

Cooperative Governance: Opportunities to Enhance Rural Livelihoods in India

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Executive summary

Agriculture employs 70% of rural Indians, but it does not enable them to earn a sustainable livelihood. At first glance the solution appears deceptively simple: allow farmers access to affordable agri-inputs — including water and seeds — so they can grow and sell crops for adequate revenues to cover costs. However, in the face of climatological and environmental stress, as well as institutional and structural barriers, achieving sustainable rural livelihood is more difficult than it may seem. Climate change will have a 5%-9% negative impact on the agricultural economy each year, which translates to a 1%-1.5% annual loss in GDP.

The persistence of agrarian distress in rural India demands innovative problem-solving. Inadequate access to agricultural markets, water scarcity and unreliable power — known as food-water-energy nexus — limits improvement of rural livelihood.

Most past and current agricultural policy schemes have only attempted to address individual aspects of the nexus. We have learned that the interlinked nature of the problem demands interlinked solutions. Experience shows that tackling only one aspect is unlikely to be successful. Rural institutions — governed by farmers, for farmers — are the most likely institutions to co-manage these resources and sustainably enhance rural livelihoods.

Fostering cooperative institutions can deliver substantial benefits to farmers through improved electricity reliability, more efficient use of the water supply, lowered costs for agricultural inputs, and improved access to markets for agricultural outputs.

Based on our examination of these issues and interviews with stakeholders over the past 12 months, we believe that farmer producer organisations, water user associations and electricity cooperatives could successfully enhance rural livelihoods. They will not emerge on their own, and they will require government support to reach scale. Without this support, they will certainly fail in improving rural livelihoods across India.

After reviewing both Indian and international experience, we conclude that new cooperative institutions that aggregate the needs of farmers and act in the interests of the farming sector as a whole are necessary.

In short, cooperative institutions with sustained support from civil society organisations, state and central governments can enhance rural livelihoods through capacity building in cooperative management, inclusivity in cooperative governance and tackling legislative, institutional and policy barriers. Such a possibility makes them worthy of further attention and study.

Introduction

The persistence of agrarian distress in rural India demands innovative problem-solving. Fostering cooperative institutions can deliver substantial benefits to farmers through improved electricity reliability, more efficient use of the water supply, lowered costs for agricultural inputs, and improved access to markets for agricultural outputs.

Agriculture employs 70% of rural Indians, but it does not enable them to earn a sustainable livelihood. At first glance the solution appears deceptively simple: allow farmers access to affordable agri-inputs — including water and seeds — so they can grow and sell crops for adequate revenues to cover costs. However, in the face of climatological and environmental stress, as well as institutional and structural barriers, achieving this outcome is more difficult than it may seem. Climate change, which induces erratic rainfall and an unseasonal cycle of drought year upon year, has worsened and is now at the heart of agrarian distress. On average, climate change will have a 5%-9% negative impact on the agricultural economy each year, which translates to a 1%-1.5% annual loss in GDP.³

To create better resilience in the face of climate change, this paper suggests that farmers' cooperatives will be more likely to increase the adaptive capacity of farms than current organisational and institutional structures. An agrarian transition toward cooperative management and decentralisation can address these added climatological complexities through the promotion of community participation in water-users associations and the adoption of climate-tolerant crop varieties.

Beyond climatological stressors, India's existing economic institutions are also not very supportive of farmers. Farmers are not able to negotiate fair prices for input expenses or crop sales. On both the input and output sides, the individual farmers are simply "price-takers" in economics jargon, and farmers must sell at the prevailing market prices even if those prices are too low to recover their costs — although several deep structural changes remain pending in economic institutions.⁴ The Government of India has made serious efforts to set up minimum support prices (MSP) to enable farmers to earn a sustainable wage. But there continues to be in delays in getting the MSP implemented throughout the supply chain, and far more storage processing and transportation investments are needed to boost agricultural income across India. Without these investments, farmers end up selling their entire crop at harvest when prices are low and the market is oversupplied, resulting in farmers receiving inadequate compensation. This dynamic is at the root of rural distress and has been an instigating factor to protests over the last two decades: prices have been so low at times that farmers have dumped produce in the streets, protesting its apparent worthlessness.⁵

The rural crisis has not gone unnoticed. Both state and centre governments have tried to address the unsustainable livelihoods of farmers. Despite myriad policy schemes and changes in business practices and financial initiatives, government efforts have had limited success. For example, most state governments offer free or heavily subsidised electricity to farmers to reduce the costs of crop irrigation. Yet such subsidies have encouraged farmers to over-pump groundwater for water-intensive crops, a practice that was causing water shortages even before the more recent concerns

³ Ministry of Finance, Government of India. (2018). *Economic Survey 2017-18*. New Delhi: Author. Retrieved from https://mofapp.nic.in/economicsurvey/economicsurvey/pdf/082-101_Chapter_06_ENGLISH_Vol_01_2017-18.pdf

⁴ Other inputs include soil, germ plasm, credit, machinery, agro-climate, agronomy, etc.

⁵ Tripathi, B. (2018). Explained: Why farmers are angry in India's fastest-growing farm economy. *Business Standard*. Retrieved from www.business-standard.com/article/economy-policy/explained-why-farmers-are-angry-in-india-s-fastest-growing-farm-economy-118113000153_1.html

about droughts caused by accelerating climate changes.

But hope is not lost. Experience both from India's past and international experience show that, to enhance rural livelihoods and increase environmental sustainability, both electricity and limited water resources must be co-optimised. One way to achieve this is to form cooperative institutions with co-optimisation of resources as their mandate. Cooperatives represent their members' shared interests enable co-optimisation of resources, thus creating both the intended economic value⁶ as well as putting Indian agriculture on a sustainable foundation in the face of dire climatological changes. A farmers' cooperative could represent its members at both ends of the value chain: by aggregating their demand for an appropriate level of inputs at lower costs and by negotiating for better prices for their crops. With the aggregated capital of its members and support from the Central Government,⁷ a farmers' cooperative could invest in new facilities, such as cold storage, warehouses and more, to add value to crops either through processing or delaying the sale until prices rise. In addition, cooperative management of water and electricity could deliver environmental benefits that reduce emissions and improve water and land use.

Cooperatives in brief

According to the International Cooperative Alliance, a cooperative is defined as "an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise."⁸

Cooperative institutions exist all over the world.⁹ One of the earliest emerged in 1844 as a retail grocery store.¹⁰ They work in numerous sectors, including utility services like water and power; banking and financial services; and health, education and social care.¹¹ Approximately a third of cooperatives globally serve the agriculture industry.¹²

In a 2018 analysis of agricultural cooperatives globally, Indian Farmers Fertiliser Cooperative Limited and Gujarat Cooperative Milk Marketing Federation Limited¹³ ranked first and second in terms of the scale of their operations relative to the national Gross Domestic Product.¹⁴

The Regulatory Assistance Project (RAP) and its partners in India have spent the last decade analysing what is needed for electricity distribution companies (discoms) to provide clean, affordable and reliable power to all. We found, as did other regulatory and financial analysis, that

⁶ Note: The paper uses the terms "cooperative" and "collectives" interchangeably. Co-management is defined as the practice of managing something jointly.

⁷ Ministry of Finance, Government of India. *Union Budget 2020-2021* [Website]. Retrieved from <https://www.indiabudget.gov.in/>

⁸ International Cooperative Alliance. *Cooperative identity, values & principles* [Website]. Retrieved from <https://www.ica.coop/en/cooperatives/cooperative-identity>

⁹ World Cooperative Monitor. (2018). *Exploring the Cooperative Economy, Report 2018*. Brussels, Belgium: Author. Retrieved from <https://monitor.coop/sites/default/files/publication-files/wcm2018-web-803416144.pdf>

¹⁰ Stories.Coop. *Rochdale Society of Equitable Pioneers* [Website]. Retrieved from <http://stories.coop/cooperatives/rochdale-society-of-equitable-pioneers/>

¹¹ World Cooperative Monitor, 2018.

¹² World Cooperative Monitor, 2018.

¹³ Amul. *Organisation* [Website]. Retrieved from <https://amul.com/m/organisation>

¹⁴ World Cooperative Monitor, 2018, p. 17.

the financial losses experienced by discoms as a result of non-payment of subsidies by state governments are one of the barriers to improving discom service. It is clear that electricity is an important input for farmers for crop irrigation. We recognised, however, that we did not know enough about the linkages from energy to water and to food production — the food-water-energy nexus.¹⁵

Three problems are primary contributors to agrarian distress¹⁶ and these components form the heart of the food-water-energy nexus.¹⁷ The three are strongly interlinked, and the repercussions of their linkage are felt across all of India. (See Appendix A for further discussion.)

- **Limited access to markets** prevents farmers from securing adequate prices for the goods they successfully produce.
- An **inadequately managed water supply** limits farmers' ability to irrigate and grow crops.
- An **unreliable electricity supply** limits farmers' ability to pump groundwater for irrigation.

To learn more about the impacts of the nexus and to try to imagine policy responses that treat the whole problem, we have spent the last year studying these linkages in both the literature and in the field. We consulted groups of rural farmers and institutions with decades of experience, and held a stakeholder workshop with these institutions to explore policy options. We studied existing India cooperatives in both the agriculture and the water sectors, and the limited Indian experience in the power sector. Where cooperative experience in India was limited, we studied examples from other countries and used them to compare and contrast different models.¹⁸

In this paper, we present a summary of our research findings. The appendices contain a more detailed accounting of the research we conducted and of the farmers and institutions we spoke with. We hope to continue these discussions and help inform the development of a new approach, one that will succeed in improving rural livelihoods and driving economic development across all of India.

In the remainder of the paper, we explore in greater depth agrarian distress and the efforts made to resolve it so far. Then, we summarise our findings on cooperative organisations. Finally, we conclude by calling for additional exploration. Cooperative institutions may not be a panacea, but they do offer a feasible pathway to enhancing rural livelihoods that is well worth exploring.

¹⁵ World Economic Forum 2011, Bonn 2011 Nexus Conference, the Sixth World Water Forum, and World Water Week 2012, have emphasised taking an integrated approach to food, water and energy security.

¹⁶ Agrarian distress is a complex problem, and a full accounting of the many contributing factors is beyond the scope of this paper. These three are selected as major causes.

¹⁷ For an illustration of food-water-energy nexus, see Appendix A.

¹⁸ The purpose of the paper is to design an alternative governance model. The paper explores multiple types of cooperatives under different models of farmer collectives, associations, etc. The models adopt various business strategies including private public partnerships, government subsidies, etc., depending upon the organisation.

Agrarian distress: A food-water-energy nexus as an interlinked crisis

The food-water-energy nexus is created by inadequate access to agricultural markets, water scarcity and unreliable power. This harms farmers' livelihood opportunities. These problems need to be solved cooperatively for India to thrive.

“Agrarian distress” describes the plight of farmers across India suffering from inhospitable economic conditions. Agri-productivity — a key indicator of economic well-being — is little more than half the global average: \$17,107 USD value added per capita worker annually in India compared to \$32,011 globally (or 534%).¹⁹ Seventy percent of rural Indian households depend on the agriculture sector for their livelihood,²⁰ yet the agriculture sector is failing to provide an adequate standard of living.

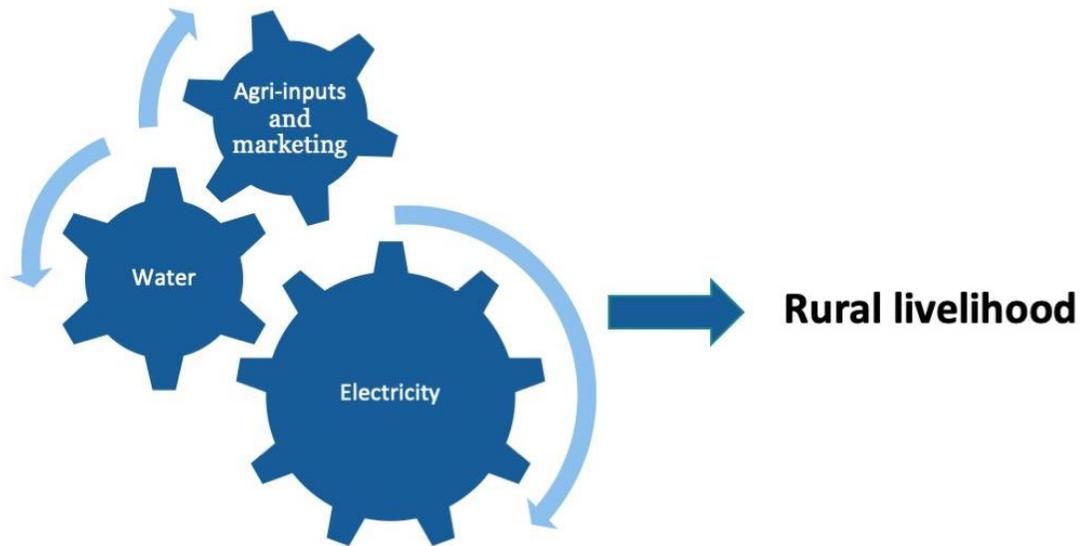
At first glance, the solution may seem to be access to affordable agri-inputs and efficient market linkages. Other factors, including climatological and environmental stress, make the problem of agrarian distress more difficult to solve. Thus, the multiple interlinked factors underlying the food-water-energy nexus need to be solved together (Figure 1).

