ASSAR

ADAPTATION AT SCALE IN SEMI-ARID REGIONS

2014–2018

PUTTING **PEOPLE** AT THE CENTRE TO ENABLE EFFECTIVE **CLIMATE ADAPTATION** IN SEMI-ARID REGIONS

INSIGHTS FROM MALI

ICRISAT

START

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VULNERABILITY AND ADAPTATION TO CLIMATE CHANGE IN SEMI-ARID MALI

ASSAR'S FOCUS IN MALI

West Africa's semi-arid regions are home to an incredibly rich history of cultures that have thrived despite highly demanding environmental conditions. Today, people living in these dryland areas face a suite of complex challenges. These are related to increasingly erratic rainfall, rising temperatures, droughts, poor soil fertility and floods, combined with high population growth, gender inequalities, ineffective decentralisation of governance, and reliance on climate-dependent livelihoods.

From 2014-2018, ASSAR's Mali team worked in the Koutiala district, in the Sikasso region, to better understand how these interlinked challenges are impacting people's capacity to adapt to current and future stressors. Our team was made up of researchers and practitioners from the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Michigan State University (MSU), l'Association Malienne d'Éveil au Développement Durable (AMEDD), and master's and PhD students from Mali-based universities. The Mali universities included Institut Supérieur de Formation à la Recherche Appliquée (ISFRA), Université des Sciences des Techniques et des Technologies de Bamako, Institut Polytechnique Rural de Formation et de Recherche Appliquée, and Institut Universitaire de Développement Territorial et Local de Bamako. We worked with partners and stakeholders from national to household levels to understand differentiated vulnerabilities, identify barriers to adaptation, and explore what needs to happen to support more effective, sustained and widespread adaptation, including intensification of agriculture.

Key insights

- New ways of conducting climate change research jointly with a wide range of stakeholders are needed. Nuanced information, including that on gender and social difference, should inform understandings on how different people, even within the same household, make decisions, and how policies might affect their ability to adapt in times of stress.

- Building continuous communication and flexible design into policy and governance systems that encompass all involved stakeholders and scales is crucial. This helps to avoid disconnects between national-level policies and local-level needs, and also helps decentralised governance structures become more transparent and effective.

- Alternatives to migration should be explored as adaptation strategies in order to avoid potential risks to the health and wellbeing of migrants and those who stay at home.

- It is essential to recognise the ways in which climatic and non-climatic stressors interplay to create new adaptation challenges and address/include these in policy.

- Participatory processes such as Transformative Scenario Planning are valuable tools for identifying and prioritising issues, building relationships, and fostering learning. These processes should be built into broader stakeholder engagement strategies in order to stimulate meaningful changes.

