

# SUSTAINABLE INTEGRATED FARMING: A Scalable Model for Small and Marginal Farmers

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Conceptualizing and grounding a development model appropriate to the diverse needs and priorities of different sections of the community, and, at the same time conserving the eco-system of the local livelihoods is a challenge of a very high order.

**L**IVELIHOOD STRENGTHENING HAS, FOR MANY good reasons, continued to dominate the development effort of most government and non-government agencies concerned with the poor and marginal communities in rural India. However, often, they miss the integrated reality of the livelihood eco-system of the community and adopt theme-centric or activity-specific interventions that fail to bring any significant impact.

The poorer the household, the higher is its livelihood portfolio. This can be for several reasons—to diversify risk, optimize the minimal resources it owns or has access to, or meet its various uncertain needs.

On the other hand, conceptualizing and grounding a development model appropriate to the diverse needs and priorities of different sections of the community, and, at the same time, conserving the eco-system of the local livelihoods is a challenge of a very high

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order. However, the following experience from Keonjhar, Odisha, provides an answer to such a challenge and is worth considering for large-scale replication.

### Contextual Issues

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Tribal communities such as Gond, Bathuli, Kolha and Munda, and OBC communities such as Mahanta are the major inhabitants of Keonjhar. Agriculture is the predominant activity here, comprising small and marginal farmers with average land-holdings of around 2 acres each. About 50 per cent of the land is un-banded upland whereas the rest is medium and lowland. Most of the families cultivate paddy in the *kharif* season and grow vegetables, along with some pulses, in the *rabi* season, utilizing the residual moisture in the paddy land or using water lifted from ponds, wells and seasonal streams on a small scale.

Other than agriculture, the rearing of small ruminants and backyard poultry have been the next most significant livelihood contributor, especially for the poor, the marginalized and the women. Besides agriculture and

livestock, people rely on non-timber forest produce (NTFP) collection from nearby forests and wage labour, for their livelihoods.

In 2013, Odisha Livelihoods Mission (OLM) and PRADAN became partners for implementing the Mahila Kisan Shashaktikaran Pariyojana (MKSP) project in four blocks spread over three districts in the state, including Patna block, Keonjhar district, to strengthen the livelihoods of the community by:

- A. Strengthening the identity of women as farmers
- B. Promoting sustainable agriculture
- C. Integrated livestock promotion

### A. Strengthening Women's Identity as Farmers

Even though women toil hard and do more than 70 per cent of the work in agricultural fields, their identity as farmers is hardly recognized. Women do many of the difficult farming tasks such as sowing, nursery raising, transplanting, weeding, thinning, harvesting and storage. Similarly, although they do most of the house-work, they are not the owners of a single item in their homes. Women agricultural labourers, are an 'invisible' workforce, which see working on farms as an extension of their roles in the family whereas others regard them as unpaid assistants to their husbands.



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Some of the factors contributing to this include their enhanced knowledge of agriculture, especially related to non-pesticide management (NPM), improved livestock rearing, linking with the market both for input procurement and selling of output, and awareness regarding different government schemes

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## Interventions

After an initial round of discussions with women SHG members, the reasons for this unjust position of women in farming were attributed to the following:

- a. Women do not have proper knowledge about agriculture and livestock rearing.
- b. They do not have exposure to markets for input and output linkages.
- c. They do not have information about government schemes.
- d. They do not have land in their name.
- e. They do not participate in various farming-related decisions.
- f. They do not consider their own contribution to the agriculture sector as significant.

Following this, carefully designed events were organized to create mass awareness programmes and to sensitize women to assert themselves as farmers. Various training and planning exercises were undertaken to build this identity. The focus was not only on enhanced income but also on strengthening the

role of women in decision-making about agricultural production, ownership of assets, control over the use of income, leadership in the community, and negotiation within the family for redistribution of care work.

