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N.M. Sadguru Water and Development Foundation's work in tribal areas of Gujarat, Rajasthan and Madhya Pradesh is world renowned. Over more than four decades, NMSWDF has been working to improve the livelihoods of small, tribal farmers through their irrigation, watershed, agriculture and other livelihood interventions. As part of IWMI-Tata Program's 'Small Farmer, Prosperous Farmer' (SFPF) initiative, this ITP Highlight tries to understand the development trajectory followed by NMSWDF farmers in Dahod with a view to draw policy lessons for mainstreaming smallholder prosperity, especially in the tribal context. It recommends a four-step replicable model – focusing on water security, crop stabilization, crop diversification and specialization – that can be implemented in less than a decade, depending on the initial conditions.

IWMI-TATA
Water Policy Program

Water Policy Research
HIGHLIGHT

Penury to Prosperity

The SFPF Journey of Tribal Farmers in Dahod, Gujarat

Astad Pastakia

Penury To Prosperity*†

The SFPF Journey of Tribal Farmers in Dahod, Gujarat

Research highlight based on Pastakia (2018)

1. Introduction

With continuous fragmentation of land holding on account of a growing population, efforts for improving earnings of marginal farmers in India have gained momentum over the past few years. In 2012, the IWMI-Tata Water Policy Research Program (ITP) launched its *Small Farmer, Prosperous Farmer (SFPF)* Initiative to understand what kind of hand-holding support can help sub-hectare farmers generate net annual income in excess of ₹2.5 lakh at 2012 prices (~US$ 5,000), considered a threshold for decent standard of living (Shah 2016). While access to and control over water was considered a necessary condition to improve farm productivity and economics, a common question most agencies struggled with was: "*what does it take to transform water-control into small-holder prosperity, especially in the Adivasi context?*" (*ibid.*)

This Highlight seeks to capture the experience of NM Sadguru Water and Development Foundation (NMSWDF) in promoting SFPF farmers in the tribal belt covering three states of Gujarat, Rajasthan and Madhya Pradesh. Founded by Sharmishtha and Harnath Jagawat in 1974, NMSWDF works with an estimated 6.2 lakh households in the tribal belt covering 11 districts. The study focuses on Dahod, an '*aspirational*' district of Gujarat, which has been the center of NMSWDF activities for over four decades. About 45,600 marginal farmers with land-holding between 1.5-3.0 acres are covered across six blocks. NMSWDF estimates that, largely as a result of their interventions, about 20 per cent of these households earn an annual net income of more than ₹2.5 lakh while 60 per cent earn more than ₹1.2 lakh per annum.

2. Objectives and Methodology

The study aims to make an assessment of SFPF farmers in sample NMSWDF villages and analyze their journey from '*penury*' to '*prosperity*'. Specific objectives include assessing the increase in net household income of targeted farmers; examining the role of on-farm water control in livelihood enhancement; examining the pathways of livelihood improvement; ranking interventions in relation to their income-enhancement potential and assessing the impact on quality of life, gender equations and intra-household benefit allocation. The study also examines the data from the lens of the ITP SFPF framework to see if it adequately explains the NMSWDF experience. Case study method was adopted for a sample of eight villages to capture the processes adopted by NMSWDF under a variety of sub-sectors and geographical locations (see Table 1). In Jhari and Balasindur villages, the focus was on understanding the dynamics of *crop specialization*.

Field work was undertaken over three visits between September and mid-October, 2018. To get a more nuanced understanding of the phenomenon, the study focused its inquiry at three different levels: [a] village-level; [b] cohort-level; and [c] individual farmer-level. FGDs were conducted to capture the oral history of development initiatives at the

Table 1: Sample blocks and villages.

