
Karlberg et al. 2015	Ethiopia	Regional (water basin)	Agriculture, energy	Exploratory	Understanding, communication, policy development	15
Lemenih et al. 2014	Ethiopia	District	Forest management	Exploratory	Understanding, guidance	30
Farwig et al. 2014	Kenya	Local (forest area)	Forest management	Exploratory	Communication, understanding	15, 40, 80
Malinga et al. 2013	South Africa	Regional	Ecosystem services	Exploratory	Management, understanding	20
König et al. 2012	Tunisia	Regional (water basin)	Soil and water conservation	Exploratory	Assessment	5
Van der Voorn et al. 2012	South Africa	Regional (coastal)	Climate adaptation	Visions and backcasting	Policy development	20
Sandker et al. 2011	Central African Republic	Regional	Wildlife conservation, industrial logging	Exploratory, participatory modeling	Understanding	20
McCloskey et al. 2011	Kenya	Regional (plain landscape)	Wildlife conservation, land use, urban development	Exploratory, participatory modeling	Communication, understanding, actions	N/A
Badjeck et al. 2011	Ghana, Senegal, Mauritania	Cross-national	Climate change, aquaculture, fisheries	Exploratory	Understanding	40

†Representative concentration pathways and shared socioeconomic pathways.

separately with different stakeholder groups (because of conflicting views and power relations), and then held jointly from the middle to end of the process (for communication and co-learning). Also, Newman et al. (2020) held a community-based

workshop at first, and then engaged multiple stakeholders at the end. In another case (Zorrilla-Miras et al. 2018), workshops were held separately with a range of stakeholder groups at different administrative levels (national, district, village), and no final

workshop was arranged at the end for all stakeholders to meet. In that particular case, stakeholder participation was primarily valued as input to increase the salience and relevance of the research. In another study (Jiren et al. 2020), initial workshops were purposively held with diverse stakeholder groups at different administrative levels to understand all sides of food security and biodiversity challenges. Also, Pereira et al. (2018) intentionally brought together as diverse stakeholders as possible to a workshop to create rich and diverse narratives of the future. However, for that study, all participants were recognized as demonstrating an interest in sustainability issues and the human–environment interface. Some studies, e.g., Kebede et al. (2018), only engaged “experts” (e.g., technical country experts and policy or decision makers) in the futures thinking process.

What scenarios were developed, and by whom?

The participatory futures thinking process typically resulted in three to four types of exploratory scenarios based on outcomes ranging from “business as usual” modes of development to more sustainable types of futures (Table 3). Few studies created normative visions, and no articles concerned predictive scenarios. For exploratory scenarios, names of futures commonly stretched from different degrees of success or destruction, e.g., “the forest reserve we want”, “winning back space”, “tragedy of commons”, and “the forest reserve collapse” (Muhati et al. 2018). For such exploratory scenarios, the initial workshop usually built on identifying drivers of change by reflecting on historical changes in the area. This process gave the participants a perception of the speed of change and which drivers cause slow or fast social, economic, and environmental change. In the subsequent step, drivers of change were usually ranked by the participants according to importance, and the most important drivers were selected to create a “double uncertainty matrix”. A double uncertainty matrix consists of two crossing axes of key drivers of change, and one explorative narrative in each cell created around the crossing axes. Three to four (or sometimes more) contrasting future narratives are thereafter developed across the matrix. During the final workshop, participants were sometimes asked to discuss which future scenario and development they aspired to, e.g., in Mshale et al. (2020:1), “Desirable scenarios depicted a well-governed, well-financed forestry sector characterized by gender equality and participative forest management”. In a few cases (Faysse et al. 2018, Muhati et al. 2018, Mshale et al. 2020), participants developed a joint action plan to determine who would be responsible for what items to reach the jointly aspired future. Pfeifer et al. (2021) applied a mixed stakeholder approach in which future pathways were defined by a combination of local and expert knowledge (i.e., farmers, traders, administrators, experts, and researchers). The participants first envisioned how livestock would be kept in the future, and these visions were then adjusted by local livestock experts to become “more realistic”.

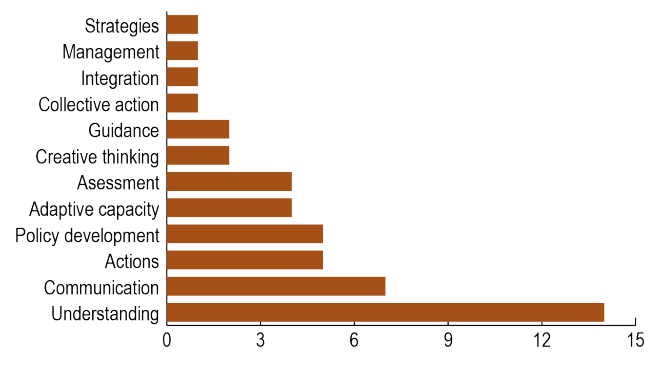
All three types of scenario were most often developed by the participants, but with support and guidance from the researchers. Researchers, in turn, were guided by approaches such as participatory prospective analysis (Bourgeois and Jesus 2004), (I) NSPECT (Johnson et al. 2012), futures wheels (Glenn and Gordon 1999), Bayesian belief networks (Bromley 2005), and serious games (Pfeifer et al. 2021). If narratives, land-cover maps, or models were developed by the researchers, the participants were often given the opportunity to evaluate and provide feedback to

the interpretation and compilation of outcomes (e.g., Kebede et al. 2018, Capitani et al. 2019, Jiren et al. 2020). However, in some cases (e.g., Zorrilla-Miras et al. 2018), feedback and evaluation were only offered to some of the initial participants (only district-level, but not village-level, officials).