ABOUT THE RESEARCH

Research priorities

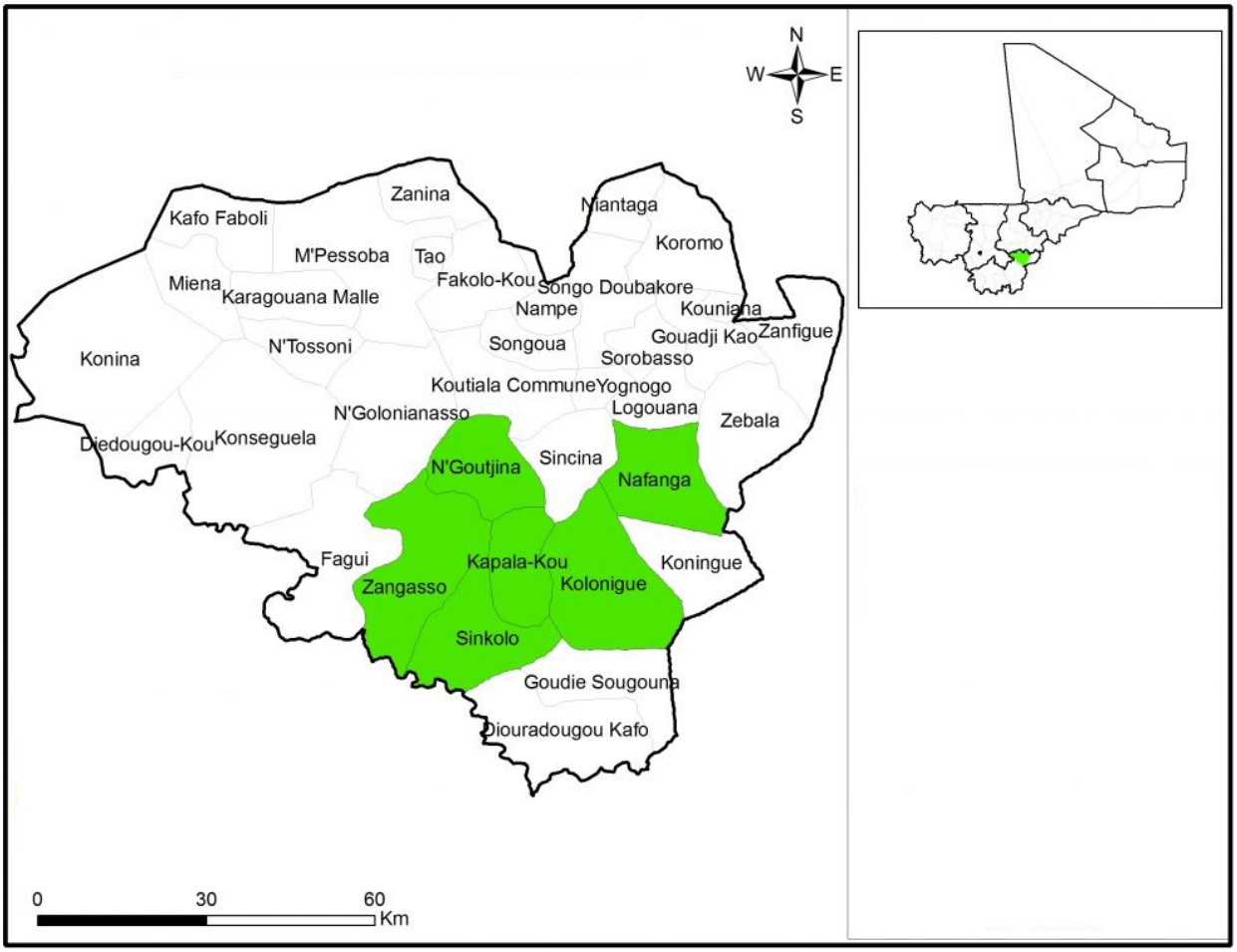
Our work in Mali prioritised agriculture, food security and livelihoods. This was done, from the start, in the context of projections that show agriculture in West Africa undergoing intensification over upcoming decades. This intensification is seen as necessary for meeting national food security needs, and could be enabled by public and private sector investments. We closely examined these priority areas and their links to adaptation with regard to factors such as access to resources (e.g., credit, services, inputs, markets, equipment, infrastructure) and governance (management of different sectors and natural resources, and social and environmental tradeoffs of different policies and actions). This was in line with ASSAR's overarching theme of adaptation under dynamic systems change.

ASSAR investigated how combined climatic and non-climatic stressors affect vulnerabilities and adaptation options among and within different groups of people in Koutiala, Mali. We also investigated barriers and enablers to adaptation relating to:

- Governance of cotton cooperatives
- Migration
- Governance of seed systems
- Gender and traditional household structures
- Transformative Scenario Planning (TSP) as a means to adaptation

Case study sites

We focused on the Sikasso portion of the dry sub-humid band that extends from the Upper West Region of northern Ghana through southern Mali, referred to as the Wa-Bobo-Sikasso transect. The region experiences high exposure to dry spells and has medium-high to high drought risk and strong multi-decadal fluctuations in climate. This transect is also an action site of the CGIAR's Dryland Systems Collaborative Research Programme (CRP) and is home to several projects with the CGIAR research program on Climate Change, Agriculture and Food Security (CCAFS).



