



The five-year (2014-2018) Adaptation at Scale in Semi-Arid Regions (ASSAR) project uses insights from multi-scale, interdisciplinary work to inform and transform climate adaptation policy and practice in ways that promote the long-term wellbeing of the most vulnerable and those with the least agency.

During the first phase of our ASSAR work – the Regional Diagnostic Study (RDS) – we identified three semi-arid sub-regions in three states of India, in which to do our work. These are: **Bangalore in Karnataka, Sangamner in Maharashtra, and Moyar Bhavani in Tamil Nadu.**

Working with stakeholders in these different contexts we developed several key questions which were contextualised within the larger national and regional development processes. These questions serve as the foundation for the next phase of our work, the Regional Research Phase (RRP), where – in close collaboration with our stakeholders – we aim to identify equitable and transformative adaptation pathways for the medium-term future (2015-2030).

In this brief, we identify and characterise the key vulnerabilities in **Moyar Bhavani.**

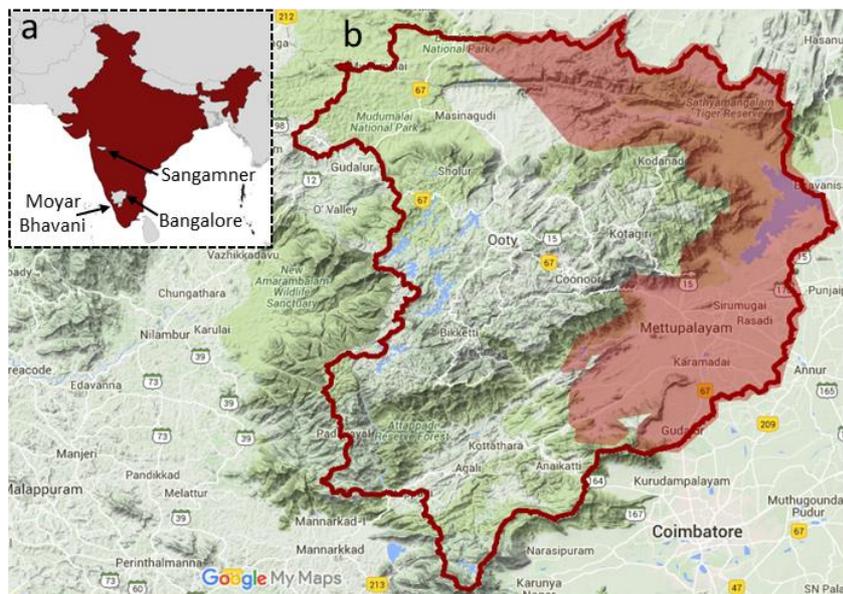
KEY INSIGHTS

- ❖ Smallholders dependent on natural resources for their livelihood will be primarily affected by the impacts of climate change, and will often be the least able to adapt. These impacts will be felt most severely in resource stressed regions particularly semi-arid areas of poorly developed regions.
- ❖ Smallholder farmers in the region are most susceptible to the vagaries of climate; this, coupled with pressure from urbanisation and inept development policies, renders them highly vulnerable. Short-term coping mechanisms and strategies used to augment income are often maladaptive in the long-term.
- ❖ Indigenous populations in the regions have tenuous livelihood structures. Loss of traditional practices, unproductive farming, market risks, unresponsive and obscure governance structures, and a depleting natural resource base are some of the risks that these communities face.

THE MOYAR BHAVANI CONTEXT

The Moyar Bhavani sub-region is characterised by a diverse ecological and human landscape that consists of two distinct areas: the predominantly agrarian Bhavani region and the forested Moyar landscape. Livelihood profiles in both regions are dependent on agriculture, although their agricultural practices differ. Agriculture in the Bhavani region is typically irrigated and more lucrative than the traditional rainfed farming system of the Moyar region. Various culturally and traditionally diverse communities inhabit this region. These include vastly heterogeneous rural communities consisting of various castes, and relatively homogeneous tribal communities located within the Sathyamangalam Tiger Reserve.