Motivations for using participatory futures thinking

The main motivation for setting up a participatory futures thinking process was to understand how different futures would look and function depending on how different drivers of socioeconomic and environmental change evolve through time (Fig. 1). “Understanding,” in this context, was mentioned in different ways, for instance, as insights into future integration of food security and biodiversity conservation aims (Jiren et al. 2020), understanding of local stakeholder responses to change (Capitani et al. 2019), managers’ understanding of driving forces of landscape change (Muhati et al. 2018), or to elicit multiple stories of the future (Schmitt Olabisi et al. 2018). “Communication, actions, and policy development” were also crucial motivations for using participatory futures thinking. Communication relates to knowledge exchange and discussions (Zorrilla-Miras et al. 2018, Newman et al. 2020), nexus toolkit development in joint dialogue (Karlberg et al. 2015), or relationship building (McCloskey et al. 2011). Actions were defined in different ways: to support actors in identifying actions for sustainability (Faysse et al. 2018), to develop action plans (Muhati et al. 2018, Mshale et al. 2020), or to inspire practical action (McCloskey et al. 2011, Pereira et al. 2018). Policy development relates to developing adaptation policy trajectories (Kebede et al. 2018) or policy actions (Schmitt Olabisi et al. 2018), identifying and evaluating policy interventions (Zorrilla-Miras et al. 2018), supporting policy and decision making (Karlberg et al. 2015), or developing more robust climate strategies (Van der Voorn et al. 2012). Another major motivation of four of the reviewed articles was to develop “adaptive capacity” with different forms of capacity building to anticipate potential impacts or assess future impacts (Faysse et al. 2018, Muhati et al. 2018, Capitani et al. 2019, Jiren et al. 2020). Different forms of “assessments” were the motivation for a few papers, to assess if futures thinking contributes to consensus building and systems thinking (Schmitt Olabisi et al. 2016) or to assess alternative development strategies (Capitani et al. 2016) or impacts (König

Fig. 1. Keywords used to describe the motivation for using participatory scenario development.



et al. 2012, Newman et al. 2020). “Creative thinking” was also a motivation for a few papers (Muhati et al. 2018, Pereira et al. 2018). To provide “guidance” and assistance in resource management was also a motivation for a few, as well as helping to induce “collective action”, “integrating” views of different actors, improving ecosystem “management”, and identifying “strategies” to prepare for possible outcomes.

Outputs and outcomes from the futures thinking process

A large variety of outputs were generated from the participatory futures thinking workshops, e.g., visualizations, land-cover maps, action plans, and graphs. Few researchers followed up on the research process to see how the participants “benefitted” from participating in the study, except for Faysse et al. (2018), who described what happened after the action plan had been developed. Some studies evaluated the outcomes of participatory process using a questionnaire (McCloskey et al. 2011, Schmitt Olabisi et al. 2016, Jiren et al. 2020). Schmitt Olabisi et al. (2016) evaluated the participants’ view of three scenario development initiatives (in Burkina Faso, Nigeria, and Malawi) and mentioned that the participants saw the diversity of stakeholders and the opportunity to share views and perspectives as main strengths of the workshops. That study differed from the others in this review, as it was mainly developed to inform and evaluate research priorities identified by scientists in larger research projects in the three regions. For example, Schmitt Olabisi et al. (2016:9) state, “building stakeholder consensus around scientific research priorities is an important outcome for scientists who want to do salient and credible research in a complex and uncertain context; these results suggest that scenario processes can help to facilitate this.” Hence, the main priority in that case was to identify key concerns that should be included in further research, and not primarily to explore alternative futures. By evaluating the workshops, both before and after they were held, the researchers also found that no participant seemed to have shifted priorities, even though “learning” was ranked as a major positive outcome of the process. Also, McCloskey et al. (2011) evaluated the participatory process using a questionnaire, and 90% of the participants expressed that they acquired new and interesting knowledge, but most participants wanted more time for understanding the methodology.

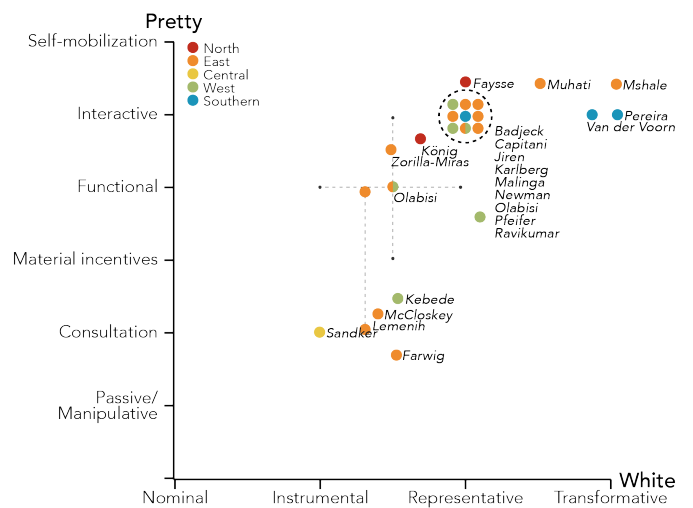
Most studies mixed stakeholders in terms of power and agency to create shared solutions. However, including decision makers in the participatory process does not necessarily mean that the scenarios or visions will be accounted for in future decision making. The only study in this review that acknowledged the challenges of mixing participants with different political and economic power solved the issue by first having separate workshops with different groups and then arranging a joint workshop for knowledge sharing (Faysse et al. 2018). The authors claimed that it was necessary to engage policy makers and decision makers with political power to shift power through this type of research. However, even though government officials were engaged in the scenario process, participants had no real power to spur a transformation toward the future vision, which was exemplified by the inability of the local Department of Agriculture and Marine Fisheries office to oppose a 200-ha development project supported by the ministry.

