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Strengthening decision-making on sustainable agricultural intensification through multi-stakeholder social learning in sub-Saharan Africa

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ABSTRACT

Increasing and competing demands on agriculture in sub-Saharan Africa mean that policy and investment decisions become more complex. Despite growing consensus on the need for sustainable agricultural intensification, there is limited agreement on how to achieve this in practice. Governments and societies face uncertainty and complex choices. This paper explores the potential of Multi-Stakeholder, Social Learning (MSL) approaches, facilitated by National Learning Alliances (NLAs), to improve policy and investment decisions. Comparative evidence from a donor-supported research and learning programme in Ethiopia, Ghana, Malawi, Tanzania and Zambia is used in a theory-based evaluation approach to assess the contribution of the NLAs to capacity and practice change amongst individuals, networks and senior decision-makers. Ten outcome cases are explored, including their contribution to systemic changes in the governance of evidence. Key lessons included: the value to decision-makers of engaging with informal networks; importance of combining dialogue, deliberation and experiential learning; the need to create safe spaces in national level MSL processes; the demanding combination of facilitation skills and commitment; and appropriately flexible support. This suggests a need not only for the production of quality research, but crucially support for MSL as a means of contributing to the good governance of evidence and sustainable change.

KEYWORDS

Sustainable agricultural intensification; decision-making processes; policy; social learning; multi-stakeholder; agriculture; values; governance of evidence; sub-Saharan Africa

1. Introduction

Globally, there are increasing demands on agriculture to provide more and different types of food, while minimizing environmental impacts (Garnett et al., 2013). Sub-Saharan African governments, investors, and societies face complex choices relating to their agricultural systems. Diverse factors such as population growth, urbanization, and climate change are driving change. In many parts of Sub-Saharan Africa (SSA), there is a further expectation that agriculture will make a major contribution to economic development.

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In line with the United Nations Sustainable Development Goals, there is widespread agreement that African agricultural productivity must increase, while reducing environmental impacts across scales and improving social outcomes (Haggar et al., 2018; Haggar et al., 2020), but less consensus on how to achieve sustainable agricultural intensification (SAI). Diverse approaches are promoted with differing emphases on, for example, the use of external inputs and agroecological principles (Haggar et al., 2020). Debates are frequently polarized, which can result in something of an impasse (Mockshell & Kamanda, 2018). For policymakers, the prevention of practices or problems, e.g. through regulation of harmful pesticides, is easier than enabling positive transitions towards sustainable practices and agroecosystems (Pretty, 2018).

The Comprehensive African Agriculture Development Programme (CAADP) provides an overarching policy framework for agricultural development in Africa. It sets out a results framework calling for improved decision-making processes, based on stronger institutional and human planning and implementation capacity, better alignment of policy design processes, more transparency and inclusion in design processes, and evidence-based analysis (NEPAD, 2015). However, achieving these goals is challenging; conventional 'research to inform policy' approaches have encountered many obstacles.

This paper explores the potential of structured social learning approaches to improve SAI-related decision-making processes, drawing upon comparative evidence from experiences in five countries in SSA. The UK Department for International Development funded the Sustainable Agricultural Intensification Research and Learning in Africa[1] (SAIRLA) programme (2015–2020) which aimed to generate new evidence and tools to enable governments, investors and other actors to deliver more effective policies and investments in SAI, particularly benefitting poorer smallholders, women, and youth. The programme had three main themes: Equity, Trade-offs and Services. In five countries, Ethiopia, Ghana, Malawi, Tanzania, and Zambia, diverse stakeholders were brought together in National Learning Alliances (NLAs) to enable multi-stakeholder social learning (MSL) to inform relevant decision-making processes, guided by facilitation teams. The teams comprised facilitator(s), communication and monitoring and evaluation specialists, and in some cases gender and policy experts. The NLAs have been hosted by different types of organizations – an international NGO, two international research organizations (one in partnership with a national policy institute), a university, and a member-led policy forum. The structured MSL processes sought to strengthen capacity and catalyse practice changes amongst individual members, networks, and senior decision-makers, and hence to inform and strengthen SAI-related policy and investment processes.

Two overall research questions guided this study:

(1) To what extent and how effective are NLA multi-stakeholder, social learning approaches in contributing to capacity, practice and systems change relating to SAI policy and investment decision-making processes?
(2) What lessons can be distilled to inform future multi-stakeholder social learning initiatives aiming to inform policy and investment decision making processes?

Section 2 of the paper provides the background to the debate on agricultural complexity, policy, and investment processes, and the role of evidence, followed by an overview of social learning and its application in different contexts. Section 3 provides an explanation of the theory of change and the study method. Section 4 presents the findings on the effectiveness of MSL in terms of the NLA social learning process and outcomes, assessed using theory-based evaluation. Short term outcomes include individual capacity and behaviour change and network capacity and behaviour change. We also discuss contributions to systems-change (e.g. shared understanding of SAI options and pathways and improved policy processes and decisions). Specific outcome cases form a key part of this theory-based analysis, to scrutinize indepth how social learning contributes to change in diverse contexts and types of issues. The discussion section answers the study questions, informing the conclusions drawn on the potential of MSL to inform decision-making processes and outcomes.

2. Background

2.1. Agricultural complexity, policy & investment processes, and the role of evidence

Agriculture in SSA is characterized by increasing complexity, due to the multiple drivers changing agriculture and food systems, such as demographic and

economic development factors, and growing demands on agriculture to meet food security and nutrition, economic, environmental and social goals. This flux creates problems and opportunities, but trade-offs and synergies can be hard for decision-makers to delineate given the complexity involved. In some cases, there are more clearly agreed problem definitions and solutions. However, for 'wicked' problems, both the issue itself and potential solutions are unclear to the decision maker (Head & Alford, 2013), with inherent uncertainties, contested values, incomplete knowledge of stakeholders (Leach et al., (2010) and political dynamics (IDS, 2006). Yet the focus is too often on managerial responses, rather than a search for adaptive solutions tailored to local dynamics and uncertainties (Chapman, 2004; Leach et al., (2010).

Development of flexible, context-specific responses requires multi-stakeholder engagement (Leach et al., (2010) and a moral imperative exists for the lived experiences of those affected by policy to have a voice (Boydell et al., 2017; McCoy & Scully, 2002).

Scientific researchers have a key role to play in SAI-related policy decision-making processes. However, failures continue to abound in such engagement. In a recent review of the literature, Dinesh et al. (2021) find science-policy engagement outcome failures, because research lacks credibility and legitimacy in the eyes of policy-makers and is not always salient to their needs. There are often insufficient knowledge brokers for iterative engagement processes, adverse power dynamics and weaknesses in institutional capacity to absorb new policy ideas. Cash (2003) posit that research should have saliency, legitimacy and credibility to be useful to policy-makers. Dinesh et al. (2021) argue that greater awareness is needed of imbalances in power dynamics, the importance of intermediaries and the institutional capacity gaps in science-policy engagement.

Changes in research actor roles are being mooted; for example, Spruijta et al. (2014) outlines key principles for researchers seeking policy influence. These are: inclusion of transparency in methods and assumptions, having humility in professional mindsets, facilitation of public participation, use of the precautionary principle, clear articulation of divergences between experts, and democratization of science (e.g. through dialogues). Similarly, the International Science Council (ISC, 2018, p. 2; based on work by Fazey et al., 2018) argue that instead of a focus on knowledge transfer, which can be termed 'first-order transformation research', research actors should ideally participate as part of the system, in 'second-order transformation research', i.e. seeking to understand change from within a system, combining learning and generation of new knowledge, and actively working with and embracing politics and values for more transformative change.

Promotion of 'evidence-based policy-making' grew globally in the new millennium, including in developing countries, supported by donor initiatives. However, even if influence is sometimes achieved by researchers and donors over policy designs, this has not always been matched by policy implementation (Andrews et al., 2017). Capacity and political economy issues are key barriers, but divergences between policy makers' beliefs and those of donors have also been identified (Mockshell & Birner, 2015).

Despite donor funding in recent years to strengthen research capacity in developing countries[2] and efforts to build policy-makers' capacity to use evidence, systemic barriers continue to exist.[3] This has led to some development practitioners arguing that more politically informed ways of working are necessary to overcome such barriers, involving on-going, flexible, collaborative processes rather than *ad hoc* activities (ITAD, 2018, p ix).

People often have a confirmation bias which causes them to look for and selectively process information which confirms their beliefs. Knowledge that contradicts prevailing assumptions may be neglected and need for change may therefore not be recognized (Medema et al., 2014). Similarly, Parkhurst (2017) identifies the importance of cognitive-political biases which shape the framing of policy issues. In some cases, powerful political actors manipulate evidence to suit their interests, while those promoting evidence-based policy making ignore political realities, depoliticizing debates and marginalizing certain voices (Parkhurst, 2017). Power dynamics infuse all policy processes; powerful actors may open policy spaces for wider participation, often in response to civil society pressure, but also use their power to close them down (Gaventa, 2009).