In the Sikasso region, the district of Koutiala was our main research site. Rainfed cotton production is the core of the agriculture system in this area. Government subsidies for cotton inputs are an essential means for farmers to also obtain inputs for other cereal crops, therefore making this system central to food security. In addition to challenges with obtaining farm inputs, those living in this area also face issues with a lack of social safety nets, high instances of gender inequality, high levels of poverty, degraded natural resources, herder-farmer conflict, and poorly functioning governance structures. Climate change is exacerbating these challenges through impacts including flooding, drought, and extreme temperatures. As governance is a key part of our research, the scale of our stakeholder interactions extended beyond the district level to the national level as well.

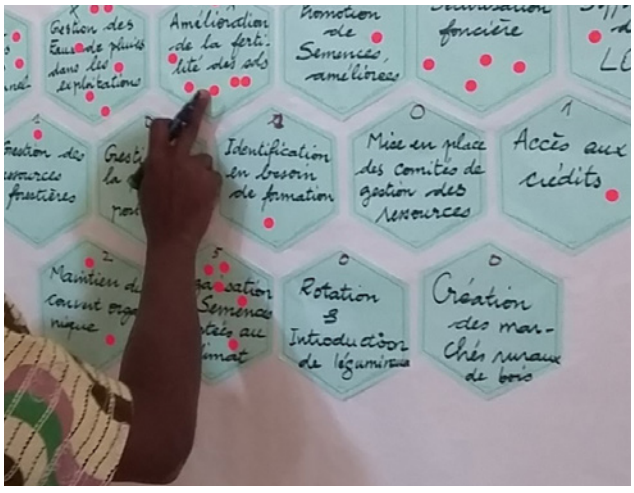
Approach

Our research in Mali contributed to answering the consortium-wide ASSAR question: "*What are the barriers and enablers for effective medium-term (2030 and beyond) adaptation, and what responses enable more widespread, sustained adaptation?*". We began by gaining a deeper understanding of current dimensions of risks, vulnerabilities and adaptation responses across and within different groups of people in the study sites and through cross-referencing at the national level. This process started during the Regional Diagnostic Study (RDS) phase of ASSAR. The RDS included a national expert meeting in Mali's capital city Bamako with national policy and decision makers; three focus group discussions in Koutiala with representatives from farmers' associations, women's groups, extension officers, and locally operating NGOs; and finally a set of key informant interviews (KIIs) in Koutiala. The engagements at the district level helped us gain a better understanding of how people at the local level understood and were responding to climate change, and explore the extent to which information from the national level was feeding into actions on the ground. The national level engagement enabled us to better understand the scale of adaptation planning in Mali, and to get a more holistic picture of how national-level policies are intended to play out at subnational levels.

The information gained during that first phase of the project helped us shape the way our research questions were contextualised and approached in the first round of studies conducted by master's and PhD students, and through research done by the senior researchers and MSU partners. Further, recognising the need to make research more participatory, inclusive, and representative of stakeholder needs, especially of the people living in the areas where we worked, we made efforts to develop a collaborative relationship with these groups and incorporate their knowledge and views in the design and analysis of the research process. This is what we called Research-into-Use (RiU). The team provided research evidence that fed into the central dimension of our RiU process, the Transformative Scenario Planning workshops held in Koutiala in the second half of 2016. These workshops aimed to bring diverse groups of stakeholders together in an open setting where they could talk openly and honestly about key challenges for the future of agriculture and food security in Koutiala, and could identify ways to work together to better prepare for those challenges.

Insights gathered during the TSP process continually informed the ongoing student and team research that formed the second phase of our Regional Research Program, which more closely examined how different types of governance, formal and informal structures, instruments, and social norms influence vulnerabilities and responses in different ways. Throughout all stages of the research, special attention was given to recognising how gender and other intersecting categories of social difference shape the vulnerabilities, capacities, and responses of different people.

The knowledge generated in the TSP along with the second phase of research also informed targeted activities at the end of the project that focused on building capacities of local and district stakeholders and strengthening the sustainability and legacy of ASSAR's work in Mali over the preceding five years.