The rest of the chapter will discuss the components of the food-water-energy nexus and their impacts on rural livelihoods.

¹⁹ World Bank. *Agriculture, forestry, and fishing, value added per worker (constant 2010 US\$) - India, World* [Website]. Retrieved from <https://data.worldbank.org/indicator/NV.AGR.EMPL.KD?end=2018&locations=IN-1W&start=1991&view=chart> The data reflect 2018 values shown in 2010 U.S. dollars.

²⁰ Food and Agriculture Organization of the United Nations. *India at a Glance* [Website]. Retrieved from <http://www.fao.org/india/fao-in-india/india-at-a-glance/en/>

Figure 1. Rural agrarian livelihoods depend on receiving adequate inputs and revenues



Source: Patankar, M. (2019, July 25). *Improving Livelihoods through Alternative Governance Structure*.²¹

Simply put, farmers are not receiving the net revenue they need, and the stress is taking a toll in multiple forms. Examples include:

- **Farmer suicides:** More than 250,000 farmer suicides were reported between 1995 and 2012.²² In 2018, more than 100,000 farmers marched in various protests across India.²³ Agrarian distress falls hardest on small and marginal landholders who are most susceptible to the financial pressure which leads to suicide. This group constitutes the largest group in Indian agriculture; 86% of holdings are two hectares or less.^{24, 25} Marginal farmers have little to invest in their farms, therefore, they are comparatively more vulnerable to income fluctuations as compared to large-scale farmers.
- **Agriculture waste:** News reports highlighted farmers dumping milk and other products in

²¹ Patankar, M. (2019, July 25). *Improving Livelihoods through Alternative Governance Structure* [Workshop presentation at the India Institute of Technology, Bombay]. The Regulatory Assistance Project. Retrieved from <https://www.raonline.org/knowledge-center/improving-livelihoods-through-alternative-governance-structure/>

²² Mishra, S. (2014). *Farmers' Suicides in India, 1995-2012: Measurement and interpretation*, p. 12. London, England: Asia Research Centre, LSE. Retrieved from https://www.lse.ac.uk/asiaResearchCentre/_files/ARCWP62-Mishra.pdf. (Summarising annual data from the National Crime Records Bureau of India.)

²³ Middlemen are agents in the agriculture production chain who trade commodities. Mashhadi, S. (2019, February 5). Farmers, Middlemen and the Way Out. *Spontaneous Order*. Retrieved from <https://spontaneousorder.in/farmers-middlemen-and-the-way-out/>

²⁴ Government of India. (2019). *Agricultural Census, 2015-2016*, pp. 7, 13. New Delhi, India: Author. Retrieved from http://agcensus.nic.in/document/agcen1516/T1_ac_2015_16.pdf

²⁵ Note: Small and marginal farmers typically have a land holding of two hectares or smaller.

the streets because the prices middlemen offered them²⁶ were too low to recover their costs²⁷ despite the government's attempt to set up minimum support prices. This lack of financial investment capacity is often caused by the prevalence of low produce prices. Low prices in turn are caused by oversupply at harvest time, which is when most farmers sell their entire crop. Too few storage and processing facilities exist to manage the supply of perishable produce.²⁸ This lack of storage costs the Indian economy dearly. There is a mismatch between storage capacity and logistical solutions available to transport produce to the market, resulting in huge losses.²⁹ In 2014, the inefficiencies in the agricultural value chain were estimated to cost India Rs. 92,000 crore (\$13 billion USD) worth of agricultural produce.³⁰ This waste harms farmers and consumers both; additionally, that produce is desperately needed to feed India's undernourished population and to finance next season's crop.³¹

- **Debt trap:** Today, farmers have no alternative to the middlemen's price offer; in economic terms, the farmers are "price-takers" (Figure 2). These offers seldom reflect the market value of the crop. Without adequate net revenue and such low levels of income, farmers must access credit by taking out loans, thus entering a never-ending debt trap from which they cannot escape.³² Concurrently, there has been a shift from formal credit sources to informal credit sources, leading to a higher interest burden on farmers. Informal sources, including family and friends, are preferable as they often do not insist on punctual repayment as compared to banks or cooperative societies.³³ The gap between what farmers receive from selling the produce and what they need to finance next season is often covered by debt. As long as this cycle continues, individual farmers will get deeper in the debt trap and thus increasingly exposed to financial failure. To add to the financial stress, costs of inputs are rising.

²⁶ See Mashhadi, S., 2019.

²⁷ Ganguly, A. (2018, June 2). Farmers dump veggies, milk. *The Telegraph*. Retrieved from <https://www.telegraphindia.com/india/farmers-dump-veggies-milk/cid/1346999>

²⁸ Mashhadi, S., 2019.

²⁹ Ministry of Agriculture & Farmers Welfare, Government of India. (2017a) *Report of the Committee for Doubling Farmers' Income Volume III: Post-production agri-logistics: maximizing gains for farmers*, pp. 26-27. New Delhi: Author. Retrieved from <http://farmer.gov.in/image/default/DFI/DFI%20Volume%203.pdf>

³⁰ National Centre for Cold-chain Development. (2015). *All India Cold-chain Infrastructure Capacity (Assessment of Status & Gap)*, p. 88. New Delhi: Author. Retrieved from https://nccd.gov.in/PDF/CCSG_Final%20Report_Web.pdf

³¹ India is home to a quarter of all undernourished people worldwide. World Food Programme. *India* [Website]. Retrieved from <https://www.wfp.org/countries/india>; United Nations in India. *Nutrition and Food Security* [Website]. Retrieved from <https://in.one.un.org/priority-areas-in-india/nutrition-and-food-security/>

³² Pradhan, N.C. (2013). *Persistence of Informal Credit in Rural India: Evidence from 'All-India Debt and Investment Survey' and Beyond*. RBI Working Paper Series. Mumbai: Reserve Bank of India, Department of Economic and Policy Research. Retrieved from https://rbi docs.rbi.org.in/rdocs/Publications/PDFs/05WS080513_E.PDF

³³ Pradhan, 2013.

Figure 2. Key stakeholders, and the predominance of middlemen, in the agriculture supply chain

The increasing indebtedness of farmers makes it difficult to get the capital required for the next season. In addition, the costs to acquire these agri-inputs – seeds, fertilisers, etc. are increasing.³⁴ Individual farmers cannot negotiate lower prices for these inputs; here, too, they are price-takers. Although the value of agricultural output has tended to increase over time, the costs of agri-inputs like seeds, fertilisers and farming equipment tend to rise as fast or faster.³⁵ This means that, although farmers may successfully grow more than they used to, they are not realising the economic benefits because their costs have risen as fast or faster than their revenues.

Following the mid-twentieth century Green Revolution,³⁶ many farmers chose to grow different crops in the hope that the new crops would provide a better economic return. These new cropping patterns, however, have resulted in resource over-extraction.³⁷ Normal rainfall patterns in some areas were insufficient to irrigate the new crops, so farmers began pumping groundwater.³⁸ Increasing environmental stress from droughts has exacerbated the need for pumping. This has placed high demand on groundwater as well as on electricity for pumping. Low or no-cost access to electricity and groundwater has incentivised farmers to grow crops which are poorly suited to their farm's ecological conditions.³⁹ For example, today, Maharashtra has the greatest sugarcane production of any state. But since sugarcane is a water-intensive crop, Maharashtra also has the worst water stress conditions in the nation.⁴⁰

34 Ministry of Agriculture & Farmers Welfare, Government of India. (2017b). *Report of the Committee on Doubling Farmers Income, Volume II: Status of Farmers' Income: Strategies for Accelerated Growth*, pp. 105-108. New Delhi: Author. Retrieved from <http://farmer.gov.in/imagedefault/DFI/DFI%20Volume%202.pdf>

35 Ministry of Agriculture & Farmers Welfare, Government of India, pp. 106-107, 2017b.

36 Frankel, F.R. (1971, republished 2016). *India's Green Revolution: Economic Gains and Political Costs*. Princeton, NJ: Princeton Legacy Library.

37 In 2017, the Central Groundwater Board of India assessed groundwater resources and found over 1,000 of India's 6,881 assessment units to be over-exploited (approximately 17%). Central Ground Water Board, Government of India. (2017). *Block wise Ground Water Resources Assessment*. New Delhi: Author. Retrieved from <http://cgwb.gov.in/GW-Assessment/Categorization%20of%20AU.pdf>

38 Sayre, S., and Taraz, V. (2019). Groundwater depletion in India: Social losses from costly well deepening. *Journal of Environmental Economics and Management*, 93(1). Retrieved from <https://www.sciencedirect.com/science/article/pii/S0095069616304442>

39 Sharma, B., Gulati, A., Mohan, G., Manchanda, S., Ray, I., and Amarasinghe, U. (2018a). *Water productivity mapping of major Indian crops*. New Delhi: National Bank for Agriculture and Rural Development (NABARD). Retrieved from [https://www.nabard.org/auth/writereaddata/tender/1806181128Water%20Productivity%20Mapping%20of%20Major%20Indian%20Crops,%20Web%20Version%20\(Low%20Resolution%20PDF\).pdf](https://www.nabard.org/auth/writereaddata/tender/1806181128Water%20Productivity%20Mapping%20of%20Major%20Indian%20Crops,%20Web%20Version%20(Low%20Resolution%20PDF).pdf)

40 Central Water Commission. Ministry of Water Resources, Government of India. (2014). *Guidelines for improving water use efficiency in irrigation, domestic and industrial sectors*. New Delhi: Author. Retrieved from http://mowr.gov.in/sites/default/files/Guidelines_for_improving_water_use_efficiency_1.pdf

These cropping patterns are in part the reason why India is in a water crisis.⁴¹ Between over-extraction and recent droughts, groundwater is not being adequately recharged.⁴² As a result, farmers face an inadequate supply of water for crops that are ill-suited for drought conditions. The lack of resilience in the agricultural sector is particularly concerning as climatological changes pose an increasingly clear and present danger. The remaining water supply urgently needs an efficient management system.

In addition, the electricity subsidies which have incentivised the current system may not continue. Financially pressed state governments providing electric subsidies are unable to pay the discoms on time. As a result, discoms are carrying financial losses in excess of \$4 billion USD.⁴³ Facing these losses, discoms view agricultural consumers as a burden and a non-priority sector, hence poor reliability is provided to the farmers. Although subsidy provisions are made, power shortages are still prevalent.

As a result, many farmers continue to find electricity service inadequate for their needs. A 2019 research study of Bihar, Uttar Pradesh, Odisha, and Rajasthan highlights that one in two agriculture grid-users faces power cuts for at least eight hours each day.⁴⁴ Power may be available only at nighttime, when farmers cannot enter their fields without risking exposure to wildlife such as snakes.⁴⁵ Some farmers leave their pumps on at all hours to ensure they receive adequate water without endangering their health, but this can lead to over-pumping, exacerbating water scarcity. Others turn to alternative means of irrigation; for example, more than 9 million farmers rely on diesel pumps.⁴⁶ Many farmers spend as much as \$400 USD per hectare as a one-time capital investment on diesel pumps and \$330 per year on operation and maintenance costs per hectare.⁴⁷ This could be as much as 45% of the average farmer's annual income on diesel pumps alone.⁴⁸

Policy decisions made two decades ago have affected multiple sectors in the country.⁴⁹ A number of problems have emerged as a result, and there are no strong reasons available with the players (e.g.,

41 NITI Aayog (2018). *Composite water management index: A tool for water management*, p. 27. New Delhi: Author. Retrieved from https://niti.gov.in/writereaddata/files/document_publication/2018-05-18-Water-index-Report_vS6B.pdf

42 Shankar, P.S., Kulkarni, H., and Krishnan, S. (2011, 8 January). India's Groundwater Challenge and the Way Forward. *Economic & Political Weekly* (46)2. Retrieved from <https://casi.sas.upenn.edu/sites/default/files/jit/EPW%20-%20Shankar%2C%20Kulkarni%2C%20Krishnan.pdf>

43 Discoms' financial losses stood at Rs 28,369 crore at the end of FY19, up 88.6% year-on-year, according to the updated data provided to the power ministry. Retrieved from <https://www.financialexpress.com/economy/uday-scheme-discoms-losses-rise-89-in-fy19/1660106/>

44 SmartPower India. (2019). *Rural electrification in India: Customer behaviour and demand*. New Delhi: Author. Retrieved from <https://www.rockefellerfoundation.org/report/rural-electrification-india-customer-behaviour-demand/>

45 We heard this from several farmers.

46 SmartPower India, 2019, p.63.

47 De Fraiture, C., & Giordano, M. (2014). Small private irrigation: A thriving but overlooked sector. *Agricultural Water Management*, 131, 167–174. Retrieved from <https://doi.org/10.1016/j.agwat.2013.07.005>

48 This was calculated using the figure by NABARD All India Rural Financial Inclusion Survey: average agriculture household income as Rs 8,931 per month in 2016-17. See NABARD. (2018b). *NABARD All India Rural Financial Inclusion Survey*, p. 22. New Delhi: Author. Retrieved from https://www.nabard.org/auth/writereaddata/tender/1608180417NABARD-Repo-16_Web_P.pdf

49 Sahai, S. (n.d.). *India Can Beat The Food Crisis*. Gene Campaign. New Delhi: Retrieved from <http://www.cbd.int/doc/external/mop-04/gc-en.pdf>

farmers and utility officials) to promote resource efficiency. This, in turn, has led to a crisis in all three sectors — energy, groundwater and agriculture. Here are some examples of government initiatives which have tried to tackle these problems within the energy, water and food sector:

Energy: Multiple regulatory reforms were made to connect rural households to the grid: In 1950, out of 500,000 villages, only 3,000 had electric poles.⁵⁰ By the mid-1980s, there was an electric pole in two-thirds of the villages.