What type of participation was used?

For all studies, the participants were invited to a space created by the researchers. However, in two cases, the space for participatory futures thinking was partly initiated by the participants (a requirement for being classified as self-mobilization in Table 4). Faysse et al. (2018) stress that participants had requested such an initiative prior to the set-up of the research. Also, in Capitani et al. (2019), the researchers were invited by an already ongoing initiative, and the scenario development workshops were organized in parallel with the development of a strategic plan for climate change adaptation interventions.

Most participatory futures thinking processes were rather complex, and participation was offered to different groups with varying degrees of guidance at different stages of the research process. It was not unusual that different types of participants were included at some stages and not at others. Sometimes the participatory processes did not purely follow one category of Pretty’s and White’s typologies, and therefore, some were categorized twice or as closer to one category than the other (e.g., Lemenih et al. 2014 and Schmitt Olabisi et al. 2016; Fig. 2). I list some of the key contents of the participatory futures thinking that were ascribed to match the different typologies (Tables 4 and 5).

Fig. 2. Assigned participation typologies for each reviewed paper based on typology features provided by Pretty (1995) and White (1996). Colors indicate the geographical location of the study in sub-Saharan Africa, and labels are based on the first author’s name. Dashed lines on specific points indicate that those studies are categorized in two typologies (e.g., Lemenih used both consultational and functional participation, but not participation for material incentives). The dashed circle encloses a cluster of studies that are all classified as interactive and representative.



Most participatory processes were classified as both interactive (Pretty) and representative (White; dashed circle in Fig. 2). This classification means that: knowledge co-production was a key purpose of inviting and mixing stakeholders to take part in futures thinking, participants played a key role in developing the future narratives, and participants could affect the outcome of the analysis with feedback and validation of key assumptions. However, studies differed as to who was engaged in the interactive process; some only

Table 4. Pretty’s (1995) typology in the context of key features of the participatory scenario development process, based on the reviewed articles.

Typology	Key features of the scenario development process
Manipulative participation	Decisions are legitimized by being called participatory, and, in fact, no or little participation occurs Participants were invited mainly as informants, having no part in scenario development and not being asked to evaluate or give feedback to the developed scenarios
Passive participation	N/A
Participation by consultation	Participants were engaged mainly in the first phase of the research, as informants Participants identify drivers of change, variables, and their relationships, and researchers make scenarios to model or map Researchers did all the analysis and created the future narratives or scenarios Participants were asked to evaluate and give feedback on the scenarios, but it is not possible to judge if the feedback was incorporated or ignored Participants are offered to hear and be heard, but under these conditions, they lack the power to ensure that their views will be seen or used by the researcher
Participation for material incentives	Participants mainly contribute with information about drivers of change, used for, e.g., modeling Researchers mainly highlight the benefit of participation as a provider of place and context Participants want to create scenarios that bring economic benefits or provide access to space, materials, etc.
Functional participation	Main purpose of the research is to obtain knowledge to further strengthen research priorities The researchers highlight that participation mainly provided benefits in terms of time and cost efficiency, and that knowledge was obtained more quickly; Participation was an effective platform for generating data and assumptions for e.g. modelling; Researchers highlight that participation mainly provided benefits in terms of time and cost efficiency and that knowledge was obtained more quickly
Interactive participation	Participation was an effective platform for generating data and assumptions for, e.g., modeling Main reason for, and outcome of, the research was knowledge co-production, mutual learning, sharing knowledge Participants developed scenarios together with, or without, the researchers Participants’ power in determining the end product is high, but researchers still have influence Participants participate in joint analysis Research contributed to strengthening local institutions Use of interdisciplinary methods to seek multiple perspectives
Self-mobilization	Researchers were invited by the participants to develop future scenarios in already existing initiatives or projects led by the participants Participants expressed the need for scenario development prior to development of the research project Participants developed the future scenarios Participants’ power in determining the end product is high There was already an expressed need or wish for future scenario development prior to development of the study The research led to some shared outcome that could help participants move on without the involvement of the researchers, e.g., an action plan that was developed by the participants

invited national “experts”, whereas others invited a broader range of stakeholders. For example, Karlberg et al. (2015) had “expert” participants from key administrative posts, institutions, and corporations, who developed storylines with the researchers, and researchers then analyzed the scenarios using models. The outcome was then evaluated by the stakeholders, and data and assumptions were refined by the researchers until the results were deemed credible by the stakeholders. Capitani et al. (2016) followed a similar procedure but also included local experts, comprising farmers and livestock keepers, in the participatory process (see Table A1.2 in Appendix 1).

DISCUSSION

Here, I investigate different types of participatory scenario development and visioning workshop designs and discuss their potential to spur sustainable change. All articles reviewed explore alternative futures and solutions to complex social-ecological systems that are notoriously “wicked”, meaning that the definitions of problems at hand vary from stakeholder to stakeholder and that attempted solutions may cause as many problems as they solve (Eitzel et al. 2020). All studies were also conducted in the African context, which is a geographical region

where most countries experience sustainability challenges strongly linked to high levels of poverty, socioeconomic injustices, and low levels of democracy. Although participatory approaches to development are often justified in terms of efficiency, effectiveness, democratization, and empowerment, there is little evidence of long-term social change in terms of material improvements for the most vulnerable people (Kyamusugulwa 2013), which I also explore and discuss. I focus the majority of this discussion on participatory futures thinking in relation to its potential and limitations to imagine sustainable futures that are just and fair, as such visions are increasingly requested in sustainability debates (Newell et al. 2020). The discussion will particularly deal with questions about who is invited to participate, the importance of plurality and recognizing conflicting ideas of what is desirable, and which futures thinking methods allow for such plurality.

