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The five-year ASSAR project (Adaptation at Scale in Semi-Arid Regions, 2014-2018) 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.

KEY POINTS

- Many people are moving out of agriculture to enter informal livelihoods in cities, where incomes earned do not significantly improve household wellbeing (at source or destination).
- Migration decisions are shaped by both climatic and non-climatic drivers. However, improving the viability of agrarian livelihoods is crucial to ensuring secure and dignified employment and to meeting India's growing food and nutritional needs.
- The current policy space views development as a binary rural vs. urban issue. We argue for a more holistic understanding of the rural *and* the urban: a rural-urban continuum of livelihoods, material flows, ideas, people and tradeoffs, where there are winners and losers on both sides.
- While the current focus on watershed development with adaptation co-benefits is positive, it must be complemented by efforts to address the growing irrigation demand.
- We unpack governance as a barrier to adaptation to note that implementation is slowed by the lack of staff – especially at State and district levels in line departments – rather than low awareness, misplaced intent and inadequate finances.

In India, ASSAR is exploring differential vulnerability and adaptive responses. Focussing on the largely semi-arid state of Karnataka in South India, we are examining how people in rural and urban areas are responding to climatic, socio-economic, infrastructural, and biophysical changes. One of our key research questions is:

How are people responding to and planning for multiple risks, and how do these responses vary among social groups?

To answer this question, during 2015-2016, researchers from the Indian Institute for Human Settlements (IIHS) used focus group discussions, household surveys and life history interviews to collect information at settlement, household and intra-household levels in the rural districts of Kolar and Gulbarga and the urban district of Bangalore. We supplemented this information with extensive key informant interviews with State and District government officials, NGO staff and researchers.



DRIVERS OF VULNERABILITY

Kolar District is at the cusp of three key states in Southern India, making it a site of cultural and linguistic intermingling and inter-state migration. Livelihoods here are strongly linked with the natural environment, and agriculture and its allied sectors (horticulture, livestock rearing and sericulture) employ most people in the district.

- **Climatic stressors:** climate projections foresee a 3.6% decrease in monsoon rainfall and an increase of 1.96°C in annual average temperature.
- **Exposure to market dynamics:** e.g. Chinese silk flooding the local market; high price volatility for tomatoes – a key cash crop.
- Move towards **high-input, intensive agriculture** (mono-cropping with high pesticide and fertiliser use).
- **Biophysical shifts:** overexploited groundwater with borewell depths reaching 1800 feet.



Gulbarga District is among the most backward districts in Karnataka, scoring low on health and education indicators. Drought is a recurring feature and most agriculture is rainfed. Main livelihoods include farming (pulses, sunflower, millet). People here migrate to cities such as Bangalore, Mumbai and Hyderabad.

- **Climatic stressors:** climate projections foresee a 1.4% decrease in rainfall and a 2.19°C increase in temperature.
- **Poor market linkages** with several parts being geographically isolated.
- **Social stratification** with scheduled caste (SC) and schedule tribe (ST) communities having unviable landholdings and performing low on development indicators.
- **Lack of alternative livelihoods** leading to large-scale out-migration into informal jobs such as working in brick kilns in Maharashtra, and as construction labourers and domestic workers in large cities.



Bangalore is a large metropolitan city which has seen exponential growth: over the past 15 years its population has doubled, and sits at 11.5 million today. It is a large technology hub and faces severe ecological and service-related challenges owing to a growing population, large-scale in-migration, and ill-equipped and fragmented government agencies.

- **Climatic stressors:** climate projections foresee erratic and intense rainfall and a heightening urban heat island effect.
- **Biophysical:** poor planning and unchecked urbanisation have resulted in localised flooding and growing water scarcity due to the disintegration of the traditional *kere* (tank) system that serviced the city.
- **Inequity:** gated communities on one end and informal settlements in notified and non-notified slums across the city, often in low-lying, flood-prone areas.



How do people respond to multiple risks?