Power sector government interventions:

- Rajiv Gandhi Grameen Vidhyuktikaran Yojana (RGGVY): a government scheme launched in 2007 by the Ministry of Power to achieve rural electrification by 2009 and energy access to all households by 2012.⁵¹
- Although 100% electrification was not achieved by the scheme, it brought electricity to villages in underdeveloped districts.⁵²
- RGGVY scheme was subsumed under Deendayal Upadhyaya Gram Jyoti Yojana (DUGJY) in 2015.⁵³ DUGJY scheme: Separated agriculture feeders from other consumption, strengthened sub-transmission and distribution through rural infrastructure and metering.
- In 2018, 100% rural electrification was declared by the government by extending infrastructure to villages.⁵⁴ The ongoing task is to enable quality supply to each household.⁵⁵

Agriculture consumes 18.33% of total electricity consumption (2016-17)⁵⁶ at highly subsidised rates, and is believed to be one of the most important causes of the power crisis and discom losses.

Industry and traction (rail) cross-subsidise agriculture, which is the lowest tariff paying sector.⁵⁷ Growing power subsidies have drained the states financially and are on the rise in Andhra Pradesh, Punjab, Tamil Nadu and Madhya Pradesh.⁵⁸

50 Khandker, S. R., Samad, H. A., Ali, R., and Barnes, D. F. (2012). *Who benefits most from rural electrification? Evidence in India*.

Washington, DC: The World Bank. Retrieved from <http://documents.worldbank.org/curated/en/374171468331748897/Who-benefits-most-from-rural-electrification-evidence-in-India>

51 United Nations Development Program. (2012). *Energizing India: Expanding Electricity Access in Rural Areas*. Bangkok, Thailand: Author. Retrieved from https://www.undp.org/content/dam/rbap/docs/Research%20&%20Publications/environment_energy/energy-plus/EE-2012-Case12-RGGVY.pdf

52 Oda H. and Tsujita Y. (2015). *Rural electrification revisited: the case of Bihar, India Progress and Ground Realities*. Chiba, Japan: Institute of Developing Economies. Retrieved from https://www.ide.go.jp/English/Publish/Download/Report/2013/2013_C04.html

53 Ministry of Power, Government of India. (2015). *Guidelines: Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY)*. New Delhi: Author. Retrieved from <http://www.ddugjy.gov.in/assets/uploads/1548234273fykio.pdf>

54 PTI. (2018, April 30). All villages in India electrified: PM. *Times of India*. Retrieved from <https://timesofindia.indiatimes.com/business/india-business/all-villages-in-india-electrified-pm/articleshow/63972628.cms>

55 SmartPower India, 2019.

56 Central Statistics Office. (2018). *Energy Statistics, 2018*. Retrieved from mospi.nic.in/sites/default/files/publication_reports/Energy_Statistics_2018.pdf

57 Kishore, A., Sharma, A., and Scott, C. A. (n.d.). *Power supply to agriculture: Reassessing the options*. Gujarat: IWM-Tata Water Policy Program. Retrieved from www.iwmi.cgiar.org/iwmi-tata_html/PM2003/PDF/07_Highlight.pdf

58 Power Finance Corporation. (2009). *Report on the performance of state power utilities for the years 2005-06 to 2007-00*. New Delhi: Author. Retrieved from

Poor electricity service is in part due to farmers receiving heavily subsidised service. Since little or no payment charges are incurred by farmers, discoms neglect the agriculture sector. To aggravate the situation, subsidy payments to discoms are delayed, reducing discom investment into service delivery. On one side, discoms perceive the sector as a burden and on the other side, farmers blame the electricity sector for undermining service delivery. The complexity of the issue highlights strong linkages between the agriculture and electricity sector.

Water: Groundwater use for irrigation has dramatically increased in India, with more than 230 billion metre cube drawn out each year.⁵⁹ The key reasons for over-extraction are inefficient water usage and subsidised rates for energy. Simultaneously, weak rainfall patterns and prolonged droughts have reduced the rate of groundwater replenishment, exacerbating water issues in the country.

With reduced water availability, farmers either deepen existing wells and buy higher capacity pumps to pump the water from greater depths or reduce the acreage of farmland that's irrigated. Well deepening requires a higher investment and increases both maintenance costs and energy consumption.

Exacerbating resource overextraction, cropping patterns have changed and water-stressed regions now grow water-intensive crops, e.g., sugarcane, paddy.⁶⁰ For example, Maharashtra (MH) faces the worst water-stressed conditions but is also the largest state with sugarcane cultivation.⁶¹ Now in the face of droughts, farmers are facing additional distress. A shift toward less water-intensive crops would result in more efficient water use relative to regional capacity and water availability, as demonstrated by the results of a study on how free electricity incentivises water-intensive crops.⁶²

The state government tried a number of schemes to address the water crisis:

- MH provided a subsidy to construct farm ponds for rainwater collection. The challenges that emerged included the evaporation of pond water due to summer heat, and the increase in energy use and the cost to pump water into the farm ponds.
- MH introduced a scheme to construct water bodies as a drought-free mechanism known as Jal Yukt Shivar Abhiyan. Although ground level implementation took place, the program focused on the straightening, widening and deepening of water bodies rather than contextual water studies prior to implementation.

Such schemes have been less effective than planned because water was managed in isolation, leading to problems in the energy sector and the agriculture supply chain.

https://www.pfcindia.com/DocumentRepository/ckfinder/files/Operations/Performance_Reports_of_State_Power_Utillities/3_Report%20on%20the%20Performance%20of%20State%20Power%20Utillities%202011-12%20to%202013-14.pdf

⁵⁹ Mishra, V., Asoka, A., Vatta, K., and Lall, U. (n.d.). Groundwater depletion and associated CO₂ emissions in India. New Dehli: India Environmental Portal. Retrieved from www.indiaenvironmentportal.org.in/files/file/groundwater_depletion_CO2_emissions_India.pdf

⁶⁰ Tiwari, P. (2019, 23 August). Agricultural solutions to help curb India's water woes. SocialStory. Retrieved from <https://yourstory.com/socialstory/2019/08/agriculture-india-water-scarcity>

⁶¹ Central Water Commission. Ministry of Water Resources, Government of India, 2014.

⁶² Sharma, B., et al., 2018.

Government enactments under the food sector:

- In 1963, the Government of India introduced the Agricultural Produce Market Committee (APMC) Act to reduce farmer exploitation by middlemen.⁶³ Under the Act, markets (*'mandis'*) were set up as a trading platform. The APMC Act prevents farmers from selling their produce directly to consumers, which means they can only sell in *mandis* to licensed middlemen.⁶⁴ Without market linkage, farmers have no choice but to sell to middlemen. The goal of APMC was to provide a platform for marketing and reducing control by traders. However, since farmers are not allowed to sell in the open market, a state monopoly has formed.⁶⁵ By giving license and authority solely to middlemen, barriers to open market access, a lack of competition and indirect transaction to farmers have increased price distortions.
- NABARD's All India Rural Financial Inclusion Survey (NAFIS) stated the average farmer's household income was just Rs 8,931 per month in 2016-17.⁶⁶

Farmers can benefit from participating in cooperative institutions

The interlinked nature of the problem demands interlinked solutions; tackling only one aspect is unlikely to be successful. Rural institutions — governed by farmers, for farmers — are the most likely institutions to co-manage these resources and sustainably enhance rural livelihoods, but such institutions face barriers to success.

India's government has engaged in multiple efforts to address the agrarian crisis,⁶⁷ but relatively little has been done to foster new rural institutions as a means to address it. A few new institutions have emerged on their own that are capable of addressing the problems of limited market access, inadequate water and unreliable power, but they, as yet, lack experience, expertise and scale. These are farmer-producer organisations, water user associations and electricity cooperatives.

One commonality between these institutions is that they share aspects of *cooperative* economic enterprises. Cooperative organisations exist to serve the common needs of their members, who govern the institutions.

While our research indicates that the cooperative model offers the potential to alleviate agrarian

⁶³ Reddy, A. A. (2017). Status of Market Reforms in India. *Indian farming* 66(8) 33-37. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3037093

⁶⁴ Pingali, P., Aiyar, A., Abraham, M., and Rahman A. (2019). Linking farms to markets: Reducing transaction costs and enhancing bargaining power. *Transforming Food Systems for a Rising India*. Palgrave Macmillan, Cham: Palgrave Studies in Agricultural Economics and Food Policy. Retrieved from https://link.springer.com/chapter/10.1007/978-3-030-14409-8_8

⁶⁵ Mashhadi, S. (2019, 5 February). Farmers, Middlemen and the Way Out. *Spontaneous Order*. Retrieved from <https://spontaneousorder.in/farmers-middlemen-and-the-way-out/>

⁶⁶ NABARD, 2018b.

⁶⁷ See Appendix B.

distress, these emerging institutions have struggled and continue to face many barriers to success. The following sections explore India’s experience with each institution and how each might be able to benefit rural farmers.⁶⁸

Farmer producer organisations and other agricultural cooperatives in India

Agricultural cooperatives enable farmers to access the benefits of economies of scale through mass purchasing of crucial inputs and managed supply of outputs. The aggregation of producer demand helps to reduce the costs of accessing and delivering resources and services.⁶⁹ These institutions/organisations could also – with assistance from state and national governments – enable necessary investments in the agricultural supply chain, such as in cold-storage facilities, so that outputs are sold in good condition and when most valuable.

India has decades of experience with agricultural cooperatives. During the 1950s and 1960s, Kaira District Cooperative Milk Producers’ Union Ltd, popularly known as Amul, demonstrated the potential of cooperatives as a successful driver for dairy development.⁷⁰ As a consequence, the National Dairy Development Board (NDDB) implemented “Operation Flood Programme,” which revolutionised the dairy industry through a cooperative model of procurement and marketing of milk and milk products. The establishment of 170 cooperative unions led to 10.7 million farmer members by 1999-2000.⁷¹ Milk production in rural milk sheds was channelled on a prescribed pathway and a ready market for milk was developed. See more details on Amul at Appendix B.1.

Today, there is rising interest in forming farmer-producer organisations (FPOs). Numerous studies have shown that FPOs promote collective action and increase farmer bargaining strength in markets for land, labour, capital and outputs.⁷² Legal authority to form FPOs has existed since 2003.⁷³ In 2011, the central government launched an initiative to promote FPOs in partnership with

68 Other than cooperatives, alternative solutions to a distressed rural economy are crop insurance, loan waivers, investment into cold storage, etc.

69 Pingali P. et al., 2019.

70 Singh, K. (2009). *Rural development: Principles, policies and management*, p. 275. Thousand Oaks, CA: SAGE Publications. Retrieved from <https://books.google.co.in/books?id=hngBwLgYGHEC&printsec=frontcover#v=onepage&q&f=false>

71 Joshi, P.K., Gulati, A., and Cummings, R.W., eds. (2007). *Agricultural diversification and smallholders in South Asia*, p. 236. New Delhi: Academic Foundation. Retrieved from https://books.google.co.in/books?id=dBT_LML9wQIC&printsec=frontcover#v=onepage&q&f=false

72 Desai, R. M., and Joshi, S. (2014). Can producer associations improve rural livelihoods? Evidence from farmer centres in India. *Journal of Development Studies*, 50(1), 64-80. Retrieved from https://www.researchgate.net/publication/279013836_Can_Producer_Associations_Improve_Rural_Livelihoods_Evidence_from_Farmer_Centres_in_India_vol_50_pg_64_2014; Bernard, T. and Spielman, D. J. (2009). Reaching the rural poor through rural producer organizations? A study of agricultural marketing cooperatives in Ethiopia. *Food Policy*, 34(1), 60–69. Retrieved from <https://www.sciencedirect.com/science/article/abs/pii/S030691920800064X>; Fischer, E. and Qaim, M. (2012). Linking smallholders to markets: Determinants and impacts of farmer collective action in Kenya. *World Development*, 40(6), 1255–1268. Retrieved from <https://www.sciencedirect.com/science/article/abs/pii/S0305750X11003020>

73 Electricity Act, 2003 (Amendment). Retrieved from <http://www.cercind.gov.in/Act-with-amendment.pdf>

state governments.⁷⁴ Now there are more than 800 registered FPOs.⁷⁵ FPOs can be federated and expanded into larger regional entities to aggregate farmers' needs and establish a platform for participative governance.⁷⁶

Sahyadri Farms⁷⁷ is one successful example of an FPO. It has successfully formed an association of approximately 8,000 small and marginal farmers who grow various crops near Nashik, Maharashtra. By aggregating production, Sahyadri Farms has effectively achieved strong market linkages, especially with international markets. The organisation's main crop is grapes. In 2018 alone, the farm exported 1162 metric tons of grapes.⁷⁸ Sahyadri Farms members receive better market prices for their produce as well as access to shared facilities, including post-harvest processing facilities to enhance the holding life of produce to fetch better market prices. Members combine capital to invest in such facilities, thus increasing overall income. See more details on Sahyadri Farms at Appendix B.2.

