

Role of social capital in driving the transition to sustainable agriculture

Abstract

The world, including India, has seen a transition in agriculture from traditional practices to chemical-intensive agriculture with the advent of the Green Revolution in the mid-20th century onwards. While this transition met the pressing need for food security, it disrupted ecosystem services associated with agriculture, negatively affecting both the environment and agriculture itself. Having understood this, the last decade saw a renewed and necessary interest in restoring this balance, with increased focus on sustainable and regenerative agriculture, from multiple stakeholders, especially government institutions at different levels. However, the results have been mixed, rather modest across states and geographies in India. This article examines the role of social capital in facilitating the transition from chemical-intensive agriculture to more sustainable farming systems in India, with a specific focus on the Andhra Pradesh Community Managed Natural Farming (APCNF) programme. It argues that a transition from a long-adopted chemical-based paradigm to sustainable methods cannot just rely on technical and policy interventions, which have received considerable attention in sustainable agriculture literature. It needs to leverage comparatively less emphasised social mechanisms that facilitate behavioural change among farmers, such as building trust and collective learning. In this context, social capital emerges as a critical explanatory variable. Drawing on the APCNF experience, the article shows how existing community institutions, including self-help groups, village organisations, farmer networks, community resource persons, and demonstration farms, have helped diffuse natural farming practices at scale. By treating community institutions as foundational assets rather than merely delivery channels, APCNF demonstrates that social infrastructure is central to agroecological transformation. The article concludes by emphasising that such paradigm shifts promoting sustainable agriculture should integrate social capital more explicitly into programme design to accelerate adoption, inclusion, and resilience in farming communities.

Keywords: social capital, sustainable agriculture, natural farming, Andhra Pradesh Community Managed Natural Farming (APCNF), Self Help Groups (SHGs), community institutions, agroecological transition, Andhra Pradesh

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Abbreviations: APCNF, Andhra Pradesh community managed natural farming; SHGs self help groups; HYVs, high-yielding varieties; FAI, fertiliser association of India; PKVY, Paramparagat Krishi Vikas Yojana; ZBNF, zero budget natural farming; NF, natural farming; RySS, rythu sadhikara samstha; PMDS, pre-monsoon dry sowing; GPs, gram panchayats; SERP, society for elimination of rural poverty; CMSA, community managed sustainable agriculture; Vos, village organisations; CSA, centre for sustainable agriculture; iCRPs, internal community resource persons

Introduction

“If agriculture goes wrong, nothing else will have a chance to go right”, a famous quote by the father of the Indian Green Revolution, M. S. Swaminathan, emphasises the role and importance of agriculture in the Indian economy and society. The Green Revolution, introduced in the 1960s, helped address the then-pressing need to increase food production in the country, thereby achieving food security. The outcome was overwhelming, with India achieving a steady increase in grain production, reaching 332 million metric tonnes (MT) as of 2023-24.¹ However, the adoption of a resource-intensive model of agricultural production, with the introduction of High-Yielding Varieties (HYVs), led to increased use of chemicals, including fertilisers and pesticides. It led to a two-pronged challenge:

- i) The failure of agriculture’s ecological services, such as carbon sequestration, pollination, and filtration, to mention a few and
- ii) The degradation of natural resources, which has impaired the ability of Agro-Ecosystems to sustain future production,² further creating socio-economic challenges, including an increased financial burden on farmers, hence raising a demand for institutional support.³

While this has been a global trend, India, like any other nation, has heavily emphasised it to meet food demand. In India, as per the Fertiliser Association of India (FAI) data, the NPK fertiliser usage has increased from 69,800 tons to 32,535,600 tons between 1950-51 and 2020-21, which is a jump of more than 450 times⁴ with a higher rise in the past few decades. However, over the years, the excessive use of chemicals has resulted in diminishing marginal utility, leading to stagnant or declining agricultural output and growing debt for farmers.⁵