Rural areas

- Most responses are around water management (drip irrigation, groundwater for irrigation), livelihood diversification (into wage labour and factory jobs), and credit access (taking loans, joining self-help groups).
- Migration is a common livelihood strategy, but net incomes – after accounting for travel costs and stay in cities – are very low.
- Villages closer to railway stations and connected to prominent bus routes have higher migration to cities like Bangalore, whereas people living in villages near state borders travel to neighbouring states such as Andhra Pradesh to work as agricultural labourers (on cotton or sugarcane farms).
- Asset bases, social networks, caste and gender dictate responses. E.g. in Kolar, men tend to commute to Bangalore while women undertake agricultural labour 10-15km from their homes. However, such work is available only when rains are good.
- In Gulbarga, there are examples of government- and NGO-led water management strategies through the building of farm ponds and soil and moisture conservation structures.

Urban areas

- Responses are usually in the form of short-term coping strategies suited to the uncertain locations and livelihoods of people living in informal settlements.
- In response to localised flooding, some households simply wait for the waters to recede. Economically better-off families choose to raise floor heights to prevent water from entering their houses.
- Migrant workers from West Bengal engaged in waste picking use networks with their labour contractors, friends and relatives to access informal employment, land for housing, water (via water tankers), and financial assistance during times of need.
- In contrast, construction workers in these settlements do not usually have a steady contractor and thus cannot access such networks for coping.
- In some cases, religious groups provide mutual support for their members: e.g. in Akiappa Garden a Sikh religious group supports access to finances and education for its members.

BARRIERS: What constrains local adaptation?

Rural areas

Physical assets

- Small landholdings (2.87 ha in Gulbarga; 0.843 ha in Kolar).
- Lack of adequate post-harvest storage facilities.
- Smallholders are unable to invest in water-saving infrastructure (drip and sprinkler irrigation, farm ponds).
- Indiscriminate use of fertilisers has depleted soil health and locked farmers into high-input cycles.

Information

- Low usability of climate and weather information due to poor timing and limited practical applicability.
- Low awareness of government schemes, especially in villages far from Gram Panchayat, and especially among women.
- Low levels of trust in extension services and Krishi Vigyan Kendra.

Financial factors

- Lack of credit facilities for investment in agriculture.
- Families trapped in debt due to loans taken for input-intensive crops and unregulated borewell digging.
- Mistrust of formal banking systems lead to continued dependence on moneylenders.
- Finances from formal institutions enable investments in farm-based livelihoods, but access varies because the borrowing regime (fixed rules on interest rates, payback periods) allows economically better-off and educated individuals to benefit.

Urban areas

Governance-related

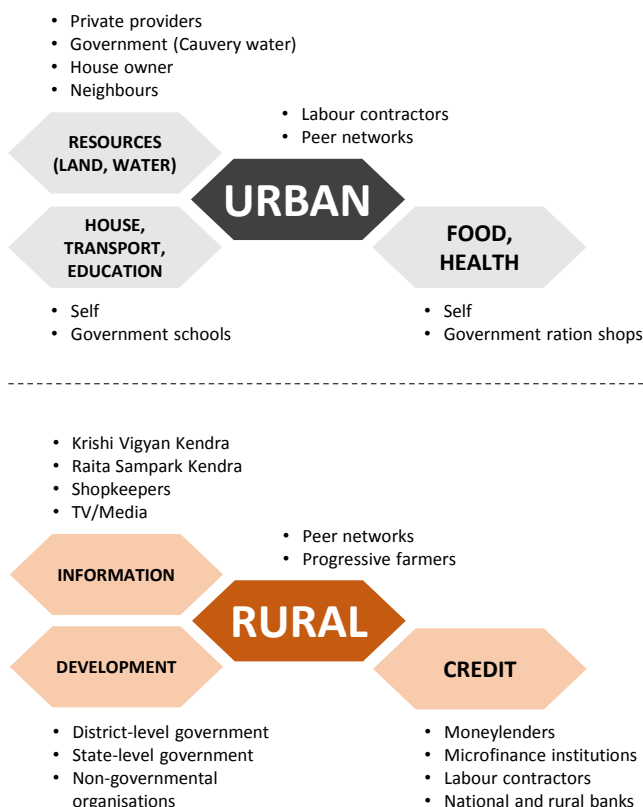
- Lack of legal recognition in the city undermines ability of informal settlement dwellers to avail rights to city services and resources.
- Lack of policies protecting migrants makes ration and electoral IDs (and the benefits accruing from them) invalid in the destination.
- Absence of tenureship rights and contested land holdings dissuade asset accumulation and belonging in the city.

