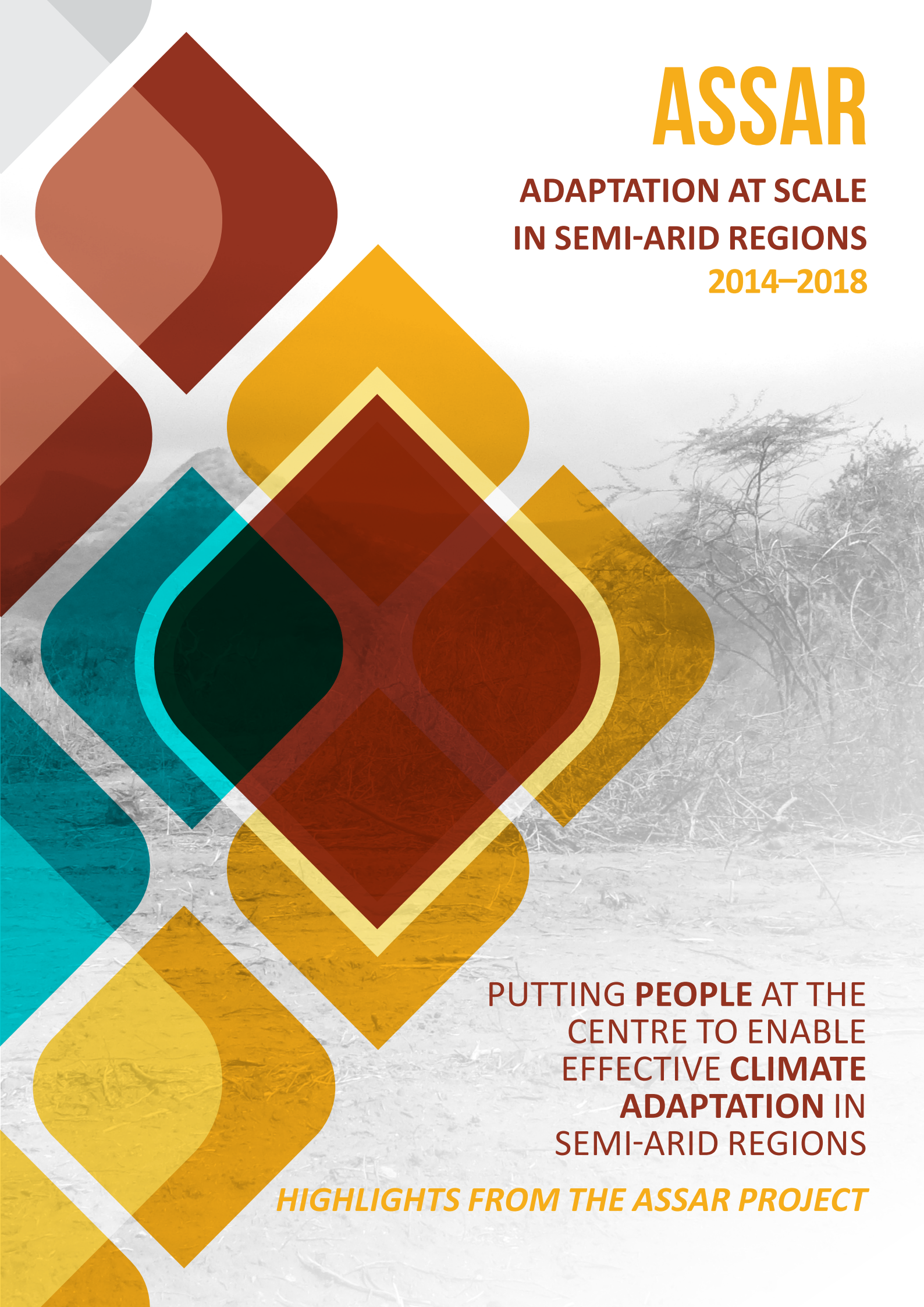
ASSAR

ADAPTATION AT SCALE IN SEMI-ARID REGIONS

2014–2018



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

HIGHLIGHTS FROM THE ASSAR PROJECT

ASSAR

Adaptation at Scale in Semi-Arid Regions

Working in the semi-arid regions of Africa and India, the five-year (2014-2018), multi-institutional and multi-scale ASSAR project combined interdisciplinary scientific research, capacity building, and stakeholder engagement to improve understandings of the barriers and enablers to effective climate adaptation. Our work centered on informing climate adaptation policy and practice in ways that advance the agency and long-term wellbeing of the most vulnerable.

ASSAR was a project within the CARIAA (Collaborative Adaptation Research Initiative in Africa and Asia) programme, funded by IDRC and DFID.

Why focus on semi-arid regions?

The need for effective adaptation responses has become increasingly urgent as the rate of climate change and severity of impacts has become more clearly understood. Home to hundreds of millions of people, the semi-arid regions of Africa and Asia are particularly vulnerable to climate-related risks.

These climate change hotspots are highly dynamic systems that already experience harsh climates, adverse environmental change, and a relative paucity of natural resources. Global warming is expected to make conditions in these areas more challenging in the coming decades. Even a 1.5°C increase in global temperature will result in warming in semi-arid regions that is greater than the global average. More frequent and intense extremes will have severe impacts on agriculture, health, and other vulnerable sectors.

People living in semi-arid regions also face a range of non-climatic stressors, including rapid population growth, historically-high rates of poverty, inequality, and rapidly changing socio-economic, governance, and development contexts. They are often far removed from government services and do not have the opportunity to participate in decision-making processes that can affect their abilities to adapt.

These challenges affect different people within these populations differently. Factors such as access and control over land and water resources, social and cultural norms, urbanisation, and opportunities for migration, all affect which livelihoods people can pursue, which support structures they can draw on, and ultimately how they maintain their overall wellbeing. Although many people in these regions are remarkably resilient, the rate at which these multiple and often interlocking pressures are expected to escalate in coming decades means that traditional coping strategies will be insufficient.

ASSAR's work was driven by the urgent need to accelerate regional adaptation responses in semi-arid regions to safeguard the livelihoods and wellbeing of those who live in them. From 2014-2018 we worked with a wide range of stakeholders in seven countries (Botswana, Ethiopia, Ghana, India, Kenya, Mali, Namibia) to explore the dynamics and drivers of vulnerability. At the same time, we engaged in efforts to strengthen the capacities of governments, local organisations, and people to adapt in ways that minimise vulnerability, strengthen agency, and promote long-term wellbeing.

ASSAR'S APPROACH

Researching the barriers and enablers to effective adaptation

To date, most adaptation efforts have focused on reactive, short-term, and site-specific solutions to climate-related vulnerabilities. Although important, these responses often fail to address the root causes of vulnerability and shed no light on how to spur larger-scale and longer-term adaptation that has positive effects on socio-economic development.

Using research and practice to address this information shortfall, ASSAR's primary aim was to produce future-focused and societally-relevant knowledge of potential pathways to greater wellbeing through adaptation.

ASSAR embraced a transformational philosophy to climate change adaptation, using insights from multi-scale, inter- and transdisciplinary work to improve understandings of the barriers and enablers to effective, sustained and widespread adaptation out to the 2030s. We considered adaptation through three principal research lenses. These emphasised the dynamics of ecosystem services, social differentiation, and governance. Knowledge systems and gender dimensions relate to all these lenses, and acted as cross-cutting themes throughout (please see a figure of our research framework on the following page).

This conceptual framing emphasised the need to understand climate change within an interlinked set of other dynamics in drylands – typically a combination of environmental, social, economic, cultural, political and administrative changes. This dynamic setting is particularly evident in semi-arid regions, in part because dryland populations have historically been among the most marginalised but are today increasingly exposed to mainstream influences. It is only through recognising and understanding the interlinked dynamics that shape vulnerability and adaptive capacity in semi-arid regions that the challenges and prospects for management of climate impacts can be adequately analysed and translated into adaptation policy and practice.