One key aspect of the agricultural value chain is market access. A few examples of social enterprises – including G4Fresh, BigBasket, Grofers, Future Group and Amazon – have effectively created linkages between farmers and consumers. Market linkages along with post-harvest processing, however, need to be strengthened to fully gain economic outputs. Further study is needed to propose farmer cooperatives as social enterprises that will connect farmers with consumers and reinforce integrated value chains.

Not all FPOs have succeeded, however. The social development organisation, Yuva Mitra,⁷⁹ has observed that many FPOs lack resources such as finance and skilled labour to effectively meet their objectives. FPOs with limited capital can only fulfil agricultural inputs, such as seed and fertiliser supplies. To overcome this challenge, Yuva Mitra has organised an FPO Facilitation Centre, where farmers in FPOs can learn more about how to manage their new institutions.

In addition, Yuva Mitra notes that legal barriers also exist. For instance, FPO membership is legislatively restricted to land-holding farmers, thus preventing farmers who rent farmland from joining. See more on Yuva Mitra at Appendix B.3.

In the U.S., two multistakeholder cooperatives appear to be succeeding: the Oklahoma Food Cooperative and the Fifth Season Cooperative. While most multistakeholder cooperatives appear to have two or three stakeholder groups, the Fifth Season Cooperative is unusual in embracing six

74 Small Farmers' Agri-Business Consortium. (2013). Policy & process guidelines for farmer producer organisations, p. 18. New Dehli: Author. Retrieved from <http://sfacindia.com/UploadFile/Statistics/Farmer%20Producer%20Organizations%20Scheme.pdf>

75 Small Farmers' Agri-Business Consortium. (2019). *State Wise Progress of FPO Promotion as on 31.10.2019*. New Dehli: Author. Retrieved from [http://sfacindia.com/UploadFile/Statistics/State%20wise%20summary%20of%20registered%20and%20the%20process%20of%20registration%20FPOs%20promoted%20by%20SFAC%20\(as%20on%2031st%20October,%202019\).pdf?var=9958288.25888](http://sfacindia.com/UploadFile/Statistics/State%20wise%20summary%20of%20registered%20and%20the%20process%20of%20registration%20FPOs%20promoted%20by%20SFAC%20(as%20on%2031st%20October,%202019).pdf?var=9958288.25888)

76 Ministry of Agriculture & Farmers Welfare, Government of India. (2018). *Report of the Committee on Doubling Farmers Income, Volume XIII: Structural reforms and governance framework*, pp. 110. Retrieved from <http://agricoop.gov.in/sites/default/files/DFI%20Volume%2013.pdf>

77 Sahyadri Farms [Website]. Retrieved from <http://www.sahyadrifarms.com/index.php>

78 Interview with Sahyadri Farms.

79 Yuva Mitra [Website]. Retrieved from <http://yuvamitra.org/>

groups: producers, producer groups, processors, distributors, buyers and workers. This cooperative is agriculturally based.⁸⁰

The Oklahoma Food Cooperative only involves consumers and producers. The case study language, however, is aligned with the notion of promoting rural community wellbeing through cooperation.

The Oklahoma co-op has two sets of decision-makers: consumers and producers. Although both membership classes have the same voting power, the board has designated a minimum of one seat each to producers and consumers so that each class has at least one representative.

Some friction is inevitable with the two classes involved with the cooperative at various levels. One board member puts it this way: “The producer class is in a better position to become the squeaky wheel because they are more visible; you are dealing with their livelihood. The stakes are not as high for consumer members.” Reserving a vice president seat on the board of equal power for each class, the board member says, ensures continued education, communication and understanding between the two groups.

Oklahoma Food Cooperative’s goal is not to get the best deal for one party, but rather to run a business that serves the community’s food economy. One cooperative member explains, “We want the farmers to live off of the food they sell and the consumers to be able to afford it.”⁸¹

Water user associations in India

Even before the current concerns about increasing climatological stress, poor maintenance of irrigation systems and gradually weakening infrastructure has led to water management problems.⁸² The government had constructed irrigation facilities without the consultation of farmers in its design/management.⁸³ Consequently, local user groups (later, water user associations) were formed to manage irrigation facilities.

Many local farmers strongly believe that, as the primary users of irrigation projects, they are better suited to oversee the management of water and ensure irrigation needs than the state’s water department. Cooperative planning enables this management to serve the needs of all farmers in a given watershed; it is also conducive to long-term sustainable management. This approach is

⁸⁰ Fifth Season Cooperative. *Our Story* [Website]. <http://www.fifthseasoncoop.com/our-story>

⁸¹ Lund, M. (n.d.). *Solidarity as a Business Model: A Multi-Stakeholder Cooperatives Manual*, p. 38. Kent, OH: Cooperative Development Center @ Kent State University. Retrieved from <https://community-wealth.org/sites/clone.community-wealth.org/files/downloads/tool-oeoc-multistakeholder-coop.pdf>

⁸² Pant, N. (2007). *PIM/IMT: Conditions of success in large canal systems of India* [Presented at the 4th Asian Regional Conference & 10th International Seminar on Participatory Irrigation Management, Tehran, Iran, 2nd-5th May]. Lucknow: Centre for Development Studies. Retrieved from www.irncid.org

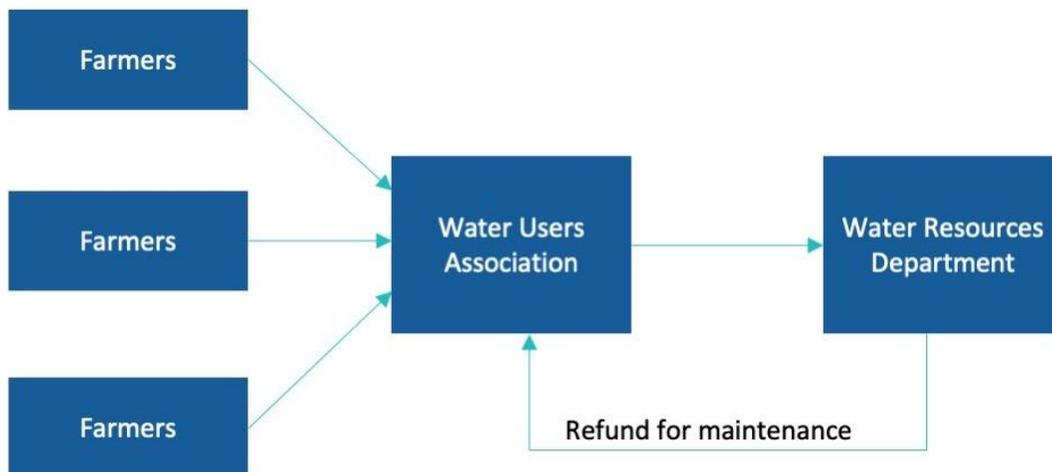
⁸³ Geijer, J. C. M. A., Svendsen, M., and Vermillion, D. L. (1995). *Transferring irrigation management responsibility in Asia: Results of a workshop*, p. 3 [Presented at the FAO/IIMI Expert Consultation on Irrigation Management Transfer in Asia, Bangkok and Chiang Mai, 25-29 September 1995]. Food and Agriculture Organization of the United Nations and the International Irrigation Management Institute. Retrieved from dlc.dlib.indiana.edu/dlc/bitstream/handle/10535/4425/transferring-irrigation-management-responsibility-in-asia-results-of-a-workshop.pdf?sequence=1

known as participatory irrigation management (PIM).⁸⁴

The Government of India has promoted farmer-run water cooperatives called “water user associations” (WUAs) since 1985.⁸⁵ Current law allows WUAs to foster PIM by grouping farmers, usually of one hydraulic unit, command or irrigation district, in one formal body for the purpose of managing parts of an irrigation system.⁸⁶ The current WUA plans water allocations and annual cropping patterns, and determines the volumetric water charges to collect from farmers for canal maintenance. In our strategic recommendations, we envision an expanded role for WUAs for managing water availability.

In Maharashtra, mandatory water charges are paid to the Water Resources Department (WRD), and 78% of the payment is refunded back to the WUAs for maintenance and operation as part of sectoral allocation (Figure 3). This institutional mechanism has supported the organisation’s financial maintenance. WUAs use the refund in part for system maintenance and farmer training (28%); primarily, however, it supports the activities of the WUAs (50%).⁸⁷

Figure 3. Financial flows involved in running WUA



Currently, 24 states have incorporated PIM partly or fully by forming WUAs by either enacting PIM

⁸⁴ The World Bank defines PIM as “the involvement of irrigation users in all aspects and all levels of irrigation management.” See World Bank (1998). *Electronic learning guidebook for participatory irrigation management*. Washington, DC: Author. Retrieved from <https://www.eldis.org/document/A26594>

⁸⁵ Ministry of Water Resources, Government of India. (n.d.). *Status of participatory irrigation management (PIM) in India – Policy initiatives taken and emerging issues*. New Delhi: Author. Retrieved from http://mowr.gov.in/sites/default/files/CADWM_Status_of_PIM_0.pdf

⁸⁶ Salman, S. M. A. (1997). *The legal framework for water users' associations: a comparative study (English)*. World Bank technical paper; no. WTP 360, p. 1. Washington DC: World Bank. Retrieved from <http://documents.worldbank.org/curated/en/272041467980487313/The-legal-framework-for-water-users-associations-a-comparative-study>

⁸⁷ We learned this from discussions. See Appendix C.

Acts or amending existing irrigation acts.⁸⁸ Altogether, this support has helped 84,779 WUAs to form.⁸⁹

One success story is Waghad Project Level Water Users (WPLWU).⁹⁰ Multiple WUAs formed around the Waghad dam outside of Nashik, Maharashtra to address water supply issues. Before that, the Waghad dam was irrigating less than 1% of its total irrigatable command area. In 2003, these WUAs joined to form WPLWU, increasing the irrigated area, using both canal water and wells, from 7,377 ha to 10,400 ha by 2008. Waghad farmers are now able to rotate crops at least five to seven times in the Rabi and hot weather seasons together.⁹¹ Five years after the project began, average member-farmer incomes doubled.⁹²

For additional details and success stories, see Appendix B.

Not all WUAs have succeeded. They often struggle with a lack of technical expertise and a shortage of capital. NGOs have tried to help many WUAs register under the Cooperative Societies Act, but not all WUAs have succeeded in improving water management.

In addition, WUAs face legal barriers. For instance, they only have legislative support to form in canal irrigation systems today, but other areas — such as areas with river basins and lakes — also need improved water management regulations.

Electricity cooperatives in India

Electricity cooperatives are authorised under the Electricity Act of 2003,⁹³ but few have emerged.

The Act permits state commission/government to exempt local bodies, cooperatives societies, franchisees, and generator-distributors from license requirements under the specified conditions set by the regulator or by notifying the rural areas to be covered. There is legal support in forming a cooperative to distribute power in a rural area. Under the RGGVY programme, the franchisee option was adopted to address regulated tariff principles through a revenue collection model.⁹⁴

Additionally, the Rural Electrification Policy 2006, inter alia, advocated the setting up of district committees to coordinate and review electrification extension. Although there have been alternative participatory approaches such as village electricity representatives, local bodies, and cooperatives, such bottom-up approaches have not been implemented. There are several reasons

88 Singh, A., Saha, D., and Tyagi, A. C. (Eds.). (2019). *Water governance: Challenges and prospects*. Singapore: Springer. Retrieved from <https://www.springer.com/gp/book/9789811326998>

89 Ministry of Water Resources, Government of India, n.d.

90 Waghad Project [Website], <https://waghadproject.org/aboutus.htm>. We spoke with Waghad representatives. See Appendix C.