With this rose the challenge across different environmental, economic, and social domains.⁶ From an environmental perspective, the application of synthetic fertilisers has directly led to soil degradation and diminished fertility, and indirectly increased soil erosion, water pollution, and disrupted aquatic ecosystems through runoff. Further, there is growing concern about these chemicals entering the food chain and directly affecting human health. On

the economic side, while there was high chemical usage and high input costs for farmers, the productivity/yield either stagnated or declined in recent times.⁷ Further market uncertainties, coupled with the vagaries of nature, placed farmers in a dire situation. Lastly, on the social front, the farming community, as the primary sector of the economy, has been at the bottom of the development pyramid. To quantify this, as of 2023-24, 42.3% of the Indian population still relies on agriculture as their primary livelihood, while it contributes only 18.2% to the country's GDP at current prices.⁸ Further, the sector has high involvement of women as a major stakeholder, with a high involvement of backward castes.⁹ Given this, the need was recognised to view agriculture not merely from a food production perspective but through a multidimensional lens that provides comprehensive services at the societal and national levels. In regions with high agricultural productivity based on high chemical inputs, the intention is to reduce reliance on such inputs while maintaining high productivity and restoring agricultural ecological services; in areas with low productivity, the intention is to increase productivity without increasing overall chemical inputs. This paradigm shift has been emphasised under the banner of regenerative farming, including chemical-free, natural, and organic farming.

In India, while this shift started as a farmers' and civil society movement, the national government intervened and institutionalised it through schemes like the Paramparagat Krishi Vikas Yojana (PKVY) in 2015 under the National Mission for Sustainable Agriculture, providing certification, financial, and knowledge-based support.¹⁰ However, even after 10 years of this policy, as of 2023-24, the area under organic certification (excluding wild-harvest areas) is estimated at 4.5 million hectares, accounting for just 2.5% of the country's total agricultural land.¹¹ Further, this figure has been substantially lower for Natural farming, at 0.65 million hectares, with very few states, such as Andhra Pradesh, Gujarat, Himachal Pradesh, and Rajasthan, having any initiatives in this direction. While the reasons for this slow uptake warrant a study in themselves, the outcome remains the same for now.

While states struggle to pick up chemical-free cultivation, one state that has been a pioneer in state-level adoption of Natural Farming practices, specifically Zero Budget Natural Farming (ZBNF), is Andhra Pradesh. The state has witnessed strong institutional support for Natural Farming (NF) practices through the Andhra Pradesh Community Managed Natural Farming (APCNF) Programme, launched in 2016 under the Rythu Sadhikara Samstha (RySS) of the Government of Andhra Pradesh. The APCNF programme has invested in understanding the science behind NF and in building breakthrough models such as Pre-monsoon Dry Sowing (PMDS),

the A-grade Crop Model, and the ATM model. The programme has scaled since inception to the current scale of 8,168 Gram Panchayats (GPs), more than 1.77 million farmers, and more than 0.92 million hectares.¹² To implement a programme on such a large scale requires a strong institutional framework that builds itself on knowledge creation around NF, knowledge transfer to participating farmers, and a participatory approach across different strata and social groups. This can be achieved only through successful tapping of social capital, which makes APCNF not just an NF-based agricultural intervention but also a form of social progress. Hence, one of the project's foundational principles is the utilisation of social capital.

To better understand how these institutional mechanisms operate, the discussion now turns to the theoretical dimensions of social capital. Social capital has long been studied across different domains, with varying utilities depending on context. While there has been no single definition of it for substantive and ideological reasons,¹³ it has often been a silent force behind policy interventions whose impact outlasts the interventions themselves. Francis Fukuyama in his 1995 book, titled, "Trust: The Social Virtues and the Creation of Prosperity" defines social capital as, 'the ability of people to work together for common purposes in groups and organizations' and 'Social capital can be defined simply as the existence of a certain set of informal values or norms shared among members of a group that permit cooperation among them'. To put it simply, it's the trust and connections that help people work together, influenced by the informal rules a community follows. It is a collective asset comprising shared norms, values, beliefs, trust, networks, social relations, and institutions that facilitate cooperation and collective action for mutual benefit.