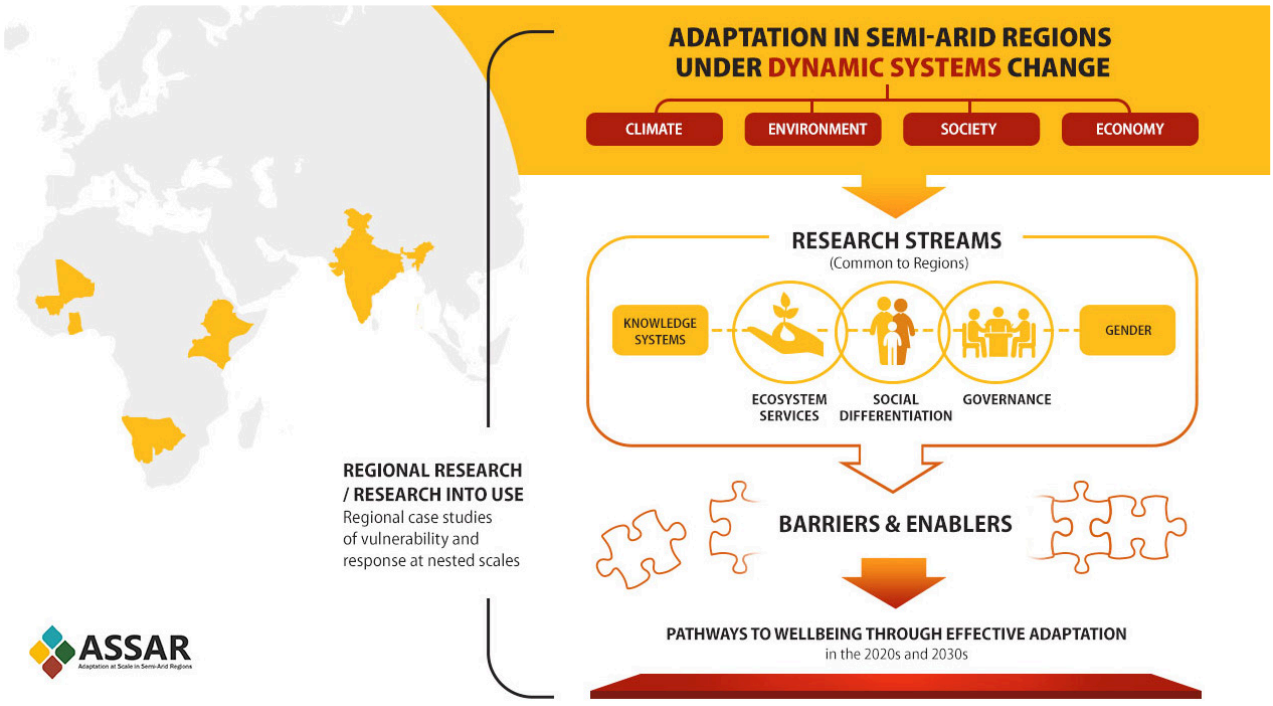
Each of ASSAR's research teams focused their case-study based investigations on regionally-relevant, socio-ecological risks and dynamics that related centrally to livelihood transitions, and access, use, and management of land and water resources. The teams worked in a coordinated manner to enable ASSAR to develop a systemic understanding of the processes and factors that impede adaptation and cause vulnerability to persist.

Creating relevant, usable research

To ensure better linkages between adaptation research, policy and practice, ASSAR employed a Research-into-Use (RiU) approach. Our research was stakeholder-guided, and responded to the adaptation challenges faced by people living and working in semi-arid regions. ASSAR's work was underpinned by early and continued stakeholder engagement based on interactive stakeholder mapping and power analyses. We targeted different levels of adaptation practice and policy, from local communities and organisations, to sub-national and national governments and institutions.

We used multi-stakeholder, participatory processes – such as Vulnerability and Risk Assessments (VRA), Transformative Scenario Planning (TSP), and Participatory Scenario Analysis (PSA) – to bring together key stakeholders. The aim was to build common understandings of current adaptation needs and past adaptation failings, while co-producing adaptation responses that can yield appropriate, tangible, and lasting benefits.

We also worked to develop audience-appropriate communication products to ensure that important research findings reached the right people, at the right times, and in the right ways.



Strengthening capacities within and outside ASSAR

To ensure that ASSAR's impact would live on after the project was completed, we prioritised building the capacity of project team members, and a variety of external stakeholders in our regional study sites.

ENHANCING RESEARCHER SKILLS AND ABILITIES

Financial support: We provided financial support for graduate students (for fieldwork and full study programs), postdoctoral researchers, and research associates. In total, we offered academic and research-focused capacity building grants to support approximately 100 early- and mid-career researchers.

Training and workshops: Through specialised training opportunities and workshops, we built researcher capacities in specific areas. These included gender, RiU, VRA, TSP, experiential learning, land use and land cover change, and climate science.

Upskilling early-career researchers: Project members also benefited from Small Opportunities Grants. These gave early-career researchers the chance to tap into a broad range of strengths, skills, perspectives, and ideas across different semi-arid hotspots. These opportunities contributed toward joint outputs across the ASSAR regions. Through these grants we bolstered the influencing and communications capacity of ASSAR researchers, built stronger ties with stakeholders in the regions, trained early-career researchers to work with stakeholders on improving local adaptation efforts, and boosted the RiU work done by regional teams.

BUILDING CAPACITY AMONG VULNERABLE GROUPS

Our two external capacity building initiatives, the Grants for Local Adaptation Support (ASSAR GLAS) and Scenario Based Capacity Building (SBCB) grants, helped strengthen the relevance and sustainability of ASSAR's research. The ASSAR GLAS were developed in order to use our research findings to help support the most vulnerable groups in each region. They focused on supporting women's groups, strengthening disaster risk management, integrating climate and development projects, and fostering peer-to-peer learning among stakeholders. We used the SBCB grants to build on the momentum and connections made during the regional teams' participatory processes, and to align these with ongoing ASSAR findings to attain actionable results. Specifically, these awards served to build capacities of those stakeholders who played vital roles in overcoming barriers to, or supporting enablers of, adaptation. They focused on topics including irrigation and soil fertility management, accessing climate information, and invasive species management.

"PREVIOUSLY, WE FOUND IT DIFFICULT AS WOMEN TO GO TO SOME OFFICES LIKE THE DISTRICT ASSEMBLIES AND FINANCIAL INSTITUTIONS TO ASK FOR CERTAIN SERVICES, BUT WITH THE HELP OF ASSAR'S PARTICIPATORY METHOD OF ENGAGING WITH US [...], WE FEEL MORE CONFIDENT [...]. WE WERE NOT UNITED AS WELL [...], BUT THROUGH THE GLAS PROJECT WE NOW HAVE WOMEN PLATFORMS THAT HAVE BEEN FORMALLY REGISTERED WITH THE DISTRICT ASSEMBLIES WORKING TOGETHER TO IMPROVE THE WELLBEING OF WOMEN."

An international and interdisciplinary team

The interdisciplinary ASSAR team comprised a mix of research and practitioner organisations from 11 countries. It included groups with global reach as well as those deeply embedded in their communities. The ASSAR consortium was a partnership between five lead managing institutions – the University of Cape Town (South Africa), the University of East Anglia (United Kingdom), START (United States of America), Oxfam GB (United Kingdom) and the Indian Institute for Human Settlements (India) - and 12 partners – the University of Botswana, University of Namibia, the Desert Research Foundation of Namibia, University of Ghana, International Crops Research Institute for the Semi-Arid Tropics, University of Nairobi, Addis Ababa University, Ashoka Trust for Ecology and the Environment, Watershed Organisation Trust, Indian Institute for Tropical Meteorology, Reos Partners, and the Red Cross Red Crescent Climate Centre.

ASSAR was one of four hotspot research projects in the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) programme, funded by Canada's International Development Research Centre (IDRC) and the United Kingdom's Department for International Development (DFID).

ASSAR IN NUMBERS

GENERAL:

7 COUNTRIES

17 INSTITUTIONAL PARTNERS

272 PROJECT STAFF

1990+ PEOPLE ENGAGED

RESEARCH OUTPUTS:

110 JOURNAL ARTICLES*

10 BOOK CHAPTERS

26 WORKING PAPERS*

47 PHD AND MASTER'S THESES

COMMUNICATIONS OUTPUTS:

335 BLOGS

5 BROCHURES AND FLYERS

18 INFOGRAPHICS

52 INFORMATION BRIEFS

9 PHOTO ESSAYS

11 RADIO SHOWS

44 REPORTS

9 SPOTLIGHTS

9 TOOLKITS AND GUIDES

51 VIDEOS

24 WEB ARTICLES

7 WEBINARS

CAPACITY BUILDING:

13 POST-DOCS

14 PHD STUDENTS

35 MASTER'S & HONOURS STUDENTS

75 STAKEHOLDER ENGAGEMENT & TRAINING EVENTS

* As of May 2019, 41 journal articles were published, 30 were under review and 39 in preparation. Of the 26 working papers, 5 were in preparation.

