

Experiments in farmers' collectives in Eastern India and Nepal: Process, benefits, and challenges

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Abstract

Do farmers' collectives, which pool land, labour, capital, and skills to create medium-sized production units, offer a more viable model of farming for resource-constrained smallholders than individual family farms? A participatory action research project in Eastern India and Nepal provides notable answers. Groups of marginal and tenant farmers, catalysed by the project, evolved into four different collective models with varying levels of cooperation, gender composition, and land ownership/tenancy status. Based on 3 years of action research, this paper examines how the models evolved and their differential outcomes. All groups have gained from cultivating contiguous plots in their efficiency of labour and machine use for land preparation and irrigation, and from economies in input purchase. Several collectives of tenant farmers have also enhanced their bargaining power vis-a-vis an entrenched landlord class and thus been able to negotiate lower rents and refuse long-standing feudal obligations. However, the models differ in their extent of economic gain and their ability to handle gender inequalities and conflicts over labour sharing. The paper explores the historical, regional, and cultural factors that could explain such differences across the models. It thus offers unique insights into the processes, benefits, and challenges of farmers' collectives and provides pointers for replication and further research.

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Farmers' collectives, group farming, participatory action research, eastern India, Nepal

1 | INTRODUCTION

Across South Asia, small and marginal farmers are facing new patterns of stress. Pressures include high levels of landlessness and growing inequality, dwindling plot sizes, and fragmented holdings. This is set against a backdrop of climate change, limited non-farm earning options, and a feminization of agriculture (Agarwal, 2019a; Sudgen et al., 2014). Government responses to growing farmer distress have been far from adequate. In India, for instance, in recent years, most state governments have favoured farm loan waivers and minimum support prices, rather than investments in irrigation or other long-term measures for increasing production or strengthening the institutional structure of farms (Agarwal, 2019).

For small and marginal farmers who have limited access to formal credit and are often net buyers of foodgrains, loan waivers and support prices bring little relief. What they need is to make farming itself viable by raising productivity. In this context, the case made by a few researchers, and especially Agarwal (2010a, 2018, 2019a, 2019b, forthcoming), for promoting collectives of smallholders, where farmers voluntarily pool their individually limited land, labour, capital, and skills to create larger units of production, appears especially compelling.

Agarwal (2014) argues, for instance, that a group approach to cultivation can involve varying levels of cooperation, ranging from “single purpose minimal cooperation,” such as joint marketing of output while farming individually, to “multipurpose limited cooperation” with joint crop planning, equipment purchase, and input procurement, and further to “multipurpose, comprehensive cooperation” where all inputs, including labour, are pooled and all output is shared. It is the last that, she notes, can bring the most benefit in terms of productivity and profits, by enlarging farm size, providing scale economies in machine and land use, enabling savings on labour and input costs, and enhancing the smallholders' bargaining power in land and other markets. She also finds empirical support for such gains in her detailed field survey and analysis for Kerala, India, with some cautionary lessons from her similar analysis for Telangana (Agarwal, 2018). In recent decades, although there have been small experiments in group farming in South Asia, none, to our knowledge, has led to the creation of as large a number of group farms as found in Kerala and Telangana, or have been studied as systematically as in Agarwal (2018, 2019b, forthcoming). The process of group creation and evolution has been even less mapped.

Hence, the experiments with group farming undertaken through an action research project (henceforth termed the Project), launched in South Asia by a consortium of local and international research institutes in 2015, are of particular relevance. These experiments are the focus of this paper. The local context of the Project being very different from that of Kerala and Telangana studied by Agarwal is also important in assessing the potential for replicating the model in diverse conditions. The idea for this project emerged in 2013, when a field team from the International Water Management Institute (IWMI), which was engaged in climate change research in the Eastern Gangetic Plains of Bihar (India) and Nepal, was developing a larger research proposal on socially sustainable dry season irrigation technologies. In this context, we noted the livelihood insecurity of tenant farmers, who constituted a notable proportion of the region's farmers. One of the NGO partners for this research—Sakhi in Bihar—already had over a decade of experience in setting up fishery collectives with poor women in Madhubani district (Bihar), with positive economic returns. The IWMI team, along with Sakhi, decided to apply this model to agriculture, on the premise that pooling owned or jointly leased land and labour and managing irrigation equipment provided by the Project would improve the livelihoods of pure tenants (those who own no land and cultivate only leased in land), marginal farmers, and women farmers, by increasing their bargaining power vis-a-vis landlords and enabling them to use land, labour, machines, and other resources more efficiently.

The team then initiated a dialogue with the NGO Centre for the Development of Human Initiatives (CDHI) on the potential for pursuing a similar model in West Bengal. The entire experiment was further influenced by Agarwal's 2010 paper, which outlined the experience of collective farming globally—from post-socialist countries to grassroots initiatives in South Asia—and advocated a new model of group farming, grounded in small scale, voluntary, and participatory units of production. The establishment of group farms was thus integrated by IWMI, the University of Southern Queensland, and a network of government and NGO partners (hereafter called the Project team)¹ into a larger proposal for an action research project “Improving Dry Season Irrigation for Marginal and Tenant Farmers on the Eastern Gangetic Plains.” It covered parts of Nepal, Bihar, and northern West Bengal (henceforth termed North Bengal). Funded by the Australian Centre of International Agricultural Research (ACIAR), the Project began in late 2014.

In mid-2015, a process was initiated to form farmers' collectives in six villages, two each in Nepal, Bihar, and North Bengal. The Eastern Gangetic Plains are characterized by a high incidence of poverty,² small-scale farming, limited commercialization, and high inequalities in land ownership, as well as highly unequal gender and caste relations (Leder, Shrestha, & Das, 2019; Sugden, 2017). Food insecurity is substantial, and male outmigration leaves many women managing both farm work and housework under severe resource constraints. In addition, in the Nepal and Bihar sites, we see a high dependence of landless and marginal farmers on leasing land through sharecropping from powerful landlords, whereas North Bengal deviates from this pattern due to the late-1970s land reforms undertaken by the government under its “Operation Barga” programme, which enabled landless tenants to become small owner cultivators.

We use the term “collectives” to describe the group farms catalysed by the Project, denoting high levels of cooperation, to differentiate them from “cooperatives,” a term used to denote a variety of organizations with varying levels of cooperation and, most typically, single activities such as marketing. In the three regions, 16 collectives were formed, later increasing to 20 as new groups emerged, some spontaneously. The initial groups were catalysed by the Project, but through a bottom-up participatory process, with farmers working to constitute models that they were most comfortable with. Four models of group farming thus emerged organically, differing in their extent of cooperation and dependence on land leasing. Within each model, groups also differed in their gender and age composition. Some were constituted only of men (young or middle-aged), others of only middle-aged women, and yet others of both genders and mixed ages. Some also changed in gender composition over time.

This paper is based on 3 years of intensive experimentation and research with these 20 farmers' collectives. (Except Bina Agarwal, all the other authors of this paper worked on the Project.) It aims to understand the process and social dynamics group formation and change, the benefits they have reaped so far, the challenges they have faced, and the lessons they provide for expansion and sustainability. Section 2 below outlines the potential of farmers' collectives. Section 3 gives details of the Project site selection, a background to the sites, and the data collection process. Sections 4 and 5 trace the evolution of the collectives, the diversity of models that emerged and why, and their management structures. Sections 6 and 7 outline the gains made, as well as the difficulties faced, especially in labour coordination, whereas Section 8 analyses why some collectives have been more successful in cooperation than others. The concluding Section 9 reflects on the lessons learnt and provides pointers for future work on the Project, as well as on the need for further research on group farming systems.

It needs mention here that although there is a substantial body of empirical work on collective action around the commons, such as for protecting forests and water bodies,³ research on collective action around private property

¹The government partners included North Bengal Agricultural University (Uttar Banga Krishi Viswavidyalaya), the Indian Council of Agricultural Research (ICAR), and the Department of Irrigation and Groundwater Resources Development Board in Nepal. The NGO partners were the International Development Enterprise in Nepal (with the support of the Krishak Samuha Sangh), CDHI in West Bengal, and Sakhi in Bihar.

²The incidence of poverty is 39.5% in Nepal's Saptari district (GoN, 2014), 45% in Bihar's Madhubani district (ADRI, 2007), and 42% in North Bengal's Cooch Behar district (Gol, 2010).

³Apart from Ostrom's (1990) classic work, see also, Baland and Platteau (1996) for an overview of the literature; Agarwal's (2010b) detailed empirical work on forest governance from a gender perspective; and Craig et al. (2016) for a global assessment of evidence.

resources is sparse. Moreover, the theoretical insights from the commons literature cannot be applied automatically to farmers' collectives constituted around private property. Increasing the number of empirical studies, including those in this paper, could in time provide the grist for such theory building.

2 | THE PROMISE OF FARM COLLECTIVES

Historically, collective farming systems have had a chequered history, given the often failed initiatives both in the socialist bloc and the 1960s and 1970s attempts in post-colonial developing countries to promote cooperative farming as part of their agrarian reform programmes. A complex set of factors (which cannot be detailed here) underlay the failures of these past efforts, both institutionally and in terms of productivity. However, broadly, among the contributory factors were top-down, often coercive methods of implementation, very large-sized farms, and large and heterogeneous groups, commonly involving both small and large farmers, despite their divergent interests within complex class structures (see variously, Robinson, 1967; Nove, 1969; and Lin, 1990 on the socialist experience, and Apthorpe, 1972; Borda, 1971; Brass, 2007; Ghose, 1983; Harris, 1980; and Scott, 1999 for the postcolonial 1960s–1970s examples. See also the overview in Agarwal, 2010a).

Shifts away from these features increased the chances of success. For example, even in Maoist China, Li (2018) demonstrates that collectives failed primarily when the state forcibly formed large farms where members lacked solidarity and a sense of belonging and where remuneration was connected poorly with labour contributions. Subject to favourable ecological and external economic conditions, Chinese collectives performed relatively well when the groups were smaller and corresponded with existing communities and lineages with strong social ties. Similarly, group farms formed voluntarily by families and neighbours after decollectivization in some former socialist countries (such as Romania, East Germany, and Kyrgyzstan), to deal with land and machine scarcities, were more successful, both in cooperation and productivity (see e.g., Mathijs & Swinnen, 2001; Sabates-Wheeler, 2002; and Sabates-Wheeler & Childress, 2004). Successful cases can also be found in European democracies (e.g., France: Agarwal & Dorin, 2018 and Norway: Almas, 2010). However, since the 1990s, there has been a renewed interest in farmers' collectives (especially all-women groups) in South Asia, manifested initially in sporadic regional initiatives (see Agarwal, 2003; Landesa, 2013), and from the 2000s onwards, in more systematic efforts on a larger scale in south India (Agarwal, 2018, 2019b, forthcoming).