FINDINGS AND RECOMMENDATIONS

TRADITIONAL GENDER AND SOCIAL ROLES CAN RESTRICT ADAPTATION OPTIONS FOR CERTAIN HOUSEHOLD MEMBERS IN TIMES OF STRESS

Cultural norms and traditions can shape the adaptive capacities of different household members in different ways. In Koutiala, climatic and non-climatic stressors intersect with traditional roles based on age and gender to increase the vulnerability of young women, despite their importance to household food security.

In Koutiala, social norms and traditions (a form of intra-household governance) can enable or constrain the way different household members navigate environmental, technological, and food-related challenges. Elder men are responsible for decisions concerning crop production, food allocation, and income generation. The decisions they make in this regard directly influence other family members. For example, they make decisions about what type and quantity of crops will be grown, and what type of inputs (fertiliser) and farming equipment will be used. However, young men and women provide the labour to implement these decisions. Overall, households with higher numbers of productive members are more likely to withstand challenges. At the individual level, however, in times of stress, whether climatic or not, elder men can better overcome many challenges, often by shifting greater responsibility to other family members for whom they make decisions. Stressors such as poor soil or sporadic rain can pose significant environmental challenges to young men working their own land; however, they are still able to work on other farms, or migrate to urban areas to provide remittances for food to the family if the need is great enough.

Elder women are responsible for most decisions concerning food consumption (setting menus, planning the preparation and distribution of food to other family members). However, young women provide most of the labour for these tasks and are primarily responsible for fetching water and pounding millet, two key aspects of food consumption in this system. Young women are also responsible for a great deal of field labour and firewood collection, and in this way are key to food security in the rural Mali farming system. But their control over their own decisions regarding their responsibilities is severely limited by adherence to traditional gender and age roles.

Under times of stress, such as those brought about by climate-change-related drought or extreme temperatures, they have fewer adaptation options than other household members.

In certain parts of Koutiala, especially the village of Koumbri, vegetable production has become a popular alternative to migration, and an important source of diversification along with cotton farming. However, married and young women who are responsible for many household duties are excluded from large-scale vegetable farming, due to the burdens encountered when attempting to carry out both activities. This exclusion is also supported by men in the village who prefer to see their wives in the household instead of in the vegetable fields. Further, people who are not originally from Koumbri are also excluded from large-scale vegetable production because they lack access to sufficient land (which is usually passed on through inheritance).

Recommendations

- Adaptation policies can benefit immensely from the integration of nuanced data that indicate how farmers—differentiated across multiple axes of social, demographic, political, and ecological factors—make decisions on how to adapt to both climatic and non-climatic risks.

- Those working on adaptation policies and planning that target households need to consider the ways in which multiple factors impacting different household members' adaptive capacities interact. This requires looking at how dimensions like environmental risks, capacity to mobilise labour (particularly household productive labour), power relationships, exposure to climate impacts, and sensitivity to those impacts all come together to mean different things for different people. Such information can be used to design plans that increase adaptive capacities of as many family members as possible, but especially the most vulnerable.

- It is critical to integrate both biophysical and socio-cultural issues when addressing food security, and challenge the social norms and patriarchal customs that discriminate against women.

BUILDING FLEXIBILITY, COMMUNICATION AND LEARNING INTO GOVERNANCE STRUCTURES ACROSS SCALES CAN HELP AVOID MALADAPTATION

Disconnects between governance actors and across scales of governance structures are a barrier to adaptation in Koutiala. These disconnects are highlighted through instances of conflict between those in charge of governing natural resources or agricultural systems, and instances where local and district level needs are not being sufficiently recognised and addressed in top-down policies.

In Koutiala, population growth combined with the depletion of pastoral resources shared by several villages is exacerbating the pressure on natural resources. This issue is compounded by multiple layers of governance that involve locally-elected, village and district administrative authorities. Lack of communication and collaboration between these overlapping decision makers is causing the governance of pastoral resources to become more complex. This leads to high-level regulations conflicting with norms and rules at the local level. Part of this complexity is related to the devolution of decision making over natural resources to local authorities, as part of the decentralisation policy, which has made locally agreed bylaws the major tools for management of pastoral resources.