CROSS-REGIONAL INSIGHTS

Key messages from our synthesis work

BARRIERS AND ENABLERS TO ADAPTATION NEED TO BE VIEWED AS DYNAMIC AND INTERSECTING RATHER THAN INDIVIDUAL AND STATIC

In ASSAR we framed our view of barriers and enablers in a normative sense, with a particular focus on what encourages or prevents effective, widespread and sustained adaptation that aligns with the aspirations of local communities. Given ASSAR's people-centred work, we placed high emphasis on understanding the barriers and enablers to adaptation for less well-off and politically-marginalised people facing livelihood and wellbeing stresses in semi-arid regions. We showed the central role that cultural factors can play in shaping the development, uptake and effectiveness of adaptation actions. Secondly, we drew attention not just to the existence of multiple forms of barriers and enablers, but to their interaction in shaping adaptation processes and outcomes. Just as different forms of enablers could combine to increase the chances of progress, so multiple interacting barriers can be mutually reinforcing to severely constrain progress.

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GLOBAL WARMING OF 1.5°C AND HIGHER BRINGS PROFOUND CHALLENGES TO SEMI-ARID REGIONS

In semi-arid regions, a global temperature rise of 1.5°C (and each interval of 0.5°C thereafter) will have progressively severe local impacts. With average local temperatures increasing faster than the global average (and rising more with each interval of global increase), along with intensifying climate extremes and changing rainfall patterns, semi-arid regions will experience declining crop yields, shifts in water availability, compromised health of people and livestock, and additional pressures to livelihoods.

Affected countries have growing evidence available to argue for emissions reductions in line with a 1.5°C warming target, as proposed in the Paris Agreement, and at the same time push for adopting climate-resilient development pathways that acknowledge the threats of increasing temperatures and their associated impacts.

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CHANGING ECOSYSTEM SERVICES ARE INCREASING PEOPLE'S VULNERABILITY IN SEMI-ARID REGIONS

Semi-arid regions are undergoing complex shifts in land-vegetation-atmosphere interactions. These shifts impact on ecosystem services, with major corresponding implications for local communities. Yet, socially-just access to key ecosystem services is an integral part of climate change adaptation, across rural and urban settings.

Enhancing human wellbeing and climate resilience in the face of these changes requires governance at multiple scales to take into account the synergies and trade-offs associated with the ecosystem services that are of value to different social groups. Including affected populations more concretely in management decisions will help to identify the main trade-offs, and support more effective design and implementation of interventions. Decision makers should also capacitate customary, traditional, and community-based natural-resource managers by devolving decision making rights to them, and by facilitating and promoting equitable and adaptive natural-resource management.

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FORWARD LOOKING, INCLUSIVE GOVERNANCE ARRANGEMENTS ACROSS DIFFERENT SCALES ARE A CRITICAL ENABLER FOR ADAPTATION

Marginalised groups in semi-arid regions who live on the frontline of climate impacts will benefit if they are more actively included in climate adaptation governance. However, in these areas, governments struggle to deliver services or engage with local communities due to a range of factors, such as inadequate mainstreaming of climate concerns in development planning, staff capacity deficits at lower levels of governance, and limited technical expertise. We see fragmented decision making across different governance levels.

Climate change adaptation responses could learn from widespread implementation of decentralisation, and how it has enabled, and in some cases undermined, the ability to support participation and flexibility across scales. Strengthening governance, and the capacity to engage in decision making across scales, across actors, and between formal and customary governance structures, should be a priority for enabling effective adaptation. Doing so could enable more equitable participation, promote flexible, hybrid forms of governance, and encourage forward-looking, cross-scalar collaboration and knowledge flows.

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PARTICIPATORY PROCESSES BUILD ADAPTIVE CAPACITY AND AGENCY AND CAN HELP TRANSFORM SYSTEMS

Transformation in climate change adaptation is the opposite of today's business as usual. It requires a reframing of the climate challenge to allow a shift from the existing largely technocratic and Northern knowledge base, to a fairer configuration of power relations that recognises the critical role of non-technocratic knowledge. Indeed, initiatives that can lead to transformation in climate change adaptation need to emphasise the reorientation of social norms and relations, as well as the reorganisation of climate governance structures.

Inclusive, participatory processes that bring together diverse stakeholders – both in positions of power and dispossession – can help to integrate marginal voices into the mainstream, thereby shifting the adaptation narrative and research methods to new spaces of grounded solutions. In so doing, these processes can help build people's agency, and their adaptive and transformative capacities.

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EFFECTIVE ADAPTATION MEANS DIFFERENT THINGS TO DIFFERENT PEOPLE

Different framings of effectiveness will influence the entire adaptation process, from identifying the vulnerabilities that adaptation aims to address, to determining who benefits and who is left behind, which adaptation actions are chosen and funded, and how they are implemented. Justice, governance, community-based adaptation, and sustainability framings are particularly important for ensuring outcomes that benefit vulnerable communities in semi-arid regions. But in any adaptation process, considering multiple framings is critical for facilitating effective, equitable and inclusive adaptation that is actively cognisant of the marginalised and most vulnerable. A clear exploration and articulation of effectiveness, from multiple framings, can guide organisations in setting adaptation priorities and outcomes, in defining criteria for funding adaptation projects, in assessing proposals, and in evaluating implementation.

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A FOCUS ON WELLBEING CAN LINK ADAPTATION TO OUTCOMES THAT MATTER TO PEOPLE

Using a wellbeing approach in climate adaptation efforts helps to humanise adaptation debates, making them less technocratic and scientific. The approach focuses on the links between human needs and aspirations; the different resources and capacities people have; and how these shape livelihood choices, satisfaction with life, and resilience. It recognises that people's capacity to engage in adaptation action, and the types of action they can engage in, varies within communities and households. All these factors coalesce to have implications for equity and inclusion. A wellbeing approach is critical for designing policies that respond to the many ways in which social dynamics lead to different levels of vulnerability.

GENDER IS ONE OF MANY SOCIAL FACTORS INFLUENCING RESPONSES TO CLIMATE CHANGE

People's vulnerabilities and responses to climatic and non-climatic risks, vary according to the way that social norms, market signals, laws and policies intersect with different dimensions of their identity. To avoid further marginalising the already vulnerable, we need to steer away from conventional approaches that focus on binaries of men and women, and move towards considering intersectional variables, that is, how aspects of age, ethnicity, class and marital status, amongst others, interact with gender to shape vulnerability and response strategies.

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MOBILITY IS AN INHERENT DYNAMIC AMONG VULNERABLE POPULATIONS

Mobility is an important strategy to manage risk in semi-arid regions, but it doesn't always lead to improved wellbeing. Whether moving or staying put, risks can increase for those with little agency. Conversely, mobility can provide the means to move out of risky locations and improve livelihoods. In these cases, migration contributes to improved wellbeing and adaptive capacity.

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ENHANCED KNOWLEDGE SYSTEMS ARE CRITICAL FOR CLIMATE CHANGE ADAPTATION

Climate adaptation knowledge is currently predominantly focused on weather and seasonal timescales, is dominated by climate warnings, and rarely extends to adaptation information. As climate change progresses, greater integration across timescales will be needed to prepare for novel climate risks. Integration of knowledge across institutions, knowledge domains, and geographic scales is equally necessary. Though the policy mandate for the generation and dissemination of climate information typically resides with government agencies, their efforts can be supported by intermediaries who are often better placed to bridge the different knowledge domains, and to work with at-risk communities.

Developing the capacity of these intermediaries, and embedding them in the broader knowledge system is key, as they can also help to tailor adaptation information for different social groups to ensure that knowledge reaches those who might otherwise be excluded. The use of mobile technology offers further opportunities for improving people's access to timely, usable and locale-specific climate and adaptation information, particularly in rural areas where access is frequently limited.

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COLLABORATIVE RESEARCH CONSORTIA ARE COMPLEX, BUT HAVE GREAT POTENTIAL

Large-scale collaborative consortia provide multiple opportunities for professional and personal growth of those involved. Interactions across disciplinary, geographical, cultural and sectoral dimensions offer a rich learning environment; and consortia provide multiple opportunities for networking, capacity building, and broadening one's understanding. However, working in consortia can be challenging, involving varied transaction costs given the diversity of partners involved, and their dispersed nature. Bridging the research-practitioner divide, for instance, requires overcoming certain barriers, such as differences in professional language and priorities. Yet continuous and iterative collaboration between researchers and practitioners is critical for research to be impactful and meaningful. Building relationships and trust is one of the most worthwhile investments one can make for the success of large-scale collaborative initiatives.