Who participates in what? Potential and limitations of different types of stakeholder engagement

Most studies engaged a wide range of stakeholders in terms of political and economic power and agency (e.g., policy makers, academics, small-scale farmers). This aspect results in different potential and limitations for what futures can be imagined and to

Table 5. White’s (1996) typology in the context of the participatory scenario development process, based on the reviewed articles.

Form	Top-down perspective (what “participation” means for the implementor)	Bottom-up perspective (what “participation” means for those on the receiving end)	Function (what “participation” is for)
Nominal: To include people in the research process, mainly for the sake of participation, but participants have no influence	Legitimation: To show they are co-producing knowledge	Inclusion: To retain some access to potential benefits	Display: Participants have no real influence on the outcome
Instrumental: Participants are involved in data collection, which is cost-efficient for the initiator or researcher, whereas participants may perceive it as a cost in terms of time spent doing the monitoring	Efficiency: To limit funders’ input, draw on community contributions, and make projects more cost-effective	Cost: To get compensated for time spent on project-related labor and other activities	Means: For the initiator to achieve cost-effectiveness and access to local facilities
Representative: Associated with positive social learning outcomes, including consensus-building and shifts toward more systemic thinking	Sustainability: To avoid creating dependency, to co-create knowledge	Leverage: To influence the shape the project takes and its management	Voice: The main outcome of the participatory process was knowledge exchange or mutual learning between different types of participants
Transformative: The purpose of the research is to achieve large or small systemic transformation and imagine futures that are not constrained by extrapolation of aspirations that are valued in the present	Empowerment: Participants are enabled to make their own (joint) decisions in the research process, work out what to do, and take action	Empowerment: Participants join (or initiate) the research process for empowerment	Means or end: The outcome can be used when the research process is over (e.g., an action plan, in which participants jointly decide who is responsible for what; outcomes can also be immaterial and lead to social change through movements

what extent such futures thinking workshops can be stepping stones for radical sustainable change. However, such trade-offs also depend on the researchers’ initial motivation to use participatory futures methods.

Most researchers used participatory futures thinking with the initial motivation to identify future risks to be avoided (exploratory scenarios), and to some extent to imagine more sustainable and just futures (normative visions). The main claim is that engaging with a broad range of stakeholders is crucial for sharing experiences and perspectives to facilitate knowledge co-creation and to create new understandings between conflicting societal groups. If the intention of research is to solve conflict, it is considered crucial to invite the conflicting actors to a shared platform and create opportunities to adopt new ways of thinking through dialogue (Drimie et al. 2018). Some authors also highlight the benefits of giving vulnerable or marginalized people the opportunity to be heard in discussions about their future by getting in direct contact with those in power, and that such set-ups make it more likely to change the status quo. Bringing together a variety of stakeholders in terms of, e.g., natural resource use, and power to control these resources, might generate benefits in terms of communication, co-creation of new knowledge, mutual learning, and understanding (Scoones et al. 2018). However, just as these outcomes might be immediate and real, there is also a need to reflect on challenges and limitations of inviting a wide range of stakeholders in terms of power and agency to the participatory process, in particular, if the goal is to induce a shift in current socioeconomically and environmentally unsustainable pathways (i.e., business as usual or the status quo).

The participation typologies by Pretty (1995) and White (1996) were useful for understanding what the participants were participating in and for what purpose, from the view of the implementor and those at the receiving end. However, the typologies could not be used to understand questions about who was participating because they failed to differentiate between

whether participants comprised mixed stakeholder groups in terms of power or purely experts or marginalized groups. For example, Badjeck et al. (2011) and Capitani et al. (2019) scored equally high in terms of participation during the futures thinking process (both were interactive according to Pretty and representative according to White), but the former only engaged “experts” (governments, NGOs, research institutes, and universities), whereas the latter engaged a mix of stakeholders represented by farmers, local officers, members of associations for women and disabled people, NGO delegates, academics, and government officers (Table A1.3 in Appendix 1). Only McCloskey et al. (2011) did not mix stakeholders other than in terms of land users (i.e., diversified agro-pastoralists, pastoralists with wildlife income, marginal pastoralists, wage-earning agro-pastoralists), but for this case, participation ranked fairly low because of how the participatory process was designed (consulting according to Pretty, and instrumental/interactive according to White).

One view from the participation literature is that stakeholders should be represented by experts because it is the most strategic way to obtain a strong and well-functioning public sphere (Ferree et al. 2002). According to this view, it is also important that the process ends in closure, which, for the case of participatory futures thinking, means that it is important that participants compromise and agree on a shared vision. This approach was seen, for example, in Pfeifer et al. (2021), where mixed stakeholders played a game that created different livestock scenarios and were asked to negotiate alternative strategies when trade-offs and conflicts appeared. The researchers aimed to find a solution that would fit all players, and consensus was reached when a group managed to converge toward a preferred scenario. However, the authors highlighted that all groups were not able to reach consensus during the short time within which the transformation game was played.