However, social norms are hindering the fair enforcement of these bylaws. For example, one provision states that the stay of transhumant pastoralists in local pastoral areas cannot exceed five days (if the stay is not prohibited, as can be the case in certain bylaws). But some local people hosting these transhumant pastoralists would like them to stay longer to maximise the benefits of the organic manure produced by their animals and to benefit from associated milk production and business opportunities, such us buying or selling oxen at good prices for the next rainy season.

Rules and regulations cannot be effective when designed at one scale while ignoring the conditions at other levels. This can be seen when looking at institutional arrangements in Koutiala's agriculture and food security sector. Here, the Cooperative Law (which governs cotton cooperatives) as well as the Seed Law (which governs seed certification and access) were both designed at national level and have yielded mixed results with regard to anticipated outcomes. The Cooperative Law is believed to degrade social cohesion and the mutual support on which vulnerable farmers rely when facing climatic and non-climatic risks. Similarly, the new seed system is found onerous and prohibitively expensive for farmers. In some ways, the local convention for the management of natural resources established as part of the ongoing decentralised governance policy seems to resonate with local culture but it remains challenged by other stakeholders who do not benefit.

Recommendations

- Mechanisms should be put in place to ensure that user perspectives are incorporated into policies from the early planning stages, and that user feedback on implemented policies is recognised, monitored, and responded to in a timely way.
- Policies need longer-term perspectives to consider potential unintended consequences, who may win or lose as a result of their implementation, and what this means for long-term adaptation to climate change.
- Extension services, together with farmer organisations, need to design social support structures for those who lose out as a result of policies that result in unintended outcomes, such as the new cotton cooperative law.
- Early-maturing, high-yield crop varieties are needed to maintain options for secure food sources. But for the seed system to work, the certification process needs to be affordable and accessible. Similarly, the Ministry of Agriculture needs to create enabling conditions to support smallholder farmers to certify seeds themselves, for example, by developing smaller and closer certification labs.
- Locally agreed bylaws on pastoral resource management should be enforced equally for all pastoralists and farmers by local law enforcement officials and traditional authorities.

ADAPTATION STRATEGIES APART FROM MIGRATION SHOULD BE EXPLORED TO AVOID RISKS TO THE HEALTH AND WELLBEING OF MIGRANTS AND THOSE WHO STAY AT HOME

Though migration is often viewed as a valuable adaptation strategy, in Mali the risks that accompany migration and the burdens placed on those who stay behind are often greater than the rewards. Some villages have found alternatives to migration, such as focusing on vegetable production. These alternatives should be looked at more widely in Koutiala and beyond.

In the village of M'Pessoba, migration is perceived as an adaptation strategy. The village is known for having high pressure on its natural resources and limited income-generating activities because of its geographic position. Migration to traditional mining sites has been gaining in popularity here. Young people who decide to migrate refer to the success stories of migrants who are able to establish their own trade businesses in the village upon return from the mining areas. Successful migrants are able to support their families with inputs and equipment during the farming season. These stories influence young people from the village to look for opportunities in traditional mining areas. However, the harsh working conditions in the mining settlements are a source of disease for many migrants. Many village heads in the area reported that they had to use common resources to treat these cases of disease, mostly to no avail. One village head said, "*the person ends up dying but the resources that they haven't contributed have been used to treat them*." Further, for some young people, what was initially intended to be a seasonal migration turns out to be a permanent move. This can create an increased burden for those who did not migrate, such as elder family members, spouses, and children. Those groups have to take on the responsibilities normally carried out by young men and women.