91 IWMI-Tata Water Policy Program. (2012). *Maharashtra Water Resources Regulatory Authority: An assessment*, p. 4. Gujarat: Author. Retrieved from http://www.iwmi.cgiar.org/iwmi-tata/PDFs/2012_Highlight-33.pdf

92 Somawanshi, S. M., Bharat Kawale, B., and Belsare, S. M. (2009). *Transformation of irrigation through management transfer*, p. 5. New Delhi: International Commission on Irrigation and Drainage. Retrieved from https://www.icid.org/ws1_2009.pdf

93 Electricity Act, 2003 (Amendment); see sections 5, 13. Retrieved from <http://www.cercind.gov.in/Act-with-amendment.pdf>

94 Bhattacharyya, S. C., and Srivastava, L. (2009). Emerging regulatory challenges facing the Indian rural electrification programme. *Energy Policy*, 37(1), 68-79

for this, including discoms's reluctance to alternate approaches, the politicised power sector, control authority, accountability and, perhaps most importantly, lack of technical and financial assistance.

Relevant provisions of the Electricity Act 2003⁹⁵

The relevant rural electrification legal provisions of the Act are as follows:

- Section 5 mandates the formulation of national policy on rural electrification emphasising local distribution through Panchayat Institutions, users' associations, cooperative societies, non-Governmental organisations or franchisees.
- Section 6 requires central and state government to provide access to electricity to all areas including villages and hamlets through rural electricity infrastructure and electrification of households.
- Section 13 authorises the regulatory commission to exempt any local level organisation or franchisee from the license requirement.
- Section 14 permits:
 - Distribution licensees to engage an agent for undertaking distribution.
 - Exemption from license requirements for any person engaged in rural electricity generation and distribution of electricity in notified rural areas.

One place where an electric cooperative has had some success, although on a very small scale, is in the village of Dhundi, Gujarat, which previously lacked access to the grid. In 2016, the International Water Management Institute⁹⁶ helped six farmers organise to form the Solar Pump Irrigator's Cooperative Enterprise (SPiCE).⁹⁷ With supporting capital to build the necessary grid and install solar panels, SPiCE has electrified the six participants' farms. The farmers can export unneeded solar back to the grid at a negotiated price, and such exports provide an additional source of income. Some participants have found they can supplement their income and also help their neighbours by selling them solar-pumped water at lower cost than their neighbours would otherwise spend on diesel pumping. If this model can be scaled up using public resources, the management of electricity in rural India would be dramatically improved.

The SPiCE concept of decentralised electricity systems owned by groups of farmers was received positively by other farmers. Our conversations with farmers in rural parts of Gujarat and Maharashtra highlighted the unreliability in the quality of their power supply, with agricultural electricity feeders receiving approximately eight to nine hours of power supply during the night-time. Uncertainties in the timing of supply have affected irrigation and labour fees, increasing the burden on other power sources (e.g., diesel pump sets) and adding to the overall input cost. We found that most farmers were keen to pay for 24/7 access to electricity and were eager to install decentralised energy production such as a solar plant to ensure reliable supply of power at a timing

⁹⁵ Electricity Act, 2003.

⁹⁶ International Water Management Institute [Website]. Retrieved from <http://www.iwmi.cgiar.org/>

⁹⁷ Dhundi Saur Urja Sahkari Majdali (DSUUSM). (2019). *Dhundi solar energy producers' cooperative society: Tri-annual report, 2015-18*. Gujarat: Author. Retrieved from [https://wle.cgiar.org/dhundi-solar-energy-producers%E2%80%99-cooperative-society-tri-annual-report-2015-](https://wle.cgiar.org/dhundi-solar-energy-producers%E2%80%99-cooperative-society-tri-annual-report-2015-18)

suitable for the crops.

Although not an electricity cooperative, sugar cooperatives in western Maharashtra offer an example of energy efficient irrigation under cooperative governance. They run large irrigation cooperative schemes of 500 - 1000 ha with central pumping stations and water distribution structures with staggered watering schedules. While the structure may not be suited to every agro-climatic condition or water availability option, it serves as an example of energy management in the agriculture sector.

While experience of electric cooperatives in India is limited, thousands of successful rural electricity cooperatives exist all over the world.⁹⁸ Here are a few international examples (for more detailed examples, see Appendix D):

Today in the U.S., for instance, there are almost 1,000 rural electric cooperatives. They own and maintain 2.6 million miles of the nation's electric distribution lines (42%) covering 75% of the nation's landmass, deliver 11% of the total kilowatt hours sold, and generate nearly 11% of the total electricity produced in the country each year.⁹⁹ Cooperatives also pay over \$1 billion USD in state and local taxes.¹⁰⁰

Electricity cooperatives were created in the U.S. to bring electric power services to rural areas and did not emerge on their own. Since the early 1930s, they received substantial and consistent governmental support, including financing support through low-interest loans and significant technical assistance. While the effort has been significant, electricity cooperatives have also been an undeniable success story in helping electrify rural America.

All the U.S. cooperatives analysed in our study began life by taking on huge amounts of subsidised government debt relative to the equity contributions from their membership. This availability of low-cost public debt may have been the single biggest contributor to the long-run success of the rural electrification policy. Due to the nature of rural electrification, new cooperatives are likely to require carefully crafted loans and government assistance to ensure that they can begin to operate. In the United States, the new rural electric cooperatives took on large amounts of government debt to begin to electrify their regions. Once the money was available, however, they still faced the challenge of finding skilled workers capable of building and operating new electrical generation and distribution systems. To meet the loan requirements, projects needed to be carefully designed to assure the repayment of loans, the suitability of the system and revenues. In the U.S. case studies, this assistance — at least initially — always came from government officials or publicly financed contractors.

To be fully prepared for the agricultural transition in India, reliability of electricity service is crucial

98 Richmond, J. and Patwardhan, A. (2018). Universal electricity access - Can cooperatives strengthen electric connections? p.53. *Economic and Political Weekly* 23(09). Retrieved from <https://www.epw.in/journal/2018/23/commentary/universal-electricity-access.html>

99 National Rural Electric Cooperatives Association. (2017). *Electric Co-op Facts & Figures*. Virginia: Author. Retrieved from <https://www.electric.coop/electric-cooperative-fact-sheet/>

100 Yadoo, A. and Cruickshank, H. (2010). The value of cooperatives in rural electrification. *Energy Policy*, 38(6), 2941–2947. Retrieved from <https://doi.org/10.1016/J.ENPOL.2010.01.031>

amongst other services. The U.S. experience pinpoints a number of factors in making cooperatives successful for rural electrification, including continuous and sustained government policy and support through substantial funding, technical expertise and institutional legitimacy.

With the appropriate level of support to overcome the significant financial and institutional barriers, electricity cooperatives can also benefit India's rural farmers.

Barriers to promoting cooperative institutions must be overcome

Unfortunately, there remain multiple barriers in forming cooperatives in the food, water and energy sectors. Our interviews across rural areas of Maharashtra and Gujarat revealed legal, financial and institutional barriers to cooperatives. Although collective forms of institutions have multiple benefits to farmers, such as the ability to aggregate produce to get higher returns and market linkages, there are multiple challenges that need to be addressed. In order to fulfil the ultimate objective of sustainable livelihood enhancement, barriers must be critically analysed to be able to identify relevant policy interventions.

Having identified FPOs as an effective mechanism to link farmers to the market, the legislative changes should address capacity building, financial challenges and value chain investment to foster an ecosystem to support a market and establish FPOs. During the study, multiple organisations pointed out the need for effective management in cooperatives being key to financial viability. The current economic policy encompassing deregulation, delicensing and privatisation demands the professionalisation of cooperatives to keep up with the competitive market.¹⁰¹ In the past, cooperatives have failed for many reasons. Some of the reasons were external, such as government interference. Often the failures were internal, as the nascent cooperative leadership suffered from a lack of cooperative management knowledge and an inability to scale cooperative membership fast enough to take advantage of economies of scale.

In any case, new start-up cooperatives will require substantial technical and business assistance to be successful. Technological capacity building including training for farmers, ranging from optimising pump sizes to region-specific cropping patterns that will increase overall agri-productivity. Sahyadri Farms has gained support from external funding to establish an agri-industry skill development academy to train youth on FPO management. For long-term sustainability of FPOs, however, technical capacity building and training in cooperative management needs to be strengthened.

FPOs and cooperatives have often struggled to meet financial requirements in their start-up stages. Due to their initial small scale of operations, the net revenues generated by the FPO are usually not sufficient to meet capital requirements. At such a nascent stage, obtaining commercial loans based on limited revenue are unviable as well. Many FPOs such as Avirat in Gujarat have found access to capital as the main challenge.¹⁰² Farmers struggle to meet their financial needs and hence cannot afford investment in FPOs, resulting in low financial stability overall. A robust model with

¹⁰¹ Singh, K., 2009.

¹⁰² Bikkina, N., Turaga, R. M. R., and Bhamoriya, V. (2015). *Farmer producer organizations as farmer collectives: A case study from India*. Retrieved from <https://web.iima.ac.in/assets/snippets/workingpaperpdf/10539809132015-01-05.pdf>

additional support from the state can alleviate the financing challenges faced by FPOs. Government oversight can also convince farmers to invest in new ways of marketing and retail activities.

The Waghad Federation, a successful WUA mentioned earlier, told us about their venture into FPOs that illustrate some of the pitfalls for start-up cooperatives. Waghad Agricultural Producer Company (WAPCO) was formed to enable market linkages. However, due to insufficient capacity of storage, poor infrastructure and lack of access to capital, the organisation was not effective. Their core problem was financial. Without access to capital, they were unable to build the strong linkages that are required to enable market growth and input facilities. They needed cold storage facilities and collection center infrastructure to achieve scale, drive down input costs and raise farmer revenues.

There are a number of legislative barriers affecting FPOs and WUAs. Under the Companies Act, Sahyadri Farms was informed that the FPO membership is limited to land-holding farmers. Farmers relying on rental farmland do not have legal authority to be a part of FPOs. Yuva Mitra has noted that the regulations for WUAs are limited to villages in the vicinity of canal irrigation systems. Other areas have no legislative support or authority to operate and manage water allocation. There is a lack of clarity about who is allowed under WUA registration.

Cross-sectoral cooperatives

Most producer cooperatives are organised around single products (e.g., almonds, milk, sugar). Multiproduct cooperatives are rare. Given the risk that a cooperative operating in one product sector could exacerbate issues in other product sectors, one must wonder if cooperation is possible across multiple products. Research of experiences around the world suggests such a multisector, multipurpose cooperative is a relatively new approach. Historically, most cooperative organisations have operated as single-purpose entities. One could imagine a multiproduct cooperative feasibly operating as a single organisation working in multiple sectors or as a group of individual product cooperatives working together. In considering an expansion of services, it is prudent to consider the barriers and risks. This section describes the research findings and calls for further discussion among stakeholders.

Multipurpose cooperatives struggle but can succeed

Few multipurpose cooperatives exist around the world. Most cooperatives are single-purpose entities, managed and operated in pursuit of a single unifying goal. For example, an electric cooperative seeks to provide electricity service to consumers, while a water cooperative seeks to manage the water needs of consumers. Most agricultural producer cooperatives are organised by product: a dairy cooperative would not typically also be a mango cooperative. Some cooperative organisations may have subsidiary organisations that offer a different service, but the two are managed and operated separately.¹⁰³ The predominant cooperative model appears to be single-

¹⁰³ For instance, Talquin Electric Cooperative (a U.S. cooperative) appears to offer both electric and water service, but a closer examination reveals two separate entities exist, which means two separate governance structures. Talquin Electric. *Board Meetings & Workshops* [Website]. Retrieved from <https://www.talquinelectric.com/about/board-meetings-workshops/>

purpose.

The reasons appear to be both contextual and managerial. For instance, the context in which electric and water cooperatives emerged in the U.S. appears to largely explain why they typically operate separately. First, they emerged at different times: the electric cooperatives largely organised in the 1930s and 1940s, whereas efforts to form water cooperatives began in the 1940s and proliferated later in the century.¹⁰⁴ Second, they emerged to solve different infrastructure problems, involving different economies of scale. Consider: around 900 electric cooperatives exist and serve about 16,000 consumers on average, while over 3,000 water cooperatives exist and serve about 2,000 consumers on average.¹⁰⁵ In short, electric cooperatives are bigger but fewer than water coops. Finally, they likely faced differing levels of government support and involvement.¹⁰⁶

The context in the United States led to a separation of water and electric cooperatives. However, this context may not be relevant in India. For instance, conversations in the U.S. are ongoing about whether rural water cooperatives should consolidate, reflecting economies of scale more similar to those of electric cooperatives.¹⁰⁷ In addition, other utility organisations in the U.S., such as municipalities, often already provide both water and electric service.¹⁰⁸ In fact, anecdotal evidence suggests the established electric cooperatives supported the organisation of water cooperatives, suggesting synergy may be possible between the two.