*Mahila kisans* (Women farmers) have now started participating actively in taking decisions related to agriculture. Some of the factors contributing to this include their enhanced knowledge of agriculture, especially related to non-pesticide management (NPM), improved livestock rearing, linking with the market both for input procurement and selling of output, and awareness regarding different government schemes. This has also helped

build the confidence of SHG members.

## B. Promoting Sustainable Agriculture

The following key components were covered under the sustainable agriculture farming system:

- a. Adoption of System of Crop Intensification (SCI) principles for crop production
- b. Trellis method of creeper cultivation
- c. Vegetable cultivation using organic practices
- d. Small-scale irrigation intervention
- e. Drudgery reduction



**Nursery bed preparation**



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## The raised-pit method helped in conserving soil moisture and supporting vigorous root growth

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### **a. Adoption of SCI principles for crop production, especially with paddy**

Paddy is the major food-crop in the area and as a measure to ensure food security, SCI principles for crop production were introduced. In transplanted fields, the System of Rice Intensification (SRI) principles were applied whereas the Direct Seeded Rice (DSR) principles were applied in the uplands. In both the cases, the seeds were segregated according to their quality, using the brine water test. In SRI, one or two young seedlings were transplanted in a square grid at a sufficient distance from the next, based on crop height and canopy coverage whereas in DSR, the seeds were sown in lines. In both the cases, two to three rounds of weeding operations were carried out using mechanical weeders.

In both the cases, nutrition and plant protection measures were taken by adopting various organic methods. Green manure was also applied in SRI fields. This was easily adopted by the farmers and proved to be very effective. The yield increased from 2–3 to 4–5 tonnes per ha, thereby ensuring additional food security of five to six months for most of the families.

### **b. Focus on traditional creeper cultivation through the introduction of a trellis**

Traditionally, people in this area grow creepers such as cowpea and bitter gourd. They used to grow these on wooden twigs collected from the local forest. With the rapid decline in forest coverage, farmers found it very difficult to collect twigs and wooden poles. Production was also very minimal and, furthermore, long dry spells affected productivity drastically. The major interventions planned in creeper cultivation were:

- Selection of seeds and varieties suitable for the region
- 4 x 4 ft spacing and planting the seeds in raised pits of 1.5 x 1.5 x 1.5 ft size.

- Filling the pits after mixing sufficient amount of organic manure.
- Making a heap after pit-filling to prevent the seeds from rotting in heavy rainfall.
- Construction of a trellis, using bamboo poles, nylon nets and polymer wires, to ensure better growth with minimum usage of wooden poles and twigs

Through these practices, most of the problems faced by the farmers were addressed and the production went up significantly. The raised-pit method helped in conserving soil moisture and supporting vigorous root growth. Also, crops could be protected in dry spells, and production period increased by about one more month.



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The introduction of drudgery-reduction machines such as weeders, reapers, ridgers and diggers enabled the women to manage their agricultural operations easily and on time. This has led to an increase in productivity

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### **c. Focus on promoting cash crops using organic measures**

Most of the SHG members had 10 to 20 decimals of homestead land. The plan was to mobilize them to cultivate vegetables in the *kharif* season, and as much as possible in the *rabi* season, by adopting organic practices. Therefore, besides promoting creepers for nutrition and as cash crops in trellis, the cultivation of solanaceous crops such as brinjal, tomato, chilli and potato were also promoted as cash crops. The major interventions in cash crop cultivation were:

- Preparing the nursery for healthy seedlings (covering with mosquito net).
- Proper spacing at the time of transplantation.
- Sufficient amount of organic manure such as *Jeevamrit* and *Ghan Jeevamrit*.
- Timely irrigation and inter-cultural operations.
- Spraying organic products such as *Nimastra*, *Brhambhastra* and *Mahulastra* at regular intervals.