These new initiatives have emerged from very different models to those that were tried in South Asia in the 1960s–1970s. They have built upon several decades of successful grassroots experience in promoting self-help groups (SHGs); community groups cooperating for governing common pool resources, such as forests and water bodies; and collectives formed to better deliver health and education programmes (Agarwal, forthcoming). In particular, SHGs, of which there were 2.6 million in the mid-2000s, begun mostly by NGOs and most constituted of women only (Tanka, 2012) provided a prototype. Successful cooperation across such diverse contexts brought both experience and optimism, laying the ground for creating farmers' collectives, even if the challenges of the high level of coordination that group farming requires remain.

The potential advantages of *voluntary bottom-up* smallholder collectives can be manifold (Agarwal, 2010a). By farming in groups, marginal farmers can make large-scale investments and spread risk. Capital can be pooled for agricultural equipment such as tractors and irrigation pump sets—the latter to build climate resilience. This is important because, individually, it is not economical for very small farmers to purchase large machines and the machine rental market is neither efficient nor equitable. Bulk purchase of inputs such as fertilizers can reduce costs. Most importantly, by collectively pooling land, a group can enlarge its farm size and operate a contiguous plot, thus allowing more efficient use of equipment and labour. Moreover, group farms can enhance the farmer's bargaining power for leasing land on more favourable terms—a benefit that would accrue particularly to women, who usually lack the power to strike favourable deals. In addition, group farming can facilitate labour saving, particularly in peak seasons. Group formation can also bring non-economic benefits in terms of capacity building and social and political empowerment for the poor, and especially women.

At the same time, there are also potential challenges in farming jointly, especially in managing labour time and ensuring that all group members contribute equally, as well as in terms of intragroup inequalities along gender and caste lines, which can create hierarchies in decision-making and interactions. These and related challenges, in turn, can undercut potential benefits. In which direction the effects move requires empirical examination.

On productivity and profits, for instance, Agarwal (2018) carried out a large primary survey in Kerala and Telangana and compared all-women group farms and individual family farms (95% of which were male-managed) in the same districts. She found that in Kerala, group farms relative to small individual family farms had five times higher net annual returns per farm, 1.8 times the net annual returns per hectare, and 1.8 times the annual value of output per gross cropped hectare, with substantially higher outputs for commercial crops such as bananas. However, paddy yields were lower in group farms than individual farms, because the groups could not easily lease in fertile paddy land which most male landowners chose to self-cultivate. The difference between foodgrains and other crops was also found in the Telangana results, where group farms relative to individual farms had a lower productivity for cereals but equivalent yields for cotton and equivalent overall net returns per hectare, especially due to saving on hired labour. Small group size, commercial cropping, wider social networks, and institutional and government support structures were all found to matter for building successful and sustainable collectives.

We drew lessons from past research and past experiences when we catalysed the formation of farmers' collectives in our project sites. At the same time, as outlined in Section 4, the farmers had a substantial say in shaping the models they felt would work for them and their contexts. In addition, although we have not yet collected the kind of detailed data needed to assess the productivity and profits of farmers' collectives—it is perhaps too soon to do so because the models are still evolving—we do have information on the average yields of the major crops in the preintervention and post-group formation periods, as well as on the economic empowerment benefits of group formation. We also discuss the challenges faced so far in collective functioning and trace the process through which different models of group farming have evolved.

3 | THE SITES AND THEIR FEATURES

The Project covers two countries, four districts, and six villages (Table 1), all located in the Eastern Gangetic Plains. Two villages are located in Nepal (Koiladi and Kanakpatti in Saptari district in the Terai-Madhesh region) and two each in the Indian states of Bihar (Bhagwatipur and Mahuyahi in Madhubani district) and North Bengal (Dholaguri in Cooch Behar district and Uttar Chakoakheti in the neighbouring Alipurduar district). All three regions are highly dependent on agriculture and are economically and politically peripheral within their respective states.

Saptari in Nepal and Madhubani in Bihar fall in separate countries, but share a caste structure, economy, and language (Maithili); deeply entrenched semifeudal class inequalities going back a long way historically; and exploitative landlord–tenant relations (Alden-Wily, Chapgain, & Sharma, 2008; Sugden, 2017; Sugden & Gurung, 2012). The North Bengal villages share some features in common with these two regions, but differ culturally and in their patterns of inequality, as discussed further below.

A census conducted in all six villages reveals high inequalities in land ownership (Tables 2 and 3). Over half the village households in Saptari (Nepal) and Madhubani (Bihar) are landless, and just over 40% lease in land and cultivate

TABLE 1 Collective farming pilot sites

State	District	Villages
Nepal	Saptari	Koiladi, Kanakpatti
Bihar (India)	Madhubani	Bhagwatipur, Mahuyahi
North Bengal (India)	Cooch Behar	Dholaguri
	Alipurduar	Uttar Chakoakheti

TABLE 2 Distribution of owned land among households: Satpari, Nepal, both study villages

Land ownership categories	No. of HHs in village	HHs (%)	HHs in given category renting land (%)	% land owned by category
Landless	386	54.8	40.7	0.00
Marginal (<0.5 ha)	172	24.4	52.9	12.8
Small (0.5–<1 ha)	68	9.6	27.9	14.2
Medium (1–<2 ha)	52	7.4	7.7	21.1
Large (≥2 ha)	27	3.8	8.3	27.5
Land not owned by surveyed farmers ^a		NA	NA	24.4
Total	705	100.0		100.0

Source: Baseline census survey of village by research team (2015).

Abbreviation: HH = household.

^aMostly includes land owned by absentee land owners, which is cultivated on a rental basis.

TABLE 3 Distribution of owned land among households: Madhubani district, Bihar, both study villages

Land ownership categories	No. of HHs in village	HHs (%)	HHs in given category, renting land (%)	% land owned by category
Landless	455	53.4	41.8	0.00
Marginal (<0.5 ha)	276	32.4	37.0	22.5
Small (0.5–<1 ha)	87	10.2	17.2	25.7
Medium (1–<2 ha)	18	2.1	16.7	10.6
Large (≥2 ha)	16	1.9	0.0	36.0
Land not owned by surveyed farmers ^a		NA	NA	5.2
Total	852	100.0		100.0

Source: Baseline census survey of village by research team (2015).

Abbreviation: HH = household.

^aMostly includes land owned by absentee land owners, which is cultivated on a rental basis.

as tenant farmers, typically on a 50:50 sharecropping basis. Almost all the remaining farmers are marginal and small, owning less than 2 ha, although many of this group also lease in land to supplement their small holdings. Sixty-four percent of the land across the two Madhubani villages and 60% in Satpari is under tenancy. Only 3.8% of farmers in Saptari and 1.9% in Madhubani cultivate 2 ha or above, yet these few farmers respectively own 27% and 36% of the land. Saptari, in particular, also has absentee landowners (owning an estimated 24% of the land), many of whom have moved to urban areas, but remain quite powerful in their villages of origin. Some 85% of the rented land in Kanakpatti and over 90% in Bhagwatipur and Mahuyahi is sharecropped on a 50:50 basis, the remaining being under fixed rent contracts with payments in kind, which are usually a fixed amount of paddy or wheat. Although this is a drought-prone region, groundwater is available and shallow tube wells are widespread. However, sharecropping discourages investment, because half of any output increase due to irrigation would go to the landlord. Moreover, tenants are unlikely to bore tube wells in land that they do not own (see Sugden & Gurung, 2012; Sugden et al., 2014).

The agrarian history of North Bengal until the 1960s was similar to that of Madhubani and Saptari: all came under the zamindari system in the colonial period. However, in West Bengal, under land reforms in the late 1970s, landless tenant farmers received land via the “land to the tiller” policy, enabling them to become small peasant proprietors. This transformed agriculture in the state in many ways (Banerjee, Gertler, & Ghatak, 2002). Nevertheless, the problem of small fragmented holdings largely persisted, so that even in post-reform West Bengal, individual

TABLE 4 Distribution of owned land among households: North Bengal, India, both study villages

Land ownership categories	No. of HHs in village	HHs (%)	HHs in given category, renting land (%)	% land owned by category
Landless	189	37.3	15.9	0.00
Marginal (<0.5 ha)	177	34.9	17.5	18.6
Small (0.5–<1 ha)	97	19.1	9.3	30.0
Medium (1–<2 ha)	31	6.1	0.0	17.8
Large (≥2 ha)	13	2.6	0.0	16.4
Land not owned by surveyed farmers ^a		NA	NA	17.2
Total	507	100.00		100.00

Source: Baseline census survey of village by research team (2015).

Abbreviation: HH = household.

^aMostly includes land owned by absentee land owners, which is cultivated on a rental basis.

investments in irrigation remained unfeasible for most farmers. The land reforms also failed to address the glaring gender inequalities in land ownership (Gupta, 1993).

Unlike the Project villages in Nepal and Bihar, with their high degree of landlessness and dependence on tenancy, in North Bengal only 19% of land is under tenancy and only 16% of landless households and 18% of marginal landowners rent in land (Table 4). Most farmers cultivate a single paddy crop. A few rent pumpsets and tube wells for irrigation, although the much higher rainfall in this region allows some rainfed agriculture.

The farmers in the study regions commonly operate three to four plots, usually on minute scattered fields (Table 5). In the Bihar sites, the average plot area is only 0.19 ha. Here, even landless tenants cultivate multiple plots, each averaging 0.17 ha. The baseline census data showed how households that both own and rent in land often cultivate five to seven very small plots, renting land wherever available from several landlords. Plots for all farmers are on average a 19-min walking distance from the house. The tiny scattered plots make investment in irrigation and the use of tractors difficult and often even unfeasible. Hence, in the Bihar villages, group members reported that the amount of land cultivated in the dry winter season depended on how much residual monsoon moisture remained in the soil. Given the impracticalities and high costs of irrigation, large areas would be left fallow after the rice harvest until the next year's rains.

In Saptari (Nepal), similarly, most farmers operate two to three very small plots, and farmers renting land have to walk 19 min on average to reach their fields. In North Bengal, however, the number of plots operated is fewer, although plot sizes are similarly small.

In all three sites—Nepal, Bihar, and North Bengal—farmers are now facing stress due to climate change and rising costs of diesel and equipment (Sugden et al., 2014). This further raises the already high barriers in accessing irrigation and increases the farmers' vulnerability to drought. Moreover, cyclical or long-term male outmigration has become a key component of livelihoods. In the Bihar and West Bengal sites, men migrate to Indian cities, whereas in Saptari (as across Nepal), migration to the Gulf states and Malaysia is widespread (Sugden, Saikia, Maskey, & Pokharel, 2016). Women are thus increasingly responsible for labour-intensive agricultural tasks and overseeing farm operations,⁴ whereas control over water and land remains with men. As a result, women's workload, especially for female household heads, has increased greatly (Sugden et al., 2016). Agricultural and water-related programmes in the region, however, fail to address the structural barriers faced by women farmers (Leder, Clement, & Karki, 2017).