The managerial reasons for forming a single-purpose entity rather than a multipurpose one appears more pressing. A single-purpose entity benefits from simplicity: it has one goal and one membership base. In contrast, a multipurpose entity must balance potentially competing goals and address potentially competing demands from different members. This competition can lead to inefficiencies, which one report refers to as “influence costs.”¹⁰⁹ Influence costs rise, the authors

¹⁰⁴ Deller, S., Hoyt, A., Hueth, B., and Sundaram-Stukel, R. (2009, March). *Research on the Economic Impact of Cooperatives*, p. 54. Madison, WI: University of Wisconsin Center for Cooperatives. Retrieved from <http://cccd.coop/sites/default/files/UWiscReportFULL.pdf>

¹⁰⁵ University of Wisconsin Center for Cooperatives. *Research on Economic Impact of Cooperatives* [Website]. Retrieved from <http://reic.uwcc.wisc.edu/utilities/>

¹⁰⁶ Many factors could explain the separate formation of electric and water cooperatives in the United States. There may be legal issues, such as whether the enabling statute for cooperative formation allows for multiple services. See Dominion Energy. (2018). *Broadband Feasibility Report to the Governor, the State Corporation Commission, the Broadband Advisory Council, and the Chairmen of House and Senate Committees on Commerce and Labor*, p. 33 n.23. Richmond, VA: Author. Retrieved from <http://surrychamber.org/broadband-feasibility-report.pdf>. (“No corporation shall be organized under the [Virginia Stock Corporation Act] for the purpose of conducting more than one kind of public service business [excepting the telephone and telegraph businesses and the water and sewer businesses, which may be combined]”). However, cooperatives in Virginia are allowed to do things “related or incidental” like electric co-op leasing space for telephone lines. See Ministry of Agriculture & Farmers Welfare, Government of India. (2017b). Similarly, there may be financing issues, such as whether the provision of multiple services would disallow or simply complicate the entity’s efforts to obtain favourable tax treatment. Seto, M. and Chasin, C. (2002). *General Survey Of I.R.C. 501(c)(12) Cooperatives And Examination Of Current Issues*. Internal Revenue Service of the United States. Washington, DC: Author. Retrieved from <https://www.irs.gov/pub/irs-tege/eotopice02.pdf>

¹⁰⁷ CoBank. (2017). *When rural water systems combine*. Greenwood Village, CO: Author. Retrieved from <https://www.cobank.com/-/media/files/ked/power-energy-and-water/water-consolidation-report--oct-2017.pdf>

¹⁰⁸ Eugene Water & Electric Board. About Us [Website]. <http://www.eweb.org/about-us>

¹⁰⁹ Iliopoulos, C. and Hendrikse, G. (2008) *Influence Costs in Agribusiness Cooperatives: Evidence from Case Studies*, Erasmus Research Institute of Management (ERIM), RSM Erasmus University / Erasmus School of Economics. Rotterdam, Netherlands: Erasmus University. Retrieved from <https://www.researchgate.net/publication/4780808>

argue, when the membership becomes more heterogenous and when the cooperative pursues to fulfil multiple goals (e.g., marketing both milk and mangoes).¹¹⁰ These costs – possibly – can be alleviated, however, by strong and effective leadership.

Creating a multipurpose cooperative may require significant planning and institutional capacity.¹¹¹ It is possible a cooperative can effectively offer multiple services, but this appears to depend on the extent to which the provision of services is synergistic rather than merely additive and the extent to which membership remains uniform across service groups. The management must be prepared to overcome member disagreements and to balance competing concerns. But with adequate support, this appears possible.

Some successes have already been realised in forming multipurpose cooperatives in India. At least two civil society organisations, Yuva Mitra and the BAIF Foundation, are already supporting and promoting the formation of rural organisations that serve both as water user associations and as farmer producer organisations. Yuva Mitra refers to this approach as the “WUA+ model.” The model expands the role of WUAs to include technical and market interventions to increase agri-productivity.¹¹²

Multistakeholder cooperatives struggle but can succeed

As noted with multipurpose cooperatives, heterogeneity in the membership of a cooperative can lead to institutional inefficiencies. However, an emerging cooperative model embraces different member groups: the multistakeholder cooperative. Where a multipurpose cooperative may face members with similar but competing interests (such as marketing milk or marketing mangos), a multistakeholder cooperative may face members with entirely opposing views, such as consumers and producers. Multistakeholder cooperatives can include consumers, workers, producers, processors, marketers and/or investors.

Because they are comparatively new, the literature on multistakeholder cooperatives is underwhelming and the authorship is very limited. Discussions appear more aspirational about the potential of this form, rather than evidence-based about the few examples’ actual performance. In addition to the literature being limited, much of it is focused on entities serving the primary stakeholder and also enabling involvement of a second, like investors. This may not inspire confidence in forming a multistakeholder cooperative in India, such as with the case of farmers needing irrigation and non-farming consumers needing drinking water. However, the aspirational language and a few agricultural examples seem well aligned with the discussion of possibilities in rural India.

One oft-cited resource manual on multistakeholder cooperatives¹¹³ provides the following

¹¹⁰ Iliopoulos, C. et al., 2008.

¹¹¹ Koch, E., Maharjan, R. C., Sharma, J. K., and Wehnert, U. (2004). *A decade of pro poor institution building in Nepal – Innovations and lessons learned from the small farmer cooperatives Ltd. (SFCLs)*. Kathmandu, Nepal: Rural Finance Nepal. Retrieved from <https://www.findevgateway.org/case-study/2005/01/decade-pro-poor-institution-building-nepal-innovations-and-lessons-learned-small>

¹¹² Currently being experimented within the organisation.

¹¹³ Lund, M. (n.d.).

description:

“Early cooperatives focused on correcting blatant market failures — bringing electricity to rural America in the 1930s is one primary example in this country. Even bringing to market something as basic as safe, unadulterated food — the need that spurred the formation of the original Rochdale Pioneers cooperative in 1849 and birthed the modern cooperative movement — can essentially be seen as correcting market failure. Multistakeholder cooperatives represent a more nuanced development. They have emerged recently not so much in response to the complete lack of availability of a particular good or service in the marketplace, but rather a rejection of the quality of an important good or service as it is presented in a conventional investor-driven or government-controlled marketplace. When the perception of the absence of certain desirable qualities is coupled with the confidence that it is possible for constituents to build a better way themselves, a fruitful ground for multistakeholder cooperatives is born.”¹¹⁴

Moreover, although some stakeholder conflict may emerge and disadvantage the cooperative, the belief appears to be that multistakeholder cooperatives are nevertheless better off. The resource noted above gives the following quixotic description:

“the disadvantage of increased costs cause by interest harmonization and decision-making is balanced by a number of advantages of this specific organizational typology, namely better quality of services (services correspond to the users’ needs) and the reduced transaction costs (due to trust relations, resulting from knowledge of local conditions and stakeholders’ involvement).”¹¹⁵

As noted earlier, a recurring issue is institutional capacity. This may be exacerbated for multistakeholder cooperatives because of the differing governance structure. Unlike a single-purpose cooperative, the governance must be divided in some way so as to ensure the engagement of each stakeholder group. Rather than all members having equal voting rights to each board position, each stakeholder group must be assigned a share of the governing board, and members vote for the representatives of their stakeholder group(s).

As with a multipurpose cooperative, there are barriers to success for multistakeholder cooperatives. However, the model could be a fruitful area for discussion.

¹¹⁴ Lund, M. (n.d.).

¹¹⁵ Lund, M. (n.d.).

Figure 4. Krushak Mitra Agro Services: A succeeding multistakeholder enterprise

Source: Yuva Mitra, presentation from workshop.^{116,117}

A cooperative federation could serve as an umbrella organisation

One way to alleviate the managerial problems of multipurpose or multistakeholder cooperatives could be through forming an umbrella organisation known as a cooperative federation. Rather than have individuals as members, a cooperative federation’s members are other cooperatives. While the “primary” cooperatives would continue to govern themselves and pursue their own mission, the governance and operations of the cooperative federation may provide a platform for addressing internal conflicts. One could imagine each primary cooperative having a representative member attend the meetings for the cooperative federation, during which the various representatives could discuss the competing needs of all the different members.

There appear to be examples of these in India, such as the National Agricultural Cooperative Marketing Federation of India (NAFED).¹¹⁸ Formed in 1958, NAFED today promotes cooperative marketing of agricultural produce for over 850 member organisations, including over 800 primary marketing organisations.¹¹⁹ Similarly, Sahyadri Farms appears more analogous to a cooperative

¹¹⁶ As noted, we held a stakeholder workshop with various organisations, including Yuva Mitra.

¹¹⁷ Krushak Mitra Agro Services, eight farmer producer organisations, and several investors have jointly promoted a multistakeholder organisation. Its goal is to market the products of the various FPOs. This organisation appears to be a multistakeholder cooperative federation.

¹¹⁸ National Agricultural Cooperative Marketing Federation of India Ltd [Website]. Retrieved from <http://www.nafed-india.com/>

¹¹⁹ National Agricultural Cooperative Marketing Federation of India Ltd. *Origin of NAFED* [Website]. <http://www.nafed-india.com/Home/ContentPage/1>; National Agricultural Cooperative Marketing Federation of India Ltd. *Membership of NAFED* [Website]. <http://www.nafed-india.com/Home/Membership/26>

federation than a primary cooperative. Sahyadri Farms itself is a “parent” organisation with several “child” farmer producer organisations that specialise in specific crops, such as floriculture, grapes and mangos.

Conclusion

Together, farmer producer organisations, water user associations and electricity cooperatives could enhance rural livelihoods.

Roughly 80% of India’s farmers are small (largely poor) landholders whose aspirations and livelihoods are constrained by limited market access, intermittent electricity service and endemic water shortages. These circumstances have led to low agricultural productivity, rising (and unsustainable levels) of agricultural debt, and to increasing frustration and protest by desperate farmers. More extreme climatological and environmental conditions are likely to threaten the very viability of farming.

A large part of the agricultural crisis stems from the imbalance in power relationships that exist between individual farmers and the larger economic and political institutions with whom they, by necessity, must interact, i.e., electricity distribution companies, water suppliers, and seed, fertiliser and other input suppliers, as well as state and central government agencies. In the jargon of economics, the individual farmers are simply “price-takers.” Results from these bilateral relationships seldom produce economic outcomes that reflect the broader collective interests of the agricultural sector.

Any sustained and comprehensive effort to improve both agricultural productivity and farmer livelihood will, by necessity, need to address these imbalances. After reviewing both Indian and international experience, we conclude that new cooperative governance institutions that aggregate the needs of farmers and act in the interests of the farming sector as a whole are necessary.

Farmer producer organisations, water user associations and electricity cooperatives face barriers to success in India. They will not emerge on their own, and they will require government support to reach scale. Without this support, they will certainly fail in improving rural livelihoods across India.

However, cooperative institutions also offer hope for a better India. They can help farmers escape the current patterns that have led to farmer indebtedness and resource overextraction. They can help farmers adopt new cropping patterns that offer both improved revenues as well as improved resilience to ecological stress and climate change. They can reduce water scarcity and alleviate the financial pressures on India’s discoms. There is also tremendous potential for solar- and biomass-based energy cooperatives to provide reliable power for irrigation and serve as an additional source of income to farmers.