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COUNTRY INSIGHTS

Key messages from our case studies

KEY INSIGHTS
BOTSWANA

- Botswana is one of the countries in Africa that will experience the most extreme changes in temperature and precipitation under global warming scenarios of 1.5°C-3°C above pre-industrial levels. These changes will have significant negative impacts on agriculture and other water-dependent sectors. There is an urgent need for communities and government to respond to climate change with measures that will build resilience and enhance wellbeing.

- In recent years, there have been adverse changes in the quantity, quality, distribution and timing of certain ecosystem services due to increasing human pressure and climate change impacts. As dependence on and access to ecosystem services varies by gender, men and women are affected differently by these ecosystem changes. Ecosystem services need to be sustainably and equitably managed through improved monitoring and restrictions on harvesting. Access to alternative livelihood options should also be enhanced.

- To increase the use of seasonal climate forecasts by people with different values, customs and belief systems, meteorological and place-based climate information need to be integrated through participatory processes with traditional and religious leaders. Forecasts should also be tailored and communicated in a way that is relevant and understandable to farmers, and should include information on what actions farmers should take.

- Climate change is causing the frequency, severity, duration and spatial extent of droughts to increase. Yet, institutionally, drought and climate change are managed separately. There is a lack of coordination among departments responsible for drought management, and responses are largely reactive and crisis-driven. While emergency drought response does have an important role to play in drought management, a more proactive and integrated approach is needed to build the longer-term resilience of vulnerable people, ecosystems and the economy.

- Grassroots stakeholders have equally valuable contributions to make as those in positions of power in policy, planning and vulnerability assessment processes. Multi-sector and multi-scalar participatory processes that enable collaborative planning and engagement with and between representative and marginalised stakeholders are thus important for ensuring that climate change responses are legitimate, effective, and tailored to the realities of various social groups.

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KEY INSIGHTS
NAMIBIA

- Adaptation policy approaches should consider that factors like gender, ethnicity, age, household composition, marital status, social capital and class are important determinants of people's vulnerabilities, and of their capacities to respond to climate risks and impacts. These intersecting factors need to be considered explicitly to enable the most marginalised to adapt.

- Building on Namibia's decentralised water reform, water and drought governance could be strengthened if there was a better understanding of and support for local challenges. This could be partly achieved by increasing the awareness and willingness of decision makers to be more inclusive of the knowledge that community members and other marginalised groups offer, building the capacity of local actors to proactively engage in governance, and by providing more targeted support for managing water better at the village level.

- Improved collaboration – among government, non-governmental organisations, academia and communities – can lead to the production of climate and adaptation information that is reliable and relevant to local subsistence farmers. It can also ensure that this is disseminated to those who need it in a timely manner.

- By engaging with traditional and religious leaders, and considering their value systems, adaptation policy makers and practitioners can promote adaptation responses that work in conjunction with cultural and social norms. Doing so will assist in helping to reduce group-specific vulnerabilities. This should also be done on a case-by-case basis considering the implications of these social norms on gender equality and human rights more broadly.

- More long-term, targeted responses to climate change are needed. Government needs to support people's livelihoods by building adaptive capacity, providing vocational training and jobs, and creating markets. These efforts must also lead to rural development processes that address water scarcity, food insecurity, and human development needs.

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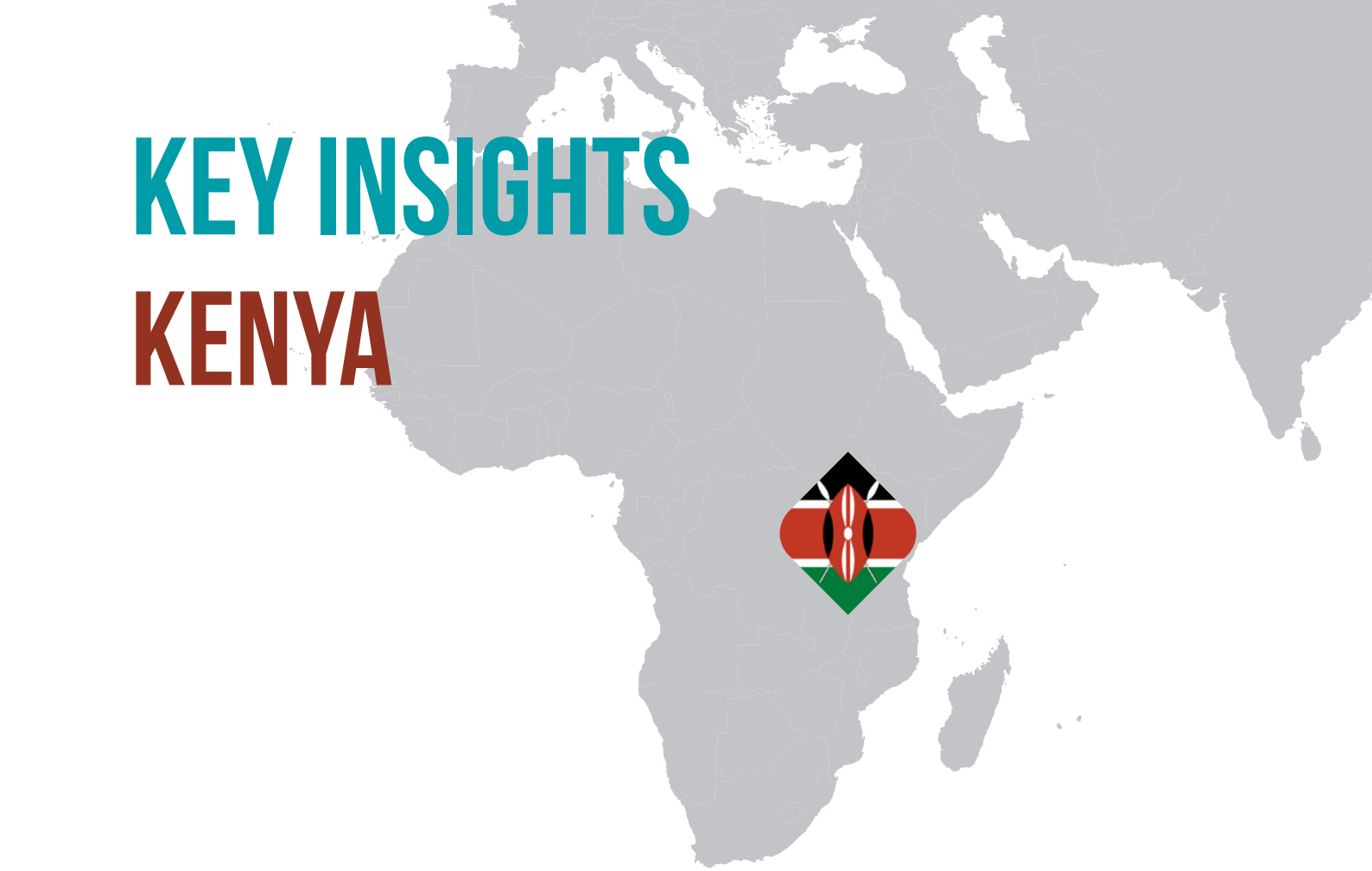
KEY INSIGHTS

KENYA



- Factors like gender, age, location, livelihood and status intersect with social and economic characteristics like household composition, social capital, marital status, income and educational attainment to determine people's capacity to effectively respond to climate risks and impacts. Adaptation policies need to consider these intersecting factors explicitly to enable the most marginalised to adapt.

- Although decentralisation has enabled local officials to respond to local needs flexibly and effectively, greater coordination between levels and sectors of government, as well as more resources, better alignment of planning and development cycles, and better provision of timely and relevant information, would further strengthen action on water governance and disaster risk management.

- Conservancies have benefitted communities with improved governance, more livelihood opportunities, and enhanced social services. To continue to build resilience, further improvements are required to reduce tensions between communities within and outside conservancies, enable more sustainable and equitable approaches to natural resource management and livelihoods, and address ongoing problems associated with human-wildlife conflict.