These conditions provided fertile ground for the establishment of farmers' collectives involving marginal landowners, pure tenants, and women farmers.

⁴See Adhikari and Hogley (2011), Maharajan et al. (2012), and Paris et al. (2005).

TABLE 5 Four models of farmers' collectives

Collective model	Target group	Levels of cooperation	Land arrangement	Labour arrangement	Collective sharing	Region where model is piloted
Model 1	Landless/tenants	Multipurpose comprehensive cooperation	Collective leasing of one contiguous area	Pooled labour within group	Land, labour, inputs, all costs and produce	Bihar (India) Madhubani district Nepal, Saptari district
Model 2	Small owner cultivators	Multipurpose comprehensive cooperation	Consolidation of private plots under one contiguous area	Pooled labour within group	Land, labour, inputs, all costs and produce	North Bengal (India) Alipurduar and Cooch Behar districts
Model 3	Landless/tenants	Multipurpose medium cooperation	Collective leasing of one contiguous area, but maintaining individual sub-plots	Household labour on own land	Land preparation, irrigation, and input purchase	Bihar (India) Madhubani district Nepal, Saptari district
Model 4	Small owner cultivators	Multipurpose medium cooperation	No leasing. Maintenance of individual subplots within single contiguous area	Household labour on own land	Land preparation, irrigation, and input purchase	Bihar (India) Madhubani district

Source: Authors' typology.

4 | FORMING THE COLLECTIVES AND INITIATING THE RESEARCH

4.1 | Participatory action research and setting the groundwork

In order to select suitable Project villages, a shortlist of settlements was prepared across the four districts, where the challenges facing smallholder agriculture were seen as representative of the larger region, based on government census data on landlessness and the extensive knowledge of local Project partners. After holding focus group discussions in each settlement, a ranking tool based upon key criteria was used to select the final six villages. In 2015, a census of every village household was then conducted in these six villages, to provide extensive livelihood data.

Subsequent research followed after the “Action Research” Project began. The process involved a cycle of planning, implementing the intervention, and evaluating the result. This Project sought to address decades of failed efforts to promote equitable intensification of agriculture in the Eastern Gangetic Plains, by piloting innovative solutions through farmers’ collectives. The research team, however, took this a step further, by ensuring that the research was driven by the participants themselves (in this case the farmers) in a democratic model that gave them ownership over the knowledge produced—in keeping with the principles of participatory action research (McTaggart, 1991; Pain, Whitman, & Milledge, 2012). Throughout the research process, therefore, we attempted to reduce the unequal relationship between participants and the Project team, through a cyclical process of engagement with the farmers. The farmers themselves shaped the design of the proposed collective models in each village, while regularly sharing their learning and the solutions they found throughout the piloting period.

Initial engagement with farmers began in mid-2015, through a series of community meetings to introduce the Project, assess the farmers’ perspectives on the socio-economic and technical challenges they face in agriculture, and discuss the potential for high level cooperation to address some of these constraints. This was led by the project NGO partners, all of whom had worked extensively in the region for decades. Some of them were new to the specific project villages, and they invested time for social mobilization, whereas others (such as Sakhi in Bihar) had already worked in many of the project villages and had established strong trust and rapport with the community. An iterative process of engagement between the farmers and the research team was followed, which started with community meetings and extended over several months (via farmer group meetings and day-to-day engagement with the Project team members).⁵ In these meetings, the merits, drawbacks, and practicalities of collectively organizing land, labour, and capital were discussed. By the end of this process, we had identified several groups of participants interested in taking these ideas forward.

During initial community consultations, it was clear that the farmers did not think it was problematic to establish multipurpose medium cooperation, such as for joint irrigation and marketing. However, pooling labour and land was considered to be both difficult and risky, even while they recognized that it offered the potential for reaping the most benefit. It thus became clear to the Project team that flexible models were needed to take into account different land ownership regimes and the degree to which farmers were comfortable shifting from individual to group cultivation. Different groups thus ended up pursuing different levels of cooperation, as discussed further below.

Under the guidance of the NGO partners, groups were formed on a voluntary basis by villagers who fell within the marginal farmer category. Priority was given to farmers owning 0.5 or less and to tenant farmers: for example, in Bihar and Saptari, members of 10 out of 12 groups depended mostly on tenancy. Women members were especially encouraged to join the experiment, because they were the most affected by male outmigration. However, given that both men and women were interested and group formation was largely farmer led, many mixed-gender groups emerged, particularly in North Bengal. Efforts were also made to enrol some farmers with demonstrated leadership

⁵In all three sites, full-time skilled research coordinators were appointed (one in each site). They spent most of their time in the villages and kept regular contact with the rest of the Project team. In Bihar, they even resided within one of the communities, near the main office of the NGO Project partner, Sakhi. The presence of these coordinators and the strong base of the NGO partners in these communities allowed continuous interaction between the Project team and the farmers.

ability or experience within each group, including those who were somewhat better educated and had broader social networks. This is important because although groups with members from similar social or gender backgrounds can reduce possible conflicts, high homogeneity can narrow the social capital base of the group (as Agarwal, 2018, also finds in her research in Kerala and Telangana).

Farmers had multiple motives for forming collectives, the most important being a recognition of the potential benefits of cooperation. But clearly, it also helped that they would get access to “free” irrigation technology, training in efficient water management, and support from the Project team for dry season vegetable production. Whether such an incentive is needed for replicating the model elsewhere needs further probing and will be discussed in Section 9 of the paper. In terms of cooperation, many farmers recognized that sharing labour in groups could save time, increase the efficiency of labour use, and help raise productivity in ways not possible with individual farms. Observing the pilot farms also made a difference, because in Madhubani and North Bengal, two new groups formed autonomously and requested the Project team to play a facilitating role.

4.2 | Four types of models

Given that the process of achieving higher levels of cooperation was essentially farmer led, in line with participatory action research principles, a range of models evolved organically, depending especially on different land ownership regimes. In the Bihar and Nepal sites, given the large number of pure tenant farmers and marginal landowners who also rent in additional land, the lease market was itself an entry point for encouraging group formation. Forming a group could increase the tenants' bargaining power with landlords, whereas improved productivity could increase net returns after deducting the rent and other costs. It was required for groups to be on fixed rent contracts rather than sharecropping contracts, because past research from this region has shown that fixed rent tenancies offer greater benefits to tenants, as the tenant keeps the gains from any increase in productivity (Sugden & Gurung, 2012). Sharecropping reduces incentives, as the landlord takes a share of the increased effort and investments, facts that were ascertained during the baseline survey and discussions with the farmers.⁶

In the two North Bengal villages, by contrast, there was limited surplus land to lease for forming collectives. Although some outmigrating farmers had rented out their land, the plots were generally small and already cultivated by tenants and were not comparable with the large tracts belonging to (often absentee) landlords in Saptari (Nepal) or Madhubani (Bihar). In the North Bengal sites, there were a few large farmers, while around two-thirds of the land belonged to smallholders with between 0.5 and 2 ha (Table 4). In this context, new mechanisms of cooperation were piloted, based upon smallholders pooling their own land rather than leasing land from others.

Overall, four models evolved, adapted to both the land ownership structure outlined above, the pre-existing willingness of farmers to manage different levels of cooperation, and their experience with working in groups over time. As of early 2018, the models that were established in each village are outlined in Table 5 and are discussed below.

4.2.1 | Model 1: Fully integrated cooperation with leased land

In Bihar and Nepal, tenant farmers, who constituted a significant proportion of the farming population, were willing to engage in high levels of cooperation. Here, the Project team, along with the farmers, developed a model whereby groups would lease in land collectively, farm it as a group, and share all costs and outputs.

⁶Although sharecropping can allow “risk” sharing between landlords and tenants, these benefits only accrue if landlords also contribute to the costs of production. We found in our baseline survey, however, that landlords rarely contribute to the costs of irrigation or fertilizer. Farmers thus bear disproportionate losses if the crop fails.

4.2.2 | Model 2: Fully integrated cooperation with own plots

In North Bengal, again, groups were willing to take up a high level of cooperation, but because there was little land for leasing group members decided to consolidate their own plots to farm collectively. Most group members preferred to operate as a collective only in the dry season, although there were other forms of cooperation during the monsoon, such as labour exchange, and one of the all-women groups farmed collectively all year round.

In both Models 1 and 2, labour and output were shared, the only difference being that the land was leased in Model 1 and owned by group members in Model 2.

4.2.3 | Model 3: Medium levels of cooperation with leased land

The disinclination of farmers in some communities to pool labour paved the way for models involving medium levels of cooperation. In Bihar and Nepal, for example, some tenant farmers agreed to collectively lease a contiguous plot of land (as in Model 1) and cooperate for some activities, including land preparation (e.g., ploughing), irrigation and marketing, sometimes also exchanging labour during busy spells, but decided to carry out other labour activities on their subplots individually, within the larger group plot.

4.2.4 | Model 4: Medium levels of cooperation with owned land

Among owner cultivators in Madhubani (Bihar), a fourth model evolved. Here, marginal farmers owning their own fields pooled a contiguous area and cooperated for land preparation, irrigation, and input purchase, but not for sharing labour. Some of them had additional plots in other parts of the village, which they continued to cultivate individually.

Groups were free to shift from one model to another during the Project life cycle. For example, if the collective labour pooling became unmanageable under Model 1, the group could shift to Model 3. Similarly, a group pursuing Model 2 could, in theory, reconstitute as Model 4. The reverse could also occur. If farmers were uncomfortable initially with collective labour pooling, they could begin farming individual subplots but shift to collective labour once the group became more cohesive. We saw such shifts taking place in several cases during the Project period.

Some groups evolved into mixed models. Among two groups in Saptari (Nepal), for example, part of the leased land was set aside for individual farming under Model 3 and the remainder for group farming under Model 1. Similarly, in all but one of the sites in North Bengal, land was cultivated collectively during the dry season under Model 2, but cultivated individually during the monsoon season under Model 4. This diversity of models is notable and suggests the potential for adaptation to diverse conditions.