In the village of Koumbri, small-scale vegetable farming introduced to help people cope with severe drought in the 1980s has now flourished into large-scale production and is well grounded as an adaptation strategy. It is perceived as an alternative to migration to mining sites. Known as a female activity in the beginning, all social groups including older and young men, are now involved in vegetable production. Young men call their vegetable plots ''*Machogo*'' (meaning mine site), in reference to these plots constituting "*gold mines*." One young man we interviewed noted, ''*we don't rent rooms to sleep or expose ourselves to challenging living conditions, such as bad food and dirty water, as is the case in the traditional mining sites*." However, this alternative livelihood is not always accessible to everyone, as women are often excluded from the large-scale production (as explained above) as are migrants to Koumbri.

Recommendations

- Migration can be a valuable adaptation option, but it should not be seen by policy makers or those working on adaptation as an *a priori* solution as it can come with many risks.

- Extension officers and local planners should seek to learn about smallholder vegetable production and conservation of produce in other villages in Koutiala to see if this could be promoted to increase adaptive capacities and food security and as an alternative to migration, which can bring about new sets of risks.

ADAPTATION TO CLIMATIC STRESSORS IS IMPORTANT, BUT IT IS EQUALLY IMPORTANT NOT TO OVERLOOK NON-CLIMATIC FACTORS THAT AFFECT PEOPLE'S LIVES AND ABILITY TO ADAPT

Climatic changes are not the only stressors that factor into adaptation needs in Koutiala. Urbanisation, changing social structures, and governance of resources are also impacting the abilities of different people to adapt. Moreover, sometimes adaptation strategies can bring about unanticipated non-climatic changes that can create new challenges that people must also cope with.

In the village of Zangasso, climatic changes (e.g., declining rainfall) are negatively affecting fishing resources. However, a number of combined non-climatic changes are also having a large impact on the fishery and the ability of people to build their livelihoods around it. Changes in who is using the fishery are complicating its management. For example, beyond the traditional ethnic groups known to be fishers by profession and through generations, fishing is now practiced by all ethnic groups in the village including Bambara and Minianka, who are traditionally known to be farmers. With this shift, the division of labour along ethnic lines is becoming blurred. At the same time, climatic changes are combining with other factors that are degrading the fishery, including the obstruction of water sources resulting from erosion and the construction of new urban infrastructure (e.g., roads and bridges). This is also contributing to traditional fishers, the Bozo and Somono, converting to farming.

The entry of new groups of fishermen, who are introducing prohibited fishing tools and techniques, is contributing to overfishing. These changes are also making it challenging to enforce the traditional governance of water resources that involve the prohibition of fishing during the reproductive periods of fish. Combined, these factors are affecting the viability of fishing as an alternative income-generating activity, and form of adaptation, for local people.

In another area of Koutiala, farmers have been engaging in lowland farming where small-scale irrigation can be used as a way to adapt to climatic changes impacting their farms. Along with this adaptation strategy, though, have come new and unforeseen challenges. For example, an invasive weed species has emerged in areas where new irrigation facilities are built for repetitive rice production.

This has created a situation where an adaptation strategy aimed at coping with climatic changes has produced a non-climatic stressor that now also needs to be dealt with.

Additional insights on agricultural intensification and ecosystem services were gained through documenting the contribution and importance of agro-biodiversity to climate change adaptation in Koutiala. This work assessed (including through farmers' perceptions) the impact of climate change and variability on agro-biodiversity and its services in rural Mali, and modelled the impact of harnessing agro-biodiversity on household vulnerability in its semi-arid areas. This work found that thinking of agrobiodiversity-based (or ecosystem-based) versus other adaptation practices/strategies as mutually exclusive might be misleading and not tell the full story on the ground. Agrobiodiversity-based adaptation practices always occur in combination with other practices. Further, both climatic and non-climatic risks drive adoption of agrobiodiversity-based practices.

Recommendations

- Policy makers and other decision makers need to take a systems view when thinking of adaptation, as pursuing adaptation in one area may create unforeseen challenges in another. Continuous learning and adjustment of adaptation planning is required.

- Climatic changes are combining with changing social traditions and urbanisation in unpredictable ways. This should be recognised when designing new policies or programmes aimed at natural resource governance or adaptation.

- While introducing new and more climate-resilient crop varieties is an important step toward sustained adaptation, the importance of traditional varieties for maintaining biodiversity and providing broader adaptation options should not be ignored.