- Recognising that interventions will result in trade-offs, with some people winning and others losing, is important. Including affected populations more concretely in decisions about interventions will help to identify the main trade-offs, support more effective design and implementation of interventions, avoid unintended consequences – especially for the most vulnerable – and help to ensure that the needs of those typically excluded from decision making are heard and valued.

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KEY INSIGHTS
ETHIOPIA

- Factors like gender, age, location, livelihood and status intersect with social and economic characteristics such as household composition, social capital, marital status, income and education level to determine people's capacity to respond effectively to climate risks and impacts. Adaptation policies need to consider these intersecting factors explicitly to enable the most marginalised to adapt.
- Although decentralisation has strengthened the ability of local officials to respond to local needs flexibly, greater coordination between levels and sectors of government, as well as more resources and better provision of timely and relevant information, would further strengthen action on water governance and disaster risk management.
- Policies and interventions on key issues such as villagisation, irrigation and invasive species management need to balance the competing needs of different stakeholders and population groups to enable more sustainable and equitable approaches to natural resource management and livelihood support in the face of climate change.
- Recognising that interventions will result in trade-offs, with some people winning and others losing, is important. Including affected populations more concretely in decisions about interventions will help to identify the main trade-offs, support more effective design and implementation of interventions, avoid unintended consequences – especially for the most vulnerable, and help to ensure that the needs of those typically excluded from decision making are heard and valued.

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KEY INSIGHTS

GHANA

- Intersecting climatic and non-climatic challenges manifest in varied ways for different groups and individuals. Therefore, researchers, policy makers and practitioners should view these combined stressors holistically, and use this more complete understanding when making decisions that will impact livelihoods and adaptation options of different social groups.
- Measures can be taken now to ameliorate non-climatic challenges and bolster adaptive capacities. These include developing market support services, expansion of veterinary services, enforcement of regulations on bush burning, and better grading and packaging of produce.
- Policy makers, government ministries, and practitioners should tailor water management to the needs of different social groups, prioritise provision of accurate and timely rainfall information, and strengthen technical capacities for maintaining water infrastructure. Further, to increase uptake among farmers, measures need to be taken to integrate traditional irrigation approaches that are culturally accepted with more modern mechanised approaches and financing.
- Migration is often seen, in an overly simplistic manner, as a favourable adaptation response to combined stressors, but this is not necessarily the case. Migration is not always an available or desirable option. A focus should be placed on supporting sustainable adaptation options for those for whom migration is not a viable alternative.
- Traditional patriarchal norms have favoured males and promoted structural inequalities among females in terms of decision making, access to and control over land for agricultural activities, and the ability to engage in more productive livelihoods. Recognising gendered dimensions of land tenure, and improving access and ownership rights for women and marginalised groups, is central to identifying successful adaptation strategies for the future.

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KEY INSIGHTS

MALI

- 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.

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KEY INSIGHTS
KARNATAKA, INDIA

- To deal with differential vulnerability across the rural-urban continuum, development policies and climate change adaptation interventions need to respond to the needs and dynamic aspirations of the most vulnerable. Urban development policies require a deeper understanding of informal settlements, including dimensions of differential vulnerability, particularly across the multitude of social categories present, the various actors involved, and the roles of social networks, local associations, and social cohesion. Additionally, viable employment options in rural areas should be developed through the strengthening of rural livelihoods and/or the natural resource base upon which these livelihoods depend.

- Migration drivers, processes and outcomes are complex, differentiated, and span the rural-urban continuum. Migration does not necessarily lead to improved wellbeing, and might have trade-offs for some members of the household. The increasing volumes of migration mean that policy makers need to reimagine adaptation as beyond-local, and develop strategies that can, on one end, make agriculture more viable, and on the other end, provide safer and more inclusive conditions for migrants in urban areas.

- Urban and regional governance in India is fragmented and weak, and there is little engagement with climate policy. Local governments lack personnel and technical capacity, and have not sufficiently leveraged the presence of a range of domestic and international non-state actors. The relationship between state and city government remains top-down, with decision making occurring at the state level, and local agencies responsible for implementation. The largest challenge, however, is to build support for climate action within state and local government officials.

- For decision makers and practitioners in semi-arid regions to make robust and informed decisions it is imperative that they take into account the available, legitimate and reliable knowledge that supports fine-scaled, contextualised, and robust adaptation responses. To facilitate knowledge transfer and local-level adaptation, knowledge brokers should be recognised and formally supported, and the effectiveness of extension services should be improved.

- Preserving functioning ecosystem services within the urban fabric is crucial for climate resilience planning. However in Bengaluru, these ecosystem services are being challenged by unplanned, haphazard urbanisation. Promoting ecosystem-service-based stormwater-management practices, and exploring alternative strategies that can enable stormwater attenuation or retention are necessary.

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KEY INSIGHTS
MAHARASHTRA, INDIA

- Building people's adaptive capacities in Maharashtra requires understanding differential vulnerabilities to climate risks and capacities among the different social (castes) and farmer (based on land ownership) categories. This understanding can be used to inform and develop local-level livelihood adaptation strategies. At the same time, the needs and aspirations of people in these different social and demographic categories need to be taken into account when preparing local adaptation and development plans.

- Heat stress in the peak summer months is increasingly affecting people's health and livelihoods. Many factors influence vulnerability to heat stress, including age, pre-existing health conditions, occupation, and type of housing. There is a need for state- and local-level heat action plans that address the needs of rural and urban populations. Community awareness about heat stress should also be improved so that people can take adequate precautions.

- Agricultural growth in semi-arid regions is largely dependent on groundwater. Depleting groundwater levels put the agrarian economy of the entire semi-arid region at serious risk. Raising farmer awareness about water management through effective communication, especially about groundwater use, is a crucial step towards implementing rules and regulations for groundwater management.

- There are a number of government and private information-communication-technology initiatives in India aimed at supporting farmers. But farmer access to usable information on weather and climate risks, and agro-advisories remains a challenge. There is also ambiguity around whether the available information meets famer requirements. A dynamic and responsive agro-met advisory system is needed to help manage climate risks and support adaptation. This system needs to provide information that is demand-driven, and relevant to the location of farmers and the specific crops that they grow.

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KEY INSIGHTS

TAMIL NADU, INDIA

- Climate change and climate variability have resulted in increased temperatures and unpredictable monsoons. Despite observed declines in rainfall and recurrent drought, some agricultural areas are greening due to a growing dependence on groundwater, and unauthorised lift irrigation from perennial rivers.
- An increase in agricultural water use, driven by government policy (e.g., free electricity), has enabled a shift from dryland agriculture to intensively-irrigated agriculture that may not be sustainable under future climates.
- The agrarian transition driven by changing aspirations has increased household incomes, especially of large and medium farmers. However, this increase has had little impact on women's capacity as they often cannot access these incomes for their own investments. The increased movement of men into non-agricultural livelihoods has opened up space for women in agriculture, but they remain constrained by a lack of asset ownership and consequent inabilities to increase land productivity.
- Although food security has improved in the region through the targeted Public Distribution System, undernourishment persists and may worsen with increasing urbanisation, shifts to high-value commercial farming (despite the risks), and water scarcity.
- Invasive alien species are adversely impacting native biodiversity and communities. Yet a lack of tenure, and the extensive network of protected areas in the region, complicate the use of these species by forest-dependent communities to supplement agricultural incomes.
- Poor access to services, and lack of knowledge and support constrain women, while men continue to maintain hegemony over technology-related, and indeed, more remunerative tasks. Education, however, remains one of the biggest assets to women, which allows them to diversify their livelihoods out of agriculture.