Other views on participation reject the norm of pure expert-driven participation and decision making and embrace the importance

of citizen inclusion through, e.g., social movements and grassroots organizations, so as not to limit the discussion to actors at the center of the political system (Ferree et al. 2002). Such citizen inclusion is seen as vital for opposing the political status quo and for challenging established elites and dominant ideologies, especially when important normative questions are at stake. Such theories of participation also highlight the danger of premature closure because it can lead to consensus when there is no consensus. Most of the reviewed articles claim that there is a lot to gain from making the center (e.g., power holders, decision makers) and the periphery (e.g., small-scale farmers, pastoralists) meet, and that such meetings can help to facilitate dialogue and mutual respect. Mixing stakeholders has shown that participatory futures thinking can help a range of actors improve their understanding of future options and the potential room to maneuver, realize that they have common interests when it comes to promoting specific changes (e.g., Faysse et al. 2018), and understand all sides of food security and biodiversity more fully (e.g., Jiren et al. 2020). Many researchers claimed that bringing diverse stakeholders together encouraged participants to identify win-win solutions together and come up with a future compromise that was good for all (Johnson et al. 2012, Oteros-Rozas et al. 2015). However, it is debatable whether such compromises are good for all, especially in terms of envisioning more just and sustainable futures, given that the most politically or economically powerful tend to win in a compromise and ignore the opinions of those in need (Cooke and Kothari 2001).

Most articles I reviewed strived to develop shared visions among a range of stakeholders, which is based on the idea that participants share the same basic moral values. It is important, however, to acknowledge that mutually respectful future narratives are often contested and not consensual. Therefore, it can be argued that it is not desirable to make all participants agree on one common future vision. Instead, we can only acknowledge that the more socially diverse participants are, the wider the range of options and implications that can be imagined. A third, and perhaps more interesting view on who should be part of the participatory process highlights the need to exclude powerful actors purposely to imagine futures beyond the status quo (Ferree et al. 2002). According to such a view, it is important to reject the notion of expertise and to privilege those who are marginalized in society because they can offer a view and voice that represents those who are “outsiders within” the system (Ferree et al. 2002). Based on this view, closure or consensus might not be desirable because it can easily suppress a diversity of expressions, beliefs, and values. Only one of the reviewed articles purposely excluded powerful actors from the participatory process (McCloskey et al. 2011), although some articles dealt with the power dilemma by first having separate workshops and then merged into mixed groups (Faysse et al. 2018, Jiren et al. 2020).

To sum up, multistakeholder participatory futures thinking methods are effective to achieve goals linked to social learning because they provide opportunities to become more aware of interdependencies and their risks. However, engaging a wide range of stakeholders during the participatory process might also reduce the “radicalness” of the envisioned futures and fail to depict the full experiences and aspirations of vulnerable groups with little or no agency. Futures based on compromises between participants with different power and agency might support

maintaining the status quo rather than exploring a reconfiguration of current socioeconomic structures toward sustainable futures that are just and fair. Striving for mutual understanding, consensus, and compromise, therefore, might limit the effectiveness of participatory futures thinking to achieve goals of justice and sustainability. Thus, there is a need to develop a diverse set of futures that recognize that there are multiple sustainable solutions and alternatives to the status quo. There is also a need to recognize that powerful actors tend to ignore the opinions of the marginalized, and that there is a need to actively exclude their voices in the process of developing new futures that are just and fair. So, to move away from the status quo, futures thinking methods need to allow for a plurality of perspectives to be held and to be increasingly informed by those in need. It is also important to identify the trade-offs of only including those at the margins who actively experience and live with the effects of injustice, and to reflect on who the losers and the privileged are in any particular future (Inayatullah 2002).

Redefining futures visions as non-consensual and developed by those in need

Because it is alarmingly urgent to propose solutions to sustainable development goals (in particular, those linked to climate change; United Nations General Assembly 2015), it is increasingly important to develop a plurality of sustainable futures while also thinking about whose future is being privileged. It is important that such futures are not restrained by what is probable or possible within the current system, but to make sure that preferred futures are imagined. Most articles used the exploratory “double uncertainty” matrix method, which was expected given that it has been the most dominant scenario method since the 1990s (Curry 2012). The method has the benefits that it follows a straightforward procedure and often produces clear visual representations of a range of futures. However, the outcomes are highly dependent on the initial research question and the process of identifying the dominant uncertainties that represent the matrix axes. It is thus dependent on who the participants are and in which part of the process they participate. The method generates one future that is more sustainable than the other options, and in the reviewed articles, the participants often agreed to develop an action plan for the “sustainable future”. However, there might be severe limitations to these action plans because the sustainable scenario might not be sustainable enough, just more sustainable than the other options.

A method that strives for a plurality of sustainable options is the Nature Futures Framework developed by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (Pereira et al. 2020a). In contrast to traditional types of scenario methods that explore what futures will emerge from current or projected economic or climatic drivers, the Nature Futures Framework strives to create multiple positive visions based on reciprocal nature–people relationships. The framework embraces pluralism because it recognizes that multiple relationships between nature and people exist and is applied across diverse social, geographical, and sectoral contexts. Such approaches could be helpful to understand and formulate solutions to conflicts over natural resource use, neo-colonial development, and conservation efforts that are common in many African countries and are often negatively experienced by those in need. Another approach is to create a diverse set of locally adapted

scenarios that are linked to global-scale scenarios (Kok et al. 2017). The advantage with this approach is that the scenarios would build on existing knowledge about large-scale global drivers while acknowledging social-ecological complexities in different local contexts.