District / Block	Key Rural Livelihood Sub-Sectors	Sample Villages
Dahod district		
Dhanpur	Horticulture and vegetables	*Kakad Khilla*
	Horticulture and vegetables	*Amli Menpur*
Limkheda	Floriculture, vegetables, horticulture, dairy and bee-keeping	*Dhabada*
	Floriculture, vegetables, horticulture, dairy	*Kamboi*
	Dairy and vegetables	*Usra*
	Seed production, dairy and vegetables	*Chhaparwad*
Garbada	Onion seed production, dairy and vegetables	*Jhari*
Banswada district		
Saggangadh	Maize Seed production	*Balasindur*

* This Highlight is based on research carried out under the IWMI-Tata Program (ITP) with additional support from Indian Council of Agricultural Research (ICAR), Swiss Agency for Development and Cooperation (SDC) and the CGIAR Research Program on Water, Land and Ecosystems (WLE). It is not externally peer-reviewed and the views expressed are of the author/s alone and not of ITP or its funding partners.
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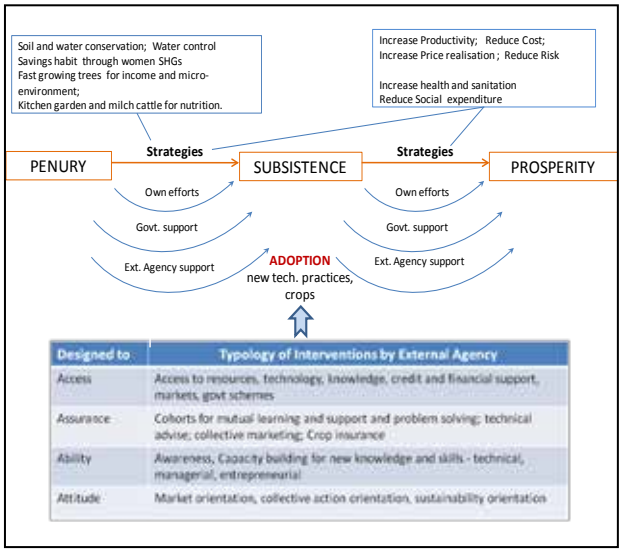
village level. Information provided was tallied with MIS data of NMSWDF. Separate FGDs or interviews with key functionaries were conducted to understand the functioning of cohorts. Informal interviews were conducted with a few '*lead*' farmers and early adopters to analyze changes in the livelihood portfolio and investment patterns. A comparison between *lead farmer* and other farmers was included to assess the extent of gap between the two, in adoption of technology and realization of benefits.

3. Framework of Inquiry and Analyses

A marginal farmer in a state of penury must first cross subsistence level before reaching prosperity. A set of indicators were used to characterize the three stages of penury, subsistence and prosperity. Penury was characterized by low and uncertain food security (3-6 months/year), compelling farmer households to migrate for work. At subsistence stage, food produced lasted for 12 months, bringing an end to forced migration. Prosperity stage was marked by crop diversification and producing for markets. Prosperity was also reflected in quality of life (QoL) investments such as *pucca* houses, water and sanitation, transport vehicles, gas stove etc. This was useful in assessing the state of a village at the time of intervention as compared to the present.

The strategies deployed to promote communities from penury to subsistence, and subsistence to prosperity are somewhat different. The framework of inquiry and analyses (Figure 1) tries to bring out these differences and show whose efforts brought about the change. *Adoption* of new technology, management practices and crops by the farmer households is a necessary condition to leverage local natural resources in making this transition. The external agency must engage at multiple levels to build the capacity of the community. Drawing on Gupta (1992), a typology of interventions is presented in the form of four A's *viz. Access*, *Assurance*, *Ability* and *Attitude*. The relationship between the four A's ultimately leading to the fifth A of adoption, is shown diagrammatically in Figure 2. Creating awareness and capacity for new knowledge and skills as well as the right attitude forms the base of the intervention. Collective orientation needs to be strengthened/ created for communities to form cohorts of mutual learning and support and take collective action in the face of challenges. Hence cohorts, both formal and informal, constitute the main form of internal assurances. External assurances can be provided by the staff of the external agency in the short run. Community resource persons (CRPs) trained by the external agency would become another source of internal assurance in the long run. When the cohorts start asserting themselves and take collective action, they are able to access resources, technology, credit and financial support, markets as well as government schemes that are rightfully theirs. Adoption is a natural consequence.