Read more

RESEARCH-INTO-USE HIGHLIGHTS

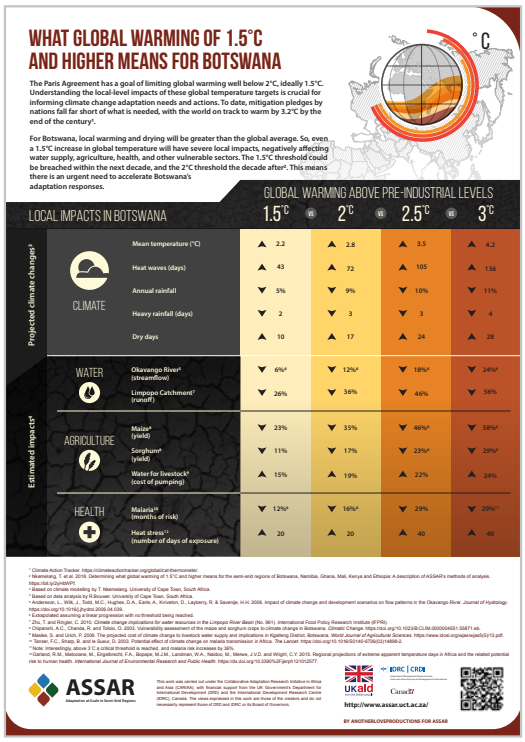
CREATING AWARENESS ABOUT THE LOCAL IMPACTS OF GLOBAL WARMING OF 1.5°C AND HIGHER

What does global warming of 1.5°C and higher mean for the countries ASSAR worked in? We developed a series of country-specific infographics to provide insight into this question by highlighting the impacts of rising global temperatures on local climatic conditions and key vulnerabilities in Botswana, Namibia, Ghana, Mali, Ethiopia and Kenya.

While limiting global warming to 1.5°C above pre-industrial levels is the main goal of the 2015 Paris Agreement, to date, mitigation pledges by nations fall far short of this, with the world being on track for a warming of 3.2°C by the end of the century. Under an increasing emissions trajectory, the 1.5°C threshold could be breached as early as the next decade, and the 2°C mark the decade thereafter.

In ASSAR countries, which are considered climate change "hotspots," even a 1.5°C increase in global temperature will have severe local impacts. Hence, there is an urgent need for these countries to accelerate their adaptation efforts, and to do so as effectively as possible.

These infographics highlight the projected changes in mean temperatures, heat wave days, annual rainfall, heavy rainfall days and dry days at 1.5°C, 2°C, 2.5°C and 3°C global warming scenarios. We positioned these climatic indicators in relation to their potential impacts on vulnerable sectors, including water, agriculture, health and biodiversity.



Understanding the implications of these projected changes is essential for policy makers and practitioners to make more informed decisions about adaptation needs and actions, and to target long-term resilience building in the face of unavoidable climate change.

Some of these infographics were presented at COP24. One immediate impact was with the Minister from Namibia, who had not been aware of the fact that global warming of 2.0 °C would lead to local warming of more than 3.0 °C in his country. Overall, these resources will provide important ammunition for national governments in arguing the case for meeting the Paris Agreement targets, and also in furthering understanding of national adaptation efforts to overcome the impacts of the rapid expected changes.

COMMUNICATING CRUCIAL FINDINGS ON HEAT STRESS IN A MYRIAD WAYS

The semi-arid regions of India are highly exposed to extreme heat events, which are likely to worsen in future. This means that heat-related deaths and illness are set to increase too, and urgent action is needed to protect vulnerable populations. During ASSAR, WOTR produced a body of work that examines heat stress in the semi-arid Maharashtra state of India. This peer-reviewed book chapter, together with this working paper, explore the health implications and coping strategies in vulnerable rural communities, where people are particularly exposed to heat. Many do strenuous outdoor work, tending to fields or working construction jobs through the hottest parts of the day.

Heat stress can lead to a variety of physical symptoms, ranging from mild to severe. If severe heat stress (heat stroke) remains untreated, people can die. In an effort to help government stakeholders understand and respond to these risks, WOTR used information briefs to highlight the key vulnerabilities and health impacts of heat stress.

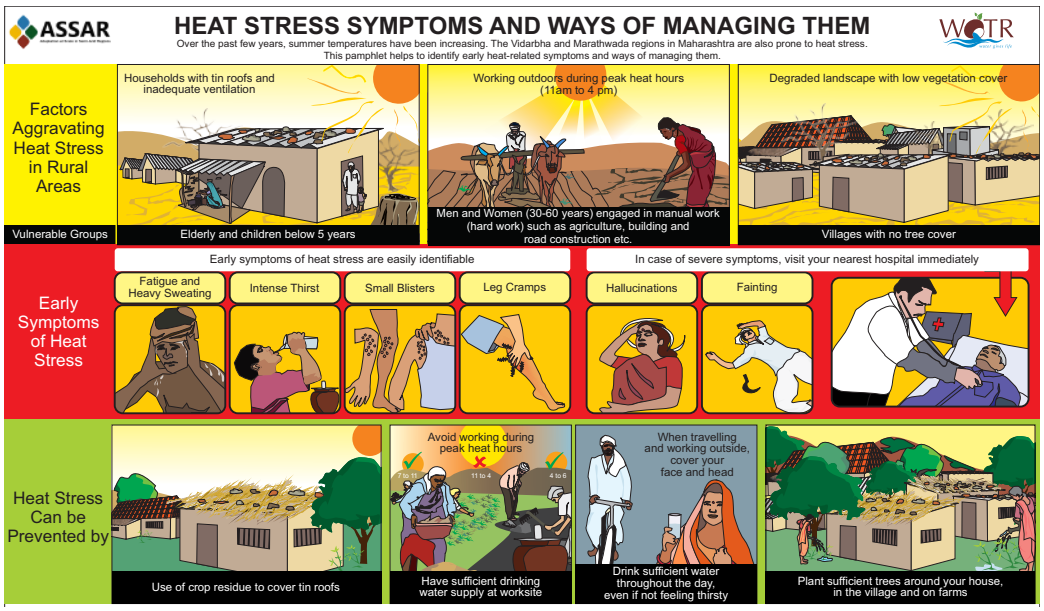
This information was also communicated in a short documentary that delves into the issue of heat stress in India's Yavatmal District. A pamphlet and poster, each of which were translated into several local languages, further explain how communities might recognise and respond to the signs and symptoms of heat stress. This multimedia approach provides an excellent example of how important research findings can be made widely accessible to diverse audiences.

INFLUENCING BOTSWANA'S DROUGHT MANAGEMENT STRATEGY

In recent decades, recurrent drought conditions have had devastating impacts on Botswana's food security, human health, and the national economy. Historically, government has taken a reactive approach to dealing with drought. However, climate change has caused an increase in the frequency and intensity of droughts, and a 'crisis-driven' approach is no longer appropriate. The Government of Botswana recognises the need to implement a more proactive and integrated approach to drought management.

In this light, and on the basis of recurring extreme drought conditions, Botswana's Rural Development Council has set up a 'Technical Team' tasked with developing a National Drought Management Strategy (DMS). This 'strategy ready' Background Paper was co-developed by a team of ASSAR researchers and practitioners from UCT and Oxfam GB with the view of contributing to and influencing the development of the DMS. Input was also provided by independent consultants who are experts in the field of policy development.

The Background Paper builds on and extends the Botswana Technical Team's outline of a draft DMS, the final version of which is required to be comprehensive enough to address all key issues directly and indirectly impacted by drought, covering short-, medium- and long-term time horizons. The outline of this Background Paper follows a proposed revised outline for the next version of the Botswana Government's DMS, in order to provide maximum assistance to the Technical Team as they revise the draft document.



ENCOURAGING PEOPLE TO CHALLENGE THEIR ASSUMPTIONS ABOUT WHO IS MOST VULNERABLE TO CLIMATE CHANGE

Climate change affects different people in different ways. While the harm caused by an impact is partly dependent on the event itself, the risks and vulnerabilities faced by people, households and communities are often socially differentiated by factors like gender, ethnicity, age and wealth. This series of infographics, which were the first of their kind to be developed by ASSAR, highlight the complex challenges faced by different social groups, and explore how effective adaptation can be achieved in highly unequal social contexts. The messages conveyed in these infographics were shared at the United Nations 62nd session on the Commission on the Status of Women in New York (2018), which focused on gender and the empowerment of rural women and girls.

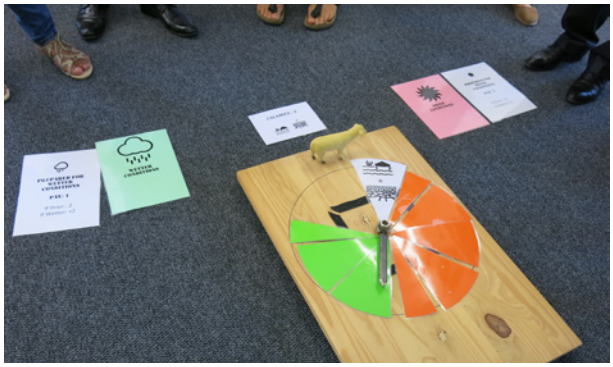
In conjunction, ASSAR researchers and practitioners hosted a webinar on social differentiation across Africa and India, where we challenged assumptions about gender and climate adaptation which, traditionally, have positioned women as victims, whilst overlooking other factors that determine people's vulnerability. Participants were engaged in discussions around the socially-differentiated nature of climate risks and impacts. We provided examples of how, in some contexts, women do have agency, whilst in others food security is a largely gendered challenge. We also emphasised the role of changing household composition, and changes to the relationships within households, as well as the importance of considering people's changing aspirations when developing adaptation strategies. Understanding this complexity is essential for ensuring that adaptation is successful, sustainable and equitable, and that it does not compromise people's wellbeing.