While Dinesh et al. (2021) focus upon factors influencing researcher-policy-maker engagement, they do not dwell on civic engagement. In contrast, Gauvin (2009) highlights two converging trends in relation to deliberation and public policy: (a) efforts to enhance civic engagement in policy decision-making as part of democratic governance, and (b)

improved science-policy engagement through both the co-production and co-interpretation of research-based knowledge. In other words, it is not only science that needs to be part of a functioning evidence-informed policy-making process; civic engagement and the broader public need to be involved for a governance system to be fully democratic and responsive to context and values. Beyond the frequent focus of donors on evidence-based policymaking, investment is needed in 'evidence-advisory institutions' that not only embrace key principles of scientific good practice, but also strengthen democratic representation. Parkhurst calls this combination the 'good governance of evidence', defined as 'the use of rigorous, systematic and technically valid pieces of evidence within decision-making processes that are representative of, and accountable to, populations served' (Parkhurst, 2017, p. 1). Enhancing democratic representation and civic engagement will require guided processes to help achieve normative goals, to improve the appropriateness of the evidence generated (e.g. to be relevant to local social concerns). Democratically elected groups stewarding the overall system provide a mechansim aiming to achieve accountability. Transparency, deliberation, representation and contestability, involving diverse stakeholders, are needed to build trust and counter potential biases in the system (Parkhurst, 2017).

2.2. Social learning

Social learning definitions vary (Armitage et al., 2008; Rodela, 2011). Originating as a concept in social psychology, social learning is understood as imitation or other forms of learning through a social context (von Schönfeld et al., 2020). Diduck et al. (2012) suggest there are two types of learning for individuals: (a) instrumental learning – acquiring knowledge and skills that are task and performance oriented, and (b) communicative learning – understanding what others mean when they communicate with us and their purposes, values and intentions. Bentley Brymer et al. (2018) unpack the process further, explaining how social learning changes an individual's understanding through enhanced communication of cognitive, relational and epistemic positions. Social learning can create opportunities and a stimulus to alter those positions rather than purely reinforcing existing knowledge, norms, and beliefs. von Schönfeld et al. (2020) suggest analysis is needed of what kinds of social interaction and knowledge exchange are most effective for maximizing positive outcomes, because there are risks of reinforcing prejudices. Reed et al. (2010) emphasize the broader scope and embedded nature of social learning with their widely used definition: 'a change in understanding that goes beyond the individual to become situated within wider social units through social interactions between actors within social networks'.

Social learning processes can lead to facilitation of deeper forms of learning and change. Johannessen et al. (2019), for example, define single, double, and triple loop learning as follows: single loop learning is based on error detection and correction and concentrates on existing practices; double loop learning also considers error detection and correction, but it involves slightly deeper learning to respond to new contextual challenges and possibilities; triple loop learning processes involve deep reflection on dominant framings and underlying assumptions and who should decide on the best course of action (Johannessen et al., 2019).

The application of structured social learning approaches has increased in complex multi-stakeholder, natural resource management contexts. Cundill and Rodela (2012) suggest a key feature of social learning processes in natural resource management contexts is sustained interaction between stakeholders, with deliberation and the sharing of knowledge in a trusting environment. This leads to improved decision making based on growing awareness of human-environment interactions, better relationships, and improved problem-solving capacities (Cundill & Rodela, 2012). In the field of research on social learning and natural resources management, Rodela (2011) suggests there are three main perspectives: individual, network and systems.

Hall (1993), citing Heclo (1974), suggests that much political interaction is in fact a process of social learning expressed through policy. Less extensive evidence exists of social learning-orientated approaches for *purposive* applications to improve national policy, planning and investment processes, especially in low- and middle-income countries, although there are examples from the health and water sectors.

Specific methods can be part of a social learning approach, such as Citizen Assemblies or field visits, but change is unlikely to happen through an individual event (IDS, 2006). Social learning can occur at different scales, or between scales (e.g. national to local and *vice versa*) if structured appropriately.

Learning alliances provide a structure to facilitate MSL processes (Sutherland et al., 2012).[4] MSL may involve processes of dialogue and deliberation; dialogue stimulates a divergent flow of communication where the conversation can take many directions and conclude with diverse representation of voices and issues, whereas deliberation stimulates a convergent flow of communication where the conversation is oriented towards resolution and decision making (Escobar, 2011).

3. Method

Attribution of impact is not feasible for a social learning process embedded in complex policy and investment decision making processes. However, Theory Based Evaluation is an appropriate approach for contexts of complexity, offering a credible evaluation of contribution, based upon a sequence of activities for increasing the trustworthiness of the analysis and generative causality (Mayne, 2011; Stern et al., 2012; Weiss, 1997; White, 2009; Woolcock, 2013). Comparative assessment of the ten Outcome Cases enables further distillation of lessons.

Based on the SAIRLA programme and a review of the literature (see section 2), a theory of change was conceptualized for how structured MSL can inform and improve specific SAI national policy and investment decisions and outcomes, but also contribute to enhancing the wider system, i.e. the processes and participation in the evidence system and its overall governance (See Figure 1).

The theory of change is as follows. Firstly, MSL occurs in diverse contexts. In the countries of implementation, agricultural and political economy situations are diverse. The quality of governance in the five study countries varies significantly and is a challenge for all. According to Kaufmann et al.'s (2010) Worldwide Governance Indicators[5] published by the World Bank[6] for the period 2016–2018, Ghana performs the best across all indicators. Ethiopia is weak, particularly on voice and accountability and regulatory quality. Malawi scores second best in terms of voice and accountability and worst for the control of corruption. Similarly, the baseline regarding the governance of evidence also varies. Evidence-governance and research evidence capacity issues also exist in all five study countries, although they vary in nature and scope.

Secondly, an MSL process is implemented by an NLA, an informal network of diverse stakeholders in the evidence governance system and the broader agricultural system. The NLA facilitation team guides a structured process, involving co-design of learning activities and regular interactions among the wider membership, and senior decision-maker engagement, often on a more occasional basis – the boundaries of membership and non-membership being somewhat fluid. The learning processes vary in terms of communication methods used, the relative focus on deliberation and dialogue and the individual methods employed (e.g. joint learning visits, sequenced dialogues, ICT for Agricultural Extension market place), but generally involve combinations of shorter and longer-term learning cycles.

Thirdly, this is anticipated to lead to capacity-strengthening of individual, network, and senior decision-makers. Individual member capacity strengthening can be cognitive (enhanced factual knowledge, skills and understanding), relational (enhanced trust and relationships) and normative (positive shifts in norms, values, and belief systems) in nature. In turn, capacity changes contribute to catalysing behaviour change amongst individual members and enhancing collective actions of the overall network, including participation by engaged senior-decision-makers. This is expected to contribute to improvements in specific SAI-related decisions. At the broader systemic level, a contribution is also possible; building a more common understanding of SAI contributes to better quality decision-making processes, improved decisions and ultimately to shifts towards more sustainable and productive agricultural systems. Many other contributing factors/assumptions need to be realized for anticipated outcomes to be achieved.

To guide the exploration of the NLA change, indicators were identified based on the theory of change and drawing on wider literature (see section 2) (see Table 1).

We use the theory of change to support an analysis of the effectiveness of the MSL processes and outcomes. We apply the seven elements of the Parkhurst (2017) governance of evidence framework, to assess contribution to effectiveness in the wider agricultural evidence governance system.

A mix of quantitative and qualitative methods were used for data collection, including a strong participatory element. Towards the end of the SAIRLA programme, workshops were held with the NLA facilitation teams and the wider NLA membership in each country – Ethiopia, Ghana, Malawi, Tanzania, and

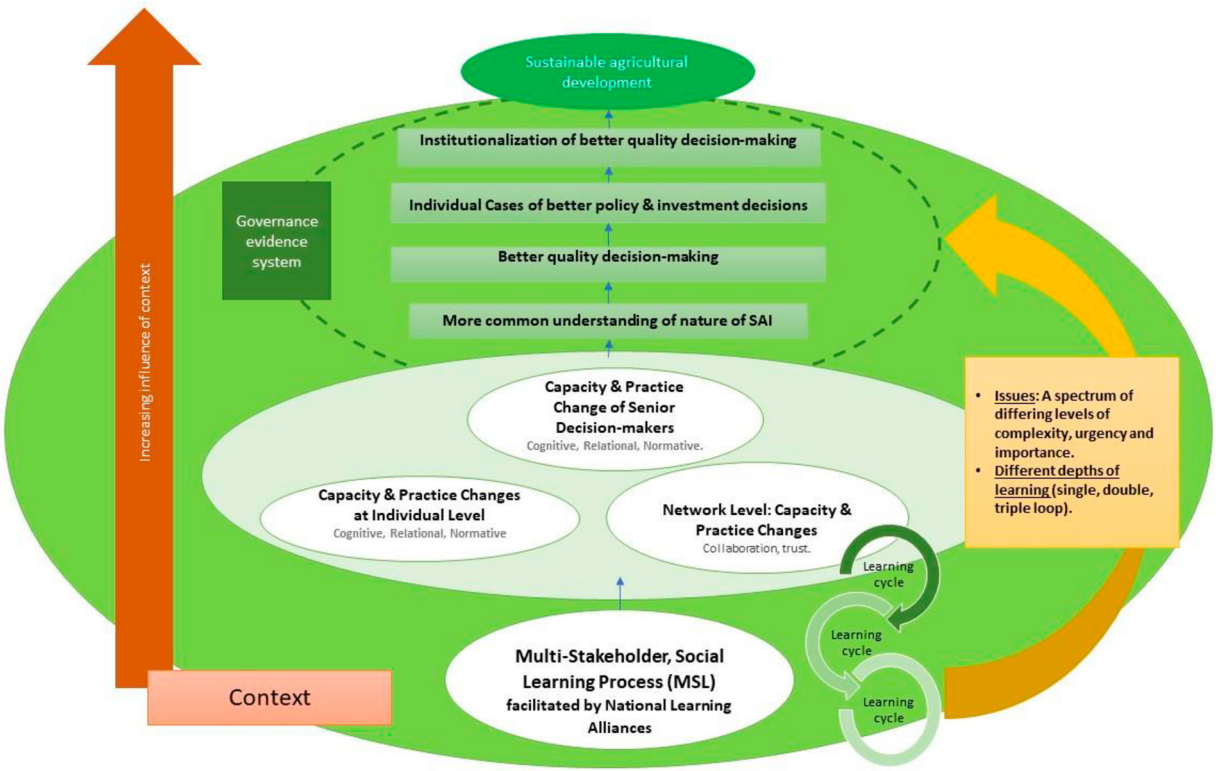

Figure 1. Theory of change: multi-stakeholder, social learning through national learning alliances to improve sustainable agricultural intensification policy and investment processes.