4.3 | Data collection

A baseline census survey was carried out prior to the intervention, along with farmer interviews, to understand their livelihood trajectories. After the pilot, collectives were set up. Between 2015 and 2019, a series of field visits was undertaken at different points in the crop cycle, to collect key information on challenges faced by the collectives in group management. This included two rounds of in-depth focus group discussions with the collectives, as well as interviews with individual members, at the end of 2016 and 2017. The discussions were based on a standardized guide that the Project team had prepared for collective reflection on the successes and challenges of the models. Further data were collected seasonally from each group on crop yields, costs, labour mobilization, and irrigation, throughout the Project life cycle, from the winter of 2015 until the winter of 2018. In

February 2017, a meeting of group representatives from all six sites was held in Madhubani to reflect on the field experience and encourage cross learning among participants. This meeting was also attended by invited resource persons, such as Bina Agarwal, and course correction was introduced in some of the collectives. The insights provided by the field teams, based in each of the sites throughout the 3-year period, were significant sources of additional information.

5 | GROUP CHARACTERISTICS AND MANAGEMENT

As seen from Table 6, the groups range in membership between 4 to 10 members. Of all the groups, five are women-only groups, three are men-only, and 12 are mixed-gender. Among the latter, eight have one-third or more women and five have less than one-third women. It has been noted in the context of collective action around community forest protection groups in India and Nepal that a critical mass of 25%–33% women makes a significant difference to women's effective participation in the group and also to conservation outcomes (Agarwal, 2010b). Hence, it would be interesting to examine, as the Project progresses, how well groups perform according to their gender composition, in terms of women's participation and economic outcomes. In particular, the Uttar Chakoakheti Group 2 (North Bengal) initially had one woman with six landowning men, potentially creating a situation of unequal power relations between the lone female member and the rest of the group. To overcome this imbalance, the group composition was subsequently changed by inviting one more woman to join the group.

The Nepal groups are all constituted of Adivasi (indigenous) or Dalit communities, the Bihar groups are all-Dalit or a mix of Dalits and Other Backward Castes (OBCs)⁷, with one being a predominantly Muslim group. The North Bengal groups are either all tribal or Rajbanshis.⁸ In other words, by ethnicity or caste, there is a substantial homogeneity within each group.

After land pooling, the average plot size of the groups was 0.56 ha in Nepal, 1.61 ha in Bihar, and 1.44 ha in North Bengal, substantially larger than the average plots cultivated by individual farmers (see Table 7). These are all single contiguous plots created by the consolidation of multiple smaller plots after the intervention. Before intervention, as already noted, the farmers were cultivating several small plots.

All groups have a management committee with a chairperson, secretary, and treasurer. They normally convene monthly meetings, but meet more frequently during peak periods in the agricultural cycle. For Models 1 and 2, which share all labour, meetings are held to plan labour and input contributions and the division of tasks for current and future crop cycles. Most members also cultivate their own plots on the side. Usually, group members agree upon a date and time to complete a required task collectively, although one-off tasks such as going to purchase inputs are allocated to members on an ad hoc rotating basis. Most groups do not have a system to record labour input by different members, but given their small group size and the fact that they know each other well, it is possible to largely ensure equal work contributions, although some challenges remain, as discussed in Section 7.

For Models 3 and 4, the meetings focus on shared tasks requiring cooperation, such as managing irrigation equipment. They also jointly plan cropping patterns and discuss when to irrigate and what inputs and techniques to use.

In all the groups, members make monthly contributions to a group fund. All the farmers in a group contribute equally. Contributions range from NPR 100 in Nepal to INR 100 in India,⁹ with some variation between the models. Additional contributions are sought if needed. The groups use the fund to cover production costs. In Models 1 and 2, the group fund is used to cover land preparation, maintenance of equipment, and purchase of inputs such as fertilizer and diesel or electricity for pumps. In Models 3 and 4, most input costs are covered by individual farmers and

⁷OBC is a Government of India classification for certain caste groups that are historically disadvantaged, but not considered Dalits.

⁸Rajbanshis are an indigenous ethnic group from North Bengal, and although they are classified in India as a "Scheduled Caste," they are not part of any pre-existing caste system, unlike in Nepal where Rajbanshis were integrated into the state-sanctioned caste system of the 19th century.

⁹US\$1 = INR 71 or NPR 114.

TABLE 6 Key characteristics of collectives in each site

Site	Village and group	No. of members	Women's group (%)	Caste or ethnic group	Type of models (summer 2019)	Farm Size (ha)	Type of land pooling	Labour and produce shared
Nepal Saptari district	Kanakpatti 1	8	100.0	Tribal	1	0.29	Collective lease	yes
	Kanakpatti 2	8	87.5	Tribal and Muslim	3	0.57	Collective lease	yes
	Kanakpatti 3	7	71.4	Dalit	3	0.74	Collective lease	yes
	Kolladi 1	6	33.4	Tribal	1>>>3	0.81	Collective lease	yes>>>no
	Kolladi 2	6	66.7	Tribal	1>>>3	0.51	Collective lease	yes>>>no
	Bhagwatipur 1	8	37.5	Dalit	1>>>3	1.5	Collective lease	yes>>>no
Bihar (India) Madhubani district	Bhagwatipur 2	9	12.5	Dalit	4	2.1	Individually owned plots	
	Bhagwatipur 3	7	28.6	Dalit and Yadav	4	3.2	Individually owned plots	
	Bhagwatipur 4	5	100.0	Dalit and Yadav	1>>>3	0.8	Collective lease	yes>>>no
	Mahuyahi 1	6	50.0	Muslim and Yadav	3	1.0	Consolidation of private plots	
	Mahuyahi 2	5	100.0	Dalit	1	1.08	Collective lease	yes
	Mahuyahi 3 (youth group)	4	0.0	Dalit	1	1.61	Collective lease	yes
	Dholaguri 1	5	0.0	Rajbanshi	2 (4 in monsoon)	1.19	Consolidation of private plots	yes
	Dholaguri 2	10	40.0	Rajbanshi	2 (4 in monsoon)	1.34	Consolidation of private plots	yes
	Dholaguri 3	9	44.4	Rajbanshi	2 (4 in monsoon)	0.68	Consolidation of private plots	yes
	Dholaguri 4	5	100.0	Rajbanshi	2	1.00	Consolidation of private plots	yes
North Bengal Alipurduar and Cooch Behar districts		8	0.0	Tribal	2 (4 in monsoon)	2.39	Consolidation of private plots	yes

(Continues)

TABLE 6 (Continued)

Site	Village and group	No. of members	Women's group (%)	Caste or ethnic group	Type of models (summer 2019)	Farm Size (ha)	Type of land pooling	Labour and produce shared
Uttar Chakoakheti 1		7	14.3	Tribal	2 (4 in monsoon)	2.20	Consolidation of private plots	
Uttar Chakoakheti 2		7	100.0	Tribal	2 (4 in monsoon)	1.77	Consolidation of private plots	yes
Uttar Chakoakheti 3		7	28.6	Tribal	2 (4 in monsoon)	0.93	Consolidation of private plots	yes
Uttar Chakoakheti 4		7						

Note. >>> means move from one type of model to another.
Source: Seasonal survey conducted by field team.

TABLE 7 Number and size of plots by farmer category before and after intervention (averages based on village level data)

Farm category	Nepal			Bihar			North Bengal		
	Saptari			Madhubani			Cooch Behar, Alidurpur		
	Average no. of plots	Average size of plots	Average farm size	Average no. of plots	Average size of plots	Average farm size	Average no. of plots	Average size of plots	Average farm size
Preintervention individual farms									
Landless tenant	1.78	0.33	0.24	2.27	0.17	0.16	1.41	0.27	0.40
Marginal owner (<0.5 ha)	2.58	0.21	0.53	3.07	0.11	0.28	1.48	0.21	0.34
Small owner (0.5–<1 ha)	3.51	0.25	0.71	4.03	0.19	0.50	1.79	0.39	0.77
Medium owner (1–<2 ha)	3.55	0.38	1.02	5.39	0.28	1.29	2.12	0.6	1.55
Large owner (2–<5 ha)	4.25	0.77	1.36	4.88	0.72	2.00	2.27	0.98	2.16
Very large owner (≥5 ha)	3.67	1.63	1.95	3.38	2.2	1.16	4.5	1.19	5.29
All owners	2.65	0.32	0.46	3.05	0.19	0.29	1.66	0.37	0.66
Post-intervention group farms									
1.0	0.56	0.56	0.56	1.0	1.61	1.61	1.0	1.44	1.44

Source: Baseline census survey of village by research team (2015) and post-intervention data from seasonal survey collected by field team as of September 2018.

the group fund is used to cover the costs of land preparation and maintaining the pumpset.¹⁰ Because the groups have contiguous plots, tractor ploughing becomes more feasible and is sometimes covered by the group fund. After ploughing, farmers in Models 1 and 2 meet at prearranged times for key activities such as sowing, transplanting, weeding, and harvesting. In Models 3 and 4, farmers are responsible for their own plots after initial land preparation, with partial cooperation on some additional activities.

In all four models, farmers cooperate for irrigation. Groups have access to a variety of equipment, including solar, diesel, and electric pumps, which were provided as part of the technical work package of the Project. Water allocation is straightforward for Models 1 and 2, as all the land is irrigated simultaneously for each crop. For Models 3 and 4, farmers must allocate the water in turns to their subplots, based on need.

Under Model 1 (the pure lease collective), the fixed rent is deducted directly from the final output, either in kind or in cash (after selling the crop). For Model 2 in North Bengal, where small owner cultivators have pooled their own plots, a “rent” needs to be factored into the final distribution of produce. This is because although members all contribute an equal share of labour, they bring in different amounts of land, varying from 0.2 to 0.5 ha, with nine members contributing no land (either because they have none, or because their land is not adjacent to that of other members). Although there is rather little wealth disparity between group members—86% of the members contribute less than 0.5 ha—it is important for the farmers to be remunerated fairly according to the land they contribute. Therefore, for each plot provided by a member, a rent is calculated, equivalent to what the owner would have received if he/she had rented it out to other tenants in the village. This rent is taken into account in calculating harvest shares or the cash profits of each group member. In some cases, farmers contribute all of their land to the groups, whereas, in other cases, farmers keep some land for home use in order to grow dry season crops (mainly vegetables) for household consumption and give the remainder to the collective, pooling plots that are adjacent to those of other group members to ensure contiguity.

Models 1 and 2 share all profits and/or output after harvest. Paddy, wheat, and other staples are shared among members, but the better quality vegetables are generally sold to generate cash for the group fund, for the next season's investment. Unsold vegetables are distributed to the group members for home consumption. In Models 3 and 4, each farmer keeps the harvest of his/her plot, with some cooperation in marketing.

6 | THE BENEFITS SO FAR

As of 2018, that is within 3 years of collective functioning, several benefits were being reaped by the collectives, with interesting variations across the models. These included challenging feudal relations, bargaining with landlords to reduce rent, land consolidation, labour saving, and increase in cropping intensity, crop diversity, and crop yields.