Further research is needed

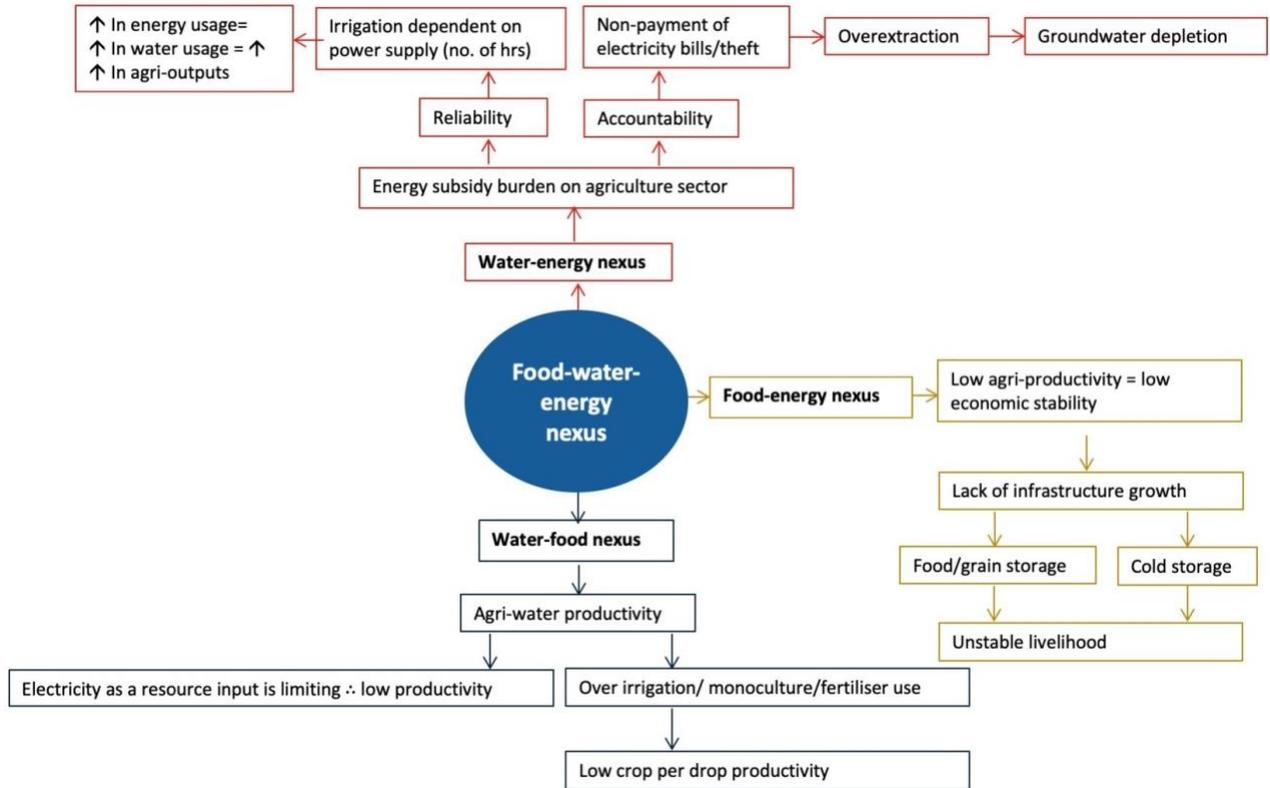
Various avenues exist for pursuing collective action in rural India. Single-purpose cooperatives may be the simplest to organise and manage, while multipurpose or multistakeholder cooperatives may enable greater synergy among differing consumer groups. Adding an additional layer of governance

through the formation of cooperative federations may be worthwhile. Further consideration of the contextual circumstances of rural India are necessary to judge the likelihood of success of any given approach. Quite possibly, different approaches may be necessary in different states or localities.

In short, cooperative institutions with sustained support from civil society organisations, state and central governments can enhance rural livelihoods through capacity building in cooperative management, inclusivity in cooperative governance and tackling the legislative barriers noted throughout the paper. Such a possibility makes them worthy of further attention and study. Further study is also needed on climate change and its impact on farmers' adaptive capacity to manage climate variability.

Appendix A: The food-water-energy nexus

Figure 5. Food-water-energy nexus



Appendix B: Agriculture cooperatives case studies

To reduce the economic vulnerability of farmers, market failures need to be addressed. One of the biggest challenges faced by small-holder agriculture is linking small producers directly to markets and reducing the price risks subjected to primary produce. The integration of farmers with the value chain is crucial for the net return to be large enough to sustain their livelihood. A community-driven solution of aggregation will derive benefits from economies of scale. Innovative institutional models have attempted to link primary producers to the agriculture value chain such as self-help groups, farmer interest groups and farmers' cooperatives.¹²⁰ Although there is policy support to solve agriculture supply chain issues in the form of seeds, fertilisers and price incentives, investment on the demand side of agriculture needs to be made, i.e., in building the institutional capacity of farmers to strategically solve local challenges.

Aggregation of producers has multiple benefits associated.¹²¹ An approach increasingly supported by governments, bilateral and multilateral donors has been the formation of farmer producer organisations (FPOs), membership-based organisations to aggregate agricultural produce. Numerous studies have shown that FPOs promote collective action and increase farmer bargaining strength in markets for land, labour, capital and outputs.^{122,123,124}

The past experience of cooperatives included political interference, corruption, elite capture and similar issues, thus producer companies were given more freedom to operate as businesses in a competitive market.¹²⁵ Producer companies were to be registered under the amended Section 581 of the Companies Act 1956, in 2003, as limited companies by equity contribution through members. Over a specific tenure, a General Body will elect members of the Board of Directors who must manage the daily operations.¹²⁶

During 2012-13, the Government of India launched an initiative to promote FPOs in partnership with 25 state governments and supported over 695,000 farmers to form 694 FPOs – 428 registered and 266 under the process of registration under the Companies Act, 1956.¹²⁷ Small Farmers

120 Mukherjee, A., Singh, P., Ray, M., Priya, S., and Burman, R. R. (2018). Enhancing farmers income through farmers' producer companies in India: Status and roadmap. *Indian Journal of Agricultural Sciences*, 88(8), 1151-1161. Retrieved from https://www.researchgate.net/publication/327174741_Enhancing_farmers_income_through_farmers%27_producers_companies_in_India_Status_and_roadmap

121 Pingali, P. et al., 2019.

122 Desai, R. M. et al., 2014.

123 Bernard, T. et al., 2009.

124 Fischer, E. et al., 2012.

125 Singh, S. (2008). Producer Companies as New Generation Cooperatives. *Economic and Political Weekly*, 43(20), 22-24. Retrieved from <http://www.jstor.org/stable/40277684>

126 Mondal A. (2010). Farmers' producer company (FPC) concept, practices and learning: A case from action for social advancement. *Financing Agriculture*, 42(7):29-33.

127 Raju, K.V., Kumar, R., Vikraman, S., Moses, S. D., Srikanth, R., Kumara, C. D., and Wani, S. P. (2017). *Farmer producer organisation in*

Agribusiness Consortium (SFAC) and National Bank for Agricultural & Rural Development (NABARD) are the two major institutional mechanisms who established FPOs across different states. SFAC is the agency of Department of Agriculture and Cooperation providing technical support, training, research and management to establish market linkages.¹²⁸ Both are key stakeholders having great potential in developing water management and market linkage structures to enhance agriculture productivity.

Appendix B.1: Amul Dairy Cooperative case study

Individual small farmers have been overcoming challenges through the power of collective action for a long time.¹²⁹ The potential of cooperatives as a successful driver for dairy development was demonstrated by Kaira District Cooperative Milk Producers' Union Ltd, popularly known as Amul, during the 1950s and 1960s.¹³⁰ As a consequence, the National Dairy Development Board (NDDB) implemented "Operation Flood Programme," revolutionising the dairy industry through a cooperative model of procurement and marketing of milk and milk products. The establishment of 170 cooperative unions led to 10.7 million farmers becoming members by 1999-2000 (NDDB, 2002). Milk production in rural milk sheds has a fixed pathway set by the cooperatives, one of the major reasons for developing a ready milk market. It is also important to note that unlike the governmental restrictions in market access imposed on the rest of the agricultural sector, the dairy industry is subject to limited government intervention. The precedence of cooperatives has since grown to reach almost all villages of India. As a result of investment into cooperative infrastructure, the shares of the livestock sector in the agricultural gross domestic product increased from 17% in 1970 to 29% by 2014.¹³¹

Appendix B.2: Sahyadri Farms case study

Sahyadri Farms is a farmer producer company that has successfully formed a collective group of approximately 7,000 marginal farmers. The organisation covers more than 21,050 acres of farmland non-contiguously located in 15 areas surrounding Nashik. To tackle challenges faced in the current agriculture sector, the organisation set up input services including an agri-input facility center (supplying fertilisers, pesticides), an aseptic processing plant with capacity of 150 metric ton/day, weather stations, as well as crop-based management assistance using mobile phone technology. Cold storage with a capacity of 2000 metric ton has also been made available to farmers

Andhra Pradesh: A scoping study. Rythu Kosam Project. Research Report IDC-16. Patancheru 502 324. Telangana: International Crops Research Institute for the Semi-Arid Tropics. 160 pp. ISBN 978-92-9066-592-2

¹²⁸ Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. (2013). *Policy and process guidelines for farmer producer organizations*. New Delhi: Author. Retrieved from

https://mofpi.nic.in/sites/default/files/fpo_policy_process_guidelines_1_april_2013.pdf

¹²⁹ Poole, N. (2017). *Smallholder Agriculture and Market Participation*, p. 110. Rugby, UK: Practical Action Publishing.

¹³⁰ Singh, K., 2009.

¹³¹ Birthal, P. S., Joshi, P. K., Negi, D. S., and Agarwal, S. (2014). *Changing sources of growth in Indian agriculture: Implications for regional priorities for accelerating agricultural growth*. Washington, DC: International Food Policy Research Institute. Retrieved from https://www.researchgate.net/publication/274454659_Changing_Sources_of_Growth_in_Indian_Agriculture_Implications_for_Regional_Priorities_for_Accelerating_Agricultural_Growth

who would not have had the access otherwise. Crop-wise, FPCs are registered to aggregate each crop in mass quantity. The main crop of Nashik is grapes, yielding a high return on investment. As part of Sahyadri Farms membership, the organisation is responsible for market linkages and produce retailing. In 2018 alone, 1,162 metric ton of grapes were exported reaching international markets.

The governance structure of the organisation consists of 650 members in the parent company who are individual shareholders. Each of the members have one vote irrespective of how many shares a particular member holds. Under registered FPCs, dividends are provided in proportion to production. Sahyadri Agro Retail Ltd is a subsidiary retail marketing company, in which 36% shares of Farmer/FPO/Non-farmer investors and 64% shares of the parent company.

A pilot solar project supplies power to a part of their premises. They are also keen on developing a long-term solution to the reliability issue of power. There are key concerns about the renewable sector, including recent changes in net-metering policies causing uncertainties about the investment in solar. Policies also seem to be favouring the interests of power companies, according to the organisation. There are also uncertainties as to whether discoms are ready to buy from local consumers.¹³² Such uncertainties should be addressed when considering regulatory reforms.

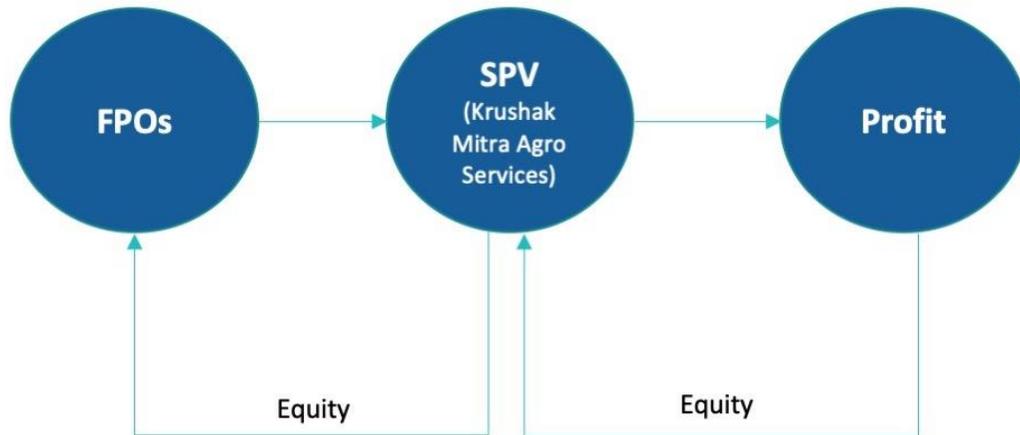
Appendix B.3: Yuva Mitra case study

Yuva Mitra is a social development organisation founded in 1995 focusing on rural development by institutional building and livelihood strengthening in Sinnar, Nashik. The organisation has played a crucial role in bringing together multiple stakeholders under FPOs for market linkages. The farmers' landholdings are mostly less than 5 acres, with crops such as onions, pomegranates, etc. grown in the region.

Having realised the benefits of collectivisation, the organisation formed FPOs, an FPO facilitation center and an intermediary organisation to strengthen the FPOs. To address the barriers faced by FPOs, Yuva Mitra set up an intermediary organisation named Krushak Mitra Agro Services Pvt. Ltd. that gains financial support from multiple stakeholders. As a marketing entity primarily, post-harvest facilities including warehouses and product marketing can reduce the burden on individual farmers and optimise economies of scale. Eight FPOs hold 26% of the stakes and the rest of the shares are owned by external finance, i.e., private organisations (Figure 6). The organisation is seeking alternative ways of funding to reduce issues of equity and increase farmer profits. The case of Krushak Mitra provides an alternative finance structure to optimise the income generation of farmer members.

¹³² Presentation given by Sahyadri Farms during visit.