The common types of social capital include structural and cognitive; bonding, bridging, and linking; strong and weak; and horizontal and vertical,¹⁴ which are critical to understand when planning to build social capital in the intervention. The three-dimensional classification of social capital into bonding, bridging, and linking¹⁵ is well established in the social capital literature. Putnam distinguishes between bonding and bridging relationships, while Woolcock extends the framework to include linking relationships with people and institutions that hold formal power and resources.¹⁶ In similar lines, Woolcock and Narayan¹⁷ conceptualise social capital as norms and networks that enable people to act collectively and emphasise that development outcomes depend on relationships both within communities and across organisational/institutional levels. Going further, Szreter and Woolcock¹⁷ distinguish Bonding, Bridging and Linking with specific threads of relations in a social framework (Table 1):

Table 1 Indicators associated with the key metrics of the framework

	Construct	Example indicator
Bonding social capital: Focuses on Internal cohesion, assessing the strength of relationships among members of the Community-Based Institutions (CBIs).	Trust	Members trust one another
	Reciprocity	Members help each other when needed
	Mutual support	Members provide economic/social support
	Participation	Members regularly participate in meetings/activities
	Shared norms	Members follow agreed-upon rules and norms
	Collective action	Members work together to solve common problems
Bridging social capital: Horizontal networking focuses on how effectively the CBI connects with other groups and networks.	Inter-group interaction	Interaction with other CBIs/groups
	Knowledge exchange	Exchange of agricultural/market information
	Collaboration	Joint activities with other groups
	Network diversity	Connections with groups beyond the immediate community
	Market networks	Connections with buyers/traders/other producer organisations
	Resource sharing	Sharing information/resources with other groups

Table 1 Continued...

Linking social capital: Emphasises vertical institutional relationships and captures how effectively the CBI can connect with institutions that control resources, services and decisions.	Government linkage	Interaction with Panchayat/line departments
	Scheme access	Ability to access government programmes
	Financial linkage	Relationship with banks/MFIs
	Technical linkage	Access to KVKs, SAUs, extension agencies, etc.
	Institutional representation	CBI members represented in institutional forums
	Decision-making influence	Ability to communicate community priorities
	Institutional responsiveness	Institutions respond to CBI requests
	Resource mobilisation	Ability to leverage external resources

The distinction is particularly appropriate for CBIs because bonding captures internal group cohesion, bridging captures horizontal networking, and linking captures the institution's ability to access external resources, information, and decision-making structures. This is consistent with the network/synergy approach of Woolcock and Narayan, in which different forms of social capital can operate together rather than be treated as independent constructs.

Bringing this understanding to the implementation side, when social capital is strong, new ideas spread faster, and people are more willing to learn from one another. In a rural setup, this often comes from years of living and working together: neighbours helping neighbours, shared norms, and local groups that people rely on. Despite its recognised importance, social capital as a concept remains underutilised, with many interventions treating it as a convenience rather than planning for it and using it effectively. However, when programmes tap into these networks through mutual trust, peer learning, local champions, and group solidarity expressed in collective decisions and group-based action, adoption becomes easier to sustain. Around the world, there are many examples of this being utilised that have helped farmer groups spread new practices. In India, SHGs, cooperatives, and producer collectives are among the clearest evidence of this working at scale. These groups are where information spreads, doubts get discussed, and people decide whether a new idea is worth trying. This matters most when an intervention needs to spread beyond initiation to have a prolonged impact. This becomes even more necessary when a transition is required from long-established chemical-based cultivation to more sustainable methods.

The social capital mechanism underlying APCNF's expansion can be traced to Andhra Pradesh's long-standing SHG network, which the state has steadily strengthened since the early 2000s. Over time, these groups have done much more than savings and credit; they have also become a way to reach villages with new information and services. To further leverage this, even before the project's inception roughly a decade ago, two initiatives were launched: the Society for Elimination of Rural Poverty (SERP) and Community Managed Sustainable Agriculture (CMSA). SERP has facilitated grassroots mobilisation through SHGs and Village Organisations (VOs) at various levels, forming the institutional skeleton, while the Centre for Sustainable Agriculture (CSA) has focused directly on advancing natural farming at the community level, helping ensure a smooth transition to Community-managed Natural Farming. These initiatives overall leveraged strong social institutions that harbour social capital, leading to the programme achieving utilisation by 231,000 women's SHGs, 10,000+ farmer-trainers, and a network of 11,000 demonstration farms. These local institutions drive adoption through peer learning, contextualised innovation, and shared ownership.¹⁸ Further, there is a focus on women as a point of intervention, with an expectation of a

multiplier effect. E.g., women account for 69% of the iCRPs (internal Community Resource Persons) being trained as part of the capacity-building programme under the APCNF intervention.⁶