Social factors

- Language barriers for interstate migration leads to social isolation.
- Caste, class, and religion divides undermine agency to gain access to basic services like electricity, water supply.
- Insecure and discriminatory livelihoods— such as construction and waste-picking — leads to unstable incomes and socio-economic marginalisation.
- Structural drivers of vulnerability, such as limited education, constrain entry into formal sectors of the economy.

Climatic factors

- Erratic and intense rainfall constrain daily life and livelihoods through second-order impacts such as increased waterlogging and spread of communicable diseases.
- Warming trend causes urban heat island effect, leading to health issues.
- Water scarcity and dependence on shrinking groundwater fosters dependence on private tankers, at an added expense.



Actors in this space

In the urban space, government and non-government actors are relatively less visible in new, non-notified slums. People tend to undertake their own coping and survival strategies or use social networks to draw on support from neighbours and contractors. Settlements that are notified are able to access and demand services from the government, whereas newer blue-tent settlements are very isolated.

In rural areas, there are many more actors for people to reach out to for information and credit. There are also several rural development schemes that contribute to building local adaptive capacity such as programmes for strengthening livelihoods, improving natural resources, and enhancing credit availability.

In both rural and urban areas, peer networks offer a key way for people learn of opportunities and undertake coping strategies. Rural areas have a stronger government and non-government presence than urban areas.

ENABLERS: What facilitates local adaptation?

Rural areas

Location

- Access to markets (either by living close to them or by owning vehicles) enables better returns from agriculture.
- Proximity to taluk headquarter enables greater awareness due to better information flows and market access.
- Proximity to Bangalore allows people to commute to diversify livelihoods, while the social and financial costs are much higher for people migrating from further away.

Information

- Peer-to-peer, network-based information sharing through mobile phones (WhatsApp, YouTube, Facebook) amplifies formal (i.e. through government line departments) communication channels.

Social and financial factors

- Social networks help gain entry into jobs, especially for migrants.
- Credit facilitation through village-level self-help groups enables savings and, in some cases, more agency to women.

Enabling policy environment (for some)

- Government schemes and service delivery build adaptive capacity, especially in drought-impacted villages. But benefits are differentiated by social position and location within the district.

Examples: **watershed development** (*Sujala, Bhoochetna*), **agriculture** (*Krishi Bhagya*, drip irrigation, Weather-based Crop Insurance Scheme), employment **provision** (Mahatma Gandhi National Rural Employment Gaurantee Scheme), **service delivery** (Public Distribution Scheme for food).

Urban areas

Recognition and length of residence

- Older settlements and legally-notified settlements have better participation in local governance processes, and better access to basic services.
- Education enables opportunities for secure jobs and increases awareness of rights.

Social factors

- Kinship networks and employment contractors provide migrants with critical services to help them cope with disruptions to livelihoods.
- Those living in the city for longer than a few decades have associations to lobby for legal recognition of their settlements, basic infrastructure and services. Some settlements have received recognition in exchange for votes for local members of legislative assemblies.

Other actors

- NGOs/civil society intervention in certain settlements has led to increased awareness about their rights and improved literacy rates.
- Citizen action groups – especially those focusing on services (e.g. waste management, public transport) and environmental issues (e.g. lake rejuvenation, green spaces) – are increasingly acting as pressure groups on the local government, with adaptation co-benefits.

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ABOUT ASSAR

ASSAR uses insights from multiple-scale, interdisciplinary work to improve the understanding of the barriers, enablers and limits to effective, sustained and widespread climate change adaptation out to the 2030s. Working in seven countries in Africa and South Asia, ASSAR's regional teams research socio-ecological dynamics relating to livelihood transitions, and the access, use and management of land and water. One of four consortia under the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA), ASSAR generates new knowledge of climate change hotspots to influence policy and practice and to change the way researchers and practitioners interact.

For more information go to www.assaradapt.org or email csingh@cariaa.net



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