### **d. Introduction of Group Managed Small Irrigation Structures**

Small irrigation infrastructure systems such as the construction

of farm ponds and ring wells in seepage lines and the lifting of water from semi-perennial streams by using diesel pump-sets, among small groups of farmers are some of the widely replicable irrigation systems established in the area. Irrigation infrastructure such as this has now been developed in collaboration with the Agriculture Department and the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA). Each of these can support about half to two acres of land/four to five farmers each, thereby generating an income of about Rs 30,000 to Rs 50,000 annually. This also serves to protect the main paddy crop in dry spells, which are now more common.

### **e. Introduction of women-friendly farm equipment to reduce drudgery**

Besides the above interventions, the introduction of drudgery-reduction machines such as weeders, reapers, ridgers and diggers enabled the women to manage their agricultural operations easily and on time. This has led to an increase in productivity. The details of this intervention are captured separately under the drudgery reduction section here.

### **C. Livestock Intervention**

Livestock in the area had a high mortality rate owing to the following challenges listed:



CAHWs (mostly women) have been groomed as entrepreneurs and are getting payment from the community as per their services. Each CAHW caters to 100 farmers and earns about Rs 3,000 monthly

- Frequent outbreak of deadly diseases such as *Peste des petits ruminants* (PPR) in goats, new castle disease and fowl-pox in poultry, leading to 50–70 per cent goat/sheep mortality and 70–90 per cent bird mortality.
- Existing government or private systems failed to provide critical vet services such as vaccination, de-worming and first-aid/vet services in the villages.
- Know-how related to rearing practices was mostly poor among farmers (poor quality night shelters, in-breeding, no supplementary food, etc.).
- Low herd size: There was an inability to attend the threshold scale and low potential to actualize the profits.
- Service delivery mechanism by grooming local Community

Animal Health Workers (CAHW) as entrepreneurs was introduced to ensure critical services such as regular de-worming and vaccination of all the small livestock (backyard poultry, goats, sheep, etc.) to curb mass mortality and to train farmers to adopt various improved rearing practices.

Gradually, farmers intensified their activity to maximize returns, as well as ensure a good return to the local trained service providers for their sustainability.

The Integrated Livestock model focusses on strengthening small livestock such as goats and poultry, reared by a family in an integrated manner. The focus is on local breeds and to build on the existing stock of a family. The prototype will comprise four to six hen units with a flock size of 50–100 and two to six mother

goats with a herd size of 8–20. The activity can be managed by the family along with their existing livelihoods engagements. Looking at the contextual differences such as the extent of the homestead land and the scope of grazing, the following three models can be adopted by the farmers.

#### Interventions

##### i. *Developing sustainable service delivery systems*

The objective was to establish the vaccination and medication service system in a sustainable manner at the door-step of the farmer. CAHWs (mostly women) have been groomed as entrepreneurs and are getting payment from the community as per their services. Each CAHW

**Table 1: Integrated Livestock Models Adopted by Farmers in Patna Block**

Models	Context	Unit Size		Total Net Annual Return (Rs)	Investment (Rs)	
		No. of Mother Goats	No. of Hens		One Time	Annual Recurring
Model-1	Medium scope for both BYP and goats	2	2	<b>17,250</b>	10,000	4,250
Model-2	High scope for BYP and low for goats	2	4	<b>26,000</b>	12,000	6,500
Model-3	High scope for goats and low for BYP	4	2	<b>25,750</b>	18,000	6,250

Regular meetings of all CAHWs take place at the block level to facilitate work, track the progress vis-à-vis the plan, address concerns and monitor their efficiency

caters to 100 farmers and earns about Rs 3,000 monthly. The maintenance of a cold-chain is the most critical aspect in the vaccination process. An existing medicine shop owner has been commissioned to supply the vaccines, de-worming and first-aid medicines to CAHWs and to ensure cold-chain maintenance. The SHG collects the payment from individual farmers and makes the payment to the CAHWs during SHG meetings. Regular meetings of all CAHWs

take place at the block level to facilitate work, track the progress vis-à-vis the plan, address concerns and monitor their efficiency.