HARNESSING THE POWER OF CITIZEN SCIENTISTS TO IDENTIFY AND MAP INVASIVE ALIEN SPECIES IN INDIA

The extensive spread of invasive species has become a thorny problem in the southern regions of India, where biologically-diverse landscapes provide an abundance of important ecosystem services to local communities. While invasive species such as *Prosopis juliflora* were initially introduced to India to combat desertification, stabilise sand dunes and provide fuel, their uncontrolled spread has negatively impacted indigenous ecosystems and rural livelihoods in a myriad ways.

There is now an urgent need to combat invasives, as climate change renders India hotter and more water stressed. However, ASSAR's findings show that responding to the country's invasive species problem is made difficult by poor access to relevant ecological data, and a lack of political motivation. Also, the dissemination of important information to farmers and other end-users is practically non-existent.

To combat these challenges, ATREE and its partners piloted the use of the ODK Collect application, which makes it easy for researchers, practitioners, Forest Department officials and schoolchildren to identify and map invasives using Android-based smartphones and tablets. They also created a pocket size invasive species identification key, along with a Land Use and Land Cover map of the region, that organisations can use to plan citizen-science mapping walks. Whilst only a first step to addressing the problem of invasives, such innovative approaches are essential for building an open-access database, and for paving the way to longer-term solutions, including the implementation of a co-management strategy whereby communities can benefit from invasive species management.



ENCOURAGING THE USE OF EXPERIENTIAL LEARNING TO STRENGTHEN ADAPTIVE CAPACITIES

Adaptation to climate risks involves decision making under highly complex and uncertain socio-ecological conditions, making anticipatory adaptation very difficult. Recently, experiential learning tools have gained traction among researchers and practitioners for their potential to enable a deeper understanding of stakeholder decision making under conditions of complexity and uncertainty. These learning-centric methods can be effective because they simulate realities in a way that cannot be captured in more traditional research and engagement techniques, such as surveys and presentations.

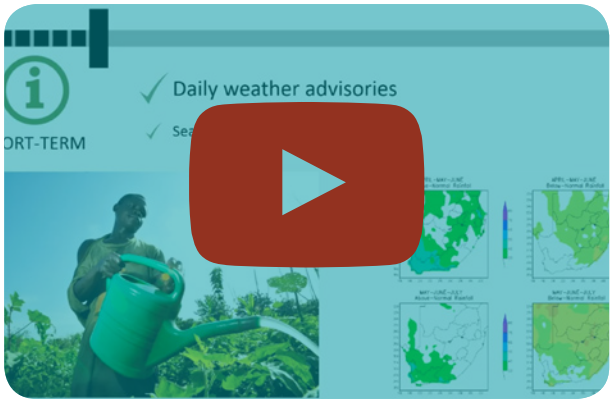
In collaboration with the Red Cross / Red Crescent Climate Centre, ASSAR researchers took part in experiential learning workshops and a webinar in which they learnt how to use creative, fun approaches to drive home key research messages. We then created a series of videos for widespread use to explain how, for example, the dynamic 'Farming Juggle' exercise can be used to explore the compounding effects of multiple stressors; or how the 'Vulnerability Walk' can allow participants to practically explore the socially-differentiated vulnerabilities that exist within their households and communities, and reflect on how adaptation efforts can effectively address these. Learning from these and other activities, such as the seasonal forecast and paying for predictions exercises, some ASSAR researchers were inspired to come up with their own games that would more accurately address their specific country challenges. For example, Maitreyi Koduganti developed the 'Peri-Urban Maze' to help people gain better insight into the complexities of living in peri-urban Bangalore; Udita Sanga developed a role-playing board game called 'Food and Farm' that explores the dynamics of decision making under a changing climate in Mali; and the WOTR team adapted games to help communities recognise the challenges associated with unsustainable groundwater use.

BRIDGING THE GAPS BETWEEN SCIENCE, POLICY AND PRACTICE

A major barrier to managing the risks of climate change in developing countries is the limited availability of accessible, reliable, and relevant weather and climate information. Equally challenging is the accessibility of scientific publications to non-academic audiences, including communities, and policy and decision makers to whom such information is often most relevant. ASSAR's work on the utility of weather and climate information for adaptation decision making in Africa and Asia has contributed to addressing both of these interlinked challenges.

This was achieved, firstly, through the publication of a journal article that explores why, despite an increasing volume of global and regional climate model simulations, there are very few clear examples of long-term climate information being used to inform decisions at sub-national scales. The article suggests that this is largely because the information being produced and disseminated is often ill-suited to inform decision making at the local scale. Drawing on lessons learnt from recent successes and failures in the study site countries, the article proposes a framework to help increase the utility and uptake of climate and weather information.

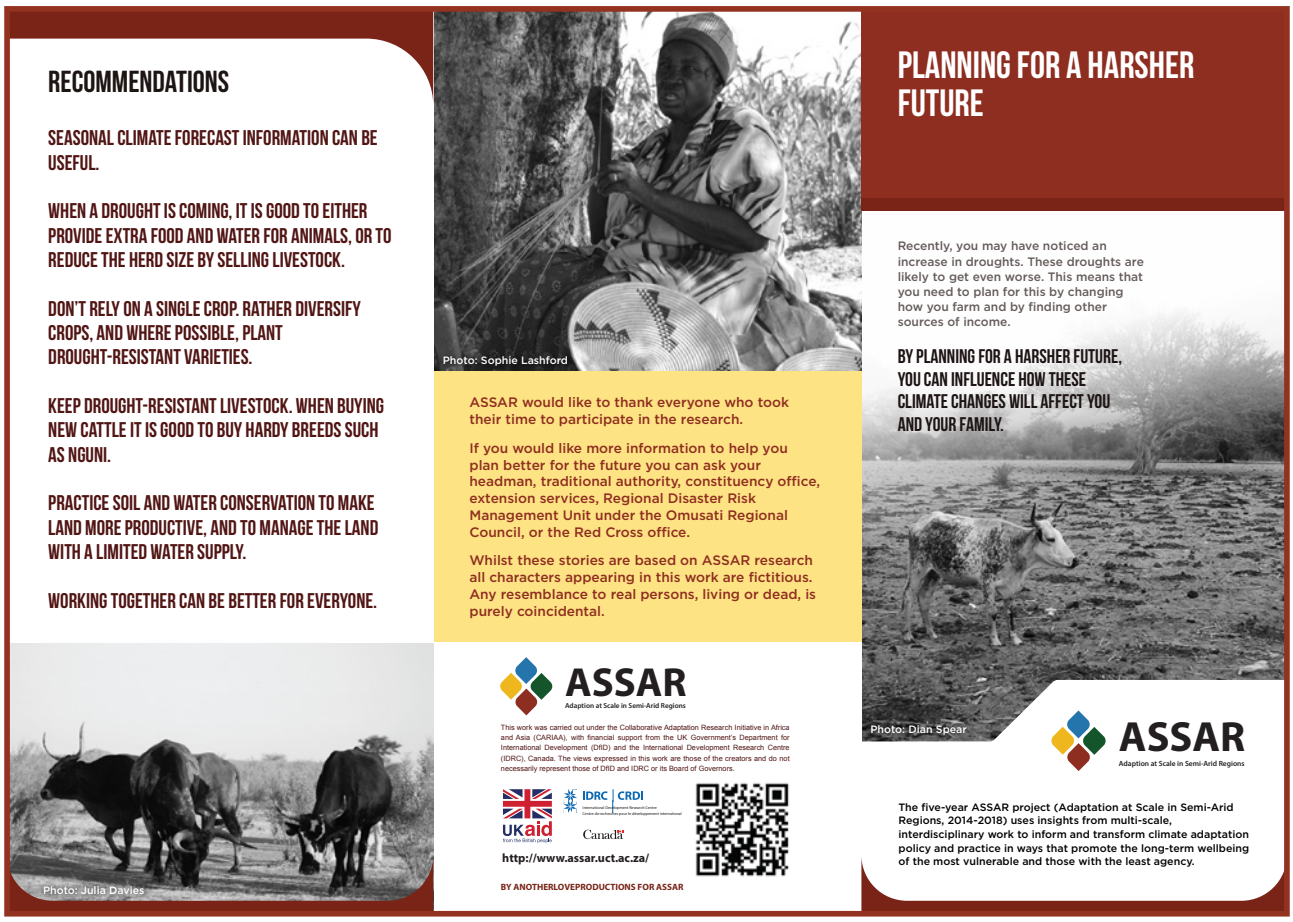
In response to the second challenge, in which non-academic stakeholders often miss out on the important messages conveyed in scientific publications, we worked in two ways to make the journal article more accessible to a wider range of audiences, namely: by highlighting the key findings and recommendations of the published article in a short, illustrative video; and by doing the same in information brief format. This integrated approach to publishing and sharing research findings is one example of how ASSAR contributed to bridging the gap between science, policy and practice.