Once well established, the same community base has been used to promote natural farming, working through village organisations (SHG clusters) and other local bodies. This is where programme design becomes extremely important. Social capital turns into real, sustained change when programmes work through existing community groups and strengthen them, rather than creating new structures that disappear once support ends. Simply put, trust and teamwork grow when there is a clear, supportive system around them, training that makes sense locally, advice people can access quickly, and institutions that respond to farmers' day-to-day decisions. Such programmes tend to last when they build on what already exists and keep farmers at the centre.¹⁹

The successful APCNF programme is a clear example of this concept in action. Many states are promoting the same set of practices, with a focus on training schedules, knowledge dissemination, and high-quality field insights, but the results are not as strong, results-oriented, or impactful as those of APCNF, where community groups are active, and farmers receive steady, local support rather than just one-time training. APCNF provides a useful illustration of how bonding, bridging and linking social capital can work together to strengthen agro-ecological transitions. Bonding social capital is reflected in the strong horizontal relationships among farmers and community groups, where farmers learn from trusted peers, exchange locally relevant knowledge, and collectively build confidence to experiment with Natural Farming practices. Bridging social capital extends these relationships beyond immediate farmer networks through Community Resource Persons (CRPs), champion farmers and model farms, who connect farmers to new knowledge, practical experiences and locally adapted solutions while facilitating continuous farmer-to-farmer learning. Linking social capital operates through vertical relationships among farmer institutions, community structures, and programme actors, enabling communities to access technical knowledge, institutional support, and programme resources while allowing interventions to remain responsive to local priorities. The strength of APCNF, therefore, lies not simply in delivering training but in creating a continuum of relationships, knowledge, and handholding around farmers. Rather than relying predominantly on one-time capacity-building, the approach builds trusted community networks, places trained local resource persons within those networks and connects them with wider institutional support. This combination can help explain how knowledge moves from programme systems to communities, across farmers, and back from communities into programme implementation. Hence, APCNF demonstrates effective use of social capital at multiple levels, thereby making it a potent force in the programme's overall execution and success (Figure 1).

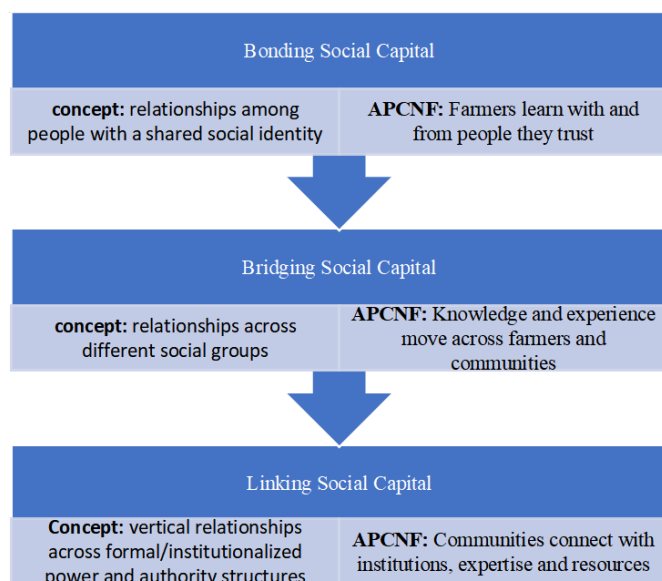


Figure 1 Connecting methods of social capital of APCNF intervention.

The Andhra Pradesh experience demonstrates that transitions towards sustainable agriculture depend not only on agronomic innovations but also on the social infrastructure through which such innovations are disseminated and institutionalised. Hence, even if an issue is highly relevant in the current context, i.e., challenges associated with chemical-based agriculture, this alone won't bring the expected changes. Rather, it needs a whole framework in place, with social capital as a pivotal component. Thus, future agricultural policies seeking to promote agroecological transitions should therefore treat community institutions not merely as delivery mechanisms but as foundational assets in the transformation process.

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Conflicts of interest

The authors declare no conflict of interest.

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