**ii. Improving rearing and management practices**

Although mass mortality can be checked through regular vaccination and de-worming, the intervention should include other components such as nutrition, housing, breed improvement,

and a curative disease-control mechanism. CAHWs not only demonstrate improved practices but also train SHG members in these practices by using various audio-visual tools and on-field demonstrations.

Through this process, mortality due to deadly diseases has completely stopped in the area. De-worming has been very effective in promoting weight gain as well as in the vaccination process. The average stock has

**Table 2: Intervention in BYP and Goats**

Intervention Components	BYP	Goats
Regular vaccination	Doorstep vaccination against RD (Ranikhet Disease) and Fowl Pox; Cold-chain establishment	Regular vaccination against PPR, Enterotoxaemia (ET) and Goat Pox; Cold-chain establishment
De-worming	Regular de-worming every three months	Regular de-worming every three months
Proper night shelters	Proper hatching space, protection from predators, etc.	Opening for ventilation, regular cleaning, leak-proofing roof, etc.
Feeding practices	Supplementary feeding for chicks and hens; Feeders	Supplementary feeding for newborn kids and pregnant goats
Breeding	Selective hens; Proper hatching practice	Timely castration
Medication service	First-aid services such as the provision of tetracycline power, use of onions, garlic, etc.	Preventive care of minor problems such as diarrhoea, gas, etc.
Predators/Accidents	Care for chicks grazing in the backyard during the initial period. Proper hatching arrangement to protect eggs from predators.	Care for kids: Keeping the kids under close supervision, especially in the backyard.
Caring practices	Provision of clean water, cleaning of sheds, season-wise care of chicks such as providing heat in winter, protecting eggs from heat, etc.	Care for kids, care of mother goats during late pregnancy stage, provision of clean water, etc.

By the end of the project, about 3,000 women farmers were covered, of which about 75 per cent adopted different prototypes and realized an average additional income of about Rs 30,000, in addition to increased food and nutritional security

increased to an average bird flock size of 50–60 birds and the goats have increased from an average herd size of three to four to about 15–16 in number. Most of the families are earning an average income ranging between Rs 20,000 and 30,000, besides consuming about two to three birds every month.

#### **Adoption of Pro-poor Livelihoods Prototypes**

Different kinds of farmers choose different prototypes and each of these prototypes have the potential to meet food sufficiency and bring about significant income, with a potential for large-scale replication. By the end of the project, about 3,000 women farmers were covered, of

which about 75 per cent adopted different prototypes and realized an average additional income of about Rs 30,000, in addition to increased food and nutritional security. Many farmers are still in the process of adopting the prototypes in the project as well as in convergence with various government programmes under the Department of Agriculture.

**Table 3: Livelihood Prototypes Adopted by the Farmers in Keonjhar**

Prototype	Land type	Unit	Intervention	Net Return	Adoption
Food grain productivity enhancement	Medium land	1 acre land	SRI and DSR principles of paddy cultivation	Additional 10 quintals of food grain	60%
Rain-fed vegetable cultivation	Medium and up-land	40–50 decimals	Vegetable and pulse cultivation with sustainable practices	Rs 30,000 to Rs 40,000	15%
Irrigated vegetable	Homestead land	15–20 decimals	Vegetable cultivation with sustainable practices - 2 seasons	Rs 40,000 to Rs 50,000	25%
Small livestock	With about 50 decimals backyard	For 2–4 mother goats and 4–6 hens	Vaccination, de-worming, supplementary feeding and improved shelter	Rs 15,000 to Rs 20,000	70%



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During implementation, the visioning exercise and the exposure visits of the women members helped in broadening their perspective on collective farming

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### Case Study: Jashoda Mahanto's Success Story