Because futures are complex, they should be treated as complex. One layer of complexity lies in multiple worldviews and the need to account for how the researchers' and participants' worldviews affect the research process and outcome. One way to approach this difficulty is to ensure that data and insights come from arenas outside of official power because that can help to reformulate what is a normal, sane, conventional, or acceptable reality (Inayatullah 2002). It is important to note, however, that the development of alternative futures is influenced by the weights of history and the participants' capacity to influence the world and create desired futures. Most natural resource management contexts are characterized by a complex web of people with different agendas and interests representing different levels of society (e.g., local people, government departments, national and international planners, professional advisors). It is often difficult to achieve compatibility between actors in power and those in need, and often a "successful" policy or project has been successful at the expense of certain stakeholder groups, in particular, the local people (Grimble and Chan 1995). Natural resources such as land, water, rangelands, and forests are essential to the livelihoods of the majority of the world's poorest people, and although they are directly dependent on natural resources, the poor are often underrepresented both politically and in terms of purchasing power. Because different stakeholders are likely to perceive the same socio-environmental problems in different ways, they will also seek different solutions to problems based on differing criteria and assessments of the desirability and value of a given intervention. In terms of natural resource management, the underlying problems and conflicts between dependent and controlling stakeholders might be so fundamentally different that discussions and a win-win compromise are unlikely to succeed (Grimble and Chan 1995). Pereira et al. (2020b) highlight the need to pay close attention to complex social dynamics and power relations among participants, but even if the selection process is careful, some form of power will inevitably enter the convened space. This problem can partly be solved by providing a platform for the participants to reflect openly on how power dynamics either enabled or disabled transformative change. Pereira et al. (2020b) have also observed, however, that participatory futures thinking processes can create unconventional alliances within a mix of actors that are systematically marginalized within current formal policy dialogues.

In light of one of the fundamental challenges of participatory approaches, that without power redistribution it might become an empty and frustrating process for the powerless (Arnstein 1969), participatory futures thinking needs to rethink structures and systems to envision sustainable and just futures in which the most vulnerable are truly empowered (Scoones et al. 2020). Because socioeconomic and cultural injustices are pervasive in contemporary societies and are rooted in processes and practices that systematically give some groups advantages at the expense of others (Fraser 1995), there are several factors that might influence the effectiveness of participatory futures thinking in facilitating social change toward more just and sustainable

futures. One of them is "a strong sense of identity", meaning that a small and homogeneous group has a better chance of facilitating collective action than a large heterogeneous group because a high level of social homogeneity is needed to form good relationships, trust, and reciprocity norms (Kyamusugulwa 2013). Also, Cornwall (2008) states that groups with little power are most likely to be given voice by coming together as a group based on their commonalities, by having a space to gain confidence and skills, and subsequently, by developing their arguments based on the solidarity and support that such a group can offer.

In Africa, which is a continent that holds many countries with highly stratified societies (e.g., Gini-coefficients > 40, or corruption index < 50), it might be important that researchers intentionally seek out and separate certain groups of society that represent those in need (as opposed to those in power) for future scenario development and visioning (Fraser 1990). In this way, groups with little power to influence their daily lives can construct their own narrative about the futures they aspire to and what is needed to get there, and researchers can provide a space for them to develop ideas that, thereafter, can be taken further to politicians. However, it is not necessarily so that marginal citizens want more radical and sustainable changes than those with power, and there are also power differences within marginalized groups (Cooke and Kothari 2001). There are also limitations to what futures can be imagined given that all participants are part of a reality that influences how they experience and think about the future (Heron and Reason 1997). Nevertheless, citizens at the margins (e.g., youth, women) have a unique perspective on the underlying socioeconomic and political structures that, for example, cause environmental degradation. Researchers can therefore support a shift in sustainability and development debates by changing who speaks about challenges such as deforestation, biodiversity loss, and poverty, because it can change what is spoken about. If we actively include marginal voices in futures discussions, it might be possible to find solutions to problems that are rarely spoken about (Persson et al. 2018). Because "knowers can only be knowers when known by other knowers" (Heron and Reason 1997:280), it is important to create dialogue between stakeholders of different power and needs to mobilize change. My suggestion, therefore, is that normative visions of those in need should be thoroughly developed prior to such meeting. In that way, it is possible to use the plural future visions as stepping stones for change because people with little to no agency can communicate their visions based on current experiences to those with political power.

This review shows that understanding and knowledge co-creation between experts and non-experts have been important for identifying shared objectives and goals in the participatory process. However, participatory futures thinking could go much further in its impacts toward justice and sustainability if it were to become more political and tap into existing movements or processes in a more systematic way, as well as if space were created for the poor to negotiate power relations and local politics (Kyamusugulwa 2013). Also, in Leach's opinion, development must be treated as thoroughly political, and not only as a technical matter (<https://www.ids.ac.uk/opinions/development-must-change-in-the-face-of-injustice-and-inequality/>). Leach highlights the need to embed politics and power more widely and deeply in attempts to induce change and transformation. So too would

participatory futures thinking benefit from becoming more political and aware of power dimensions to spur just and sustainable change, and not always strive for consensus.

CONCLUSION

Because power relations underlie the causes and vulnerabilities linked to health, climatic, and economic turmoil, they lie at the heart of inequalities and injustices. It is therefore important that participatory futures thinking pays close attention to power relations between stakeholders to identify a plurality of just and sustainable futures. Focused on sub-Saharan Africa, a context with a long history of participatory approaches to development, I show that most of the reviewed articles strived for increased understanding and knowledge co-creation for identifying shared objectives and aims, and that such processes often led to consensus and compromise in the form of a shared future vision and action plan. The strong focus on stakeholder mixing (in terms of power) and consensus reaching might be one of the main limitations of participatory futures thinking's potential to imagine sustainable futures that are just and fair. Because it is increasingly urgent to reach sustainable development goals (in particular, linked to issues of climate change), it is crucial to understand the perspectives and aspirations of those in need and to include marginalized voices in the redesign of the future. It is therefore important that those in need play a key role in scenario development and future visioning, and that their experiences, knowledge, and aspirations are communicated to those in power of policy- and decision-making to change the status quo.