Figure 1: Framework for enquiry and analyses



4. Findings

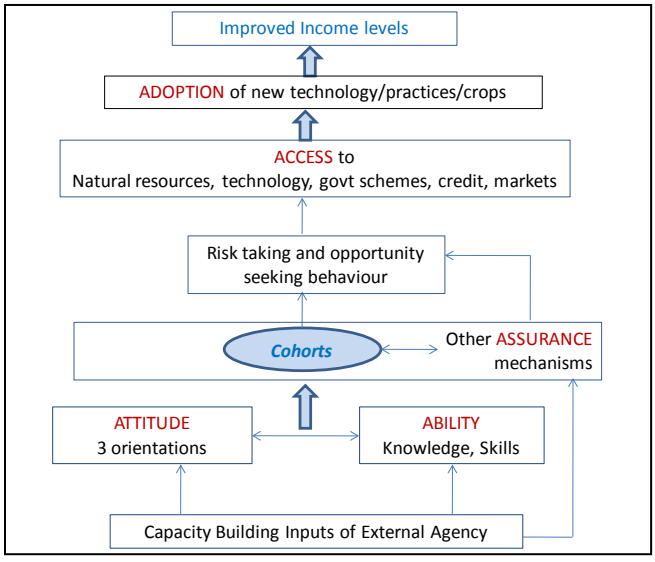
4.1 About the Sample

- Four out of the eight villages[1] had already reached the stage of subsistence when NMSWDF came to the village. This was largely achieved through their own efforts to tap government schemes for water control, agriculture extension among other things.
- The average stay of NMSWDF for villages that moved from subsistence to prosperity was 10.5 years while for villages that moved from penury to prosperity, it was 18.5 years.

4.2 Village-level Findings

NMSWDF has been following graduated steps to build up the livelihoods of tribal communities. Four important strategies corresponding to these steps were water security, crop stabilization, crop diversification, and crop specialization as discussed below.

Figure 2: A framework for adoption of new technology and crops



[1] As this is not a representative sample, the figures could be misleading. According to Mr. Kanhaiya Choudhary, CEO NMSWDF, only one out of eight may have reached subsistence through own efforts.

A. *Water Security*

- Water security was realized by 45-75 per cent households for around two seasons. In Dhabada, an entire hamlet of 45 farmers was able to specialize in floriculture as they had water security for three seasons. On the other hand, an important reason why farmers in Jhari were looking for alternatives to their traditional crop of onion was unreliable water supply during *rabi* season.
- Efficient irrigation methods like sprinkler, drip, and plastic mulching received a mixed response, in spite of 75 per cent government subsidy. However, progressive farmers made good use of drip and obtained impressive results. Villages like Jhari can gain immensely by adopting drips for cash crops like onion as that would make the water last for the full season.

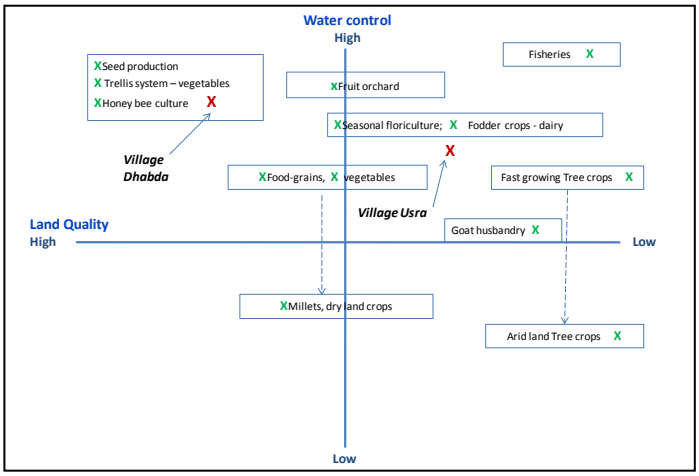
B. *Crop Stabilization*

- Farmers growing rain-fed maize and paddy during *kharif* could now include wheat, gram, pigeon-pea and soybean to their food basket. With assured irrigation, yields became more stable and food-security improved to 12 months, resulting in end of distress migration.
- The family now had time for activities like dairy and kitchen garden, which contributed to nutritional security and improved health.
- The introduction of a scientific 'package of practices' helped improve yields. It enabled farmers to optimize seed rates and other agricultural inputs; as well as maintain soil health. In paddy, the yield increased from 2-3 Q/acre to 7 Q/acre. In maize, the seed rate was brought down from 20kg/acre to 8Kg/acre by planting in rows. This resulted in marketable surplus and made more land available for cultivating cash crops.