6.1 | Challenging feudal relations

Group solidarity can potentially translate into greater bargaining power for landless tenants and marginal farmers vis-a-vis landlords. The local political power of landlords has decreased somewhat in the Eastern Gangetic Plains with the growth of absentee landlordism, greater political awareness among tenants, and a decline in interlinked contracts (such as the interlinking of tenancy, credit, and labour contracts, which tied down the tenant in a semifeudal exploitative relationship).¹¹ At the same time, these changes have not eliminated landlord influence, and even now power relations are quite unequal (Sugden, 2017).

¹⁰The group has raised additional funds in Koiladi (Nepal) by renting out the pumpset to neighbouring farmers at below the market rate, although this only takes place occasionally. Renting out the pumpset appears to be a sensible move by the farmers since it adds to their income, and their own land is insufficient to make full use of the capital investment. The returns are shared equally by the farmers.

¹¹There is a substantial literature on interlinked markets in India from the 1970s and 1980s, but for an overview, see especially Bell (1988).

Against this backdrop, it is a notable gain that collective leases pursued under Models 1 and 3 have enabled group members to challenge old power relationships. For instance, in Koiladi village of Saptari (Nepal), past relations between the Rajput landlords and mostly Adivasi tenants were marked by severe inequalities. Landlords who now lease land to groups would make informal exploitative demands on their sharecroppers. Oral contracts with individual farmers were the norm, and the landlords exerted their traditional authority to take advantage of this informality and demand services from tenants beyond the rent, in terms of helping with domestic chores and livestock care.

One of the Koiladi landlords complained that ever since the farmers took on a collective lease, they were unwilling to take on such unpaid obligations. The written contract with the collective clearly stipulates that the farmers will pay a fixed cash rent. Furthermore, the process of working as a group had given farmers the confidence to refuse to work for the landlord beyond the terms of the contract. A breakdown of traditional obligations was apparent in one landlord's complaint that although the farmers work on his land, they rarely visit his house except to pay the rent. He even tried to get the farmers' group to revert to a sharecropping arrangement by which it was reportedly easier to extract additional services. When the farmers' group refused, the landlord terminated the contract. Although this event resulted in several group members losing interest and leaving the collective, three members remained keen to continue. They invited new members and moved their irrigation equipment to another plot owned by a different landowner. They also collectively applied for a free tube well provided by the irrigation department.

We found similar instances of landlords expecting informal "contributions" in another site in Saptari, Nepal. Here, the landlord's family would help themselves to vegetables from the groups' field. This was challenged by the collective on repeated occasions, and during a recent visit by the landlord the group demanded payment for the vegetables, which was duly given.

Moreover, in a context where rents are usually non-negotiable, there were several reported instances of farmers' collectives being able to extract concessions from landlords, by building on their group strength and increased self-confidence. In Madhubani (Bihar), a Dalit group pursuing Model 1 on a 1.2ha plot was actually approached by the landlord to take on more land, because the group had proved to be a reliable and productive tenant. In the past, landlords would be unwilling to rent land at all to the Dalit community. The group members felt their bargaining power could be enhanced further if they negotiated jointly with another group (a smaller youth-led collective) which was also renting land from the same individual. They therefore arranged a lease for 4.45 ha for both groups (1.6 ha for the youth group) and bargained down the rent from INR 12,000 per bigha (0.36 ha) to INR 10,000—which is unusual because, as noted, rents here are rarely open to negotiation. Similarly, a collective in Saptari (Nepal) that had diversified into fishery production brought down the annual rent of their pond from that originally proposed by the landowner.

In part, landlords are willing to cooperate with tenants because they expect to benefit from increased productivity due to group formation and Project-supported irrigation. The shift towards fixed rent tenancies has benefited tenants, but it has also provided a guaranteed income for landlords. Some landlords have supported the collectives for non-economic benefits, such as an opportunity to increase their social standing by displaying benevolence to marginalized farmers. This appeared particularly the case among landlords who had moved to urban areas or who drew a significant share of their income from salaried work.

There are of course limits to the collective bargaining power of former tenants. Sometimes, prior histories of conflicts continue to play out, as happened in Koiladi village of Saptari (Nepal) which has a long history of landlord-tenant conflict deeply imbued with caste inequalities. A group from the Koiladi Dalit community sought to negotiate a land lease, but negotiations fell through, given a long-standing dispute over a village pond between Rajput landlords and the Dalit community. In the same village, the landowners also attempted to increase the rent of one of the other groups after the installation of irrigation equipment. This demand was only withdrawn after the Project team intervened.

Apart from increasing their bargaining power with landlords, the farmers as a group have been able to claim government entitlements and support, which they could not earlier. In Saptari (Nepal), subsidies for seeds and fertilizer are offered to cooperatives with a minimum of 20 members. Three farmer groups therefore came together to access these. Collectives can also become a tool for spreading knowledge and political awareness from farmer to farmer. Sometimes, this can spread beyond the group confines through the pre-existing extended networks of each member.

For example, in Uttar Chakoakheti, a predominantly tribal village of North Bengal, the group members encouraged other villagers to apply for Scheduled Tribe status, as well as apply collectively for government-installed tube wells, and even seek land ownership certificates which they had not held previously.

6.2 | A contiguous plot

All four models benefit from more efficient land preparation and irrigation, due to their cultivation of a contiguous plot. As noted earlier (see Table 7), prior to the Project intervention, the farmers in the study regions commonly operated three to four plots, usually on minute and scattered fields. After forming farmers' collectives each group cultivates one contiguous plot of a much larger size. The average plots of 0.56 ha in Saptari (Nepal), 1.84 ha in Madhubani (Bihar), and 1.34 ha in North Bengal are broadly equivalent to the plot sizes operated by larger, more mechanized, farmers.

Farmers recognize the benefits of consolidating their land in a large contiguous plot. For instance, they report that land preparation has become easier. It was now more economical, feasible, and time saving to use tractors. Similarly, irrigation is more efficient because moving a heavy pumpset between distant plots adds to time and labour, and for electric pumps it is not even possible to do so if there is no power source nearby. Contiguity thus brings benefits to all four models.

However, the models differ in the extent of benefits they reap. In the groundwater economy of the Eastern Gangetic Plains, a widespread problem is that farmers have to compete for rented pumpsets during times of peak demand, such as during paddy transplanting (Sudgen et al., 2014). This is a challenge not only for individual farmers who depend on pump rental, but also for those sharing a pump under Models 3 and 4. However, even these farmers have benefited from greater efficiency, as the pump does not need to be transported across the village. When their turn comes, group members simply move the delivery pipe to their own field. Models 1 and 2, however, do not need to wait for their turn for the pumpset or compete for water. Water can be applied to different subplots in the most efficient order and according to the needs of the crops.¹²

6.3 | Labour management and time saving

Models 1 and 2 also have the advantage of saving on labour time. This is a key benefit especially for women who (as noted) bear a heavy work burden with male outmigration. Paddy transplanting and harvesting, in particular, require high labour inputs, concentrated within a short span of time. Delays in transplanting after early rains can dry out seedlings. Farmers lacking sufficient family labour must hire workers in peak seasons, which is difficult because outmigration has aggravated shortages of both family and non-family labour. Labour pooling helps address this problem.

In Saptari, as a farmer said, "It took me 3 days to complete one field task. With the group it takes just half a day or a day." Traditionally, labour exchange among households was common. Even now in both Madhubani (Bihar) and North Bengal, households (usually neighbours) sometimes exchange labour for paddy transplanting. In North Bengal, this is an important cultural practice known as *hauli*,¹³ and a day of work generally ends with a feast hosted by the household whose plot was worked on that day. In fact, labour exchange institutions have been widespread across Asia's rice farming systems.¹⁴ Although these institutions have been eroding in recent years due to outmigration and associated labour scarcities, the farmers are still keen to work together, and the collectives have helped maintain this system to some extent. Furthermore, Models 1 and 2 extend the benefits of indigenous labour exchange systems beyond peak labour demands to the entire agricultural cycle.

¹²Even in Vietnam, the challenge of synchronizing irrigation was one of the drivers that encouraged the collective exchange of labour in the Mekong Delta, in both the socialist and presocialist period (Tuan, Cottrell, & King, 2014).

¹³See Shrestha (2010) for insights into the *hauli* system among Rajbanshis in eastern Nepal.

¹⁴See Messerschmidt (1981) for Nepal, Shah (2013) for India, and Tuan et al. (2014) for Vietnam.

TABLE 8 Winter and pre-monsoon fallow land: pre-intervention and post-intervention

District	Agricultural year	Winter fallow area (%)	Premonsoon fallow area (%)
Saptari (Nepal)	2014–2015 (pre-I)	33	97
	2017–2018 (post-I)	27	44
Madhubani (Bihar)	2014–2015 (pre-I)	33	96
	2017–2018 (post-I)	27	44
North Bengal	2014–2015 (pre-I)	82	NA
	2017–2018 (post-I)	43	NA

Note. pre-I = preintervention; post-I = post-intervention.

Source: Baseline census survey of village by research team (2015) and post-intervention data from seasonal survey collected by field team.

Several group members noted that in the past, each farmer was responsible for buying fertilizers or selling vegetables. Now, these tasks can be delegated to one member, giving the remaining members time for other activities. Each group member also brings new skills and experience to the collective knowledge pool, and the time saving that group farming allows has fostered a sense of solidarity or *bhaichara* (brotherhood), as they term it. Even in Models 3 and 4, some labour exchange continues during busy times, particularly in North Bengal.

Apart from labour saving, cooperation brings savings on other input costs. Fertilizer costs less when purchased in bulk, as under Models 1 and 2. They only pay for transportation once and also save time in loading the produce. Models 3 and 4 mostly purchase their own fertilizer, although there is also a potential for cost reduction through joint input procurement here.

6.4 | Impact on cropping intensity, diversity, and crop yields

The technical intervention of irrigation provisioning and the institutional innovation of group farming have jointly helped increase cropping intensity, the diversity of crops grown, and crop yields. Some may argue that irrigation in itself can bring substantial gain on these counts. But in our Project, it is not possible to separate the effect of group formation from the irrigation interventions because, in many cases, irrigation would not have been feasible without group formation. As noted above, group formation enabled land consolidation into larger contiguous plots, which made irrigation both economical and practically feasible. Group formation also helped the farmers use other machines such as tractors. One of the beneficial effects of increasing the size of farms in India is to reap scale economies in machine use (Foster & Rosenzweig, 2011). Hence, we can attribute the gains described below to the joint effect of irrigation and group formation.

We found, to begin with, that the groups had increased cropping intensity on the land they cultivated. This included bringing fallow land under cultivation (Table 8). The most substantial change took place in the premonsoon period. In 2014–2015, prior to the formation of the collectives, 97% of land in Saptari and 96% in Madhubani was fallow in the premonsoon (*pre-kharif*) period. In 2017–2018, this had fallen to 44% in both sites, mostly due to the cultivation of premonsoon vegetables and pluses.