Table 1. Theory of change and indicators.

TOC stage	Domain	Indicator
NLA MSL process	Democracy Participation Space for different types of knowledge Facilitation Communication	• Level of democracy of NLA (accountability, legitimacy, transparency, awareness of NLA's learning themes, influence on NLA decision-making) • Stakeholder participation (level of participation, satisfaction with participation, opportunity for participation) • Different types of SAI knowledge (scientific knowledge, local knowledge) • Quality of facilitation • Quality of communication
Individual change	Cognitive Capacity	• Knowledge and understanding of SAI issues in national context • Understanding of trade-offs in SAI • Ability to use SAI- related tools • Ability to use appropriate evidence
	Relational Capacity	• Level of respect for views of others • Trust in views of other NLA participants • Diversity and quality of SAI-related relationships
	Normative Capacity	• Extent to which views on SAI challenged • Consideration of social, environmental economic trade-offs in SAI • Commitment to act on SAI issues
	Individual Behaviour	• Increased use of specific SAI-related tools • Increased use of research, contextual and experience-based evidence • Increased frequency and reciprocity of communication, joint planning, and action • Broadened relationships to include new stakeholder groups
Network changes	Network Capacity	• Common understanding of SAI issues in national context • NLA joint framing of problems and opportunities • NLA joint assessment of alternative SAI options • Trust amongst NLA participants • Diversity and quality of relationships • Access to new opportunities for collaboration • Opportunities to interact and share experiences, ideas, and environments • Access to safe space to challenge norms and ways of thinking
	Network Behaviour	• Increased frequency and reciprocity of communication, joint planning, action, and reflection of the NLA • Innovative and effective communication of NLA learning to the wider agricultural system actors. • Extent to which NLA has creatively engaged diverse stakeholders in a learning process to inform SAI related decision making
Systemic change	Good Governance of Evidence	• More common understanding of nature of SAI • Quality of policy and investment decision-making process to address issues • Policy & investment decisions • Institutionalization of better quality, decision-making • Sustainable agricultural development

Source: Draws on Bentley Brymer et al. (2018), Medema et al. (2014), Cundill and Rodela (2012), Harvey et al. (2013), Van Epp and Garside (2014) and own work.

Zambia. In mini-workshops the facilitation team reflected on the evolution of the NLA and factors mediating the NLA process, and in a participatory workshop the wider NLA members jointly assessed the NLA MSL process and outcomes, and possible future scenarios for continuation of the NLA. Fifty semi-structured interviews guided by a checklist were conducted with key informants (KIs), to

understand their perceptions and insights. The KIs included decision-makers of varying seniority (civil servants, donor representatives, private sector, elected government representatives) who had engaged with the NLA process, together with NGO managers, journalists, researchers and academics. For all the qualitative data, transcripts and workshop reports were produced. A questionnaire survey with 112 respondents was undertaken with questions primarily based on the theory of change indicators. For most questions, interviewees were asked about their level of agreement or satisfaction using a Likert scale and responses were analysed using simple descriptive statistics. Ten Outcome Cases were researched and documented using the Outcome Harvesting methodology (Wilson-Grau & Britt, 2012). Five of these cases have been written up as 'Stories of Change' and are available on the SAIRLA website (https://sairla-africa.org/). All evidence was assembled to evaluate the theory of change and interrogate its assumptions to generate findings and lessons.

To minimize contribution bias, evidence was collected from a diverse range of stakeholders and different sources of information to support triangulation. It was not practicable to construct a counterfactual comparison group for the questionnaire survey or participatory assessments, but senior decision-makers were interviewed who were not regularly involved in NLA activities, and who would have a more independent view of the achievements of the NLA. Further, questions were included to explore other factors contributing to change, as well as the NLA MSL processes.

4. Findings

4.1. Multi-stakeholder, social learning (MSL) process

There is strong evidence that an MSL process has been effectively facilitated in all five countries, although with varying levels of success. In each country a clear pattern emerged of the MSL processes facilitated: firstly, a launch and establishment phase (early-mid 2017), followed by a second phase in which more specific learning priorities were set, with some associated activities (mid/late 2017–2018s), followed by a final, highly active 'take off' phase where many more activities were undertaken on tightly focused learning themes and areas of engagement with decision-makers (2018–2019).

There were high levels of consensus amongst stakeholder groups regarding the democratic nature of the process; feedback in participatory workshops was largely positive, although in Zambia responses were more mixed, reflecting internal changes in the host organization.[7] Questionnaire assessments by individual members were positive: Perceived accountability of the NLA to its members was judged as 'high' (76% of respondents said levels were 'high' or 'very high'). NLA legitimacy with respect to SAI policy and investment processes was judged to be 'fairly high' (66% of respondents rated it 'high' or 'very high'). NLA transparency was rated as 'high' or 'very high' by 80% of respondents. Overall awareness of the NLA social learning strategy was rated by 63% of respondents as 'high' or 'very high'. However, members were generally less satisfied with their levels of influence over NLA decision-making; only 46% of respondents were 'completely satisfied' or 'very satisfied' with their level of influence.

Stakeholder participation was rated 'very high' in all five countries (participatory workshop assessments). Survey data is consistent, indicating a majority (71%) who were 'very satisfied' or 'completely satisfied' about their opportunity to participate and 63% who were 'very satisfied' or 'completely satisfied' with their own participation levels. However, only just over half of the members (54%) assessed their actual level of participation as 'high' or 'very high' and the level was even lower in Ethiopia (39%) and Malawi (31%). The way scientific and local knowledge was shared was highly rated both in the participatory workshops and in the questionnaire survey data (for scientific knowledge 88% and local knowledge 79% of members rated sharing as 'appropriate' or 'absolutely appropriate'). This was said to result from the diversity of stakeholders brought into the social learning process.

Workshop participants in Ethiopia and Ghana were 'extremely positive' about the quality of the facilitation and coordination, and 'quite positive' for Malawi and Tanzania, with a few exceptions. In Zambia, there was a mixed response, including negative assessments. However, the individual questionnaire survey, which asked about facilitation only, indicates an overall positive majority (85% were 'very' or 'completely satisfied'). Communications were positively assessed (in participatory workshops and questionnaire survey) in four countries, Zambia being the exception.

4.2. Outcomes

4.2.1. Overall assessment of capacity and behaviour change

4.2.1.1. Individual capacity. Individual NLA members assessed changes in their cognitive (4 indicators), relational (3 indicators) and normative (3 indicators) capacity. It is important to note that baseline capacity varied by individual and by country context, which means that in some cases or situations there would be greater scope for changes in capacity than others. Overall, the majority of respondents said that their cognitive capacity had 'improved significantly' or substantially, ranging from 54% of respondents in terms of their 'understanding of trade-offs in SAI', and 55% of respondents in relation to their 'ability to use SAI – related decision making tools', to 67% of respondents, with respect to their 'understanding of SAI-related issues in their national context'. Perceived changes in cognitive capacity were influenced by NLA members' assessment of their own understanding of SAI, including trade-offs, in their own national context prior to joining the NLA and the extent to which SAI decision-making tools were addressed in their respective NLA learning theme activities.

Perceived improvements in relational capacity were even higher, ranging from 72% of respondents reporting 'significant' or 'substantial improvements' in their trust in the views of others, to 79% reporting that their level of respect for the views of others and the diversity of stakeholders with whom they have relationships had improved 'significantly' or 'substantially'. The majority of members of all stakeholder groups, women, and men; and all NLAs reported 'significant' or 'substantial' improvements.

The majority of respondents also reported 'significant' or 'substantial' changes in the three indicators of normative capacity. The greatest reported change was 71% of respondents assessing that their commitment to act on SAI issues had increased 'significantly' or 'substantially'. Across stakeholder groups, gender and NLAs at least 61% of members reported that their commitment to act on SAI issues had improved 'significantly' or 'very significantly'.

4.2.1.2. Individual behaviour change. A wide range of concrete changes in individual decision making were reported from members of all stakeholder groups.

Gaining cognitive (understanding and skills) and relational capacity helped participants to improve their decision-making. In Ghana, respondents noted that their understanding of Climate Smart Agriculture and crop production had improved. In Ethiopia, one NLA member reported how training had strengthened their skills: 'agricultural risk management and ICT4 AES (ICT for Agricultural Extension Services) training helped me to increase my skills and decision making' and that their participation had resulted in awareness of 'the importance of using ICT in agricultural extension advisory services and the personal decision on trying to know more on agricultural risks that are attributed to the Ethiopian context'. This respondent also commented, 'I have more knowledge and information regarding the use of technology, and I am more confident in what I decide in delivery of my knowledge and skills'.