- A holistic approach is crucial for taking stock of the synergies created through integrating multiple practices/strategies (agrobiodiversity/ecosystem-based) across scales. The effectiveness of these synergies in reducing vulnerability to risks or improving adaptive capacity needs further investigation.

TRANSFORMATIVE SCENARIO PLANNING IS A USEFUL TOOL FOR BUILDING RELATIONSHIPS AND LEARNING, BUT NEEDS TO BE PART OF BROADER STAKEHOLDER ENGAGEMENT TO STIMULATE LONG- TERM CHANGES

TSP is a participatory process of stakeholder engagement that creates unique opportunities for bringing diverse, sometimes conflicting, stakeholders together around serious shared challenges. It helps people imagine the ways in which the future can be changed, and to identify leverage points to facilitate that change. TSP provides a valuable space for learning, and building networks and relationships, but in order to bring about meaningful adaptation changes it needs to be part of a larger engagement effort.

We convened TSP workshops in Koutiala that brought together 27 stakeholders from Koutiala and Bamako. Participants included district officials, village leaders, NGO staff, public servants (extension officers, planning officers, forest agents and meteorological agents), farmers, researchers, and the media. Discussions centered on three key questions: What is the desired future for agriculture and food security in the district of Koutiala? What can and/or must the participants do individually and collectively to achieve the desired future? How could ASSAR's research help to achieve the desired future?

ASSAR researchers and stakeholders approached these questions together by building scenario stories to imagine what might plausibly happen to Koutiala's agriculture, natural resources, and food security in the future (up to 2035). More importantly, scenario team members were able to critically reflect on what needs to happen in the present to better prepare for that possible future.

Scenario team members identified access to agricultural land and access to water for irrigation as the main drivers of food and agricultural security in Koutiala. These drivers were then used to build four scenarios of the future. These scenarios informed the second TSP workshop where the participants developed "Vision 2035," a shared outlook on what challenges need to be targeted and key actions that could improve them. The Vision 2035 statement reads, "By 2035, strategic investments will target agriculture and natural resource conservation to ensure food security and improve household income in the Koutiala district. New, updated training sessions will allow communities to make better use of the scarce water resources and variable rainfall in the region. This will be combined with improved rainwater and soil management and the promotion of improved seeds." Actions that participants felt would help achieve this vision included developing partnerships, training farmers on sustainable rainwater management, piloting new rainwater management techniques, and diagnosing barriers to adoption of improved seeds. These identified actions later informed follow-up RiU and capacity building activities in Koutiala.

After the close of the workshops, further analysis found that while scenario workshops provide a valuable and unique interaction space for learning and building networks and relationships, scenario processes alone may not be enough to stimulate transformation around key adaptation challenges. The actions identified for helping to achieve Vision 2035, though important for improving adaptive capacities of those in Koutiala, were incremental and will likely not be a sufficient long-term solution for ensuring future agriculture and food security. These long-term solutions need a broader stakeholder engagement effort that targets the root causes of key challenges.

Recommendations

- Inclusive and participatory methods can help more comprehensively identify sources of risk and their socially differentiated impacts, compared to traditional "expert-driven" models. Such methods are a valuable addition to methodologies for analysing climate risk. Scientists and policy makers would do well to consider dynamic interactions between drivers of risk when assessing the resilience of agricultural systems to climate change.
- Scenario planning exercises, and consultative processes generally, need to be incorporated as one component of broader and deliberate stakeholder engagement, learning, and evaluation processes. Such processes need to focus on targeted actions that aim to change and improve root causes for key challenges such as governance, market systems, and cultural traditions.

WORKING WITH STAKEHOLDERS TO IMPROVE ADAPTATION AT MULTIPLE SCALES

The TSP workshops in Koutiala were central to our RiU and capacity building work in Mali. They built a strong foundation of communication and collective visioning that helped identify more relevant and legitimate actions aimed at building stakeholders' adaptive capacities. In order to build on the development of Vision 2035, a cross-border exchange visit was organized for TSP participants to a neighbouring area of Burkina Faso where the villagers have extensive experience in these practices, especially in the construction and use of runoff basins for water conservation.