The cropping pattern has also become more diverse. In Saptari and Madhubani, for example, prior to the intervention in 2014–2015, the dominant crops were monsoon (*kharif*) paddy, followed by winter (*rabi*) wheat, pulses, and mustard on some of the land. Now, paddy is supplemented by monsoon vegetables on higher land and grains, pulses, and vegetables in winter. In North Bengal, the farmers have shifted from monsoon paddy and limited potato, to paddy followed by winter potatoes, vegetables, wheat, maize, and jute.

TABLE 9 Nepal: Some crop yields from pre-intervention and post-intervention period, until 2017–2018

Group	Model	Agricultural year (monsoon till summer)	Average paddy yields kg/ha	Average wheat yields kg/ha
Koiladi 1	Conventional farming by tenants	2014–15 (pre-I)	3,550	1,775
	Model 1	2016–2017(post-I)	3,710	Wheat not cultivated
	Model 3	2017–2018(post-I)	4,730	1900
Kanakpatti Group 1	Land was not cultivated	2014–2015 (pre-I)	Land was uncultivated	Land was uncultivated
	Model 1 and Model 3 on different plots	2016–2017 (post-I)	590	1,250
		2017–2018 (post-I)	2,150	1,370
Kanakpatti Group 2	Land was not cultivated	2014–15 (pre-I)	Land was uncultivated	Land was uncultivated
	Model 1 and Model 3 on different plots	2016–17 (post-I)	No data	No data
		2017–18 (post-I)	3,150	1,010

Note. pre-I = preintervention; post-I = post-intervention.

Source: Baseline census survey of village by research team (2015) and post-intervention data from seasonal survey collected by field team.

In addition, we note clear yield increases in key crops in each region, if we compare the 2014–2015 preintervention period and each subsequent year of intervention until 2018–2019 (Tables 9–11).¹⁵ The preintervention figures were obtained through the baseline survey undertaken prior to Project implementation. Each farmer who later constituted a given group was asked his/her average crop yield for specific crops in 2014/2015, and the average for that group in the preintervention was thus calculated. The post-intervention information on crops grown and yields obtained was collected seasonally by the local NGO from the participating farmers, through focus group discussions with each group separately at the end of each season. Because the NGO teams were also present at the time of crop harvesting and sale, they were able to broadly assess the veracity of the figures given by the collectives. Although this method does not provide the kind of accurate estimates that would be obtained through meticulous weekly data collection as undertaken by Agarwal (2018), it does give a broad idea of the yield effects.

We cannot draw conclusions about which model works best in terms of productivity, but in all the collectives, the figures point to significant improvements in yields. For example, in Koiladi 1 (Saptari, Nepal), paddy yields were 3,550 kg/ha in 2014–2015 prior to group formation and had risen to 4,730 kg/ha in 2017–2018 while pursuing Model 3. Similarly, we note an increase in wheat yields. In addition, both the Kanapatti groups have gained considerably in output produced, because, prior to the intervention, the land was fallow, thus producing nothing.

Again, in Bhagwatipur (Bihar), all the groups show improvements over time in paddy yields, from 2014–2015 to 2018–2019, and wheat yields between the preintervention figures and 2017–2018 (Table 10). In some cases, there have been quite substantial yield increases, such as the almost doubling of wheat yields in Group 4 (Model 3) from 2,200 to 4,150 kg/ha between 2014–2015 and 2017–2018.

In North Bengal, again, paddy yields have risen in all cases and quite substantially among the Dholaguri groups (Table 11). Although all groups except Dholaguri Group 4 farmed their own plots during the monsoon, they cooperated in other ways (as discussed below). For potatoes where labour was pooled following Model 2, in the Dholaguri Groups 1 and 3, yields were higher in 2018 and 2019 by 30% and 48%, respectively, relative to the pre-project winter of 2014/2015.

¹⁵These data were gathered from the previous cultivators of the land in the baseline census of the village. Yields from some groups (mostly those formed after the inception of the project) are not available.

TABLE 10 Bihar: some crop yields from preintervention and post-intervention period until 2018–2019

Group	Model	Agricultural year (monsoon to summer)	Average paddy yields kg/ha	Average wheat yields kg/ha
Bhagwatipur Group 1	Conventional farming by tenants	2014–2015 (pre-I)	3,284	2,282
	Model 1	2016–2017 (post-I)	2,500	1,940
	Model 3	2017–2018 (post-I)	3,100	2,428
		2018–2019 (post-I)	3,700	No data
Bhagwatipur Group 2	Conventional farming (owner cultivators)	2014–2015 (pre-I)	3,595	2,205
	Model 4	2016–2017 (post-I)	3,825	2,893
		2017–2018 (post-I)	3,026	2,800
		2018–2019 (post-I)	3,717	No data
Bhagwatipur Group 3	Conventional farming (owner cultivators)	2014–2015 (pre-I)	3,267	2,200
	Model 4	2016–2017 (post-I)	4,443	3,215
		2017–2018 (post-I)	3,344	3,227
		2018–2019 (post-I)	3,675	No data
Bhagwatipur Group 4	Conventional farming (tenants)	2014–2015 (pre-I)	3,136	2,200
	Model 1	2016–2017 (post-I)	4,083	1,867
	Model 3	2017–2018 (post-I)	2,400	4,150
		2018–2019 (post-I)	3,857	Wheat not cultivated

Note. pre-I = preintervention; post-I = post-intervention.

Source: Baseline census survey of village by research team (2015) and post-intervention data from seasonal survey collected by field team.

These improvements in cropping intensity and farm productivity, as noted, are likely to reflect the combined effect of using the irrigation equipment supplied by the Project and group formation. The latter not only made efficient irrigation feasible, but also brought other benefits such as improved land preparation and input use, greater labour availability which allowed timely completion of operations, and so on. In other words, promoting institutional innovation with the technology was key to the benefits obtained. Without group formation, the effect of the technology would have been limited.

7 | THE CHALLENGES

Along with the benefits, however, group formation has also brought challenges.

7.1 | Timekeeping and group management

The main challenge under Models 1 and 2 arose in labour sharing and the fact that not all group members were contributing labour as and when required. A women's group in Bhagwatipur village, Bihar, states:

Often there are allegations such as “I did more work than you”; “I did all the work yesterday and you did not, so you should do it today”; “I harvested most of the paddy crops compared to others in the group.”

TABLE 11 North Bengal: some crop yields from preintervention and post-intervention periods, until 2018–2019

Group	Model	Agricultural year (monsoon to summer)	Average paddy yield kg/ha	Average potato yield kg/ha
Uttar Chakoakheti 1	Conventional farming (owner cultivators) Model 2	2014–2015 (pre-l)	1954	Potato not cultivated
		2016–2017 (post-l)	not cultivated	Potato not cultivated
		2017–2018 (post-l)	2,680	Potato not cultivated
		2018–2019 (post-l)	2,889	Potato not cultivated
Uttar Chakoakheti 2	Conventional farming (owner cultivators) Model 2	2014–2015 (pre-l)	2,243	Potato not cultivated
		2016–2017 (post-l)	NA	Potato not cultivated
		2017–2018 (post-l)	2,677	13,542
		2018–2019 (post-l)	2,679	No data
Uttar Chakoakheti 3	Conventional farming (owner cultivators) Model 2	2014–2015 (pre-l)	2,108	Potato not cultivated
		2016–2017(post-l)	Not cultivated	15,424
		2017–2018(post-l)	2,165	Potato not cultivated
		2018–2019(post-l)	2,933	No data
Dholaguri 1	Conventional farming (owner cultivators) Model 2	2014–2015 (pre-l)	2,577	20,108
		2016–2017(post-l)	Not cultivated	25,988
		2017–18(post-l)	4,227	21,809
		2018–19(post-l)	4,128	28,961
Dholaguri 2	Conventional farming by owner cultivators Model 2	2014–15 (pre-l)	2,629	Potato not cultivated
		2016–2017 (post-l)	Not cultivated	25,880
		2017–2018 (post-l)	3,591	No data
		2018–2019 (post-l)	4,881	28,900
Dholaguri 3	Conventional farming by owner cultivators Model 2	2014–15 (pre-l)	2,876	14,638
		2016–2017(post-l)	Not cultivated	26,119
		2017–2018(post-l)	3,478	21,877
		2018–2019 (post-l)	3,934	28,118

Note. pre-l = preintervention; post-l = post-intervention.

Source: Baseline census survey of village by research team (2015) and post-intervention data from seasonal survey collected by field team.

A long-running critique of collective production from the socialist and postcolonial experiences has been that it is likely to lead to labour sharing problems.¹⁶ However, these assumptions have been called to question both by developments in collective action theory, which now recognizes that trust and community relations can help overcome such problems, and by practical experience. On the latter, for instance, Li notes that in the smaller collectives of the late Maoist era in China, peer pressure and solidarity helped check work shirking. Similarly, in our study, we cannot assume that farmers were consciously “shirking.” Most farmers recognized that group farming saved them time, which they could spend on other activities, and that it was in their interest to contribute the expected labour hours, while also acknowledging that peer pressure encouraged members to contribute fairly. However, as we found in our farmer interviews and focus group discussions, farmers often struggled to coordinate their busy work schedule in order to find common time during which all of them were available. They frequently remarked that all of them needed to be present together, and if some members were busy then conflicts could arise.

There are several processes at play here. The group farms are not large enough in area for members to meet their entire subsistence needs. Some farmers reported a tendency for members to prioritize their own plots outside the collective. This was often for pragmatic reasons linked to the need to coordinate certain activities on personally farmed plots, such as planting when water was available. For example, one respondent noted that if he had called labourers to work on his private plot for paddy transplantation when irrigation was available, he needed to finish that task before coming to work on the collective. However, if members failed to turn up on time, it delayed key group activities, with a possible adverse effect on productivity. One female group member in a mixed group in Koiladi reflected on these challenges:

Many times we could not irrigate the vegetables [on the collective farm], as none of us had time. As a result the crops dried up. The Brinjals (eggplant) got damaged due to delayed irrigation. We don't have men to support us in our agricultural work. Sometimes my father-in-law helps.

This illustrates the challenges that women, in particular, face. Due to male outmigration, they manage their own fields and livestock (outside the collective) as well as domestic tasks such as cooking and collecting dung for fuel. Some women also supplement their income with other work. In Koiladi of Saptari, for example, they sell snacks in the periodic market. In North Bengal, many men and women were engaged in off-farm labour—including under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS),¹⁷ and some members of the tribal community in Uttar Chakoakheti migrate seasonally to Bhutan, leaving their family members to take on their group responsibilities. This causes a conflict between working on one's home fields and working on the collective.