Similarly, media stakeholders reported several areas of capacity and behaviour changes including enhancing their knowledge and understanding of SAI issues, which is important for writing accurate, analytical stories, and increased frequency of consultation of different stakeholders when developing media content. A participating Ethiopian journalist said,

> I was not that familiar with SAI. … I came to the NLA and I have come to understand how agriculture is complex, how sustainable agriculture intensification could support the smallholder … [I learned] how we can also use small scale mechanization to a certain level to support labour intensive agriculture. I write better articles! I better understand what I am writing about! Yes, problems for smallholders … but also many solutions.

NGOs/CSOs members also said their decision making has become better informed and they have gained experience in policy engagement processes and now use this in their daily work. One participant reported using the knowledge gained in their daily advocacy work within the civil society sector.

Private sector actors reported fewer concrete changes, but some significant ones were reported. Some individuals reported more commitment to considering environmental and social factors in agriculture. There are also some concrete examples of decision-making being more informed and supported by appropriate tools and skills. A former Ghana Agro-Input Dealers' Association vice president and Ghana CAADP Non-State Actors Forum participant said,

> [I was] involved from the get-go [in the] core consultative group before it was launched. [I] saw it as a brilliant idea. To us – an innovation … [it] let us see the users or value of intensification plus environment and all of that, it was an eye opener personally, and for my organization, [we] need to intensify not using too many chemicals but still get a good result. We [are] also health conscious and want [the] best for people and environment.

The importance of stakeholder engagement in decision making processes was stressed by several public development actors, who valued the opportunity created by the informal NLA to speak freely and learn about the perspectives of others. A Senior Decision maker in the Ministry of Agriculture in Tanzania explained the value of the NLA being in its capacity to overcome some of the limitations for government entities in the way they operate:

> The way you speak and talk in government-led forums is always structured. My engagement with NLA has given me the opportunity and freedom to connect with any actors of my choice and share my expertise in environment and climate change; [it provides] free space to share and link with other stakeholders; opportunity to get new information and skills – not only on environment but also equity and governance – from research and discussions held; a chance of meeting with different non-state actors and get to understand what they are doing – mainly because the NLA invited people who are in the field to come and share their knowledge.

Making decisions based upon research evidence was highlighted by many NLA respondents. In Ghana, the example of a change in government strategy to use of botanicals or biorationals for control of Fall Armyworm (FAW) was given. In Tanzania, one civil servant stated, 'Of course you can always make better decisions in terms of planning and implementation of critical social issues if you have enough evidence and sufficient knowledge'.

However, the NLA process also raised awareness of the value of bringing not only research evidence, but also other types of experiential and situational evidence. A senior Ministry of Lands civil servant in Malawi said,

> you mix all levels of people from grassroots to policy makers, even the media – so in this way it is a holistic approach, so many people can be involved, and solutions can come in to solve problems or remove fears of people once they understand all interventions. If intervention is wrong, you can add critical analysis to see how best to intervene.

As well as communicating more types of knowledge, engaging diverse stakeholders helps in the sharing of diverse types of values: in Malawi, a respondent noted,

> there is need for more satisfaction at the grass roots on the new land-related laws especially Customary Land Law where people at grass root have fear of losing land through the new land related laws, as a result, people in the villages are selling land so that they do not lose out completely.

4.2.1.3. Network capacity and behaviour change.

Network capacity strengthening was envisaged as an important early outcome in the theory of change. Eight indicators were used; the evidence (qualitative and quantitative) strongly suggests that there has been network capacity strengthening in all five countries in terms of a more common understanding of SAI amongst members, more diverse and higher quality relationships, access to new opportunities for collaboration, improved trust levels, opportunities to interact and share experiences/ideas/environments, safe spaces provision enabling the challenging of norms and ways of thinking. For example, 67% of respondents reported that in their view there has been a 'significant' or 'very significant' change towards improved levels of trust amongst NLA members, while 66% reported a 'significant' or 'very significant' change in terms of the NLA providing a safe space for challenging commonly held views. Qualitative workshop data indicates that there were positive assessments in Ghana, Malawi, and Tanzania, on whether more common understanding of SAI issues in the national context had been achieved, with a more mixed response in Ethiopia and Zambia.

On average, 66% of NLA members reported that they felt that there had been a 'significant' or 'very significant' change towards achieving a more common understanding of SAI issues among NLA members. However, there was some variation in individual responses in the questionnaire data, ranging from 50% in Ethiopia to 85% in Ghana.

Network behaviour change is a key outcome in the theory of change. Three indicators were used to assess behaviour change at the network level in participatory assessments. The evidence suggests that there has been network behaviour change in all five countries, but to varying degrees. In terms of joint planning, action and reflection, stakeholder assessments were largely positive in Ethiopia, Malawi, and Tanzania, but less so for Ghana and Zambia. More scope for joint planning was noted.

In terms of the frequency and reciprocity of communication, Ethiopian, Ghanaian, Malawian, and Tanzania stakeholders were broadly positive about communications, less so in Zambia. However, in Ethiopia, once more focused learning themes were initiated, communications between members increased. In terms of innovative and effective communication with stakeholders beyond NLA members, stakeholders in Ghana, Malawi, and Tanzania were positive about communications and reach to wider agricultural system actors, given the resources available, but Zambian stakeholders gave mixed responses, while still being relatively positive, especially regarding national level engagement. On the creative engagement of diverse stakeholders, feedback was highly positive in Ghana, Malawi, and Tanzania, but in Zambia the feedback was mixed. Ethiopian stakeholders did not comment.

4.2.2. Learning theme Outcome Cases

We have used retrospective Outcome Harvesting methods to explore ten Outcome Cases, in which changes are thought most likely to have occurred. Evidence was collected to test the theory of change in each Outcome Case to generate insights. The ten cases were selected from a longer list of anticipated outcomes tackled by the NLA. They sit along a spectrum from relatively lower to higher levels of complexity and are organized as such into three tables – Table 2a, b, and c – which also summarize the evidence collected against the theory of change.

The NLAs addressed a wide range of SAI-related issues with differing degrees of complexity, urgency, uncertainty and contestation in selected learning themes. For some issues there was relative consensus relating to the framing of the problem and potential solutions, but in other cases less clear agreement on such matters. For example, the FAW outbreak is widely understood as a social concern in Ghana and much of SSA. Potential solutions focused on an expansion of established practices. In another example, in Ethiopia and elsewhere in SSA, it is widely expected that the demand for meat will grow, but the environmental impacts are complex, not least as they will be partially determined by future consumer choice and potential interventions. Public concern about environmental impacts is limited, given other socio-economic challenges, hence the issue lacks visibility and clear framing. Insect larvae potentially offer a more environmentally friendly source of protein for livestock and fish farming, but in the Ghana case there are concerns regarding consumer resistance to the use of insects such as Black Soldier Fly.

There is widespread agreement that ICT offers clear potential to improve extension services in Ethiopia and elsewhere in SSA, but less consensus on what needs to improve and how. In a case from Tanzania, local government planning and budget decisions can have important implications for social and environmental outcomes, but there are transparency challenges, complexity in trade-offs, and a need for cross-scale information sharing and learning. Major complexity and contestation surround access to and control of land in Malawi, Zambia, and many other parts of SSA, with very different views about the most desirable way forward.

The NLA process varied in response to this complexity. In some cases, the NLA helped to re-frame an issue *as a problem and / or an opportunity*. For example, the NLA membership helped to reveal the policy incoherence in Ethiopia between the Ministry of Agriculture's initial livestock feed strategy and the government's climate and environment policy. The NLAs were also involved in co-designing improved responses, whether more specific solutions or a reframing to move beyond an impasse. For example, in Ghana various members of the NLA such as civil servants, scientists, journalists, input stockist representatives, helped to change the public debate around how to manage FAW. In Malawi and Zambia, the NLA membership and others contributed towards a more common understanding around the issues on customary land registration.

In some cases, once an issue had been identified of social concern, a relatively small group of participants engaged around it in a decision-oriented group working in deliberative manner. In some cases, these were government-led groups to which the NLA facilitation teams extended support; for example, in Ethiopia, a group engaged in developing the livestock feed strategy and in Malawi, the NLA facilitation team and other stakeholders supported the extension strategy-development process. The stakeholders participating in these groups effectively expanded the diversity of perspectives and values involved; for example, private sector actors were brought into the process for developing the livestock feed strategy in Ethiopia. In other cases, NLA-led learning theme groups addressed issues such as ICT and extension services in Ethiopia and Tanzania, land in Malawi and Zambia and insect protein in Ghana.

Table 2. Outcome cases.