Historically Tamil Nadu has been known for progressive rural policies and development initiatives, including poverty alleviation programs, liberal agricultural policies and active participation of rural communities. This can be partially accredited to the dynamic political state of Tamil Nadu where closely competing political parties are eager to develop equitable, visionary strategies. However, farmers are still plagued with common problems of rural agrarian India, including: fluctuating markets, depleting resources, poor access to credit sources, reducing yields, limited labour availability and uncertain weather patterns. Adding to this are the risks of climate change and global market changes, which have made smallholder agriculture an uncertain affair. The cash income generated from a shift to crops



(a) The three Indian sub-regions that form the focus of our broader work (in grey); (b) the Moyar-Bhavani catchment area (solid red line) and the sub-region (shaded red area) that forms the focus of this brief.

often does not flow back into the household nutrition. Compromising nutrition can lead to lowered labour productivity, reduced tolerance to disease, and depressed educational achievements – all of which contribute to increased vulnerability^{1;2;3}. Conflicts in the Bhavani – between farmers from the old system and those from the newly-expanded irrigation system; people upstream and people downstream; and head-reach and tail-reach conflicts within canal command areas – have all been documented^{4;5}.

Our research focuses on identifying the most vulnerable populations and understanding the main drivers of vulnerability in the Moyar Bhavani sub-region. In particular, we investigate the implications of changing patterns of tribal and rural livelihoods on gendered vulnerability in the region.



EXPECTED CLIMATE CHANGES

Around the world the most effects of climate change will be felt by smallholders, including: rural producers in developing countries with small land holdings; subsistence farmers and pastoralists; and people dependent on artisanal fisheries and aquaculture. The vulnerability of these groups comes from poor biophysical and socio-economic conditions that limit their ability to adapt⁶. The 'Agrarian crisis' in India – widely discussed in the literature^{7,8} – is characterised by declining trends in crop yields, limited non-farm employment, declining size-class holdings and increasing marginal holdings, and no significant increase in rural household incomes. These issues are exacerbated by the caste, gender and class inequities that are common features of rural India.



Changing Farming Practices

The vagaries of weather have a profound impact on agriculture in India, especially for smallholder, rainfed agriculture where sowing and harvesting dates are determined by traditional “rain” calendars. Disruptions to rainfall can cause decreased yields and sometimes crop failures. This has been widely observed in Tamil Nadu where more farmers prefer irrigated, rather than rainfed, agriculture⁹. Farmers are also increasingly opting for extensive use of chemical fertilisers and pesticides. This makes them more dependent on market inputs, which drives a greater demand for credit, adding another dimension to rural vulnerability. Yet, dependence on agriculture is predominant among these small and marginal farmers and agricultural labourers who constitute the bulk of the agricultural sector. These marginalised groups bear the brunt of water scarcity in semi-arid landscapes¹.

Water Scarcity

Water scarcity in the Bhavani sub-basin has led to a considerable reduction in crop area, yield and agricultural income^{10,11}. This scarcity can be attributed to an increase in irrigated areas, coupled with increased diversion of water supplies to industries and urban centres. Equitable distribution of water, particularly from the Bhavani Sagar reservoir, is an issue of major contention in the surrounding villages and towns. With increasing uncertainty of rainfall, farmers are demanding more water from the reservoir for agriculture; however, with increased urbanisation and industrialisation, the conflict over water shows no sign of amelioration. Unauthorised pumping of river water and unregulated groundwater extraction – encouraged by liberal institutional financing and electrical subsidies – are rampant in the region. The state government attempted to impose some notional electricity charges – an act that was met with aggressive farmer opposition. Water quality has also diminished due to the drastic expansion of irrigated agriculture which requires chemical fertilizers and pesticides (primarily due to an increase in the cultivation of cash crops) and the poor infrastructure for wastewater and effluent treatment¹².