C. *Crop Diversification*

- To initiate market oriented crop diversification,

Figure 3: Matching new crop requirements with village endowments



NMSWDF provided between 2 to 5 crop alternatives to each village based on the available soil and water resources and local market conditions.

- NMSWDF staff drew upon its own experience as well as collective knowledge of farmers. These choices could well be based on scientific protocols that map the requirements of new crops against the soil and water endowments of the village as illustrated in Figure 3.
- Based on the experience of lead farmers the *income generation potential in different sub-sectors* has been computed by NMSWDF and verified by the author in the field (Tables 2A, 2B). These are taken as benchmarks for the present, although lead farmers could raise the bar in coming years.
- As of now, almost all the new crops under crop diversification cater to local markets. The introduction of "gherkin" two years ago, for supply to distant markets (Europe and US through contract farming with Ken Agritech, Bangalore) is a notable exception.

Table 2A: Income generating potential of farm sub-sectors

Sub-sector	Unit of production (acres/nos)	Estimated production (Kg)	Estimated price (₹/Kg)	Estimated Gross returns (₹)	Estimated Net returns (₹)	Estimated Net returns/ acre (₹)
Farm sector						
Seed production						
- *Maize*	1.00 acre	1600	25	40000	34500	34500
- *Wheat*	1.00 acre	2000	35	70000	54000	54000
Vegetables						
- *Trellis (varies with crop)*	0.25 acre	3000	20	60,000 (60-75,000)	40,000	1,60,000
- *Vegetables (varies with crop)*	0.50 acre	-	-	60-70,000	50-55,000	1,00,000-1,10,000
- *Gherkin (for export)*	0.25 acre	1200	28	33,600	22,600	90,400
Horticulture (wadi)	0.75 acre	850	50		42,500	56600
Floriculture						
- *Seasonal (marigold/ chrysanthemum)*	0.25 acre	1400	30	42,000	36,000	1,44,000
- *Annual (rose)*	0.25 acre	1000	55	55,000	45,000	1,80,000

Table 2B: Income generating potential of off-farm sub-sectors

Sub-sector	Unit of production (numbers)	Likely Unit of Adoption (numbers)	Average production (Kg/ Lts/Nos)	Price (₹ /Unit)	Net Returns per Unit (₹)	Net Returns per unit of Adoption (₹)
Off-Farm Sector						
Dairy – cows/buffaloes	1	2	20 litres/day	₹35/litre	₹35,000 (cow); ₹40,000 (buffalo)	₹0.7 – ₹0.8 lakhs
Goat rearing (Sirohi breed)	1	10	1litre/day (home consumption; 2-3 goats for cash/year	₹300/kg	₹7500/ goat	₹0.3 to ₹0.4 lakhs
Honey-bee rearing (boxes)	1	10	10 kg/year	₹300/kg	₹3000/box	₹ 30,000/year
Tree crops (saplings)	1	20 on bunds 250 in open lands	No of poles/logs	Pole – ₹50,000 Log – ₹2.0 lakhs	Pole – ₹50,000 Log – ₹2.0 lakhs	₹10 lakhs after 4 years; ₹40 lakhs after 15 years