This work was facilitated by the ASSAR Scenario Based Capacity Building (SBCB) grants and by Oxfam. The exchange visit allowed community members to learn from their peers by being exposed to new experiential knowledge from Burkina Faso. The replication in Koutiala of what was learned in Burkina Faso is expected to create room for capacity development around the practical needs on soil and water management in the district. Beyond the 10 participants who took part in the cross-exchange visit, all the TSP participants were trained on the practices of soil and water management as a follow-up to the visit to Burkina Faso. After learning about the criteria for selecting appropriate sites to construct runoff basins for supplemental irrigation, participants identified two suitable sites to construct pilot basins in Koutiala. Though the construction of these basins in Koutiala, and the capacities built with the exchange, are not sufficient for meeting overall long-term adaptation needs, some short-term ones have been addressed. The process helped to build skills, relationships, and knowledge, and therefore boosted adaptive capacities.

Based on the research on household-level adaptive capacities highlighted above, and discussions in our TSP workshops, we also recognised a need for strengthening the adaptive capacity of young women, who are the most vulnerable to climate change because of their limited access to education, financial services, and assets.

The team used an ASSAR Grant for Local Adaptation Support (GLAS) to identify windows of opportunity for young women's businesses to expand their access to resources. The project team proposed that creating reliable market opportunities for young women could inject much-needed income into some of the poorest food-insecure rural households and increase their resilience. A group of 14 women were selected from seven villages in Koutiala for a workshop on exploring ways to improve their living conditions through the increase of business revenue across the agricultural value chain. The workshop discussions identified vegetable production and the conservation of produce to improve access to markets as cross-cutting issues among the seven villages. The meeting was followed by an exploratory trip to the seven villages to meet with young women together with the village councils and heads of villages. The aim was to assess the level of organisation, cohesion, and other criteria for eligibility to host a test strategy for promoting vegetable production and conservation of produce. This strategy involves partnership building, extension services, and exploring broader funding options with financial institutions.

We will continue working with the Association of Awakening to Sustainable Development (AMEDD), Oxfam, and other partners to ensure that progress made through the activities initiated with the SBCB and GLAS grants will not be lost, and that instead these groups can continue working with those in Koutiala and beyond to build on lessons learned and extend successful dimensions of this work to other areas.

NEXT STEPS FOR RESEARCH, POLICY AND PRACTICE

The findings outlined above are important for the future of adaptation in Mali because they identify important challenges that will have to be overcome in order to attain food and livelihood security in the face of a changing climate.

Rapid climatic changes, ongoing attempts at decentralised governance, and entrenched cultural norms are combining in ways that will make adaptation difficult without substantial and meaningful changes – especially for groups with limited power and agency to determine their own decisions and livelihoods. Such changes are especially necessary for more inclusive and participatory policy design processes and for increasing the rights and decision-making power of women and marginalised groups. ASSAR's research, and its RiU and capacity building dimensions, have built on the work of others to continue sowing seeds for change aimed at overcoming barriers to adaptation, but this progress needs to be sustained through continued research, practice, and policy actions.

Our findings provide certain concrete (though not simple) recommendations for ways that these challenges can be addressed. Overall, we emphasise the need for a shift away from conventional top-down and expert driven policy making approaches toward flexible approaches that are built on continuous communication and learning across scales and actors, with specific focus on making these processes more representative. Current decentralisation efforts are not going far enough. There should be renewed energy put toward inclusion of previously marginalised voices, especially those of young women. Participatory processes can be used for capturing diverse perspectives and needs, and building new and sustainable relationships across organisations and institutions for testing, monitoring, and expanding promising adaptation solutions.

In the short term, certain concrete actions, such as building affordable seed certification facilities near to farmers, promoting small-scale vegetable production in cotton-dominated villages, and supporting water harvesting practices, can contribute to strengthening adaptive capacities in the face of sometimes unpredictable climatic changes.

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