Responses to this article can be read online at:
<https://www.ecologyandsociety.org/issues/responses.php/12617>

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Data Availability:

The data that support the findings of this study are available on request from the corresponding author, E.J.

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Appendix

Table A1.1. Review protocol with questions answered for each reviewed article.

Title
Author
Year
Who Participates? (who?)
Who Participates? (why?)
In what? (What are they contributing to/Tasks?)
In what? (what type of futures are developed?)
Who did the analysis?
Framework used?
For whose benefit?
Typology (Pretty)
Typology (White)
Context (Country)
Context (Locality/spatial scale)
Context (Theme)
Context (Time horizon)
Scenario type
Context (Scenario names)
Context (Aspects of the future considered)
Rationale
Conclusions
Outcomes?
Evaluation (what happened?)

Table A1.2. Pretty's typology in the context of participatory future scenario development. The columns account for different steps of the research process, and distinguish stakeholders as implementors (I) and receivers (R) according to White's typology.

Typology	Initiative leader		Consultation phase	Decision taking		Analysis		Scenario Development		Feedback/evaluation by participants	Ownership of action plan/other output	
	I	R		I	R	I	R	I	R		I	R
Manipulative participation	1	0	No	1	0	1	0	1	0	No	1	0
Passive participation	1	0	Yes	1	0	1	0	1	0	No	1	0
Participation by consultation	1	0	Yes	1	0	1	0	1	0	Yes/No	1	0
Participation for material incentives	1	0	Yes	1	0	1	0	1	0	Yes/No	1	0
Functional participation	1	0	Yes	1	0	1	1	1	1	Yes/No	1	0
Interactive participation	1	0	Yes	1	1	1	1	1	1	Yes	1	1
Self-mobilization	0	1	Yes	0	1	0	1	0	1	Yes	0	1

Table A1.3 Overview of the participatory scenario development set-up, in terms of number and types of participants, their role in the scenario development, and the material outcome of the research process.

Author & Year	Total number of participants	Participants per workshop	Stakeholders	Workshop stakeholder set-up	Who developed the scenarios?	Outcome(s)
Pfeifer et al. 2020	124	29-33	Farmers, traders, local leaders and administrators, experts, researchers, high-level stakeholders (1 st case). Livestock producers, butchers, dairy processor, provincial and regional government representatives, NGOs, farmers, local administration and experts (2 nd case)	Mixed	The participants	Sustainable livestock intensification pathways
Newman et al. 2020	67	12-44	Community members (gender and age balanced). Community representatives, members from agricultural-, forestry-, environment-, water-, energy-, and tourism sectors. Two NGOs.	First community based, then multi-stakeholder	The participants	Sustainable land use pathways
Jiren et al. 2020	35	35	'Local people' representatives of the three municipalities, district and zonal levels; Bureau of agriculture and natural resources at or across administrative levels; governmental organizations, NGOs, CSOs, other sectors including food security and biodiversity. Cross-sectoral organizations: groups of women, men, community leaders, religious leaders, community cooperatives, health professionals, elementary school teachers.	Mix (separate and diverse at first, then joint)	The researchers developed the scenarios based on initial input from participants, then the scenarios were evaluated by all stakeholders, and feedback was incorporated to the scenarios.	Visualizations
Capitani et al. 2019	62	30-32	Farmers, Government officers, NGO delegates, members of associations for women and disabled people, academics, local officers	Mix	Local stakeholders develop qualitative and semi-quantitative scenarios guided by a team including facilitators and modellers. Modellers then translate this information into quantitative and spatially explicit outputs. The final outputs were created with stakeholders' validation of preliminary results.	Maps
Faysse et al. 2018	N/A (20-25 cooperative members,	N/A	Small- and large-scale farmers, representatives from the Department of Agriculture and marine	Mix (separate stakeholder groups at first, then	Participants together with researchers	Action plan

	otherwise unspecified)		fisheries, representatives from catchment agencies.	joint workshop)		
Kebede et al. 2018 (details in Nicholls et al 2017)	N/A (only specified that at least 10 experts were interviewed)	N/A	Experts (technical country experts) and stakeholders (policy/decision-makers) at different stages.	Expert- led, with stakeholders providing evaluations and feedback.	Stage 1: Narratives of adaptation policy trajectories (Expert-led), Stage 2: Evaluate and validate (Engaging stakeholders), Stage 3: Revise and remodel (Expert-led) Stage 4: Refine and finalise (Re-engage stakeholders)	Graphs
Muhati et al. 2018	142	26	Initial interviews and questionnaires: key agencies in the area (Forest service, Wildlife service, Agricultural and livestock research organization, county government, water resources authority, national drought management authority, national environmental management authority, food for the hungry, a representative of conservation NGOs, conservancy managers. Focus group discussions with local population based on their utilisation of the forest. Questionnaires to focus group participants (firewood collectors, farmers, honey collectors, livestock herders, water users, herbalists).	40 from the user groups, and 12 from management institutions.	The participants	4 plausible scenarios, action plan.
Olabisi et al. 2018	50	30	Extension workers, academics, representatives of farmer organizations, representatives from development and agricultural non-profit organizations, private sector input suppliers, local elected officials, traditional leaders, and government scientists.	Workshop participants were intended to represent a cross-section of those involved with the agricultural sector	Participants developed scenarios, researchers coded the scenarios for analysis.	Narratives
Zorrilla-Miras et al. 2018	56	18 at national level, 14 at provincial level, 24 at community level	National institutions, provincial and district level stakeholders, community members (diversity in gender, age, and main income activity)	Mix but divided: workshops divided across three administrative levels (national, district, community). The different groups never had a joint workshop.	The researchers, narratives are based on initial input from workshop participants. Then evaluated by the district- and national level stakeholders.	Maps, graphs
Pereira et al. 2018	23 (+7 facilitators)	23 (+7)	23 key thinkers: artists, scientists, change makers ('seed' representatives, practitioners involved in NGOs), and 7 facilitators	Mix of very different stakeholders	The participants developed the scenarios based on three different pre-identified 'seed-	Narratives