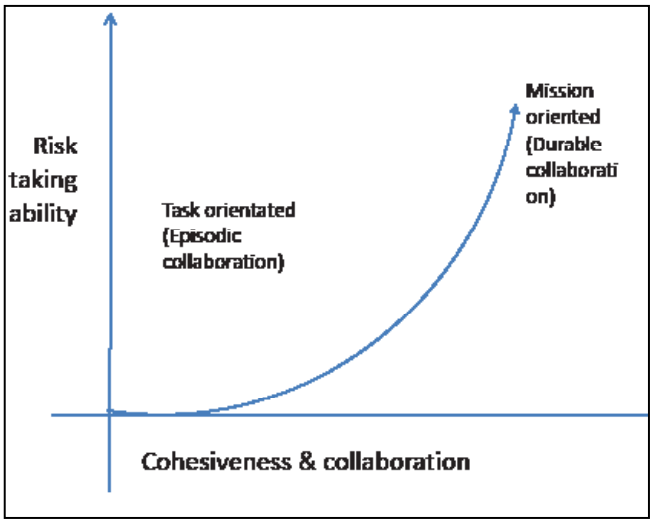
D. Crop Specialization

- While crop diversification enables smallholders to minimize risk from vagaries of nature, it also has a downside. Farming households tend to limit cash crop production to small plots that can be managed with the available labor and which have a ready market locally. Hence, most of the vegetable plots that have a huge potential are limited to a scale of 0.25 acres. Within vegetables, a variety of seasonal crops are grown to maintain a steady cash flow throughout the year. This strategy of "crop diversification by choice" has worked well so far, as there is an expanding local market for vegetables, fruits and flowers.
- However, too much of diversification means lack of specialization and lack of aggregated produce in the market that can help the FPOs bargain for better prices and tap distant markets. The experience of PRADAN and other institutions in developing 'pro-poor value chains' suggests that a certain level of crop specialization is necessary for farmers to move to the next level of prosperity.

4.3 Cohort-level Findings

- Adoption of new technology generally follows a pattern of early adoption by few; followed by mainstream adopters and '*laggards*'. There is usually a time lag in adoption, as potential adopters watch the performance of leaders. This study shows that the presence of strong cohorts can dramatically reduce this lag. In the case of seed production, the cohort ensures that all members strictly adhere to the rules stipulated by the seed producing agency, thereby resulting in more uniform and collective adoption. Even in sectors where rules are not externally imposed, strong cohorts lead to more uniform adoption of practices and more equitable economic impacts.
- *Collective orientation* is necessary for emergence of cohorts. *Market orientation* can prompt cohorts to take market initiatives. *Sustainability orientation* is necessary to counter the tendency to over-exploit natural resources for short-term economic gains. Greater the cohesiveness and cooperation, the greater is the risk taking ability. Cohorts may start with episodic collaboration around simple tasks (like collective purchase of inputs) and progressively move to more long-term goals (Figure 4).
- Traditionally many of these villages had a strong collective orientation. But in villages like Jhari, farmers confessed that they had abandoned the traditional practice of collective sowing of onion crop on a rotational basis. In the absence of a strong cohort, they

Figure 4: Enhanced risk taking ability through cohorts



are unable to meet the threat of falling market prices for onion.

- In contrast to Jhari, the farmers of Balasindur, who have barely emerged from subsistence, have shown that with a strong cohort they can collectively realize 58 per cent higher market price by cultivating seed maize in place of regular maize.

During our field visit to over a dozen cohorts, we saw varying level of collective orientation – from formal to informal; and episodic to durable. For example, farmers in Chhaparwad approached an MLA during election year to get their water issue fixed, resulting in a lift irrigation scheme being built with government support and bringing 75 per cent land under irrigation. Likewise, collective solar drinking water supply scheme in Balasindur and Kakad Khilla are managed effectively by cohorts of 15-16 households; reducing costs and drudgery for women. Women's horticulture cooperative, with over 700 members in Kakad Khilla, runs a vegetable collection for the entire block. It is procuring a 4-ton pick-up worth ₹ 8 lakhs to facilitate collective sale of vegetables. Women's SHG Federation in Limkheda has invested in a 10-ton spice processing unit costing ₹ 10 lakhs after successfully operating a smaller unit of 2.5 tons. Among the informal cohorts that emerged organically, the one engaged in floriculture, in Kamboi, showed high degree of cohesiveness (see Box 1).

4.4. Farmer-level Findings

- An analysis of the livelihood portfolio of selected farmersbefore and after NMSWDF interventions using a Risk-Returns matrix shows that in all cases, there was a shift in the portfolio of crops from a less desirable to more desirable position.

- Comparison of lead farmers with other farmers, in villages like Kamboi and Balasindur with strong cohorts, showed that there was not much difference in the progress made by the two. The reverse was true in villages where the cohorts were either non-existent or weak.