Case	Theory of change: Process →	Theory of change: Outcomes →
(a) Cases of lower levels of complexity		
Building on science-based strategies to enhance wider ownership of more integrated approaches to Fall Armyworm Management, Ghana	• Invasive pest outbreak identified by NLA as social concern. • Initial government response reverted to established, but damaging practice (use of conventional pesticides). • NLA co-explored scientific evidence on negative pesticide impacts raising decision-maker and stakeholder awareness. • Invitation for NLA to work with formal government taskforce.	• Formal-informal collaboration strengthened capacity [understanding, motivation, commitment to act] in a crisis. • Wider range of possible responses considered (use of biorationals). • Practice change through deeper learning; shift in government strategy to more innovative solutions. • National action planning and expenditure allocations changed, plus coverage in Agricultural Investment Plan.
Demystifying insect protein substitutes for livestock feed, Ghana	• NLA identified an opportunity to promote an alternative source of protein in response to increasing meat demand and environmental impacts. • The NLA engaged stakeholders, sharing knowledge via a workshop, and learning visits to a research institute and community group producing insect larvae. • NLA members pool resources, including the Ministry of Agriculture, to hold field demonstrations and monitoring visits.	• Shift in stakeholder mindset on the effectiveness of feeding chickens using insect larvae compared to other treatments. • Interest in the business case emerged amongst mid-level policy-makers and implementers. • Proof of concept demonstrated and shared with policy-makers and investors.
Livestock feed – production and environmental trade-offs, Ethiopia.	• NLA exploration revealed lack of policy coherence on meat targets and climate mitigation commitments, partly informed by SAIRLA Livestock Production-Social-Environment Trade-offs project. • Government recognized a strategy gap. • NLA facilitated broader stakeholder participation in strategy development, engaging the Ministry of Agriculture and Agricultural Transformation Agency. Funding of a week-long retreat for experts funded, including private sector actors.	• Enhanced stakeholder understanding of livestock-environment trade-offs and private sector perspectives on livestock feed. • Ministry of Agriculture and the Agricultural Transformation Agency motivated to integrate SAI perspectives in development of new livestock strategy. • Commitment from government to review taxation regime for imported feed additives. • Gender and environmental sustainability concerns mainstreamed into strategy. • Sustainability considerations integrated in feed strategy vision, mission, goals and in strategic issues and interventions prioritized, and in cross cutting issues section.
(b) Cases of medium levels of complexity		
Integrating equity and environmental issues in district budgeting, Tanzania.	• Analysis of equity allocations in 2 district budgets conducted and shared with national and district level decision-makers. • 2 district level MSL workshops held to explore the findings with stakeholders: Joint identification of more equitable, sustainable planning and budgeting. • Application of participatory tool in one district on trade-offs management for sustainability in budget allocation process. • Demand articulated among district stakeholders to raise national stakeholder awareness. • Budget analysis/findings shared at national level meeting (Ministry of Agriculture, Parliamentary Agriculture Committee) co-hosted with CAADP Agricultural Non-State Actors Forum.	• Increased understanding of district staff, farmers, other stakeholders on trade-offs and mandatory requirements. • District government staff motivated / confident to demand honouring of mandatory budget allocations for agriculture • Improved inter-departmental study district and ward coordination improves soft loan recipient advisory support. • District councillors plan to use trade-off tool to scrutinize policies and in budget allocation planning /monitoring. • On mandatory requirements, council leadership made public commitments/ showed increased political will. • Increased allocations and timely remittances in 2 target districts according to equity (e.g. disabilities).

		• Plus, small increase in overall district agricultural investment and timely disbursement. • MSL in 2 wards in 1 district, identified actions (e.g. increase investment in rainwater harvesting) to be considered in review of ward development priorities. • Increased district capacity to identify vulnerabilities amongst social groups. • Government directive requiring all LGAs to open separate bank accounts for mandatory 10% special development allocation funds.
Mobile phones and extension services, Tanzania	• NLA and SAIRLA research projects jointly facilitated 2 meetings with government stakeholders identifying ineffective mobile phone use in extension services, especially lack of a business model. • Dialogue event facilitated [Tanzania Communication Regulatory Agency, Ministries of Agriculture and Livestock, Tanzania Revenue Authority, mobile phone companies, private companies building and running digital platforms, NGOs].	• Stakeholders gain more knowledge on stakeholder applications of ICT in agriculture and enhanced common understanding of issues. • Agreement on need for public-private group to take issue forward. • Potential for improved public-private engagement and collective action around mobile phones and extension services in Tanzania.
Strengthening capacity for policy implementation: ICT innovation for agricultural extension, Ethiopia	• NLA identified limited capacity of government to operationalize its ICT in extension plans. • Marketplace event and electronic platform designed engaging ICT providers and users. • A new public-private working group established to guide policy implementation, diversifying participation and evidence use. • Digital web portal developed to share information with extension workers and farmers.	• Stakeholder awareness raised, practical skills obtained, key relationships created. • The capacity of key senior decision-makers strengthened (e.g. Director of Extension Services) and a supportive network created. • Improved extension roadmap and implementation guidelines produced, with greater stakeholder ownership and motivation. • Clear pathway for operationalization developed improving likelihood of strategy delivery. • Enhanced ICT capacity can support localized agricultural innovation, enabling SAI.
SAI trade-offs and extension services, Zambia	• MSL using a participatory SAI trade-off tool (developed by a SAIRLA project) at community and district level in 3 districts • Farmers, Government, Private sector and NGO stakeholders assessed relative outcomes of three donor programmes on SAI (conservation agriculture, market-based livelihood development/ sustainable land management/deforestation-free value chains).	• Enhanced awareness among stakeholders of trade-offs involved in SAI decision-making. • Strong stakeholder motivation, including senior sub-national Ministry of Agriculture staff, to apply trade-offs analysis and management in the multiplicity of sustainable agriculture programmes they already engaging with and implementing. • Integration of MSL approach agreed in newly beginning innovation platforms project (funded by international donor, covering 5 districts).

(*Continued*)

Table 2. Continued.

Case	Theory of change	
	Process →	Outcomes →
(c) Cases of high levels of complexity		
Operationalizing pluralistic, demand driven extension system, Malawi.	• Strategy drafting and approval process accelerated, with more diverse expert and non-governmental participation, overcoming longstanding blockages through support for and engagement with Department for Agricultural Extension Services. • Co-funding and co-facilitation of retreat in which review team were challenged to deeply reflect on challenges of the Extension and Advisory Services and how to address them. • Post-retreat participation in sub-team process of re-drafting strategy, advancing a stronger emphasis on how to operationalize a pluralistic, demand driven strategy drawing on district-level experiences.	• More inclusive extension strategy finalized. • Greater sense of stakeholder ownership. • Enhanced stakeholder understanding of and coordination between key actors in the extension system. • Groundwork laid for implementation: improved coordination and alignment of strategy on extension service delivery.
Customary land registration, Zambia	• Land Policy under development for 20 years. Current draft Land Policy seeks to strengthen customary land administration for security of tenure, but some provisions created deadlock between government and traditional leaders. • Customary Land Certificates being piloted in some Chiefdoms with external support and using different approaches. • NLA team facilitated dialogues in 3 chiefdoms where Customary Land Certificates being piloted [villagers, traditional leaders, civil society organizations, government stakeholders]	• Enhanced understanding of the perspectives, values, and concerns of other stakeholders across scales and between highly polarized groups. • Helped shift focus away from antagonism towards a focus on learning. • Contribution to more consensus on customary land registration process. • Initial contribution to more mutually acceptable land legislative and governance framework.
Facilitating a constructive dialogue on ways forward on highly contested issues – customary land registration, Malawi.	• NLA identified that the Customary Land Act (2016) and district piloting was raising civic concerns about potential exclusionary impacts of customary land registration. • A series of land dialogues (11) held at community, district and national scales involving diverse stakeholders.	• Enhanced understanding of differing values, knowledge, and experiences across scales and between polarized groups. • A limited, but clear contribution to finding a more mutually acceptable land legislative and governance framework moving beyond antagonistic communicative forms; such issues require longer periods of multi-stakeholder engagement.

The nature of the learning facilitated in each case varied, shaped by the fundamental nature of the issue tackled and how that issue was currently perceived by stakeholders. Single loop learning was achieved where stakeholders gained a better understanding of a specific topic, such as the potential use of a specific ICT tool, or the risks of using various pesticides. In most cases an element of double loop learning was achieved responding to changing conditions or emerging opportunities. For example, in Ghana control of FAW was taken beyond application of conventional pesticides to an understanding of biorationals (less toxic and more environmentally friendly type of pesticide) as a control measure. Even deeper learning in response to the FAW crisis would involve exploring a range of alternative farming system transitions which might reduce overall vulnerability to future pest outbreaks, but this may be harder to address mid-crisis.

The ten Outcome Cases include several instances whereby there is strong evidence that the NLA MSL process contributed to positive improvements in concrete policy and investment decisions – enhancing the way in which problems are framed and specific decisions are arrived at and improving the quality of the decision itself (e.g. its relevance to social concerns, the depth of the learning which underpins the decisions in light of complexity of the problem as framed by the NLA). For example, new strategies or policies were developed in a more collective way in the FAW management case in Ghana, the extension strategy in Malawi and the livestock feed strategy in Ethiopia. Policy implementation was advanced in several cases; for example, better use of ICT in extension services in Ethiopia and enhanced allocation of local government budget to vulnerable groups for agricultural and other projects in Tanzania.

At the systemic level, there were examples whereby the MSL processes have influenced other decisions and the approach is beginning to be utilized to address other challenges. For example, emerging from the FAW experience in Ghana, wider interest has developed in contingency planning approaches on different kinds of pests and on other agricultural challenges. Stakeholders indicated that this also extends to other countries in SSA. Similarly, stakeholder appreciation of the Ethiopian MSL approach to ICT innovation in agricultural extension was expressed by other members of the pan-African African Forum for Agricultural Advisory Services (AFAAS) network after the experience was shared through an AFAAS on-line seminar and bi-annual conference in 2019. In Malawi, there is now greater capacity amongst government actors to draw upon technical expertise in policy processes and to accommodate non-governmental actors. The demonstration of the value of the MSL approach has created opportunities for the Malawi NLA to work with the Ministry of Agriculture in other policy and investment processes.