Figure 6. Financial linkages between farmer producer organisation and special purpose vehicle (SPV)

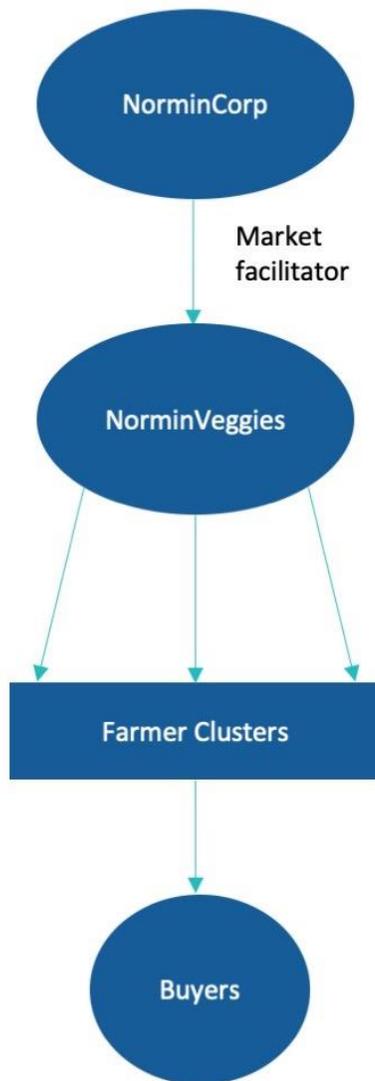


International experience with agriculture cooperatives

There are a number of examples internationally of fostering cooperative institutions to ameliorate agriculture problems. For example, a producer company called NorminCorp of the northern Mindanao vegetable producers' association (NorminVeggies) in the Philippines has been successful in interfacing between large buyers and small farmers of vegetables by working as a cooperative (Figure 7).¹³³

Quality farming and postharvest management is carried out by each farmer in the cluster, and coordination is provided for the sequence of activities that include order taking, shipment logistics, billing/charging, fee collection and remittance to the farmers. NorminCorp plan production at the cluster level with marketing facilitation for a fee, and use the income to cover the marketing management overhead.

¹³³ Singh, S., and Singh, T. (2014). *Producer Companies in India: Organization and Performance*, p.16. Ahmedabad: Centre for Management in Agriculture, Indian Institute Management. Retrieved from https://www.iima.ac.in/c/document_library/get_file?uuid=6eb2a966-9b58-4a85-94bd-b1aa38cd98a3&groupId=62390

Figure 7. NorminCorp market flow

Note: NorminCorp is a market facilitator linking the farmers through their cluster directly to the buyer. The farmer is given the buyer's price and is accountable for the product and retains ownership of the product until sale. This encourages the farmer to supply the best quality since the price is given to him/her and all sales are remitted directly after deducting the market facilitation fee, which is based on the quantity of accepted vegetables. The farmer and the buyer are responsible for quality and delivery, based on which the commercial terms are agreed upon. Products are labelled per farm or farmer provider for traceability.¹³⁴

¹³⁴ Vorley, B., Lundy, M., and MacGregor, J. (2009). Business Models that are Inclusive of small farmers. In da Silva, C. A., Baker, D., Shepherd, A. W., Jenane, L., and Miranda-da-Cruiz, S. (eds.): *Agro-industries for Development*, FAO, UNIDO and CABI Oxfordshire, pp. 186-222.

Appendix C: Water cooperatives case studies

Legislation under state water policies have collaboratively promoted farmers' participation in irrigation management through WUAs. Currently, 24 states out of 28 states have adopted Participatory Irrigation Management (PIM) partially or fully through the formation of WUAs by the enactment of specific acts or amendments to existing irrigation acts.¹³⁵ States such as Andhra Pradesh, Rajasthan and Maharashtra have advocated farmer participation in irrigation schemes – Andhra Pradesh Farmers Management of Irrigation Systems Act 1997; Rajasthan Farmers' Participation in Management of Irrigation Systems Act 2000; Maharashtra Management of Irrigation Systems by Farmers Act 2005. A few states including Andhra Pradesh and Maharashtra have formulated legislation to inculcate the water institutional framework – Andhra Pradesh Water Resources Development Corporation Act 1997; Maharashtra Water Resources Regulatory Authority Act 2005.¹³⁶ National Water Policy has encouraged active involvement through a bottom-up approach in irrigation management, with 56,539 WUAs being formed by 2017.¹³⁷ We visited various water users associations in different regions to gain a deeper understanding on ground.

Appendix C.1: Waghad Water Users Association case study¹³⁸

Maharashtra state government encouraged participatory irrigation management in 1991 by implying regulations on volumetric water allotment and a water cess on fixed volumetric rates. In 2003, multiple WUAs joined to take responsibility of the operation and management of the entire Waghad irrigation scheme by forming a federation called Waghad Project Level Water Users Association (PLWUA). Covering four villages, Waghad area is distributed according to tail, middle and head section, built on the medium irrigation project of Waghad dam. The main issue was that the Waghad dam was irrigating less than 1% of its total irrigatable command area.

Significant positive impacts have been recorded following the establishment of WUAs, such as the increase in land area covered under irrigation and hence an increase in farmer incomes. An average farm income of Rs. 60,000 per ha was recorded by 2007.¹³⁹ The irrigated area both under canal and well has increased from 7,377 ha in 2003 to 10,400 ha by 2008. The average income of a farmer in 2003-2004 was about \$1200USD/ha, which doubled to \$2800USD/ha by 2013-14.¹⁴⁰ Waghad is

¹³⁵ Sinha, P. K. (2019). *Farmers' participation in managing water for agriculture*. *Water governance: Challenges and prospects*, pp. 131-155. Singapore: Springer.

¹³⁶ Cullet, P., and Gupta, J. (2009). *India: evolution of water law and policy*. In *The Evolution of the Law and Politics of Water*, pp. 157-173. Springer, Dordrecht.

¹³⁷ Dhawan, V. (2017). *Water and agriculture in India* [Presented as a background paper for the South Asia expert panel during the Global Forum for Food and Agriculture (GFFA) 2017]. With support from the Federal Ministry of Food and Agriculture, Germany. Retrieved from https://www.oav.de/fileadmin/user_upload/5_Publikationen/5_Studien/170118_Study_Water_Agriculture_India.pdf

¹³⁸ Waghad Project [Website]. Retrieved from <https://www.waghadproject.org/aboutus.htm>

¹³⁹ Somawanshi, S.M. et al., 2009

¹⁴⁰ Somawanshi, S.M. et al., 2009

able to receive at least five to seven rotations in the Rabi and hot weather seasons together.¹⁴¹

The organisation complies with the regulatory framework set by the state under the Maharashtra Water Resources Regulatory Authority Act, 2005. With the strong backing of a regulatory policy managed through a financing mechanism, successful water management is enabled. All WUA s are governed through an election of members to form a Board of Directors, which takes on the responsibility of operation and management. The board makes a collective decision about the annual crop pattern, crop rotation and water distribution strategy according to water entitlements. Water bills are issued by the Water Resources Department, Government of Maharashtra (WRD) to the Water User Association for the total volume of water released at the canal head in every season. The government has allocated an executive engineer for the site to monitor payment and delays. The Federation has a patrolling team in place to ensure accountability by all members.

Appendix C.2: Yuva Mitra case study

The rural block of Sinnar is located in the Nashik district of Maharashtra near the Dev River. The state government has initiated infrastructure development by constructing highways and an airport. Farmers and villagers, however, do not receive reliable electricity supply or financial access such as affordable loan interest rates. Sinnar is a drought-prone area with a scarcity of water, fodder and food grains. People are primarily dependent on rain-fed agriculture and hence most choose to migrate to urban areas for employment. Water is sourced solely from wells extracting groundwater. The villagers' immediate needs are appropriate support for their agricultural-based livelihoods.

Yuva Mitra, which has formed FPOs as per previous discussion, was formed primarily to begin solving the water scarcity issue. Through the establishment of 296 diversion-based irrigation systems, the organisation has improved water availability in dams by desiltation. Water management is inculcated through catchment basin development from ridge to valley to maximise the irrigation potential, acknowledging the village topography. The organisation adopted an integrated water management approach by setting up WUAs subsequent to dam redevelopment and ensures successful implementation of participatory irrigation management. There are 24 WUAs registered under the Cooperative Societies Act.

Appendix C.3: Bharatiya Agro Industries Foundation (BAIF) case study

Bharatiya Agro Industries Foundation (BAIF) is a development research foundation working in agricultural development since 1967, and based in Urali Kanchan near Pune, Maharashtra. The organisation has taken an integrated approach to watershed development in many parts of India, and has established a strong network over time in rural and tribal areas. The organisation gathers funds for individual projects from mainstream financial institutions, public and/or private funding. Our field visits consisted of two villages — Randullabad and Karanjkhop, Maharashtra. In both villages, participatory irrigation management has been adopted to manage water by forming watershed development committee (Figure 8). Installation of farm bunds, line ponds and drip

¹⁴¹ IWMI-Tata Water Policy Program, 2012.

irrigation systems have been put in place. BAIF representatives manage the responsibility of operation and maintenance as well as address the communities' concerns.

Figure 8. Stakeholders directly managing the watershed committees



The farmers emphasised their need for a reliable and quality supply of electricity. Currently, the agriculture feeders receive a nighttime supply of approximately two to four hours per night. As a result, surge fees for labourers at night hours and environmental threats such as snakes are constant challenges. There is a significant demand for an effective governance structure similar to a water users association to manage the village's power load. In addition, the farmers have requested competitive price for the surplus electricity that gets produced. Small-scale solar has been procured, e.g. solar pumps have been installed to transfer water into overhead tanks. Currently, a village water committee run by women allocates water that be used by the population and maintains the drinking water system. These established institutional organisations can be given responsibility to manage village-level power distribution. Realising the need for electricity supply, rural electric cooperatives can emerge.

Appendix D: Electric cooperatives case studies

The concept of local cooperatives targeting rural energy access has been successful in the past. Extensive knowledge gleaned from international case studies of cooperatives provides crucial learnings for the Indian power sector. In 1930, fewer than 10% of farms in the United States had access to electricity.¹⁴² By the mid-1950s, nearly every farm in the country had electricity. Within less than 15 years, a thousand rural electric cooperatives had directly increased the share of farms electrified from 10.9% in 1935 to approximately 78% of all farms in 1949.¹⁴³

The establishment of the Rural Electrification Administration (REA) in 1935 as well as the Rural Electrification Act in 1936 fueled the development of locally owned rural cooperatives which enabled the expansion of electricity in the United States. Infrastructure financing was accomplished through the REA, resulting in 90% farms electrified by 1953.¹⁴⁴ The most crucial takeaway is that the electrical cooperatives were not solely an organic, grassroots movement. They were, and remain, creatures of strong and sustained government policy frameworks that provided substantial funding, technical expertise and institutional legitimacy. This policy framework was not only crucial in the early years of the electrical cooperatives, but has in large measure continued to the present. A detailed case study analysis on U.S rural electric cooperatives can be found in the referenced document.

Now a total of 930 rural electric cooperatives (864 distribution and 66 generation and transmission cooperatives) serve 42 million people in 47 states. These cooperatives own assets worth \$75 billion USD and employ 70,000 people. They own and maintain 2.6 million miles of the nation's electric distribution lines (42%) covering 75% of the nation's landmass, deliver 11% of the total kilowatt hours sold, and generate nearly 11% of the total electricity produced in the country each year.¹⁴⁵ Cooperatives also pay more than \$1 billion USD in state and local taxes.¹⁴⁶

The context of India differs and hence it will be crucial to analyse an example of an electric cooperative in India.

Appendix D.1: Dhundi Solar Cooperative Case Study

A first of its kind, Solar Pump Irrigator's Cooperative Enterprise (SPiCE) was formed by the International Water Management Institute (IWMI) in 2016 to facilitate irrigation through pumps powered by a solar plant. A cooperative was established in Dhundi, an off-grid village in the Kheda district of Gujarat where there is no access to the agriculture feeder supply. A power purchase agreement was made between six farmers with the support of IWMI and Madhya Gujarat Vij

¹⁴² 1930 U.S. Federal Census Records.

¹⁴³ U.S. Department of Agriculture. (1933). *Rural lines, USA; the story of cooperative rural electrification*. Washington, DC: Author.

¹⁴⁴ National Rural Electric Cooperative Association (NRECA) [Website]. Retrieved from www.nreca.org/

¹⁴⁵ National Rural Electric Cooperatives Association, 2017.

¹⁴⁶ Yadoo, A. et al., 2010.

Company Ltd (MGVCL).

Under the agreement, the state discom will buy power from the cooperative at Rs. 4.63 per unit for the next 25 years with total installed capacity of 56.4 kW. Thus, an additional source of income has been generated for the farmers. Farmers have also started selling water to neighbouring farmers as the price of pumping water from diesel is higher than the cooperative model. The cooperative is registered under the Cooperatives Act, 2002. A secretary is appointed who is responsible for overall management including operation, maintenance and complaint redressal. A monthly fee of INR 400 is charged to each farmer to cover maintenance costs.

As a result of the Dhundi cooperative, a sub-national programme was initiated in Gujarat called the Suryashakti Kisan Yojana (solar initiative for farmers, or SKY in short).¹⁴⁷ The initiative provides the purchase of excess electricity from the farmers at INR 3.5/kWh under a 25-year power procurement agreement plus an additional payment to farmers of INR 3.5/kWh capped at 1000 kWh/kW/year – interestingly called an Evacuation Based Incentive (EBI). The EBI payment will go directly to the farmers' loan repayment for the solar panels. The SKY initiative is being run as a pilot project capped at 175 MW of load from the agriculture sector.

¹⁴⁷ Suryashakti Kisan Yojana [Petition]. (2018). Retrieved from www.ugvcl.com/Petition%20of%20SKY%20YOJANA.pdf



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