5. Conclusion

To sum up, the entire development process discovered by NMSWDF over a period of four decades through trial-and-error and learning-by-doing could be conceptualized as a logical, replicable model (see Table 3; Figure 5) that telescopes the process and makes it achievable within a significantly shorter time-frame. The model specifies the strategies in each stage, the cohorts needed to make those strategies work and outcomes necessary to move on to the next level. The model comes close to the ITP SFPF framework, but there are also a few differences in delineating the stages and naming them. A notable difference is that NMSWDF uses "*crop diversification by design*" as a strategy that works well with local markets and launches farmers into (level 1) prosperity.

Table 3: Four Stage Model of Development for Marginal Farmers

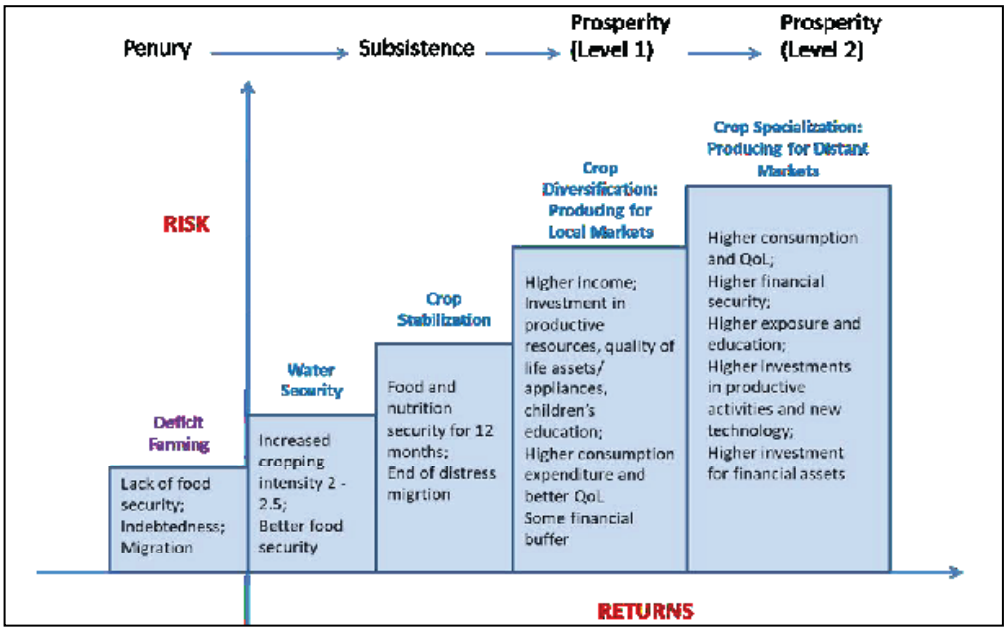
Stage	Strategies	Cohorts	Outcomes	Estd. Duration (years)
0. Penury				
1. Water security	Water security: Check-dams and lift irrigation; watershed development; ground water development and access Crop expansion to rabi season	Lift irrigation cooperative (LIC) Watershed development committee (WDC)	Increase in cropping intensity to 2.0-2.5 (Crop expansion to rabi season and in some cases to summer season)	0.5-1.0 (5.0 for watershed)
2. Subsistence / Food Security	Crop stabilization: New seed; adoption of scientific practices; resource optimizing, yield maximization for existing corps. Savings habit in small groups and inter-loaning; mixed farming for nutrition and soil health	Producer groups (informal cohorts of farmers) Self-help groups of women and men	Food and nutrition security for 12 months; End of distress migration	2.0-3.0
3. (Level 1) Prosperity	Crop diversification: Producing for local markets Off-farm diversification; Closed loop value chains; Aggregation and collective marketing; Market linkages	SHG federations Farmer Producer Organizations (FPOs)	Higher income; Investment in productive resources; Investment in quality of life assets/ appliances; Investment in children's education; Consumption expenditure and better quality of life; Some financial buffer	2.0-4.0
4. (Level 2) Prosperity	Crop specialization: Producing for distant and local markets; Market integration and value added production; Partnerships with social and micro entrepreneurs to create pro-poor value chain; Non-farm and service sector development	FPOs, Federations and Farmer producer company (FPC);	Higher consumption and quality of life; Higher financial security; Higher exposure and education; Higher investments in productive activities and new technology	2.0-6.0