4.2.3. Systemic change

The original aim of the NLA was to inform specific policy and investment decisions, but the potential to contribute to broader systemic change was also kept in view as part of the longer-term theory of change. Over time, our evidence shows that there are contributions to systemic change and lessons about how to achieve this, to which we return in the discussion.

4.2.3.1. More common understanding of SAI. There was relatively limited awareness of the concept of SAI in the five countries, especially outside the world of research. SAI jostles alongside other concepts relating to sustainable agriculture, such as Climate Smart Agriculture, Agroecology, Agroecological Intensification and Regenerative Agriculture. Aspects of SAI were explored to varying extents by the NLAs – especially the concept of trade-offs and synergies, which are increasingly recognized as being intrinsic to SAI processes, and which help to focus minds on practical difficulties faced at all scales by decision-makers, from farmers to senior civil servants and politicians. However, more time could have been spent on unpacking different concepts and their origins and strengths and weaknesses. There was variation in the depth of learning achieved (e.g. single, double, or triple loop) and in the extent to which meta-framing was facilitated, i.e. challenging entrenched positions by revealing more clearly the plurality of values that may exist. Our analysis suggests that a more in-depth debate amongst agricultural system stakeholders in the early stages of the process could have allowed for a more exploratory process to test the concept of SAI and its differing interpretations and contextual relevance in relation to competing and complementary concepts. This would have enabled the MSL participants to have more scope to reframe issues.

4.2.3.2. Better decision-making processes. The NLAs have contributed to specific SAI-related policy and investment decisions, but in this section, we also consider whether they have contributed to improving SAI-related decision-making processes more widely. We use Parkhurst's (2017) governance of evidence framework and principles to analyse our findings from the outcome cases. Our evidence suggests NLA MSL processes have contributed across several of Parkhurst's principles, particularly enhancing the appropriateness of evidence, deliberation, contestability, and transparency (Table 3), but less so on other dimensions. With respect to the stewardship of evidence, Parkhurst suggests that the agent setting the rules and shape of official evidence advisory systems should have a 'formal mandate'. In this case, the NLAs were externally initiated by the SAIRLA programme. However, in this context, perhaps because evidence capacity was fairly weak, strong local ownership developed amongst stakeholders as the process advanced. In terms of the principle of representation, Parkhurst (2017) states, 'the final decision authority for policies informed by evidence lies with democratically representative and publicly accountable officials'. However, the extent to which these 'final decision authorities' have sufficient capacity to perform this role is key.

5. Discussion

In this section we seek to answer the research questions on (a) the effectiveness of the NLA MSL processes, and (b) the key lessons learned based on the theory of change analysis.

5.1. The effectiveness of multi-stakeholder, social learning approaches in contributing to SAI-related policy and investment decision-making processes

Policy processes related to SAI in SSA are complex and messy in nature, with multiple demands from diverse stakeholders and limited agreement on how these should be met. There is a body of theory and literature that suggests that structured MSL processes can contribute to improved decision-making processes and outcomes in such contexts (for example see reviews by Medema et al., 2014; Rodela, 2011). Previously, more attention has been paid to evaluating MSL processes involved, rather than the outcomes achieved (De Vente et al., 2016), especially at national levels (Boydell et al., 2017) and very limited attention given to MSL initiatives in SAI-related national policy processes. Our discussion of the effectiveness of MSL as a means of informing SAI-related decision-making processes is guided by our theory of change and empirical evidence (see section 3).

This study assessed the changes resulting from MSL processes at individual, network and systems levels and decision-making outcomes in ten SAI-related MSL Outcome Cases using comparative analysis and Theory-Based Evaluation, with appropriate attention to complexity. We employed Parkhurst's (2017) 'good governance of evidence' framework, which has seven attributes, two of which relate to the appropriateness and rigour of research evidence, and the rest which pertain to the level of democracy of the evidence system. We use this framework to analyse MSL effectiveness with respect to systemic change in agricultural policy processes, i.e. the longer-term stages of the theory of change. Parkhurst's framework encompasses issues raised by Cash (2003) on saliency, credibility, legitimacy of research evidence for policy-makers, and Gauvin's (2009) attention to the role of civic engagement in democratic processes of policy decision-making. Our analysis using Outcome Cases underpinned by theory-based evaluation, aligns with Dinesh et al.'s (2021) focus on the contextual and operational aspects of science-policy engagement relating to power dynamics, institutional capacity, and intermediary brokers.

Our empirical evidence found generally high satisfaction with the NLA process as reported by participants, although greater influence over the agenda was desired. Space was provided for open dialogue in the earlier phases of the NLA, moving to the inclusion of more decision-oriented, deliberative learning themes in later stages, especially more intense periods of activity in the third year. Both open dialogue and more decision-oriented deliberation was key to success. Consistent with the findings of Muro and Jeffrey (2012), the SL processes were effective because they were multi-dimensional, dynamic and involved extended engagement. This is not to say that success was achieved with respect to all the issues identified by NLA MSL participants in the early stages. One of the criteria for the prioritization of issues was a perceived opportunity to effect change, but if it became clear that progress could not be made then the NLA focused on other areas

Table 3. Analysis of contribution using the good governance of evidence framework.

Principle	Definition	Contribution of NLA MSL process
Quality and rigour of evidence generated	High quality of evidence generated (with quality criteria reflecting methodological principles), and systematic assessment of evidence, not cherry picking.	The NLAs did not generally seek to generate scientific evidence themselves, although some research members did, but they instead created spaces for reflection upon scientific and other types of evidence and experience.
Appropriate-ness of evidence	Relevant to social concerns. Produced in a way that is useful to achieve policy goals, and decision criteria. Evidence is applicable to local context.	Improved by the NLA which has involved a wider diversity of stakeholders across scales (local, district, national levels) in co-identifying learning themes of social concern and co-generating co-owned solutions: e.g. public, private, and other stakeholders engaged in ICT for Extension Services in Ethiopia. The approach moves towards a transdisciplinary approach by engaging scientific and non-scientific experience, and diverse types of experience (e.g. that of traditional authorities and local communities in land dialogues). Horizontal interactions combined with vertical ones (e.g. learning visits, localized activities, such as district budgeting linked to a national review process).
Stewardship of evidence system	The agent setting the rules and shape of official evidence advisory systems should have a formal mandate.	The NLAs were externally initiated by a donor-funded programme with a main focus on research and hence do not have a formal mandate. Participating government actors' ownership of the process increased significantly during the course of the programme, especially by a core group in each country, reaching across organizations and topics. They valued the informal NLA network and this led to engagement with formal government entities (e.g. government taskforces, parliamentary committees, strategy development processes).
Representation	The final decision authority for policies informed by evidence lies with democratically representative and publicly accountable officials.	Public policy decision authority remains with public officials in the study countries, but democracy and evidence capacity levels vary, with all countries facing democratic-governance related challenges. Donors also tend to already have a strong influence in the 5 countries. The NLAs successfully expanded policy space participation by engaging broader sets of stakeholders in decision-making processes in constructive, collaborative approaches while respecting the democratically representative and publicly accountable authority.
Transparency	Open information and clear ways for the public to see how evidence bases are identified and used.	Increased by broadening stakeholder participation and building trust, allowing greater information disclosure and debate. For example, on equity and environmental issues in district budgeting processes, Tanzania; knowledge-based media reporting on FAW outbreak, Ghana.
Deliberation	Engagement of the public in ways that allow multiple competing values to be considered.	Enhanced by the NLA through the facilitation of sharing of diverse perspectives and value sets and showing the utility of such engagement to government decision-makers in particular. For example, formalized deliberative processes, such as land dialogues on customary land registration in Malawi and Zambia, create safer spaces for values and perspectives sharing, deeper listening and learning and shift beyond antagonistic communication and positioning.
Contestability	Technical advice and scientific research findings open to critical questioning and appeal. Choice of evidence and its appropriateness for a specific case can be challenged.	The NLAs facilitated safer spaces providing more opportunities for stakeholder review of pieces of evidence, such as the effectiveness of a new decision-support tool to manage trade-offs, evidence on the effectiveness of insect protein for livestock feed, but also brought other evidence bases into view of policy-makers e.g. FAW taskforce considers a wider range of evidence on human health and environmental impacts, Ghana and the potential of biorational pesticides.

Source: The first and second columns are based on Parkhurst (2017).

where they could move forward. The NLA MSL process was found to be effective, despite contextual variations, although more complex and contested issues will require more time and careful facilitation. Our findings confirm those of De Vente et al. (2016), that a similar well-designed MSL approach can be effective in different national contexts, but it needs good leadership and to be adaptable and responsive to a given setting. There were varying degrees of consistency in membership amongst the NLAs, and a spectrum of levels of participation is to be expected, but those on the periphery can still benefit (see also Wenger et al., 2002).

Significant changes were observed in capacity and practice. There is strong evidence that individual capacity change occurred, although with country variation. There was improvement in knowledge and skills on SAI, relevant to the national context and priorities. The ability to use SAI-related tools and appropriate evidence improved, and the quality and diversity of relationships were strengthened. Examples of shifts in the mindsets, norms, and values of key individuals emerged. Individuals from all stakeholder groups provided concrete examples of changes in the way they did things. For example, journalists prepared much better-informed articles on agricultural issues, extension workers incorporated SAI trade-offs concepts into other projects and private sector representatives expressed commitment to consider environmental and social, as well economic, factors in agriculture.