Some groups in North Bengal were able to weather these challenges, but others reduced their degree of cooperation. For instance, in Koiladi and Bhagwatipur villages in Bihar, four groups shifted from labour pooling under Model 1 to individual plot cultivation under Model 3 after several seasons. In Bhagwatipur, members devised a mid-way solution, namely, subdividing into smaller teams that worked on the collectively leased land on assigned days of the week on a rotation basis. However, this led to mistrust between the teams over which team had put in more work. For vegetables, there was mistrust over how much had been sold on each day, because vegetables are generally harvested continuously over several weeks rather than as a one-off event. Eventually, like the two Koiladi groups, the Bhagwatipur ones also reverted to partial cooperation: they now cooperate for land leasing, irrigation, and marketing, and some also for land preparation and paddy transplanting, but take individual responsibility for all other agricultural tasks and the purchase of inputs. It is possible that over time frequent interaction could help build greater trust among the members, which, along with observing the benefits of cooperation, could move them to higher levels of cooperation.

¹⁶See Dang (2009) for Vietnam and Scott (1999) for Tanzania.

¹⁷The MNREGS provides 100 days of work per year per household to rural communities, mostly on government infrastructure programmes.

7.2 | Gendered division of labour and inequities

One of the key aims of the Project is to provide women with an avenue for empowerment. Although the results are positive, particularly for women-headed households, traditional gender roles pose challenges, particularly in all-women groups.¹⁸ Women have to depend on male household members or outside labourers for what are considered “male tasks,” such as land preparation, transporting and starting the pump, laying pipes for irrigation, and digging furrows. Gender norms are deeply engrained, as one women stated in Koiladi village.

How can girls operate pumps? I get scared to use the pump. What if I am electrocuted? Look at my daughter, she does not know anything.

A male farmer in Koiladi also noted his “concerns” regarding female work roles, exemplifying the prevailing attitude that certain “technical” tasks, such as irrigation, fall outside the female domain.

How will women irrigate with the pump? They know how to switch the pump on and off, but what if the motor fails to draw water after switching the system on. In that case they may damage the motor. I know that if the motor does not function, I check the fan with a stick and switch on the machine again. Women can irrigate once the pump is functioning, but if there are problems in the motor, they cannot fix it. For example, a motor should be put 3 inches below the boring, otherwise it will not draw water properly.

In some respects, the ability to draw upon men for tasks such as irrigation is advantageous for women, as it encourages voluntary support from household men and gives them a sense of joint ownership in what are women-run enterprises. However, not all groups can mobilize male family members. Women-headed households, in particular, are dependent on male wage labourers from outside, which adds to their production cost.

However, in Bhagwatipur village (Madhubani, Bihar) and Kanakpatti village (Saptari, Nepal), and among the all-female groups in North Bengal, women have started operating pumps on their own, due in part to the introduction of more user-friendly solar and electric pumps. Women have also been taking over other tasks that were formerly in the male domain, such as negotiating with tractor operators or ploughmen for land preparation. This provides a way forward. As one women stated in Kanakpatti:

When we were girls, we were not allowed to ride bicycles or go to school. I have learned ... to cycle and to write. Similarly, I have learnt to operate pumps and spray machines.

Some of the women in nearby areas have gained experience by operating electric pumps in their homes and now know how to prime pumps as well.

Another challenge is associated with mixed groups pursuing Models 1 and 2. Although all members receive an equal share of the produce, the rigid gender division of labour places greater burdens on women for tasks seen as “women’s work,” such as weeding and transplanting. These tasks are often more labour intensive, compared with what are considered “male” activities within the group, such as negotiating for leasing land or a tractor, land preparation and repairing bunds, or purchasing seeds. In North Bengal, it was noted that men would often come to work on the agreed day, but would spend less time on the land, as they considered their tasks “higher value”—reflecting the prevailing agricultural labour market where male tasks such as land preparation receive higher wages. As noted above, coordinating busy schedules was seen as a bigger constraint in labour management than active work shirking.

¹⁸See also the insights on gender inequalities and dynamics of these farmers’ collectives in Leder, Sugden, Raut, Ray, and Saikia (2019).

But when such complaints did arise, they usually tended to be about men in mixed groups not contributing their fair share of labour time. Male members also sometimes call on their female relatives to help in transplanting and harvesting. As these workers are not core members of the group, they get no direct benefits from the group activity in terms of payment.

It could be argued that both male and female family members who substitute for a group member are providing unpaid services, but women are already heavily burdened with work, and wives and daughters-in-law are often less in a position to refuse to help when asked by male family members, than vice versa.

8 | COMPARING THE PERFORMANCE OF MODELS

Several mediating factors are seen to affect successful labour pooling under all four models.

8.1 | Crop type

The first is the crop grown. For foodgrains such as paddy and wheat, farmers in Madhubani and Saptari felt that labour management is relatively straightforward, as everyone is required for some days of intensive work during transplanting, weeding, and harvesting. This contrasted with vegetable production, which required a less intense but more frequent mobilization of labour every few days for weeding, irrigating, pesticide application, and harvesting—with the latter often being spread over several weeks as the vegetables mature. This was more difficult to coordinate. As a result, in Kanakpatti, two groups changed their level of cooperation and decided to cultivate vegetable fields individually, as in Model 3, while cultivating paddy and wheat collectively, as in Model 1. As a woman farmer in Koiladi village noted:

Vegetable farming needs a lot of work. Potato, cauliflower, and cabbage need weeding. We also have to check whether the plants require water. In contrast, winter wheat requires less labour. We have to plough, apply fertilizer, and irrigate twice—once some 25 days after sowing and a second time later.

Not all groups share this view, however. In North Bengal, all but one of the groups did vegetable cultivation collectively under Model 2 and reverted to individual cultivation for the monsoon season (as in Model 4). Underlying this was a cultural preference in the community for each family to be responsible for its own paddy crop. Historically, farmers in these communities have always cultivated their own land during the paddy season to ensure food security and rarely lease out land at this time of year. Nevertheless, even with their own plots, transplanting remains a cooperative process, with most farmers exchanging labour.

8.2 | Group composition

A second factor affecting labour pooling is the social composition and history of the group and, especially, gender and age dynamics. Although most groups belong to the same ethnic community or caste, the women-only groups in Nepal and Bihar showed a greater ability to work together, relative to the mixed-gender groups. Three out of four groups that abandoned labour pooling under Model 1 (Koiladi 1 and 2 and Bhagwatipur 1) were mixed groups, and these were the first to experience conflict over labour contributions. On the whole, women-only groups, such as in Mahuyahi 2 (in Bihar) and Kankapatti 1 (in Nepal), were successful in working together with relatively little conflict and demonstrated strong bonds of solidarity. It is notable that Mahuyahi 2 had emerged organically on the initiative of the farmers themselves, with minimal support from the Project partners.

8.3 | Regional differences

Third, regions differ in their relative success with labour pooling. North Bengal is more successful compared with Madhubani (Bihar) and Saptari (Nepal), despite the fact that all but two of the North Bengal collectives are predominantly male or all male. Although in Madhubani and Saptari too, three groups have successfully pooled labour, this is not the case with the other groups here. For instance, four groups in this region began by pooling labour under Model 1 at the start of the Project, and one group experimented with Model 2, but subsequently all four reverted to Models 3 and 4—the primary constraint being labour management and coordinating the members' schedules to come to the field at the same time for given operations.

In contrast, all the North Bengal groups are pooling labour under Model 2, for all crops except paddy, and although labour management constraints were mentioned, this was not a large enough problem for the group to abandon labour pooling. In these sites, peer pressure and strong cohesion encourage farmers to come on time or make up for lost time later, as also noted by Agarwal (2019b) in her regions. Moreover, there was mutual understanding that although individual family circumstances can occasionally make it difficult for some members to come on time on a given day, these differences would be made up within the whole agricultural cycle. Compensation from members was only sought for repeated absences.

There appear to be several reasons why labour management issues could be resolved in North Bengal but not in Nepal and Bihar (see also Table 12). First, there is a long history of successful collective action in the North Bengal villages. For example, in the past, marketing cooperatives and SHGs had been particularly active in Dholaguri. Some members had even tried labour pooling on a smaller scale to cultivate turmeric as part of an earlier government-supported project. There is also an active farmers club in the community, which has its own plot of land used for collective endeavours. Uttar Chakoakheti also has a history of collective investment. For example, one neighbourhood recently invested jointly in furniture and utensils for social events. Past experience in successful collective action helping subsequent attempts is also noted in other contexts (Agarwal, 2010a; Seabright, 1997), as do strong social bonds and solidarity between members (Li, 2018).

Second, it is possible that in North Bengal, successful cooperation is associated to some extent with the Operation Barga land reforms under which West Bengal successfully mobilized peasants for their collective rights and recorded the land rights of tenants—something not seen on this scale in Bihar or Nepal. West Bengal also encouraged some of the former landless beneficiaries of Operation Barga to pool their land and cultivate together in small groups (Patnaik, 2001). However, more research is needed to understand the role of peasant political history and its effect on farmers working together.

Third, the North Bengal community has fewer caste divisions relative to the Bihar and Nepal sites, enabling the building of stronger community trust and cohesion (Dholaguri is almost entirely Rajbanshi, and Uttar Chakoakheti is

TABLE 12 Regional characteristics and levels of cooperation

Characteristic supporting collective action	North Bengal	Madhubani Bihar	Saptari Nepal
Groups pursuing high levels of cooperation (Models 1 and 2) for all or part of the land (%)	100.0	28.0	40.0
Past experience of pooling land, labour, and production expenses	Yes	None	None
Average number of plots farmed per household in the village (baseline census)	1.66	3.05	2.65
Active caste system in village	No	Yes	Yes
Households belonging to an indigenous or tribal community (baseline census) (%)	36.4	0.0	82.2

Source: Baseline census and seasonal survey data collected by field team as of September 2018.

predominantly tribal). In addition, there are indigenous institutions within these communities that foster cooperation, such as the earlier mentioned labour exchange system, *hauli*, reinforced by jointly celebrated cultural and religious festivals (Leder et al., 2019). Although such practices are also observed to a degree in Madhubani (Bihar), they were particularly widespread in North Bengal and have both a cultural and an economic function. In some contexts, through this system, groups have even brought in non-group members to support the collective during busy times.

Fourth, the North Bengal farmers have fewer plots outside the collective. Hence, for many farmers, the land contributed to the collective is the family's primary agricultural land. There is thus less conflict between farming one's own land and working on the collective farm. In Bihar, the farmers cited this as one reason why the women's group in Mahuyahi was more successful in labour pooling than the women's group in Bhagwatipur. In the former, most farmers had only very small plots of less than 0.1–0.2 ha outside the collective, whereas, in the latter, members had larger areas of land up to 0.5 ha, which they were leasing in separately for family use.