					projects', guided by instructions from facilitators	
Mshale et al. 2017	39	15-28	Government, private sector, NGOs, local communities	Mix and divided: Forestry and agricultural sectors + women only.	Participants developed four scenarios with guidance from a "Participatory Prospective Analysis" approach.	Narratives, Action plan
Ravikumar et al. 2017	N/A	N/A	At least one representative each from: Local communities, NGOs, private firms, and multiple government agencies from the local to the national level, including environment, forestry, mining, and agricultural offices	Mix, first homogenous groups, then together.	Researchers combine the factors in diverse ways to present four very general future states of the landscape that the participants need to flesh out and describe in detail.	Narratives, maps, carbon sequestration computations.
Olabisi et al. 2016	86	29	Members of local government; NGOs; farmer organizations; extension services and development projects; media; universities; CGIAR centers, and private sectors.	Mix for entire 3-day workshop	Participants, within the already determined theme determined by the researchers	Narratives
Capitani et al. 2016	240 (7 workshops with in total 180 participants) synthesis workshop with 60 participants	~ 25	Governmental institutions, private companies, research institutions, and civil society organizations (CSOs) representing land users, land managers (technical and political) at municipal, district, and regional level, with expertise in socioeconomic and development sectors. Local (village-level) communities were represented by farmers and livestock-keepers associations, community-based natural resources management and conservation organizations, and women's groups.	Mixed, first sub-national and then on national level. 1. Mixed groups across administrative units and sectors to generate consensus and harmonize visions within each subnational unit of analysis	Rankings and qualitative scenarios developed by mixed groups in sub-national workshops. Researchers modelled land use and land cover change based on narratives developed by participants. Participants from national and sub-national workshops then evaluated the models, maps, and assumptions, and researchers revised the model until consensus was reached.	Land use and land cover maps based on storylines.
Karlberg et al. 2015	30	30	Bureau of Agriculture, Bureau of Energy and Mines, Bureau of Environmental Protection, Land Administration and Use, the Abbay Basin Authority, the Ethiopian Electric Power Corporation, the Amhara Regional Agriculture Research Institute, Bahir Dar University, and the Organization for Rehabilitation and Development in Amhara.	Mixed sectors	Participants and researchers jointly developed the narratives, researchers did the analysis, participants evaluated the outcome	Graphs
Lemenih et al. 2014	70	34-36	Local communities, development agents, and experts of Office of Agriculture at district level	First key informant interviews, household	Participants together with researchers, researchers used	STELLA model output, predictions of tree population

				surveys, and focus group discussions, then one workshop per site to present findings and develop alternative scenarios together	the scenarios for modelling	and yields under four scenarios
Farwig et al. 2014	No workshop	No workshop	Local community, managing authorities, scientists	In depth knowledge and stakeholder consultation	The researchers	Forest management scenarios
Malinga et al. 2013	34	22 local users interviewed 12 stakeholders in workshop	Local governmental organizations, NGOs, local stakeholders (i.e. small-scale farmer, large-scale farmers, representatives of nature reserves). Workshop participants: researchers, policy makers, practitioners, resource managers, and resource users.	Interviews with local users, workshop with regional stakeholders	Stakeholders outlined scenarios during workshop. The researchers made the scenarios based on stakeholder outlines. Scenarios were evaluated by local and regional stakeholders, and refined.	Estimates of changes in ecosystem services based on three storylines
König et al. 2012	10	N/A	Local actors: stakeholders and experts from regional land administration and research institutions. Stakeholders invited for scenario impact assessment: regional authorities, administrators linked to policy guidelines or implementation (Regional Administration of Agricultural Development, South Development Office, Me'denine, Tunisian Union of Agriculture and Fishing, Ministry of Environment and Sustainable Development).	Consultation with local actors. A group of stakeholders invited to scenario assessment.	Researchers together with land administration experts	Scores (Assessment of soil and water conservation measures and its social, environmental and economic impacts)
Van der Voorn et al. 2012	N/A	N/A	N/A "A broad and diverse range of stakeholders"	The five steps consist of: 1) strategic problem orientation; 2) vision development; 3) backcasting analysis; 4) elaboration, assessment & agenda development; and 5) embedding of results.	Unclear – likely the researchers and participants in joint workshops	Narratives and goals
Sandker et al. 2011	100	No workshops	Village households, local experts	Interviews to fill data gaps for the model	The researchers	Model output (graph)
McCloskey et al. 2011	N/A	N/A	Diverse set of stakeholders with different land use interests (grazing, cultivation, urban development)	Four separate workshops for each livelihood strategy:	Unclear – likely the researchers and participants in joint workshops	Maps

				diversified agro-pastoralists, pastoralists with wildlife income, marginal pastoralists, wage-earning agro-pastoralists)		
Badjeck et al. 2011	28	28	17 experts from governments, non-governmental organizations (NGOs), research institutes and universities	Grouped by nationality, 2.5 days of workshops.	The participants, with guidance from research framework	Narratives and visualizations, research and development needs, recommendations