Changes in senior decision-maker capacity and practice were achieved, but engagement levels varied significantly. Where senior decision-makers did participate, many reported significant changes in personal capacity, developing strong ownership of the NLA and valuing the opportunity to engage with diverse stakeholders through an informal network. The process allowed senior-decision-makers and other participants, to make sense of the complex multi-dimensional problems that they face. As found by McCoy and Scully (2002) in the US, based on research by Harwood, 'public engagement techniques' can be too directive; instead, participants value the opportunity to 'sort out what is going on around them' in the early stages of social learning processes. We found that this space for sense-making is valuable not only for the public, but also for senior decision-makers, in contexts of growing complexity.

Early signs of systemic changes were identified with respect to achieving a common understanding of SAI and SAI-related decisions, and in the broader decision-making process and governance of the evidence system. The NLAs contributed to a more common understanding of SAI, by introducing relatively new concepts to agricultural stakeholders, exploring notions of trade-offs and tools for trade-off analysis and management. However, there was limited joint interrogation of the concept of SAI compared to others occupying a similar space (for example, climate smart agriculture, agroecology, African green revolution), diluting the NLA's contribution. A more open framing, e.g. on the future of agriculture, from the outset could have allowed greater scope for reframing of issues and more in-depth, collective exploration of possible pathways, than an MSL process that was externally focused on the concept of SAI by the donor.

Beyond understanding of SAI, the NLAs contributed to improved decision-making processes. Evidence drawn from the Outcome Cases, specifically shows that enabling meta-framing is key to tackling particularly intractable problems and for building new shared narratives of sustainable agricultural pathways. McCoy and Scully (2002) quote Gastil (1993) who states, 'the ability to reformulate or reframe an issue is essential if people are to have real power to set the public agenda'. At the same time, SAI is also a broad framing, encapsulating multi-dimensional, complex issues; we found that sub-themes can be identified for learning to inform specific policy and investment decisions and addressed in longer-term cycles to build capacity and willingness to engage in democratic and accountable decision-making processes.

MSL processes can be an important means of addressing issues with differing characteristics. Highly urgent issues of social concern can be perceived as requiring rapid, government responses because of their visible impacts (e.g. pest outbreaks affecting smallholder productivity contributing to food insecurity), with such perceptions tending to encourage single loop learning which encourages a return to established practices, including maladaptive ones. But our evidence demonstrates that NLAs can encourage shifts from single to double loop learning, where conditions are changing, and potentially start to catalyse shifts towards triple loop, deeper learning, although the evidence is not as robust on the latter. Triple loop learning is key to accommodating and bridging competing value sets in contested and complex sustainable agriculture issues. MSL may not be appropriate in all circumstances, e.g. where urgent solutions are required or highly contested,

but resources to undertake MSL are inadequate (Muro & Jeffrey, 2012). However, the wide range of issues addressed by the NLAs suggests that, within a broadly flexible design, the type of learning process and the level of ambition of outcomes can be modified according to circumstances.

Analysis of our empirical evidence using Parkhurst's framework on the good governance of evidence indicates that the NLAs contributed to several of the principles or dimensions, but not all (see Table 3 above). We found that the NLAs had a greater role to play in enhancing the appropriateness of evidence, rather than improving the quality and rigour of scientific evidence generated. The NLAs improved the former by co-identifying learning themes of social concern and timely interest to decision-makers. However, on the quality and rigour, the NLAs in this specific programme, did not have a prime role in generating rigorous scientific evidence, although this would be feasible with more flexible, longer-term funding. NLA MSL processes could support improvement in the co-production of research evidence and other forms of knowledge and experience, not only in the co-interpretation of such evidence, which was the primary focus in this specific donor programme design.

Of the other five principles or dimensions of the good governance of evidence system, the contribution of the NLAs was most marked in three dimensions – transparency, deliberation, contestability – and least on stewardship and representation. With respect to the stewardship of evidence, Parkhurst suggests that the agent setting the rules and shape of official evidence advisory systems should have a formal mandate, but in SSA this is highly influenced by external Parties, such as donors, and increasingly the private sector, because of prevailing capacity and resource arrangements. In this programme, the NLAs did not have a formal national public mandate, but they were still able to build a strong sense of ownership amongst some government office holders during the process. This was achieved by operating as a supportive informal space, which could feed into more formal policy processes at opportune moments. In the longer term, ideally the overall 'thickness' of the evidence ecosystem would be strengthened, with more diversity of actors and organizations engaging with government, and more bridging between stakeholder groups and between value-sets. The role of universities has received less attention in this regard, but it was striking in at least one of the NLA processes how universities were perceived as having greater independence compared to NGOs, for example, enabling them to act as more acceptable brokers or actors that can bridge values. In terms of the principle of representation, Parkhurst (2017) states that the final decision authority for policies informed by evidence lies with democratically representative and publicly accountable officials. However, the extent to which these final decision authorities have adequate capacity to perform this role is key.

A clear strength of Parkhurst's governance of evidence framework is its meshing of aspects of democracy in decision-making more widely, including in relation to the evidence system, but also the nature of the evidence used and how it is generated. However, it is important to note that real-world change is not only about policy design, but about policy *implementation* processes. To achieve effective policy implementation requires overcoming organizational and systemic issues such as 'isomorphic mimicry' (the ability of organizations to sustain legitimacy through the imitation of the forms of modern institutions but without functionality), and 'attempts at promoting development through "accelerated modernization through transplanted best practice"' (Pritchett et al., 2010) and instead creating space for learning and building locally owned initiatives with momentum for action. Such a process includes engaging key decision-makers with influence to make change. Even the best-planned and supported policy initiatives depend eventually on what happens as individuals throughout the system interpret and act on these (Medema et al., 2014). This requires motivated individuals, as well as fostering spaces and linkages for collective action.

Further, we note that research is more likely to be appropriate and of high quality if it draws on diverse epistemologies and ontologies through MSL processes in which diverse stakeholder participation is facilitated in the co-production of knowledge. Our findings also highlight that experiential learning is core to the MSL process, but this is not foregrounded in the work of Parkhurst (2017), Cash (2003) or Dinesh et al. (2021). Experiential learning can enable different actors to bring their own perspectives, the learning process is embedded in action and there may be more opportunities to address different settings, cultures of communication and emotional attachments (Cheyns, 2011).

While the NLAs did effectively engage with community and other sub-national actors on some issues, it was not feasible in all cases due to resource constraints, but the findings point to the value of cross-scale MSL processes. For example, the Tanzania NLA has facilitated learning and decision making around agricultural planning and budgets between local and national actors.

Theory-based evaluation has a useful role to play in evaluating the effectiveness of MSL processes, because it focuses on whether key assumptions behind anticipated change processes leading to normative goals hold true in practice and helps to explain barriers to success. For example, power imbalances, value divergences, institutional capacity gaps can all be revealed by applying theory-based evaluation, including during iterative MSL processes, to enhance outcomes.

5.2. Lessons to inform future multi-stakeholder social learning initiatives aiming to inform policy and investment decision making processes

Responsiveness to decision-maker priorities: The NLAs were responsive to strong and varying demands from senior decision-makers and a wide range of agricultural stakeholders for MSL processes to address a range of agricultural issues. If key policy actors are to be effectively engaged, then as noted by Boydell et al. (2017) the focal topic must be perceived as a relevant priority. Senior decision-makers and other stakeholders highly valued the individual capacity strengthening achieved, including cognitive (understanding, skills), relational (trust, connectivity etc), and normative (norms and values) capacity, with the latter two being most highly valued by stakeholders and associated with the biggest changes.

The value of informality to articulate with formal policy spaces: The informality of the NLA network attracted senior decision-makers to the MSL process, and this provided the NLA with an entry point to more formal decision-making processes. High ranking civil servants and elected representatives valued the safe space created for open discussions which the informal NLAs could offer. We found that providing the opportunity for policy makers to discuss problems with researchers is a key feature of such processes, which confirms the findings of Boydell et al. (2017). The informality and 'sense-making' opportunities in contexts of complexity, offer senior policy-makers in particular, an opportunity to shift positions. The NLA MSL process generated effective linkages with more formal decision-making entities and processes, such as departmental meetings, taskforces, parliamentary committees, and government-led strategy development processes. Decision-makers valued drawing on the network and sharing with it, especially when their goals and those of the NLA aligned. This fits with the findings of McCoy and Scully (2002), who also emphasize the need for 'a context of reciprocity and relationship building that makes for a non-threatening way for public officials to re-evaluate their own perspectives on policy issues'.

Pros and cons in engaging individuals and organizations: NLA members were engaged in the MSL process as individuals. There are both pros and cons to engaging individuals instead of organizations. Sometimes individuals are highly enthusiastic and commit to the entire process, but in other cases, they drop out or cannot continue for unrelated reasons. Individual personality played a role in the NLA processes, which concurs with Medema et al. (2014), who argue that individuals and their attributes form the basis through which learning and change processes take place. Hence conducive personality characteristics such as high tolerance of ambiguity, openness to new experience and capability for critical self-reflection, flexibility and open mindedness are important. We also suggest that such characteristics are not fixed, and positive features can be reinforced through MSL processes which demonstrate the value of open engagement and create opportunities to engage in ways different from the past. Lack of familiarity with these new ways of engaging can create discomfort for some, but this can be reduced by providing clear communications on the structure of the MSL process to build confidence in the process and energise participants, while retaining flexibility. Engaging organizations may require more formal collaborative arrangements (such as Memorandums of Understanding). However, developing such arrangements can be a resource consuming activity (Head & Alford, 2013) and may undermine the opportunity to rapidly engage individuals, particularly those from the public sector. On the other hand, organizational partnerships offer potential avenues for greater institutionalization.