Box 1: Cohort of Flower Producers in Kamboi

The Patelia hamlet of 45 farmers in Kamboi is the only group in the village that produces flowers throughout the year as it has year-round water control. Beginning as a SHG of male farmers ten years ago, the institution took a social hue when its leaders started resolving internal conflicts. Each year 4-5 social conflicts are resolved. The fees for resolving conflicts ranging from ₹1000/- to ₹10,000/- are deposited in the collective account, which currently has a balance of around ₹2.5 lakhs. Thanks to sharing of knowledge and collective purchase of inputs, they could make floriculture a success earning ₹1.5 lakhs/acre. Being bound by kith and kin relations they thought of addressing the issue of excessive social expenditure - the cost of a marriage was ₹3-4 lakhs. Equipment needed to organize a` marriage such as chairs, tent, utensils etc. was purchased as a common pool resource, which members could hire at nominal rent. By using own flowers, and labour for cooking etc. the cost came down to ₹1.5 lakh, resulting in annual savings worth ₹12-15 lakhs. The example suggests that cohorts rooted in a strong social relations, could be more stable, cohesive and versatile.

While it may take between 4-5 years to reach (level 1) Prosperity, the same cannot be said about moving to (level 2) Prosperity; experience of institutions like PRADAN suggests that creating pro-poor value chains can take anything from one to two decades, depending on the peculiarities of a given sub-sector and the availability of technology that can be accessed and adopted by communities and community institutions. Here too, the time taken could be telescoped if social entrepreneurs enter the market and establish linkages with institutions like NMSWDF. For instance *Ergos Business Solutions Private Limited* is a unique social enterprise that provides micro-warehousing services to farmers in Bihar at a reasonable and affordable rate or ₹10/Q/month. Along with storage, the farmer can also access a variety of services including finance against warehouse receipt, market advisory and market linkage for fetching better prices. Farmers can access these services easily through kiosks and/ or cell phones, which serve as a "grain-ATM"[2]. With such partnerships in place, the entire journey from penury to (level 2) prosperity could be possible within a decade. If the village were already food secure at the time of intervention, it would take even less time. To address the inequity caused due to lack of water in certain hamlets, NMSWDF could adopt a parallel model in the non-farm sector drawing upon "Graduation approach" espoused by Sheldon (2016). (Level 2) prosperity would also throw up opportunities for such households to take up micro-entrepreneurship and contribute to building new pro-poor value chains.

Figure 5: Replicable model based on NMSWDF experience



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[2] Personal communication with social entrepreneur Kishor Jha.

About the IWMI-Tata Program and Water Policy Highlights

The IWMI-Tata Water Policy Program (ITP) was launched in 2000 as a co-equal partnership between the International Water Management Institute (IWMI), Colombo and Sir Ratan Tata Trust (SRTT), Mumbai. The program presents new perspectives and practical solutions derived from the wealth of research done in India on water resource management. Its objective is to help policy makers at the central, state and local levels address their water challenges – in areas such as sustainable groundwater management, water scarcity, and rural poverty – by translating research findings into practical policy recommendations. Through this program, IWMI collaborates with a range of partners across India to identify, analyze and document relevant water management approaches and current practices. These practices are assessed and synthesized for maximum policy impact in the series on Water Policy Highlights and IWMI-Tata Comments.

Water Policy Highlights are pre-publication discussion papers developed primarily as the basis for discussion during ITP's Annual Partners' Meet. The research underlying these Highlights was funded with support from International Water Management Institute (IWMI), Tata Trusts, Indian Council of Agricultural Research (ICAR), Swiss Agency for Development and Cooperation (SDC), CGIAR Research Program on Water, Land and Ecosystems (WLE) and CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). However, the Highlights are not externally peer-reviewed and the views expressed are of the author/s alone and not of ITP or any of its funding partners.

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