The Transforming Rural Economy

Structural transformation of the rural economy has resulted in intergenerational and outward mobility of the agrarian labour force. The Moyar Bhavani sub-region is located in close proximity to the Coimbatore-Tiruppur textile belt. To augment their livelihoods, agricultural labourers and farmers in the region seasonally migrate to work in the textile factories during the summer months. The impact of this migration on social structures and inter- and intra-household relations remains largely unknown; however, neurological, musculoskeletal and respiratory health problems in garment workers are evident, along with impacts on social relations and family bonding¹³. At the same time, seasonal and permanent migration has reduced the availability of farm labourers for agriculture and caused increases in labour costs. Although the use of mechanisation in labour has placated these impacts to some degree, advanced mechanisation remains inaccessible to small marginal farmers, and to farming communities in remote tribal villages. Interviews in the region indicated that labour is one of the dominant factors that influence crop choice. The lack of farm workers is the major cause of the decrease in paddy cultivation and other labour-intensive crops in the area. The emancipation of dalits in this region in the last century has also led to decrease in the availability of cheap labour, particularly for large farm owners, resulting in many of them shifting away from agriculture.

Social Welfare Policies

Tamil Nadu has proved to be a successful case in terms of implementation of social welfare measures. The Universal Public Distribution Scheme, Girl Child Protection Scheme, Midday Meal Scheme in primary schools, and Integrated Child Development Scheme have been largely useful in supplying impoverished rural populations with basic necessities and in making infant and child health and education improvements. Instances of child mortality and hunger-related deaths have drastically reduced and were hardly seen in the areas where most of the community had access to these schemes. However these policies have been ineffective at reducing poverty or creating opportunities for livelihoods.

Protected Areas

There are large populations of tribal hamlets within the Sathyamangalam and Bandipur Tiger Reserves. Agriculture ecotones are of vital importance to these indigenous communities¹⁴. High poverty rates combined with high decadal growth rates, low sex ratios, and poor access to basic amenities and financial resources render these communities particularly vulnerable.

Many of the communities living within protected areas are under the constant threat of relocation which threatens their existing livelihood practices even further and worsens their existing vulnerabilities¹⁵.

Women here are especially vulnerable given their child-rearing responsibilities and the domestic burdens (e.g., collection of water, firewood and non-timber forest products) along with assuming certain laborious farming activities. Within these remote areas women spend nearly half their time on survival activities. Access to medical and maternal facilities is limited, increasing the chances of maternal and child mortality.

In the Moyar region the growing proximity of human settlements to protected areas has led to increasing instances of human-wildlife conflict. Elephant and wild boar frequently enter fields to forage and are often blamed for depleting resources within forests, and increasing agricultural lands. Pastoralists, especially those in rural settings who are solely dependent on the sale of livestock and livestock products, are challenged with isolation, low levels of technology, and limited access to markets and facilities that promote livestock wellbeing. These people are highly vulnerable to the effects of unpredictable climate. Pastoralists in the Moyar-Bhavani sub-region also suffer persistent losses due to attacks by wildlife owing to their close proximity to forested areas; often government compensation is not provided. The livestock are also vulnerable to diseases such as foot and mouth disease, which often take a huge toll on livestock rearing communities in this area. Livestock are not insured due to unreliable and insufficient insurance payouts and, consequently, the communities suffer devastating losses.

THE WAY FORWARD FOR ASSAR

India's rural landscape is changing. While the explicit implications of climate change on these tenuous livelihoods remains speculative, it is clear that climate change will bring added uncertainty to the future of these communities. ASSAR's research aims to study the vulnerability of communities in the region and identify relevant and contextual adaptation strategies. This will be achieved through stakeholder-informed research in key thematic areas, mainly social differentiation and governance that will draw upon key biophysical evidence. We aim to influence policy and practice in the region through continuous engagement and effective knowledge sharing with key stakeholders and, through this process, strengthen existing adaptation mechanisms that can build the resilience of these communities to the current and future impacts of climate change.

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ASSAR is a five-year, multi-country research project, which aims to deepen the understanding of the barriers and enablers for effective, medium-term adaptation within the dynamic and socially differentiated semi-arid regions of Africa and Asia. ASSAR will generate new knowledge about how adaptation processes – especially those linked to governance systems, policies and adaptation responses – can be modified or improved upon to achieve more widespread, equitable and sustained adaptation. We are particularly interested in understanding people's vulnerability and, in doing so, exploring the dynamic structural and relational aspects linking vulnerability to social difference, governance and ecosystem services.

For more information visit www.assaradapt.org or email assar@atree.org

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