Enhancing the diversity of stakeholders is demanding, but is needed for reframing and more in-depth learning: Enhancing the diversity of stakeholders can slow MSL

processes (Medema et al., 2014), but is important to bridge plural values and enable issues to be re-framed. MSL processes can be effective in catalysing the re-framing of issues. Contestation over policy is often rooted in competing values, as much as technical challenges, requiring new ways to bridge and integrate values to advance policy implementation in ways that have public support and contribute to the common good. The collaborative learning achieved through the NLAs reached across organizational and stakeholder siloes, between scales (national, district, local), and across types of knowledge (scientific, expert, situational). Engaging under-represented stakeholders (for example, media actors, traditional authorities, private sector actors, elected female government representatives) in MSL processes is fruitful if they are actively engaged in joint learning. Too often, multi-stakeholder processes are insufficiently diverse; our findings show that there is merit in reaching out to groups as participants, e.g. media in a participating role rather than as reporters on MSL processes.

Constructive contestation is a necessary first step to 're-framing' issues in ways that open opportunities to bridge values in the future: To enable constructive contestation in MSL processes it is important for MSL processes to reinforce trust-building and create safe spaces on all types of issues, but especially for contested topics such as land. In Malawi and Zambia, the NLAs showed how it is possible to refresh the framing of a problem as a step towards accommodation and bridging of competing value sets.

Effective MSL designs involve early space to explore key competing concepts and to do sense-making in broader dialogue-oriented learning cycles, combined with mini-learning, problem-focused, deliberative cycles: Combining learning cycles that balance a broader dialogue process with focused, deliberative learning adds significant value to the MSL process, but requires skilful facilitation, coordination and tailoring to local contexts. A broader dialogue process allows a flow of communication where the conversation can take many directions and conclude with diverse representation of voices and issues, building local ownership. Shorter learning cycles are more oriented to deliberative decision-making and can help to demonstrate progress and build commitment among participants and funders, as well as contributing to the broader process. Through an iterative process, insights from the deliberative learning themes are reflected in the broader process. MSL processes are less effective and dissipate energy when they raise expectations without delivering clear benefits. Some NLAs experienced periods when implementation slowed, but overall momentum was largely sustained or regained when activities increased, and benefits were realized. MSL which involves experiential learning, such as joint field visits, are highly valued by participants, and helped to catalyse action at senior national levels. Wenger et al. (2002) emphasize the importance of finding a regular rhythm for a community such that it is vibrant, but not so fast-paced that it becomes overwhelming in its intensity.

Experiential learning plays a central role in effective MSL processes: Our finding that both dialogue and deliberation are important in MSL processes to inform policy are consistent with those of other researchers and practitioners (Boydell et al., 2017; Escobar, 2011). However, multiple forms of communication in appropriate settings are needed for experiential learning with diverse stakeholders and for them to effectively have voice (McCoy & Scully, 2002; De Vente et al., 2016).

Strong facilitation skills and appropriate styles of leadership styles are required to underpin effective MSL processes: Facilitating the interplay between learning cycles and attracting and engaging diverse stakeholders at the national level is highly demanding, intensive and requires an appropriate leadership style, involving high emotional intelligence. The NLAs are led by a facilitation team which combines diverse skill sets and attributes, including the lead facilitator(s), communications experts, monitoring and evaluation staff and gender specialists. Participants need to be guided to co-identify and examine sometimes sensitive issues or to act upon new opportunities. In moving from dialogue to deliberation the facilitator's role included maintaining a focus on the issue at hand, while giving voice to participants and guiding the process towards decision making. This aligns with findings in the health sector (see Boydell et al., 2017). The process requires dedication, patience, time, and energy to overcome uncertainties and pitfalls. As Palm and Lazoroska (2020) note, we also find that leadership of collaborative planning processes requires skilled facilitators who can bridge cultural gaps, drawing upon networks and skills to engage across multiple spheres.

Effective MSL processes provide clarity on the overall structure and direction of the MSL process, but allow for flexibility given the inherent uncertainty of learning processes that respond to changing contexts. Internalising

MSL processes focused on national decision-making takes time and uncertainties as to the exact direction of an organically evolving process can be high. Building and sustaining trust, ownership of and belief in the process is critically important. Strategies are needed to build confidence in the process, e.g. through monitoring and reporting on achievements, delivering shorter-term wins, and communicating the overarching principles and interlinked types of cycles from the outset to help participants to rapidly catch the deeper meaning of the approach so that they can then own it themselves and take it forward. To become engaged, people need to see that their participation will make a difference and that it will be valued. They need opportunities that allow them to make the best use of their skills and time. In line with McCoy and Scully (2002), we found that active engagement is more likely when participants are invited to participate by those they know and trust.

Changes at organizational and system levels are needed to enable researchers to support effective MSL to inform decision making and change. Researchers have an important role to play as part of, and not external to, governance systems, to contribute to transdisciplinary approaches to solving complex challenges (Fazey et al., 2018). However, these processes are time-intensive and the opportunity cost for researchers may pose a challenge (e.g. in terms of promotion within their organizations, there is a much greater incentive to invest their time in writing papers for peer reviewed journals). How research is funded also has a major influence on researchers' opportunity and ability to contribute to the good governance of evidence. These issues need to be addressed at organizational and systems levels. In Canada, for example, funding agency mandates require researchers to engage with stakeholders, including policy makers for effective and innovative changes in the health sector (Boydell et al., 2017).

Funding agencies and governments can play a role in improving the quality of the evidence governance system by strengthening in-country capacity for MSL, but a flexible, adaptive approach is required. Donors and other stakeholders should give more consideration to the wider evidence governance system, funding improvements through informal networks, building relationships and collaborative engagement, thereby adding value to their investments in high quality research. There is relatively limited in-country organizational capacity to support informal networks aiming to improve the good governance of evidence in SSA. This could be an important role for funders, but flexible funding is needed to accommodate uncertainty. The NLAs are all exploring differing routes to sustainability, but available funding sources tend to shy away from adaptive, flexible processes, because of the uncertain results, despite growing demand for the better governance of evidence. The risk is that the NLAs will only be able to obtain project-based funding which pulls them away from an open agenda and into specific themes identified up front and externally, rather than more broadly defined good governance of evidence outcomes.

6. Conclusions

Increasing and sometimes conflicting demands on agriculture in SSA means that policy and investment decisions are becoming more complex. Despite growing consensus on the need for SAI, there is limited agreement on how to achieve this in practice. Decision-makers need evidence and tools to improve their decision-making in the face of such complexity, but biases and vested interests affect how evidence is chosen and used.

MSL processes offer an innovative approach to improving national level policy and investment decision-making on SAI and other issues, through contributions to actor and network capacity as part of the good governance of the evidence system.

The experience of the five NLAs shows that an externally launched and framed MSL process can be sufficiently democratic to build ownership and achieve multiple positive outcomes in diverse contexts and on policy issues with varying levels of complexity. Importantly, evidence also suggests that such an MSL approach also strengthens various aspects of the governance of evidence system.

Governments, donors, and other actors can improve policy and investment decision-making processes and outcomes by recognising the importance of, and investing in, MSL processes for strengthening the overall evidence governance system and moving towards more sustainable agricultural systems.

Notes

1. See https://sairla-africa.org/. The programme funded eight international SAI-related research projects implemented mainly in six SSA countries.

2. For example, DFID has invested in the following programmes: Development Research Uptake in Sub-Saharan Africa (DRUSSA); SciDev.Net; Strengthening Research and Knowledge Systems (SRKS); Global Open Knowledge Hub (GOKH). See https://devtracker.dfid.gov.uk/.
3. For example, in Malawi, obstacles have been identified including a lack of policy advisory infrastructure, very low ratios of researchers to Members of Parliament, weak relationships between researchers and parliamentary committee clerks (Mushani et al., 2016). An evaluation of a donor programme promoting 'evidence-informed policy-making' in developing countries found individual policy-maker capacity (knowledge, skills, confidence, commitment) to use evidence is critical, but more systemic changes are also needed in organisations, management support and incentives to change ways of working and ensure joined-up interventions with a systemic effect (ITAD, 2018, p. 1). This suggestion is based on the authors' finding that evidence-use contexts were characterized as frequently involving 'authoritarian, politicised and fragmented institutions' with 'financial constraints, low technical or policy experience among civil servants and high levels of corruption' (ITAD, 2018, p. 1)
4. Under the SAIRLA programme National Learning Alliances (NLAs) were established to facilitate social learning on SAI within countries, while an International Learning Alliance was created to facilitate learning between countries.
5. The countries are scored using governance indicators which are calculated from various data sources based on perceptions and presented on a scale of -2.5 to +2.5. The governance indicators are voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption.
6. http://info.worldbank.org/governance/wgi/index.aspx#reports
7. After the NLA was established, the host organisation went through a period of organizational re-structuring, programme orientation and significant staff changes.
8. Table 2 is effectively in three sections a, b and c. Please could you modify to make sure each appears on a separate page. i.e. a) *Cases of lower levels of complexity* is on one page b) *Cases of medium level of complexity* are on another page and c) *Cases of high level of complexity* are on another page.

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