Jashoda Mahanto, a single woman and an active *Mahila Kisan*, lives with her aunt in Budikapudi village, Patna block in Keonjhar district. They have about 20 decimals of homestead land and 65 decimals of lowland. There is a well in their homestead land and they have a pump-set. Jashoda, along with SHG members Sukanti and Labanga, got this support from MKSP two years ago. This year, sprinkler sets have been provided to the group. Jashoda also has a vermi-bed in her homestead land, with the support of the Horticulture department. She and her aunt have taken up the cultivation of cowpea under the improved trellis method in 10 decimals of land, and tomato and ginger in another 10 decimals of land in their homestead. Under MKSP, Jashoda learned about the different, improved agricultural practices such as the pit-method of planting, application of compost, seed treatment, proper sowing of seeds, and the preparation and use of organic manure. She earned about Rs 18,000 by selling cowpeas, tomato and ginger in the local Turumunga market.

She also applied some principles such as seed selection, seed treatment, line transplanting and the application of organic manure in paddy. Jashoda told us that in the last three years she has seen a significant increase in the yield of paddy from about 10 quintals to nearly 17 quintals.

Jashoda and her aunt have also started rearing goats. During the last two years, from one mother goat they now have five adult goats and two kid goats, and have sold two goats for Rs 6,500. She now also has 35 poultry birds. With the help of the local CAHW, the livestock has been vaccinated, resulting in a significant reduction in mortality rates. Jashoda has also started focussing on proper feeding and shelter of the livestock after being trained on feed management.

From poultry, she is now able to earn about Rs 10,000 per year, almost double of what she used to earn earlier; her family consumes about 20 birds every year. Now Jashoda is a confident farmer. Her annual earnings have gone up by about Rs 40,000, along with increased food security for four months. Much of this cash income comes to her; her say in the family has improved significantly thereafter. People are recognizing her as a model *Mahila Kisan* in their area.

### Learnings and Best Practices

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Overall, the study team made the following observations that can be adopted as best practices in other areas:

- The programme design in itself, wherein the women are the

participants, enabled them to take an active part in the implementation of the project.

- During implementation, the visioning exercise and the exposure visits of the women members helped in broadening their perspective on collective farming.

- Most of the organic extracts are prepared by the women in their homes; therefore, their dependency on the market and their men-folk has come down significantly. This has helped build ownership, their participation in and knowledge of farming, along with an

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## The beauty of this approach also lies in the way the villagers, especially women, have participated and become agents of change to sustain this effort

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- equitable competency to participate in decision-making.
- Creation of a pool of women farmers as community resource persons (CRPs) automatically enhances the participation of women in various training events. This increases the women's motivation to participate and learn from CRPs.
  - The manual on sustainable agriculture practices, which was with the CRPs, has been very useful for members and women farmers.
  - Women are now accessing and using women-friendly implements such as weeders, markers, ridgers and paddy transplanters. Because the manually-operated implements can be easily operated by women, the dependency on outsiders or even on their men has come down. The use of these implements has helped in reducing drudgery, and saving time and money with increased effectiveness.
  - The approach of a production cluster helped in produce aggregation and selling. The

collective selling of their produce not only helped women have access to and control over their income, but also helped in establishing linkages with the market, contributing to enhancing the identity of women as farmers.

- Small livestock rearing is largely done by women. They are greatly benefitted by this simplified livelihood intervention, which does not require much investment or external support. This also ensures income in the hands of women and the nutritional security of family members.
- With the establishment of various activities in the locality such as rain-fed agriculture, irrigated agriculture and integrated livestock, women from different socio-economic segments can now identify their best-suited activity combination/prototype as per their interest and priority.

### Conclusion

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The experience shared here has certainly proved to be highly

effective in bringing significant improvement in the economic well-being of most of the households in the area, including the poorer ones. The beauty of this approach also lies in the way the villagers, especially women, have participated and become agents of change to sustain this effort. The eco-system of the livelihoods in the area has been activated with localized knowledge and service system in place, linkages with relevant agencies such as the market force, banking system and government departments, along with various natural resource conservation measures to enhance the carrying capacity of the area. Although many more improvements can be included, the interventions have certainly shown the path for many to follow, especially those who are in the serious business of addressing rural poverty sustainably.

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