ASSAR'S MASSIVE OPEN ONLINE COURSE TO TEACH DIVERSE AUDIENCES ABOUT RESEARCH-FOR-IMPACT

The Research for Impact Massive Open Online Course (MOOC) is a six week, free online course focused on what ASSAR initially called Research-into-Use, but what was later renamed to 'Research-for-Impact' (R4I). This MOOC continues ASSAR's mission to respond to the ever-increasing imperative of development research programmes contributing to impact beyond the academic sphere.

Hosted by ASSAR's institutional lead, UCT, and co-branded with Oxfam, the course covers the five key areas of the R4I approach in dedicated modules as well as an introductory module. These are: (1) Theory of change and monitoring, evaluation and learning; (2) Strategic partnerships and stakeholder engagement; (3) Strategic communications; (4) Capacity development; and (5) Influencing. The course also features case studies telling stories of impact and transformation from across ASSAR and the wider CARIAA programme. It is aimed at: academics, postgraduates and consultants working on development-related research; development practitioners (e.g., where a development agency wishes to mainstream climate change into their operations); and professionals from different sectors (e.g., engineering, water) working in developing countries.



A MULTIMEDIA APPROACH TO REACH LOCAL AND NATIONAL AUDIENCES IN NAMIBIA

Communities in the semi-arid Omusati Region of Namibia are highly vulnerable to climate variability and change, and it is increasingly urgent that Namibia implements effective adaptation measures. ASSAR's work in Namibia focused not only on understanding key vulnerabilities and identifying adaptation options for addressing them, but sought to share these important messages in innovative ways with a range of different audiences, using diverse forms of media.

One way that this was achieved was through the broadcasting of ASSAR's work on radio, a medium that reaches over 90% of the regional population. The radio show, which was conducted in the local Oshiwambo language, stimulated public dialogue on climate change, and focused on key topics related to adaptation. These broadcasts were complemented by a series of news articles that covered some of ASSAR's main research findings, for example those relating to water governance, culture as a barrier to the sale of livestock, the role of tradition and religion in farming decisions, and the need for support for smallholder farmers in Namibia. Developed by science writer Leonie Joubert, these articles were published in print and online in several newspapers including The Namibian, The Mail and Guardian, New Era, and The Patriot.

Academic and policy audiences were targeted through the publication and sharing of various journal articles, information briefs, working papers and a book chapter. We reached communities (in both English and Oshiwambo) using an information manual that explains what climate change is, as well as a brochure that describes what communities might do to adapt. We also produced a video documentary that explores how droughts and floods impact local farmers in Omusati, and how they are adapting to these ongoing challenges.

USING THEATRE TO REVEAL OUR BIASES AND SEEK NEW SOLUTIONS

The use of the theatre of the oppressed (TO) as a transformative social learning tool has proven to be a highly effective, yet underappreciated, mechanism for knowledge co-production and empowerment. Opposite to top-down approaches, TO creates supportive environments where people from diverse backgrounds can come together to experience, understand, analyse, and challenge unjust realities. The TO methodology was conceptualised by Augusto Boal in the 1970s, and gives audiences the opportunity to participate in the play and become actors, effectively rewriting the narrative and changing the outcome. Doing so encourages people to recognise their own biases and seek solutions from new perspectives. Effectively, this helps people to move from a situation where only the obvious, traditional, and socially/politically-tolerated solutions are pursued, to one where thinking about more just, liberatory, and hopeful futures is possible and encouraged.

ASSAR's experimentation with TO proved to be a successful way to engage people in thinking differently about problems and relating to them as human beings, and not just from the perspective of the roles they are playing professionally. We played ASSAR TO sessions:

1. At the Adaptation Futures conference in June 2018 in Cape Town, South Africa, where we worked with semi-professional performers from the Drama School of the local university (theme: Achieving research impact);
2. At the Transformations 2017 conference in Scotland;
3. For practitioners and students at Wageningen University and Reading University;
4. At UNFCCC COP 24's side event 'Development and Climate Days' in collaboration with IDRC (theme: Gender justice in the context of climate change);
5. For a generalist audience in two theatres in Cape Town, South Africa (one of which was within one of the city's informal settlements) on the topic of gender and climate justice; and
6. At one of ASSAR's annual meetings.

STRENGTHENING THE ABILITIES OF GHANAIAN FARMERS TO ACCESS CLIMATE INFORMATION

In the Upper West Region of Ghana, increasing climate variability, lengthy dry spells and water stress create pressing challenges for agricultural production and food security. With inadequate access to extension services, and a low base of knowledge about adaptation options, many vulnerable farmers have to make the hard choice of migrating to southern Ghana, or else to engage in relatively low-yielding, unprofitable dry season farming. As climate change exacerbates these challenges, there is an increasingly urgent need to capacitate farmers to implement effective adaptation measures that will enable year-round farming.

In this light, ASSAR's Ghana team resolved, with the support of a START Scenario Based Capacity Building grant, to establish Climate Advisory Resources Centres (CARCs) in the Nandom and Lawra districts. These CARCs are digital information centres aimed at training farmers and extension officers in practical adaptation, water management, and agronomic practices that will build resilience to climate change, whilst enabling higher crop productivity, including through the use of dry season farming advisories.

To complement this, and given the rapid increase in the use of smartphones in Ghana, the ASSAR team used funding from a Small Opportunities Grant to develop 'The Adaptation Hub' mobile application. This platform is aimed at extension officers, community development workers, researchers and students, and supports information transfer and knowledge sharing about climate change adaptation. This initiative inspired other ASSAR teams, such as Namibia, to consider developing their own mobile application to create sustainable links between extension workers, farmers and the private sector, and to support their research dissemination and stakeholder engagement efforts.

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ASSAR ACRONYMS

AAU	Addis Ababa University
ACDI	African Climate and Development Initiative
ASSAR	Adaptation at Scale in Semi-arid Regions
ATREE	Ashoka Trust for Ecology and the Environment
CARIAA	Collaborative Adaptation Research Initiative in Africa and Asia
CCAFS	Climate Change, Agriculture and Food Security
DES	Dynamics of ecosystem services
DFID	Department for International Development
DRFN	Desert Research Foundation of Namibia
FGD	Focus group discussions
ES	Ecosystem services
GLAS	Grants for local adaptation support
IAS	Invasive alien species
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDRC	International Development Research Centre
IIHS	Indian Institute for Human Settlements
IITM	Indian Institute of Tropical Meteorology
KII	Key informant interviews
LULC	Land use/land cover
PSA	Participatory scenario analysis
R4I	Research for impact
RCCC	Red Cross Red Crescent Climate Centre
RDS	Regional diagnostic study
RiU	Research-into-Use
SBCB	Scenario based capacity building
SCF	Seasonal climate forecasts
SOG	Small opportunities grant
TSP	Transformative scenario planning
UB	University of Botswana
UCT	University of Cape Town
UEA	University of East Anglia
UG	University of Ghana
UNAM	University of Namibia
UoN	University of Nairobi
VRA	Vulnerability and risk assessment
WOTR	Watershed Organisation Trust

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ASSAR
Adaptation at Scale in Semi-Arid Regions

CARIAA
Collaborative Adaptation Research Initiative in Africa and Asia

UKaid
from the British people

IDRC
International Development Research Centre

CRDI
Centre de recherches pour le développement international

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