9 | LESSONS LEARNT AND FURTHER RESEARCH

What then are the lessons offered thus far by these experiments in group farming? A key lesson is the need to experiment with and allow multiple models to emerge, with varying levels of cooperation. These variations may emerge for several reasons, such as differences in the extent of prior trust among farmers in a region, historic social inequalities, prior experience of cooperating, the nature of land lease markets, the crops grown, and so on. Over time, as trust develops or cropping patterns change, the models may also change. In prior histories of group farming, model designs were typically decided by those promoting the collectives.

Second, whichever model emerges, there are clear gains from cooperation. The collectives have helped farmers locked into unequal landlord–tenant relations by increasing their bargaining power with landlords, enabling them to obtain better rental terms undermine the landlord's feudal expectations that the tenant would provide additional unpaid labour. The collectives have also helped farmers increase their cultivated area and create larger contiguous plots, thus reaping economies of scale in machine use and labour sharing and reducing the costs of input purchase. All these gains demonstrate that farmers' collectives offer a significant opportunity for marginal/small and pure tenant farmers to overcome agrarian stress.

At the same time, the models have not yet gone far enough to create widespread class consciousness and solidarity among marginal and tenant farmers. The number of farmers engaged in group farming is still too small to help undermine inequitable agrarian relations across the region. Nevertheless, even the incremental empowerment of tenants is important, and with the expansion of this model in the long term, group solidarity could potentially develop to help tenants claim their legal rights to land and support movements for tenancy reform—particularly if groups begin to take on a much larger share of rented land in the community. How the interests of landlords and other stakeholders (e.g., input dealers) would be affected by a more widespread adoption of the collective model opens up questions for further research.

Third, the collectives reap most benefits when they pool labour, as in Models 1 and 2, because it reduces their peak labour shortages and helps irrigate their fields more efficiently, provided they can overcome work coordination problems. But the models work much better in some locales, such as North Bengal with its largely tribal population and prior agrarian reform history, than in the caste heartland of the East Gangetic Plains in Nepal and Bihar.

Labour coordination issues are resolved informally in North Bengal, whereas elsewhere, more formal methods may be needed, such as keeping regular records of time inputs and reviewing aggregate labour and financial contributions at the end of each crop season. Overall, compensation (such as a share of the harvest) could then be linked more accurately with time worked. Some groups in North Bengal have a constitution and have started time sheets, which also include a division of responsibilities. If a member cannot come on a particular day, a wage labourer or a family member can be sent to substitute, as also observed by Agarwal (2019b) in Kerala and Telangana. However, the time sheets are not used to calculate shares of the harvest; they are used to ensure that absentees can provide

labour later or substitute their family members to take their place. We need further experimentation to see how the labour sharing issue can be resolved.

At the individual farmer level, a conflict can also arise between the time spent working on the group farm versus working on one's own farm. A possible solution would lie in increasing the size of the group farm, by having people pool more of their land with the group, so that it can cover the members' subsistence needs to a greater extent. We have seen that in sites where farmers have fewer plots outside the collective, there is less conflict over labour time.

A fourth lesson lies in the potential connection between crops grown and cooperation. The experience thus far suggests that due to cultural practices and the intensity of labour use, certain crops are more amenable to collective farming in particular regions than others. Hence, we saw that monsoon paddy was done individually in North Bengal by all but one group due to cultural preferences, whereas vegetables were farmed collectively.

Overall, this indicates the need for sensitivity to local differences in cultural, ethnic, and gender norms as well as the technical needs of crops in choosing group models, allowing combinations of models to emerge. Although ongoing awareness raising among farmers on the benefits of fully integrated cooperation, including labour sharing, is important, it is essential that farmers are comfortable with these changes and adapt the model to their needs at their own pace.

9.1 | Building sustainable collectives

Beyond individual models, the question of their sustainability over time is also key, as is the model's replicability. The provision of irrigation and other equipment through the Project cannot be sustained in the long run. However this, in itself, need not reduce the model's replicability or its long-run sustainability. Most previous initiatives at successful collective formations in South Asia have focused primarily on the social interventions of group formation without providing technical hardware, because farmers can adapt their cropping patterns to include less water-intensive crops. A variety of this equipment is also available through government schemes at heavily subsidized rates, and forming groups can facilitate access to these schemes, both due to the collective strength of the groups and because many schemes offer resources to groups rather than to individual farmers.

Even without equipment contributions, however, other types of long-term external support are likely to be needed to assist existing groups in accessing state subsidies and obtaining technical and managerial inputs. Support will also be needed to help new entrants who want to form groups. These functions can be served by creating an "institutional spine" to connect the groups and help in the replication of our models,¹⁹ as discussed further below. At present, the groups depend on the local NGO and government partners in each site for technical support and guidance in financial management, although some groups are more independent than others. Also, whereas group farming has improved the farmers' bargaining power with landlords and other stakeholders, not uncommonly the Project partners have also played a mediating role, particularly in disputes over rent or contributions to the group fund. An alternative institutional mechanism is needed to replace these third-party stakeholders. This, we believe, will help to make the joint farming approach more sustainable.

Potential models for an institutional spine could be (a) a federation of farmers' collectives that links them horizontally and vertically, as among SHGs, or (b) forming community-led societies of collectives that are independently registered at the village council level, as done in Kerala. Agarwal (forthcoming) discusses both types of support structures in the collectives she studied, the federation of women's collectives in Telangana and community development societies in Kerala. Importantly, the Kerala collectives had more leverage with government agencies, in terms of direct technical training, access to subsidies, and so on. In our study area, in addition to technical support, such institutions could participate in dispute resolution, upholding rules and best practices, and putting farmers in touch with

¹⁹This was suggested by Agarwal during her field visit, based on her analysis of the Kerala and Telangana group farming experience.

relevant government authorities. Indeed, farmers' collectives need to become a core component of the government's agricultural development strategy and commitment, while also being able to exercise autonomy. A triangular approach could well provide the answer, with farmers' collectives, civil society, and government agencies constituting the three institutional pillars.

The importance and advantages of an institutional body is apparent even now in our study area. Here, a farmer's club in Dholaguri, North Bengal, which predates the Project, has provided a loose institutional base for the collectives in that village. It has already helped to strengthen bonds of trust between the farmers and provided technical support to the collectives.

9.2 | Gender and other inequalities

Improving gender equality within the collectives is another challenge. A focus on single-gender groups is worth considering, but women themselves have mixed views on this. Some feel that women-only groups are more cohesive and help reduce conflict over labour contributions, whereas others feel that mixed groups are needed to reduce the need to hire male labourers for traditionally male tasks, thus saving costs. When promoting mixed groups, however, gender inequities need to be addressed. These can take several forms. For instance, women's contributions in mixed-gender groups tend to be greater than men's, given the gender division of labour whereby the more labour-intensive tasks, such as transplanting rice and weeding, are considered "women's tasks," whereas the more mechanized ones, such as land preparation and irrigation, are seen as falling in men's domain. Also, male members often draw upon their wives as "substitutes" when they are absent, but retain the output themselves. A way around the latter problem would be to keep a record of labour inputs by family members providing substitute labour, and compensating them for the work done at the end of the year, as noted earlier.

In the long term, of course, organizations supporting the formation of collectives would need to prioritize training women in technical tasks that fall within the male domain and encouraging men to take on so-called female tasks. In fact, paddy transplanting is sometimes found to be done by hired male labour in south India, along with hired female labour (Agarwal, 1985). This will help to undermine rigidities in the division of labour within mixed groups and also reduce the dependence of all-women groups on men for particular tasks. We have already seen this shift in some of the women's collectives in Bihar and Nepal where, after being trained, women could operate the irrigation pumpsets themselves. Broader sensitization among groups around gender inequalities in agriculture should also be an important part of future interventions. Indeed, the Project has already piloted a participatory gender training with all the groups as part of this process (Leder, 2016).

Beyond gender, most groups are caste homogenous and do not have large disparities of wealth between members, particularly for Models 1 and 3, which are constituted mostly of tenants. Of course, differences can exist within the groups in the levels of education and the social networks different members may command, and this can result in unequal power over decision-making. At the same time, the presence of members with greater social capital can also work to the group's advantage when it comes to accessing state services or bargaining with external stakeholders. The most significant intragroup differences are in Model 2 in West Bengal, where farmers have contributed different amounts of land, with a small number providing none.²⁰ Although these differences are relatively low because the farmers are mostly poor in the first instance (most own under 0.5 ha), more research is needed to assess if these intragroup economic disparities affect cooperation.

Another relevant question is whether Model 2, based on the pooling of owned land, is likely to perform better than Model 1, based on the pooling of leased land. On the one hand, Model 2 has an advantage in that all the returns from cultivation will accrue to the group members, whereas the returns in Model 1 will be net of the rent

²⁰Women members, in particular, own little land, as is also the case more generally across India (Agarwal, Anthwal and Mahesh, 2020).

paid to the landlords. At the same time, Model 2 may prove less stable in terms of cooperation because all the members have an exit option, whereas the farmers forming Model 1 are more interdependent and therefore more likely to remain together. These are again questions for further research.

9.3 | Conclusion

To conclude, this paper, based on an action research project to encourage group farming, shows that bottom-up, voluntarily constituted farmers' collectives offer significant opportunities and benefits to marginal farmers and landless tenants, including women. In particular, they are able to overcome agrarian stress and create more viable farm units. The paper does not provide a blueprint, but seeks to present lessons from a project in progress and insights on different models of the collective. It also brings to light the challenges faced by the farmers in group formation, which underlie the evolution of the diverse models.

Importantly, the experience shows that these collectives have the capability of challenging long entrenched power relations within feudal settings. Although they are not at present numerous enough to change the overall feudal structure of entire villages, they have the potential of doing so because the demonstrated success of a few could lead to the formation of many new collectives. It is also possible that, over time, they will begin to engage politically at the local level, as found by Agarwal (2019b) among women's collectives in Kerala and Telangana. The internal dynamics of power relations within the collectives are also a challenge, especially along gender lines. However, since no single model was imposed on them from above, they have been able to reconfigure their compositions, as well as adapt their extent of cooperation to what works for each.

The experiment also opens up an agenda for further research on an institutional aspect of farming that is often overlooked. Much work remains to be done to test, tailor, and develop multiple models of collective production, suitable to the complex social formation of the Eastern Gangetic Plains, and more generally to meet the needs of South Asia's most vulnerable farmers, especially in the context of climate change. The impact on productivity and profits also need assessing, based on carefully collected detailed data of group farms in comparison with conventional family farms. In addition, some of our observations could be treated as hypotheses for further testing, such as how the local history of agrarian relations and land reform might impinge on the potential for cooperation and collective action, and the kinds of collectives that may emerge as a result. We hope that the lessons learnt thus far will further these research and action agendas.

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